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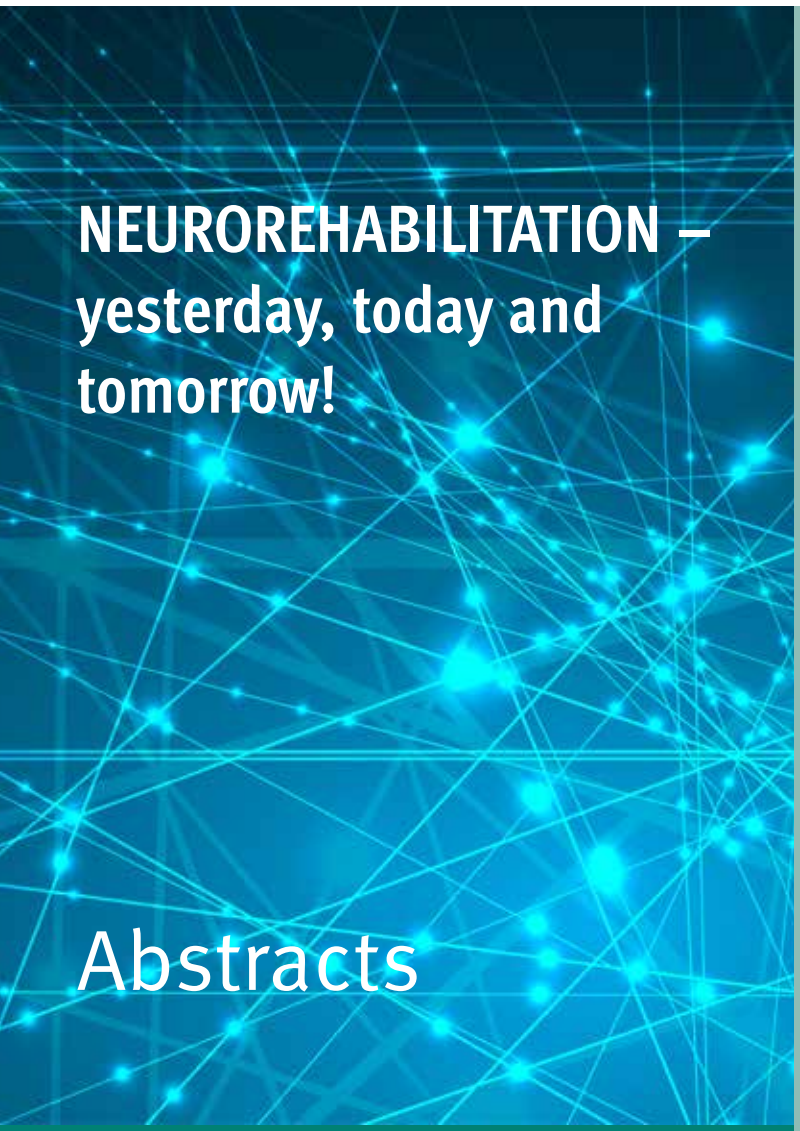

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SYMPOSIEN

S2–04

Herausforderungen der Corona Pandemie in der Neurorehabilitation: Differenzen zwischen Versorgungsdaten und subjektiver Wahrnehmung der Rehabilitanden

M. Wiest, M. Schrader, J. Lumpe, A. Sterr (Berlin/DE)

Einleitung: Die Corona Pandemie hat zu massiven Veränderungen in der Neurorehabilitation geführt, u. a. mussten Arbeitsweisen und therapeutische Angebote an Infektionsschutzmaßnahmen angepasst werden. Um zukünftigen Herausforderungen zu begegnen, ist es wichtig zu verstehen, wie sich diese Veränderungen auf Ebene der Versorgungsdaten darstellen, aber auch wie Rehabilitanden, diese Veränderungen wahrnehmen und bewerten. Diese Fragestellung wurde im P.A.N. Zentrums für Post-Akute Neurorehabilitation in Berlin untersucht. Das P.A.N. Zentrum ist eine Langzeitrehabilitationseinrichtung für Erwachsene mit erworbenen Schädel-Hirn-Verletzungen. Ziel des 18-monatigen Aufenthalts ist es, Teilhabe und Selbstständigkeit zu fördern und eine ambulante Wohnform im Anschluss an die Rehabilitation zu ermöglichen.
Methode: Im Juni 2020 wurden neun leitfadengestützte Interviews mit Rehabilitanden geführt. Zu diesem Zeitpunkt galt u.a. eine Trennung der Wohnverbünde (WVB), eine feste Zuordnung von Therapeuten auf WVB und das Aussetzen von gruppentherapeutischen Angeboten über die WVB hinweg. Verglichen wurden die qualitativen Interviews mit Daten zur therapeutischen Versorgung über den Zeitraum von Januar 2020 bis Mai 2021. Dieser Zeitraum spiegelt unterschiedliche Infektionsschutzmaßnahmen im P.A.N. Zentrum wider (z. B. Lockerungen zwischen August und November 2020) und dokumentiert die Auswirkung der Maßnahmen auf die Ausgestaltung der Therapieangebote.
Ergebnisse: Rehabilitanden erleben die Therapiemöglichkeiten als reduziert. In den Interviews wird u.a. die Sorge geäußert, dass wichtige Ziele der Rehabilitation nicht erreicht werden können. Die Arbeit von Therapeuten auf dem WVB wurde als positiv erlebt. In den Versorgungsdaten zeigen sich unterschiedliche Veränderungen in den einzel- und gruppentherapeutischen Angeboten. Erste deskriptive Auswertungen dokumentieren die verringerte Anzahl an Gruppentherapien in der ersten und dritten Welle. Die Anzahl an Einzeltherapien war lediglich zu Beginn der Infektionsschutzmaßnahmen im April und Mai 2020 merklich reduziert. Ab Juni 2020 wurden wieder mehr, aber kürzere Einzeltherapien durchgeführt.
Diskussion: Die Infektionsschutzmaßnahmen im P.A.N. Zentrum stellen für Rehabilitanden eine große Herausforderung dar. Am Beispiel der therapeutischen Maßnahmen wird deutlich, dass sich die subjektive Wahrnehmung der Rehabilitanden von den dokumentierten Versorgungsdaten unterscheidet. Nur wenn dieser Unterschied adressiert wird, kann eine gleichbleibende Qualität der Rehabilitation auch unter herausfordernden Situationen sichergestellt werden. Der Beitrag diskutiert, das Vorgehen im P.A.N. Zentrum und die Analyse von pandemiebedingten Veränderungen mit unterschiedlichen Datenquellen.

S13a–01

Prädiktive Faktoren einer Kniehyperextension bei erwachsenen SchlaganfallpatientInnen – Eine Querschnittsstudie

K. Henschel (Bad Reichenhall/DE)

Einleitung: Das Ziel der Studie ist die Überprüfung der Parameter Beinkraft, Tiefensensibilität, Rumpfkontrolle, Balance, Spastik und Gangparameter als prädiktive Faktoren einer Knieüberstreckung nach Schlaganfall.
Methodik: Es soll eine Querschnittstudie mit mindestens 23 ProbandInnen durchgeführt werden. Dabei sollen unterschiedliche kinematische Parameter bei verschiedenen Ausprägungen eines Genu recurvatums erhoben und anschließend statistisch mit der Überstreckungshäufigkeit modelliert werden. Die Überstreckungsanzahl wird auf einem Laufband über 100 Doppelschritte als relative Häufigkeit erhoben. Neben den biografischen Daten wird die Maximalkraft der Beinmuskulatur mithilfe eines Dynamometers, die Tiefensensibilität des Kniegelenkes durch das Mirroring, die Rumpfkontrolle durch die Trunk Impairment Scale, die Balance mit der Berg Balance Scale und die Spastik mit der Tardieu Skala erhoben. Die Gangparameter werden auf einem h/p Cosmos Laufband ermittelt. Die selbst gewählte und maximale Ganggeschwindigkeit wird auf einem 10 Meter Flurabschnitt erfasst. Eingeschlossen werden subakute SchlaganfallpatientInnen über 18 Jahre mit einer Functional Ambulation Categorie ≥ 3 und einer Kniehyperextension. Ausgeschlossen werden bihemisphärische SchlaganfallpatientInnen sowie jene, die verbalen Instruktionen nicht folgen können oder jene mit Komorbiditäten, welche das Gangbild signifikant beeinflussen.
Ergebnisse: Derzeit liegen noch keine Ergebnisse vor, da die Datenerhebung im Herbst 2021 bis Sommer 2022 stattfindet. Die bis Anfang Dezember erhobenen Daten werden auf dem Kongress vorgestellt. Die Veröffentlichung der Masterarbeit findet im Herbst 2022 statt.
Diskussion: In der Literatur gibt es Hinweise darauf, dass eine Schwäche in der Hüftstrecker-, Kniebeuger- und Kniestreckermuskulatur [1] eine Knieüberstreckung verursachen kann. Ebenso wird eine Störung der Propriozeption als mögliche Ursache benannt [2]. Auch wird vermutet, dass es Zusammenhänge zwischen der Rumpfaktivität und dem Genu recurvatum gibt [3]. Zudem scheint die Ganggeschwindigkeit sowie die Gangsymmetrie eine Überstreckung zu beeinflussen [4]. Daher werden die erhobenen kinematischen Parameter als prädiktive Faktoren eines Genu recurvatums erwartet.

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S13a–02

Verkürzte Verweildauer bei frühmobilisierten Schlaganfallpatienten auf der Schlaganfallstation

T. Bohle, C. Bäcker, K. Brück (Cologne/DE)

Einleitung: Die erste Mobilisation aus dem Bett nach Einlieferung auf der Schlaganfallstation wird zu unterschiedlichen Zeitpunkten durchgeführt. Beobachtet wurde, dass früher mobilisierte Schlaganfallpatienten kürzer auf der Schlaganfallstation verweilen als später mobilisierte Patienten [1]. Insgesamt ist die Aufenthaltsdauer auf der Schlaganfallstation an klinischen Kriterien der Patienten orientiert [2]. Bislang ist jedoch unerforscht, ob es einen Zusammenhang zwischen dem Zeitpunkt der ersten Mobilisation nach Aufnahme auf der Schlaganfallstation und der Verweildauer auf der Schlaganfallstation gibt, sodass dieses Gegenstand des vorliegenden Projektes war.
Material/Methode: Es wurde eine Datenanalyse mit 101 Probanden auf der Schlaganfallstation der Asklepios Klinik in Harburg über einen sechswöchigen Untersuchungszeitraum durchgeführt.
Ergebnisse: Die Ergebnisse zeigten eine Korrelation zwischen dem Zeitpunkt der ersten Mobilisation und der Verweildauer auf der Schlaganfallstation ($r = .409$, $p < .001$). Im Rahmen der Mobilisationsphasen ≤ 24 Stunden, 25 – 48 Stunden und ≥ 49 Stunden hielten sich die am frühsten mobilisierten Probanden durchschnittlich am kürzesten auf der Schlaganfallstation auf, gefolgt von den später mobilisierten Probanden.
Diskussion: Nach einer Subgruppenanalyse konnte das Alter, die vorliegende Schlaganfallschwere sowie finanzielle Aspekte für die Verweildauer als mögliche Ursache für den Zusammenhang identifiziert werden.

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S13a–03

Better together? Die Wirksamkeit von Gruppentherapie im Vergleich zur Einzeltherapie bei Funktionsstörungen der Hand nach Schlaganfall – Eine randomisierte kontrollierte Studie

N. Werner-Nels (Trier/DE)

Einleitung: Armlähmungen als Folge einer Hirnschädigung haben einen wesentlichen Einfluss darauf, ob Patienten ihren Alltag wieder bewältigen können oder in ihre berufliche Tätigkeit zurückkehren können. Durch den demographischen Wandel ist ferner mit einer höheren Anzahl von Schlaganfallpatienten zu rechnen, welchem der zu erwartende therapeutische Fachkräftemangel gegenübersteht. Der Wechsel von der Einzelbehandlung hin zur Gruppentherapie könnte eine Antwort auf diese Problematik geben. Studien zur Verbesserung der Mobilität der unteren Extremität nach Schlaganfall belegen, dass die Gruppentherapie der Einzeltherapie nicht unterlegen ist [1]. Ein hinreichender Wirksamkeitsnachweis für die Effektivität der Gruppentherapie zur Verbesserung der Handfunktion im Vergleich zur konventionellen Einzeltherapie steht noch aus. Die Fragestellung ist, ob sich durch den Einsatz von supervidierter Gruppentherapie die motorischen Fähigkeiten der betroffenen Hand im gleichen Maße verbessern lassen wie in der Einzeltherapie.
Material/Methode: Die Studie soll mit 58 Probanden im Zentrum für ambulante Therapie in Trier durchgeführt werden. Die Interventionsgruppe trainiert im Gruppensetting, während die Kontrollgruppe in einer 1:1 Betreuung mit dem Therapeuten übt. Das Training beinhaltet funktionelle Übungen zur Verbesserung der manuellen Geschicklichkeit der betroffenen Hand und ist in beiden Therapiesettings identisch. Die Probanden beider Gruppen führen jeweils dreimal wöchentlich eine 30-minütige Trainingseinheit über einen Zeitraum von 3 Wochen durch. Als primäres Outcomeparameter wird der »Box and Block Test« zur Erfassung der groben manuellen Geschicklichkeit erhoben. Als sekundäre Zielparameter werden der »Nine Hole Peg Test« für die Beurteilung der Feinmotorik, die Griffkraft mit dem Handkraftdynamometer und der Quick-DASH-Fragebogen zur subjektiven Einschätzung der Funktionseinschränkungen des betroffenen Armes erhoben. Die Assessments werden jeweils vor Beginn und im Anschluss an den Interventionszeitraum durchgeführt. Die Interventionsgruppe wird zusätzlich mittels eines Fragebogens zur Zufriedenheit mit dem Gruppentraining befragt.
Ergebnisse: Derzeit liegen noch keine Ergebnisse vor, da der Untersuchungszeitraum von September 2021 bis März 2022 geplant ist. Die bis Anfang Dezember erhobenen Daten können auf dem Kongress vorgestellt werden. Die Fertigstellung der Masterarbeit ist für den Herbst 2022 geplant.
Diskussion: Im Rahmen der Studie soll erforscht werden, ob ein supervidiertes Gruppentraining zu vergleichbaren Verbesserungen der manuellen Geschicklichkeit der betroffenen Hand führt wie die Einzeltherapie.

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S13a–04

Kalorienrestriktion bei Patienten mit ausgeprägter Adipositas verbessert verbale hippocampale Gedächtnisleistungen im RAVLT

M. Manegold, M. Heine, L. Bonde, L. Erpenstein, A. Hanert, J. Rave, S. Philippen, S. Aludin, L. P. Schmill, O. Granert, A. Beckmann, A. K. Seoudy, M. Laudes, T. Bartsch (Kiel/DE)

Beim Lernen und bei der Konsolidierung deklarativer Gedächtnisinhalte spielt der Hippocampus eine wichtige Rolle. Der Hippocampus und die damit assoziierten kognitiven Funktionen unterliegen vielfältigen neuroplastischen Prozessen, zeigen aber auch eine besondere Vulnerabilität gegenüber metabolischen Schädigungen im Rahmen von Stoffwechselerkrankungen und Adipositas-assoziierten Erkrankungen. Unsere Studie untersucht an adipösen Patienten die Auswirkungen einer starken Gewichtsreduktion durch eine Kalorienrestriktion auf die verbale Gedächtnisleistung.
In dieser laufenden prospektiven Interventionsstudie CogniFast wurde bei Probanden mit einer ausgeprägten Adipositas (BMI ≥ 38 kg/m^2), die durch eine multimodale Lebensstilintervention und eine diätische Intervention mittels einer Kalorienrestriktion eine starke Gewichtsreduktion erzielten, eine kognitive Testung von Hippocampusfunktionen vor

und nach einer 10-wöchigen Kalorienreduktion (816 kcal/d) durchgeführt. Als Test für die deklarative verbale Gedächtnisleistung wurde der Rey auditory verbal learning test (RAVLT) verwendet.
Die Studienteilnehmer (n = 43; 25 Frauen; Alter: 46,95 ± 13,52 Jahren) reduzierten ihr Ausgangskörpergewichtes (M = 140,13 ± 21,84 kg) innerhalb von 10 Wochen durchschnittlich um 18,28 ± 5,51 kg. Es zeigte sich nach Gewichtsreduktion ein Zuwachs in den Lernvorgängen (RAVLT5 – RAVLT1) (prä: 6,44 ± 2,03; post: 7,19 ± 2,59; z = -1,99 p = 0,047). Im Summenwert aus allen fünf Lernvorgängen konnte keine Veränderung festgestellt werden (prä: 50,14 ± 11,18; post: 52,16 ± 11,11; t(42) = -1,71; p = 0,095), jedoch zeigte sich eine signifikante Zunahme der erinnerten Wörter im verzögerten Abruf nach 30 min (p = 0,014). Auch die verbale Wiedererkennungsleistung nach 30 min verbesserte sich nach der Gewichtsreduktion signifikant (p = 0,004).
Unsere Ergebnisse zeigen, dass eine Kalorienreduktion zu einer Verbesserung des Hippocampus-assoziierten verbalen Gedächtnisses führt. Dabei wirkt sich eine starke Gewichtsreduktion nicht auf die unmittelbaren Encodierungsfähigkeiten im Summenwert des verbalen Gedächtnisses aus, sondern auf die Konsolidierung deklarativer Gedächtnisinhalte und den hippocampal vermittelten Lernzuwachs. Die Lernverbesserung wird am ehesten über neuroplastische Mechanismen im Rahmen der Kalorienreduktion, z. B. über BDNF-Effekte und eine verringerte Neuroinflammation vermittelt. Die kognitiven Effekte einer Kalorienrestriktion könnte Auswirkungen auf die Rehabilitation von Patienten mit Stoffwechsel- und Adipositas-assoziierten Erkrankungen haben.

S13a–05

Neues Ernährungskonzept zur erfolgreichen Schlaganfallprävention in der Neurorehabilitation

S. Schrader, K. Brück, B. Lambers (Köln/DE)

Einleitung: Die Risikofaktoren für einen Schlaganfall sind zu 90 % modifizierbar und können durch eine Fehlernährung begünstigt werden. Personen mit Schlaganfall zeigen eine unausgewogenere Ernährungsweise als Personen ohne Schlaganfall. Dabei kann eine ausgewogene Ernährung das Schlaganfallrisiko senken. Demnach ist eine Ernährungsintervention zur Prävention eines erneuten Schlaganfalls bedeutsam. Patienten nehmen zwar an einem Vortrag im Rahmen eines Präventionsprogrammes in Rehabilitationseinrichtungen teil, setzen die erlernte Ernährungsweise allerdings nicht in den Alltag um [2]. Das Ziel der vorliegenden Studie ist die Entwicklung eines Ernährungspräventionskonzepts, das dem aktuellen Forschungsstand entspricht und den Alltagstransfer der Lehrinhalte ermöglicht.
Material/Methode: Basierend auf einer Literaturrecherche und einem Experteninterview wurde ein Ernährungskonzept erstellt, das motivationale Aspekte entsprechend des Transtheoretischen Modells berücksichtigt. Dies beschreibt anhand von Phasen, wie eine Verhaltensänderung abläuft und was zur Unterstützung der entsprechenden Phasen beiträgt [1].
Ergebnisse: Das Konzept setzt sich aus 11 Gruppen- und 3 Einzeleinheiten zusammen. Die Gruppeneinheiten umfassen theoretische Sequenzen, deren Inhalte in praktischen Sequenzen angewendet werden. Es wurde eine Nachbetreuung über mindestens ein Jahr eingeplant, um die langfristige Umsetzung der Kursinhalte zu fördern. Neben einer risikosenkenden Ernährung werden Angehörige einbezogen, Fallbeispiele besprochen sowie modifizierbare Risikofaktoren, Vorteile und die praktische Durchführung einer Ernährungsumstellung und die Erreichung von Zielen alltagsnah und handlungsrelevant erarbeitet.
Diskussion: Ein optimales Ernährungskonzept muss umfangreich sein und eine lange Nachbetreuung beinhalten, damit die Patienten die erlernte Ernährungsweise langfristig im Alltag umsetzen und ihr Schlaganfallrisiko effektiv senken können. Aufgrund der zeitlichen Begrenzung des Aufenthalts in der Rehabilitationseinrichtung und der Kombination mit anderen Therapien ist das Konzept hier nicht umsetzbar. Es müssen stattdessen dringend neue Strukturen geschaffen oder eine ambulante Umsetzung angestrebt werden.

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S13a–06

Auswirkungen von Chorgesang auf die Lebensqualität von Menschen mit chronischer Aphasie

F. Wappler, B. Lambers, K. Brück (Köln/DE)

Einleitung: Menschen, die als Folge eines Schlaganfalls eine Aphasie erleiden, sind häufig in ihrer funktionellen Kommunikation betroffen [3], die mithilfe von musiktherapeutisch gestützten Einzeltherapieprogrammen behandelt werden können. Musikalische Gruppenerfahrungen bieten hingegen die Möglichkeit nicht nur funktionelle Verbesserungen zu erzielen, sondern durch den Austausch mit ähnlich betroffenen Menschen den Auswirkungen von Aphasien entgegenzuwirken [4]. Ziel der Studie war es, den Einfluss einer Chorteilnahme bezogen auf die subjektiv wahrgenommene Lebensqualität und das subjektiv wahrgenommene Kommunikationsverhalten von Menschen mit schlaganfallbedingter, chronischer, nicht-flüssiger Aphasie zu überprüfen sowie deren temporären Effekt zu erfassen.
Material/Methode: In der quantitativen Befragung wurden 54 chronische, nicht-flüssige AphasikerInnen mit bestehender Chorerfahrung anonym mithilfe der deutschen Übersetzung der »Stroke and aphasia quality of life scale – 39« (SAQOL-39) [2] befragt. Der Fragebogen wurde mit aus Studien extrahierten weiteren Outcomeparametern ergänzt. Die Analyse, Auswertung und Interpretation der Ergebnisse erfolgte deskriptiv und inferenzstatistisch.
Ergebnisse: Die StudienteilnehmerInnen gaben eine erhöhte subjektiv empfundene Lebensqualität und ein erhöhtes subjektiv empfundenes Kommunikationsverhalten in Abhängigkeit zur Dauer und Häufigkeit zur Teilnahme im Aphasikerchor an. Die Auswirkungen der Choraktivität waren nach subjektiver Einschätzung der StudienteilnehmerInnen bis einige Tage nach der Teilnahme zu verzeichnen.
Diskussion: Gegenstand zukünftiger Forschungen ist die Überprüfung der ermittelten Grundlagen mithilfe von Kontrollgruppen und großen homogenen PatientInnenpopulationen, um zu ermitteln, ob die Verbesserungen auf die Teilnahme im Aphasikerchor oder auf weitere Einflussfaktoren zurückzuführen sind.

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S13b–01

Effekte einer Stimulation des Vestibulums auf die posturale Kontrolle, die dynamische Stabilität, die Atmung und die Stimme bei Kleinhirninfarkten: Eine prospektive Pilotstudie

A. Waga (Gera/DE)

Einleitung: Symptome, wie Sprechstörungen (67 %), Koordinationsstörungen (61 %), Schluckstörungen (30 %), sowie Stand- und Gangunsicherheiten (42 %), stellen bei Patienten mit Kleinhirninfarkten im klinischen Setting häufig eine Herausforderung dar [1]. Durch die Koordinationsstörungen wird die posturale Kontrolle unzureichend reproduziert [2]. Mittels Feedforward- und der Feedback-Mechanismen wird zum einen intrinsisch die kommende Destabilisierung geplant und zum anderen adäquat auf den von außen kommendem Reiz reagiert ([2], S. 142). Eine intakte Zwerchfell-Flanken-Atmung wirkt sich positiv auf die posturale Kontrolle aus. Bei guter pulmonaler Aktivität verbessern sich die Ausatmung, die Stimmlautstärke und die Atem-Schluck-Koordination ([2], S. 143). Ziel der vorliegenden Studie ist es, daher die Effekte einer Stimulation des Vestibulums auf die posturale Kontrolle, die dynamische Stabilität, die Atmung und die Stimme bei Kleinhirninfarkten zu untersuchen.
Material/Methode: Für diese Prospektivstudie sollen vierzig, gehfähige Probanden mit akutem Kleinhirninfarkt zwischen Oktober 2021 und März 2022 rekrutiert werden. Ausschlusskriterien sind kognitive Störungen wie epileptische Anfälle, Demenz oder Depressionen. Als primärer Zielparameter wird die posturale Kontrolle mit Hilfe des Timed up and Go evaluiert. Zusätzlich werden zwei sekundäre Zielparameter wie die Phonationslautstärke und die Phonationsdauer zur Beurteilung der Stimmlautstärke und der Ausatemdauer erhoben. Die Datenerhebung erfolgt direkt vor und nach der Durchführung der vier aufeinanderfolgende Rollsequenzen um die Körperlängsachse auf der Bodenmatte. Für die Berechnung systematischer Veränderungen wird deskriptive Statistik verwendet.
Ergebnisse: Die Rekrutierung für die Studiendurchführung beginnt im Oktober 2021, sodass erste Ergebnisse der Studie auf dem Kongress vorgestellt werden. Die vollständigen Ergebnisse werden voraussichtlich im Sommer vorliegen-
Diskussion: Es wird erwartet, dass direkt nach den Rollsequenzen eine Verbesserung des primären Zielparameters – die posturale Kontrolle – und der sekundären Zielparameter – der Phonationslautstärke und der -dauer – erreicht wird. Aufgrund des Studiendesigns müssen bei positivem Effekt weitere Studien die Nachhaltigkeit der Ergebnisse mit Follow-up untersuchen.

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S13b–02

Machbarkeit randomisiert kontrollierter Studien im Routinebetrieb neurologischer Rehabilitationseinrichtungen – Eine Studie im Mixed Methods Design

I. Hotz, F. Kübler, G. Diermayr (Heidelberg/DE), B. Seebacher (Münster/DE)

Hintergrund: Randomisierte kontrollierte Studien (RCTs) gelten als Goldstandard für klinische Evidenz. Deren Fokus auf die interne Validität kann die Generalisierbarkeit und Umsetzung von Ergebnissen in der Praxis limitieren. Eine Integration von RCTs in den realen Routinebetrieb könnte somit die Übertragbarkeit von Ergebnissen steigern. Das Ziel dieser Arbeit ist, die Machbarkeit von RCTs in neurologischen Rehabilitationseinrichtungen zu untersuchen.
Methodik: Ein konvergent paralleles Mixed Methods Design wurde gewählt. In Teil A wurden in 12 semi-strukturierten Interviews mit Expert*innen der neurologischen Rehabilitation die Barrieren und Förderfaktoren für die Durchführung von RCTs im Routinebetrieb erhoben. Die Entwicklung der Leitfäden erfolgte auf Basis von Michies Theoretical Domains Framework. Teil B ist ein Pilot-RCT, welcher die Machbarkeit und erste Effekte eines alltagsorientierten physiotherapeutischen Trainings mit (IG) und ohne (KG) Blickbewegungstraining auf die dynamische Balance und das Sturzrisiko bei Personen mit idiopathischem Parkinsonsyndrom untersucht. Die Machbarkeitsparameter beinhalten die Rekrutierungs-, Retentions- und Adhärenzrate. Die Effektstärken wurden mit Mann Whitney-U Test Z-Werten der Post-Prä-Differenzen und einer 2x2 ANOVA berechnet. Anschließend erfolgt eine Synthese der qualitativen und quantitativen Ergebnisse.
Ergebnisse: Vorläufige Ergebnisse zeigen, dass Expert*innen der neurologischen Rehabilitation die Komplexität des Settings und der Krankheitsbilder als erhebliche Barriere für die Durchführung von RCTs im Routinebetrieb identifizieren. Förderfaktoren stellen die Flexibilität hausinterner Strukturen und die Motivation im Team dar.
Für den Pilot-RCT wurden bisher 10 Personen (8 männlich) mit Parkinson im mittleren Alter von 70,60 (Standardabweichung SD 4,7) Jahren und einer Erkrankungsdauer von 6,8 (SD 4,21) Jahren rekrutiert. Deren medianes Hoehn & Yahr Stadium betrug 2,3 (unteres – oberes Quartil 2,0 – 3,0), der mediane Unified Parkinsons Disease Rating Scale Wert war 37 (29 – 44).
Präliminäre Effektstärken zeigen in der IG (n = 5) im Vergleich zur KG (n = 5) einen großen Effekt für den Timed-Up-and-Go mit manuellem Dual Task (Eta-Quadrat $\eta^2 = 0{,}39$) und die Kategorien Mobilität ($\eta^2 = 0{,}25$), emotionales Wohlbefinden (h2 = 0,44) und körperliches Unbehagen ($\eta^2 = 0{,}56$) des Parkinson's Disease Questionnaire-39. Die Rekrutierungsrate betrug 82,35 % (95 % Konfidenzintervall KI 0,56; 0,95), die Retentionsrate 90,01 % (95 % KI 0,57; 1) und die Adhärenz 100 % (95 %, KI 0,76; 1).
Diskussion: Die Machbarkeit von RCTs im Routinebetrieb kann durch ausschließlich quantitative Methoden nicht vollständig abgebildet werden, da Barrieren häufig nicht nur eine quantitativ messbare Ressourcenknappheit betreffen, sondern auch Einstellungen, Überzeugungen und Intentio-

nen der Involvierten. Eine vollständige Ergebnissynthese der Barrieren und Förderfaktoren erfolgt am Kongress.

S13b–03

Patientenpräferenzen für Roboter- und Assistenztechnologien im Gesundheitswesen – Ein Discrete Choice Experiment mit Schlaganfallpatienten in der Neurorehabilitation

A. K. Fischer (Neubrandenburg/DE)

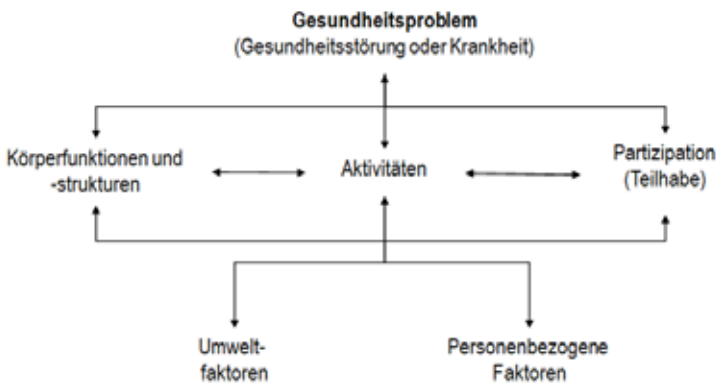
Die folgende Einreichung bezieht sich auf ein Studienprotokoll für eine Health Preference Research Studie (HPR) als Promotionsarbeit.
Einleitung: Schlaganfall und andere Erkrankungen, die zu körperlichen Einschränkungen und Alltagseinschränkungen führen, bedingen einen steigenden Bedarf an rehabilitativen Therapieleistungen.
Der steigende Bedarf an rehabilitativen Leistungen zusammen mit dem derzeit anhaltendem Fachkräftemangel, führen zu einem Bedarf an neuen Lösungen im Gesundheitswesen. Roboter- und Assistenztechnologien in der Neurorehabilitation können den Problemen entgegenwirken. Um die neuen digitalen Lösungen zu integrieren und durch die Maximierung der Akzeptanz eine hohe Effektivität zu erreichen, sollten die Präferenzen und die Akzeptanz der Patienten in die Bewertung der digitalen Therapien einbezogen werden.
Ziele: Das primäre Ziel ist es, die Kriterien zu evaluieren, die zur Patientenakzeptanz führen.
Die sekundären Ziele sind: Nutzen-Aufwands-Bewertung. Bewertung der relativen Wichtigkeit von Attributen für den Vergleich von Alternativen. Identifizierung von Schlüsselattributen, die die Patientenadhärenz beeinflussen.
Methoden: Mit Hilfe einer Stated-Preference Studie werden Therapiemerkmale, die Patienten bei der Bewertung digitaler Therapieoptionen berücksichtigen, identifiziert und verglichen. Die Studienpopulation umfasst in der Experimentalgruppe Schlaganfallpatienten in der Neurorehabilitation. Zusätzlich wird die Allgemeinbevölkerung als Vergleichsgruppe befragt.
Die Ergebnisse der Vorstudie haben zu einer Auswahl von Therapieattributen geführt, die in eine quantitative Bewertung der relativen Attributbedeutung durch ein Discrete-Choice-Experiment (DCE) oder eine Best-Worst-Skalierung (BWS) einfließen werden.
Die Analyse wird Logit-basierte Ansätze verwenden, um die von den Befragten erhobenen Daten zur Behandlungspräferenz zu analysieren, einschließlich Random-Parameter-Logit (RPL), um unbeobachtete Variation in den Präferenzen innerhalb der Stichprobe zu modellieren. Die anfängliche Modellspezifikation wird nur Haupteffekte berücksichtigen, die durch die Attributvariablen charakterisiert sind. Die Heterogenität wird mit Hilfe der Latent-Class-Analyse (LCA) analysiert.
Ergebnisse: Diese HPR wird die Patientenpräferenzen für Roboter- und Assistenztechnologien in der Neurorehabilitation dokumentieren. Die Behandlungsattribute für die Erhebung der Patientenpräferenzen und -akzeptanz umfassen technische Aspekte und therapiebezogene Attribute, wie finanzielle, klinische und digital-administrative Attribute.
Schlussfolgerungen: Die Erforschung von Patientenpräferenzen hilft, Entscheidungen im Gesundheitswesen zu unterstützen und ein effektives und effizientes Gesundheitssystem mit bedarfsgerechter Versorgung und niedrigen Kosten zu fördern. Der Einbezug von Präferenzen und Akzeptanzkriterien hat kurz-, mittel- und langfristig positive Auswirkungen auf Patienten und das Gesundheitssystem

S13b–04

Der Wert körperlicher Funktionen und Aktivitäten bei der Bewertung der robotergestützten Neuro-Rehabilitation – Wie kann die Bedeutung anhand des generischen Instruments der ICF abgeleitet werden?

C. Juhnke (Neubrandenburg/DE)

Ziele: Das Verbundprojekt »E-BRAiN« untersucht den möglichen Einsatz von humanoiden Robotern als Therapieassistenz in der Neurorehabilitation bei Armparesen und Neglect nach einem Schlaganfall. Selbst wenn Roboter als erfolgreich angesehen werden, stellen sich Fragen nach der Akzeptanz und den Präferenzen der Patienten, den klinischen Effekten und damit der Relevanz für die zukünftige medizinische Versorgung. Klinische Studien im Rahmen von »E-BRAiN« messen klinische Parameter, die ein Ausdruck der Armbeweglichkeit oder der visuospatialen Wahrnehmung sind. Diese geben Hinweise auf bestimmte Körperfunktionen. Es ist jedoch unklar, ob messbare Funktionen oder -verbesserungen einen Einfluss auf den (Patienten-) Nutzen haben.
Methoden: Im Rahmen der laufenden Studie werden verschiedene Komponenten der International Classification of Functioning, Disability & Health (ICF) bewertet. Die Klassifikation beschreibt die körperliche Funktionsfähigkeit und Behinderung des Menschen. Für jede Funktion und Aktivität gibt die ICF eine allgemeingültige, klinische Definition vor. Es stellt sich aber die Frage, wie diesen Funktionen ein Wert zugeordnet werden kann. Geht man davon aus, dass die Stabilisierung oder Verbesserung von Körperfunktionen Auswirkungen auf die Aktivitäten der Patienten hat und dass diese Aktivitäten messbare Einflüsse auf die (gesundheitsbezogene) Lebensqualität der Patienten haben, stellt sich die Frage, auf welche Körperfunktionen legen die Patienten in der Neurorehabilitation nach Schlaganfall größten Wert? Was sind die schwerwiegendsten Beeinträchtigungen der Armfunktion oder der visuospatialen Wahrnehmung aus Sicht der Patienten/Bevölkerung? Drei geplante Choice-Experimente mittels Best-Worst-Scaling gehen den Fragen nach, wie eine Wertfunktion aus einem generischen Instrument wie der ICF abgeleitet und wie eine latente Nutzenskala, z. B. aus einem



S13b–04. Abb. 1: WHO 2001. The International Classification of Function, Disability and Health (ICV). Geneva: WHO

Wahlexperiment, mit einem (kardinalen) Nutzenmaß verknüpft bzw. in ein solches übersetzt werden kann.
Ergebnisse: Die ICF stellt die Bewertung in Kontext und ermöglicht die Auswahl relevanter Aspekte der Funktionsfähigkeit und Behinderung für die Bewertung. Das Credo der ICF ist: »Aus Körperfunktionen entstehen Aktivitäten«. Da sich der Wert einer Körperfunktion aus den Aktivitäten ableitet, ist ein weiteres Wahlexperiment geplant, um die Aktivitäten mit den Funktionen zu verknüpfen und deren Wert zu messen. Die generische Qualifizierungsskala der ICF wird verwendet, um das Ausmaß der Funktionsbeeinträchtigung, Aktivitäts- und Teilhabeeinschränkung zu erfassen.
Schlussfolgerungen: Es wird davon ausgegangen, dass die Wiedererlangung körperlicher Funktionen Auswirkungen auf die Aktivitäten der Patienten hat und dass die Aktivitäten Auswirkungen auf die gesundheitsbezogene Lebensqualität haben. Außerdem wird angenommen, dass im Gegensatz zur ICF, in der alle Beeinträchtigungen gleich wichtig sind, die Patienten verschiedene Körperfunktionen und/oder Aktivitäten unterschiedlich bewerten.

S13b–05

Therapeutic effects of peripheral electrical stimulation on the somatosensory cortical representation in healthy subjects and in the rehabilitation of patients after stroke: A systematic review

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Purpose: So far, there has only been a small number of intervention studies that have measured the effect of therapeutic peripheral electrical stimulation (PES) on somatosensory evoked potentials (SSEP) in healthy humans and even less in the rehabilitation of the patients after stroke. PES is a rehabilitative technology that uses electrical currents applied to the peripheral nerves [1]. SSEPs are time-locked potentials evoked by electric stimulation of the sensory or mixed peripheral nerves and recorded along with the large fiber somatosensory (dorsal column – medial lemniscus) pathway [2]. The main objective of this research was to investigate whether the PES has a role in changing latencies and/or amplitudes of SSEPs in healthy subjects and in stroke patients. The second aim of this research was to investigate whether therapeutic effects of PES have a role in improving pathological latencies and/or amplitudes of SSEP caused by a post-stroke lesion in stroke patients.
Methods: The following databases were searched without publication date limit: Pubmed/MEDLINE®, Scopus, the Physiotherapy Evidence Database (PEDro), and ClinicalTrials.gov. Titles and abstracts as well as full-text reports were screened for eligibility by two independent reviewers according to a priori defined eligibility criteria. The methodological quality of included studies was assessed using the Cochrane Risk Of Bias In Non-randomized Study (ROBINS-I) tool and the »Quality Assessment Tool for Before-After (Pre-Post)« developed by the National Institutes of Health.
Results: The final systematic search resulted in 892 records. Based on the titles and abstracts, 16 reports were included for full-text reading. Four non-randomized studies with serious to moderate risk of bias and four pre-post studies without a control group with poor to good methodological quality were retained for review.
Conclusions: To date, there has been a small number of studies that used SSEP to demonstrate sensory changes and cortical plasticity among healthy subjects or to estimate the rehabilitation prognosis or neuroplasticity in patients after stroke. Only three included studies are comparable to a well-performed randomized trial in terms of their methodological quality although those did not give sufficient data to provide guidelines on PES efficacy of SSEP. Results and methods of assessments are still controversial and there is a fair need to investigate this specific field of neurophysiology more precisely. The conduction of randomized controlled trials is required.
Keywords: peripheral electrical stimulation, somatosensory evoked potentials, stroke rehabilitation, sensory and motor recovery

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S13b–06

Feasibility and Effectivness of plyometric training of the lower extremities to improve walking ability in patients after stroke – a systematic Review

A. Höche (Berlin/DE)

Introduction: Regaining the ability to walk is usually the primary aim of rehabilitation training in patients after stroke. Common rehabilitation methods to improve walking ability do not show improvements on an everyday-relevant level. Plyometric Training uses the stretch-shortening-cycle, which is part of the physiological gait in humans. Existing studies show positive effects of gait speed, power and changes of direction in athletes and healthy older adult.
Objectives: To determine if plyometric training of the lower extremities is safe and feasible in patients after stroke, and if plyometric training improves walking ability in patients after stroke.
Materials and Methods: A systematic review was carried out. Four electronic databases were searched via PICOS-Scheme. Risk of Bias was assessed with ROB-I und ROB-INS-I-Tool. Reporting of interventions was evaluated with TIDieR-Checklist. A qualitative analysis of the outcomes and meta-analysis to evaluate improvements in walking ability were implemented.
Results: Seven studies reached the inclusion criteria (3 RCTS, 3 Cohort studies without Control group, 1 Case-Series). Plyometric Training seems to be safe and feasible for patients after stroke. No serious adverse events were reported. In meta-analyses, effects of plyometric training tested with Timed-up-and-go Test were positive (Standard mean difference 7,143; Confidence interval -11,416 to -2,870)
Discussion: Certainty of Evidence of the results is low, due to the low quality of the included studies. There is a high risk of bias and sample size was small in all studies.
Conclusion: The results indicates that plyometric training of the lower extremities is safe and feasible for patients after stroke and could improve walking ability. There is a need for more studies with high quality to confirm the results of this systematic review.
Keywords: plyometric training-walking ability-stroke-safety-jump training

Ist die Umsetzung eines plyometrischen Trainings der unteren Extremität mit Patienten und Patientinnen nach Schlaganfall möglich und können die Patienten und Patientinnen nach Schlaganfall mit einem solchen Training ihre Gehfähigkeit verbessern?

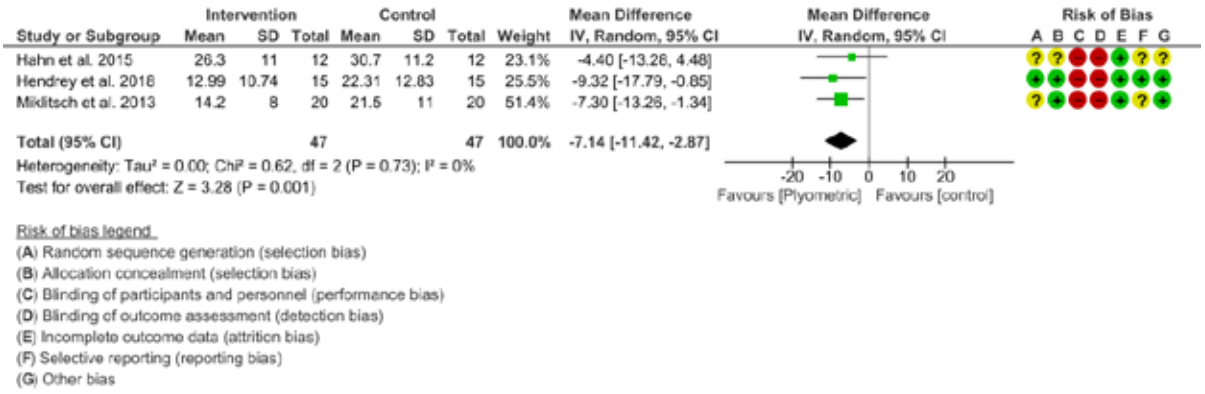
Patient oder Population: Patienten nach Schlaganfall
Setting:
Intervention: Plyometrisches Training
Vergleich: andere Intervention oder keine Intervention

Endpunkte	Erwartete absolute Effekte* (95% CI)		Relativer Effekt (95% CI)	№ der Teilnehmer (Studien)	Certainty of the evidence (GRADE)
	Risiko mit andere Intervention oder keine Intervention	Risiko mit Plyometrisches Training			
Gehfähigkeit bewertet mit: Timed Up and Go	Der Mean gehfähigkeit was **21-30** Sekunden	MD **7.14 Sekunden weniger** (11.42 weniger bis 2.87 weniger)	-	94 (3 RCTs)	⊕⊕◯◯ NIEDRIG a,b
Sicherheit bewertet mit: Adverse Events	Keine Schwerwiegenden Adverse Events.			145 (7 Beobachtungsstudien)	⊕◯◯◯ SEHR NIEDRIG abcde
Machbarkeit bewertet mit: Rekrutierungsrate, Verbleib in der Studie, Durchführung der Einheiten, Akzeptanz der Proband Innen gegenüber der Übungen	Geringe bis keine Drop Out Rate. Geringe Rekrutierungsrate (3,5-10,8%). Durchführung der Einheiten konnten mit >80% abgeschlossen werden. Generell herrschte eine hohe Akzeptanz der Proband Innen gegenüber des plyometrischen Trainings.			145 (7 Beobachtungsstudien)	⊕◯◯◯ SEHR NIEDRIG abcde

*Das Risiko in der Interventionsgruppe (und das 95% Konfidenzintervall) basiert auf dem vermuteten Risiko in der Vergleichsgruppe und der **relativen Wirkung** der Intervention (und dem 95% KI).
CI: Confidence interval; **MD:** Mean difference

GRADE Working Group grades of evidence
High certainty: We are very confident that the true effect lies close to that of the estimate of the effect
Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

S13b–06. Fig. 1



S13b–06. Fig. 2

S13b–07

Die Applikation von Interleukin-4 reduziert den sekundären Hirnschaden nach experimentellem Schädel-Hirn-Trauma im Mausmodell

J. Mende (Heidelberg/DE)

Hintergrund: Einer der Schwerpunkte der experimentellen Schädel-Hirn-Trauma Forschung (SHT) hat sich in jüngster Zeit auf die Rolle von Entzündungsprozessen verlagert. So konnte z. B. gezeigt werden, dass die Aktivierung des Interleukin-4 (IL-4)-Signalwegs den sekundären Hirnschaden vermindert; Daher untersuchten wir die Wirkung der therapeutischen Anwendung von IL-4 auf den sekundären Hirnschäden nach experimentellem Schädel-Hirn-Trauma im Mausmodell.
Methoden: Bei 81 C57/B16-Wildtyp-Mäusen wurde mittels Controlled Cortical Impact (CCI, Bolzendurchmesser 2 mm, Aufpralltiefe 1 mm, Geschwindigkeit 8 m/s, Kontaktzeit 150 ms) ein standardisiertes Schädel-Hirn-Trauma induziert. IL-4 wurde subkutan in einer Dosis von 5 mg/kg 15 Minuten nach der Trauma-Induktion verabreicht. Die neurologische Funktion wurde nach 24 Stunden sowie drei, sieben, 14 und 28 Tage nach der Traumainduktion mittels Hole-Board-, Video-Open-Field- und CatWalkXT®- Ganganalysetests beurteilt. Zusätzlich wurde an den genannten Zeitpunkten das Kontusionsvolumen durch Nissl-Färbung bestimmt und schließlich die Entzündungsreaktion mittels Immunhistochemie beurteilt.
Ergebnisse: Die IL-4-Behandlung führte zu einem reduzierten Kontusionsvolumen über die Tage eins bis 28 (z. B. 7,82 vs. 10,03 mm^3 am Tag 7), einem verbesserten Gangbild und motorischer Funktion sowie reduzierter Entzündungsreaktion.
Schlussfolgerungen: Da die Anwendung von Interleukin-4 zu einer reduzierten strukturellen Schädigung führt und die neurologische Funktion nach experimentellem SHT verbessert, stellt die therapeutische Applikation von IL-4 eine interessante Behandlungsoption dar. Die aktuellen Ergebnisse bilden die Grundlage für eine mögliche Translation in die klinische Forschung, die in Zukunft genauer untersucht werden sollte.

S13b–08

Die Bewertung der motorischen und Gangfunktion mit Hilfe des CatWalkXT® liefert wertvolle Information für die Bewertung von sekundären Hirnschäden nach »controlled cortical impact (CCI)« bei Mäusen

S. M. L. Hutagalung (Heidelberg/DE)

Hintergrund: Der CatWalkXT® hat sich als Methode zur automatisierten Gleichgewichtsuntersuchung in Nagetieren in der akuten Phase nach experimenteller Schädel-Hirn-Trauma-Behandlung als wirksam erwiesen, sein Stellenwert in der chronischen Phase nach Trauma-Induktion bleibt jedoch unklar. Daher haben wir die Korrelation der CatWalkXT®-Parameter mit dem histologischen Läsionsvolumen untersucht und das zeitliche und räumliche Muster der Beeinträchtigung der CatWalkXT®-Parameter über vier Wochen nach experimentellem SHT bei Mäusen analysiert.
Material/Methode: Bei 45 C57Bl/6-Mäusen wurde mittels Controlled Cortical Impact ein standardisiertes Schädel-Hirn-Trauma induziert. Die CatWalkXT®-Ganganalyse wurde am Tag vor dem CCI sowie an den postoperativen Tagen 1, 3, 7, 14 und 28 durchgeführt. Die Ermittlung des histologischen Läsionsvolumens erfolgte ebenfalls an den postoperativen Tagen 1, 3, 7, 14 und 28. Schließlich wurden zeitliche und räumliche Profile der Gangstörung analysiert und die CatWalkXT®- Parameter mit Hilfe linearer Regressionsmodelle mit der Läsionsgröße korreliert.
Ergebnis: Der CCI führte zu signifikanten Läsionsvolumina mit einem Maximum am Tag 14 nach CCI. Während in der ersten Woche nach CCI eine signifikante diffuse bilaterale Beeinträchtigung fast aller CatWalkXT®-Parameter auftrat, bildete sich die Beeinträchtigung der Pfotenabdrucksfläche, der Pfotenintensitäten und der globalen dynamischen Bewegungsparameter danach zurück. Die Korrelation der CatWalkXT®-Parameter mit dem Läsionsvolumen war insgesamt sehr gering ausgeprägt, da z. B. nur 2,2% (11/500) der R^2-Werte der linearen Regression der CatWalkXT®-Parameter auf das histologische Läsionsvolumen größer als 0,6 waren.
Schlussfolgerung: Da die CatWalkXT®-Parameter bis zu vier Wochen nach CCI nicht mit der Läsionsgröße korrelieren, liefert die Gangbeurteilung mit CatWalkXT® wertvolle Zusatzinformationen zur alleinigen histologischen Beurteilung der Verletzung. Alle CatWalkXT®-Parameter können für die Gangbeurteilung in der ersten Woche nach Traumainduktion verwendet werden, da CCI zu einer reproduzierbaren diffusen bilateralen Beeinträchtigung von Pfotenabdrücken, Pfotenintensitäten, dynamischen Einzelpfoten sowie dynamischen Bewegungsparametern im Vergleich zum präoperativen Status führt. Die Verwendung CatWalkXT® in der chronischen Phase nach experimentellem SHT sollte jedoch auf dynamische Einzelpfotenparameter, wie z. B. die Schwunggeschwindigkeit, beschränkt werden, da sich andere Parameter nach einer Woche vollständig erholen.

S13b–09

Evidenzbasierte Mundpflege auf Intensiv- und Frühreha-Station

A. Pryzwanski (Munich/DE), A. Müller (Bad Aibling/DE), A. Herzog (Bad Aibling/DE), V. Huge (Bad Aibling/DE), C. Krewer (Bad Aibling/DE)

Einleitung: Viele schwer pflegebedürftige Patient*innen benötigen bei ihrer Mundpflege Hilfe durch Pflegende. Patienten*innen auf der Intensivstation weisen z. B. mehr Zahnbelag auf als andere. Auch wird ein Zusammenhang mit nosokomialen Pneumonien berichtet [1]. Um standardisiert den Mundgesundheitsstatus von neurologischen Intensivpatient*innen durch Pflegende erfassen zu können, entwickelten Prendergast et al. [3] das Bedside Oral Exam (BOE). Das BOE beinhaltet acht Items, die jeweils zwischen 1 (= normal) und 3 (= schwere Dysfunktion) bewertet werden (min – max: 8 – 24 Pkt).
Material/Methode: Zur Überprüfung der Variabilität und Retest-Reliabilität, wurde das BOE bei N = 75 Patient*innen auf der Intensiv- und Frühreha-Station über einen Zeitraum von vier Wochen durch eine zahnmedizinische Fachkraft erhoben. Zwischen ein und vier Assessments wurden pro Patient erfasst, die jeweils am Vormittag im Abstand von einer Woche durchgeführt wurden.
Ergebnisse: Der durchschnittliche Gesamtscore des BOE betrug 12,39 Punkte (SD: 1,85; min – max: 8 – 17). Bei 69% der Patienten konnten mindestens 2 Messungen durchgeführt werden. Der BOE Score variierte durchschnittlich um 1,49 Punkte pro Patient (SD: 1,47; min – max: 0 – 6).
Die Retest-Reliabilität zeigte, dass die Korrelation zwischen der zweiten und dritten Woche hoch (r = 0,773; p = 0,000), jedoch zwischen der ersten und zweiten Woche niedrig war (r = 0,314; p = 0,008).
Diskussion: Das BOE weist nur eine geringe Variabilität auf, auch ohne eine stringente Kontrolle potenzieller externer Confounder. Durch die Pflegenden zu beeinflussenden Items des BOE (Lippen, Zunge und Speichel) könnten den Score um ca. 3 Punkte kurzfristig verändern. So könnte der Speichelfluss durch Speicheldrüsenstimulation oder -ersatz erhöht, die Lippen durch Paraffin-freie Lippenpflegeprodukte feucht gehalten werden. Eine Mundtrockenheit kann allerdings auch durch weitere Faktoren, wie bestimmte Pharmaka, negativ beeinflusst werden [2]. Die Zähne bzw. der Zahnersatz lassen sich mechanisch mithilfe einer Zahnbürste reinigen, wobei nur weicher Biofilm, aber kein Zahnstein mit der Zahnbürste entfernt werden kann. Faktoren, die für die unterschiedlichen Reliabilitätswerte verantwortlich sein könnten, müssen weiter untersucht werden. Aufgrund der geringen Variabilität des BOE spielen diese niedrigen Reliabilitätswerte aber ggf. nur eine untergeordnete Rolle.

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S18–05

Beeinflusst Prismenbrillen-Adaptation die Pusher-Symptomatik?

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Hintergrund: Bei PatientInnen mit einer schweren neurologischen Hirnschädigung auf der rechten Hemisphäre zeigt sich häufig eine Pusher-Symptomatik. Solche Patient:innen drücken ihren Körper in allen Ausgangsstellungen zur Seite der mehrbetroffenen Seite. Als Grund wird hierfür eine fehlerhafte Wahrnehmung der Körperposition im Raum

benannt. Prismenbrillenadaptation bewirkt eine Neukalibrierung der motorischen und visuellen Koordinaten der Raumwahrnehmung. In mehreren Einzelfällen untersuchten wir deshalb die Auswirkung von rechtsseitiger Verschiebung der visuellen Wahrnehmung um 10 Sehwinkelgrad auf das Ausmaß der Pushersymptomatik.

Methode/Intervention: Für die Studie wurden 5 PatientInnen mit einer rechtshemisphärischen Läsion und einer Pusher-Symptomatik ausgewählt. Um eingeschlossen zu werden, mussten sie beginnende Rumpfkontrolle ausweisen, sodass sie auf einem Hocker sitzen können. Auf diesem Hocker befindet sich der »Tymo«, eine Sensormessplatte der Marke Tyromotion, welche Gewichtsverteilungswerte prozentual misst. Die Evaluation der Wirksamkeit der Prismenadaptation erfolgte durch eine Serie von single case experimental design: Nach jeweils drei Eingangsmessungen (Baseline) erfolgte die Intervention mit Prismenbrille (Intervention). Anschließend wurde der Gewichtsverteilungswert erneut ohne Prismenbrille erhoben. Während der Phase der Prismenadaptation sollten die Patient:innen 80 x in hoher Geschwindigkeit vorgegebene Punkte auf einem Steckbrett antippen.

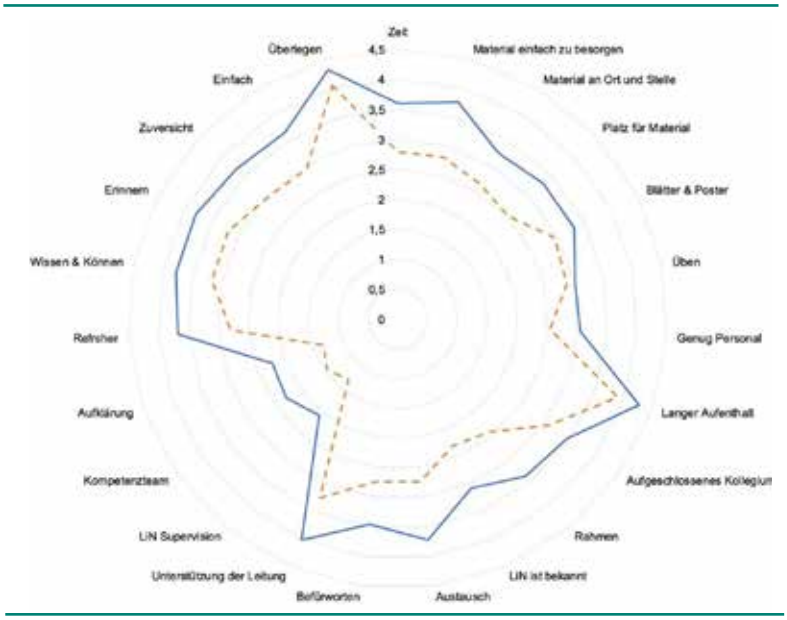
Ergebnis: Alle fünf Patienten zeigten individuell eine Verbesserung ihrer Leistung. Die Seitendifferenz in der Ausrichtung sank von 20 % auf 5 % ab.

Die Baselinewerte ergaben eine Seitendifferenz von durchschnittlich 8, 25, 20, 20, 29. Nach Interventionsdurchführung zeigten sich folgende Endwerte 4, 12, 0, 16, 2. **Tabelle 1** gibt eine Übersicht über die einzelnen Patient:innen.

S18–05. Tab. 1: Übersicht der Gewichtsverteilungswerte

Pat.	Baseline (Mittelwert)		Interventionsmessung (Mittelwert)		Baseline (Endwerte)	
	Links	Rechts	Links	Rechts	Links	Rechts
B (w)	54,34	45,67	51,34	48,67	52	48
D (m)	62,67	37,64	56,34	43,67	56	44
E (w)	60,34	39,67	51,34	48,67	50	50
F (m)	60,34	40,34	53,5	46,5	58	42
G (m)	64,67	35,34	48	52	51	49

Schlussfolgerung: Prismen Adaptation könnte eine Methode zur kurzfristigen Verbesserung einer Pushersymptomatik darstellen. Zukünftige randomisierte Studien sollten diesen Effekt replizieren versuchen und auch die langfristige Wirksamkeit der Prismenadaptation untersuchen.



S21–04. Abb. 1

S21–04

Förderfaktoren und Barrieren bei der Anwendung von LiN – Lagerung in Neutralstellung in der klinischen Praxis: Eine Längsschnittuntersuchung

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Einleitung: Patienten zu positionieren ist für die Pflege immobilisierter und behinderter Patienten von entscheidender Bedeutung, um Komplikationen wie z. B. Druckgeschwüre zu vermeiden. Allerdings werden effektive Lagerungsmethoden in der klinischen Praxis oft nicht angewandt, selbst wenn die Pflegenden geschult wurden und über die Vorteile Bescheid wissen. Hier untersuchten wir, welche Faktoren die Anwendung von LiN – Lagerung in Neutralstellung, eine Methode mit deutlichen Vorteilen gegenüber der konventionellen Lagerung – beeinflussen, nachdem die Teilnehmer einen LiN-Kurs absolviert hatten.

Material/Methode: Es wurde eine Längsschnittuntersuchung mit 101 LiN-Kursteilnehmern durchgeführt. Jeder Teilnehmer füllte direkt nach einem 2-tägigen LiN-Grundkurs und 12 Wochen später einen Fragebogen aus, in dem er die tatsächliche Häufigkeit der LiN-Anwendung in der Praxis angab. Es wurde ein für dieses Thema entwickelter Fragebogen konzipiert, der 23 spezifische Aspekte umfasste, die gegebenenfalls die LiN-Anwendung am Patienten erleichtern oder behindern könnten. Diese betrafen den Arbeitsplatz, soziokollegiale Faktoren, Motivation, Selbstvertrauen und Denkweise.

Ergebnisse: Fast alle bewerteten Aspekte standen im Zusammenhang mit der LiN-Anwendung, wobei die wichtigsten das Selbstvertrauen, die wahrgenommene Leichtigkeit der Anwendung, ausreichend Zeit, die Einschätzung der eigenen Fähigkeiten als ausreichend, die Erinnerung an die relevanten Schritte und ein Arbeitsumfeld, das einen geeigneten Kontext für fortgeschrittene therapeutische Konzepte bietet, waren. Am wenigsten wichtig waren die Möglichkeit, mit weniger schwer betroffenen Patienten zu üben und eine gute Dokumentation. Eine Faktorenanalyse identifizierte drei Faktoren: (1) persönliche Einstellung, (2) Arbeitsbedingungen und (3) Aspekte, die sich auf das Team beziehen. Die persönliche Einstellung war am stärksten prädiktiv für die LiN-Nutzung, gefolgt von den Arbeitsbedingungen und teambezogenen Faktoren.

Diskussion: Zahlreiche Faktoren können die Anwendung von neu erworbenen pflegerischen Fertigkeiten, wie z. B. LiN, beeinflussen. Viele davon können durch eine geeignete Gestaltung des Arbeitsplatzes (z. B. Bereitstellung leicht zugänglicher Materialien) verbessert werden. Die wichtigsten Faktoren sind jedoch das Selbstvertrauen und die selbstwahrgenommenen Fähigkeiten der Anwender. Dies legt nahe, dass Ausbilder von fortgeschrittenen Pflegepraktiken auch einen Schwerpunkt auf die Förderung des Selbstver-

trauens und eine anwenderfreundliche Arbeitsweise bei den Kursteilnehmern legen sollten, z. B. durch die Vermittlung einer Denkweise, in der Fehler als normal angesehen werden und durch umfangreiche Ermutigung.

S23–02

Zwischenauswertung der Studie zu Organizität der Symptome bei Patienten mit Multipler Sklerose

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Einleitung: Funktionelle neurologische Symptome (FNS) sind wiederkehrende bzw. anhaltende neurologische Symptome ohne hinreichende organische Ursache. Trotz ihrer hohen Prävalenz (ca. 30 % [1]) werden sie häufig übersehen und nicht korrekt behandelt – mit der Folge chronifizierender Krankheitsverläufe, was nicht nur in großem persönlichen Leid resultiert [2], sondern auch hohe Kosten für das Gesundheitssystem verursacht [3]. Dies ist insbesondere dann der Fall, wenn FNS komorbid zu neurologischen Krankheitsbildern auftreten, sodass diese Symptom-Kombination aus rehabilitations- und sozialmedizinischer Sicht eine ernstzunehmende Komplikation darstellt. Obwohl FNS bei Patienten mit Multipler Sklerose (PwMS) im klinischen Alltag kein seltenes Phänomen darstellen, ist die empirische Lage zur Prävalenz solcher Symptome sehr mangelhaft. Die Identifizierung von FNS bei PwMS wird durch ein ätiologisch und phänomenologisch komplexes Symptombild der MS erschwert [4]. Carson und Stone haben das Organizitätsrating [5, 6] als validiertes und reliables Messinstrument in diesem wissenschaftlichen Zusammenhang eingeführt.
Vor dem Hintergrund klinischer Bedeutsamkeit und der eingeschränkten empirischen Lage zu FNS bei PwMS hat die Studie zum Ziel, die Organizität der Symptomatik bei PwMS zu beleuchten.
Methode: Nach dem aktuellen Stand wurden Daten von 183 PwMS in Kliniken Schmieder Konstanz erhoben. Eingeschlossen werden PwMS zw. 18 und 60 Jahren, die keine motorischen oder kognitiven Defizite als Folge einer anderen neurologischen Erkrankung (z. B. Schlaganfall) haben.
Das Krankheitsbild wurde durch die Fachärzte für Neurologie mit einem Organizitätsrating beurteilt. Dieses schätzt ein, in welchem Umfang sich das Krankheitsbild durch die organische Pathologie erklären lässt. Die Beurteilung erfolgt in Anlehnung an Stone und Carson mit einer 5-stufigen Skala [6, 5]. Hierbei bedeutet der Skalenwert von 1, dass das Krankheitsbild bzw. Symptom sich durch die organische Pathologie gar nicht erklären lässt bzw. ein Skalenwert von 5, dass es sich hierdurch vollständig erklären lässt.
Ergebnisse: In 15 % der Fälle lässt sich die Symptombildung zu weniger als die Hälfte organisch erklären (entspricht dem Organizitätsrating von ≤ 3). In 29 % der PwMS wird das Gesamtbild der Symptome überwiegend organisch erklärt (Organizitätsrating von 4). Die in diesem Kontext am häufigsten genannten Symptome waren kognitive und körperliche Fatigue, Schmerzen und Gedächtnislücken. Bei den restlichen 56 % kann die Symptombildung vollständig organisch erklärt werden.
Diskussion: Im Einklang mit der Literatur [7, 1] weisen unsere Ereignisse auf einen relevanten Anteil nicht-organisch begründbarer Symptome bei PwMS hin und bekräftigen die klinische Relevanz funktioneller Symptombildungen bei neurologisch Erkranken.
Rehabilitationsmedizinisch sollte dies bei der Diagnostik, der Planung und der Umsetzung des individuellen Therapieprogramms berücksichtigt werden.

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S23–03

Entscheidungskompetenz des Patienten mit MS und Auswahl der Immunmodulation

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Einleitung: Eine immunologische Behandlung des Patienten mit Multipler Sklerose (PmMS) muss einerseits die Bedürfnisse des Patienten berücksichtigen, andererseits möglichst wirksam sein und gleichzeitig möglichst wenig Nebenwirkungen und Risiken beinhalten. Bei der Versorgung von Patienten mit chronischen Krankheiten hat sich das shared decision Modell (SDM) aus verschiedenen Gründen als vorteilhaft erwiesen. Eine partizipative Entscheidungsfindung setzt aber voraus, dass der Patient gut informiert und entscheidungskompetent ist. Im Rahmen einer Online-Befragung haben wir Entscheidungskompetenz von PmMS untersuchen wollen in Abhängigkeit von der Einnahme ihrer immunmodulatorischen Behandlung. Ferner haben wir versucht zu klären, ob die Entscheidung für ein bestimmtes Medikament mehr vom Patienten oder mehr vom Neurologen ausging.
Material/Methode: Über die Homepage der AMSEL, DMSG und der Kliniken Schmieder wurden PmMS auf einen link aufmerksam gemacht, auf dem sie die Fragen online beantworten konnten. Basierend auf der Arbeit von Hoffmann et al. [1] wurde Entscheidungskompetenz operationalisiert mit zwei Kategorien: »risk perception« (Risikowahrnehmung) und »decision rules« (Befolgung von Entscheidungsregeln). Beides sind Teil der Adult Decision Making Competence battery (A-DMC) und etablierte Maße zur Erfassung der Entscheidungskompetenz [1]. Zusätzlich wurde informal abgefragt, ob die Entscheidung vorrangig durch den Patienten, durch den Neurologen oder gleichermaßen von beiden getroffen wurde. Die Immunmodulatoren wurden eingeteilt entsprechend der Leitlinie in drei Wirksamkeitskategorien (Gruppe 0 = keine Immunmodulation; Gruppe 1, »Basismedikation« = Interferone, Glatirameracetat, Fumarsäure, Teriflunomid; Gruppe 2 = Finolimod, Cladribin, Ozanimod;

Gruppe 3, hochwirksame Medikamente = Alemtuzumab, Ocrelizumab, Rituximab, Natalizumab)
Ergebnisse: 197 PmMS nahmen teil. Entgegen unserer Hypothese unterschied sich die Risikowahrnehmung nicht in den drei Medikamentengruppen und den PmMS ohne Immunmodulation. Allerdings unterschied sich die Befolgung von Entscheidungsregeln signifikant in den vier Gruppen: Sie war am höchsten in der Gruppe mit den Basismedikamenten und am niedrigsten in Gruppe 2 (mittelstarke Medikamente). Gleichzeitig war der Anteil der Patienten, die die Entscheidung hinsichtlich der Immunmodulation sich allein zuordneten, bei den PmMS am höchsten, die keine Immunmodulation nahmen.
Diskussion: Bemerkenswert ist, dass unter den unbehandelten PmMS (Gruppe 0) der Anteil derjenigen, die angaben, die Entscheidung selbst getroffen zu haben, am höchsten war. Der Hinweis für eine niedrige Entscheidungskompetenz in Gruppe 2 (mittelstark) ist überraschend und läßt verschiedene Interpretationen zu.

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S23–04

THER-I-ACT (THERapy-related Inter-ACTion) – Interrater-Reliabilität eines neuen Instrumentes zur standardisierten Erfassung therapeutischer Interaktion in der Rehabilitation

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Ziel der Studie: Prüfung der Interrater-Reliabilität des neuen Instruments THER-I-ACT zur Beobachtung kommunikativer therapeutischer Interaktionen in der Rehabilitation.
Methoden: Das neue Instrument THER-I-ACT (THERapy-related Inter-ACTion) wurde entwickelt, um sowohl die Häufigkeit als auch die zeitliche Dimension kommunikativer therapeutischer Interaktion in den Themenfeldern Informationsbereitstellung, Rückmeldung (Feedback), andere motivationsbezogene Interaktion und Beziehungsförderung zu erfassen; innerhalb dieser Themenfelder werden ferner spezifische Kategorien therapeutischer Interaktion definiert. Zudem erfolgt eine Bewertung von Engagement und Fokussiertheit der Beteiligten bei der Therapie.
Für die Interrater-Reliabilitäts-Studie erhielten Schlaganfallpatienten (N = 29) entweder Armrehabilitation entsprechend der individuellen Indikation als Arm-Fähigkeits-Training, Arm-Basis-Training, oder Spiegeltherapie, oder eine Neglect-Therapie. Die Therapiesitzungen wurden videografisch aufgezeichnet (eine Sitzung pro Teilnehmer*in) und die therapeutische Interaktion von zwei unabhängigen Ratern mit THER-I-ACT Manual-basiert dokumentiert.
Ergebnisse: Im Hinblick auf die Fähigkeit des Instruments, therapeutische Interaktion mit vordefinierten Kategorien zu erfassen, wiesen die Daten von 29 Therapiesitzungen eine fast vollständige Erfassung nach. Die Interrater-Reliabilität der Erfassung therapeutischer Interaktion war sehr hoch, sowohl für die einzelnen Kategorien der therapeutischen Interaktion (Häufigkeit und Dauer der Interaktion) (Intraklassen-Korrelationskoeffizient, ICC 0,91 bis 1,00), als auch für die Summenwerte für die Themenfelder therapeutischer Interaktion (ebenfalls Häufigkeit und Dauer der Interaktion) (ICC 0,98 bis 1,00). Die Interrater-Reliabilität für die Bewertung von Engagement und Fokussiertheit war, sowohl für den Patienten als auch den Therapeuten substanziell (ICC 0,71 und 0,86).
Schlussfolgerungen: Die Beobachtungsstudie dokumentiert, dass mit Hilfe des neu konzipierten Instrumentes THER-I-ACT verschiedene Arten therapiebezogener kommunikativer Interaktion seitens der Behandler mit einer sehr hohen Interrater-Reliabilität erfasst werden können. Darüber hinaus deckten die mit dem Instrument definierten Themenfelder und Kategorien therapeutischer Interaktion umfassend die Interaktionsarten ab, die in den beobachteten therapeutischen Sitzungen auftraten.

Drittmittelangaben:
Das Verbundprojekt »E-BRAiN - Evidenz-basierte Roboter-Assistenz in der Neurorehabilitation« (www.ebrain-science.de) wird vom Europäischen Sozialfond (ESF), Referenz: ESF/14-BM-A55-0001/19-A02, und dem Ministerium für Bildung, Wissenschaft und Kultur des Landes Mecklenburg-Vorpommern gefördert. Die Forschung wurde zudem vom BDH Bundesverband Rehabilitation e.V. gefördert (TP). Die Sponsoren hatten keinen Einfluss auf die Projektinhalte, deren Analyse oder Publikation.

S23–05

Entwicklung und Validierung eines kurzen Fragebogens zur Erfassung »erster Eindrücke« wahrgenommener Patientencharakteristika bei rehabilitativer Therapie

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Hintergrund und Zielsetzung: Trainingsbasierte Rehabilitationstherapie ist ein Schlüsselelement in der Rehabilitationsmedizin und wird häufig als persönliche Trainingssituation organisiert. Dabei ist ein Therapeut als »Coach« aktiv und ein oder mehrere Patienten als »Trainees«, um ein bestimmtes Training zu absolvieren und so ihre Fähigkeit für bestimmte Körperfunktionen und Aktivitäten oder ihre tatsächliche Performanz im Alltag zu verbessern. Die Rolle der Therapeuten ist gekennzeichnet durch Kenntnisse und Fähigkeiten sowohl in Bezug auf die angewandte Therapie als auch die kommunikative Interaktion, die das Arbeitsbündnis, die Motivation und die tatsächliche Umsetzung der Therapie fördert. Diese Interaktion wird auf der Grundlage von Patientenmerkmalen individualisiert und angepasst, wobei sich einige auf bekannte Fakten beziehen, während andere von den Therapeuten eher subjektiv wahrgenommen werden, mitunter als »erster Eindruck«. Ziel dieser Untersuchung war die Entwicklung und Validierung eines kurzen Fragebogens zur Messung der wahrgenommenen Patientenmerkmale auf der Grundlage eines »ersten Eindrucks«.
Methoden und Ergebnisse: Relevantes Fachwissen über ggf. therapierelevante Patientenmerkmale wurde in strukturierten Interviews von einer rehabilitationserfahrenen Ergotherapeutin und einer Ärztin erfragt. Auf der Grundlage dieses Wissens wurden 69 Items zur Beurteilung wahrgenommener Patientenmerkmale entwickelt und ihre Beobachtbarkeit und Reliabilität anhand einer Stichprobe von videoaufgezeichneten Rehabilitationstherapiesitzungen mit 29 Schlaganfallpatienten analysiert. Dreiunddreißig der insgesamt 69 Items, welche für alle 29 Patienten, die eine Rehabilitationstherapie erhielten, auf der Basis einer Therapiesitzung von zwei unabhängigen Ratern konsistent und zuverlässig bewertet werden konnten, wurden anschließend für eine prinzipielle Komponenten-Analyse (PCA) genutzt. Für eine Teilmenge von 24 Items ergab die PCA ein stabiles Modell

mit drei Komponenten, wobei alle Items jeweils nur zu einer Komponente einen wesentlichen Beitrag leisteten. Unter Verwendung einer Teilmenge der 9 Items mit der engsten Assoziation zu den drei identifizierten Komponenten wurden drei zusammengesetzte Scores (»composite scores«) gebildet, die jeweils einen anderen Aspekt der subjektiv wahrgenommenen Patientenmerkmale umfassten, nämlich »Arbeitsweise«, »Interaktion« und »Verstehen«. Alle drei zusammengesetzten Scores zeichneten sich durch eine sehr hohe Inter-Rater-Reliabilität aus (ICC > 0,90).
Schlussfolgerung: Der systematisch entwickelte Fragebogen »First Impressions in Rehabilitation Sessions by Therapist, FIRST questionnaire« ist ein kurzer 9-Item-Fragebogen, dessen Konstruktvalidität belegt ist und der zuverlässig, erste Eindrücke von wahrgenommenen Patientenmerkmalen, die Therapeuten, während einer ersten (einzelnen) therapeutischen Sitzung gewinnen, dokumentieren kann.

S24–03

Verlaufsstudie zu robotergestützten Assessments von propriozeptiven Handdefiziten bei Schlaganfall-Patienten und deren Zusammenhang mit der sensomotorischen Funktionserholung

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Einleitung: Es ist unklar, ob motorische und propriozeptive Beeinträchtigungen der Hand nach Schlaganfall ähnlichen Genesungsmustern folgen. Momentan konzentrieren sich die meisten Studien auf die motorische Erholung, weshalb wir nicht viel über die sensorische Genesung wissen. Zusätzlich sind die klinischen Assessments nicht sensible genug, um Veränderungen genau zu erfassen.
Methode: Die Assessments der motorischen und sensorischen Handbeeinträchtigungen wurden mit einem Roboter (ETH MIKE) durchgeführt. Der ETH MIKE kann den Zeigefinger präzise bewegen und misst Kraft, Position und Geschwindigkeit. Mit dem Gerät können mehrere Assessments durchgeführt werden, um Bewegungsdefizite und sensorische Störungen (spezifisch – Propriozeption) zu messen.
In dieser Studie werden bis zu 50 subakute, stationäre Patienten der Phasen C und D der Kliniken Schmieder Allensbach rekrutiert und alle zwei Wochen mit robotischen Assessments vermessen. Bei Studieneintritt und -austritt werden zusätzlich auch klinische Assessments, sowie Neurophysiologie (Somatosensorisch Evozierte Potentiale [SEP] und Motorisch Evozierte Potentiale [MEP]) durchgeführt. Zudem werden MRT-Bilder zur Läsionslokalisation akquiriert.
Ergebnisse: Bis jetzt wurden 41 Schlaganfall-Patienten rekrutiert. Die bisher analysierten Daten (N = 23) zeigen eine große Variabilität in den Beeinträchtigungsprofilen der Schlaganfallpatienten (z. B. Fugl-Meyer Obere Extremität: 4 – 60 Punkten). Die Patienten waren bei Studieneintritt im Durchschnitt 35 Tage und bei Studienaustritt 60 Tage nach Schlaganfall. Basierend auf dem Messfehler der robotischen Assessments hat sich die Mehrheit der Probanden nicht in der motorischen Funktion (aktiver Bewegungsumfang, 8/23 Patienten) oder in der Propriozeption (1/23 Patienten) verbessert. Probanden, die bei Studieneintritt bessere propriozeptive Fähigkeiten hatten, konnten bei Studienaustritt einer vorgegebenen Bewegung mit dem Roboter gleichmäßiger folgen (N = 23, Spearman rho = 0,553, p = 0,005). Schließlich fanden wir eine starke Korrelation zwischen MEP, sowie Fugl-Meyer Obere Extremität und einer Roboter-basierten Metrik zur Fingermotorik bei Studieneintritt (N = 13, rho = 0,77 – 0,89, p < 0,01). Der gleiche Trend, aber nicht signifikant, war auch zwischen den verschiedenen Assessments der sensorischen Beeinträchtigung vorhanden.
Diskussion: Die Genesungsmuster sind bei den bis jetzt rekrutierten Patienten unterschiedlich, was möglicherweise von der Größe und Lage der Läsion abhängt. Wahrscheinlich sind motorische und sensorische Genesung dissoziiert, da sich bisher mehr Patienten in der motorischen als in der sensorischen Funktion verbessert haben. Eine intakte Propriozeption bei Studieneintritt oder deren Genesung ist jedoch hilfreich für eine sensomotorische Genesung, gemessen an der gleichmäßigen Zielverfolgung mit dem Finger am Roboter bei Studienende. Die ersten Resultate deuten auch auf die Validität der vorgeschlagenen robotergestützten Assessments hin.

S24–05

Elektrophysiologische und behaviorale Effekte von anodaler und kathodaler transkranieller Gleichstromstimulation der betroffenen Hemisphäre bei Schlaganfall

S. Yasaroglu, J. Liepert (Allensbach/DE)

Einleitung: Transkranielle Gleichstromstimulation (transcranial direct current stimulation, tDCS) wird zur Verbesserung motorischer Defizite nach Schlaganfall eingesetzt. Überwiegend wurden bislang klinisch-behaviorale Effekte untersucht, nur wenig Evidenz besteht hinsichtlich der durch tDCS hervorgerufenen Erregbarkeitsveränderungen. Bei Gesunden führen anodale Stimulationen zu einer Erregbarkeitssteigerung, kathodale Stimulationen zu einer Reduktion der Erregbarkeit. Ob dieses auch für Patienten mit einer bereits durch die Hirnschädigung hervorgerufene Veränderung der Erregbarkeit gilt, ist unklar. In dieser Studie wurden sowohl eine anodale als auch eine kathodale Stimulation der geschädigten Hemisphäre durchgeführt; mittels verschiedener Techniken der transkaniellen Magnetstimulation (TMS) wurden vor und nach der tDCS-Behandlung inhibitorische und fazilitierende Eigenschaften des motorischen Kortex untersucht.
Methodik: In die Studie wurden 20 Patienten mit Schlaganfall in der subakuten Phase (< 6 Monate nach Ereignis) eingeschlossen. Die Patienten erhielten eine 20-minütige tDCS-Behandlung des primär motorischen Kortex der betroffenen Hemisphäre mit 1,5 mA. Es wurden sowohl eine anodale als auch eine kathodale Stimulation im Abstand von 2 – 4 Tagen durchgeführt. Die Reihenfolge war randomisiert. Vor und nach der tDCS wurden mittels TMS die Short latency intracortical Inhibiton (SICI), die Intracortical facilitation (ICF) und die Long latency intracortical inhibition (LICI) sowohl in der betroffenen als auch der nicht-läsionierten Hemisphäre untersucht. Zudem wurden motorische Funktionen der betroffenen Hand mit dem Box-und-Block Test (BBT) vor und nach der tDCS untersucht.
Ergebnisse:

1. Nach anodaler Stimulation waren die BBT-Ergebnisse unverändert (prä: 33,... blocks, post: 33,... blocks), nach kathodaler Stimulation trat eine signifikante Verbesserung auf (prä: 31, ... blocks, post: 33,... blocks, p = 0.004)

2. Nach anodaler Stimulation war die SICI in der betroffenen Hemisphäre geringer ausgeprägt als bei Baseline.
3. Bereits bei der baseline Messung war die SICI in der betroffenen Hemisphäre geringer als in der nicht-läsionierten Hemisphäre.
4. Nach kathodaler Stimulation waren die Amplituden motorisch evozierter Potentiale erhöht, jedoch ohne Änderungen von SICI, ICF, LICI.

Diskussion: Eine anodale tDCS bewirkte eine intrakortikale Disinhibition in der betroffenen Hemisphäre; eine relative Disinhibition bestand bereits vor der tDCS, höchstwahrscheinlich durch eine Herunterregulation des GABA-Stoffwechsels. Kathodale Stimulationen führten nicht zu einer messbaren Erregbarkeitsreduktion und waren mit einer Verbesserung motorischer Funktionen assoziiert. Weitere Analysen folgen.

S28–02

Messung der Ergebnisqualität in der neurologischen und geriatrischen Rehabilitation, zwei Befragungsansätze

N. Birkner (Düsseldorf/DE)

Einleitung: Der GKV-Spitzenverband betreibt seit 2012 ein bundesweit verbindliches, einheitliches und routinemäßig angewandtes QS-Verfahren im Bereich der stationären und ambulanten Rehabilitation, das QS-Reha®-Verfahren. Darin werden zur Beschreibung der Behandlungs-erfolge Effektstärken bestimmt. Im Neurologie-Modul wurden wiederholt keine bis negative Effekte gefunden. Eine Sonderauswertung [1] soll den Hintergrund für dieses unerwartete Ergebnis aufdecken.
Material/Methode: Für die Sonderauswertung wurden die Befragungsdaten der Indikationsbereiche Kardiologie, Muskuloskeletale Erkrankungen, Pneumologie und Neurologie des Erhebungszyklus 2015 – 2017 zu vergleichenden Analysen ausgewertet. Die Ergebnisqualität wird im QS-Reha®-Verfahren mit Skalen des IRES-3 [2] im Prä-Post-Design gemessen. Neurologischen Reha-Patienten werden verkürzte Skalen sowie eine Zusatzskala mit 10 neurologischen Symptomen vorgelegt. Analysiert wurden u.a. Datenqualität, Item-Kennwerte, Messgüte und Effektivität.
Ergebnisse: Insgesamt wurden 19.319 Fälle aus 220 Einrichtungen ausgewertet. In der Neurologie fällt die Rücklaufquote am niedrigsten und der Anteil fehlender Werte am höchsten aus. Neurologische Reha-Patienten geben zu Reha-Beginn am häufigsten Symptomfreiheit an. Der Anteil positiver Delta-Werte fällt bei neurologischen Reha-Patienten am geringsten aus. Item-Schwierigkeit und Trennschärfe liegen nahezu ausnahmslos im Zielbereich. Die Antworten neurologischer Patienten weisen nahezu durchgehend eine höhere interne Konsistenz auf als die der Vergleichsgruppen (Reliabilität). Eine explorative Faktorenanalyse der Delta-Werte der Neurologie-Daten liefert eine exakte Replikation der verwendeten IRES-Skalen und der Zusatzskala (Konstruktvalidität). Bei vier von fünf Scores zeigen sich bei neurologischen Reha-Patienten Effektstärten nahe Null, in einem Fall fällt sie negativ aus.
Diskussion: Die Ergebnisse zeigen, dass die verwendeten Skalen mit Ausnahme der Zusatzskala sehr gute Messeigenschaften aufweisen und dass die Angaben der neurologischen Reha-Patienten im hohen Maße valide sind. Die Ergebnisse lassen sich mit der Inhomogenität der Beschwerdebilder in der neurologischen Reha erklären. Geringe bis negative Effekte resultieren, da für einen Patienten jeweils nur bestimmte Items relevant sind, die ggf. Effekte zeigen. Die restlichen irrelevanten Items verwässern dann das Ergebnis mit der Aggregation. Daher empfehlen wir eine Individualisierung der Ergebnisqualitätsmessung. Als Beispiel eines individualisierten QS-Verfahrens wird auf das Geriatrie-Modul im QS-Reha®-Verfahren hingewiesen.

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S36–01

Welche Biomarker sind charakteristisch für CRPS und wie verhalten sich diese unter Intervention (GMI)? / Transferring chronic pain patients back in to movement – changes in biomarkers and clinic during graded motor imagery (GMI) treatment in patients with complex regional pain syndrome (CRPS)

S. Strauss, M. Lotze (Greifswald/DE), G. Lorimer Moseley (Adelaide/AU)

Neuropathic pain is difficult to treat and increase of symptoms over time is frequent. For complex regional pain syndrome (CRPS) behavioural interventions found their way into national and international guidelines for treatment options. We used graded motor imagery (GMI) treatment in a wait-list control study to investigate not only clinical outcome (movement pain) but also sensorimotor performance, functional representation of the sensorimotor system, functional representation for implicit imagery (mental rotation of hands) and cortical excitability using dual-stimulation transcranial magnetic stimulation (TMS). Several biomarkers were characteristic for patients but not for age matched controls. Movement pain and sensorimotor performance after 6 weeks of treatment improved over intervention but not over waiting. Wit respect to biomarkers cortical inhibition and S1-activation magnitude for the affected hand movement were modified by intervention into the direction of HCs. Overall, we demonstrated characteristic changes in clinical, behaviour and neuropathology parameters applying GMI in patients with upper limb CRPS.

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Acknowledgements:
The study had been generously supported by the Else Kröner-Fresenius-Stiftung (2019-A24).

S37–01

Langzeitrehabilitation – Entwicklungschancen für Menschen mit erworbenen Hirnschädigungen

M. Schrader, A. Sterr, C. Dohle, S. Bamborschke (Berlin/DE)

In Deutschland ist die Anzahl an erworbenen Hirnschädigungen (EH) mit je ca. 250.000 neuen Fällen von Schlaganfall und Schädelhirntrauma pro Jahr nach wie vor sehr hoch. EH gehören zu den häufigsten Ursachen für bleibende Behinderungen im Erwachsenenalter. Nach dem Aufenthalt in der Akutklinik schließt sich für etwa die Hälfte der Betroffenen mit relevantem Defizit eine stationäre neurologische Rehabilitation an. Aber nicht alle Patienten können ihr Potential in dieser Rehabilitationszeit ausschöpfen und sind weiterhin stark in ihrer Selbständigkeit und Teilhabe eingeschränkt. Das Konzept der Langzeitrehabilitation ist im Phasenmodell der BAR der Phase E zugeordnet und bietet betroffenen Patienten die Chance, weiter gefördert zu werden. Oberstes Ziel ist dabei die Rückkehr in ein möglichst selbständiges Leben.
Am Beispiel des P.A.N. Zentrums für Post-Akute Neurorehabilitation wird in dem Vortrag ein Konzept der Langzeitrehabilitation im Zusammenspiel zwischen rehabilitativen Maßnahmen und pädagogischer Alltagsbegleitung erläutert und Verläufe dargestellt. Mit diesem Konzept erreichen nach einer durchschnittlichen Aufenthaltsdauer von 18 Monaten etwa 78 % der Klienten, die bei Einzug ein sehr hohes Maß an Unterstützungsbedarf hatten, die Rückkehr in eine selbstbestimmte Wohnform. Detaillierte Analysen, z. B. des (Frühreha-)Barthel Index und des Mayo-Portland Adaptability Inventory zeigen kritische Prädiktoren und Zielparameter.
Das komplexe Finanzierungsmodell von Langzeitrehabilitationsmaßnahmen demonstriert aber auch, wie die strikte Sektorierung des deutschen Gesundheitssystems effektive Maßnahmen zur langfristigen Reduktion von Pflegeabhängigkeit erschwert.

S40–04

Is there a circadian differential effect of fatigue in multiple sclerosis on sustained attention performance?

A. Bernik, A. Hildebrandt (Oldenburg/DE), I. A. Heber (Wilhelmshaven/DE), H. Hildebrandt (Oldenburg/DE)

Fatigue is one of the most common and debilitating symptoms in multiple sclerosis (MS) [1], yet the mechanism itself is still not well understood. One model proposes that fatigue is caused by activation of the immune system. As the immune system undergoes circadian changes, fatigue should be fluctuating accordingly [2]. Indeed, previous study reported fatigue increase throughout the day [3]. Most likely, subjective fatigue feelings lead to increased attention towards interoceptive information, thus generating attentional interference [2].
The present study aimed to investigate whether subjective fatigue is stronger in the afternoon than in the morning (shows circadian pattern) and whether it can be measured objectively with vigilance task (VT) primarily in the afternoon, based on assumption that fatigue impairs attentional performance by internal distraction. So far we assessed N = 14 patients with MS (ongoing study). Each patient was tested once in the morning and once in the afternoon on two different days. Both times we first applied Visual Analogue Scale (VAS) to measure momentary subjective fatigue level, followed by auditory VT and ending again with VAS.
Repeated measures ANOVA was used to compare the performance on VT and subjective fatigue assessment between low- and high-fatigued group (divided by median value of cognitive fatigue, 25.5), while controlling for covariate age. We observed a significant interaction between the groups and response times (RT) in relation to the two halves of VT ($p = 0.035$) and VAS scores before vs. after VT ($p = 0.014$). RT of the low-fatigued group increased significantly by the end of VT ($p = 0.008$), whereas it remained almost the same for the high-fatigued group, which was, however, still slower. Subjective fatigue of the latter group increased significantly throughout the task ($p = 0.004$). The overall difference between the groups was significant ($p < 0.001$), for VAS score before VT ($p = 0.004$) as well as after it ($p < 0.001$). However, there was no effect of the time of the day related to subjective and objective fatigue measures.
Our study failed to replicate previous studies showing circadian pattern of attention in fatigued MS-patients. High-fatigued patients showed slowed RT in VT from the beginning, while low-fatigued patients showed higher decrement in RT.
In conclusion, hitherto results indicate that VT can indeed be used at any point of the day as an objective tool for measuring MS-related fatigue.

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S40–05

Kognitive Fatigability als signifikanter Prädiktor hinsichtlich des Erwerbsstatus 3 Monate nach Entlassung

S. Marchione, C. Dettmers, A. W. Jäkel (Konstanz/DE), B. Godde (Bremen/DE), M. Jöbges (Konstanz/DE)

Hintergrund: Bei Menschen mit Multipler Sklerose (PwMS) führt das Gefühl pathologischer Erschöpfung, bekannt als Fatigue, häufig zur vorzeitigen Berentung. Es wird zwischen subjektiver Empfindung von Erschöpfung (Fatigue) und objektiv messbarer Leistungsveränderung (Fatigability) differenziert.
Absicht: Ziel dieser Studie war, herauszufinden, ob die Fatigue Skala für Motorik und Kognition (FSMC) als Maß für Fatigue oder die tonische Alertness-Messung als Marker für Fatigability der stärkere Prädiktor für den Erwerbsstatus 3 Monate nach Entlassung der Rehabilitation ist.
Methode: 64 MS-Patienten wurden eingeschlossen (mittleres Alter 48,9, 43 Frauen, Durchschnittsdauer der Erkrankung 14,7 Jahre, mittlere Expanded Disability Status Scale (EDSS) 3,8), die über eine vermehrte Müdigkeit klagten und Zweifel erkennen ließen, ob sie ihr tägliches Arbeitspensum weiterhin schaffen. Entsprechend nahmen sie an einem kognitiven Belastungstag während ihres stationären Rehabilitationsaufenthalts teil. Das subjektive Empfinden (Fatigue) wurde

mit Hilfe des Fragebogens für Motorik und Kognition (FSMC) erfasst. Die objektive Messung wurde auf der Basis der Reaktionszeitleistung unter Verwendung der Alertness-Testung (TAP-M) durchgeführt. Die tonische Wachsamkeit wurde im Tagesverlauf um 8 Uhr, 11 Uhr und 14 Uhr gemessen. Die Patienten arbeiteten morgens sowie nach dem Mittagessen an einer standardisierten Testbatterie, um Ermüdbarkeit zu induzieren. Mittels eines standarisierten Telefoninterviews wurde der berufliche Status 3 Monate nach Entlassung erfragt und klassifiziert.
Ergebnisse: Der durchschnittliche Wert der kognitiven Fatigue hinsichtlich FSMC betrug 38,9 ± 7,4 und die durchschnittliche motorische Erschöpfung 41,0 ± 5,6, was auf eine schwere kognitive und motorische Fatigue hindeutet. 15 (88 %) von 17 der Vollberufstätigen gaben an, unter einer schweren Fatigue gemäß FSMC zu leiden. Unter den Prädiktoren haben die Grundmessung am Morgen (Alertness1) und die Differenz der Messung von Nachmittag zum Mittag (Alertnessdifferenz32) einen signifikanten Einfluss auf den beruflichen Status. Der FSMC zeigte keinen prädiktiven Wert hinsichtlich des Erwerbsstatus. 83 % der sozialmedizinischen Prognosen, wie sie im Entlassungsbrief festgehalten wurden, gingen 3 Monate nach Entlassung in Erfüllung. Bei 16 (94 %) von 17 vollberufstätigen MS-Patienten ist die berufliche Situation 3 Monate nach Entlassung bezüglich der letzten sozialversicherungspflichtigen Tätigkeit als auch auf dem allgemeinen Arbeitsmarkt geklärt. Dieser endgültige Erwerbsstatus ist bei den teilzeitarbeitenden MS-Patienten zu 50 % geklärt.
Schlussfolgerung: Für den Erwerbsstatus 3 Monate nach Entlassung der Rehabilitationsklinik erweist sich die objektive Performance Messung (Alertness1 und Alertnessdifferenz32) als der besserer Prädiktor entgegen dem subjektiven Ermüdungsempfinden gemäß FSMC.

S43–01:
The role of action re-enactment in cognition. Implications for neurological diseases and neurorehabilitation

G. Buccino (Milan/IT)

There is increasing evidence that our capacity to imagine and recognize actions as well as to understand actions when described verbally is strictly related to our capacity to re-enact actions, in the absence of an overt execution. Pivotal studies carried out with different neurophysiological and brain imaging techniques have demonstrated that during motor imagery and action observation the same areas active during the actual execution of actions are involved. More recently, data have been collected showing an early involvement of the motor system during language processing of different grammar items (nouns, verbs). Taken together, these experimental findings raise the problem of the residual capacity of neurological patients to imagine, understand and process semantically actions and the potential role of these cognitive strategies in neurorehabilitation. Results of rehabilitation studies exploiting action re-enactment, like Action Observation Treatment (AOT), in both neurological and non-neurological diseases will be presented and discussed.

BERUFSVERBÄNDE

DVE–01

Erfahrungen in der Umsetzung von einer manualisierten ergotherapeutischen Intervention

S. Brinkmann (Osnabrück/DE)

Hintergrund: Die Manualisierung von Interventionen kann als eine wichtige Voraussetzung gesehen werden, um im Rahmen von Wirksamkeitsstudien das Vorgehen verschiedener ErgotherapeutInnen standardisiert und vergleichbar evaluieren zu können. Manuale gewinnen deshalb zunehmend an Relevanz in der ergotherapeutischen Versorgung. Das Manual »Zurück in den Alltag- Aktivitäten des täglichen Lebens« (ZidA-ADL) beschreibt die Durchführung eines ergotherapeutischen Alltagstrainings für Personen mit einem Schlaganfall in der ambulanten Versorgung [1]. Prozessorientiert werden Infomaterialien, Erhebungsbögen, Planungsstrukturen, Interventionsinhalte und Dokumentationshilfen bereitgestellt und soll ErgotherapeutInnen dabei unterstützen, den Interventionsprozess strukturiert, transparent und evidenzbasiert zu gestalten. Die Intervention sollte vornehmlich im häuslichen Setting stattfinden und sieht eine konsequente Einbeziehung der betroffenen Person und gegebenenfalls dessen Angehörigen sowie weitere beteiligte Professionen in allen Prozessschritten vor.
Material/Methode: Zur Überprüfung der Umsetzbarkeit des ZidA-ADL Manuals, wurden 11 ErgotherapeutInnen aus unterschiedlichen Praxen über einen Zeitraum von 3,5 Stunden geschult und das Vorgehen unter Alltagsbedingungen über zehn Wochen reflektierend erprobt [2]. Daten zur Schulung, über das Manual und dessen Umsetzung wurde mittels Evaluations- und Selbstreflexionsbögen, Analyse der therapeutischen Dokumentation sowie einer abschließenden leitfadengestützten Gruppendiskussion von 7 TeilnehmerInnen erhoben.
Ergebnis: Die Auswertung der Daten brachte erste Erkenntnisse über Schulung, Einarbeitungsprozesse, Verständlichkeit, Vollständigkeit und Handhabbarkeit des Manuals. Zudem konnten förderliche und hinderliche Faktoren bei der Umsetzung der Intervention im Praxiskontext identifiziert werden. Neben kleineren Anpassungen am Manual ist eine intensive Begleitung der ErgotherapeutInnen im Einarbeitungsprozess notwendig, um eine zuverlässige und vergleichbare Implementierung der Intervention zu erzielen. Auch Kommunikationsprozesse mit der betroffenen Person und dessen Angehörigen haben einen Einfluss auf die Umsetzung der Intervention und benötigen intensive Phasen der Aufklärung und Einbindung im Interventionsprozess.
Diskussion: ZidA-ADL ist eine komplexe Intervention, dessen Umsetzung im Praxiskontext verschiedene Veränderungsprozesse erforderlich macht. Nächste Schritte sind die Überarbeitung des Manuals, die Konzipierung und Evaluation einer modularen Fortbildung sowie eine weitere Erprobung und Evaluation des Manuals.

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DBfK–01

Bedeutung der pflegewissenschaftlichen Begutachtung

C. Bienstein (Berlin/DE)

Erst seit den 90er-Jahren haben Pflegende den Zugang zu einem pflegewissenschaftlichen Studiengang erreicht. Zuvor wurden pflegerelevante Gutachten primär durch Mediziner:innen erstellt. Dieses erwies sich in vielen Fällen als nicht förderlich. Klagen gegen die Begutachtung im Rahmen der Pflegeversicherung nahmen deutlich zu. Nach Errichtung des Departments für Pflegewissenschaft an der Universität Witten/Herdecke und weiterer Studiengänge in diesem Bereich an anderen Hochschulen wurden die gutachterlichen Anfragen häufig an diese gestellt und von dort übernommen.
Es zeigte sich, dass die pflegewissenschaftliche Expertise in vielen Fällen von Bedeutung war und ist, da Kenntnisse über die Aufgaben und Verantwortlichkeiten, die Pflegefachpersonen im Rahmen ihrer beruflichen Tätigkeit übernehmen Voraussetzung für eine sachgerechte Erstellung eines Gutachtens sind, welches pflegerelevante Fragen beantworten muss.
Im Referat wird auf die Entwicklung und den jetzigen stand pflegewissenschaftlicher Gutachten eingegangen.

GNP–01

Neuropsychological disorders in patients after COVID-19 – spectrum of symptoms and differential diagnostic considerations

A. M. Plohmann, K. Bopp, A. Meienberg (Basel/CH)

Introduction: A substantial number of patients who suffered from COVID-19 complain of persistent symptoms including neuropsychological disturbances and increased fatigue/fatigability. Even patients after a mild course of disease experience these symptoms to such a degree that they apply for disability benefits. Especially in cases where no somatic symptoms can be found, the question of the objectifiability of cognitive impairment and possible differential diagnoses arises.
Methods: As a collaborative practice of the Polyclinic for Internal Medicine, University of Basel, we are examining Long-Covid patients with mild disease courses and no damage of organs who still report cognitive impairment more than 3 – 6 months after infection. The neuropsychological assessment, lasting several hours, includes not only neuropsychological tests (NAB, TAP) but also self-report instruments (MMPI-2, CIS-20-R, CFQ) as well as performance and symptom validity tests. We present preliminary descriptive assessment results.
Results: The extent of underperformance in neuropsychological tests in our sample ranges from slight impairments, e.g., in working memory, to severe deficits in all examined cognitive domains. It is important to note, that these deficits are not always valid. In many cases MMPI-2 profiles show a »conversion v« indicating a possible somatoform disorder, often associated with marked repression and denial. There are also hints for special personality traits.
Discussion: When assessing neuropsychological disorders in Long-Covid patients, relevant psychological differential diagnoses and comorbidities should be considered, especially in cases with prolonged sick-leave. In our sample

these seem to consist mainly in somatoform disorders and personality accentuations or disorders, mostly with histrionic personality traits.
This has important implications for the development of treatment programs for this special group of Long-Covid patients.

GNP–01
NeuroCOVID International Neuropsychology Taskforce

E. Łojek (Warsaw/PL)

As a global challenge, the Covid-19 pandemic has begun to generate new initiatives for international cooperation. One of the responses of the international community of neuropsychologists and specialists in related fields was the foundation of the NeuroCOVID International Neuropsychology Taskforce (NeuroCovid INT) as a part of the International Neuropsychological Society Special Interest Group in April 2020. This presentation aims to explain the history of the NeuroCovid INT foundation, goals, structure, international representation (see **Fig. 1**), multidisciplinarity, work carried out so far, projects in progress, development prospects. Particular attention will be paid to the Recommendations for the international harmonization of neuropsychological measurement methods in COVD-19 [1]. Examples of other relevant international projects and initiatives will also be given.

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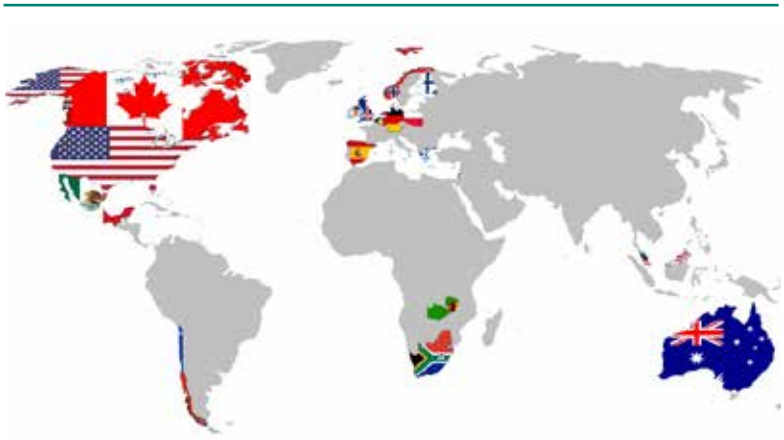
GNP–03
An Interdisciplinary Concept for the Treatment of Neurocovid Symptoms

A. S. Hasting, S. Herzig, A.Thöne-Otto (Leipzig/DE)

Neuropsychological symptoms, especially long-term complains of fatigue, as well as concentration and memory disorders are frequent in Post Covid patients. The etiology is unclear, female gender and a previous mental illness seem to increase vulnerability. We will present an interdisciplinary day-clinic treatment concept, derived from evidence-based elements of other neurological diseases with accompanying fatigue. The aim of the program is to increase self-efficacy in coping with the long-term impairment. Patients learn to differentially perceive resources and weaknesses and to optimize compensation strategies. The participants get to a better understanding of the factors influencing their performance. On this basis, strategies for activity and break management (pacing) are applied. Regular cognitive training serves both to activate and promote cognitive long-term resilience and as a practice field for the self-controlled use of breaks. Mindfulness-based training improves the focus of attention. In addition, participants have the opportunity to practice and apply the strategies under communicative requirements. Physiotherapeutic elements include training of strength and fitness, as well as mindfulness-based exercises (Qi-Gong). Psycho-educational elements on nutrition sleep hygiene and social law issues complete the program. Preliminary experiences will be presented.



GNP–01. Fig. 1: The Taskforce INT representation, including the following countries (in alphabetical order): Australia, Belgium, Canada, Chile, Finland, Germany, Greece, Israel, Malaysia, Mexico, Netherlands, Norway, Poland, Portugal, South Africa, Spain, UK, USA, Zambia

GNP–04
Neuropsychological consequences of COVID-19 in people with dementia

R. Thyrian (Greifswald/DE)

There is emerging evidence and a growing scientific body targeting at the short-, mid- and long-term neurological consequences and implications of COVID 19. While it was considered a lung disease in the beginning, there were symptoms described that imply neurological consequences like loss of smell and taste, forgetfulness and apathy because of an infection with the SARS-CoV-2-Virus.
There are parallels between SARS-COV-2 virus infections and neurodegenerative diseases, not only that aetiology, mechanisms and course of the disease are not fully understood. In the beginning older people were identified for being of special vulnerability. This is true for dementias as well. Age and morbidity is associated with severity of Corona. There is a need to understand and examine the consequences of COVID 19 on people with dementia. Due to measures of social distancing, there was not much research possible in the beginning of the pandemic, but currently the body of evidence is growing considerably every week. Anecdotal reports and qualitative assessments were the basis of later, bigger studies with advanced methods. Long-COVID has been identified as a syndrome of interest.
The presentation will give an up to date review about research on the consequences of COVID-19 on neuropsychological variables in people with dementia. This will support discussions about treatment and care opportunities.

DVSG–01

Teilhabeorientierte Anforderungen für die gesundheitsbezogene Soziale Arbeit in der Neuro-Rehabilitation

S. Dettmers (Kiel/DE)

Gesundheitsbezogene Soziale Arbeit bietet theoretisch fundierte Interventionen zur Förderung der sozialen Teilhabe für Menschen mit neurologischen Erkrankungen in der medizinischen und beruflichen Rehabilitation an. Anhand der komplexen Anforderungen durch sozialrechtliche Rahmungen und unterschiedlichen Lebenslagen von Rehabilitandinnen und Rehabilitanden sowie ihren Angehörigen sind bestimmte Maßnahmen zur sozialen Sicherung, sozialen Unterstützung und Autonomieunterstützung notwendig. Anhand der Dimensionen Inklusion und Integration werden fachliche Zugänge Sozialer Arbeit vorgestellt, die eine optimierte Teilhabe ermöglichen.

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DVSG–02

Neuro-Rehabilitation an den Versorgungsschnittstellen mit dem Fokus auf Teilhabe

A. Thomas (Lübeck/DE)

Leistungsrechtlich begründet in SGB V, SGB VI, SGB VII SGB IX und SGB XIV wird an den Übergängen von neurologischer Akutbehandlung und medizinischer Rehabilitation das Handlungskonzept Case Management als Koordinationsoption implementiert. So hat die DGUV bereits seit vielen Jahren Reha Management implementiert [4], die Deutsche Rentenversicherung hat ein übergreifendes Fallmanagementkonzept erstellt [1] und in der Schlaganfallnachsorge werden unterschiedliche Lotsenprojekte erprobt [3]. Im Bereich der Neuro-Rehabilitation wurde am Beispiel Schlaganfall im Rahmen einer Metasynthese zur Umsetzung der RTW-Planung ebenfalls ein Fallmanagement empfohlen [2]. In dem Vortrag wird kurz in die unterschiedlichen Modelle eingeführt und dargestellt, welchen Beitrag die Gesundheitsbezogene Soziale Arbeit leisten kann.

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DVSG–03

SWIMMER - Erfahrungen aus einem Forschungsprojekt und Implikationen für die Praxis gesundheitsbezogener Sozialer Arbeit in der Rehabilitation

T. Knoop, N. Scheiblich (Bielefeld/DE)

Der Sozialdienst (SD) ist Bestandteil des multiprofessionellen Teams der medizinischen Rehabilitation. Der gegenwärtige Forschungsstand verweist auf eine ausgeprägte Variation in der Inanspruchnahme und Ausgestaltung sozialarbeiterischer Leistungen und inkonsistente Ergebnisse zu deren Wirksamkeit [1]. Das von der GfR NRW e. V. geförderte Projekt SWIMMER soll an dieser Stelle zur Aufklärung beitragen.

In insgesamt 10 Rehabilitationseinrichtungen in NRW werden Leitfadeninterviews mit Mitarbeiter*innen des SD und Leitungspersonen sowie teilnehmende Beobachtungen des Arbeitsalltages der SD durchgeführt. Zusätzlich werden Beratungsgespräche aufgezeichnet. Die Auswertung der anonymisierten Daten orientiert sich am Vorgehen der Grounded Theory [2].

Der Zugang zum SD erfolgt überwiegend über das ärztliche Personal, aber auch initiativ durch die Rehabilitand*innen selbst, in Team-Besprechungen oder wird obligatorisch hergestellt. Sozialarbeiter*innen sammeln, verarbeiten und nutzen Informationen der Rehabilitand*innen, des Reha-Teams sowie externer Akteure. U.a. dabei sind sie vom Grad der Einbindung in den Reha-Prozess (z. B. Assessment) und in die interprofessionelle Kommunikation abhängig. Sie setzen diese Informationen bei der Planung weiterer Leistung und der Beantragung dieser ein. Neben dem Aufgabenschwerpunkt bei der Erschließung beruflicher Teilhabeperspektiven trägt der SD auch zum Gelingen der Reha-Maßnahmen während und nach dem Aufenthalt insbesondere durch die Klärung der wirtschaftlichen Absicherung der Rehabilitand*innen bei.

Sozialarbeiter*innen befinden sich in einem Spannungsfeld zwischen den Reha-Zielen der Rehabilitand*innen, dem durch die Einrichtung vermittelten gesellschaftlichen Auftrag, den Erwartungen des Reha-Teams und dem professionellen Mandat. Die Studie gibt Hinweise, dass die sozialdienstliche Netzwerkarbeit mit Nachversorgern wie z. B. dem Fallmanagement von einer regelmäßigen und möglichst direkten Kommunikation profitiert. Für den bedarfsorientierten Zugang über das ärztliche Personal mangelt es an Kenntnis über die möglichen Aufgaben und Kompetenzen des SD.

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ZVK–03

The construct of outdoor ambulation capacity of people after stroke in the chronic phase – SCOPING REVIEW

C. Pott (Neuried/DE)

Introduction: Although a large proportion are discharged from inpatient rehabilitation as ambulatory many people after apoplex do not move outside of their living quarters in the chronic phase (Phase-E). There is a lack of evidence for interventions to improve community ambulation and uncertainty which assessments should be used. The reason for this is the lack of a generally accepted definition and a comprehensive description of the multidimensional construct of community ambulation. It is unclear which dimensions and indicators characterize the construct. The objectives of the master's thesis were a comprehensive representation and conceptualization of the multidimensional construct, the identification of models related to the construct to synthesize recommendations for the development and evaluation of interventions and assessments.

Method: A scoping review was carried out. The search was carried out from October to December 2020 in the databases Cochrane Library, MEDLINE, OT Seeker and PEDdro and by hand search. The data was analyzed quantitatively and descriptively. Analyzation was done model-based by using content analysis according to the framework of Arksey & O'Malley for scoping reviews [1]. Coding and categorization were based on the ICF-based model for physical outdoor activity after a stroke by Outermans et al. [2]. The methodological procedure was reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyzes extension for Scoping Reviews (PRISMA-SCR checklist) [3].

Results: The database search identified in MEDline 1705, in the Cochrane Library 25, in Clinical Trials 223, in OT Seeker 52 and in PEDro 48 hits (n = 2053). Data analysis of the included studies was carried out after a selection process and the integration of hits from other sources (n = 75), which included one international guideline.

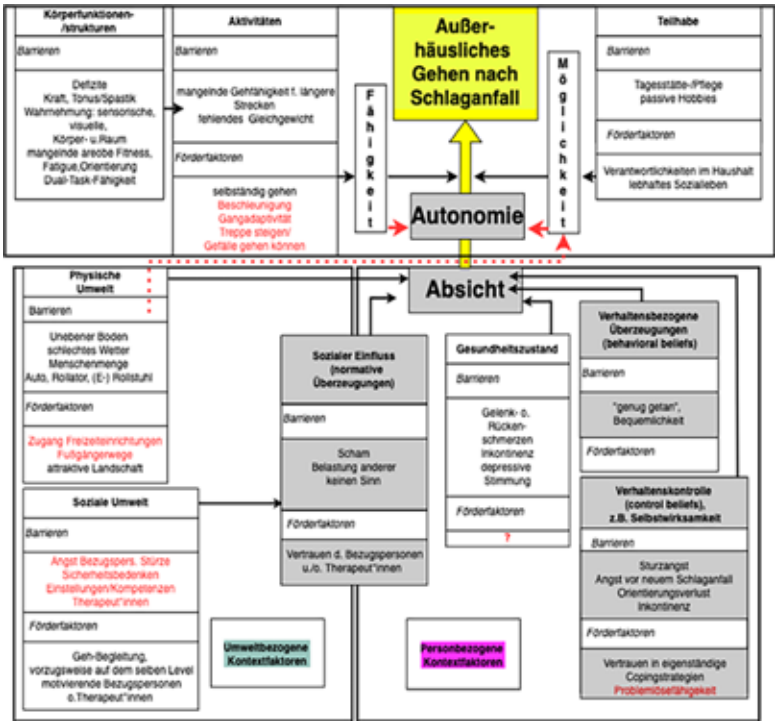
There is no generally accepted definition of the construct and no effectiveness of interventions to improve community ambulation of people after apoplex in the chronic phase (on a systematic review level of evidence, [4]). The ICF-based model for physical outdoor activity after a stroke by Outermans et al. [2]. was confirmed **(Figure 1)** and five other models were found. A comprehensive behaviour model has not yet been implemented.

At an individual-level a distinction can be made between the dimensions of motor skills and psycho-emotional factors. Personal, physical and non-physical environmental factors influence walking outside the home as well as underlying motor parameters. The gait parameters speed and endurance characterize the motor dimension. Balance self-efficacy, control beliefs and a willingness to change behavior can be measured as psycho-emotional indicators. The influence of self-efficacy has been well investigated, whereas other dimensions of resilience were neglected. A few studies explore the influence of environmental factors on community ambulation. Attitudes of relatives and therapists have a significant impact on people who have had a stroke who would like to increase their abilities of walking outside.

There is a lack of theory-based evaluated interventions, classifications and assessments. The real performance of the abstract ability of community ambulation can be evaluated with motion sensors that meet the validity requirements even at low speeds and on uneven ground. Interventions should be complex, interprofessional and incorporate behavior change techniques. There are a number of research perspectives, especially with regard to inter- and transprofessional approaches.

Discussion and conclusion: Walking outside in the chronic phase of people after stroke can be understood as one dimension of the construct of gait-related participation. The assessments and classifications available to date are not suitable for measuring the ability of community ambulation in the chronic phase. There is no evidence of the effectiveness of a complex intervention to improve community ambulation. Walking behavior outside the home is the result of the interactions of individual motor, psycho-emotional, cognitive factors against the background of many influencing context factors that are present in the person himself and in the environment. There is a need to develop theory-based assessments and interventions.

Keywords: stroke, construct, community ambulation, scoping review



ZVK–03. Fig. 1: The scoping review onfirmed the ICF-based model for physical outdoor activity after a stroke by Outermans et al. [2] (extensions are marked in red)

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DBL–01
Neurorehabilitation in der Logopädie

J. Klann (Heidelberg/DE), M. Abel, J. Quinting (Köln/DE)

Das Symposium gibt einen historischen Überblick über die Rehabilitation in der Sprachtherapie und wirft einen Blick in die Zukunft. Dabei werden neue Entwicklungspotenziale in der sprachtherapeutischen Versorgung von Patient*innen in der Neurorehabilitation fokussiert.

Der erste von drei Teilen in diesem Symposium gibt einen Überblick über die Anfänge der logopädischen Neurorehabilitation. Im Mittelpunkt stehen hier die Aphasien und Sprechapraxien. Während Diagnostik und Therapie den Klassifikationen dem Schema der International Classification of Impairments, Disabilities and Handicaps (ICIDH) folgend stark defizitorientiert ausgerichtet waren, standen im Mittelpunkt der rehabilitativen Forschung Lokalisationstheorien und die Frage nach der Abgrenzung von Syndromen und Subsyndromen. Dem folgte die Hinwendung zu Sprachverarbeitungsmodellen und modellgeleiteter Diagnostik und Therapie. Mit moderneren Techniken und Erkenntnissen aus der Bildgebung veränderte sich die Sicht hier hin zu Netzwerken und ganzheitlichen kommunikationsorientierten Ansätzen. Schließlich vollzog mit der Ablösung der ICIDH von der International Classification of Functioning, Disability and Health (ICF) ein vollständiger Paradigmenwechsel in der Betrachtung gesundheitlicher Befindlichkeiten. Die Zielsetzungen wanderten damit von der Orientierung an der Normleistung zur Beschwerpunktung der Teilhabe mit weitreichenden Folgen für die diagnostisch-therapeutische Arbeit. Zudem rückten weitere Störungsbilder mehr in den Blick der Logopädie, wie z. B. Abbauerkrankungen (v. a. Alzheimer-Demenzen, Parkinson-Demenzen und Primär Progressive Aphasien). An dieser Stelle setzt der zweite Teil des Symposiums seinen Fokus, der die aktuellen Entwicklungen und Zukunftsvisionen in den Blick nimmt.

Die logopädische Versorgung fokussiert seit Einführung der ICF auch in der Neurorehabilitation neben funktionalen Beeinträchtigungen der Betroffenen verstärkt die Ebenen Aktivität und Partizipation. Dies wird inzwischen nicht mehr nur seitens der WHO (2001) gefordert, sondern auch von den Kostenträgern. Dies erfordert eine Modernisierung diagnostischer Materialien über die Funktionsebene hinaus und die Verschiebung des therapeutischen Schwerpunkts auf pragmatisch-kommunikative Fähigkeiten. So sind die Therapieziele inzwischen auf der Aktivitäts- und Partizipationsebene gemeinsam mit dem Patienten zu entwickeln. Hier erfährt auch die rein sprachsystematische Sprachtherapie einen Umbruch hin zur evidenzbasierten alltagsorientierten Sprachtherapie [4, 7]. Im Zuge der Modernisierung der Sprachtherapie und insbesondere während der aktuell herrschenden pandemischen Lage wächst zudem die Hinwendung zu digitalen Therapie- und Diagnostikmöglichkeiten. Gefordert werden neben der reinen Umwandlung analoger in digitale Formate (Leinweber & Dockweiler, 2020) auch die Anwendung originärer digitaler Medien und Techniken [3].

Ein momentan besonders hervortretender und brandaktueller Aspekt der modernen logopädischen Neurorehabilitation betrifft eine tiefergehende Betrachtung kognitiv-kommunikativer Beeinträchtigungen. Aufgrund des demographischen Wandels und einer alternden Bevölkerung, wird in Zukunft eine Zunahme der Zahl Betroffener mit Demenzerkrankungen erwartet. Aber auch verbesserte und weitreichendere Diagnostikmöglichkeiten lassen detailliertere Diagnosen zu. Vor eine neue Herausforderung können uns so auch immer jünger diagnostizierte Patienten mit Demenz stellen sowie auch Patienten mit Demenzerkrankungen und Migrationshintergrund [2].

Ein Aspekt, der zunehmend an Bedeutung und Beachtung in der Sprachtherapie gewinnt, sind kognitiv-kommunikative Beeinträchtigungen, die mit einer Demenzerkrankung einhergehen können [1], jedoch häufig auch im Rahmen erworbener neurologischer Erkrankungen, etwa in Folge eines Schädel-Hirn-Traumas (SHT) auftreten können [8]. Diesem, häufig als Kognitive Kommunikationsstörung beschriebenen Störungsbild, widmet sich der Schwerpunkt des Symposiums. Die Symptomatik umfasst Beeinträchtigungen, die weniger als sprachsystematisch (Phonologie, Lexikon/Semantik, Syntax) definiert werden können, sondern ihren Störungsschwerpunkt im kommunikativen Einsatz von sprachlichen Fähigkeiten haben. Das vom Gesprächspartner häufig als auffällig wahrgenommene Kommunikationsverhalten ist Resultat einer Dysfunktionalität der komplexen Interaktion verschiedener kognitiver, linguistischer, emotionaler, physischer, behavioraler und psychosozialer Bedingungsfaktoren [5]. In den Fokus aktueller Literatur rückt zunehmend der explizite Einfluss sozialkognitiver Dysfunktionen [6]. Der dritte Vortrag greift das neuere sprachtherapeutische Forschungs- und Tätigkeitsfeld der ‚Kognitiven Kommunikationsstörungen' auf und skizziert entsprechend grundlagentheoretischer Erkenntnisse zum Zusammenhang sozial kognitiver Subkomponenten (Emotionserkennung, Empathie, Theory of Mind) und kommunikativer Kompetenz bei Betroffenen mit SHT. Weiterhin werden aktuelle diagnostische und therapeutische Ansätze vorgestellt und Empfehlungen bzgl. der interdisziplinären Versorgung Betroffener durch Medizin, Neuropsychologie, Ergotherapie und Sprachtherapie abgeleitet.

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ORAL PRESENTATIONS

OP1–01

An exploratory study on cognitive and psychological performance in post-CoViD-19 patients during rehabilitation

M. Ottonello, E. Fiabane, C. Vassallo (Genova/IT), M. Manera, C. Pistarini (Pavia/IT)

Introduction: Most scientific studies suggests that Codvid-19 is associated with adverse mental health consequences as posttraumatic stress disorder (PTSD) symptoms, distress, anxiety and depression and that cognitive deficits are common following acute respiratory distress syndrome (ARDS) but still few scientific studies investigate the effects of COVID-19 on cognitive functioning and the relations with the clinical variables of the disease.
Objectives: The present study aimed at investigate cognitive and psychological outcomes related to sociodemographic and clinical features in Covid-19 during rehabilitation.
Materials & Methods: Forty-five post-Covid-19 patients admitted to rehabilitation Unit of ICS Maugeri SPA SB (Pavia, Italy) in order to improve their functional status. Exclusion criteria were: history of mental or neurological disorders and use of drugs that may interfere with the assessment; previous physical disabilities; hearing or visual impairments. During the 1st week of admission, all patients underwent a psychological and neuropsychological assessment. Sociodemographic and clinical data about the patients were also retrieved through interview or clinical documentation. Mini Mental state Examination was used for screening cognitive impairment and Prose Memory Test (PM) to evaluate memory function more thoroughly. Depression was assessed using Patient Health Questionnaire -9 (PHQ-9) and Psychological distress related to the Covid-19 was assessed using the Impact Scale-Revised (IES-R). This is a preliminary study of a research project approved by the local Ethics Committee of Maugeri. All participants give their written informed consent to the study.
Results: The mean age of participants was 69.4 (± 9.75), predominantly male (66.7 %) with a mean education of 11.24 (± 3.94). Neuropsychological assessment showed that 17.8 % of patients resulted impaired in the total score of MMSE adjusted for age and education and the 36.4 % in the recall function at PM test. We found significant differences on cognitive performance (MMSE total score and PM) in relation to disease severity of Covid-19 ($p < .05$). The 58.2 % of participants showed a depression of minimal to moderate severity and a psychological distress with severe symptoms (33.3 %) and 12.8 % from mild to moderate symptoms.
Conclusions: These results confirm that post-COVID-19 patients recovered in rehabilitation unit presented cognitive deficits, especially in memory functions. In this preliminary study, we found that patients admitted to an Intensive Care Unit (ICU) presented better cognitive performance than those not admitted. The worse cognitive performances were of patients with disease severity mild-to-moderate requiring O2 or not invasive ventilation. This exploratory study has limitations related to the small sample size and further research are needed to improve the validity of results.

OP1–02

Fatigue and »brain fog« in the aftermath of mild COVID-19: a neuropsychological and TMS study

P. Ortelli, D. Ferrazzoli, L. Sebastianelli (Vipiteno - Bolzano/IT), R. Maestri (Montescano Pavia/IT), S. Dezi (Vipiteno - Bolzano/IT), D. Spampinato (Rome/IT), L. Saltuari, A. Alibardi, M. Engl, M. Kofler (Vipiteno - Bolzano/IT), A. Quartarone (Messina/IT), G. Koch (Rome/IT), A. Oliviero (Toledo/ES), V. Versace (Vipiteno - Bolzano/IT)

Background and aims: Fatigue and »brain fog« are frequently complained by patients even after mild COVID-19. We investigated whether these symptoms could be related to central neurological dysfunctions.
Methods: Sixty-seven patients complaining of fatigue and/or »brain fog« and 22 healthy subjects (HS) were enrolled. Fatigue, perceived exertion (evaluated after motor task) and »brain fog« were evaluated. Global cognition and executive functions were assessed with Montreal Cognitive Assessment (MoCA) and Frontal Assessment Battery (FAB). Attention was measured with Sustained Attention, Stroop and Navon computerized-tasks. Transcranial magnetic stimulation (TMS) of the primary motor cortex (M1) evaluated resting motor threshold (RMT), motor evoked potential (MEP) amplitude, and cortical silent period (SP). Intracortical activity was evaluated with paired-pulse TMS protocols including short-interval intracortical inhibition (SICI), reflecting GABAA-mediated inhibition, long-interval intracortical inhibition (LICI), a marker of GABAB receptor activity, and short-latency afferent inhibition (SAI) that indexes central cholinergic transmission.
Results: Patients reported high level of perceived fatigue, exertion and »brain fog«. MOCA and FAB highlighted poorer performances in patients than HS. At computerized tasks, both, sustained and executive attention were impaired. Patients presented higher RMTs, lower MEPs amplitude and longer SPs, as compared to HS, concurring with a reduced M1 excitability. LICI and SAI were impaired, indicating altered GABAB- and cholinergic neurotransmission.
Conclusions: Overall, our results demonstrate, in long COVID-19, an important link between fatigue, »brain fog« and central nervous system dysfunctions, characterized by frontal lobe cognitive impairments and altered neurotransmission.

OP1–03

Within-session reliability of anticipatory postural adjustments in people with Parkinson's disease with freezing of gait

J. Seuthe (Kiel/DE), N. D'Cruz (Leuven/BE), P. Ginis (Leuven/BE), R. Blöbaum, B. Weisser, G. Deuschl (Kiel/DE), A. Nieuwboer (Leuven/BE), C. Schlenstedt (Kiel/DE)

Introduction: Gait initiation (GI) is impaired in people with Parkinson's Disease and Freezing of Gait (PD+FOG) due to start hesitation. An essential part of the GI process are anticipatory postural adjustments (APAs) and first step characteristics which are hypometric in PD+FOG [1]. Improving GI is an important rehabilitative aim in PF+FOG but to date it is unclear how many trials need to be assessed to obtain a reliable measurement of the GI process. Therefore, the aim of this study is to investigate the within-session reliability of APA and first step characteristic detection in PD+FOG and

healthy elderly (HC) under single (ST) and dual task (DT) conditions.

Methods: Thirty-eight PD+FOG (ON-medication) and 30 HC performed 5 trials of GI under ST and DT (auditory stroop test). APAs and first step characteristics were captured using inertial measurement units (IMUs) placed on the lower back and on each foot. Intraclass correlation coefficients (ICCs) and the standard error of measurement (SEM) were calculated to investigate reliability and mixed model analysis performed to find potential systematic errors between trials. On top of that, we computed an estimation for the number of necessary trials to reach acceptable reliability (ICC = 0.75) for each outcome.

Results: ICCs varied from low reliability to excellent reliability across the various outcomes in PD+FOG and HC **(Figure 1)** and were comparable under ST and DT for most outcomes. The SEM results confirmed the ICC results. A systematic error was found for the first trial in first step range of motion (ROM), however exclusion did not change the results substantially. The number of necessary trials was lowest for medio-lateral (ML) APA size and first step ROM in both PD+FOG and HC.

Discussion: Within-session reliability varied across outcomes but was similar for PD+FOG and HC, and ST and DT. ML APA size and first step ROM showed the highest reliability. Especially first step ROM, which previously showed sensitivity to differentiate between PD and HC [2], could be used as an outcome or progression marker in future clinical trials. Depending on the selected outcome, future studies should conduct several trials of GI to increase reliability.

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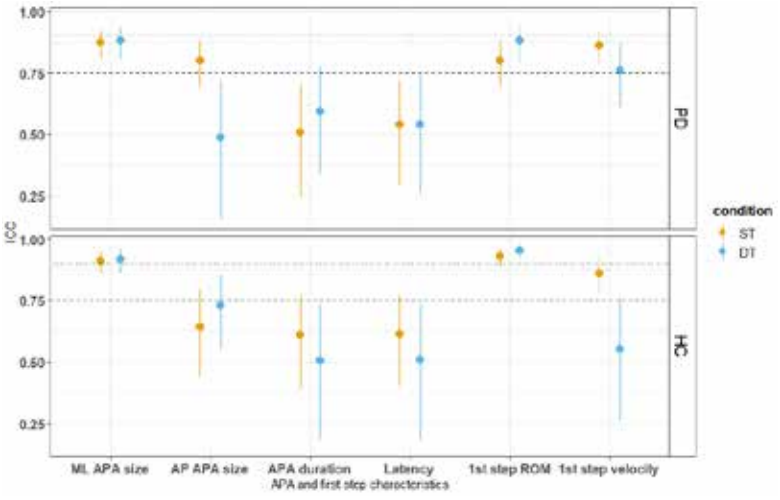


OP1–03. Fig. 1: ICC (2,k) for PD + FOG and HC. Values above the dashed line indicate good reliability. Values above the dotted line indicate excellent reliability. The figure shows ICCs with lower and upper 95% confidence intervals

OP1-04

Validity and reliability of the 6-minute walk test over a distance of 6 metres in people with multiple sclerosis

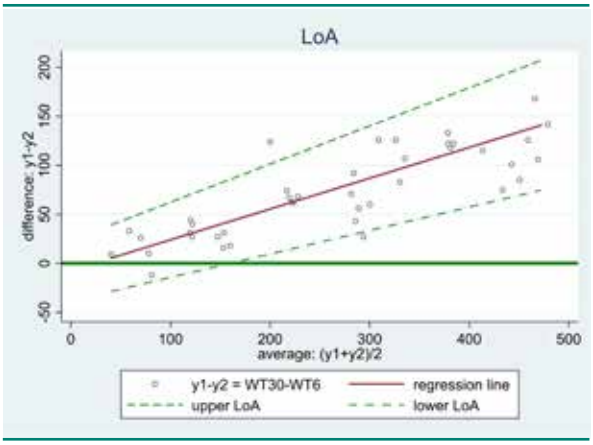
S. Ferchichi-Barbey, (Lausanne/CH), K. Guex (Lausanne/CH)

Introduction: The 6-minute walk test (6MWT) is used to monitor patients with multiple sclerosis (MS) in physiotherapy. It represents their walking endurance and is strongly associated with their real activities of daily living [1, 2]. However, it's often impossible to use it at the physiotherapy practice and at patients' homes because the distance of 30 m is not always available to carry it out. It is even recommended to write »not applicable« to these situations by the Academy of Neurologic Physical Therapy [3].

Objectives: To validate a new version of the 6MWT over a distance of 6 m and to verify its test-retest and intra-rater reliability. To analyze the factors influencing a possible difference between the two tests, and especially the time to turn in a complete circle as on a shorter distance the half turns will be more frequent.

Patients and method: Validation study on 21 patients with MS, EDSS between 3 to 6.5, who performed twice the 6MWT on 6 m, once the 6MWT on 30 m and turned in a complete circle (360 Degree Turn Test) while timed on 2 separate days.

Results: The 6MWT on 6 m is very highly correlated with the reference 6MWT on 30 m ($r = 0.98$, $p < 0.01$, IC 0.98 to 0.94). Its test-retest and intra-rater reliability is excellent (ICC 0.996 and 0.979 respectively). However, a difference in performance between the 6MWT on 6 m and the reference 6MWT is present and 50 % is explainable by the time taken to turn around (360 Degree Turn Test). The degree of agreement between the 6MWT on 6 m and the 6MWT shows a greater difference than the minimal important change and a proportional bias is noticeable. A transformation coefficient of 1.34 is therefore needed to use the 6MWT on 6 m interchangeably with the 6MWT. Other factors that account for this difference include gender, time since relapse, age and weight of the person.



OP1–04. Fig. 1

Conclusion: The 6MWT on 6 m is valid and reliable. In order to compare its results to those of the standard test and thus to compensate for the proportional bias, a coefficient must be used. Since then, it can be use in all practices and at patients' homes. These results make a valuable instrument available for a wider use.

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OP1–05

Efficiency and Effectiveness of an asynchronous telerehabilitation intervention for people within AD continuum: the Ability-TelerehABILITation model

F. Rossetto, S. Isernia, O. Realdon, F. Borgnis, V. Blasi, C. Pagliari, M. Cabinio, M. Alberoni, F. Mantovani, M. Clerici, F. Baglio (Milan/IT)

Background: Telemedicine constitutes an innovative solution for the long-term management and rehabilitation of people in the Alzheimer's disease (AD) continuum. Specifically, the asynchronous telerehabilitation approach can be considered the most sustainable model to provide home-based, individualized care, overcoming the restrictions of traditional face-to-face interventions. However, randomized controlled trials demonstrating the effectiveness of this telerehabilitation approach are needed.
Objective: This study aimed to pilot investigate the efficiency and effectiveness of an innovative digital health, home-based Ability-TelerehABILITation intervention (ABILITY) for people with cognitive impairment.
Method: This randomized controlled trial involved thirty people with within AD continuum, randomly allocated to a digital-health telerehabilitation treatment (ABILITY; n = 15, 6 males, mean age = 78.2 ± 3.95), or treatment as usual (TAU; n = 15, 8 males, mean age = 77.13 ± 6.38). Both groups performed six weeks of multidimensional activities combining cognitive, motor, and functional rehabilitation in their social environment. In the ABILITY group, cognitive and motor activities were provided through the digital telerehabilitation platform. Moreover, vital parameters (body weight, oxygen blood level, blood pressure, and heart rate) were monitored through specific devices integrated into the ABILITY platform. In the TAU group, the intervention was carried out in a standard modality (paper and pencil cognitive activities and written instructions for physical exercises). Patients and their caregivers were assessed at baseline (T0), after eight weeks of treatment (T1), and 12 months after the baseline (T2). Efficiency (usability, adherence, and perceived fit of demands and skills) and effectiveness measures (neuropsychological level, neuropsychiatric symptoms, and autonomy in daily living) were collected at each time point of evaluation.
Results: Our results showed that ABILITY is more efficient than TAU ensuring high patient adherence to treatment (81% vs. 62%), with a perception of greater balance between own and required skills during the ABILITY program ($p < .05$). Also, the ABILITY system has been judged usable by both caregivers and patients. In terms of effectiveness, results revealed a treatment effect (ABILITY > TAU) on the global cognitive level and multidimensional cognitive outcomes (language, executive functions, and memory). Moreover, a carry-over effect of treatment (1-year follow-up) was observed in global cognitive functions and language (ABILITY > TAU), as well as on the frequency of behavioral symptoms (TAU < ABILITY) and caregiver distress (TAU < ABILITY).
Conclusion: Our pilot findings supported the notion that the ABILITY telerehabilitation approach is an effective and efficient digital health intervention useful in strengthening environmental, social, and functional resources while preserving cognitive abilities.

OP1–06

The effects of intensive neurorehabilitation on sequence effect in parkinson's disease patients with and without freezing of gait

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Background: The sequence effect (SE), defined as a reduction in amplitude of repetitive movements, is a common clinical feature of Parkinson's disease (PD), and is supposed to be a major contributor to freezing of gait (FOG). During walking, SE manifests as a step-by-step reduction in step length when approaching a turning point or gait destination, resulting in the so-called destination sequence effect (dSE). Previous studies explored the therapeutic effects of several strategies on SE, but none of them evaluated the role of an intensive rehabilitative program.
Objectives: Here we aim to study the effects of a 4-week rehabilitative program on dSE in patients with PD with and without FOG.
Methods: Forty-three patients (30 males, 70.6 ± 7.5 years old) with idiopathic PD were enrolled. The subjects were divided into two groups: patients with (PD+FOG, n = 23) and without FOG (PD-FOG, n = 20). All patients underwent a standardized 4-week intensive rehabilitation in-hospital program. At hospital admission (T0) and discharge (T1), all subjects were evaluated with inertial gait analysis for dSE recording.
Results: At T0, the dSE was more negative in PD+FOG group (-0.80 ± 0.6) when compared to PD-FOG group (-0.39 ± 0.3) ($p = 0.007$), even when controlling for several clinical and demographic features. At T1, the dSE was reduced in the overall study population ($p = 0.001$), with a more pronounced improvement in PD+FOG group (T0: -0.80 ± 0.6; T1: -0.23 ± 0.4) when compared to PD-FOG group (T0: -0.39 ± 0.3; T1: -0.22 ± 0.5) ($p = 0.012$). At T1, we described in the overall study population an improvement in speed, cadence, stride duration, and stride length ($p = 0.001$ for all variables).
Conclusions: dSE is a core feature of PD gait dysfunction, specifically in patients with FOG. A 4-week intensive rehabilitative program improved dSE in PD patients, exerting a more notable beneficial effect in the PD+FOG group.

OP1–07

Split-Belt Treadmill to treat gait disorders in Parkinson's disease

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Question: Split-Belt Treadmill (SBT) is an attractive tool to modulate asymmetric gait particularly in neurological con-

ditions such as Parkinson's disease (PD) where asymmetry play a key role due to the laterality of the disease. Freezing of Gait (FOG) as an episodic gait disorder in PD is associated with gait asymmetry and switching deficits which can both be modulated by SBT as the two treadmill belts can run at and switch to different speeds. This presentation will give an overview of the current literature of SBT in PD and will show results of two randomized controlled multi-center trials about the effects of one session SBT training (Study I) and of a long-term 4 weeks SBT training (Study II) to improve gait in people with PD.
Methods: Study I was a pilot study to investigate the effects of one session treadmill training during which different SBT conditions and a tied-belt condition were compared in people with PD (n = 45) and healthy controls (HC, n = 36). Participants were tested at Pre, Post, and 24h-Retention after the training session. Study II aimed at investigating SBT training with regular treadmill training over a training period of 4 weeks, 3 x per week. People with PD (n = 52) were randomized to either SBT or regular treadmill training and were tested at Pre, Post and 4-weeks-Retention.
Results: Results of Study I revealed that SBT proved beneficial for gait adaptation in people with PD and HC ($p < 0.0001$); however, HC improved more. SBT with changing ratios demonstrated significant effects on gait adaptation from Pre to Post in people with PD, supported by strong effect sizes ($d = 1.14$) and improvements being retained for 24 hours. Results of Study II are currently in the process of being statistically analyzed and will be presented at the conference.
Conclusion: People with PD improved gait adaptation after a single SBT session although effects were smaller than in HC. SBT with changing ratios was the most effective to ameliorate gait adaptation in people with PD. Whether long-term SBT training has potential to induce a better resilience to gait disorders such as FOG is currently under investigation and results will be presented at the conference.

OP1–08

Incidence of post traumatic epilepsy in Khartoum state, Sudan, between the period of december 2018 to january 2020

R. Mahde (Omdurman/SDN)

Introduction: Epilepsy is one of the commonest neurological disorders. It has a strong association with trauma to the brain, constituting of 5% of epilepsy cases.
Objective: To determine the prevalence of post-traumatic epilepsy among Sudanese patients and to demonstrate the relation between traumatic brain injury and occurrence of epilepsy.
Methodology: A descriptive hospital-based cross-sectional study, conducted in Bashiar, Omdurman, and Ibrahim Malik Teaching Hospitals in Khartoum state, in the period from December 2018 to January 2020. Patients were interviewed by general emergency team. Relevant history was obtained, and both biochemical and neuroimaging investigations were done.
Results: 70 patients with history of traumatic brain injury (TBI), 6 (11.3%) developed post traumatic epilepsy (PTE). (82.9%) were males and (17.1%) were females. In the 6 patients who developed PTE, the mode of trauma in two of them was gunshots, two due to fall, one by an automobile accident and one had missing data. Out of them, one had subarachnoid hemorrhage, one had bilateral subdural hematoma and one developed massive epidural hemorrhage. Statistically significant correlation was found between TBI and number of comorbid conditions. Older age was associated with more severe TBI. Significant correlation reported between the etiology of TBI and occurrence of PTE. Significant correlation between higher GCS at the time of trauma and not having PTE. People with TBI and GCS more than 12 had 1.8 less chance to develop PTE.
Conclusion: Traumatic brain injury constituting of type of trauma, etiology, formed of brain injury, and GCS at presentation, has significant implications to the occurrence of epilepsy.

OP1–08. Table 1: Cause

Count	Options
12	automobile accident
19	fall
16	assa
5	gun shot
4	hard accidental...
3	other
13	no answer

OP1–08. Table 2: Gender

Count	Options
58	male
19	female
2	no answer
13	no answer

OP1–08. Table 3: Severe TBI

Count	Options
8	brain contusion
4	ICH
12	loc for hours
13	pta amnesia

OP1–09

Transesophageal Echocardiography – Dysphagia Risk in Acute Stroke (TEDRAS): a prospective, blind, randomized and controlled clinical trial

S. Hamzic, T. Braun, M. Butz, H. Khilan (Giessen/DE), S. Weber (Friedberg/DE), M. Yeniguen, T. Gerriets, P. Schramm, M. Juenemann (Giessen/DE)

Background and purpose: Dysphagia is common in acute stroke and leads to worse overall outcome. Transesophageal echocardiography (TEE) is used in the diagnostic evaluation of stroke with regard to its etiology and is a known cause of postoperative dysphagia in cardiac surgery. The prevalence of dysphagia in acute stroke patients undergoing TEE remains unknown. The aim of the Transesophageal Echocardiography – Dysphagia Risk in Acute Stroke (TEDRAS) study was to assess the influence of TEE on swallowing among patients who have experienced acute stroke.
Methods: The TEDRAS study was a prospective, blind, randomized, controlled trial that included two groups of patients with acute stroke. Simple unrestricted randomization was performed, and examiners were blinded to each other's results. Swallowing was tested using flexible endoscopic evaluation of swallowing (FEES) at three different time points in the intervention group (24 h before, immediately after and 24 h after TEE) and in the control group (FEES on three consecutive days and TEE earliest after the

third FEES). Validated scales were used to assess dysphagia severity for all time points as primary outcome measures.
Results: A total of 34 patients were randomized: 19 to the intervention group and 15 to the control group. The key findings of the repeated-measures between-group comparisons were significant increases in the intervention group for the following dysphagia measures: (1) secretion severity score (immediately after TEE: $P < 0.001$; 24 h after TEE: $P < 0.001$) and (2) Penetration-Aspiration Scale score for saliva (immediately after TEE: $P < 0.001$; 24 h after TEE: $P = 0.007$), for small (immediately after TEE: $P = 0.009$) and large liquid boli (immediately after TEE: $P = 0.009$; 24 h after TEE: $P = 0.025$).
Conclusion: The results indicate a negative influence of TEE on swallowing in acute stroke patients for at least 24 hours.

OP1–10

Facilitation of oral sensitivity by electrical stimulation of the faucial pillars

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Dysphagia is common in neurological disease. However, our understanding of swallowing and its central nervous control is limited. Sensory information plays a vital role in the initiation of the swallowing reflex and is often reduced in stroke patients. We hypothesized that the sensitivity threshold of the anterior faucial pillar could be facilitated by either electrical stimulation (ES) or taste and smell information. The sensitivity threshold was measured by ES in the anterior faucial pillar region. The measurement was repeated 5 min after baseline. Thirty minutes after baseline, the participants underwent a test for taste and smell. Immediately after the test, the ES was repeated. Thirty healthy volunteers with a mean age of 27 ± 5.1 participated in the trial. Mean sensitivity threshold at baseline was 1.9 ± 0.59 mA. The values 5 min after baseline (1.74 ± 0.56 mA, $p = 0.027$) and 30 min after baseline (1.67 ± 0.58 mA, $p = 0.011$) were significantly lower compared to the baseline, but there was no difference between the latter ($p = 0.321$). After 5 min, a potentially facilitating effect was found on oral sensitivity by ES of the faucial pillar area. Thirty minutes later, this effect was still present.

OP2–01

Walk and grow up! The influence of gait on cognitive development

M. Avellis (Asso/IT)

When we think of an activity like walking, we consider something dynamic and our attention focuses on biomechanical issues. Therefore, when faced with any problem regarding walking in early intervention, we usually consider pattern, stability and balance. In CP, the physiological mechanisms of the gait are often altered. When patients are affected by spasticity, dystonic patterns, sensory disturbances or structured deformities, we can observe, in their behaviour, the occurrence of internal compensations (kinematic and/or postural changes). Usually, if the patients need it, we can provide them with external compensations (orthosis and/or technical aids).
Several authors pointed out the correlation between the motion/locomotion and the cognitive development, which can depend from:

- Spatial perception
- Depth visual perception
- Initiative
- Social factors
- School performances

Moving in safety allows the kids to improve spatial exploration experiences, one of the most important elements in the relationship between locomotion and cognitive development. According to Kermoian and Campos [1] the spatial seeking can be improved by movement and locomotion. A baby searching for his or her mum's eyes, may be an example of movement, while locomotion may be interpreted as movement in space, such as walking.
Another important issue is the depth visual perception. As it develops, usually starting from the 4th month of age, babies shift their visual perception from 2D vision to 3D vision. They discover that the space around them is not flat. Walking can help to develop this capability (Berenthal, Campos & Kermoian, 1992).
A lack of initiative can make the kids passive and dependent (Butler, 1991); while motion and walking can help them to develop a more curious and proactive approach to reality.
We should suggest walking in early intervention and, for those patients which need external compensations, walking with a gait trainer can make the difference in order to improve the spatial and depth perception, the initiative and the social skills as well as the school performances.
That's why the kids' posture has to be well stabilized during walking.
The modularity and versatility of the gait trainer are crucial. As the kids grow, their clinical needs, their skills and, of course, their size and body shape change and we have to adjust and adapt the equipment to these changes so we can offer to the kids the best possible quality of life.

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OP2–02

tDCS for improving activities and arm function after stroke – update of a Cochrane review

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Question: To assess the effects of transcranial direct currents stimulation (tDCS) on ADL, arm and leg function, muscle strength and cognitive abilities (including spatial neglect), dropouts and adverse events in people after stroke.
Methods: We searched the Cochrane Stroke Group Trials Register, CENTRAL, MEDLINE, Embase and seven other databases in January 2019. In an effort to identify fur-

ther published, unpublished, and ongoing trials, we also searched trials registers and reference lists, handsearched conference proceedings, and contacted authors and equipment manufacturers.
This is the update of an existing review. In the previous version of this review, we focused on the effects of tDCS on ADL and function. In this update, we broadened our inclusion criteria to compare any kind of active tDCS for improving ADL, function, muscle strength and cognitive abilities (including spatial neglect) versus any kind of placebo or control intervention.
Two review authors independently assessed trial quality and risk of bias, extracted data, and applied GRADE criteria. If necessary, we contacted study authors to ask for additional information. We collected information on dropouts and adverse events from the trial reports.
Results: We included 67 trials with 1729 Participants. 23 Studies with 781 Participants examined the effects of tDCS on our primary outcome ADL. 19 studies reported total values at the end of intervention and in a meta-analysis there was evidence of an effect in favor of tDCS (standardized mean difference (SMD) 0.28; 95% confidence interval (CI) 0.13 to 0.44; moderate quality of evidence) with aggregated intervention groups. Four studies with 95 participants reported change scores for this outcome. Their results showed evidence of an effect (SMD 0.48; 95% CI 0.02 to 0.95; moderate quality of evidence). In a sensitivity analysis, these effects did not persist, when we included only studies of high methodological quality. 34 Studies with 958 participants did not show any effects of tDCS for improving arm function (SMD 0.17; 95% CI -0.05 to 0.38 (24 studies with total values, moderate quality of evidence) and SMD 0.33; 95% CI -0.12 to 0.79 (10 studies with change scores; low quality of evidence). There was no evidence of a difference in safety between groups.
Conclusions: There is evidence of very low to moderate quality on the effectiveness of tDCS versus control (sham intervention or any other intervention) for improving ADL outcomes after stroke. However, the results did not persist in a sensitivity analyses including only trials with proper allocation concealment. Future studies should particularly engage with patients who may benefit the most from tDCS after stroke, but also should investigate the effects in routine application. Therefore, further large-scale randomized controlled trials with a parallel-group design and sample size estimation for tDCS are needed.

OP2–03

Rehabilitation glove in patients after a stroke: the possibility of functional recovery increase

E. Ekusheva, V. Voitenkov (St. Petersburg/RU), A. Komazov (Moscow/RU)

Background: One of the most common causes of persistent loss of voluntary motor activity, reduced quality of life, social maladaptation and the inability to self-care in patients after ischemic stroke (IS) is a violation of fine motor skills in the hand.
The aim of the study was to study the effectiveness of bilateral use of the rehabilitation glove based virtual reality (VR) in patients after IS for their functional recovery.
Material and methods: 42 patients were enrolled into the study: those with impaired fine motor skills of the hand after an initial IS in the pool of the right (19) and left (23) middle cerebral arteries (mean age 60.9 years, disease duration from 6 to 12 months). Patients were randomized into 2 groups: the main group (22) and the control group (20). The physical rehabilitation program in the main group included 10 sessions with the rehabilitation glove based on VR (1 hour 1 time per day for each arm for 2 weeks). Functional status in patients of both groups was assessed before and after the course of rehabilitation treatment using the Frenchay scale, ARAT test, MAS scale, the test »nine pegs and nine holes«, the Barthel index and the FIM scale, in the presence of pain - VAS.
Results: Patients of the main group showed a statistically significant improvement compared with the control group according to most methods for assessing functional status, as well as a significant improvement in independence and activity in everyday life. Moreover, the presence and severity of pain was a factor that impedes and slows down the restoration of the act of fine motor skills of the hand.
Conclusion: The bilateral use of innovative technologies with the Biofeedback system in patients after IS, in particular, the rehabilitation glove based on VR, improves the efficiency of the recovery process and the quality of life. Presence and severity of pain is important when ones consider the algorithms of rehabilitation measures in patients after IS.

OP2–04

Undamaged hemisphere activation enhances control on spinal networks of the affected arm post stroke

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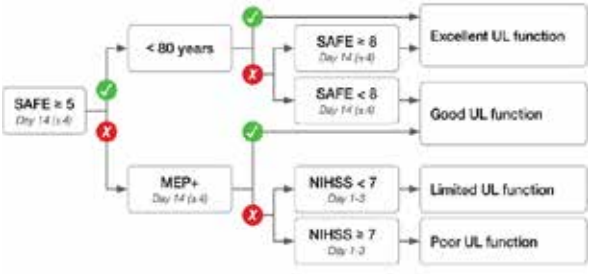
Background: In healthy adults, ipsilateral efferent pathways from the motor cortex poorly contribute in transmission of the voluntary command to spinal motor nuclei. Recent magnetic resonance imaging (MRI) studies suggest that the undamaged hemisphere may contribute in functional adaptation after unilateral brain damage. To what extent ipsilateral tracts from the undamaged hemisphere may strengthen corticospinal control onto spinal motor networks following stroke remains elusive.
Objective. This randomized-sham control study aims to explore effects of undamaged hemisphere activation onto spinal motor networks in 21 hemiparetic stroke patients.
Method: Anodal transcranial direct current stimulation (tDCS) was combined with monosynaptic H-reflex method to evaluate the variations of reciprocal inhibition in wrist flexors. Moreover, five patients underwent MRI in spinal cord to evaluate alterations in descending tracts.
Results: Anodal tDCS unmasks an ipsilateral control from the undamaged hemisphere onto spinal motor networks of the affected side. In the unaffected side, the results differ from that observed in healthy subject. Additionally, an atrophy in spinal cord was found in stroke patients.
Conclusion: Stimulation of the ipsilateral undamaged cortex in stroke patients induces modulation of motor networks controlling the hemiparetic side.
Significance: Rehabilitation could leverage stimulation of the undamaged hemisphere to enhance motor recovery post stroke.

OP2–05

Accuracy of the upper limb prediction algorithm PREP2 applied 2 weeks after stroke: A prospective longitudinal study

C. Lundquist, J. Feldbæk Nielsen (Hammel/DK), F. Gabriel Arguissain (Ålborg/DK), I. Brunner (Hammel/DK)

Background: The Predict Recovery Potential algorithm (PREP2) was developed to predict upper limb (UL) function early after stroke. However, assessment in the acute phase is not always possible.
Objective. To assess the prognostic accuracy of the PREP2 when applied in a subacute neurorehabilitation setting.
Material and methods: This prospective longitudinal study included patients ≥18 years old with UL impairment following stroke. Patients were assessed in accordance with the PREP2 approach. However, 2 main components, the shoulder abduction finger extension (SAFE) score and motor-evoked potentials (MEPs) were obtained 2 weeks after stroke. UL function at 3 months was predicted in 1 of 4 categories and compared with the actual outcome at 3 months as assessed by the Action Research Arm Test. The prediction accuracy of the PREP2 was quantified using the correct classification rate (CCR).
Results: Ninety-one patients were included. Overall CCR of the PREP2 was 60 % (95 % CI 50 % – 71 %). Within the 4 categories, CCR ranged from the lowest value at 33 % (95 % CI 4 % – 85 %) for the category Limited to the highest value at 78 % (95 % CI 43 % – 95 %) for the category Poor. In the present study, the overall CCR was significantly lower (P < .001) than the 75 % reported by the PREP2 developers.
Conclusions: The low overall CCR makes PREP2 obtained 2 weeks after stroke unsuited for clinical implementation. However, PREP2 may be used to predict either excellent UL function in already well-recovered patients or poor UL function in patients with persistent severe UL paresis.



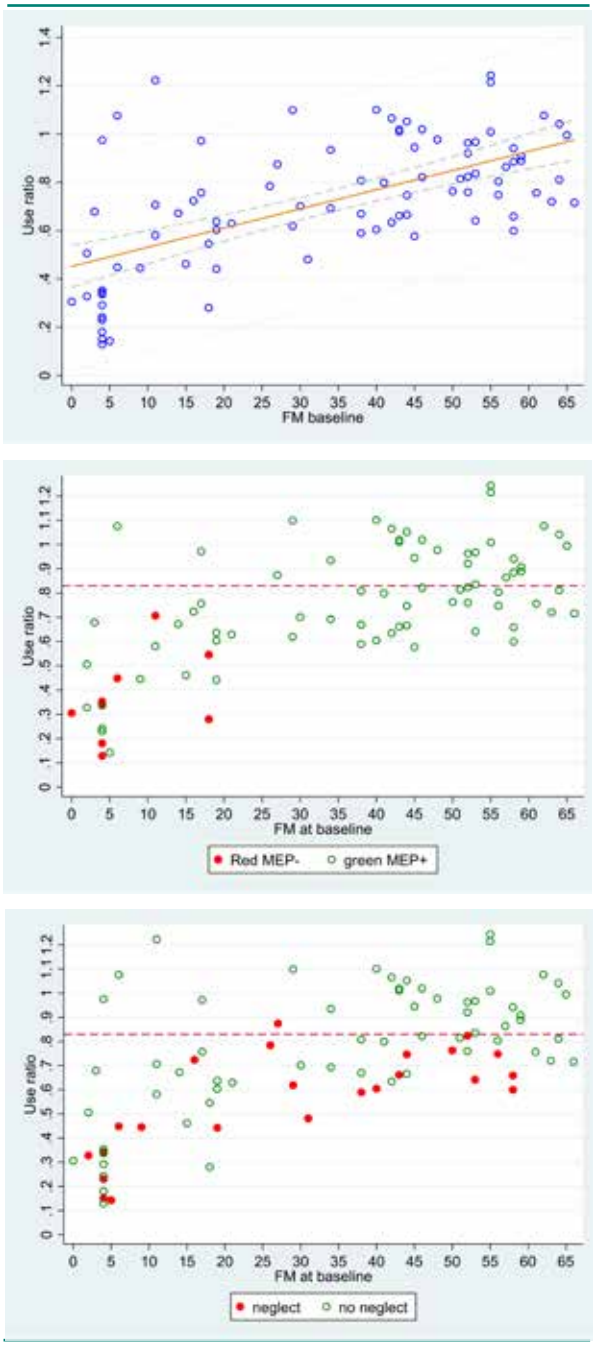
OP2–05. Fig. 1

OP2–06

Prediction of upper limb use three months after stroke: A prospective longitudinal study

C. Lundquist, J. Feldbæk Nielsen, I. Brunner (Hammel/DK)

Background: A goal of upper limb (UL) rehabilitation after stroke is to facilitate the use of the paretic arm in daily life activities.
Purpose: To examine if UL impairment two weeks after stroke can predict real-life UL use at three months. Furthermore, to identify additional factors which contribute to future UL use, and characteristics of patients who do not achieve normal UL use.
Materials and methods: This study included patients with stroke ≥18 years. UL impairment was assessed by Fugl-Meyer upper extremity motor assessment (FM). Use ratio was assessed with accelerometers at three months. The association between FM score and UL use ratio was investigated with linear regression models and adjusted for secondary variables. Non-normal use was assessed by logistic regression.
Results: Eighty-seven patients were included. FM score predicted 38 % of the variance in UL use ratio. A multivariate regression model predicted 55 %, and the significant predictors were FM, motor-evoked potential (MEP) status and neglect. Non-normal use could be predicted with a high accuracy based on MEP and/or neglect. In a logistic regression the sensitivity for prediction of non-normal use was 0.93 and specificity was 0.75.



OP2–06. Figures 1–3

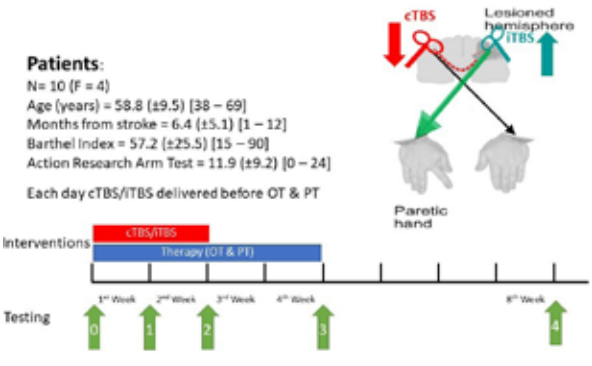
Conclusion: Better baseline capacity of the paretic UL predicted increased use of the arm and hand in daily life. Non-normal UL use could be predicted reliably based on the absence of MEPs and/or presence of neglect.

OP2–07

Feasibility and safety study on the use of bilateral sequential theta-burst stimulation (TBS) in the rehabilitation of post-stroke hemiparesis

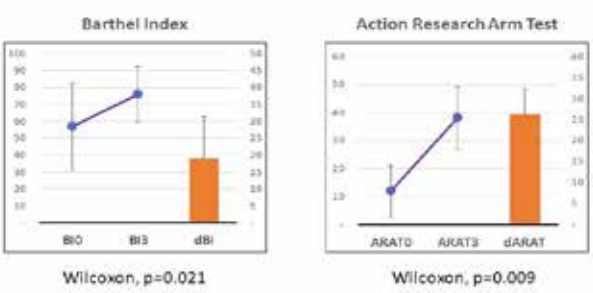
S. Filipovic, M. Jelic, S. Milanovic, L. Konstantinovic (Beograd/RS)

Question: Previously, we demonstrated in healthy participants that bilateral sequential stimulation consisting of applying an inhibitory TBS protocol (continuous TBS – cTBS) over the dominant motor cortex (M1) followed by excitatory TBS protocol (intermittent TBS – iTBS) over the non-dominant M1 can improve motor skill learning by non-dominant hand more than applying any of the two protocols alone. It was assumed that the approach not only increases activation of the non-dominant hemisphere but also releases it from the dominant hemisphere's inhibition additionally improving the non-dominant hand's performance. This study's aim was to check whether a similar approach would be suitable for use in the rehabilitation of post-stroke hemiparesis where similar healthy hemisphere vs. injured hemisphere rivalry exists. More specifically, we aimed to answer the following questions: 1) whether it is feasible to use the bilateral sequential TBS in daily clinical practice for a longer period of time; 2) whether there are side and/or adverse effects of the method; 3) whether the method hampers the recovery of the paretic hand by interfering with physiological plasticity mechanisms already engaged by physio and occupational therapy; 4) whether the method negatively affects motor functions of the healthy hand.
Methods: Ten patients (mean age 58 years [range 38 – 69]) with hemiparesis due to MCI stroke, in the subacute post-stroke recovery phase, were enrolled in the study. They all had daily physio and occupational therapy for four weeks. During the first and second week, bilateral sequential TBS was delivered each day before therapy procedures. Ballistic hand tapping (BHT), simple reaction time (RT), and the Purdue pegboard task (PPT) were measured, for each hand, before therapy, after the first and the second week, after the end of therapy (4th week), and a month following completion of the therapy.

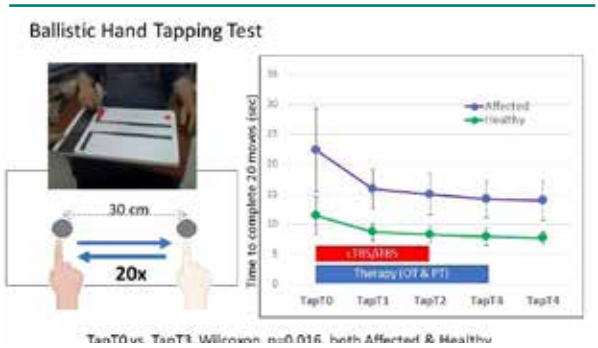


OP2–07. Fig. 1: Design

Results: Healthy hand showed clear improvement with time, consistent with the learning/training effect of repeated practice. The paretic hand showed significant improvement in BHT, while RT showed variable results. No adverse effects were reported apart from an occasional mild headache at the area of the coil contact with the scalp.



OP2–07. Fig. 2: Results – Global clinical scales



OP2–07. Fig. 3: Results – Specific hand/arm measures

Conclusions: Bilateral sequential TBS is feasible for use to boost the effectiveness of physical and occupational therapy in post-stroke hemiparesis. There are no major safety issues and no serious adverse effects. There are no untoward effects on the healthy hand. Further controlled studies are needed to confirm the benefit.

OP2–08

Multi-muscle TMS mapping for the assessment of motor cortex reorganization after finger independence training

M. Nazarova, A. Asmolova, M. Makarova, E. Ivanina, P. Novikov, M. Reshetnikov, V. Nikulin (Moscow/RU, Leipzig/DE)

Recently we have shown (Nazarova et al., 2021) that it is possible to reliably trace interactions among motor cortical representations (MCRs) of different upper limb muscles using navigated transcranial magnetic stimulation (nTMS), demonstrating that the overlaps among different muscle MCRs are reliable and muscle specific.
We aim to investigate how the interactions among different upper limb MCRs change during finger independence training. We hypothesize that the MCRs of the trained muscles would increase, while the overlaps between muscles, which are trained to contract independently, would decrease.
13 participants have been enrolled, 8 participants (8 males, 18 – 26 y.o.) have already undergone the whole procedure.

On the first and last days of the study, the volunteers underwent multi-muscle nTMS motor mapping. Motor evoked potentials (MEPs) were recorded from the abductor pollicis brevis (APB), abductor digiti minimi (ADM), first dorsal interosseous, extensor digitorum communis and biceps brachii. Stimulation was done at an intensity of 110% of the motor resting threshold (RMT) of the APB. Between two TMS sessions participants were trained for 10 days to perform independent thumb and little finger abduction using custom-made EMG biofeedback software. We probed the maximal contraction and the ability of independent contraction of the trained muscles (APB and ADM), also we performed 9-Hole Peg Test for both hands. TMS data were processed using the TMSmap software (https://tmsmap.ru/). We compared MCR parameters with the previously obtained individual smallest detectable changes (SDC) from the earlier study without motor training (Nazarova et al., 2021).
Finger independence training was successful in all the volunteers, while the maximal contraction level did not show a clear pattern of change. There was an improvement in 9-Hole Peg Test performance for both hands, significant for the right one ($p = 0.01$). In comparison to SDC (95% confidence interval, CI) APB RMT decreased in two and increased in two participants. As for TMS mapping, we observed changes bigger than SDC (95%CI) for APB MCR area, which increased in three participants, and for ADM MCR area, which increased in two and decreased in one volunteer (Fig. 1). As for the overlaps, changes bigger than SDC (95%CI) were observed in the only participant (overlaps between MCRs increased).

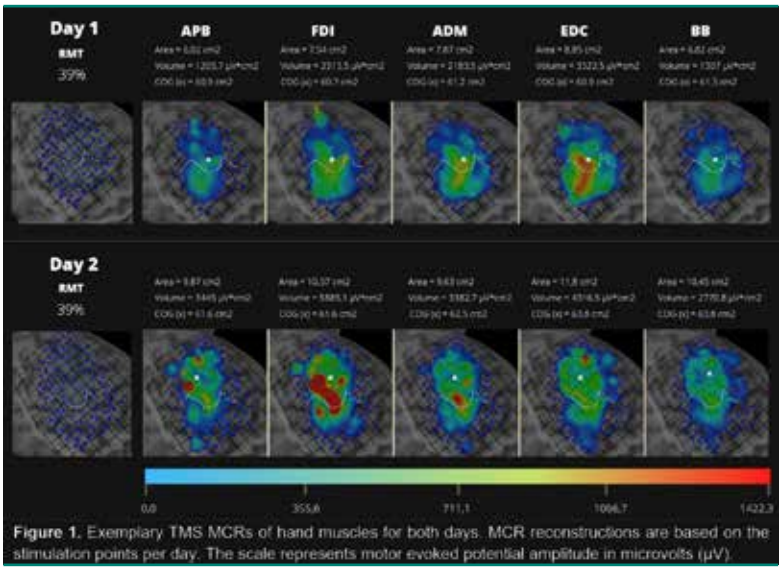


Figure 1. Exemplary TMS MCRs of hand muscles for both days. MCR reconstructions are based on the stimulation points per day. The scale represents motor evoked potential amplitude in microvolts (μV).

OP2–08. Figure 1: We demonstrated that finger independence training was effective in all the volunteers, while the maximal contraction strength of the trained muscles did not always increase, which agrees with the idea of a non-linear association between the hand strength and dexterity. Our preliminary results do not clearly support the hypothesis of the decrease of the overlap between muscles trained to contract independently, which will need to be checked with a bigger amount of data. We believe that the results of the study may be important for the interpretation of nTMS motor mapping results

OP2–09

After stroke, recovering a better orientation with respect to gravity magnifies balance recovery: Study from the DOBRAS cohort

S. Dai, C. Piscicelli, C. Lemaire, E. Clarac, O. Detante, A. Chrispin, P. Davoine, D. Pérennou (Grenoble/FR)

Objective: Mobility is one of the top priorities related to post-stroke impairments. Novel model explains mobility disability from balance disorders, mainly by impaired body orientation with respect to gravity in the frontal plan (lateropulsion). We invesigated the hypothesis that improvement in body orientation with respect to gravity was a factor determining balance recovery at the subacute stage.
Methods: Data from DOBRAS cohort study of 106 individuals consecutively admitted to a neurorehabilitation ward after a first hemisphere stroke (ClinicalTrials.gov: NCT03203109), were systematically collected on day30, day60 and day90 after stroke. Primary outcomes were lateropulsion and balance disorder, quantified by the Scale for Contraversive Pushing (SCP) and the Postural Assessment Scale for Stroke (PASS).
Results: The correlation between the changes in SCP and PASS scores was moderate from D30 to D60 ($r = 0.63$, 95%CI [0.47-0.76], $p < 0.001$) meaning that between D30 and D60 lateropulsion recovery explains 40% (95%CI [22 – 58]) of balance recovery. This relationship was smaller from D60 to D90 ($r = 0.44$, 95% CI [0.15 – 0.63], $p < 0.001$). Within the 46 individuals with a satisfactory lateropulsion recovery (SCP ≥0.75), 43/46 (93%) had a satisfactory balance improvement (MDC95 of the PASS >2, mean change =8.1 [3.8]) and only 3/46 (7%, $v = 0.44$, $p < 0.001$) had a poor balance improvement. Conversely within the 60 individuals with a poor lateropulsion recovery, only half (32, 53%) had a satisfactory balance improvement.
Conclusions: Balance improvement is possible without substantial change in body orientation with respect to gravity, but this better orientation with respect to gravity amplifies balance improvement during the same period.

OP2–10

Lateropulsion prevalence after stroke: a systematic review and meta-analysis

S. Dai, C. Lemaire, C. Piscicelli, D. Pérennou (Grenoble/FR)

Background and Objectives: Lateropulsion is a deficit of active body orientation with respect to gravity in the frontal plane, mostly observed after a stroke. Its prevalence remained to be estimated, which is the main objective of this systematic review and meta-analysis.
Methods: We systematically searched MEDLINE, EMBASE, CINAHL, and COCHRANE CLINICAL TRIALS up to 31 May 2021 for original research reporting a prevalence or incidence of post-stroke lateropulsion. We followed MOOSE and PRISMA guidelines. Eligibility for inclusion, data extraction, and study quality (Joanna Briggs Institute guideline) were evaluated by 2 reviewers who used a standardized protocol: PROSPERO-CRD42020175037. A random-effects meta-analysis was performed to obtain pooled prevalence, whose heterogeneity was investigated by subgroup analysis (stroke locations and post-stroke phases) and meta-regression.
Results: We identified 22 studies gathering 5125 individuals (mean age 68.5 years, 42.6% female) who were assessed in average 24 days after stroke. The studies quality was adequate, with only 8 (36.4%) showing risk of bias. The pooled lateropulsion prevalence was 55.1% (95% confidence intervals [CIs] 35.9 – 74.2). After supratentorial stroke lateropul-

sion prevalence was 47.4% (95% CI [38 – 63.9]), only 12.5% (95% CI [9.2 – 15.9]) in individuals with severe forms called pushers. Meta-regression didn't reveal any effect of age, sex, geographic region, publication year, or study quality. Lateropulsion prevalence progressively decreased from 52.8% in the acute phase (95% CI [40.7 – 65]) to 37% in the early subacute phase (95% CI [26.3 – 47.7]), and 22.8% in the late subacute phase (95% CI [0 – 46.3]). The ratio of right to left-hemisphere stroke with lateropulsion increased as a function of time: 1.7 in the acute phase to 7.7 in the late subacute phase. After infratentorial stroke lateropulsion prevalence was very high, reaching 83.2% (95% CI [63.9 – 100.3])
Conclusions: Post-stroke lateropulsion prevalence is high that appeals for its systematic detection to guide early interventions. Uprightness is a function of the right hemisphere.

OP3–01

Gait Assessment in Stroke: Feasibility of Accurate Gait Analysis in Clinical Practice

S. Wasti (Abu Dhabi/AE)

Background: Gait impairment in stroke is common. Regaining ability to walk is often the most desired outcome sought by stroke survivors who undergo a number of interventions, physical therapy being most common. The goal is to be able to walk again although optimized gait pattern may not always be pursued. Consequently, patients return to ambulation with variable levels of success but in doing so, optimization of gait pattern may be overlooked. Often this is due to lack of readily available gait analysis. The tools deployed are often cumbersome to install, costly and time consuming, making their utility in clinical practice rather limited. Our group reviewed the analyses of post-stroke gait with focus on recent technology-driven gait characterization, including the smart low-cost wearables and AI tools and linked these to feasibility and potential value in clinical settings.
Methods: We conducted a comprehensive literature search using Google Scholar, PubMed, and ScienceDirect and original articles that met the selection criteria were reviewed.
Results: The key conclusions that we drew from the review include:

- Conventional qualitative gait analysis, often utilized in clinical practice, is predominantly observational, and therefore is subjective and highly influenced by observer's experience.
- Quantitative gait analysis provides measured parameters, with good accuracy and reproducibility and is inherently more reliable for accurate diagnosis and comparative assessments during rehabilitation. However, the cost and time restrictions may be limiting.
- Novel smart wearable technology and AI, such as Machine Learning, Support Vector Machine, and Neural Network approaches are rapidly gaining ground in gait research because they provide means for acquiring, storing and analyzing multifactorial complex gait data, while capturing its non-linear dynamic variability and hence offer invaluable benefits in predictive analytics and personalized precision rehabilitation.

Conclusion: Gait analysis is complex and existing methods that are precise and analytical are not readily applicable in clinical practice because of cost and time restraints. It is likely that emerging novel tools and technologies can circumvent these restrictions and make it possible to analyse gait more accurately in clinical settings, making it possible for stroke survivors to regain optimized gait. Smart wearable technology and AI promise a paradigm shift in stroke gait quantification and predictive analytics. It is therefore important to enhance research efforts in this area and bring engineering and science closer to clinical practice.

OP3–02

Multivariable prognostic prediction models for functional independence at discharge from post-acute inpatient rehabilitation following acquired brain injury – conference abstract for a systematic review and meta-analysis

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Introduction: Acquired brain injury is associated with substantial health care costs. One aim of rehabilitation is to assist individuals to achieve a meaningful life. This aim is increasingly being challenged by reduced healthcare spending, as experienced in the Danish healthcare system, which is shifting towards value-based healthcare, i.e. achieving the best outcome(s) at the lowest cost. Functional independence is an important outcome measure for neurological rehabilitation, often representing »successful« rehabilitation. In this context, prognosis research may be particularly important as it can provide an indication of potential recovery and may support informed collaborative patient-centred goal setting. Further, this may increase the value of rehabilitation (i.e. efficient resource allocation and meaning for the individual). Validated evidence on prognosis of differentiated functional independence following acquired brain injury is sparse. Previous systematic reviews [1 – 3] investigated rehabilitation prognosis for patients with acquired brain injury; yet, included studies were limited for the current scope due to time of prognostication, predicted outcomes or lack of validation.
Objectives: The objective of this systematic review is to identify and synthesise multivariable prediction models of the Functional Independence Measure (FIM®) at discharge from post-acute inpatient rehabilitation in adult patients with acquired brain injury using obtainable measures on admission to post-acute rehabilitation as predictors.
Materials & methods: The protocol was registered in PROSPERO (CRD42021257098). This review uses the Prognosis Research Strategy framework. The electronic searches were structured using the PICOTS acronym with search filters for the identification of prognosis research. We systematically searched PubMed, EMBASE and Web of Science. The inclusion criteria were a) patients with acquired brain injury (ischaemic/haemorrhagic stroke, subarachnoid haemorrhage, TBI, anoxic brain injuries, encephalitis and primary brain tumours), b) internally validated development, update/extension or external validation of a multivariable prognostic model, c) a predicted outcome of FIM® score at discharge from post-acute inpatient rehabilitation and d) time of prognostication within 1 week of admission to post-acute inpatient rehabilitation. We plan to perform a meta-analysis on the performance of included externally validated prognostic models.

Results: We identified 3,140 unique articles through the electronic searches. The screening process is ongoing.
Conclusion: The current review will summarise multivariable prognostic models for the FIM® on discharge from inpatient rehabilitation in patients with acquired brain injury. Model performance will be highlighted based on results of meta-analyses.

References:
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2. Jaja et al. 2013, DOI: 10.1007/s12028-012-9792-z
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OP3–03

Efficacy of robot-assisted mirror therapy with the GloReha (RgST study) – a pilot study

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Introduction: Hemiparesis is a frequent consequence of acquired brain damage such as stroke or traumatic brain injury. In upper limb hemiparesis patients show limited or no use of their affected arm and hand. The therapy options for the very severely affected arm are limited compared to those for the moderately to mildly affected arm. Mirror therapy has shown good results for patients with low-functioning hemiparesis. A unilateral approach with a distal focus in which movements are initiated independently by the patient is predominantly recommended. In the present study we examined whether a bilateral robotics-based approach, in which especially the finger motor function is passively supported, can further increase the effect of standard mirror therapy.
Patients and methods: Patients with severe upper limb hemiparesis or hemiplegia following acquired brain injury were included in a randomised clinical trial conducted in an inpatient setting. Patients were randomized to the robotic-assisted mirror therapy group (RgST = ST combined with passive movement) or to the mirror therapy group (ST). The training took place 15 times within 5 weeks on 3-5 days per week for 30 minutes. The mirror training run alongside the standard rehabilitation program. Outcome measures, comprising the Fugl-Meyer Test (FM) for the upper extremity and the Motoricity Index Arm (MI), were collected at baseline (T1) and after the intervention phase (T2). The level of pain was assessed after each session using a pain scale. A feasibility questionnaire was administered to patient and therapist at T2. Data were analyzed using »per protocol« analyses. Depending on distribution characteristics a T-test or Mann-Whitney U test was performed on |T1 – T2| difference values with significance level set to 5%. Descriptive analysis was conducted for the pain- and questionnaire data.
Results: 22 patients were included in the analysis. At baseline (T1) the groups were not significantly different for FM or MI respectively except for gender distribution. Group comparisons for the change values revealed a significantly greater improvement in the FM motor function subscore for the RgST than the ST group ($p = 0.017$); the FM somatosensibility subscore suggested a trend for stronger improvement in RgST ($p = 0.050$). For MI the group difference was insignificant ($p = 0.254$). Examination of the pain assessments yielded no indication for chances to pain levels in either group. The feasibility and acceptance ratings by patients and therapists were overall positive. No adverse effects were reported.
Conclusion: The data provides initial evidence that robotic-assisted mirror therapy with a bilateral approach achieves stronger treatment effects in the area of motor function and somatosensibility than conventional mirror therapy. This form of training is well received by patients and therapists, and a feasible tool in an inpatient setting. Larger-scale trials are needed to further affirm this conclusion.

OP3–04

Detecting/ objectifying local and regional neurorestorative elements after ischemic stroke

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We achieved a topical literature review about definitory notions/terms and related details on the intimate/morph-functional damages caused by ischemic stroke and respectively, regarding neurorestoration – based on neuroregeneration and brain repair – with actual possibilities to objectify them, too.
We have systematized such dedicated evaluation instruments into: clinical-functional (assessment scales/indices), imagistic, neuro-physiologic, laboratory bio-markers, and mixed/intermingled (imagistic and histologic) ones, i.e. for instance, confocal and/or electron microscopy.
All the above constitute an evidence-based solid background of an exhaustive and reliable quest for neurorestorative, spontaneous and/or therapeutic-rehabilitative induced, phenomena – this being the appropriate fundament to strengthen the thorough research towards the long awaited effective cure of the central nervous system lesions, including after ischemic stroke.

OP3–05

Bladder disorders and quality of life after stroke in rehabilitation center in Benin

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Introduction: Bladder disorders (BD) are common after an episode of stroke, and can persist beyond the acute phase. They need to be studied for better long-term patient follow-up.
Objective: To study post-stroke's bladder disorders in patients followed at CU-MPR.
Patients and methods: It was a descriptive and analytical cross-sectional study. It concerned patients followed for at least 6 months at the CU-MPR from January 1st, 2014 to February 1st, 2020 for documented stroke, carried out from May 1st to August 31st, 2020 and who consented to participate to the study. Patients with bladder disorder (BD) before the stroke occurred or with cognitive impairment identified during data collection were excluded. We determined the frequency of BD, their types and their impact on the quality of life of patients, as well as the factors associated with it. The USP and SF-Qualiveen scales were used to analyze the urinary disorders and quality of life of these patients.

The digestive functional score of patients weres assessed with neurogenic bowel dysfunction (NBD) score. Data were analyzed with SPSS 25. Statistical tests used were chi-square of Pearson and Ficher test. The level of significance chosen were 5%.
Results: This study involved 155 predominantly male patients (58.06%). Their mean age was 58.90 ± 12.73 years. The frequency of bladder disorder was 25.80%. The third of cases of BD were associated with anorectal disorders. Overactive bladder and urinary incontinence were the common urinary disorders observed in patients, 23.87% and 19.35% respectively. 82.5% of patients with BD have an alterated quality of life. Duration of stroke and regular pre-stroke alcohol consumption were associated with BD in general. Regular coffee consumption was significantly associated with impaired quality of life in patients.
Conclusion: The frequency of bladder disorders decreases in the long term after stroke. They are dominated by overactive bladder and urinary incontinence. However, they have a negative impact on the quality of life of patients requiring long-term psychological follow-up.

OP3–06

Need telerehabilitation for stroke patients in covid19 pandemic

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Background: During the COVID-19 pandemic have an increased risk of infection, as contact with other people often cannot be avoided on the way to and from the hospital. As the frequency of contact increases, the probability of becoming infected with COVID-19 also increases. In pandemic days the need of hospital beds were increased and our disabled or old and patients who had several comorbidities stayed at home. Stroke patients could not find rehabilitation beds and had depression or anxiety because of Covid 19 and their illness. So that reasons, three rehabilitation clinic in Istanbul established »the Coronavirus Telerehabilitation Support Programme« (KOREH) with the support of the »Istanbul Health Directorate«. Telerehabilitation refers to providing rehabilitation service using electronic communication technologies.
Methods: We prepared exercise sheets and videos for KOREH during the pandemic days for rehabilitation of disabled patients or healthy people who stayed at home. Two physiatrists and 6 physiotherapists who will work in two seperate rehabilitation hospital were educated for answering and giving telerehabilitation with video and exercise sheets and filling forms. A call center was implemented with these two team in asian and european sides of Istanbul, in two continent.
Results: There were more than 2000 calls for KOREH. 350 of these calls for physiatrist check or exercise prescription. 2% of 2000 calls were referred to the emergency department due to suspected Covid19. 30.3% received telerehabilitation services from physiatrist, and 67.7% were evaluated by a physical therapist. 237 individuals evaluated by a physical therapist; 11% called for respiratory exercises for Covid19, 37.6% for staying active at home during quarantine, 51.1% for pain, 25.3% for disease-specific exercise, and 23.6% for respiratory exercises. In the control call after 2 weeks, 73.4% said they had performed the recommended exercises, 68.8% symptoms had decreased and 77.6% were satisfied with telerehabilitation. Patients who are called back by physiatrist there were a decreased in pain evaluated with VAS (74.5% of patients ($p < 0.001$)), and 97.2% were satisfied with telerehabilitation protocol. 33 stroke patients in 350 calls had exercise prescription. 66% of them was in third grade in functional ambulation classification. 89% of stroke patients were reported in a better mood after telerehabilitation program. All of the stroke patients were satisfied with telerehabilitation protocol and want to attend telerehabilitation unit of hospital.
Conclusions: Telerehabilitation could be used to check for changes in symptoms and quickly detect symptom exacerbation to ensure that they receive on-time treatment and rehabilitation for stroke patients. Depression or anxiety is serious problem for stroke. Such psychological problems could be exacerbated during the COVID-19 pandemic. Telerehabilitation in stoke patients may helpfull for these problems too.

OP3–07

Neural predictors of multimodal rehabilitation efficacy: The role of the parietal neural reserve in AD continuum

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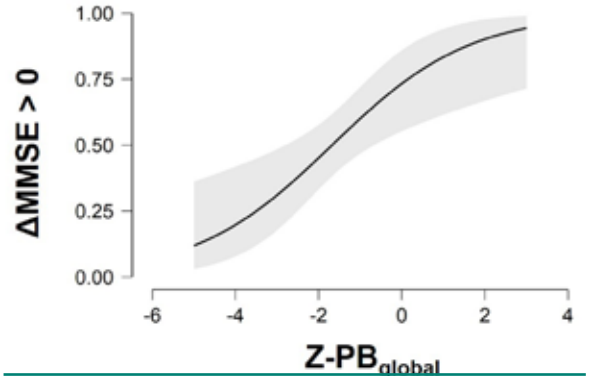
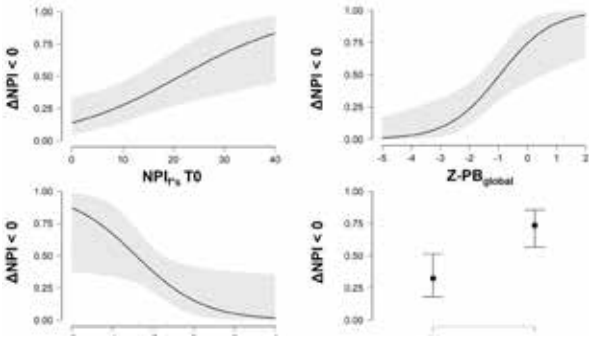
Introduction: Alzheimer's Disease (AD) is characterized by neuronal loss in specific target areas and cognitive decline even from early phases. The possibility to predict the efficacy of rehabilitative interventions basing on neuroimaging biomarkers of the disease is still sparse.
Objectives: We aimed to detect neural predictors of multimodal interventions efficacy in AD-continuum patients to characterize the ideal candidates for treatment considering cognitive and behavioral outcome.
Patients and methods: Eighty-two subjects within AD-continuum were included [Males = 38, mean age = 76 ± 5.30, mean education years = 9.09 ± 3.81, Mini Mental State Examination (MMSE) mean score = 23.31 ± 3.81]. All subjects underwent a structural MRI acquisition (1.5T) at baseline (T0). All subjects performed an intensive multimodal rehabilitation (8 – 10 weeks), and a neuropsychological evaluation (MMSE, NPI, phonologic and semantic fluencies) at T0 and after intervention (T1). Neural markers (MRI brain volumes) were obtained with Freesurfer software considering areas strongly related to AD-continuum conditions: Medial Temporal Brain; Posterior Brain (PB); Frontal Brain (FB), Subcortical Brain indices. The MMSE and Neuropsychiatric Inventory (NPI) scores were considered treatment outcomes, and Delta changes (T1 – T0) were computed and dichotomized in Improved ($\Delta MMSE > 0$; $\Delta NPI < 0$) and Not Improved ($\Delta MMSE \leq 0$; $\Delta NPI \geq 0$). Logistic Regression (LR) and Random Forest (RF) models were performed including neural markers, neuropsychological, and demographical variables (sex, age, education) at T0. Predicted probability value was derived to profile the ideal candidate of multimodal rehabilitation.
Results: Concerning the cognitive outcome, MMSE score ($p = .003$) and PB index ($p = .005$), especially right PB ($p = .002$) at baseline were revealed as significant predictors of ΔMMSE in the LR model. The accuracy of RF classification was 77%. Predicted probability values indicated that the



OP3–07. Fig. 1: Probability to improve in the cognition status at different scores of MMSE at baseline and Z-PB_{global}. **MMSE** Mini Mental State Examination; **ΔMMSE >0** Delta change score (T1–T0) of Mini Mental State Examination; **Z-PB_{global}** Z-values of Posterior Brain index



OP3–07. Fig. 2: Probability to reduce behavioral symptoms at different scores of NPI at baseline, and Z-FBZ_{global}, Z-PB_{global}.and sex. **NPI** Neuropsychiatric Inventory; **ΔNPI >0** Delta change score (T1–T0) of Neuropsychiatric Inventory frequencies and severity of symptoms; **Z-PB_{global}** Z-values of Posterior Brain index; **Z-FB_{global}** Z-values of Frontal Brain index; **M** males, **F** females

deal candidate for the multimodal program was a person with lower MMSE and higher PB-index, especially in the right PB-index, at T0 (See **Fig 1**). Instead, for the behavioral outcome, sex (p = .002), NPI (p = .005), PB index (p = .006) and FB index (p = .039) at baseline predicted ΔNPI in LR model. The accuracy of RF classification was 86%. Exploring predicted probability of success, ideal candidate for the multimodal intervention was a person with higher severity of NPI, lower FB-index and higher PB-index, at T0 (See **Fig 2**).

Conclusion: The herein findings demonstrated that increased PB neural reserve is relevant for the compensatory mechanisms activated by rehabilitative treatment even in presence of lower cognitive and behavioral residual capabilities. These data are significant to support clinical decision by identifying target patients with high probability of multidomain rehabilitation success on cognitive and behavioral functioning.

OP3–08

Influence of the nature of the spread of pituitary adenoma on the quality of life in the pre- and postoperative period

E. Semina, M. Kurnukhina, V. Cherebillo (St. Petersburg/RU)

Summary: pituitary adenomas occupy the 3rd place, accounting for from 7.3% to 18% of all verified brain tumors and affecting people, mainly of working age, which accounts for about 75% of all cases of the disease. The importance of the assessment on the Knosp Scale, the Hardy and Vezina classifications according to MRI data is associated with a high frequency of supra- and parasellar adenoma growth.
Purpose: analysis of the influence of the nature of the spread of pituitary adenoma on the quality of life in the pre- and postoperative period.
Material and methods of research: a clinical study of 210 patients with brain adenoma aged from 19 to 65 years (median 42.7 years) a was conducted. To evaluate the studied parameters, the classifications of Knosp, Hardy and Veszina, the EORTC QLQ-C30 quality of life questionnaire, SNOT 22 were used. All the studied patients underwent transsphenoidal endoscopic removal.
Results of the study: According to the Knosp Scale (KS), various degrees of invasion were present among the studied patients: Grade I: 4.8%, Grade II: 47.6%, Grade III: 36.2%, Grade IV: 11.4%. According to the Hardy and Vezin classification (HaVC) Grade 0 – III: 98.1%, IV: 1.9%, types O – C: 99.05%, Type D: 0.95%. The frequency of relapses in the postoperative period is 5.24% (patients with Grade IV KS invasion of the cavernous sinus). It was revealed that patients with Grade III-IV KS, Grade IV HaVC had visual disorders more often in the postoperative period (p < 0,05). According to the SNOT 22 questionnaire, the highest values were observed in patients in the early postoperative period with Grade IV HaVC-84.3 ± 11.2, 6 months after surgical treatment – a decrease to 12.2 ± 7.6 (p < 0.05)
Conclusion: Thus, the spread of pituitary adenoma Grade III-IV KS, Grade IV negatively affects the quality of life in the pre and postoperative period.

OP3–09

Distribution of pituitary adenoma according to the knosp scale, hardy and vezin classifications as important neuroimaging parameters for assessing dynamic changes in the postoperative period

M. Kurnukhina, E. Semina, V. Cherebillo (St. Petersburg/RU)

Summary: Pituitary adenomas occupy the third place among all tumors of the central nervous system and, according to various authors, account for from 6.7% to 18% of all brain tumors. The gold standard of surgical treatment of pituitary adenomas is transsphenoidal endoscopic removal. The operative approach to a pituitary adenoma is guided by the size and location of the tumor and its relation to surrounding anatomical structures. The importance of the assessment on the Knosp Scale, the Hardy and Vezina classifications according to MRI data is associated with a high frequency of supra- and parasellar adenoma growth. Thanks to the MRI data of the chiasmal-sellar region, it is possible to determine the nature of the spread of pituitary adenoma

at the preoperative stage, as well as after surgical treatment, as an MR control.
Purpose: on the basis of MRI data of the chiasmal-sellar region, an assessment of the nature of the spread of pituitary adenoma according to the Knosp Scale, Hardy and Vezina classifications and an analysis of the influence of these neuroimaging parameters on dynamic changes in the postoperative period.
Material and methods of research: a clinical study of 210 patients with brain adenoma aged from 19 to 65 years (median 42.7 years) a was conducted. To evaluate the studied parameters, the classifications of Knosp, Hardy and Veszina, the EORTC QLQ-C30 quality of life questionnaire were used. All the studied patients underwent transsphenoidal endoscopic removal.
The results of the study: To determine the nature of the spread of pituitary adenoma, MRI sections were used at the level of the sella turcica. According to the Knosp Scale (KS), various degrees of invasion were present among the studied patients: Grade 1: 4.8%, Grade II: 47.6%, Grade III: 36.2%, Grade IV: 11.4%. According to the Hardy and Vezin classification (HaVC) Grade 0 – III: 98.1%, IV: 1.9%, types O – C: 99.05%, Type D: 0.95%. The frequency of relapses in the postoperative period is 5.24% (patients with Grade IV KS invasion of the cavernous sinus). It was revealed that patients with Grade III – IV KS, Grade IV HaVC had visual disorders more often in the postoperative period ($p < 0,05$). It was found that patients with Grade IV KS, Grade IV HaVC were more often disturbed by sleep disorders before surgery, in the late postoperative period there were lower values for physical, role, cognitive, emotional functioning, increased fatigue, severe pain syndrome, financial difficulties and a lower assessment of their health status ($p < 0,05$). Thus, Grade IV KS, Grade IV HaVC at all stages of treatment negatively affects the quality of life.
Conclusion: Determination of the nature of the invasion of pituitary adenoma into the cavernous sinus by the Knosp-Scale, Hardy and Vezina classifications is one of the important indicators in the MR diagnosis of the chiasmal-sellar region to assess the effectiveness of surgical treatment.

OP4–01

Lateropulsion after hemispheric stroke, a form of spatial neglect involving graviception

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Objective: To test the hypothesis that lateropulsion is an entity expressing an impaired body orientation with respect to gravity, in relation to a biased graviception and spatial neglect.
Methods: Data from the DOBRAS cohort (ClinicalTrials.gov:NCT03203109), were collected 30 days after a first hemisphere stroke. Lateral body tilt, pushing and resistance were assessed with the Scale for Contraversive Pushing.
Results: Among 220 individuals, 72% were upright and 28% showed lateropulsion (Tilters = 14% less severe than Pushers = 14%). The three signs had very high factor loadings (>0.90) on a same dimension, demonstrating that lateropulsion was effectively an entity comprising body tilt (cardinal sign), pushing and resistance. The factorial analyses also showed that lateropulsion was inseparable from the visual vertical (VV), a criterion referring to vertical orientation (graviception). Contralesional VV biases were frequent (44%), with a magnitude related to lateropulsion severity: Upright -0.6°(-2.9;2.4), Tilters -2.9°(-7;0.8), Pushers -12.3°(-15.4;-8.5). Ipsilesional VV biases were less frequent and milder ($p < 0.001$). They did not deal with graviception, 84% being found in upright individuals. Multivariate, factorial, contingency, and prediction analyses congruently showed strong similarities between lateropulsion and spatial neglect, the latter encompassing the former.
Conclusions: Lateropulsion (pusher syndrome) is a trinity constituted by body tilt, pushing and resistance. It is a way to adjust the body orientation in the roll plane to a wrong reference of verticality. Referring to straight above, lateropulsion might correspond to a form of spatial neglect (referring to straight ahead), which would advocate for 3-D maps in the human brain involving the internal model of verticality.

OP4–02

Lesions of the left insula are associated with an impaired recognition of facial expressions of anger

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Questions: Suffering from a stroke can not only result in motor and language impairments but also affect the capability to recognize emotions from facial expressions which in turn was shown to be associated with negative social consequences [2]. There is certain evidence that the insular cortex (IC) is crucially involved in the processing of facial expressions of emotions [3]. However, only few studies have examined such capabilities in stroke patients with lesions of the IC with inconsistent results regarding nature and laterality of deficits [1, 5]. We therefore examined stroke patients with and without lesions covering the IC using a facial emotion recognition paradigm and voxel-wise lesion-symptom mapping (VLSM).
Methods: Brain lesions were manually drawn on T1-weighted images and then normalized. Facial emotion recognition was tested by presenting pictures of faces showing emotional expressions with 12 pictures respectively for each emotion (fear, anger, disgust, happiness) and a forced-choice answering format. Recognition performance was computed separately for each emotion and considered accuracy and the time needed for correct recognition. To examine the relation between lesion site and impairments VLSM was conducted using the NPM toolbox [4]. Data of 29 stroke patients (left lesions: 16) were finally available for analysis.
Results: Using a region-of-interest analysis (bilateral insula) VLSM (corrected for multiple comparisons) showed that lesions in the left insular cortex were significantly associated with recognition impairments for expressions of anger.
Conclusion: We show a critical role for the left insula in decoding anger from facial expressions and therefore suggest that social cognition impairments should be considered in stroke patients in general more accurately but also specifically in those with lesions of the left IC.

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OP4–03

The role of the ventral stream in distance estimation of daily objects in an augmented reality environment

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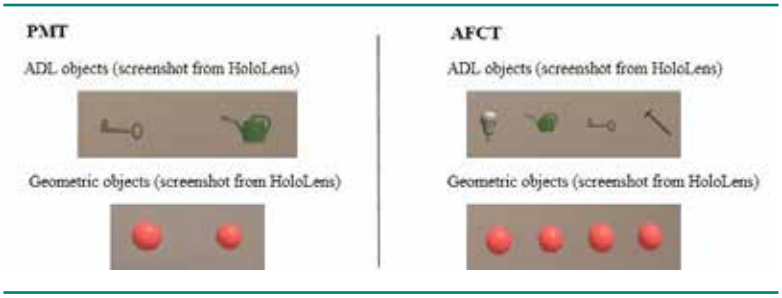
Introduction: In an Augmented Reality (AR) environment, patients after stroke show deficits in distance estimation of holographic objects which are specifically prominent when using objects of activities of daily living (ADL) [1]. Since the ventral stream (VS) of visual processing (V1, V2, V4, intraparietal area) is responsible for size constancy, we hypothesize that patients with damaged areas of the VS perform better in distance evaluation of ADL objects with different size compared to 1) depth processing of identical geometric objects and 2) patients without VS damage.
Methods: Twelve patients after stroke, six with lesions in the VS (age: 59 ± 17 y, stereovision: 203 ± 298«) and six without such a lesion (age: 66 ± 17 y, stereovision: 153 ± 144«) were included. Two distance judgement tasks were performed in an AR setting, ten times each. In an action-based task, patients had to match the distance of two holographic objects (Perceptual Matching, PMT). In the Alternative Force Choice Task (AFCT), patients had to name the closest of four objects. Either identical geometric objects or different ADL objects with an unnatural relative size were randomly presented in the patients' near field. The performance in each AR task was analysed using a mixed factor ANOVA.
Results: While patients with a lesion in the VS matched geometric holograms in the PMT with a deviation comparable to patients with no damage in the VS (mean difference in deviation: 0.5 ± 1.2cm), the former group matched ADL objects more accurately than the latter group (mean difference in deviation: 3.2 ± 2.5cm). This interaction between group and type of object showed a trend towards significance ($F(1,10) = 2.095$, $p = .089$). In the geometric type of the AFCT, the proportion of correct responses of patients with a damage in the VS was 22.7 ± 19.9 percent points lower than in patients with an unaffected VS. In contrast, patients with a VS damage performed 11.7 ± 15.9 percent points better than those without a lesion in the VS when ADL objects were presented. The group-type interaction was statistically significant ($F(1,10) = 4.555$, $p = .030$).
Conclusion: The hypothesis of better distance estimation of ADL (and not geometric) holograms in patients after stroke with a lesion in the VS than in patients without such a lesion was confirmed. Results indicated that patients with a lesion in the VS rather rely on physiological distance information (accommodation, convergence, binocular disparity) than the learned interpretation of size as a cue. It is of note that this effect was not present when the distance of identical spheres was estimated. Conclusively, areas of the VS might only be involved in visual processing of differently sized objects, while distance estimation of identical objects is not affected by lesions in the VS.



OP4–03. Fig. 1

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OP4–04

Role of LCF scale as an outcome prognostic index in patients with traumatic brain injury

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Background: The disabling effects of traumatic brain injuries (TBI) present a significant healthcare concern to developed countries. In order to achieve a reliable prognosis, validated assessment scales are used to monitor the cognitive outcome, like the Level of Cognitive Functioning Scale, or the overall functional outcome, namely the Functional Independence Measure and Glasgow Outcome Scale.
Question: The aim of our study was to evaluate the role of Level of Cognitive Functioning Scale (LCF) as an outcome prognostic index in patients with TBI.
Materials and methods: Fifty-four patients with TBI with a mean age of 44.9 years (SD 20.915) were enrolled in this retrospective study. Patients were evaluated at admission and at discharge using the Glasgow Outcome Scale, Functional Independence Measure, and Level of Cognitive Functioning Scale. The Glasgow Outcome Scale was also implemented at 6 months after discharge (OUTCOME.GOS), whereas the LCF was used twice a week throughout hospitalization. For our purpose, we named LCF at admission LCFa, whereas permanence in the same LCF value (number of days), LCFaL.
Results: Δ.GOS, Δ.FIM (Δ = difference between value at discharge and at admission), and OUTCOME.GOS were significantly affected by age, length of stay, LCFa, and LCFaL.
Conclusion: The LCF can give a valuable indication to the prognosis of patients with TBI besides monitoring changes in cognitive function. This allows for individual rehabilitation plan, and long-term management strategies could be developed more quickly upon patient's discharge. Consequently, valuable healthcare and social care resources could be assigned correctly.

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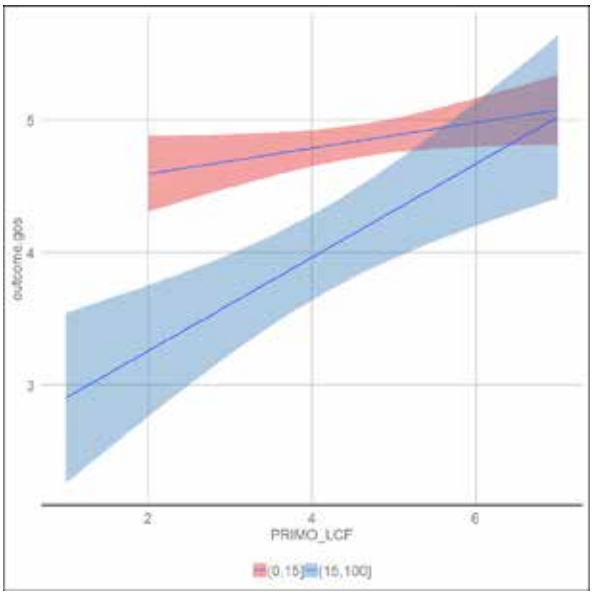

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OP4–05

The effect of combined treatment on the intelligence and mnestic function of patients with brain gliomas

M. Kurnukhina, V. Cherebillo (St. Petersburg/RU)

Summary: neuroepithelial tumors account for 45.6 % – 58 % of all primary brain tumors in adults, and the most common of these are gliomas. Currently, it is a generally accepted method of complex treatment of patients with glial tumors, which includes surgical removal of the neoplasm followed by radiation treatment, chemotherapy, and / or specific antitumor immunotherapy. Changes in the mental sphere and disorders of higher cortical functions – including a decrease in memory and intelligence, are one of the most dangerous, disabling clinical manifestations of brain gliomas.
Objective: to analyze and evaluate changes in the intelligence and mnestic function of patients with brain glioma after combined treatment.
Materials and methods of research: a clinical study of 30 patients with brain glioma was conducted. The diagnosis in the studied patients was based on clinical and laboratory data, data from radiation and instrumental methods of research. The analysis of intellectual-mnestic disorders was carried out in patients in the preoperative period, as well as 3 – 6 months after the combined treatment. The studied patients were aged from 25 to 65 years, the median was 56.5 years. In this study, we used intelligence tests-the Amthauer test (for people under 60 years of age) and the Raven test; memory tests - a 10-word memory test, the Wexler memory scale. All patients consulted clinical phycologist after surgery.
The results of the study: After combined treatment, patients with brain glioma showed regression of various intellectual disorders (from 20 % to 3.3 %; $p < 0.05$), an increase in the values of the intelligence quotient ($p < 0.05$), a decrease in the number of patients with severe dementia (from 16.7 % to 3.3 %) and an average level of intelligence (from 30 % to 13.3 %) ($p < 0.05$). Patients with smaller gliomas were more likely to have a good intelligence score (according to the Amthauer test) ($p < 0.05$). Regression of various mnestic disorders was revealed (from 100 % to 96.7 %) after combined treatment. Short-term memory in patients with brain glioma shows more pronounced changes in comparison with long-term memory disorders. After combined treatment, there is a regression of short-term memory disorders (from 46.7 to 20 %; $p < 0.05$), a softening of the severity of short-term, long-term memory decline; a regression of memory insufficiency (from 63.3 % to 26.7 %; $p < 0.05$), improvement of verbal-logical, visual and associative memory. Patients with smaller gliomas were less likely to have impaired long-term memory ($p < 0.05$).
Conclusion: According to the values of various intelligence indicators before and after combined treatment in patients with brain glioma, it was found that combined treatment leads to an

OP4–06

Changes in the quality of life of patients with low-grade glioma after combined treatment

M. Kurnukhina, V. Cherebillo (St. Petersburg/RU)

Summary: Low-grade gliomas (LGG) are slow-growing infiltrative primary brain tumors,which account for up to 60 % of all primary brain tumors in children and 10 % in adults. Among adults,LGG mainly affects young and middle-aged people. The peculiarity of LGG is slow and continuous growth,as well as a high risk of malignant transformation. One of the most common tactics of treating LGG patients is to perform a combined treatment: surgery is supplemented with radiation exposure and chemotherapy.One of the goals of the combined treatment of this group of patients is to improve the quality of life of the patient.
Materials and methods: A clinical study of 40 patients with LGG was conducted. 45 % of men and 55 % of women, the gender ratio was 1 : 1.22. The age of the patients ranged from 20 to 68 years.The average age of patients was 34.6 ± 11.4 years,the median was 40.5 years. At the same time, the studied brain neoplasms mainly affected people of working age. The average size of the LGG before surgery was 47.4 (5.9/80.1) cm^3,in the late postoperative period: 1 year – 14.2 (3.2/30.3) cm^3, 2 year – 16.1 (4.1/37.2) cm^3, 3 year – 21.6 (5.4/42.4) cm^3, 4 year – 24.2 (5.6/46.1) cm^3, 5 year – 46.8 (12.7/60.2)cm^3. The clinical study included an analysis of the disease history, assessment of laboratory and instrumental data, features of surgery, results of histological and immunohistochemical studies, determination of changes in the quality of life of the subjects before surgery,in the early postoperative period (the first 5 – 7 days after surgery – the time of discharge from the hospital), in the late postoperative period (within 5 years - an interval of 6 months).To assess the quality of life we selected special questionnaire EORTC QLQ-C30. All patients consulted clinical phycologist after surgery.
Results and discussion: It was noted that in 30 % of patients 3 – 6 months after the combined treatment, there were no complaints, focal symptoms, no MR data for the presence of pathological volume formation of the brain (100 % on the Karnovsky scale and 0 points on the WHO ECOG). According to the results of combined treatment, in comparison with the preoperative period, positive dynamics was noted on all

functional scales: physical, role, social, emotional and cognitive functioning improved ($p < 0.05$). The most pronounced intensity of the pain syndrome is noted by patients with LGG in the early postoperative period (86.7 ± 4.9); as well as after 5 years of follow-up (83.1 ± 11.8) (probably due to the appearance of continued growth/transformation into HGG). More often, dyspeptic manifestations of LGG patients were noted in the early postoperative period (20.4 ± 12.2) and after 4.5 – 5 years of treatment (76.5 ± 16.8), which were signs of general toxicity against the background of chemotherapy. A negative impact on the quality of life was revealed – the presence of a wild-type IDH mutation in a patient with LGG.
Conclusion: We found that the best indicators on various scales of the EORTC-QLQ C30 were in patients 0.5-1.5 years after the start of combined treatment($p < 0.05$)

OP4–07

Measuring cognitive reserve: an umbrella review

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Introduction: Cognitive reserve (CR) describes an active process that explains the discrepancies between the degree of lesion or brain pathology and their clinical manifestations. In recent years there has been a growing interest in operationalizing and measuring CR.
Objectives: The main purpose of this study is to summarize reviews focused on instruments and procedures to measure CR.
Materials and methods: Systematic reviews and meta-analyses were identified through a literature search following the guidelines of Aromataris et al. (2015). The methodological quality of the papers included in this umbrella review was assessed with AMSTAR- 2 and Specialist Unit for Review Evidence.
Results: 23 reviews were identified, 13 were systematic reviews and 10 were meta-analyses. Most had a critically low quality according to AMSTAR-2. The reviews included between two and 135 studies, mostly focused on older adults with dementia. CR was measured using between one to six proxies. Education alone, combined with occupation, or combined with occupation and mental activities were the most assessed proxies of CR. Only two reviews focused on standardized questionnaires of CR, with the Cognitive Reserve Index questionnaire being the most frequently used.
Conclusion: Considering the interplay between cognition, emotion, and sensory functioning, measuring CR through a single proxy, such as education, seems limited. A multidimensional model is proposed to measure CR considering the above-mentioned interplay. This review also provides suggestions for future longitudinal studies targeting the development of a formula to calculate the CR and the question on how CR translates into individual functionality in the activities of daily living.

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OP4–08

Minimally invasive laser thermosurgery of malignant gliomas: results of treatment and rehabilitation of 40 patients

O. Ostreiko, V. Cherebillo, E. Melnikova, A. Shmonin (St. Petersburg/RU)

Relevance: Malignant gliomas are the most common primary CNS tumors. With glioblastomas after 6 – 8 months. after surgery and standard treatment, continued tumor growth begins. New tumor nodes often have deep and multifocal growth. In many cases, repeated craniotomies and resection of the recurrent tumor are not performed due to the high risks. Second-line chemotherapy has low efficacy, and re-treatment has not yet been indicated due to its recent use and the risks of radiation necrosis of the brain.
Introduction: At the Pavlov Medical University, a technique for minimally invasive laser coagulation of glial tumors has been developed. Tumor biopsy and its subsequent laser coagulation were performed under general anesthesia using neuronavigation. The minimally invasive and atraumatic nature of the operation made it possible to start early rehabilitation measures.
Purpose. Evaluation of the effectiveness of a therapeutic approach using minimally invasive laser surgery and early rehabilitation.
Materials and methods: The results were evaluated in 40 patients with primary and recurrent glial brain tumors. An assessment was made on the Karnofsky scale before and after the operation. Early rehabilitation was carried out. In some cases, the sensor was left in the wound to monitor intracranial pressure in the early postoperative period. Control computed tomography was performed 1 – 3 days after the operation.
Results: In the immediate postoperative period, the functional status of patients remained stable or improved, except for one case. In a patient with recurrent malignant glial tumor of the parietal lobe, deep sensitivity disorders in the leg increased and the quality of walking deteriorated. The average hospital stay after surgery was 5.6 days.
Conclusions: Minimally invasive cytoreductive surgery, early rehabilitation make it possible for patients to quickly adapt and socialize. This creates the prerequisites for a quick discharge, return home and the continuation of comprehensive anticancer rehabilitation treatment.

OP4–09

Preservation of »SELF« in neurological rehabilitation

S. Wasti (Abu Dhabi/AE)

Brain generates the function of »mind« that determines physical, psychological and behavioural characteristics of an individual. When brain is affected by disease or trauma the mind function becomes impaired and as a consequence, patient may suffer subtle or overt changes in personal characteristics. This can result in loss of role and autonomy. Neurorehabilitation focuses on retrieving lost function but due to operational medical bias, most emphasis is placed on physical recovery, particularly in early rehabilitation. During this phase of rehabilitation an individual may be subjected to elimination from decision making. Clinical, social or personal surrogacy may evolve unnoticed and over period

of time an individual with neurological affliction can suffer from impairment of »SELF«. This has a negative impact on several domains of personal functioning including change in roles and relationships, leading to loss of confidence and self-esteem. Through this evolutional process an individual may be forced to opt out of work, education, reactional and social activities and relationships with family, friends and community at large may be affected in a manner that either results in over dependence or partial or complete detachment. This generates complexities in personal functionality and maladaptive readjustment patterns emerge.
Therefore, there is a need for modified neurorehabilitation protocol that has built in processes to prevent impairment of »SELF« and where necessary facilitate retrieval and reinstatement of »SELF«. In pursuit of this we recommend that following should be considered when formulating neurorehabilitation plans:

- Assess communication ability early and establish communication protocols that ensure an individual's inclusion in all interactions
- Assess decisional capacity as early as feasible. This may necessitate evolutional process of assessments.
- Preserve autonomy of an individual in all decision making, as much as possible, and eliminate the culture of »presumptive incapacity«
- Re-enact pre-morbid »person« as early as possible through pre-morbid personal profiling and putting in place daily activity schedules that closely match an individual's pre-morbid patterns of daily living.
- Acquire information about likes and dislikes and introduce plans to establish care routines that take these into account.
- Salvage and preserve integrity
- Prevent unnecessary decisional surrogacy through appropriation of clinical teams and family's involvement
- Assess for and manage depression, anxiety and global executive function early during rehabilitation to preserve / re-gain »SELF«.
- There needs to be an analytically supervised change in role, decision making and vocational status.

Given that more individuals are surviving severe neurological injuries and disease, it is imperative that measures are put in place to preserve »SELF«. We recommend that structured research is conducted in this hitherto neglected area of neurorehabilitation.

OP4–10

Barriers and facilitators from people's perspective with multiple sclerosis – A case based source analysis

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Introduction: MS is a chronic disease that affects around 15,000 people in Switzerland. As a complex life-long illness, effects on progress and symptoms of MS vary from a biopsychosocial and ethical perspective. Based on this broad spectrum of variability of illness experiences leads to following question: »How do people with MS experience and describe barriers, facilitators and ethically relevant conflicts?« This will be specified as follows: a) Which causes, and backgrounds are named and how could possible solutions look like from an ethical point of view? b) What consequences and benefits can be explored for the collaborative practice in the care of people with MS?
Methods: Comparison of barriers and facilitators as ICF codes as a common theoretical framework for analysis compared in three different source materials using content analysis:
Source 1) transcripts from a qualitative study design of two individuals with MS based on semi-structured DIPEx interviews.
Source 2) a literary autobiographical depiction of a person's life with MS based on extracted ICF codes.
Source 3) the comprehensive ICF Core Set for MS as supplemented by additional ICF codes from across the whole classification system of ICF. Only on ICF codes from the environmental factor's domain were focused to code barriers and facilitators for people with MS.
To answer the ethical question, Beauchamp, and Childress' four biomedical principles were used as a common framework for analysis.
Results: The topics discussed in each of the ICF domains within the environmental factors are portrayed, as well as the ethical issues. Both the numerical distribution of references to codes and specific examples of topics discussed are shown.
Discussion: The analysis of the topics led to the following lessons learned:

- Understand the circumstances
- Do not reduce people to their diagnosis
- Understanding is important and its meaning for medicine
- Respect of persons individuality
- Relationships are important for the illness and treatment relationship

All these lessons learned are supported by statements made by people with MS in the three compared sources. While not without their limitations, these lessons learned are important in the management of health care of people with MS.

OP5–01

Health Status of COVID-19 Patients Six Months After Discharge from Neurorehabilitation

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Introduction: The global dissemination of the pandemic syndrome of coronavirus 2 (SARS-CoV-2) has resulted in a large number of individuals affected by the associated disease since 2019 (COVID-19). Currently, huge numbers of infections with SARS-CoV-2 have been confirmed worldwide. Although many affected people have no or mild symptoms and recuperate within a few weeks, there is a proportion of patients developing a variety of prolonged symptoms (long-COVID) including dyspnea, fatigue, headache, and anosmia, illustrating the need for long term treatment such as neurorehabilitation. As little is known about the long-term health status of critically affected COVID-19 patients suffering from neurological deficits, we aim to report their health course for a six month period starting at discharge from the neurorehabilitation facility. We compare the data to non-COVID patients with critical illness polyneuropathy and -myopathy.
Methods: Recruitment of adult post-COVID patients took place since June 2020 during rehabilitation at Schoen Clinic

Bad Aibling, Germany. The study visits at discharge (V1) and six months afterwards (V2) included assessments concerning functional independence in daily activities (Barthel-Index (BI)), overall disability (modified Rankin Scale (mRS)) and quality of life (EQ-5D-5L). To compare quality of life between COVID-19 patients and controls, EQ-5D-5L were converted to EQ-5D-3L (used in the control group).

Results: For this interim analysis 23 patients were included (mean age 62.5 ± 14.2 years, 7 female). On average, the patients were hospitalized in our hospital for 98.87 ± 74.2 days. The control group included 56 patients (mean age 69.3 years, 21 female) with a mean hospitalization of 109.7 ± 52.4 days. Regarding the COVID-19 patients, statistical analysis revealed a significant difference in the BI ($z = -4.138, p < 0.001$) with an increase from in the median 65 (IQR = 5) at V1 to 95 (15) points at V2. In contrast, neither the mRS (V1&V2: 3 (1), $z = -1.027$, $p = 0.305$) nor the EQ-5D-5L index (V1: 0.755 (0.25) V2: 0.716 (0.106), $z = -1.308$, $p = 0.191$) showed any significant change between the two visits. In comparison the control group had at V2 a lower BI (80 (42.5)), but the same mRS value (3 (2)). The median of the EQ-5D-3L of the COVID-19 patients was 22221 and for the control group 22211.

Conclusion: The study shows that COVID-19 patients still have to cope with various problems six months after discharge from inpatient neurorehabilitation and that deficits are only incompletely regressed. They still have a moderate level of impairment and low quality of life. In particular, they show problems in the dimensions of mobility, self-care, general activities, and in the aspect of pain/physical complaints, but no problems regarding anxiety/depression. As impairments are still obvious after six month, further investigations are of high relevance to evaluate the impact of the lasting impairments on patients' daily and professional life.

OP5–02

Advantages of Botulinum toxin A treatment in combination with controlled dynamic stretching orthotics for the treatment of contractures in the lower extremity

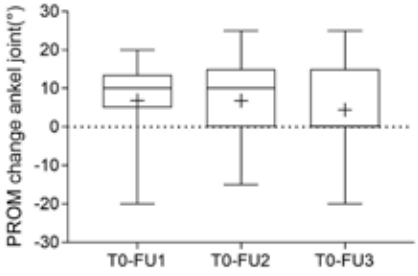
L. van der Stam, M. Bülow, P. Bittigau, A. Kaindl (Berlin/DE)

Introduction: Spasticity is a common clinical appearance in 80 % of the children diagnosed with cerebral palsy. Secondary to spasticity, contractures can occur. Botulinum toxin A (BTA) is used to treat spasticity. Though the spasticity is reduced by BTA, the contractures are not treated. Therefore BTA is used in combination with other therapies, such as physical therapy (PT) and casting. Serial casting shows to be most effect to treat contractures after BTA- injections. Though it brings a great benefit in improving the passive range of motion (PROM), it does come with its disadvantages: skin irritations and pain are a common problem caused by serial casting. But its greatest disadvantage is, that no active PT is possible whilst wearing the cast. Controlled dynamic stretching orthotics have proofed to be able to reduce contractures with a median of 10° ($p = 0.001$) in our last studies. Also, active PT is allowed during the most active period of BTA, as the CDS orthotic are recommended to be worn only 1-2 hours/day. We hypothesized that the combination of BTA with CDS orthotics will show greater results in terms of ankle joint PROM than BTA treatment only.

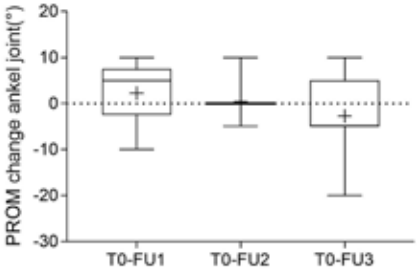
Method: In 2015-2021 BTA was administered at children with cerebral palsy at Charité. Starting 2019, CDS orthotics were part of standard treatment in combination with BTA in the calf muscles. Data of both treatment options were retrospectively compared. Group A contained the treatment of calf muscles spasticity with BTA in combination with a knee- and ankle joint CDS orthotic. Group B contained the treatment of calf muscle with BTA only. We evaluated PROM of ankle joint at baseline, 1 month, 3 months and 6 months post-injections.

Results: Group A included 19 lower extremities treated with this combinational treatment. Group B included 12 lower extremities were treated with BTA only. At 1 month post-injections, group A showed a significant improvement in term of ankle joint PROM with a of median 10° ($p = 0.019$). Group B showed non-significant changes in ankle joint PROM of median 5° ($p = 0.340$). After the active period of BTA, at 3 months post-injection, group A still showed significant improvements with median 10° ($p = 0.016$). Group B showed a median 0° in terms of ankle joint PROM at 3 months post-injections ($p = 0.453$). By 6 months after first injections of BTA, group A showed the median ankle joint PROM returned back to its initial, median 0° ($p = 0.152$). Group B had worsened its ankle joint PROM since the beginning of treatment with -5° ($p = 0.353$).

Discussion: This retrospective study has confirmed our hypothesis, the combinational therapy of BTA with CDS orthotics show promising results in terms of PROM of the ankle joint. At 6 months post-injections, treatment without CDS orthotics showed worsening of the contracture, where stabilization of the contracture is found with the additional CDS orthotic. This success could mean more comfortable treatment options in the future for children with calf muscle spasticity.



OP5–02. Fig. 1



OP5–02. Fig. 2

OP5–03

Virtual reality and social robots in pediatric neurorehabilitation as a new way to develop social skills

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Introduction: The lack of children's social skills is a growing problem. Over 50% of children with neurological disorders (ND) have demonstrated social deficit (Greenham 2010). According to the latest data, every 5th Estonian child needs some kind of educational support service and only 3% receive help from schools. It is important to develop new modern technological solutions in pediatric neurorehabilitation. VR environment is a novel and less anxious learning environment for the child to enhance their social competences. Japanese Robot Pepper is a child-like humanoid (created at 2014 by Softbanks Robotics) for creating a social dialogue similar to child-to-child.
Objectives: To develop a method of pediatric neurorehabilitation based on news technologies (VR with a social robot Pepper) for the development of social skills in children with ND.
Patients and methods: 55 children have participated in VR and Pepper **(Figure 1)** trainings (34/21 respectively) to improve their social communication competence. VR training with HTC Vive VR goggles included children with ND (epilepsy, traumatic brain injury, stroke etc.) and social impairment at the age of 9–12 yrs. Robot training group participants with language and social deficit were at the age of 5–7 yrs. We have developed a structured protocol with 10 social metaphors in VR environment. For robot trainings 8 sessions were developed: topics included recognizing emotions and understanding other child's feelings etc., developing communication vocabulary. After interventions children and parents gave feedback.

OP5–03. Fig. 1

Results: The children acknowledged VR as an interesting, exciting, and safe method to learn and train social skills in challenging life situations. Children trained by Pepper became more patient and concentrated in social situations with improved vocabulary, social attention and acceptance. Children perceived the robot as an equal companion, teaching each other new skills and politeness. Parents' and teachers' feedback showed children's enhanced self-expression skills and social vocabulary. Important finding was the 100% compliance in trainings. Making contact with the robot was faster for children, especially in patients with social anxiety and defiant behavior.
Conclusion: An effective combined method with safe environment for children with ND was created to develop communication skills and coping in difficult situations. VR social metaphors and humanoid Pepper were motivating for children to develop communicating skills, vocabulary and coping with challenging social situations.

OP5–04

Enhancement of STroke REhabilitation with Levodopa (ESTREL-Study) – update of an ongoing randomized controlled trial

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Question: Levodopa given in addition to rehabilitative therapies based on the principles of motor learning may be associated with a patient-relevant enhancement of motor recovery after acute stroke. However, adequately designed and powered randomized controlled trials (RCTs) are required, to clarify whether this approach is safe and effective.
Methods: (I), we present the findings of a rapid systematic review with preliminary meta-analysis searching Medline, the Cochrane Library, and clinicaltrials.gov using »stroke« AND »levodopa« restricted to RCTs. (II), we designed a multicenter-RCT, and report on 200 participants.
Results: 6 RCTs were identified comparing levodopa (n = 402 patients) versus control (n = 393 patients) in stroke patients with data on motor outcome stratified to the type of treatment available. There was a small non-significant trend towards a more favorable motor outcome in levodopa-treated stroke patients as compared to control patients (Standard Mean Difference [95% Confidence Interval]) = 0.15 (-0.25 to 0.55). However, heterogeneity between RCTs was considerable (I2 = 67%). The RCTs differed with regard to patient populations (chronic/acute stroke), study treatment, length of follow-up, and outcome measures. None mentioned adaptation of concomitant rehabilitative therapies to the principles of motor learning. Of note, safety concerns were absent. We designed ESTREL (Enhancement of STroke REhabilitation with Levodopa), to study whether levodopa compared to placebo given in addition to standardized rehabilitation based on the principles of motor learning is associated with a patient-relevant enhancement of functional recovery in acute stroke patients. ESTREL is a multicenter, placebo-controlled superiority trial. Enrolment is in certified stroke units/centers, followed by stroke rehabilitation in established neurorehabilitation centers. Participants receive Levodopa 100mg/Carbidopa 25mg three times daily or matching placebo for 5 weeks in addition to standardized rehabilitative therapy. The primary outcome is the between-group difference of final scores in the Fugl-Meyer-Motor Assessment-(FMMA) 3 months after randomization. A sample size of 610 participants allows to detect a mean difference between the Levodopa- and the control-group in the FMMA score of 6 points (power 80%; significance level 5%). Currently, 200 participants have been recruited. Participants were 73[64-82]) years of age (median[IQR]), were female in 43.5%, and had an ischemic stroke in 84.5%. Median [IQR] NIH-Stroke scale score at recruitment was 7[5-10]. In 89% patients, 3 months visits were successfully completed, 11 (5%) had died and 5 (2.5%) had withdrawn from the study.
Conclusions: The ESTREL-study and similarly designed large trials are required to clarify whether levodopa given in addition to rehabilitative therapy in acute stroke patients is safe

and effective. ESTREL has started successfully and shows a high acceptance rate among participants.

OP5–05

Falls in patients with neurological disorders – a retrospective observational cohort study in a clinical setting

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Introduction: Falling is common among neurological in-patients. Problems arise from the fall itself and also when the faller is unable to get up afterwards, especially when the fall occurs unobserved. There is a need for (online) fall detection, e.g. using smart technology. The European research project TeNDER (www.tender-health.eu) aims to create an integrated care ecosystem with real-time fall detection. The necessity to implement such a system in a home-based environment is comprehensible; the need for a fall detection system in a clinical setting, however, lacks evidence. Specifically the proportion of unobserved falls has not been sufficiently investigated. Therefore, this study aims to investigate falls in neurological in-patients and compares unobserved and observed falls, as well as general factors potentially leading to a greater number of falls.
Methods: In this retrospective observational cohort study, all patients who had at least one fall during their hospitalisation between 2012 and 2020 were included, resulting in a data collection period of about eight years. Fall-related data (circumstances and patient specific risks) was accumulated via a customised fall report form. Regression analyses were conducted to investigate predictors for increased numbers of falls and characteristics and consequences of unobserved falls.
Results: During the study period, N = 17,543 patients were admitted and hospitalised at Schoen Clinic Bad Aibling of which N = 2056 patients (11.73 %) had at least one fall with a total of 3532 falls. Results indicate positive associations between the number of falls and being male, duration of hospitalisation, higher Patient Clinical Complexity Levels (PCCL), cerebrovascular diseases, intracranial injury, and psychogenic disorders (mental disorders due to known physiological conditions, without dementia). 70 % of falls were unobserved. Unobserved falls had significantly higher odds for the following conditions: to happen in the patient's room (OR = 2.50 [2.08, 3.01]), in the bathroom while taking a shower (OR = 18.15 [3.95, 322.21]) or using the toilet (OR = 4.47 [3.15, 6.52)]; to happen because of slipping (OR = 1.90 [1.34, 2.76]), falling out of a bed with a bedrail (OR = 10.71 [5.60, 23.83]) and falling out of a wheelchair, toilet chair or normal chair (OR = 2.87 [2.29, 3.61]).
Conclusion: The high incidence of unobserved falls in neurological in-patients supports the idea to develop and establish fall detection systems in hospitals. Such systems should at least cover the patient's room and the bathroom.
This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875325 (TeNDER, affecTive basEd iNtegrateD carE for betteR Quality of Life).

OP5–06

Zero to two years of professional experience in an ICU indicates strong to strongest imaginable burden for speech- and language therapists

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Introduction: In intensive care units (ICU), attempts are made to save the lives of sick or injured people, which is why the working staff is confronted with many stressors on a daily basis. Teixeira et al. (2013) [1] identified the burnout (BO) level of physicians and nurses in ICUs in their study and demonstrated a high BO level in 31 % of the participants. In addition to physicians and nurses, the interdisciplinary team also includes speech and language therapists, who, for example, provide tracheal cannula management and diagnosis and therapy of swallowing disorders. The aim of this study was to assess signs of BO and secondary traumatic stress (STS) in speech and language therapists in the ICU. In addition, the subjective stress of the participants was measured, which originated from nine different occupational factors.
Method: The survey was conducted in the period from 06.03.2021 to 27.03.2021 using an online questionnaire, which included the German version of the Professional Quality of Life Scale and was supplemented with occupational stress factors and a question about the stress caused by private factors. Participants were recruited through two Facebook forums and through staff members of German university hospitals. Results were presented using descriptive statistics.
Results: Participants were in a low to average range with regard to BO and STS. Regarding Compassion Satisfaction (CS), only average to high scores were demonstrated. The strongest burden came from the treatment of patients after exposure to violence. On average, mild to moderate burden emanated from all nine factors. Women were more often in a strong, very strong, and strongest imaginable range than men. Speech and language therapists with zero to two years of professional experience in an ICU more often indicated a strong, very strong and strongest imaginable burden than therapists with at least 10 years of professional experience in an ICU.
Discussion: Future studies should examine the differences between nursing and speech language therapy work in the ICU and whether there is a relationship between the duration of treatment and the development of BO and STS. Furthermore, it should be evaluated what makes speech and language therapists feel burdened in the ICU and how they deal with this burden.

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OP5–07

Describing children's hospital fear and response to a new distraction technique – holographic display for reducing fear and pain in the paediatric population

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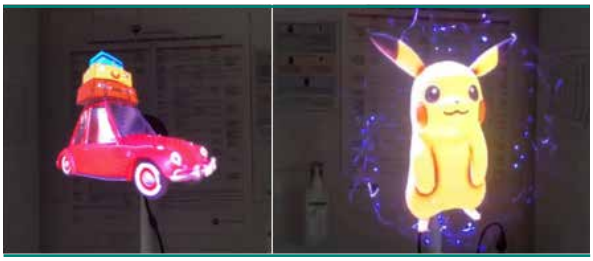
Introduction: Management of medical fear and procedural pain is a challenging and complex mission in pediatric patients. Digital distractions provide pain and distress reduction for children undergoing painful or uncomfortable hospital procedures (Gates et al, 2020). The interest in more interactive and engaging methods of distractions increases. Using novel technology (virtual reality, tablets, social robots) has shown promise in pain management. Holographic display provides an innovative approach as a modern distraction technique. To our knowledge, holograms have not been used as a method of distraction in children to cope with hospital pain and fear before.
Objectives: The aims were to describe children's hospital fears and assess the effectiveness of the holographic display method in reducing pain in children during hospital procedures.
Patients and methods: Study group consisted of 51 children at the age of 5.5 months – 11 years (mean age: 4.06 years; SD = 2.44) undergoing painful hospital procedures. HYPERVSN holographic solution with 31 different 3D animations was applied for distraction (see **Figure 1**). Pain levels were assessed by nurses with FLACC scale (Face, Legs, Activity, Cry, Consolability scale, 1997) before and after viewing holograms during procedures. Parents assessed children's hospital fear by answering a children's hospital fear questionnaire (created by the authors).



OP5–07. Fig. 1: Examples of holographic animations shown in the procedure room

Results: Parents' reports revealed high hospital fear scores (7 – 10/maximum 10 points) in 45.1% of children. 55% of parents considered venipuncture as the most frightening procedure in children. Also, the percent of children with higher fear scores significantly increased with age (Fisher's Exact Test $p < 0.0001$), which means that older children were reported to have higher fear scores compared to younger children. The fear level 7 and above was reported among 58.3% of the children aged 12 – 18 years compared to 33.3% in children aged 0 – 3 years (see **Table 1**). Furthermore, children's pain scores on FLACC scale were significantly lower ($p < 0.0001$) after viewing holograms- pain reduction was 4.01 points (out of ten). The study shows great promise in applying holograms as a new distraction method during painful procedures.
Conclusion: For the first time, novel hologram technology was utilized and revealed as an effective distraction technique in children for pain and distress reduction during common painful and uncomfortable hospital procedures. We believe that looking at holograms, in addition to distraction, may also improve children's emotional state and perception of control over pain. The distraction technique was effective in children of different ages, including smaller children aged 10 – 13 months (reported by nurses). In addition, procedures like measuring blood pressure and Botox therapy were easier to conduct using the supplementing holograms. We encourage healthcare professionals to implement modern exciting holographic videos or images in hospital settings.

OP5–07. Table 1: The relationship between the level of hospital fear and the age of the child

Intervals of fear scale (1–10)	Children's age during the latest medical procedures (years)									
	Total		0–3 y		4–7 y		8–11 y		12–18y	
	N	%	N	%	N	%	N	%	N	%
1–3	14	27.5	7	58.3	4	25.0	2	18.2	1	8,3
4–6	14	27.5	1	8.3	6	37.5	3	27.3	4	33,3
7–10	23	45.1	4	33.3	6	37.5	6	54.5	7	58,3
Total	51	100.0	12	100.0	16	100.0	11	100.0	12	100.0

OP5–08

What are the needs of direct care workers who support stroke survivors? Preliminary evidence across EU states

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Introduction: Stroke is the second leading cause of disability and is clearly associated with old age, with the risk of suffering a stroke doubling in each successive decade from 55 years on. The dramatic increase in the demand for stroke rehabilitation, due to current epidemiological trends, is putting care providers and direct care workers under enormous pressure. Direct care workers are a key category in all care settings due to their essential role of providing personal care to patients with stroke and support to other health professionals in a variety of activities. They are also the least trained as no formal qualifications are necessary for their position. Vocational training is also lacking since the environments in which they work do not usually promote lifelong training opportunities.
Objectives: The Erasmus+ project titled: »iTRAIN: Mobile Training for Direct Care Workers dealing with Stroke Survivors« aims to make evidence-based knowledge available for semi-skilled direct care workers engaged in stroke care by first identifying their knowledge gaps in relation to stroke care, and second, the type of support stroke survivors and their families would like to receive from these carers.
Materials and methods: Data was collected via an online survey and focus groups in the five participating EU countries (Cyprus, Italy, Lithuania, Portugal, Sweden). A total of 113 direct care workers participated in the online survey and 24 for the focus groups. Data analysis was based on descriptive statistics for the survey data and thematic analysis for the focus groups.
Results: The findings revealed that direct care workers seek knowledge on issues related to the behavioral and emotional impacts of stroke and on the kind of support they can

provide stroke survivors with communication, cognitive and emotional difficulties (e. g., depression). The type of support stroke survivors and their families wish to receive from direct care workers focuses on issues related to emotional care.
Conclusions: There is an urgent need for direct care workers to be supported through training so that the quality of their services remains high. This has an impact on the quality of life of stroke survivors and their families. The consortium is currently developing a comprehensive vocational training package, to be available for free and to be used with mobile devices, for direct care workers dealing with stroke survivors.

OP5–09

Multisensorial stimulation in a vertical standing for visually impaired kids with CP

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In many clinical descriptions of children affected from CP we have to face visual impairments or blindness. For these kids, the sensory deprivation is an added element of disability; besides having any difficulties in the psychomotor area, the visual impairments could complicate the rehabilitation path. Kids affected by visual impairments find particularly hard keeping an upright posture even with the aid of vertical stabilizers; this makes it more difficult for them to improve their trunk control and lower limbs loading. Their perception of motion and of their own bodies is also often altered.
The multisensorial stimulation is really important for visual impaired or blind kids (as well as in other pathologies), especially in order to give them an experience of sensory perception and improve their compliance.
A group of 10 kids has been involved in the Hollman Center, a scientific institute specialized in supporting visually impaired children affected from CP. The age range within the group is 21/48 months and the clinical situation was visual impairment/blindness associated to a CP or dysmetabolic syndromes.
We used a multisensorial standing for the trials, a vertical stabilizer that provides a sensory stimulation while keeping the standing position. Our aim was to analyze the differences in compliance, attention, motivation, gratification and performances between the two configurations (just with audio and with audio/pallestesic stimuli).
To do so, we put a big switch (on/off), connected to a radio or tablet device, on the standing's tray. We left six minutes to each kid to handle the switch (turning on and off the radio depending on their feelings); when the subjects were unable to press the switch by themselves, we helped and assisted them. We looked at how many times the kids activated the switch and how their compliance was.
Afterwards, we connected the device to the electronic hardware of the standing providing the multisensorial stimulation, which boosted the audio and made the subjects feel the vibrations; we recorded for the same amount of time (six minutes) the kids' compliance and the switch use frequency.
The kids activated the switch up to 30 % (time of using) more with the multisensorial stimulation layout than with the simple audio stimulus, with a benefit for the upper limbs motor skills improving their compliance, too.
Almost all of the visual impaired kids showed a better compliance holding the upright position for a longer time and with better awareness. As clinical relevance this kind of stimulation during the upright position can improve the sensory perception, besides enhancing their motor skills.

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OP5–10

Smart Ankle Bracelet-Laser Device to Improve Gait and Detect Freezing of Gait (FOG) in a 58-year-old Female with Parkinsonism: A Case Report

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Background: Freezing of gait (FOG) is a debilitating symptom in parkinsonism including Parkinson's disease (PD), leading to multiple falls. Some patients do not respond well to medications. Visual cue has been proven to alleviate FOG, however, results are mixed and the clinical implications remain inconsistent. In addition, FOG detection in hospital settings that does not reflect the severity in real-life situations poses challenges in measuring clinical outcomes.
Objective: To demonstrate the efficacy and feasibility of a new smart ankle laser to monitor FOG and improve walking in parkinsonism.
Methods: A Case report. The smart ankle bracelet laser **(Fig. 1)** was designed as a close loop cueing device to project the laser line automatically. The line was adjusted to her walking steps, so less learning curve was required. The freezing pattern was also recorded.
Results: A 58-year-old woman was diagnosed with secondary parkinsonism with a corticobasal syndrome-like feature, secondary to hypoxic brain injury involving bilateral basal ganglia, left greater than right. She had FOG for 5 years and had no response to levodopa 600 mg/day and ropinirole 4 mg/day. Gait speed and step length with the laser on, compared to when the laser was off, were increased from 0.43 to 0.5 meter/second, and 0.67 to 0.73 meters, respectively. TUG is reduced from 39.44 to 21.70 seconds after turning on the laser cue. FOG dominantly occurred during the turning position, which required physical assistance to secure the instability. The percentage of FOG was 47 % while walking with the laser off. With the laser, FOG was remarkably reduced to no FOG. The monitoring FOG detected by the device is shown in **Fig. 2**. No adverse effects were found.

OP5–10. Fig. 1: Showing the proposed device which is worn around the ankle

OP5–10. Fig. 2: Displaying the FOG data analyzed on the cloud-based assessing platform, in which the highlighted areas represent the freezing of gait episode

Conclusion: Smart ankle bracelet-laser devices can immediately improve walking parameters and offer promising results in gait monitoring at home.

Keywords: parkinsonism, freezing of gait, gait disorders, self-help devices

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KURZVORTRÄGE

KV1-01

Subkortikale Aphasie = Subkortikale Aphasie?

I. Rubi-Fessen, K. Gerbershagen (Köln/DE)

Einleitung: Klassischerweise treten Aphasien nach Insulten mit Läsionen der kortikalen linkshemisphärischen Sprachareale auf. Aphasien werden aber auch nach subkortikaler Läsion (z. B. der Basalganglien) beschrieben [1]. Die Sprachtherapie orientiert sich an den Methoden zur Therapie kortikaler Aphasien. Die Parameter, die den Rückbildungsverlauf subkortikaler Aphasien beeinflussen, sind noch Gegenstand der Forschung. Neben dem Einfluss der Verschonung spezifischer anatomischer Strukturen und derer Verbindungen [2], zeigen aktuelle Studien, dass die Effizienz der Aphasietherapie durch nicht-invasive Hirnstimulation, z. B. durch die transkranielle Gleichstromstimulation (tDCS) gesteigert werden kann.
Ziel: Bei zwei Patient*innen mit vergleichbarer subkortikaler Läsion und Aphasie sollte die Wirksamkeit einer additiven anodalen tDCS an unterschiedlichen Stimulationsorten auf den Outcome der Aphasietherapie evaluiert werden.
Patient*innen: Patientin A (28 Tage/p.o., schwere Amnestische Aphasie) und Patient B (91 Tage/p. o., Globale Aphasie) jeweils nach Stammganglienblutung loco typico links (vgl. **Abb. 1** und **Abb. 2**).
Methode: *Design:* Beide Patient*innen durchliefen nacheinander zwei je zweiwöchige Therapiephasen (T1 und T2) mit jeweils 10 sprachtherapeutischen Einheiten. Direkt vor T1, zwischen T1 und T2 und nach T2 erfolgte eine sprachtherapeutische Diagnostik.
Therapie: In T2 wurde die Sprachtherapie durch eine linksseitige anodale tDCS (2 mA, 20 Minuten) unterstützt. Bei Pat. A wurde die Anode über M1 platziert, bei Pat. B über dem Broca-Areal. Die Methodik der Sprachtherapie wurde über T1 und T2 beibehalten.
Ergebnisse: Pat. A verbesserte sich sowohl in T1 und T2 signifikant: Nach T1 bezüglich der Profilhöhe des Aachener Aphasie Tests (AAT) und dem Token Test; nach T2 bezüglich der Profilhöhe des AATs (jeweils $p < 0{,}05$). Pat. B zeigte nach T1 und T2 keinerlei signifikante Veränderung.
Diskussion: Pat. A verbesserte sich sowohl in T1 als auch in der tDCS-gestützten Phase T2 signifikant. Deshalb kann über einen Add-on der tDCS keine verlässliche Aussage getroffen werden. Da Pat. A zwischen T1 zu T2 von der späten Postakutphase zur frühen chronischen Phase mit abnehmender Spontanremission wechselte, könnte der weiterhin signifikante Anstieg in T2 durch die additive tDCS über M1 begünstigt worden sein. Pat. B zeigte nach keiner der Therapiephasen eine signifikante Veränderung. Ursachen für den mangelnden Therapieerfolg und ausbleibenden Effekt der tDCS über dem Brocaareal links könnten neben der fortgeschrittenen Chronizität sowie dem höheren Schweregrad der Aphasie auch eine stärkere Beteiligung des Fasciculus arcuatus **(Abb. 2b)** sein [2].

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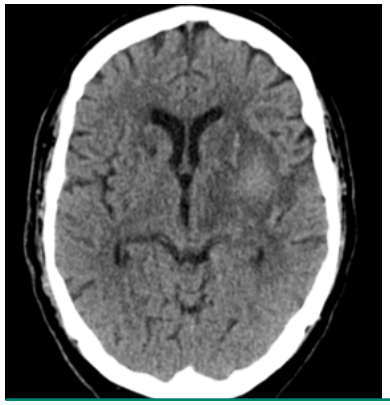
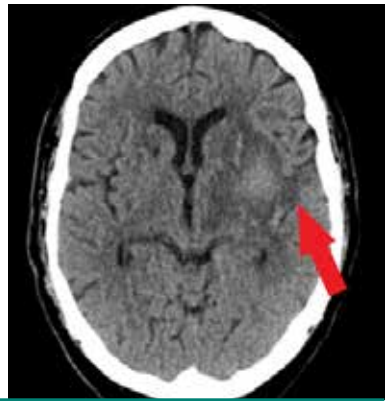
KV1–01. Abb. 1



KV1–01. Abb. 2a



KV1–01. Abb. 2b

KV1–02

Zuverlässige und valide robotergestützte Assessments von propriozeptiven, motorischen und sensomotorischen Beeinträchtigungen der Hand nach Schlaganfall

M. Zbytniewska, C. Kanzler, L. Jordan (Zürich/CH), C. Salzmann, J. Liepert (Allensbach/DE), O. Lambercy, R. Gassert (Zürich/CH)

Einleitung: Ein Schlaganfall kann zu motorischen und sensorischen Funktionsstörungen in der Hand führen. Der Zusammenhang zwischen diesen Defiziten ist schlecht verstanden. Vor allem gibt es keine passenden Methoden, um propriozeptive Defizite zu diagnostizieren und damit ihren Zusammenhang mit motorischen Beeinträchtigungen zu untersuchen. Die klinischen Assessments sind häufig subjektiv und nicht sensitiv. Technologie-basierte Lösungen könnten eine objektive Alternative darstellen. Das Ziel dieses Projekts ist es, roboterunterstützte Assessments der motorischen und sensorischen Handbeeinträchtigungen zu entwickeln und zu validieren.
Methode: Die Assessments wurden auf einem Roboter (ETH MIKE) mit einem Freiheitsgrad für den Zeigefinger implementiert. Als Sichtschutz befindet sich über der Hand ein Tablet mit grafischer Benutzeroberfläche. Propriozeptive Defizite haben wir mit dem »Positionsbestimmung«-Assessment bewertet. Der Roboter bewegt den Finger in eine bestimmte Position, und der Patient muss auf dem Bildschirm die gespürte Fingerposition anzeigen. Um die Handmotorik zu messen, muss der Patient den Finger so schnell wie möglich zu einem Ziel bewegen. Als Assessment

von sensomotorischen Beeinträchtigungen muss der Patient einer vorgegebenen Bewegung so genau wie möglich folgen. In der Studie wurden alle robotischen Assessments zweimal im Abstand von einem bis drei Tagen mit Schlaganfallpatienten wiederholt. Zusätzlich wurden klinische Tests durchgeführt. Als Kontrollgruppe wurden gesunde Probanden der gleichen Altersgruppe für nur eine Messung rekrutiert.
Ergebnisse: Es wurden Daten von 30 subakute Schlaganfall- und 31 Kontrollpersonen analysiert, rekrutiert in Kliniken Schmieder Allensbach und an der ETH Zürich. Wir haben herausgefunden, dass es möglich ist, ein breites Spektrum von Beeinträchtigungen (z. B. Fugl-Meyer Obere Extremität zwischen 4 und 65 Punkten) mit robotergestützten Assessments zu bewerten. Die Ergebnisse zeigen eine gute Reliabilität, mit Intraclass-Korrelationen >0.7 für alle Assessments. Zusätzlich konnten wir zeigen, dass die robotischen Messungen die Unterscheidung zwischen Kontrollprobanden und Schlaganfallpatienten ermöglichen. Es gibt außerdem eine moderate bis starke signifikante Korrelation zwischen Robotermetriken und entsprechenden klinischen Assessments (Spearman rho = 0.4 – 0.8). Schließlich korrelierten robotergestützten Assessments, die auf verschiedene Defizite abzielten (motorisch, sensorisch), nicht stark miteinander (rho < 0.32, p > 0.1), wodurch komplementäre Informationen über das Beeinträchtigungsprofil jedes Patienten präsentiert wurden.
Diskussion: Die vorgeschlagenen robotergestützten Assessments sind klinisch machbar, zuverlässig und valide bei der Charakterisierung von Beeinträchtigungen der propriozeptiven, motorischen und sensomotorischen Funktion der Hand. Deshalb können die vorgeschlagenen Roboter-Messungen nun verwendet werden, um Änderungen der Beeinträchtigungen longitudinal zu untersuchen.

KV1–03

Strukturierter frühkindlicher Schriftspracherwerb bei Kindern mit Behinderungen

M. Klähn (Düsseldorf/DE)

Einleitung: Kinder mit Behinderungen werden meist ambulant durch Seh- und Hör-Frühförderung, Frühförderzentren und Physio-, Ergotherapie und Logopädie gefördert. Fokus sind sensorische, motorische und sprachliche Fähigkeiten im Vergleich zum Alterskollektiv. In der Schule erlernen schwerst Mehrfach-Behinderte Kinder nur selten Schriftsprache. Es gibt kaum Programme zur frühen intellektuellen Förderung. Private Organisationen propagieren die Fähigkeit zum Lesen ab dem 1. Lebensjahr, da Lernen per Definition keine motorischen Ressourcen benötigt. Wissenschaftliche Evidenz findet sich kaum. Betrachtet wird ein heterogenes Kollektiv von Kindern mit Behinderung, die ein strukturiertes Programm zum frühen Lesen absolviert haben, hinsichtlich ihrer (Lese-)Entwicklung.
Material/Methoden: 8 Kinder (2 – 11 Jahre) mit verschiedenen Behinderungen wurden anhand eines elternbasierten Programms täglich in 15 Sessions a 1 Minute mit Schriftsprache auf Wortkarten oder per Projektor vertraut gemacht. Die Schriftgröße wurde den visuellen Fähigkeiten angepasst (1 – 30 cm). Karten-Format und Schriftart waren einheitlich, die Reihenfolge variierte, um die Identifikation nur anhand der Schrift zu sichern. Initial wurden 5 Wörter/d repetitiv gezeigt und wöchentlich wiederholt, bis die Kinder Zeichen von Erkennen zeigten. Dann wurden täglich 5 – 10 neue Wörter präsentiert. Die Anzahl der Wortwiederholungen war 15/Woche. In Spielen bewiesen die Kinder ihre Fähigkeiten die Wörter zu erkennen.
Ergebnisse: Alle Kinder lernten Einzelwörter zu unterscheiden. Ein Kind nach Meningitis mit mehrjähriger globaler Entwicklungsverzögerung machte an einer internationalen Schule Abitur, ein Kind mit Down-Syndrom lernte mit 4 Jahren Lesen und Sprechen und wurde ohne sonderpädagogischen Förderbedarf eingeschult. Das Kind mit Cardio-Facio-Cutanem Syndrom besucht mit Förderschwerpunkt Lernen eine Gesamtschule. Der frustran logopädisch geförderte 3-Jährige mit V.a. Sprechapraxie las nach 6 Monaten unbekannte Wörter und begann in 3-Wort-Sätzen zu sprechen. Ein Junge mit Down-Syndrom differenzierte mit 2,5 Jahren Wörter, konnte aber bei inkonsequenter Förderung die Lesefähigkeiten nicht dauerhaft ausbauen. Ein Junge mit Cerebralparese lernte mit 11 enthusiastisch Wörter lesen. Ein mehrfach behinderter Junge mit schweren visuellen, auditiven und motorischen Defiziten erwarb einen Wortschatz um 2.000 Wörter. Der Verlauf wurde über Jahre videodokumentiert.
Diskussion: Der frühe Erwerb von Schriftsprache ist möglich und stellt eine sinnvolle Förderung von Kindern mit Defiziten dar, da er über visuelle und zeitgleich auditive Sinnes-Kanäle verläuft und Defizite ausgleichen hilft. Darauf kann eine strukturierte Informationsvermittlung zu allen Bereichen des Lebens aufbauen und ermöglicht die intellektuelle Förderung von Kindern mit Behinderungen. Dies schafft eine bessere Voraussetzung zur Teilhabe am Leben in einer Welt, die auf Schriftsprache basiert.

KV1–04

Hilft Augmented Reality bei Apraxie? Verbesserung des gestörten Bewegungsverhaltens mittels holografischer Reize in einer Pantomime Aufgabe

N. Rohrbach (München/DE), C. Krewer, K. Jahn (Bad Aibling/DE, München/DE), J. Hermsdörfer (München/DE)

Einleitung: Die zugrunde liegenden Mechanismen fehlerhaften Werkzeugnutzung bei Patienten mit Gliedmaßen-Apraxie nach einem Schlaganfall sind noch nicht vollständig verstanden. Studien zeigen, dass Kontextinformationen die Leistung der Werkzeugnutzung beeinflussen können. Mit Hilfe von Augmented Reality (AR) Technologie kann die reale Umgebung durch holografische Zusatzinformationen angereichert werden. AR findet bereits in vielfältigen Bereichen Einsatz und wurde im Rahmen dieser Studie herangezogen, um den Einfluss kontextbezogener Informationen auf das Bewegungsverhalten systematisch zu untersuchen.
Material/Methode: Ziel der Studie war es, den Einfluss visueller Reize mit unterschiedlicher Ausprägung zu vergleichen, um die effektivste Art der Unterstützung zu ermitteln. Hypothese war, dass visuelle Kontextreize den Zugang zum motorischen Programm unterstützen können und die gestörte Bewegungsausführung durch holografische Reize gemildert werden kann.
Die Pantomime-Aufgabe gilt als sensitiver Test zur Diagnostik der Gliedmaßen-Apraxie und wurde für die Zwecke dieser Studie herangezogen. 44 TeilnehmerInnen (21 Patienten nach linkshemisphärischem Insult, 23 gesunde Kontrollpersonen) wurden aufgefordert, die Nutzung fünf gängiger Objekte (Hammer, Bügeleisen, Gießkanne, Schlüssel, Glühbirne) vorzuführen, ohne diese in die Hand zu nehmen. Sie erhielten visuelle Unterstützung in Form zwei verschiedener Modalitäten (statisch vs. dynamisch) und zwei

verschiedener Umgebungen (Bildschirm vs. Head Mounted Display, HMD), was zu insgesamt vier Testbedingungen führte (ScreenStat, ScreenDyn, HMDStat, HMDDyn), gefolgt von einer echten Werkzeugdemonstration. Die Auswertung erfolgte basierend auf Videoaufzeichnungen anhand eines standardisierten Scoringsystems und wurde mittels 2x2x2 mixed ANOVA (Zwischensubjektfaktor »Gruppe«; Innersubjektfaktoren »Modalität« und »Umgebung«) analysiert.
Ergebnisse: Die Kontrollgruppe schnitt in allen Bedingungen unabhängig von den gegebenen Reizen ähnlich gut ab und signifikant besser als die Patienten ($p < .001$). Die Patienten hingegen erzielten mit holografischen ($p = .021$) oder dynamischen Hilfsreizen ($p = .019$) signifikant bessere Ergebnisse. Interessanter Weise unterschied sich ihre Leistung nicht wesentlich von der realen Werkzeugdemonstration, wenn sie durch animierte holografische Hinweise (z. B. schlagender Hammer) unterstützt wurden ($p > .461$).
Zusammenfassung: Die Leistung der Patienten verbesserte sich durch visuelle Reize mit zunehmender Salienz. Die Ergebnisse sind von erheblicher theoretischer und angewandter Bedeutung für das Verständnis der zugrunde liegenden Mechanismen der Apraxie sowie für die Entwicklung und Implementierung von AR-Systemen in der Neurorehabilitation. AR-Technologie kann für Patienten mit Apraxie im Sinne eines Assistenzsystem eine vielversprechende Ergänzung zu herkömmlichen therapeutischen Ansätzen darstellen.

KV1–05
Logopädie und Atmungstherapie – ein Dreamteam?!

K. Eibl (Regensburg/DE)

Einleitung: In Zentren für Beatmungsentwöhnung in der neurologischen Frührehabilitation (NNFR) arbeiten Atmungstherapeuten (AT) und Logopäden (SLT) zunehmend interdisziplinär und ergänzen sich gegenseitig in ihren Kompetenzen im Beatmungs-, Trachealkanülen-, Sekret- und Dysphagiemanagement. Dieser Tätigkeitsbereich gewinnt an Bedeutung, da sich das Behandlungsspektrum der NNFR zunehmend auf die Versorgung Schwerstkranker erstreckt. Allerdings ist nicht bekannt, wie viele Atmungstherapeuten in diesen Zentren tätig sind. Auch die Interaktion von AT und SLT ist noch nicht wissenschaftlich beschrieben. In diesem Vortrag wird der State-of-the-Art in der Zusammenarbeit von SLT und AT beschrieben und ein aktuelles Forschungsprojekt vorgestellt, bei dem im Jahre 2022 diese Zusammenarbeit genauer untersucht werden soll.
Ziel: Die Aufgabengebiete von SLT und AT in der Versorgung von beatmeten Patienten sowie die Ausgestaltung der interdisziplinären Schnittstelle sollen exakt beschrieben, Zusammenhänge mit Strukturmerkmalen der Einrichtungen sollen geklärt werden.
Methode: Eine quantitative Fragebogenstudie und eine qualitative Erhebung mittels Experteninterviews sollen die Aufgabengebiete und die Schnittstelle von SLT und AT erforschen. Dabei sollen die therapeutischen Maßnahmen im Bereich Tracheal-, Dysphagie- und Dekanülierungsmanagement, der Einsatz instrumenteller Verfahren wie FEES, Tracheoskopien oder Hustenassistenten sowie standardisierte Abläufe erfasst werden. Strukturelle Daten (Anzahl Weaningbetten, personelle Ausstattung) sollen ergänzend erhoben werden.
Diskussion: Schon jetzt leisten AT und SLT einen sehr wichtigen Beitrag zur Versorgung beatmeter Patienten in der NNFR. Die hier vorgestellte Studie soll einen langfristigen Beitrag zur Optimierung der Versorgung beatmeter Patienten in der NNFR und der interdisziplinären Zusammenarbeit liefern. Ziel dieses Vortrags ist die Gewinnung möglichst vieler Zentren und Expert*innen, die sich an der Studie beteiligen wollen.

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KV1-06
Der Einfluss von intensivem Gleichgewichtstraining bei MSA-C

R. Saile, M. Jöbges, C. Dettmers (Konstanz/DE)

Einleitung: Bei der MSA-C handelt es sich um eine seltene neurodegenerative Erkrankung aus dem Bereich der Parkinson-Syndrome. Zerebelläre Symptome dominieren häufig und führen zu Funktionsdefiziten, insbesondere im Bereich des Gleichgewichts. Diese Gleichgewichtsdefizite können durch dopaminerge Stimulation allenfalls partiell beeinflusst werden. Im Rahmen einer Untersuchung in Single Case Design führten wir ein Zirkeltraining mit dem Schwerpunkt »Gleichgewicht« durch, um zu ermitteln, inwiefern Funktionsdefizite in diesem Bereich durch intensives Training bei einer MSA-C beeinflusst werden können. Durch das Training sollten die Mobilität und Sicherheit im Alltag verbessert werden.
Methoden: Der Proband, männlich, 59 Jahre, mit einer MSA-C mit rasch progredientem Verlauf, absolvierte über einen Zeitraum von drei Wochen zusätzlich zu den therapeutischen Maßnahmen einer stationären neurologischen Rehabilitation insgesamt zwölf Trainingseinheiten. Eine Trainingseinheit umfasste 60 Minuten. Dabei wurden die Trainingsgeräte Posturomed, Galileo und Hunova eingesetzt.
Zur Erfassung der Gleichgewichtsfähigkeit wurden der Wert auf der Trunk Impairment Scale bestimmt und der Mini-Balance Evaluation System-Test durchgeführt. Zusätzlich wurde die subjektiv wahrgenommene Beeinträchtigung des Gleichgewichts bzw. der Mobilität durch einen Fragebogen, angelehnt an die MS-Walking-Scale, ermittelt.
Ergebnisse: Nicht nur auf der Trunk Impairment Scale sondern auch im Mini-Balance Evalution System-Test ist die erreichte Punktzahl nach dem dreiwöchigen Training höher als zuvor. So konnte der Proband bei der Postuntersuchung auf der Trunk Impairment Scale zwei Punkte und im Mini-Balance Evaluation System-Test fünf Punkte mehr erzielen. Dies weist darauf hin, dass das Gleichgewicht bei einer MSA-C schon nach relativ kurzer Zeit durch intensives Gleichgewichtstraining verbessert werden kann. Die objektiven Messergebnisse stimmen auch mit der subjektiv wahrgenommenen Beeinträchtigung überein, welche zum zweiten Messzeitpunkt niedriger ist als vor dem Training.

Diskussion: Auch eine rasch progrediente neurodegenerative Erkrankung konnte in ihrem Verlauf durch ein sehr intensives Gleichgewichtstraining unter Einbeziehung von Trainingsgeräten, auch aus dem Bereich der Robotik, modifiziert werden.
Da die Untersuchung im Rahmen einer stationären, neurologischen Rehabilitation stattgefunden hat, muss miteinbezogen werden, dass mit hoher Wahrscheinlichkeit eine Konfundierung durch andere Therapien stattgefunden hat und die positiven Effekte nicht ausschließlich aus dem spezifischen Gleichgewichtstraining resultieren.

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KV1–07

Barrieren und Förderfaktoren aus Sicht von Menschen mit Multipler Sklerose – Eine fallbezogene Quellenanalyse

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Einleitung: MS ist eine chronische Krankheit, von der in der Schweiz rund 15.000 Menschen betroffen sind. Da es sich um eine komplexe, lebenslange Erkrankung handelt, sind die Auswirkungen auf den Verlauf und die Symptome der MS aus biopsychosozialer und ethischer Sicht unterschiedlich. Ausgehend von diesem breiten Spektrum an Variabilität der Krankheitserfahrungen ergibt sich folgende Frage: »Wie erleben und beschreiben Menschen mit MS Barrieren, Förderfaktoren und ethisch relevante Konflikte?« Dies wird wie folgt spezifiziert:
a) Welche Ursachen und Hintergründe werden benannt und wie könnten mögliche Lösungen aus ethischer Sicht aussehen?
b) Welche Konsequenzen und welcher Nutzen können daraus für eine interprofessionelle Zusammenarbeit in der Versorgung von Menschen mit MS abgeleitet werden?
Methoden: Abgleich von Barrieren und Förderfaktoren als ICF Codes als gemeinsamer theoretischer Rahmen für die Analyse verglichen in drei verschiedenen Ausgangsquellen mittels Inhaltsanalyse:
Quelle 1) Transkripte aus einem qualitativen Studiendesign von zwei Personen mit MS auf der Grundlage von halbstrukturierten DIPEx-Interviews.
Quelle 2) eine literarische, autobiografische Darstellung des Lebens einer Person mit MS anhand von extrahierte ICF Codes.
Quelle 3) das umfassende ICF Core Set für MS als, ergänzt durch zusätzliche ICF-Codes aus dem gesamten Klassifikationssystem. Für die Codierung von Barrieren und Förderfaktoren für Menschen mit MS wurden ausschließlich ICF-Codes aus dem Bereich der Umweltfaktoren herangezogen.
Zur Beantwortung der ethischen Frage wurden die vier biomedizinischen Prinzipien von Beauchamp und Childress als gemeinsamer Rahmen für die Analyse verwendet.
Ergebnisse: Darstellung der extrahierten und kondensierten Themen und ICF Kategorien aus den Umweltfaktoren. Präsentation ethisch relevanter Themen, die das Material enthielt und dessen Häufigkeiten.
Diskussion: Die Analyse der Themen führte zu den folgenden Erkenntnissen:

- Verstehen der erlebten Umstände
- Menschen nicht auf ihre Diagnose reduzieren
- Verstehen ist wichtig und seine Bedeutung für die Medizin
- Die Individualität der Person respektieren
- Beziehungen sind wichtig für die Beziehung zwischen Krankheit und Behandlung

Die genannten Aspekte werden durch Aussagen von Menschen mit MS in allen drei verglichenen Quellen gestützt. Obwohl sie nicht ohne Einschränkungen sind, sind diese Erkenntnisse für das Management der Gesundheitsversorgung von Menschen mit MS wichtig.

KV1-08

Eine empirische Vergleichsstudie der Klinischen Schluckuntersuchung mit der apparativen Schluckdiagnostik mittels Videofluoroskopie bei Patienten mit Myasthenia gravis

S. Herre, U. Kling, A. Kartmann, N. Keller, B. Tomandl, N. Sommer (Göppingen/DE)

Hintergrund/Fragestellung: Die Myasthenia gravis ist eine seltene Krankheit (Prävalenz: 1: 10 000), bei der über die Hälfte der Patienten im Verlauf der Erkrankung Schluckstörungen aufweist (Bartolome & Schröter-Morasch, 2014). Ziel der vorliegenden Untersuchung war es zu klären, ob und welchen Mehrwert die apparative Diagnostik mittels Videofluoroskopie (VFSS) im Vergleich zur Klinischen Schluckuntersuchung (KSU) hinsichtlich Schweregrad und Kostempfehlung ermöglicht.
Methode: Die Daten von 50 Patienten mit einer immunologisch und klinisch-neurologisch gesicherten Myasthenia gravis sowie vorliegender KSU und VFSS wurden retrospektiv anhand der Schweregradeinteilung des Bogenhausener Dysphagiescores-2 (BODS-2) ausgewertet. Die Daten wurden hinsichtlich des Schweregrades und der empfohlenen Kostform verglichen.
Ergebnisse: In der VFSS zeigt sich eine Verbesserung des Schweregrades bei 60 % der Patienten im Vergleich zur KSU. Dadurch konnten 46 % der Patienten eine höhere Kostform erhalten. Lediglich bei 18 % der Studienteilnehmer musste eine strengere Kosteinschränkung empfohlen werden. Es zeigt sich somit zwischen beiden Verfahren ein signifikanter Unterschied in der Bestimmung des Schweregrades der Dysphagie sowie der aus den Untersuchungen abgeleiteten Kostempfehlungen ($p = 0.001$).
Schlussfolgerung/Diskussion: Die Ergebnisse unterstreichen die Bedeutung der Videofluoroskopie in der Dysphagie-Diagnostik von Patienten mit Myasthenia gravis. Eine routinemäßige apparative Verlaufsdiagnostik ist vor allem in Bezug auf das vergleichsweise häufige Vorkommen von stillen Aspirationen im Verlauf der Erkrankung indiziert. Durch die Größe der Studienpopulation und die festgelegten Einschlusskriterien sind die erhobenen Daten untereinander gut vergleichbar und bieten Ansatzpunkte für neue Fragestellungen und entsprechende Untersuchungen. So zeigen sich Hinweise, dass das Vorliegen eines bestimmten BODS-Scores in der Klinischen Schluckuntersuchung den diagnostischen Mehrwert der apparativen Diagnostik vorhersagen lässt. Durch den direkten Vergleich der VFSS mit der FEES könnten Handlungsempfehlungen für die klinische Tätigkeit abgeleitet und damit die Versorgung der Patienten mit Myasthenie-bedingter Dysphagie verbessert werden.

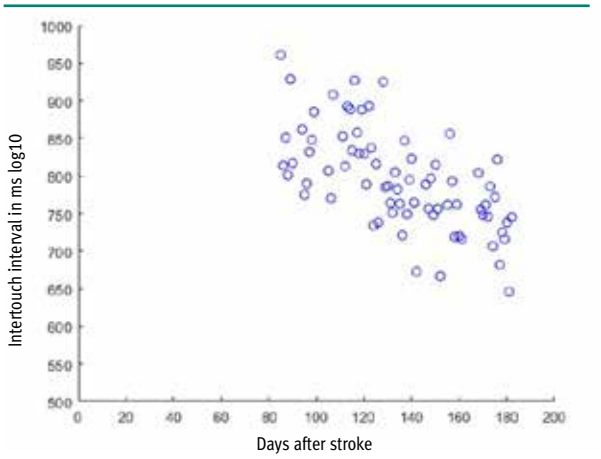
ePOSTER

eP1–01

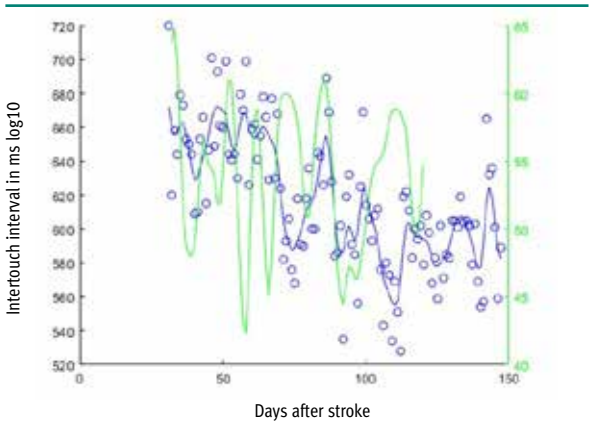
Capturing stroke-related behavioral dynamics based on smartphone touchscreen interactions

I. Brunner (Hammel/DK), A. Ghosh (Leiden/NL)

Questions: Quantifying the impact of stroke on real-world behavior is a key step towards developing novel diagnostic markers and recovery monitoring tools. Conventional cognitive tests and subjective questionnaires highlight the diverse consequences of stroke but they can only provide limited insights into its real-world impact. The insights are particularly obscured as stroke can introduce a broad array of behavioral differences – from deficiencies in fine motor skills to sleep. The reliance on digital interactions for daily behavior and the corresponding digital footprint provides a fresh opportunity for individualized and longitudinal quantification of real-world human behavior in health and disease. The pervasive use of smartphones and the reliance on touchscreen interactions have been successfully exploited to proxy sensorimotor processes and sleep. Furthermore, it has been recently deployed to capture the disease activity in epilepsy. Here, we use smartphone behavioral monitoring to reveal the impact of stroke in behaviors spanning across multiple time scales from milliseconds to minutes. Our analysis reveals the behavioral topology of stroke in contrast to the healthy population, and the dynamical longitudinal alterations post-stroke.
Objectives: To contrast the smartphone behavioral patterns in persons with stroke with the healthy population.
To describe the longitudinal changes in smartphone behavioral dynamics generated after stroke.
Patients and methods: We continuously recorded the interaction of 25 stroke survivors with their smartphones during the first 3 months after discharge. The timestamps of touchscreen events and the labels of the corresponding apps in use were gathered using a background App (TapCounter, QuantActions, Lausanne). The control group consisted of 500 self-declared healthy volunteers recruited via the agestudy.nl recruitment platform hosted at Leiden University. The discrete smartphone events were quantified using joint-interval distributions spanning milliseconds to minutes to capture the next-event-dynamics while the phone screen was on. This resulted in 2500 parameters which were then analyzed using statistical clustering tools including regression models and t-tests developed for high dimensional neuroimaging data. The post-stroke analysis was based on behavioral data binned every 24 hours.
Results: The comparison of persons with stroke vs. the healthy population revealed that the differences were heterogeneous across the smartphone behavioral space based on the joint-interval distributions. The post-stroke behavioral fluctuations were highly individualized – both in terms of the temporal features of the smartphone behavior and in terms of time taken to recover.
Conclusion: Smartphone touchscreen interactions can be used to study the complex behavioral dynamics associated with stroke. Moreover, if scaled to larger populations, such links may be used to monitor recovery after stroke.



eP1–01. Fig. 1: Example of the association between time after stroke and digital behavior



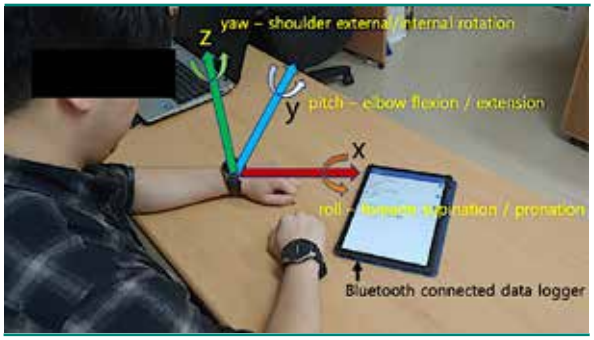
eP1–01. Fig. 2: Association between intertouch interval, time after stroke and self-reported health

eP1–02

Single wearable sensor-based functional outcome measure of upper extremity impairment

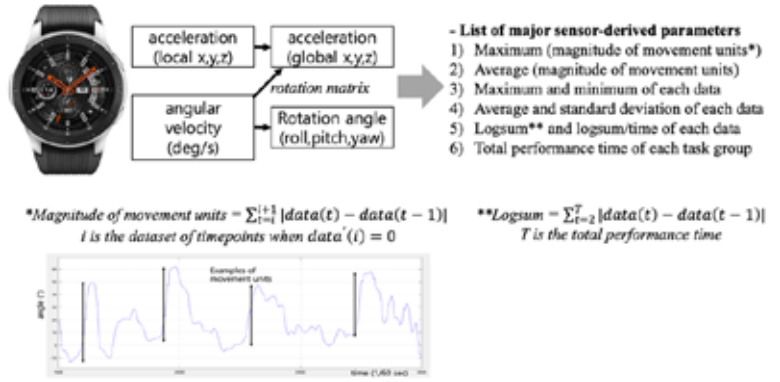
H. S. Nam (Ras al Khaimah/AE, Seoul/KR), S. Han (Seoul/KR), J. H. Leigh (Seoul/KR), M. S. Bang (Seoul/KR)

Background: Wearable sensors are applied during rehabilitation to analyze upper extremity movement; however, simple and clinically relevant applications of such data are scarce. We aimed to investigate potential sensor-based clinical outcome parameters of upper extremity impairment.
Method: Ten patients with unilateral shoulder pain and range-of-motion limitation due to traumatic injury were enrolled. The participants were equipped with wrist-worn smartwatches, Galaxy Watch®, on each wrist **(Fig. 1)**. They were instructed to perform 3 upper extremity movement domains: 1) gross activities-of-daily-living (ADL) tasks; 2) Wolf Motor Function Test (WMFT) items; and 3) selected tasks from the Upper Extremity Functional Index (UEFI). The acceleration and angular velocities were acquired from the smartwatches via the Bluetooth-linked data logger application and processed with the algorithm developed using the MATLAB®. Previously studied sensor-based parameters which were shown to correlate with hemiplegic stroke patients, including the motion segment size (MSS) which



ePI–02. Fig. 1

represents motion smoothness or magnitude of movement units, for acceleration and joint motion angles were extracted **(Fig. 2)**. Correlation analyses were performed between the extracted parameters and the clinical outcome measures: WMFT and UEFI.



ePI–02. Fig. 2

Results: For gross ADL tasks including overhead and behind-body activities, the maximum acceleration (R = 0.668 and 0.677, for WMFT and UEFI, respectively) and maximum MSS (R = 0.698 and 0.729) in the z-axis (up-down direction) demonstrated significant correlation with both the WMFT and UEFI scores. The maximum (R = 0.695, p = 0.038) and average (R = 0.787, p = 0.012) MSS for elbow flexion/extension showed significant correlation with the WMFT scores. For the WMFT tasks consisting of mostly planar movements on the desk, the average MSS of acceleration for x-axis (R = 0.835, p = 0.005) and y-axis (R = 0.738, p = 0.023), and the average MSS for angle of forearm supination/pronation (R = 0.815, p = 0.007) and shoulder external/internal rotation (R = 0.873, p = 0.002) showed significant correlation with the WMFT score. For UEFI tasks mostly consisting of planar fine motor activities, average MSS for x-axis acceleration (R = 0.798, p = 0.006) and total performance time (R = -0.742, p = 0.014) showed significant correlation with the WMFT. Average MSS for elbow flexion/extension demonstrated significant correlation with both the WMFT (R = 0.871, p = 0.001) and UEFI (R = 0.718, p = 0.019) scores.
Conclusions: Accelerometer and gyrosensor data processed from a single smartwatch demonstrated significant correlations with the clinical outcome measures; in which the average MSS for major axes and joint range of motion showed consistent potential for use in clinics for functional assessments. The reliability and consistency of the suggested parameters as well as clinical feasibility require further investigation.

ePI–03

COVID-19 related delays of botulinum toxin injections have a negative impact on the quality of life of patients with dystonia and spasticity – results from a structured questionnaire

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Introduction: Botulinum toxin A (BoNT-A) is considered a safe and effective treatment for spasticity and dystonia. The relief of symptoms starts approximately 10 days after the injection of a single dose of BoNT-A into the affected muscles and last between two and four months. Individual inter-injections intervals are critical for the maintenance of this effect. In Austria, BoNT outpatient clinics were shutdown from November to December 2020 during COVID-19 control measures, leading to rescheduling of BoNT-A injections.
Objectives: Aim of this survey was to investigate the influence of COVID-19 related injection delays on symptoms, physical functioning and quality of life (QoL) of the affected patients.
Patients and methods: Between April and July 2021, 32 outpatients (21 females, mean age: 63.4 ± 12.1 years), who were treated more than 12 months at the BoNT outpatient clinic Horn (Austria) and experienced at least two weeks of injection delays, completed a structured face-to-face questionnaire.
Results: Indications were dystonia (34 %), spasticity (63 %) and hyperhidrosis (3 %). Injections were delayed by 10 weeks (median, range: 2 – 15). Muscle cramps increased in 95 % of patients with spasticity, muscle twitches in 91 % of those with dystonia, pain in 9 % and 60 % for dystonia and spasticity, respectively. Overall, 75 % reported functional worsening, and deterioration in QoL by 62.6 % ± 16.8 (mean ± SD). The impact on QoL correlated with the subjective global improvement induced by BoNT-A (Rs: 0.625; p < 0.001). In patients suffering from spasticity, the effect on QoL was greater in those with voluntary motor function (n = 14, mean 66.8 ± 14.9 SD) compared to those without (n = 4, 43.8 ± 15.7). For 75 %, long-term assurance of BoNT-A therapy was very important, and 81 % felt their patient rights not respected.
Conclusions: COVID-19 related delays in BoNT-A injections illustrate the importance of this therapy for symptom relief, functional outcome and QoL in patients suffering from involuntary muscle hyperactivity. BoNT-A therapy is essential and has to be guaranteed even in circumstances such as the COVID-19 pandemic.

ePI–04

Impact of pandemic on mental health of addicts and their families

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A major outbreak in the 21st century, the corona virus disease (COVID -19) pandemic has led to unprecedented hazards to mental health globally. While psychological support is being provided to patients, health care workers, general public's mental health requires significant attention as well. Our motive of this study is to study the mental health of addicts and their families. People who are already suffering from mental illness and substance use disorder related to alco-

holism have to be given special attention too. Four in every ten adults in our study have reported symptoms of anxiety and depression. Negative impact reported were insomnia, increased consumption of alcohol, substance abuse and worsening of chronic conditions related to addiction.
Our aim of this study is to synthesize the reports on the effects of COVID 19 on psychological outcomes of addicts and their families. Mostly due to situations linked to poor mental health outcome, such as unemployment, domestic violence, withdrawal symptoms and isolation due to COVID lockdown.
We used tools like meditation, exercises, indulging in homebound walks and chores, inculcating habit of reading good journals.
Results were catered by comparing and evaluating the data of pre and post counseling stress and anxiety levels. Study was performed on a group of 25 patients where 10 sessions within two and half months were taken. Average one session per week. That brought significant reduction in levels of stress anxiety, created better home environment and significant reduction in levels of addiction or alcoholism. Seeking psychological support in form of counseling sessions where one on one discussion was done played a prudent role in improving the outcomes.

eP1–05

Effectiveness, adherence and usability of a teleneurorehabilitation program to provide patients with acquired brain injury with clinical assistance during the COVID-19 pandemic

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Question: The health pandemic caused by SARS-CoV-2 (COVID-19) has limited the access of a large number of patients with acquired brain damage to neurorehabilitation programs [1]. Telerehabilitation can potentially enable continuum of care in situations of physical distancing, so it could be an effective alternative to physical intervention and mitigate some negative effects caused by the pandemic. The objective of this study was to determine the effectiveness, adherence and usability of a teleneurorehabilitation intervention aimed at providing patients with acquired brain injury with clinical assistance during the pandemic.
Methods: All patients older than 18 years old who participated in a face-to-face neurorehabilitation program at the time of confinement were candidates to participate in a teleneurorehabilitation program. Within the following 3 days to the declaration of the state of alarm in Spain due to the pandemic caused by the COVID-19, a therapist contacted the candidates and/or their caregivers by telephone to offer the continuity of the rehabilitation program during the period of restricted mobility through a custom-made teleneurorehabilitation online tool. All the patients who accepted to participate in the teleneurorehabilitation program were assigned to a responsible therapist, who coordinated their clinical assistance and provided technical guidance if needed. An individual intervention was planned for all the participants to replicate their face-to-face program, reproducing the contents, duration and frequency of the sessions, as well as their previously assigned therapists. This planning was reviewed weekly. The effectiveness of the program was determined from the change in functional independence, determined with the extended version of the Barthel Index, once the face-to-face activity was resumed. The adherence to the program was assessed by the responsible therapist using a 10-point Likert scale. The usability of the teleneurorehabilitation tool was determined by the participants using an »ad-hoc« questionnaire.
Results: A total of 146 patients, 70.6 % of the total, participated in the study. The participants significantly improved their independence, showing an improvement in the Barthel Index between the beginning (77.3 ± 28.6) and the end of the program (82.3 ± 26). The intervention had high adherence (8.1 ± 2.2 out of 10) and the online sessions were the best-rated content. The usability of the tool used was evaluated positively (50.1 ± 9.9 out of 60) and just over half of the participants did not require any help to interact with it.
Conclusions: The teleneurorehabilitation intervention was effective at improving the independence of patients with acquired brain injury, and promoted high adherence and usability.

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eP1–06

Risk of falls in older adults in preventive isolation due to SARS-CoV-2 pandemic

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Introduction: Voluntary confinement during the health emergency due to SARS-CoV-2 has affected the quality of life, health, and recreation of all, especially the elderly. Considering the degenerative process characteristic of older adults, the difficulty of performing outdoor activities and home confinement to prevent the spread of the pandemic virus could adversely affect the patient's motor control, balance, and gait.
Objective: This work aims to analyze if the balance and the risk of falls are influenced by voluntary preventive confinement before the contagion of SARS-CoV-2.
Methods: 54 older adults between 65 and 94 years old were evaluated. Individuals with voluntary isolation (n = 34) and without voluntary preventive isolation (n = 20) of at least six months, without a previous positive diagnosis of SARS-CoV-2, were included. All participants signed the informed consent.
The Berg Balance Scale was applied to assess the risk of falls in older adults. All biosecurity measures were followed during the evaluation process. Spearman's non-parametric statistic was used to determine the correlation between variables.
Results: In the group without isolation, 80 % of individuals had a low risk of falls, while 15 % had a moderate risk of falls, and 5 % had a high risk of falls. In the group with isolation, 73.5 % had a low risk of falls, 23.5 % had a moderate risk of falls, and 2.9 % had a high risk of falls. Analyzed the data with the Spearman statistic, they yielded a p -0.514 in the group with isolation, while in the group without isolation, the correlation results were -0.587, so that in both cases, there is a moderate inverse correlation between variables.
Conclusions: The observed data show a moderate correlation between the variables analyzed in the two groups. However,

there is no significant difference between the two groups of participants in the risk of falling, regardless of whether they were involuntary preventive isolation or not.

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eP1–07

Functional outcome of four subjects with critical Illness polyneuropathy and COVID-19 and a scoping review of the literature

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Introduction: Ill critical subjects can develop a common neuromuscular complication defined ICU-acquired weakness (ICUAW) (1). COVID-19 patients show several neurological disorders, but the occurrence of ICUAW remain unclear. Four COVID-19 subjects with ICUAW and their functional outcome are described. Furthermore, a scoping revision of COVID-19 literature to investigate occurrence and recovery of COVID-19 subjects with ICUAW was performed.

Method and participants: Post COVID-19 subjects admitted to neuro-rehabilitation of IRCCS »Casa Sollievo della Sofferenza« from June 2020 to February 2021 with neuromuscular disorders were screened. EMG was employed in diagnosing ICUAW. All patients underwent strength evaluation by MRC and functional evaluation by DRS and FIM, at admission, discharge and six months of follow-up. A search of the studies was conducted using MEDLINE/PubMed, CINAHL, EMBASE and Web of Science to retrieve COVID-19 subjects with ICUAW.

Results: among screened post-COVID-19 subjects admitted to neuro-rehabilitation setting, 4 (3 M, 1 F; mean age 58.2 ± 6.62) patients showed ICUAW. Of these, 3 and 1 subjects had CIP and CIP/CIM to EMG, respectively. At discharge, only one subject gained full recovery and ability in activity daily living. Two subjects had incomplete recovery with minor disability and one showed paresis of lower limbs. At follow-up, all COVID-19 subjects with CIP type gained full recovery, whereas the subject with CIP/CIM showed moderate disability requiring bilateral ankle foot-orthosis and support for the gait. Review of literature detected 11 studies about COVID-19 patients with ICUAW **(table)** concerning a total number of 80 patients: 23 with CIM (7 probable), 21 with CIP (8 possible), 15 with CIPNM and 21 with ICUAW. Recovery was reported in 6 studies. Globally, the outcome was reported for 41 (35%) subjects: 9 with CIM (6 had probable CIM); 8 with probable CIP, 4 with CIP/CIM and 20 with ICUAW. Among 35 survivals COVID-19 patients with ICUAW, only 3 (8.5%) subjects gained full recovery, a value lower than that reported in the literature (68.8%). All of these had CIM, but 2 subjects had

eP1–07. Table 1

Authors	Study; Setting	CIPNM type	Neurologigal features	Follow-up	Functional measures	Other measures	Outcome
Bagnato S et al. 2020	case report neurorehabilitation	A 62-year-old woman; CIM		2 months	none	EMG	At discharge, the patient had a mild weakness in her lower limb proximal muscles and was able to walk without assistance
Tankisi A 2020	case report ICU	A 68-year old man; CIM	severe symmetrical proximal and distal weakness, diffuse musde wasting and absent deep tendon reflexes	not reported	none	MRC (2/5)	Not reported
Madia F e t al. 2020	case series; ICU	5 M, 1 F; ranged from 51 to 72 years CIM = 6 probably	acute flaccid quadriplegia	14 to 20 days	none	ENG/EMG	2 (28.5%) pt gained complete recovery; 3 (42.8%) pts showed disability due to NS lesions; 2 pts died
Bax F et al. 2020	Case series; Post-ICU	4 pts;CIP = 2;CIM = 1 (possible) CIPNM = 2; ICU-AW* = 1			none	MRC; ENG/EMG	Not reported
Nasuelli NA et al. 2020	Case series; ICU	4 pts; 3 M, 1 F; age from 60 to 74 years CIPNM = 4	tetraplegia with diffuse hypotonia, and hypotrophy	1 month Time in ICU>3 weeks	none	EMG	only one patient had positive outcome but slow recovery of motor skills, in particular due to foot flexion deficit, improved after intensive rehabilitation. three (75%) pts died
Cabanes-Martfnez L et al. 2020	Retrospective study; clinical neurophysiology department;	12 patients; 10 M, 2 F; mean age 65 years (52–75); 11 pts; CIM =7; CIP = 4	general weakness and/or difficulty to wean from the ventilator	n/a	none	NCS/EMG; biopsy (3	Five (45.4%) pts died and 7 patients were discharged from the ICU, but patients) outcome was not reported
Nersesjan V et al. 2020	Cohort study; prospective observational study; tertiary referral center	Total 61 patients; 63% males, mean age 62.7 years; CIP = 8 (possible); alone 1 patient was diagnosed by ENG/EMG	tetraparesis with hyporeflexia and atrophy	3 months, 10 died and follow-up available for 45	mRS	ENG/EMG; re-admissions (if any), death after discharge, and new-onset neurological and psychiatric diagnoses	all patients were tetraparetic at discharge, had muscle atrophy and atrophy and had been admitted to ICU
Rifino N et al. 2020	Cohort study; retrospective, observational analysis	1 760 COVID-19 patients, 137 presented neurological manifestations; CIPNM = 9 pts; 8 M, 1 F, mean age 60.7 years			none	ENG/EMG	Not reported
Van Aerde N et al. 2020	Cohort study; retrospective; observational study; ICU	74 subjects with IVM; 20= ICUAW	Not reported	30 30 (19-42) days	Barthel scale; mobiility score	MCR-sum score	handgrip-strength 43% (28-59%) versus 64% (36-80%), (p = 0.045), and Barthel: 8 (2.5-11.5) versus 10.5 (8-18), (p = 0.040) remained lower in COVID-19 subjects with ICUAW at discharge
Frithiof R et al. 2021	prospective, observational intensive careunit cohort study; incidence and ES parameters	11 M; mean age 64 years; CIM=4; CIP= 7	muscular weakness	n/a	none	ENG/EMG	Not reported
Yildiz OK et al. 2021	Case series; ICU	3 patients; 3 F (64, 76 and 81 years old, respectively); CIM=3	diffuse muscle weakness and tetraparesis	2–16 months	none	ENG/EMG	One recovered slowly with intensive physiotherapy. Two subjects died

Legend: **ICU** = intensive care unit; **MRC** = Medical Research Council scale; **NCS** = nerve conduction study; **EMG** = electromyography; *clinically evident weakness but equivocal EMG findings

diagnosis of probable CIM. On the other hand, we observed that the functional outcome in our COVID-19 subjects with ICUAW was in line with the finding of the literature.
Conclusions: ICUAW can occurcommonly in COVID-19 subjects requiring intensive rehabilitation. The recovery was variable, but a lower percentage of COVID-19 patients with ICUAW than general ICUAW populationgained full functional outcome. The review of the literature due to small samples and heterogeneity of studies did not permit conclusive remarks.

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eP1–08
Role of rehabilitation in myasthenia gravis – Current evidence

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Introduction: Myasthenia gravis (MG) is an autoimmune disease characterized by skeletal muscle fatigue. MG patients have several deficits that require a multidisciplinary approach. Rehabilitation helps in symptomatic relief. The health benefits of physical exercise are well established in other diseases. However, in MG it can worsen symptoms. Knowledge on the ideal exercise in patients with MG as well as its safety is important for its management.
Objectives: Review the different interventions in rehabilitation, physical exercise, and safety profile in patients with MG.
Methods: Non-systematic research in databases (Pubmed, Scopus) with the terms »Exercise«, »Rehabilitation« and »Myasthenia Gravis«
Results: The most common interventions in MG patient rehabilitation assess the efficacy and safety of physical exercise, respiratory rehabilitation, and balance training.
Evidence is limited with few studies with robust methods. Physical exercise includes protocols of moderate-intensity aerobic exercise, strength exercises and progressive resistance. Different protocols demonstrate effectiveness in improving mobility, muscle strength, and quality of life in patients with mild to moderate MG. The general recommendation is to carry moderate intensity physical exercise for at least 150 minutes per week.
Respiratory rehabilitation is effective in managing fatigue, dyspnea, and respiratory failure. Its benefits include increased respiratory muscle strength, endurance, and physical performance. Expiratory muscle strength predicts functional exercise capacity in patients with generalized MG.
Physical exercise and respiratory rehabilitation programs applied before thymectomy have excellent results. Improvement in fatigue is not similar to the improvement in muscle strength.
Balance training combined with physical exercise improves visual-vestibular integration. It is not known whether there are training protocols specifically beneficial for MG patients.
Discussion: Robust evidence is lacking regarding effectiveness of different types of rehabilitation in MG patients. Physical exercise increases the number of mitochondria in the muscle by increasing muscle mass. Therefore, neuromuscular transmission is more effective, increasing muscle capacity to deal with fatigue. The effects of respiratory rehabilitation is explained by reduction of respiratory rate. Work and energy involved in the breathing process decreases, leading to less fatigue and an overall improvement in physical ability.
Conclusion: Rehabilitation programs are generally safe for patients with mild to moderate MG. These programs must meet the patient needs and are to be maintained for the long term. There are no specific recommendations for training intensity and volume. It must be constantly adapted and personalized to obtain not only better outcomes but also a better quality of life and participation.

eP1–09
Effectiveness of targeted dry needling to treat craniofacial pain and temporomandibular disorders in patient with altered oral status

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Introduction: Complex cases in dentistry require complex analysis of all aspects of pain and temporomandibular disorders (TMD), oral cavity pathologies, pain and posture. Myofascial pain is widespread, is reliable cause of orofacial pain and posture, the mutual interplay contributing to oral health. Myofascial trigger points (MTrPs) treatment of the head and neck muscles was reported to be effective for tension-type headache and migraine [1].
Objectives: The aim was to study the and associations of dental and oral pathologies with oral orofacial pain and TMD; and to evaluate efficacy of deep DN of MTrPs in patients with helthy and compromised oral cavity.
Materials and methods: We included to the study 22 patients (15 females, avarage age was 32 ± 6 years old). All patients suffered from intensive chronic persistent or recurrent one- or two-sided orofacial pain radiation to neck, arm and teeth, temporal and/or occipital areas, TMD symptoms. All patients underwent general exam, MRI, precise physical tests, extensive functional multiparameter neuromuscular US and evaluating oral status including determination of indices of caries (decay, missing and filled teeth), periodontal, bleeding, oral hygiene indices. Then patients received DN of detected MTrPs under US guidance according to the R. Bubnov [https://doi.org/10.1186/1878-5085-3-13].
Results: The active and latent MTrPs were diagnosed in medial, lateral pterygoid muscles + in shoulder rotators and suboccipital muscles (rectus and obliquus capitis muscles). Patients demonstrated individually specific patterns of MTrPs mapping in these areas and received DN. Shoulder dysfunction (impingement) with active trigger points in shoulder rotator muscles was detected and successfully treated in 19 patients. DN resulted immediately in decreasing TMD symtoms and pain (80 % decreasing by VAS, $p < 0.01$) immediately in all patients, and sustainable pain relief outcome after one month observation (12 patients did not need another session); most patients with good levels of oral health In one session 1-3 needles were inserted, 1-2 sessions applied to each patient. We found periodontal diseases and oral health disorders in 14 patients. Generalized periodontal diseases correlated with VAS levels and TMD; these patients had poorer outcomes, severe TMD symptoms, had relapses after DN and required more DN sessions. Localized forms of periodontal diseases diagnosed in 7 patients and also influenced on outcomes; we detected moderate

oral status improvement in one month after DN needed more sessions (1-3 weeks after first procedure) until sanation oral cavity. Preliminary data shows decreasing levels of oral indices in 6 patients. One month after all patients finishing DN and sanation oral cavity reported significant decreasing of pain levels and of TMD.
Conclusion: Craniofacial pain, posture and TMD depend on poorer oral status and vice versa. Targeted DN can improve oral status in complex cases in dentistry.

eP1–010

Prosodic alterations in parkinson's disease: effects of a dedicated treatment

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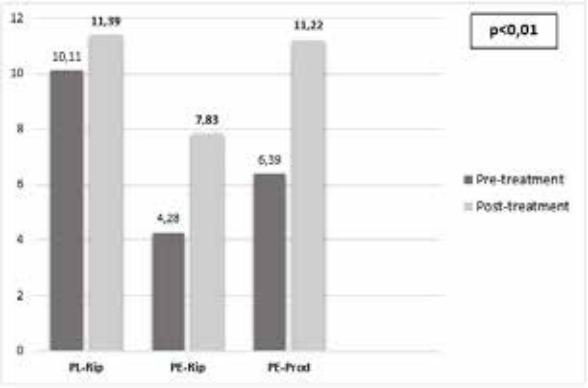
Introduction: Parkinson's disease (PD), in more than 80% of cases, causes changes in voice, articulation, resonance, linguistic and emotional prosody [1 – 2]. Monotonous speech often affect patients' ability to convey emotions through language [3].
Objectives: This study aims to investigate the prosodic features in a sample of parkinsonian patients, draw up and evaluate the effects of a group prosody treatment program, tailored to the specific parkinsonian difficulties, assess the patients' satisfaction with the training.



eP1–010. Fig. 1: Comparison of the mean scores of the PL-Rip, PE-Rip and PE-Prod subtests before a prosodic treatment

eP1–010. Table 1: Percentage of the answers to each item of the satisfaction questionnaire on prosodic treatment

Item	1	2	3	4	5
1. More 'colourful' voice	10	0	1 0	4 0	40
2. Improved volce	0	10	3 0	1 0	50
3. Easiness In following the speech and language theraplst	0	0	0	2 0	80
4. Feeling at ease	0	0	2 0	1 0	70
5. Easy access to the session	10	0	0	3 0	70
6. Enjoying the treatment	0	0	0	0	100
7. Repeat the expenence	0	0	0	1 0	90
8. Expectations met	10	0	1 0	3 0	50
9. Recommend the treatment to others	0	0	0	0	100
10. Global satlsfact!on	**0**	**0**	**0**	**0**	**100**

1 »No, absolutely not«; **2** »No, 1 don't think so«; **3** »Neither yes or no«; **4** »Yes, I think so«; **5** »Yes, absolutely yes«

Material and methods: 36 patients suffering from PD underwent clinical and instrumental voice evaluation. Prosodic abilities were investigated with subtests of the Montreal Protocol for the Evaluation of Communication (MEC)4: Repetition test for Linguistic Prosody (PL-Rip) and Emotional Prosody (PE-Rip), Production test for Emotional Prosody (PE-Prod). A group of 18 patients undertook a rehabilitation path articulated in weekly one-hour meetings for a total of 20 sessions.
Alongside phono-articulatory training, the group undertook a speech therapy program focused on the reinforcement of prosodic abilities. In particular, to train prosodic production, exercises of acting simulation and role playing were proposed, using dialogues easily generalizable to everyday life.
At the end of the treatment, patients filled in a satisfaction questionnaire designed by the authors.
Scores before and after treatment were compared using t-student test for paired samples.
Results: The results of the preliminary study showed pathological performance in 67% of patients on the PL-Rip test, 86% on the PE-Rip test, 69% on the PE-Prod test.
After treatment patients showed significant improvements ($p < 0.01$) in all the administered MEC subtests **(Fig. 1)**.
The answers obtained by participants to the questionnaire showed a high satisfaction **(Table 1)**.
Conclusions: A specific speech training has a positive effect on the enhancement of prosodic skills in parkinsonian patients. In addition, the impressions gathered from patients indicate that the treatment acts also positively on other aspects: mood, quality of life, voice perception, motivation, communicative-relational skills and social participation.

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eP1–011

Benefits of strength training in patients with Parkinson's Disease, Multiple Sclerosis and Amyotrophic Lateral Sclerosis

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Introduction: The field of neurodegenerative diseases is marked by a diversity of symptoms, one of the most common being muscle weakness. The mechanisms underlying the weakness differ but its consequences on all ICF levels are comparable [1]. Therefore strength interventions are implemented to compensate for the developing weakness and associated problems. In stroke patients several benefits have been associated with strengthening interventions [2]. However, it remains unknown what strength and possibly other benefits can be expected in patients with a diagnosis of Parkinson's Disease (PD), Multiple Sclerosis (MS) or Amyotrophic Lateral Sclerosis (ALS). Hence, this study evaluates, what health effects can be anticipated after the execution of a strength training in patients with PD, MS, and ALS, and

whether these outcomes are generalizable over several neurological disorders.
Materials and Method: A literature review in 3 databases (PubMed, PEDro, Cochrane) was conducted. Studies had to have a strengthening intervention, a control or a second intervention group, a strength assessment and at least one other assessment. Systematic reviews were included if they investigated the effects of a strengthening intervention on strength and other body functions or activities. All studies were evaluated in their quality either by the PEDro score or the AMSTAR 2 checklist.
Results: 17 studies were included. Nine, six and two for PD, MS and ALS respectively. Improved strength and a trend for less falls was found for all patients. MS and PD studies found significant improvements in walking performance, balance, and ADL tests. In MS they also found reduced fatigue and increased quality of life. ALS studies found a trend for a better quality of life and ALSFRS outcomes.
Conclusion: All studies found strength training to be safe and compliance rates were high. It is useful to improve strength and walking performance and to some degree ADL capacities and balance. Following the implemented protocols, a 2-week habituation phase should be given to patients. A routine of five exercises per extremity at an intensity of 70 % of the 1RM seems necessary. While exercise parameters were comparable between studies, outcome measures were not. Patients with neurodegenerative disease have impairments on multiple levels of the ICF. Hence outcome measures used by studies should evaluate several spectrums of the ICF. Next to this, more comparable and validated outcome measures need to be used. Lastly, more high-quality intervention studies are required, especially in PD and ALS patients.

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eP1–012

Challenges in rehabilitation of a patient with spinal arachnoid cyst post meningitis: case report and review of the literature

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Introduction: The literature review (EBSCO Databases, Cochranelibrary) brought out information about spinal arachnoid cyst neurodiagnosis and neurosurgical intervention but failed to include information about neurorehabilitation management.
Objectives and Methods: As such we want to share our overview in the management of such rare diagnosis via a case report of a relatively young active male who presented with progressive weakness in lower limbs due to a post-meningitis multiloculated thoracic arachnoid cyst. He underwent cyst fenestration but after symptomatic recurrence a thoracic cysto-pleural shunt was inserted. Despite these measures patient continued to experience low pressure headache, weakness and numbness in lower limbs with bladder and bowel dysfunction. The serial scans showed recurrence of the previously demonstrated thoracic cyst with cord compression.
Results: Despite the frequent disruptions in the therapies due to the symptoms induced by the recurrence of the cyst and shunt revision patient has successfully achieved the long-term goals.
Conclusions: spinal arachnoid cyst formation secondary to infectious meningitis is a rare lesion which usually is discovered incidentally but can grow to such a seize that can exert compression over the spinal cord given devastating paralysis.
The literature illustrates the successful management of the arachnoid cysts following surgery (Source Clinical neurology and neurosurgery; 2019; vol. 180; p. 87-96) or following cysto pleural shunt insertion (Clinical neurology and neurosurgery; 2020; vol. 194; p. 105835) whereas it was not the case for our patient as recurring cyst worsened the clinically manifestations.
Therefore this case required an MDT approach to create individualized rehabilitation program to address the secondary complications of spinal compressions, frequent neurologic assessments, management of persistent and disabling spasms and close contact with Neurosurgeons.

eP1–013

Rehabilitation of cognitive and swallowing disorders of a patient with cerebral fat embolism syndrome

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Introduction: Fat embolism syndrome (FES) is a rare and potentially serious clinical entity resulting from traumatic injury to long bones (incidence 3 – 10 %). Cerebral manifestations may be present, inducing neurologic deficits.
Objectives: To present a case of a 30 year old patient with FES (after a tibial fracture) associated with neurologic complications, including serious cognitive deficits and swallowing disorders, focusing on the utilization of rehabilitation procedures and their efficiency.
Materials and methods: The patient was admitted to the rehabilitation department one month after the initiation of the FES with tracheostomy and nasogastric feeding tube. Regarding his cognitive deficits, the patient was assessed with the Aphasia Screening Test (score = 192) which noted deficits in his reading and hearing comprehension, his speech production and his mathematical knowledge and writing. He scored 13/30 in the Mini Mental State Examination. The treatment methods that have been used initially by the Speech Therapist (4 therapeutic sessions per week) and the Occupational Therapist (5 therapeutic sessions per week) included: completion of sequences, memory exercises, execution of complicated writing orders, description of simple and complex figures and exercises for attention, concentration and verbal memory. The cognitive rehabilitation software »RehaCom« was also used to enhance the recovery of cognitive abilities. He was also assessed with the Blue Dye Test which noted dysphagia in liquids. The tracheostomy was removed. He started feeding and receiving liquids with a coagulant factor (thicken up) per os with gradually decreasing dose. He followed directions for feeding such as good oral health care, head flexion, double swallowing per bolus, slower completion of his meal, small and controlled food and liquid quantities, and staying in a vertical position about half an hour after food and/or liquid intake.

Results: His Mini Mental State Examination score was increased to 22/30 one month after the initiation of the therapeutic procedure. He substantially improved his skills in creation of complex figures and description. The therapeutic program of cognitive deficits remains in progress. The nasogastric tube was removed two weeks after the initiation of the dysphagia treatment. Today the patient receives food and liquids safely without any restrictions.
Conclusion: The complexity of the various effects of FES in the central nervous system requires an individualised therapeutic plan by the interdisciplinary team which can lead to notable recovery.

eP1–014

Quality of life and sex life of adults with Cerebral Palsy (Cerebral Palsy) in Cotonou

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Introduction: Clinical manifestations of cerebral palsy (CP) are generally severe and can affect quality of life (QOL) and sexual life (SL) of patients in adulthood.
Objective: To assess QOL and SL of adult patients with CP in Cotonou.
Patients and methods: It was a cross-sectional study with a descriptive and analytical aim from January to November 2020. The consenting CP patients were enrolled in Cotonou in the university clinic of Physical Medicine and Rehabilitation of the CNHU-HKM, community-based rehabilitation centers and an inclusive school for CP patients. QOL was assessed using the SF-36 scale and the SL using the Multidimensional Sexuality Inventory (IMS).
Results: The mean age of patients was 24.94 ± 6.81 years. The male sex (57 %) was the most affected. 40 % of adults were out of school and 50 % were civil servants. 82% of these subjects were single (not married). 90 % had orthopedic deformities. patients had a better quality of life mentally (64.89 %) than physically (60.40 %). 70 % of patients have never had a romantic relationship. Only 18 % of our study population have done sexual experience. Quality of life was impacted by communication disorders. Sexual life was influenced by the patient's gender, occupation, mode of residence, communication disorder, motor impairment, sense of isolation and quality of life.
Conclusion: In general, adults with cerebral palsy do not have a consistently reduced quality of life. However, their sex life is less rich. It would be interesting to confirm the results of this work through cross-sectional studies in the general population.
Keywords: adults BMI, quality of life, sex life, Cotonou

eP1–015

Speech therapy with phonological components analysis (PCA) and transcranial direct current stimulation (tDCS) in semantic dementia: a single case study

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Introduction: Frontotemporal dementia is the most common form of early-onset dementia [1]. It is characterised by degeneration of frontal and temporal brain areas and can be divided into behavioural variant and primary progressive aphasia (PPA) [2]. A special form of PPA is semantic dementia (SD) [3]. Typical symptoms in SD are deficits in language production and communication due to loss of conceptual and lexical knowledge [3]. One way to treat these deficits is the phonological components analysis (PCA) [4]. Although this method focuses on phonological features to facilitate word retrieval, there is evidence of improvement in patients with semantic deficits after PCA [4]. We therefore investigated the effects of therapy with PCA on naming. In addition, we combined PCA with tDCS in order to enhance a potential therapeutic effect.
Methods: The participant was 58 years old and diagnosed with SD in 2018. She was previously shown to benefit from tDCS in combination with linguistic tasks and language therapy (semantic feature analysis) [5]. Interestingly, phonological cues were more effective than semantic cues in facilitating word retrieval. Therefore, we hypothesised that using the preserved phonological skills in therapy might also improve her naming.
The patient participated in four periods of PCA and tDCS (20 minutes per day, 1.5 mA, anodal left temporal). Each period consisted of ten consecutive work days. After each period, there was a break in therapy of at least 14 days containing two diagnostic sessions (3rd and 14th day).
Results: After the intervention with PCA and tDCS the patient showed improved naming abilities. Using logistic regression, we found that training led to better word retrieval (Estimate = -.899, SE = .185, Z = -4.85, p < .001). Additionally, regarding the untrained items, the second diagnostic session significantly predicted correct naming (Estimate = .386, SE = .184, Z = 2.10, p = .036). This indicates that the patient successfully used the phonological strategy after at least 14 days of therapy.
Conclusion: To date, there are few therapeutic approaches for SD. Our results suggest that PCA combined with tDCS could improve or maintain word retrieval.

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eP1–016

Sharing competencies through a cross-sectoral specialized home-based dysphagia rehabilitation program in subjects with neurological disorders: A feasibility study

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Background: Therapists working with rehabilitation in the municipality may see clients with very diverse limitations in functions and activities of daily living. Based on this, they may not have the same level of expertise in rehabilitating clients with dysphagia as therapists in hospitals, who are specialized in dysphagia [1]. In line with this, a nation-wide Norwegian survey found that in 75 % of nursing homes, residents were not routinely screened for dysphagia, and 50 % of nursing homes did not have access to external experts in dysphagia [2]; and a survey from Canada found that 75 % of

dieticians in primary care did not have a dysphagia screening process, and felt that they lacked the competencies in performing screening and assessments [3].
Objective: To investigate the feasibility of a cross-sectoral specialized Home-based Dysphagia Rehabilitation (Specialized-HDR) program for individuals with neurological disease, and investigate the experience of the municipality OTs on the Specialized-HDR.
Methods: Mixed-method feasibility study. A convenience-sample of five subjects with neurological disorders received Specialized-HDR by Occupational Therapists (OTs) from a specialized neurorehabilitation hospital. Subjects were assessed pre- and post-intervention with clinical- and instrumental assessments of swallowing. Municipality-based OTs received guidance from the specialized OTs and were hereafter responsible for the training. A focus group interview was conducted with the municipality OTs, to get their experience on the Specialized-HDR program. Results: Three themes emerged from the interview: 1) A positive attitude towards the specialized-HDR program, 2) Relevance of the Specialized-HDR, encompassing two subcategories; Authority and Guidance, and 3) Development potential of the Specialized-HDR encompassing two subcategories; Individual needs and Prerequisites in the municipality. There were too few subjects with heterogeneous neurological disorders to show a direct effect on dysphagia, but subjects were positive towards the rehabilitation program.
Conclusion: This innovative approach of receiving guidance and enhancing competencies in the clients' home environment was well-received by municipality OTs and subjects. A larger clinical trial considering the constructive feedback from the municipality OTs is required to show whether this approach have a direct effect on dysphagia.

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eP1–017

Foods of IDDSI levels 1 to 4 show changes in their IDDSI level over a three-hour period

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Introduction: In the presence of dysphagia, texture-modified foods and thickened beverages are routinely used to minimise the risks of choking and aspiration [1]. Previous studies have shown that the consistency of thickened liquids and foods can change over time [2, 3, 4].
Objectives: This work addresses the question of the time intervals during which there is a change in the IDDSI level after the preparation of slightly thick to extremely thick/pureed dysphagia foods in the hospital kitchen until the serving time on a neurological ward. The influence of temperature is also considered.
Materials and methods: In an experimental study design, temperature measurements as well as triple consistency tests were performed on 12 dishes of IDDSI levels 1 to 4 within three hours at a clinic in Vienna using suitable IDDSI testing methods.
Results and conclusion: Of the 12 food components, 50% changed in their IDDSI level with equal distribution over the two possible time periods between the three testing time points. The average range of temperature for dishes that showed changes in their IDDSI level, 15.2 °C, differed only slightly from the average temperature range of those components without changes in IDDSI levels, namely 14.2 °C. There are indications for potential effects of a stirring process on the consistency of dishes categorised as IDDSI levels 1 to 4. The results of this study suggest an assessment of thickened liquids and foods as close to the time of ingestion as possible when dealing with patients with dysphagia. This is to ensure safe as well as efficient swallowing.

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eP1–018

Isolated Dysphagia in a Patient with Medial Medullary Infarction - Effects of Evidence-Based Dysphagia Therapy: A Case Report

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Medial medullary infarction (MMI) is a vascular occlusion in the medulla oblongata leading to certain constellations of neurological symptoms and seriously affecting the patient. Effective evidence-based treatment of severe dysphagia as sole symptom of MMI has not yet been reported. This case study aims to report successful effects of evidence-based therapy based on findings of dysphagia symptoms and pathophysiology of swallowing by flexible endoscopic evaluation of swallowing (FEES) in severe isolated dysphagia after MMI. FEES was performed to evaluate swallowing pathophysiology and dysphagia symptoms in a 57-year-old male with severe dysphagia after MMI. On the basis of FEES findings, simple and high-frequent evidence-based exercises for improvement of swallowing were implemented: thermal stimulation of faucial arches, Jaw Opening Exercise, and Jaw Opening Against Resistance. After 7 weeks of high-frequent evidence-based therapy and regular FEES evaluation the patient was set on full oral diet with no evidence of aspiration risk. In a first case report of isolated dysphagia in MMI our case illustrates that high-frequent evidence-based dysphagia therapy in combination with FEES as the method to evaluate and monitor swallowing pathophysiology can lead to successful and quick rehabilitation of severely affected dysphagic patients.

	Cortical lesion (n=21)	Subcortical lesion (n=20)	BS & Cbll lesion (n=12)	p-value
Age (years)	68.52±10.69	63.10±13.08	62.50±14.59	0.284
Gender (M/F)	16/5	9/11	8/4	0.113
Type of strokes (n)				
Ischemic/hemorrhagic	21/0	12/8	11/1	0.002
Laterality of lesion (n)				
Lt./Rt. hemisphere	11/10	7/13	10/2	0.655
K-MMSE	19.29±8.28	20.30±8.52	25.08±4.44	0.112
K-MBI	49.38±26.05	35.25±24.87	54.92±21.3	0.066
Feeding method (n)				
Non-oral feeding	11 (52%)	5 (25%)	4 (33.5%)	-
Limited diet (LD)	4 (19%)	8 (40%)	1 (8.5%)	-
NRD	6 (29%)	7 (35%)	7 (58%)	-
Bedside water screening test (n)				
Low risk	4 (19%)	5 (25%)	4 (33%)	-
Medium / high risk	17 (81%)	15 (75%)	8 (67%)	0.655
DOSS	2.90±1.73	3.20±1.32	3.17±2.37	0.848

eP1–019. Table 1

	Cortical lesion (n=21)	Subcortical lesion (n=20)	BS & Cbll lesion (n=12)	p-value
Test Days from stroke Onset (day)	4.76±1.34	5.15±1.27	4.50±1.73	0.428
VFSS score				
FDS (total)	30.1±12.45	26.6±9.67	26.33±13.98	0.561
FDS (oral)	1.05±2.73	1.00±2.47	1.50±2.71	0.858
FDS (pharyngeal)	29.05±11.52	25.60±8.67	24.83±11.68	0.450
PAS	6.05±2.38	6.55±1.73	5.33±2.02	0.282
PCF	178.62±152.85	187.75±133.28	204.25±110.89	0.875
PAS ≧ 6 (n)	14 (67%)	13 (65%)	5 (42%)	-

eP1–019. Table 2

	Cortical lesion (n=21)	Subcortical lesion (n=20)	BS & Cbll lesion (n=12)
Alleviating the control of dietary method			
Non-oral feeding → Limited diet (%)	6 (28.5%)	5 (25.0%)	4 (33.3%)
Limited diet → NRD (%)	0 (0)	0 (0)	1 (8.3%)
Restricting the control of dietary method			
NRD → Limited diet (%)	4 (19.0%)	6 (30.0%)	5 (41.7%)
Limited diet → Non-oral feeding(%)	1 (4.8%)	0 (0)	0 (0)
No change dietary method	10 (47.7%)	9 (45.0%)	2 (16.7%)

eP1–019. Table 3

	Cortical lesion (n=21)	Subcortical lesion (n=20)	BS & Cbll lesion (n=12)	Total
NRD (initial→post VFSS)	6 → 2	7 → 1	7 → 3	6/53 (12%)
Alleviating diet	6	5	5	16/53 (30%)
Restricting diet	5	6	5	16/53 (30%)
No dietary change	10	9	2	21/53 (40%)

eP1–019. Table 4

eP1–019

Dietary Changes after Early VFSS in Acute Stroke Patients with Dysphagia

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Introduction: Swallowing problems are reported in 37–78% of stroke patients depending on the timing of screening and assessments used. Most stroke patient's feeding method was determined by formal dysphagia screening protocols within 24 hours after stroke onset. Sometimes acute stoke patients with dysphagia were kept with nasogastric (NG) tube for a long time even if they could be removed NG tube and eat orally. Also, dysphagia screening test could have a limitation to detect a silent aspiration and residual volume. We hypothesized that intensive evaluation within 7 days after stroke onset like videofluoroscopic swallowing study (VFSS) helps to choose a proper feeding method and to be a safe for stroke patients.
Objectives: This study was to investigate a dietary changing tendency and usefulness after early VFSS in stroke patients with dysphagia.
Materials & Methods: After primary stroke treatment, VFSS was performed within 7 days after stroke onset for neurologically stable patients. We enrolled the patients who dieted the food via nasogastric tube with recovering alert mentality and improving cooperation. Patients were divided into 3 groups according to their brain lesion, cortical lesion (CL), subcortical lesion (SCL) and brainstem/cerebellar lesion (BCL). On the result of VFSS, we checked tendency of changing dietary method and discrepancy of predicting the aspiration risk between the DST and the VFSS.
Results: One hundred sixty three patients met our inclusion criteria; 61 patients were enrolled to the CL group, 54 to the SCL, and 48 to the BSL group. Patients who had aspiration risk, which penetration aspiration scale (PAS) scores were 6 to 8, were noted in three groups on the VFSS (47.5% in CL, 59.3% in SCL, and 47.9% in BCL). 79.2% of patients were needed to change their feeding methods after VFSS and patients who could have a normal regular diet (NRD) was only 20.8%. 64.4% of patients were needed to change their feeding methods after VFSS. Among them, 37.4% of patients should restrict the control of their feeding methods due to aspiration risk. The discrepancy between the result of screening test and VFSS was found 19.0%. Aspiration pneumonia was observed in 12 patients (7.4%) after VFSS during 3 weeks. Only restricting diet group, aspiration pneumonia was observed.
Conclusion: Early VFSS for acute stroke patients provides a more proper feeding method and helps to manage dysphagia effectively.

eP1–020

Case report: dysarthria improvement in a patient with severe stroke in the pons of the brainstem

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Introduction: Dysarthria is a disorder of the muscles used for speech. It is a common complication after stroke, observed in 30–40% of stroke survivors. It is considered the third most common impairment, with prevalence as high as 51% in the acute phase and 27% in the chronic phase after a

stroke. Dysarthria is considered as an important barrier to quality of life as it can hinder communication and therefore one's self-care. In most patients, major strides in improvement during rehabilitation are observed in the first 3-6 months after stroke.
Objectives: This case report highlights the significant improvement of dysarthria of patient with ischemic stroke in the pons of the brainstem, especially in the chronic phase after the occurrence of the stroke.
Materials & methods: A 66-year old male patient was admitted in our rehabilitation department a month after an ischemic stroke in the pons area. The underlying conditions were arterial hypertension and epileptic seizures following a car accident. Both conditions were being treated with medications. The patient was transferred from the neurology department to the rehabilitation department two weeks poststroke. He presented with dysphagia and dysarthria and he was assessed by the Speech Therapist. At the first clinical assessment the patient presented with severe weakness and coordination disorders of the facial musculature. His speech was totally incomprehensible. After the medical report of an otolaryngologist the patient is fed via gastrostomy. One and a half months after the stroke, the patient suffered a subdural hematoma. After intubation and an ICU stay of about three weeks, he returned to the rehabilitation department. He was assessed for dysarthria with Robertson Dysarthria Profile which noted very severe deficits. The following therapeutic techniques (5 daily sessions per week) were used: respiratory exercises, relaxation exercises, improvement exercises for oral muscles, reverberation exercises and reading exercises.
Results: The patient was discharged eight months after the stroke occurred, having completed his tactical program with the Speech Therapist, that improved diadochokinesis and coordination of the facial musculature, concurrency of respiration and phonation, intelligibility and production of speech, prosody and swallowing reflexes.
Conclusion: The continuation of the dysarthria treatment of stroke survivors during the chronic phase could have beneficial effects in parameters of speech.

eP1–021

Human-Technology interaction in neurorehabilitation for robot-assisted gait training with bed verticalization

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Introduction: Neurorehabilitation increasingly relies on technology. Currently, a novel assistive robotic system is being developed for very early mobilization in the setting of the intensive care unit. Robot-assisted leg movements take place during bed verticalization. Stroke patients remain in their beds for the duration of the whole therapy session, and they do not have to be transferred out of bed.
Objectives: The patients' experiences and preferences regarding human-technology interaction need to be investigated in order to provide optimal health care.
Patients and methods: In the research and development process, patients in neurorehabilitation and healthy volunteers underwent therapy sessions with the device. Therapy was offered both in a standardized mode and in a version with an automatic and continuous adaptation, which was mediated by methods of artificial intelligence, in order to meet individual rehabilitation requirements. Afterwards, the twenty-four participants in the four intervention groups answered validated and self-developed questionnaires regarding mood, satisfaction, and perception of care. The subjects were also interviewed according to structured guidelines. The interviews were literally transcribed and analyzed by qualitative content analysis.
Results: The participants recognized the approach to combine gait training with verticalization as highly valuable. They gave recommendations to improve the robotic device in the areas of steering parameters, safety measures, and design. Additional ideas for simultaneous arm or cognitive training were contributed. The participants considered the vertical position very helpful to support perception, communication, and interaction with the personnel. They felt more awake, active, and involved. Prior information and continuous oversight were regarded as important. Safety was generally perceived as high because of the supervised situation and the stepwise training approach. Human contact remained particularly relevant throughout the robot-supported therapy sessions. The automatic adaptation mode was valued as appropriate and motivating.
Conclusion: Research and development for neurorehabilitation technologies benefit from users' feedback. Clinical evaluation should progress from healthy volunteers to affected patients for obtaining recommendations for improvements. Robot-assisted gait training possesses a high potential to enhance rehabilitation outcomes. Human-technology interaction deserves greater attention in health care in order to identify personal determinants for acceptance and to promote personalization in neurorehabilitation technology.

eP1–022

Effects of early environmental enrichment and treadmill training in a rodent model of cerebral palsy: a possible translational approach for Hand and Arm Bilateral Intensive Training including Lower Extremities (HABIT-ILE)?

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Background: Cerebral Palsy (CP) is a major cause of motor and cognitive disability in children due to injury to the developing brain. Risk factors include preterm birth, asphyxia, labor and delivery complications, fetoplacental infection and/or inflammation leading to neurological disorders. Experimental CP has been shown to induce cortical injury and deficits in myelination leading to behavioral impairments. HABIT-ILE therapy is a 2 weeks intensive intervention based in physical rehabilitation and has proven to decrease motor impairments and to induce plastic changes in white matter tracts altering its structure in infants suffering from CP, however, the substrate for the recovery is not well understood. Using a CP model in rodents, we tested the protective role of HABIT-ILE like strategy, namely treadmill training (TT) and environmental enrichment (EE), either alone or in combination (EETT) assessing behavioral function, brain macro and microstructure and proteins that could be involved in the mechanisms responsible for the functional recovery afforded by HABIT-ILE.
Methods: Pregnant Wistar rats received an i.p. injection of LPS (200mg/kg on E18 and E19). At P0, pups were exposed

to anoxia for 20' in a chamber at (37°C). From postnatal day 2 to 21, animals had hindlimbs movements restricted for 16h/day. Rehab (environmental enrichment and/or treadmill) lasted from P21 to P28. TT consisted of 15 min/day at 7cm/s speed. EE provided increased multiple sensorimotor stimulus in cages changed 2x/day. Functional 3D Kinematic Gait Analysis was performed at P21 and P28 and Rota-Rod at P28. Brain tissue was collected for ex-vivo DTI/NODDI and histological analysis. Proteins involved in the injury mechanism as well be part of the molecular pathways which HABIT-ILE could rescue afforded by the therapy in different regions of the CNS.
Statistics: Kruskall-Wallis/Mann-Whitney for non-parametric data, ANOVA/Duncan for parametric. Significance accepted when $p < 0.05$.
Results: CP animals had worse performance in the Rota-Rod and altered gait compared to Controls. CPEETT rescued partially the motor performance in both tasks. DTI/NODDI confirmed loss of microstructure in CP rats; however, it was not reversed by the treatment. Histological analysis evidenced preservation of neurites (NF200) and myelination (MBP) in the corpus callosum and decreased astrogliosis (GFAP) in the cortex and hippocampus of treated animals. Moreover, CPEETT showed robust effects modulating BDNF signaling, interfering in inflammatory processes and decreasing cortical excitatory dysfunction (increased Synaptophysin, VGlut1 and PSD95) induced by the model.
Conclusions: Overall, translational HABIT-ILE reversed hind limbs dysfunction and promoted tissue rescue following experimental CP through multiple molecular mechanisms of action and support the concept that early (and intense) protocols of physical rehabilitation such as HABIT-ILE induce neuroprotective effects following injuries to the developing CNS.

eP1–023

Combination of a computerized cognitive training (CoRe System) with transcranial direct current continuous stimulation (tDCS): what effects in Alzheimer's dementia?

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Background: Alzheimer's disease (AD) is the most frequent cause of dementia. To date, there is no fully proven pharmacological treatment for cognitive impairment and the available pharmacological armamentarium has limited efficacy. Therefore, non-pharmacological intervention may represent adjunctive therapy to medications in order to delay the evolution of the cognitive deficits. In fact, intervening on »at risk« patients represents a valuable way to slow the disease progression, taking advantage of the residual neuroplasticity capacity and stimulating compensatory mechanism. Cognitive training (CT) and non-invasive brain stimulation seem to prevent or delay the cognitive impairment since the early stages of the disease.
Objectives: This study aims to evaluate the effectiveness of a combined treatment associating a computerized cognitive training (CoRe system – acronym for Cognitive Rehabilitation) with non-invasive brain stimulation techniques [transcranial direct current stimulation – tDCS]).
Materials and methods: Patients with mild AD were enrolled and randomized to receive CoRe plus anodic tDCS (EG - experimental group) or CoRe plus sham tDCS (CG - control group). The treatment protocol consisted of 12 sessions of CoRe training combined with on-line tDCS applied to the dorso-lateral prefrontal cortex. All patients were evaluated before (T0) and after (T1) treatment with an exhaustive neuropsychological assessment focused on global cognitive functioning, episodic long-term memory, logical-executive functions, working memory, and attention/ processing speed. Furthermore, follow-up visits were scheduled 6 months (T2) after the end of the treatment. At T0, the cognitive reserve was assessed using Cognitive Reserve Index questionnaire (CRIq).
Results: For what concerns neuropsychological tests, when comparing T0 vs T1, CG improved only in one attentive test, while EG improved in more executive tests. During the training, both groups improved their performance at CoRe tasks, but this improvement was higher in EG. After 6 months (T1 vs T2) no post-training improvement was maintained in both groups. With respect to T0 (T0 vs T2), cognitive profile was stable in both groups compared to the baseline.
Conclusions: These preliminary data suggest that this combined treatment has a slightly higher rehabilitative efficacy, especially on some aspects of executive functions. Follow-up visits allow to assess whether this combined treatment affects the evolution of cognitive decline. The presence of a higher cognitive reserve seems to have a positive impact on the cognitive training performance. In conclusion, combined multi-domain interventions may contribute in preventing or delaying disease progression.

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eP1–024

Computer-based cognitive telerehabilitation in early phases of cognitive decline: the HomeCoRe system

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Background: Given the limited effectiveness of pharmacological treatments for cognitive decline, non-pharmacological interventions have gained increasing attention and, in recent years, telerehabilitation (TR) has been proposed as a cognitive rehabilitation strategy to contrast dementia onset and/or slow its progression. During the past years, we implemented the software CoRe for in-person cognitive training in the hospital setting supervised by a trainer, being successfully tested in terms of usability and (immediate and long-term) effectiveness in patients with early cognitive impairment. In light of this, we have recently developed HomeCoRe, the »home« version of CoRe, in order to provide cognitive intervention remotely supported by a family caregiver.
Aim: The main goal of this project is to assess the functionality and usability of HomeCoRe, as cognitive TR tool targeting people with neurodegenerative diseases. In particular, the specific aims are the following:
1) to verify both the overall functionality and usability of HomeCoRe and consequently refine the technological innovation of the system before use it at home;

2) to investigate the efficacy of the HomeCoRe system in terms of patients' acceptance, perceived benefits and barriers related to home-based TR.

Materials and methods: The study involved six patients with early cognitive impairment (and caregivers) recruited at the IRCCS Mondino Foundation. All patients received a touch-screen laptop with the HomeCoRe software: a patient-tailored intervention aimed at stimulating several cognitive abilities in adaptive mode through a series of exercises planned remotely. The intervention consisted of 18 sessions (3 session/week for 6 weeks, about 45 minutes/day). Specific questionnaires were used to measure the level of familiarity with computer tools, attractiveness, clarity, efficiency, usability and innovativeness of the TR system, as well as the level of satisfaction/benefits perceived.
Results: All patients completed the intervention program independently from their familiarity with computer tools. Caregivers' involvement varied according to patients' level of cognitive impairment. Patients found HomeCoRe system as an innovative and user-friendly tool they used willingly within their daily life routine. Among feedbacks to improve the system, it was reported the need of extra time for performing exercises. All patients asked for extra sessions of TR.
Discussion: We created a TR tool to allow therapy sessions to be undergone from home, thus guaranteeing continuity of care and advantages in terms of time and costs for the patients and the healthcare system. The next step will consist in performing a clinical trial to explore the cost-effectiveness of HomeCoRe TR versus face-to-face CoRe intervention in neurodegenerative diseases.

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eP1–025

A Focal group interview study about the effectiveness of patients who had Early Supported Discharge program

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Introduction: Early supported discharge (ESD) is a transitional care model aimed at accelerating hospital discharge and providing multidisciplinary specialist rehabilitation at home. This study aims to investigate patients' experiences of Early Supported Discharge services.
Subjects and methods: In this qualitative study, patients who completed the ESD program were interviewed. Patients in the ESD group received a 4-week home-based rehabilitation program by a multidisciplinary team. Interviews were conducted within 1 month after the end of the ESD program and in the conference room of OO National University Hospital. A total of about 30 participants were expected, and a total of 3 group studies of 4 to 5 participants were expected. Interviews were conducted by physicians specialized in stroke rehabilitation and participating in the rehabilitation program of the ESD group as associate investigator (S., J.). We started with introductory questions about the feeling of being discharged from the hospital at home after the onset of stroke and the changes in life before and after the onset of stroke. The main questions were about why you may not be assigned to the ESD group, why you agreed to participate in the study, and what would be the appropriate level if there is a cost.
Result: 1. The feeling of being discharged from the hospital at home after a stroke: One patient expressed anxiety about early discharge: »It was bad because I was discharged too early. I had no strength, so it was difficult to move and clean. I was anxious and worried because I had relapsed 4 times. I did.« However, another patient expressed good feeling that he did not have to see another patient in the ward: »It feels good to be discharged from the hospital. I had to listen to other patients who are sick every day in the hospital room, but it was nice to return home.«
2. What has changed in your life before and after the onset: After the onset of stroke, they commonly expressed a decrease in confidence, the importance of health, and the importance of family 3. Reasons for participating in the study despite the possibility of not being assigned to an ESD group: The reason for agreeing to participate in the study was that they wanted to help the medical community: »I thought it would be good to help the development of the medical community in Korea.« 4. If there is a co-payment for an ESD program, how much is it reasonable?: Considering the case of planning the ESD program as a regular program, participants were asked about the cost they thought was reasonable: »I think about 5,000 won per treatment would be appropriate.«, »I think 30,0000 won would be good for the whole program itself.«
Conclusion: ESD program at home by accelerating hospital discharge showed a positive response in the ESD group. However, there were complaints about the inability to easily access medical knowledge about various symptoms of stroke due to early discharge and the resulting anxiety.

eP1–026

Arm-hand boost therapy during inpatient stroke rehabilitation: results from a pilot randomized controlled trial

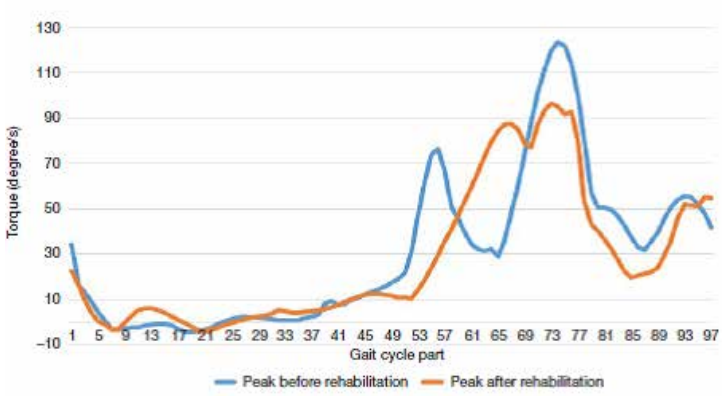
S. Meyer (Herk-de-Stad/BE), G. Verheyden (Leuven/BE), K. Kempeneers, M. Michielsen (Herk-de-Stad/BE)

Introduction: The impact of both content and intensity of arm and hand therapy for improving upper limb motor function after stroke is well known. However, the response to a very focused program including proximal control as well as distal alignment, including stratification of patients and principles of neurophysiological recovery, delivered at high doses in the sub-acute phase post stroke remains poorly understood.
Objectives: It was the aim of this study to assess feasibility, safety and potential efficacy of our new intensive, focused arm-hand BOOST program during inpatient rehabilitation and to explore whether there is a difference between early versus late delivery of the program in the sub-acute phase post stroke.
Patients & methods: In this pilot RCT, patients with stroke were recruited from the inpatient rehabilitation unit of Jessa Hospital (Belgium) and were randomized to the immediate group (IG) receiving 4 weeks (4w) of BOOST followed by 4w of CONTROL or the delayed group (DG) receiving 4w of CONTROL followed by 4w of BOOST, on top of the usual care program. The arm-hand BOOST program (1 hour/day, 5x/week, 4 weeks) consisted of group exercises with a focus on scapula-setting, core-stability, manipulation and complex

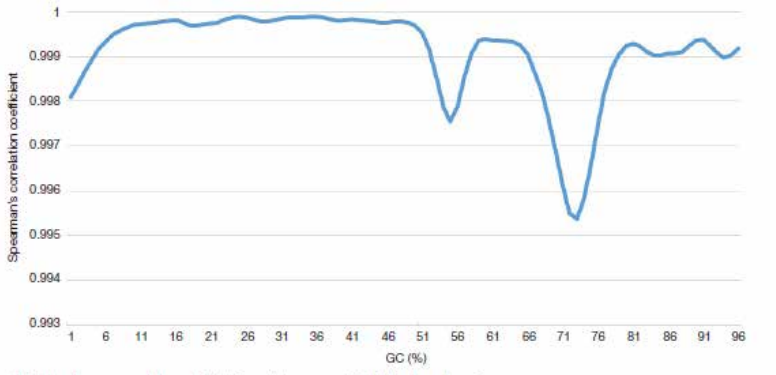
ADL tasks. Additionally, the Armeo®Power (Hocoma AG, Switzerland) was used one hour per week. The CONTROL intervention comprised a dose-matched program (24 one-hour sessions in 4w) of lower limb activity exercises and general reconditioning. At baseline, after 4 weeks and 8 weeks of training, the Fugl-Meyer assessment upper extremity (FMA-UE), action research arm test (ARAT) and stroke upper limb capacity scale (SULCS) were administered. Mann-Whitney U tests were used to assess between-group differences in change over time in outcomes.

Results: Eighteen participants (IG: n = 10, DG: n = 8) were included at a median (IQR) time post stroke of 8.6 weeks (5-12) and had a median (IQR) age at stroke onset of 65.3 years (52-73). No adverse events were reported during or after completion of the trial. Significant between-group differences were found after 4 weeks of training for FMA-UE (p = 0.003) and SULCS (p = 0.033) and a trend for ARAT (p = 0.075) with median (IQR) change scores for the IG of 9 (7 – 16), 2 (1 – 3) and 12.5 (1 – 18) respectively, and for the DG of 0.5 (-3 – 3), 1 (0 – 1) and 1.5 (-1 – 9), respectively. In the IG, 80 % of patients improved beyond the minimal clinical important difference of FMA-UE, compared to none of the patients in the DG. Between 4 and 8 weeks of training, patients in the DG tend to show larger improvements when compared to the IG, however, between-group comparisons did not reach significance.

Conclusion: Results of this pilot RCT revealed that our arm-hand BOOST program, provided on top of usual care, is feasible and safe and suggests positive, clinical meaningful effects on improving upper limb motor function and activities, especially when delivered in the early sub-acute phase post stroke.



eP1–027. Fig.1



eP1–027. Fig. 2: The ankle joint angle range correlation coefficient for each two consecutive GC parts on the goniograms

eP1–027

Effect of robot-assisted gait training on biomechanics of ankle joint in patients with post-stroke hemiparesis

A. Klochkov, A. Zimin, A. Khizhnikova, N. Suponeva, M. Piradov (Moscow/RU)

Question: Currently, robot-assisted gait training is recognized as the gold standard of locomotor poststroke rehabilitation. Meta-analyses confirm the efficacy of electromechanical devices in restoring the impaired walking function, especially in patients who are unable to ambulate independently. However, there is no consensus in the literature on their effect on ankle joint movements.

Methods: This study aimed to investigate the effect of robot-assisted gait training on ankle joint movements in patients with post-stroke paresis. The study conducted in 2010 – 2017 recruited 22 hemispheric stroke survivors (18 men and 4 women). The median age was 50.5 years (41; 56.5), the median time elapsed after stroke was 6.0 months (2.8; 12.9). Their motor function was assessed using clinical scales and motion capture analysis. All patients received 11 robot-assisted gait training sessions. The clinical efficacy of robot-assisted rehabilitation was assessed using the validated Russian versions of the Fugl-Meyer Assessment scale, the modified Ashworth scale for spasticity in the gastrocnemius and soleus muscles, the modified Rankin Scale, and the Functional Ambulation Categories scale. Measurements were performed before the beginning of the rehabilitation program and on the day following its completion. The biomechanics of walking were evaluated using the motion analysis system (Biosoft-3D; Russia)

Results: After rehabilitation, the total score on the Fugl-Meyer Assessment scale increased from 146.5 to 152 points (p < 0.05); for the lower limb, the score increased from 18 to 20.5 points (p < 0.05). The muscle tone of ankle extensors decreased from 2.5 to 2.0 points on the modified Ashworth scale (p < 0.05). The duration of the stance phase increased from 28.0 to 33.5 % relative to the total gait cycle. We also observed an increase in active motion on the FM scale after rehabilitation. The total motor score increased from 146.5 (128; 163.5) to 152 (134.3; 176.8) (p < 0.05), whereas for the lower extremity, the score increased from 18 (16; 21) to 20.5 (18; 24.3) (p < 0.05).The main difference in the gait cycle structure before and after rehabilitation is the presence of three gait cycle parts instead of five, suggesting consolidation of patients' goniograms at 1-61 % of the gait cycle. The joint angles interquartile ranges have been significantly improved after rehabilitation (p < 0.05).

Conclusions: Gait circle asymmetry is one of the most common gait disturbances besides reduced walking speed and shorter step length observed in stroke survivors. In gait circle asymmetry, the stance phase becomes shorter, whereas the swing phase of the paretic limb becomes longer, which is reflected in the temporal characteristics of the gait cycle before rehabilWe conclude that robot-assisted training with knee and hip joint actuators indirectly affects the kinematic parameters of the ankle joint by promoting a shift towards the average gait kinematics.

eP1–028

EMG-triggered FES and serious gaming for upper limb stroke rehabilitation: a feasibility study

L. Wild, A. de Crignis (Bad Aibling/DE), C. Höhler, K. Jahn, C. Krewer (Bad Aibling/DE, Munich/DE)

Introduction: Both, functional electrical stimulation (FES) and Virtual Reality (VR) / serious gaming (SG) therapies are used in stroke rehabilitation. A combination of both approaches seems to be beneficial for therapy success, as SG provides targeted, task-specific training in an engaging and motivating way, and FES allows for increased repetitive practice by supporting hand function in hemiparetic patients. However, evidence for this novel approach is still scarce and controlling FES stimulation remains a challenge. Therefore, we address the questions, whether the combination of SG and EMG-triggered contralateral controlled FES is feasible and useful in the clinical setting, and which patients might benefit from the additional use of FES.
Methods: In this crossover study, we compared the usability and feasibility of SG alone to SG with the support of FES (SG+FES). For SG we used the Bubbles protocol from the Rehabilitation Gaming System (Eodyne, SL, Spain), which targets hand opening and closing. In the SG+FES condition, wrist and finger extension of the affected limb was supported via FES on the impaired forearm triggered by the activation of the hand extensor muscles of the non-paretic limb using the STIWELL med 4 device (MED-EL Elektromedizinische Geräte GmbH, Austria). Participants received two consecutive training sessions of SG+FES and two sessions of SG alone in a random order. Usability of the therapy system was assessed using the Intrinsic Motivation Inventory, Nasa Task Load Index and System Usability Scale after each condition. Gaming parameters (e.g. score), perceived fatigue level and a user and technical documentation added further information on feasibility.
Results: To date, five out of 20 subacute patients after stroke (65 ± 14 years) with a hemiparesis of the upper limb (MRC ≤ 4) completed the study. Most participants perceived the SG and SG+FES therapies as enjoyable and valuable and could well imagine using the system regularly. While two severely impaired individuals (MRC 0-2) benefitted most by the integration of FES, as they were unable to play the game without FES support, it provided no or little additional immediate benefit to the patients with mild impairment (MRC 3-4).
Conclusion: This preliminary work demonstrated that the combination of SG with contralaterally controlled FES is feasible and well accepted among patients after stroke in the clinical neurorehabilitation setting. It seems that the additional use of FES may be more beneficial for severely impaired individuals as it enables the execution of the serious game and thus increases the usability of the gaming therapy. These findings provide valuable implications for the development of rehabilitation systems by combining different therapeutic interventions to increase patients benefit.

Acknowledgement:
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eP1–029

Online application for motor rehabilitation after stroke based on a movement choice

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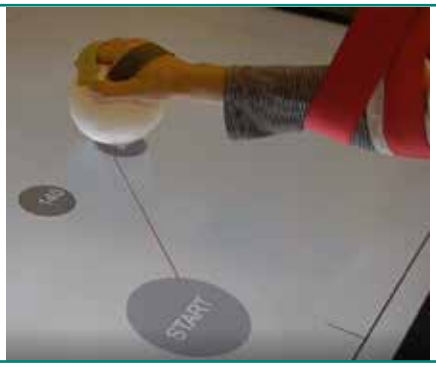
One of the key issues in motor rehabilitation is patient involvement and internal motivation. We suggest that it may be possible to increase active participation of a patient in motor rehabilitation by introducing more movement choice into it.
Our objective is to develop an online tool for motor rehabilitation providing patients with various goal choices during movements (motor lotteries) and, thus, allowing investigating the process of motor decision making.
We developed an online application to investigate the process of motor decision making in patients with motor impairment **(Fig. 1).** The software is developed using the Blazor framework. It allows tracing hand movements using a touch screen **(Fig. 2)** or computer mouse as an input device, and to provide patients with various goals with different values and difficulty level.

eP1–029. Fig.1: The general view of the application window with a participant performing a choice between the »risky« and »sure« options and an exemplary output table



eP1–029. Fig.2: An example of the application use combined with reaching movements

The application is freely available by https://risk-n-reach.azurewebsites.net/. Two aims (»sure« and »risky«) are displayed for reaching during every trial. Baseline stage consists of determining the probabilities of reaching a »risky« aim at its different positions on a screen. After a baseline stage it is possible to suggest scores for both »sure« and »risky« aim position. Aims' parameters can be randomly generated from trial to trial or predefined by a researcher.

We expect that this online application for the study of motor decision making processes will be useful for the investigation of the process of motor recovery, for example in stroke patients, and may be serve as a small step forward a more active patients involvement in motor rehabilitation.

eP1–030

Ipsilesional deficits of manual control following stroke and the association with apraxia

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Since stroke frequently leads to contralateral paresis, patients are dependent on the function of their ipsilesional sides of the body. However, also the »non-paretic« hand can be affected. One important example is apraxia, which typically occurs after left brain damage and affects both sides. In addition, deficits were also reported for elementary motor tasks and fine motor skills. The aim of the present study was to investigate ipsilesional deficits following stroke in the Nine-Hole-Pegboard Test (9HPT), a widely used tests of manual dexterity and to analyze the association with apraxia.

21 patients following left-sided stroke and 22 control subjects performed two trials of the 9HPT with the left hand under maximum speed instructions. In addition, patients were tested with the DILA-S apraxia test battery using the left hand. Duration quantified performance in the 9HPT and apraxia was scored by two examiners.

On the average patients needed clearer longer to complete the 9HPT compared to the control subjects ($p < 0.002$), despite a substantial variability of performance within the patient group. Duration correlated with errors in the imitation of meaningless gestures apraxia test, which was one of the most sensitive apaxia tests in the sample ($R = 0.71$). Despite the significant correlation 9HPT performance varied substantially even within patients with severe imitation deficits. Other tests of apaxia, like pantomime or imitation of symbolic gestures, did not correlate. Weak significant correlations were detected for ratings of execution during apraxia tests. Semantics tested with the Bogenhausener-Semantiktest and elementary motor performance assessed with the Motricity Index did not revealed significant correlations with the 9HPT.

We found that stroke patients with left-sided brain lesions are partly severely slowed when performing the 9HPT with their left hand. The correlation with errors during the imitation of meaningless gestures suggests an association with apraxia. However, there are dissociations in patients with severe apraxia of imitation and normal 9HPT performance. Lacking correlations with elementary motor performance and semantics as well as lacking correlations with other tests of apraxia could indicate an independent manifestations of apraxia. Early classifications of apraxia contained such an independent form called »limb kinetic apraxia«, which however was limited to the contralesional side according to the definition. Alternatively, ipsilesional deficits of manual dexterity may be a result of a combination of deficits in multiple aspects of performance from which one is shared with the processes during the imitation of meaningless gestures, others may be related to visuo-constructive or visuo-motor abilities.

eP1–031

Neurological rehabilitation after stroke for recovery of fine motor function – dynamic music therapy concept based on interacting musical psychological phenomena

D. Dimitrov (Unterhaching/DE)

Introduction: Problems with fine motor skills after stroke may have a positive effect on the basis of neuro-psycho-physiological phenomena in music: 1) Spontaneous intense, active intentional or unintentional movements are inextricably linked and interdependent by the emotional-cognitive component; 2) The connection between musical hearing and motor reaction, as well as musical rhythm-motor reaction would support precision and are a factor in improving fine motor skills. III. Any neuropsychological phenomenon related to the art of music may give as well as borrow an emotionally figurative substance from other phenomena. Thus, on the basis of neuroplasticity, the relevant impaired movement of fine motor skills would be reconstructed.

Objectives: to develop a method for refining the fine motor coordination, based on musical psychological phenomena: 1. rhythm, 2. movement, 3. harmony, 4. improvisation, 5. emotional power.

Patients and methods: The patients suffered a stroke and as a result there are fine motor coordination problems. A special device with a manipulator has been developed - a type of electro-acoustic musical-rehabilitation instrument, allowing movement of the fingers and the wrist along the three axes »x«, »y« and »z«.

The innovative element in this case is: The active part of the process is a pre-prepared opportunity for instrumental improvisation, in which the therapist and the patient play. The role of the therapist is by his playing to help the formation of positive emotional experiences in the patient, and simultaneously exercising continuous control and impact on the movements.

Results: The more intense the emotional experience in the course of therapy is, the stronger the improvement in fine motor skills after a stroke is. Higher results are achieved in the course of the activity when searching for more distant musically cognitive interrelations - the required movement and the stimulus for it should not be based on the previous motor experience of the patient, but on the potential one.

Conclusion: A newly developed concept based on the impact of the emotional power – music – fine motor coordination correlation unequivocally proves that the successful improvement of the fine motor coordination training generally produces higher results, as follows:

- The more in-depth and active the emotional power of music is, the higher the therapeutic impact is.
- Rhythm, as a phenomenon of musical expression creates the impression of movement and thus also activates the movements.
- Repetitive musical structures require repetitive movements, which provides possibility for unintentional and at the same time repeated exercise of the relevant movement.

The impact of music on visual perceptions and emotional experience stimulates the brain plasticity on the basis of some correlations that are the subject of further research.

eP1–032

Cerebral blood flow response to different transcranial direct current stimulation montages in acute ischemic stroke: A randomized sham-controlled trial

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Background: Transcranial direct current stimulation (tDCS) is a non-invasive brain stimulation that can modulate cortical excitability with a polarity-specific manner. Common tDCS montages that are usually used in stroke rehabilitation are unilateral-tDCS and dual-tDCS, which are based on different proposed mechanisms i.e. to excite the affected hemisphere (AH) via the anode, and to inhibit the unaffected hemisphere (UH) via the cathode. However, there are contradictory findings concerning which montage is more suitable to induce post-stroke recovery. Cerebral blood flow is continuously coupled to neural activity, and reorganization of the neural network after stroke of both AH and UH are associated with motor recovery.
Objective: This study explored the effects of 5 consecutive daily sessions of anodal-tDCS, cathodal-tDCS, dual-tDCS over the M1 before physical therapy on mean flow velocity (MFV) of the middle cerebral arteries (MCA) of both hemispheres compared to sham in acute ischemic stroke.
Material and Methods: Sixty-three participants with mild-moderate motor deficit were randomly allocated into four groups. Participants received either anodal, cathodal, dual (1.5 mA, 20 minutes), or sham tDCS (1.5 mA, 30 s) before physical therapy (1 hour) for 5 daily sessions. MFV was assessed by Transcranial color-coded duplex ultrasonography at baseline, immediately post-intervention, and follow-up 1-month.
Results: Two-way mixed ANOVA showed no significant changes of the MFV in AH in all groups, while there was a significant increase of MFV in UH only in the anodal group at post-intervention and follow-up.
Discussion: The improved UH MFV response was seen following 5-sessions of anodal stimulation with training and the effect prolonged for at least 1-month. Predominant activation of certain brain areas in UH was previously demonstrated to associate with post-stroke recovery of good recovers. Our results would support the use of anodal stimulation combined with training in the acute phase to promote post-stroke recovery.

eP1–033

Effectiveness of physical therapy modalities on motor function, functional recovery, and post-stroke complications in patients with severe stroke: a systematic review

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Introduction: Stroke is the third most common cause of disability worldwide [1]. Stroke rehabilitation aims to optimise physical function. Less is known about the effectiveness of physical therapy interventions for severe stroke survivors. A systematic review by McGlinchey et al. [2] revealed effects of rehabilitative interventions in severe stroke but did not assess dose-response associations. Therefore, the review will be updated and completed to make a treatment recommendation.
Methods: A systematic review will be conducted according to the PRISMA statement and registered on PROSPERO. To identify eligible randomised controlled trials (RCTs) in English and German the Cochrane Library, Medline via PubMed, EMBASE, PEDro, CINAHL will be search between December 2018 till March 2021. Searching trial registers (ClinicalTrails.gov, ICTRP, DORIS) will help to identify ongoing RCTs since 2019. In addition, reference lists of retrieved articles will be checked for additional trials.
RCTs will be included that have enrolled severe stroke patients aged ≥18 years with physical rehabilitation interventions. Studies that recruited participants with all levels of stroke severity were included only if subgroup analysis based on stroke severity was performed. We will exclude pharmacological and surgical interventions, as well as complimentary and non-invasive brain stimulation.
Titles and abstracts of citations obtained from the search will be examined independently by two researchers using predefined selection criteria. To examine the methodological quality of the included studies, the Cochrane Risk of Bias 2.0 tool will be used. For data extraction, two independent reviewers will follow the grid of the TIDieR-Checklist. If possible, a meta-analysis is performed for the main outcomes of motor function, functional recovery, and post-stroke complications otherwise they will be synthesized narratively.
Results: Initial results will be presented at the congress.
Conclusion: This review will show the current state of evidence for treating severe stroke patients and which modalities may have an impact on their outcome.

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eP1–034

Reliability and validity of event-related potential and Resting-state EEG in subacute stroke

M. K. Sohn, D. Yun, S. Jee, Y. W. Kim (Daejeon/KR)

Objective: The reliability of the event-related potential (visual and auditory) test is evaluated for patients with subacute stroke, and the validity of the cognitive function of the event-related potential is evaluated.
Method: We recruited 20 subacute ischemic stroke patients over the age of 19 and with an MMSE score of 11 – 26. K-MMSE (Korean-mini mental stat examination) and K-MoCA (Korean-Montreal Cognitive Assessment) of all participants were tested. The resting-state EEG and P300 wave using an auditory and visual oddball paradigm were measured at baseline (i.e., within 4 weeks poststroke) and once again in 24 hours. We calculated the brain symmetry index (BSI) and directional BSI (BSIdir) over different frequency bands (1-25 Hz, delta, theta) and delta/alpha ratio (DAR). The intra-rater reliability and validity of the P300 latency, amplitude, BSI, BSIdir and DAR were measured by intra-class correlation (ICC) analysis and by Pearson's correlation coefficient analysis, respectively.

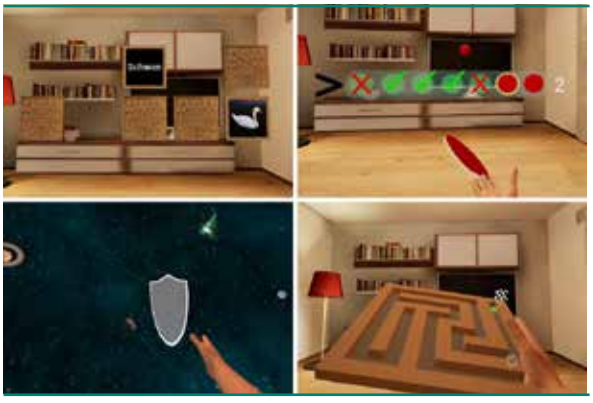
Result: P300 latency showed good reliability (ICC = 0.79, $p < 0.05$). As to P300 amplitude, reliability was good with ICC of 0.76 ($p < 0.05$). The intra-rater reliability of BSI, BSIdir and DAR was good ICC, (0.81, 0.80, 0.77, $p < 0.05$), respectively. Pearson correlation analysis demonstrated that the BSI, affected DAR was significantly correlated with the K-MMSE score (Pearson $r = 0.71$, $r = 0.64$, $p < 0.05$) respectively. P300 amplitude, latency, BSI, BSIdir and DAR were correlated with K-MMSE and K-MoCA, especially affected DAR and BSI showed strong validity.
Conclusion: P300, BSI, and DAR are consistent and highly related to the patient's cognitive function, so it can be used as an electrophysiological function test for stroke patients. It is necessary to clarify the relevance of stroke patients to functional recovery.

eP1–035

Rehago – Digital mirror therapy in virtual reality An explorative data collection with 48 patients

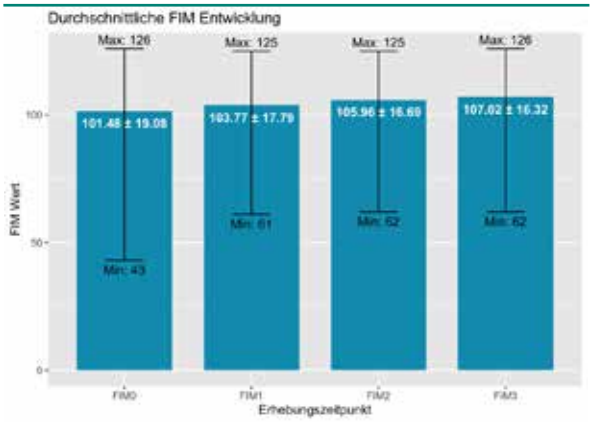
C. H. Chen, T. Kreidler, A. Ochsenfahrt, P. Zajac, J. Höfener (Leipzig/DE)

Introduction: Stroke is one of the major causes of death worldwide and usually leads to long-term disabilities such as hemiparesis or hemiplegia. To help patients accelerate their recovery process, it is important for them to receive proper rehabilitation as soon as possible after the onset to have a better prognosis. Mirror therapy is one of the long-existing therapeutic concepts with proven effect supported by clinical evidence. The DiGA »Rehago« integrates the concept of mirror therapy and gamified training into virtual reality (VR) to provide the opportunity for patients to conduct rehabilitative exercises using the VR goggles in a home-based environment.
Objectives: To better understand the effectiveness and the feasibility of digitalized mirror therapy using virtual reality (VR) technology, a pilot study was conducted with the DiGA »Rehago«.
Patients and methods: 53 patients participated in this pilot study. At the time of evaluation, 48 patients had completed 42 days of training with Rehago. 5 patients dropped out of the study due to personal reasons. Patients received VR goggles with the pre-installed Rehago digital therapy program. The recommended daily exercise duration was 30 minutes, 5 days per week. An assessment with the Functional Independent Measurement (FIM) and EQ5D-5L questionnaires were performed by the patients' therapists every 14 days. In addition, the subjects kept a diary of their training sessions. The results of these questionnaires were sent to the ReHub GmbH for further data processing and analysis.



eP1–035. Fig. 1

Results: The results showed an average improvement of 5.54 ± 9.23 points in the FIM score, and an improvement of 7.12 ± 10.76 points in the assessed quality of life score (EQ5D-5L). The average training days per week were 4.38 days in the first week and 4.48 days in the last week. 20 (41.67 %) subjects met the recommended adherence criteria of 30 minutes of daily exercise 5 days per week over a 42-day period.



eP1–035. Fig. 2

Conclusion: A trend can be observed from the data that the stroke patients improved their FIM score, quality of life score, and adherence of training time with the DiGA »Rehago« even with the relatively limited number of subjects. Therefore, a more comprehensive study has been planned in summer 2021. In this followup study, more stroke patients will be recruited and divided into groups to fully evaluate and understand the interventional effects of »Rehago«. The results can help therapists gain a better insight of the potential and effectiveness of home-based training of their patients and adjust the training plan accordingly to help patients achieve a better outcome.

eP1–036

The efficiency of neurorehabilitation in relation to the starting time in poststroke patients

S. Kotov, E. Isakova, L. Kodzokova (Moscow/RU)

Questions: It is known that in the first 3 months after a stroke, the restoration of impaired functions occurs most actively, then the recovery rate decreases. The aim of our study was to compare the effectiveness of neurorehabilitation in the first 3 and the next 3 months of the early recovery period after an ischemic stroke (IS).
Methods: 83 patients were examined after hemispheric IS with hemiparesis of 2 – 4 points and walking disorders. Neurorehabilitation 44 started at 1 – 3 months after IS (group 1), 39 at 4 – 6 months after IS (group 2). All patients were given 10 daily exercises, including robotic mechanotherapy, physical rehabilitation. The assessment of muscle strength in the paretic leg was performed according to the Medical Research Council Scale, the quality of walking was evaluated according to the Hauser Ambulance Index in points, the walking speed – according to the 10-meter walking test in seconds.

The study of stability and equilibrium was carried out using the Berg Balance Scale. The assessment of the degree of disability and functional capabilities was carried out using the Modified Rankin Scale (MRS) and Bartel index of activities of daily living (BI).
Results: Initially, there were no statistical differences in the indicators of groups 1 and 2, except for the level of spasticity, which was higher in patients of group 2. There was an improvement in the condition of patients of groups 1 and 2, manifested in a decrease in the degree of hemiparesis, an increase in the muscle strength of the paretic limb, improved balance, improved and accelerated walking ($p < 0.001$), the differences between the groups were not statistically significant. This made it possible to increase the degree of social adaptation and reduce the degree of disability. An increase in the strength of paretic muscles was noted in 37.5% of patients of group 1, 27.6% of group 2, more pronounced progress in restoring postural stability and walking quality was noted in group 2, walking speed increased more in group 1. A decrease in the level of disability for MRS was noted in 31.2% in group 1, in 14.3% in group 2. There was a statistically significant increase in activities of daily living in patients of group 1 compared to group 2 ($p < 0.01$). Conclusion. The results of the study showed that the effectiveness of neurorehabilitation in patients after a stroke in the first 3 months after a stroke is high, in the next 3 months it remains, but statistically significantly lower. The greatest result at the early start of neurorehabilitation was achieved in terms of restoring the strength of paretic limbs and activities of daily living.

eP1–037
Characteristics of runny nose as a sequelae of stroke

S. Jee, J. E. Choi, M. K. Sohn, Y. W. Kim (Daejeon/KR)

Introduction: The objective of this study was to investigate the relationship between rhinorrhea and Stroke in patients who had a stroke.
Subjects and Methods: This study was conducted through a retrospective review of medical records and questionnaires from outpatient stroke patients from June 2020 to July 2020. The inclusion criteria were adults over the age of 19, and stroke patients who were diagnosed through CT or MRI. Patients with existing neurologic diseases or medical conditions with a life expectancy of less than one year were excluded.
All subjects completed a questionnaire about the sino-nasal outcome test (SNOT-22), and the autonomic nervous system symptoms. The Korean version of the modified Barthel index (K-MBI), Korean mini-mental state examination (K-MMSE), functional ambulatory category (FAC), and modified Rankin scale (mRS) were performed on the subjects who visited the outpatient clinic. Through retrospective medical record review, demographic data, and clinical data including the Korean version of National Institute of Health Stroke Scale (K-NIHSSS), K-MBI, K-MMSE, FAC, and mRS on admission and at discharge were collected.
Result: A total of 60 stroke patients were enrolled. Fifteen of the subjects had new rhinorrhea symptoms after the onset of stroke (rhinorrhea group), and 45 had no rhinorrhea symptoms (no-rhinorrhea group). The mean age of the rhinorrhea group and the no-rhinorrhea group were 61.20 ± 9.84 and 61.78 ± 12.89, respectively. The mean initial clinical evaluations (K-NIHSSS, K-MBI, K-MMSE, FAC, and mRS) were not different significantly between the rhinorrhea group and the no-rhinorrhea group **(Table 1)**. In the rhinorrhea group, 14 out of 15 subjects have clear rhinorrhea, and one subject filled out a questionnaire that he did not know. Eleven subjects answered that the rhinorrhea was thin and 4 had moderate viscosity. Regarding the period when rhinorrhea usually occurs, 9 subjects said that rhinorrhea appears during the meal, 4 people say that it comes out frequently, 2 people answered with other things. When the stroke lesions were divided into two categories (basal ganglia, thalamus vs others) and analyzed by the chi-square test, the relative risk of rhinorrhea in the stroke in basal ganglia and thalamus was 2.9. As a result of analyzing only patients with cerebral infarction, the relative risk increased to 6.26. The SNOT-22 score showed a positive correlation with the autonomic symptom questionnaire score in the rhinorrhea group ($R = 0.808$, $p < 0.01$). In the no-rhinorrhea group, there was also a positive correlation. But the correlation coefficient was lower than the rhinorrhea group ($R = 0.56$, $p < 0.01$).
Conclusion: The rhinorrhea that occurs after a stroke seems to be related to the location of the lesion. In the case of the lesion in basal ganglia or thalamus, the relative risk of rhinorrhea increases. The rhinorrhea symptom in stroke patients is highly correlated with autonomic nervous system symptoms.

eP1–037. Table 1: Demographic and clinical characteristics of subjects

Item	Rhinorrhea group	No-rhinorrhea group	p-value
participants, n	15	45	
Demographics			
– Sex, n (M : F)	9 : 6	31 : 14	0.527
– Age, mean±SD	61.20±9.84	61.78±12.89	0.875
Stroke, type n			0.423
– Ischemia	9	32	
– Hemorrhage	6	13	
Initial clinical evaluation, mean±SD			
– K-NIHSS	4.71±4.41	4.79±4.55	0.956
– K-MBI	61.67±21.08	55.22±24.79	0.37
– K-MMSE	18.67±8.33	20.05±8.22	0.578
– FAC	2.46±1.27	2.02±1.51	0.35
– mRS	3.58±0.99	3.57±0.83	0.967

SD standard deviation; **K-NIHSS** Korean version of National institute of Health Stroke Scale; **K-MBI** Korean version of Barthel Index; **K-MMSE** Korean Mini Mental State Examination; **FAC** Functional Ambulatory Category; **mRS** modified Rankin Scale; * $p < 0.05$

eP1–038
Motor and post-stroke neurorehabilitation in eight months: a case report

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Introduction: Stroke is a condition that affects the blood supply, oxygen and supplies that keep the brain fully functioning. can affect one or more areas of the brain, and neurons, cells that make up the brain, may end up dying if the stroke is not treated as quickly as possible. Since neurons do not multiply like other cells in the body, the death of one of them due to stroke can generate sequelae for the individual, since the function of that cell cannot be performed by another. In general, the first three months after the stroke occur are

essential to evaluate the patient's recovery and improve their general condition.

Case Report: Pacient, 54 years old, woke up with central facial paralysis, disoriented in time and space. She was immediately taken to the emergency room in a reference hospital, where she was diagnosed with an ischemic stroke and treated. After four days in the intensive care unit, she was discharged from hospital. The sequel was speech difficulty and a mild form of depression, then the patient started the neurorehabilitation with physical therapy four times a week. After eight months of the stroke episode, she speaks perfectly, as before, and the depression has improved.

Discussion: A stroke causes a dynamic process of repairing and remodeling the remaining neural circuits, and this process is shaped by behavioral experiences. The appearance of motor impairment simultaneously creates a powerful incentive to develop new compensatory ways of performing daily activities. Compensatory movement strategies that are developed in response to motor deficiencies may be a dominant force in the formation of neural remodeling responses after stroke and may have mixed effects on functional outcome. The possibility of selectively harnessing the effects of compensatory behavior on neural reorganization is still an insufficiently explored route to optimize functional outcome after stroke.

eP1–039

Impact of rhythmic transcranial and multilevel magnetic stimulation on the H-reflex in post-stroke patients

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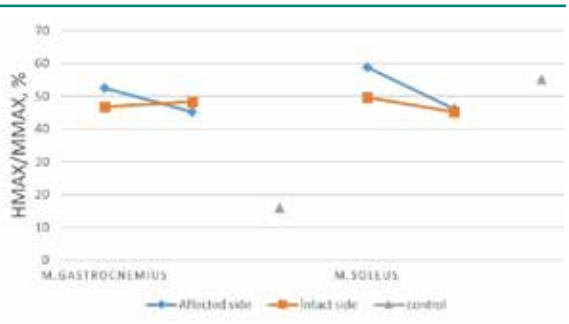
Question: Measuring changes in the excitability of a spinal neuron is possible by measuring the amplitude of the H-wave, and the calculation of the ratio H_{max}/M_{max} is practically an accurate indicator that shows the frequency and number of excitatory alpha motoneurons by the activity of the descending tract. The investigation aimed to study the H-reflex in post-stroke patients under the influence of multilevel and transcranial magnetic stimulation.

Methods: The study included 102 stroke patients admitted in the early, late, and residual periods of recovery after a stroke at the age of 34 to 81 years. To study the H-reflex, EMG stimulation of the tibial nerve in the popliteal fossa was performed. Surface electrodes were placed at the motor points of the medial gastrocnemius and soleus muscles. The parameters of the M-response and the H-reflex were studied: excitation threshold, latency, maximum amplitude, the ratio of the maximum amplitude of the H-reflex to the maximum amplitude of the M-response – H_{max}/M_{max} before and after magnetic stimulation in two groups (the first group - multilevel magnetic stimulation and the second group - transcranial magnetic stimulation (TMS)).

eP1–039. Table 1: Average indices of H-reflex and M-response (n = 102)

	Indicators	m.gastrocnemius		m.soleus	
		1	2	1	2
H-reflex	Threshold, mV	108,0 ± 7,6 *	109,6 ± 6,9 *	101,8 ± 6,9 *	91,6 ± 60 *
	Control	48,8 ± 2,3		46,5 ± 2,9	
	Latency, ms	32,1 ± 0,3 *	32,6 ± 0,4 *	32,1 ± 0,3	32,6 ± 0,4
	Control	29,4 ± 0,3		30,5 ± 0,5	
	Amplitude, mV	3,5 ± 0,4 *	2,7 ± 0,3 *	3,3 ± 0,3	2,7 ± 0,3
	Control	1,2 ± 0,2		2,9 ± 0,4	
M-response	Amplitude, mV	7,0 ± 0,5	7,8 ± 0,5	6,9 ± 0,5	7,8 ± 0,5
	Control	7,8 ± 0,5		5,2 ± 0,5	
	Hmax / Mmax,%	49,8 ± 5,0	34,9 ± 3,5	45,6 ± 4,0	32,2 ± 3,2
	Control	15,9 ± 3,3		55,0 ± 1,1	

Note: 1- indicators from the affected side, 2- indicators from the intact side; * - the reliability of the difference, calculated in relation to the control group ($p < 0.05$) ; control group (M±m , n=20, age 17-60 years)



eP1–039. Fig. 1: Average indices of H-reflex and M-response (n = 102)

Results: There was a significant ($p < 0.05$) increase in the threshold of the induction of the H-reflex in comparison with the control values from both muscles **(Table 1)** both on the affected and on the intact side. Average latency indices of the H-reflex slightly deviated upward as in the study of m. gastrocnemius and m. soleus on both sides. A significant ($p < 0.05$) increase in the amplitude of the H-reflex is observed on both sides with m. gastrocnemius, more significant from the affected side. The ratios of the maximum amplitudes of the H-reflex and the M-response with m. gastrocnemius significantly increased in comparison with the control data, and with m. soleus, on the contrary, are lowered, and more on the intact side ($p < 0.01$). After a course of multilevel magnetic stimulation, there was a decrease in H_{max}/M_{max}, and after a course of TMS, on the contrary, an increase in this parameter from the gastrocnemius muscle, however, from the soleus muscle, this indicator decreased on both sides **(Figure 1)**.

Conclusions: A study of the monosynaptic H-reflex after treatment led us to the conclusion that transcranial magnetic stimulation of the projections of the motor zones of the cortex of the affected hemisphere in patients after stroke affects the activation of the motor neuron, which is directly reflected by the direct muscle response. And also there is an effect on the reflex arc of the H-reflex, caused by irritation of the sensory fibers of the nerve and the subsequent synaptic switching of the signal from the axon of the sensitive cell to the motor neuron, which was reflected in the parameters of the H_{max}/M_{max} from the gastrocnemius muscle.

eP1–040

Effects and change progressions of transcranial direct current stimulation (tDCS) at premotor cortex versus primary motor cortex with mirror therapy following stroke: A pilot RCT

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Introduction: Transcranial direct current stimulation (tDCS), a priming role in the contemporary rehabilitation in stroke,

could augment the effects through modulating cortical excitability. Scant research compared the effects of tDCS delivered to the premotor cortex (PMC) versus the primary motor cortex (M1) combined with mirror therapy (MT) and explored the change progressions of the patients during the whole intervention.

Objectives: Investigating the effects of and progressions during the intervention of tDCS at PMC versus M1 with MT.

Materials and methods: The patients with chronic stroke were recruited and randomly allocated into one of three groups (PMC, M1, or Sham group). They received 20 intervention sessions. In each session, they firstly received anodal tDCS with 2mA at ipsilesional M1 or PMC for 20 minutes or sham stimulation depending on the group allocated, then received MT and functional task training. The clinical assessments including the Fugl-Meyer Assessment for upper extremity and joint pain (FMA-UE and FMA-joint pain) and Modified Ashworth Scale (MAS) were conducted at pre-, mid-, and post-interventions. In the neurophysiological assessment, the relative power of resting-state of electroencephalography, (EEG) in the alpha rhythm (αRP) was assessed 8 times well-distributed during the whole intervention. Non-parametric statistics were applied for within- and between-group comparisons.

Results: Twenty-five participants were recruited, and the results showed in **Table 1** and **Figure 1.** The PMC and M1 groups had significant improvements from pre- to post-treatment in the FMA-UE. However, the between-group comparisons showed no significant differences. In the first half intervention, the PMC and Sham groups had significant improvements in the FMA-UE and the PMC and M1 groups had marginally significant improvements in the FMA-joint pain from pre- to mid-term intervention. In the between-group comparisons, the changes in the FMA-joint pain were significantly different (p = 0.05) in favor of the PMC group (p = 0.06) in the post hoc analysis. In the last half intervention, the PMC group had significant improvements in the FMA-UE and MAS; and the M1 group had a marginally significant improvement in the FMA-UE from mid-term to post-intervention. The between-group comparisons showed no significant differences. Regarding the αRP, only the PMC group had significant improvements primarily shown in the last half intervention at the ipsilesional M1 and PMC areas compared to the first assessment. No significant differences were found in the between-comparisons in the EEG assessment.

Conclusion: In the clinical assessments, the PMC and M1 groups may have improvements and the PMC group may accelerate the improvements in the first half intervention. The PMC and M1 groups may also have persistent effects in the last half intervention and this result in the PMC group also could correspond to the cumulative effect in the electrophysiological level.

eP1–040. Table 1: The within- and between-group comparisons of the changes of clinical assessments

variables		groups						p^b
		PMC (n = 8)		MI (n = 9)		Sham (n = 8)		
		mean (SD)	p^a	mean (SD)	p^a	mean (SD)	p^a	
FMA-UE	pre-midterm	2.63 (2.93)	0.03*	0.44 (3.50)	0.23	4.88 (4.88)	0.04*	0.06
	midtertm-post	2.38 (2.00)	0.02*	3.11 (4.43)	0.08	1.13 (5.79)	0.21	0,99
	pre-post	5.00 (3.70)	0.01*	3.56 (4.48)	0.02*	6.00 (6.95)	0.06	0.35
FA-joint pain	pre-midterm	3.38 (7.23)	0.07	0.67 (1.00)	0.06	-0.50 (1.07)	0.19	0.05*
	midterm-post	-0.25 (1.17)	0.46	-1.11 (2.76)	0.22	0.63 (1.30)	0.20	0.24
	pre-post	3.13 (7.88)	0.32	-0.44 (3.28)	0.79	0.13 (0.35)	0.32	0.32
MAS (mean)	pre-midterm	-0.07 (0.37)	0.40	0.02 (0.44)	0.87	-0.08 (0.27)	0.87	0.87
	midterm-post	-0.23 (0.25)	0.03*	-0.17 (0.31)	0.11	-0.06 (0.19)	0.39	0.39
	pre-post	-0.30 (0.35)	0.11	-0.15 (0.33)	0.19	-1.13 (0.32)	0.26	0.26

* significant difference; **a** The Wilcoxon sign rank test; **b** the Kruskal Wallis test

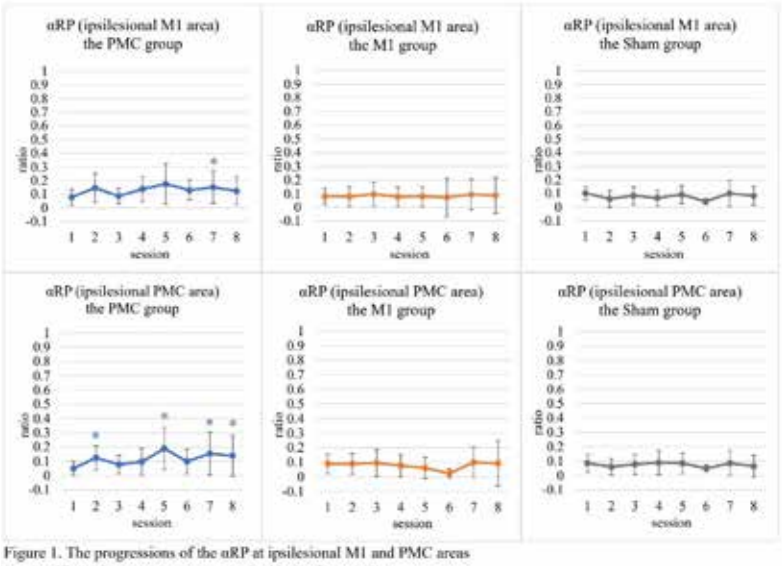

Figure 1. The progressions of the αRP at ipsilesional M1 and PMC areas
* – significant improvement compared with the first session

eP1–040. Fig.2: An example of the application use combined with reaching movements

eP1–041

The effect of anti-B-cell therapy on the restoration of motor functions in patients with neuromyelitis optica spectrum disorders

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Question: Neuromyelitis optica spectrum disorders (NMOSD) lead to severe disability and a decrease in the quality of life of patients because of repeated exacerbations. Carrying out rehabilitation measures without stopping the progression of NMOSD is ineffective, since repeated exacerbations neutralize the effects of rehabilitation. The aim of the work is to evaluate the effect of anti-B-cell therapy on the restoration of motor functions in patients with NMOSD.

Methods: We observed 27 patients with NMOSD, 9 men and 18 women aged 20 to 51 years, the follow-up period was 18-24 months. All 27 patients included in the study met the criteria for the diagnosis of NMOSD [Wingerchuk DM et al., 2015]. In 6 of them, AQP4-IgG+ was detected, in 14 MOG-IgG+, 7 patients were seronegative for AQP4-IgG and MOG-IgG. Optic neuritis was detected in 13, myelitis-in 21, cerebral syndrome-in 20, hipotalamic syndrome-in 9, stem syndrome-in 4, area postrema syndrome-in 1. Treatment regimen: the first course (induction therapy) – intravenous infusions of rituximab 1000 mg on day 1 and 15, the second and subsequent courses (maintenance therapy) – intravenous infusions of rituximab 1000 mg once every 6 months. The Expanded Disability Status Scale (EDSS) was used to assess the level of disability. Physical rehabilitation and exercises on robotic training devices were used to restore motor functions.

Results: During the 18-month follow-up period, 2 clinical exacerbations were registered in 27 patients with NMOSD, 1 in a patient with AQP4-IgG+ and 1 in a patient with MOG –

IgG+. The average annual number of exacerbations before the start of therapy was (M ± σ) 0.6 ± 0.3. The average annual number of exacerbations 18 months after the start of therapy significantly decreased to 0.07 ± 0.27 ($p < 0.0001$). There was no significant change in the level of EDSS, before the start of therapy, the indicator was (Me [Q1; Q3]) 4.5 [3.25; 6.0], 18 months after the start of therapy 4.0 [3.0; 5.75] ($p = 0.679$). The disability rate did not increase during the follow-up period, and in patients seronegative for AQP4-IgG and MOG-IgG, it decreased slightly, but statistically significantly. Conclusions. As a result of the study, it was revealed that anti-B-cell therapy in patients with NMOSD led to a significant decrease in the average annual number of exacerbations, which made it relevant to carry out rehabilitation measures in patients with NMOSD. The use of methods of physical rehabilitation in patients without exacerbations allowed not only to stabilize, but also to reduce the severity of motor disorders.

eP1–042

Sleep-related breathing disorders after stroke

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Introduction: Sleep-disordered breathing encompasses a broad spectrum of sleep-related breathing disorders (SBD), including obstructive sleep apnea (OSA), central sleep apnea, as well as sleep-related hypoventilation and hypoxemia. Of these, OSA is the most common in all ages. Sleep apnoea has been independently associated with increased risk of stroke. On the other hand, SBD is highly prevalent after stroke and is associated with poor recovery, longer hospitalization, higher mortality, worse functional and cognitive function, and with an increased risk of recurrent stroke.
Objectives: To investigate the prevalence of SBD among subacute stroke patients and to analyse its association with stroke characteristics and functional outcome [Functional Independence Measure (FIM)].
Patients and methods: Cross-sectional study including stroke patients admitted in a rehabilitation center between January 2019 and May 2021 that performed PSG type 3 (Apnealink, Resmed®). All patients were observed and oriented by a Pulmonologist.
Results: A total of 57 patients were included. Most patients were male (n = 41, 71.90 %), aged 63.03 ± 9.91 at the time PSG was performed. Thirty (52.60 %) presented body mass index (BMI) ≥ 25kg/m^2 at admission. Most strokes were ischemic (n = 46, 80.70 %) and small-vessel occlusion (n = 20, 41.70 %) and large-artery atherosclerosis (n = 15, 31.30 %) were the most representative subtypes. Posterior circulation was the most commonly affected vascular territory (n = 17, 35.40 %). PSG was performed 55.00; 14.00 days after stroke episode and SBD was seen in 42 (73.70 %) patients, mostly men (n = 29, 69.05 %), with OSA being the most common disorder (n = 22, 52.40 %). Four patients (7.00 %) had previous OSA and this diagnosis was confirmed in 3 of them. Considering the 3 patients with previous stroke history, 2 of them presented BSD. There were no statiscally significant differences between SBD diagnosis and sex ($p = 0.517$), age at PSG ($p = 0.062$), stroke type ($p = 0.079$), ischemic stroke etiology ($p = 0.310$), previous stroke history ($p = 1.000$), and dyspaghia at admission ($p = 0.730$). BMI ≥ 25kg/m^2 was associated with SBD diagnosis ($p = 0.024$) but not with its severity. In constrast, ischemic stroke was associated with a higher number of severe sleep apnoea ($p = 0.041$); all SBD detected in hemorrhagic stroke patients were moderate; and the only case detected among patients with hemorrhagic transformation after ischemic stroke was mild. Total discharge FIM was not different in patients with SBD ($p = 0.971$) and were independent from SBD subtype ($p = 0.931$) and severity ($p = 0.945$).
Conclusion: Most stroke patients presented sleep apnoea. Timely diagnosis and proper treatment seem to be associated with a functional outcome not significantly different from those with no SBD, regardless of sleep apnoea severity. Whether being a cause or a stroke consequence, SBD screening should be performed, considering sequelae and functional impact, and for recurrent stroke prevention.

eP1–043

Immediate effect of the gait imagery and its more demanding option on the lower limbs muscle activity and postural stability in stroke patients: a pilot study

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Introduction: The main goal of rehabilitation of stroke patients is to achieve their independence and restore functional ability in everyday activities. According to current studies, the technique of the motor imagery can be used to fulfill this goal, among other techniques. Motor imagery is defined as a cognitive process in which an individual imagines that he is performing a movement without actually performing it.
Objectives: The aim of the presented pilot study is to find out what changes in the activity of selected lower limb muscles and postural stability occur in the gait imagery and its more demanding option (gait on the line imagery) in stroke patients.
Patients and methods: The pilot study included 10 subacute stroke patients (< 3 months) with a Movement Imagery Questionnaire-Revised second version score of ≥ 3 (good motor imagination). Muscular activity of the hemiparetic and healthy lower limb (rectus femoris – RF, biceps femoris – BF, gastrocnemius medialis – GM and tibialis anterior – TA) and postural sacral deflections were measured using an IMU sensors Trigno (Delsys Inc., Boston, MA, USA), in the following situations: at rest (without imagination) and further with the kinesthetic gait imagery/gait on the line imagery. Electromyographic and accelerometric data were statistically processed in Statistica 13.0 (TIBCO Software Inc., Palo Alto, CA, USA).
Results: There was no significant change in postural deviations in any of the tested situations during gait imagery and gait on the line imagery. There was a significant decrease in BF and GM ($p < 0.05$) in the hemiparetic lower limb, when comparing rest and the gait imagery/gait on the line imagery. In the healthy lower limb, a significant decrease in muscle activity ($p < 0.05$) was observed in all muscles except GM in the same comparison.
Conclusion: According to the results of our study, the imagery of known movement (gait) and the imagery of its more demanding option (gait on the line) did not lead to significant changes in postural stability in stroke patients. However, in both types of imagination there was a change in

muscle activity in terms of decrease, which can be explained by the nature of the inhibitory effect of some areas of the cortex and cerebellum during the initiation of motor imagery. Muscular activity in BF and GM hemiparetic limbs is probably associated with stabilization of the lower limb during the standing phase of gait cycle. While the muscle activity pattern (TA, RF and BF) on healthy limb seems to indicate an effort to step forward.

eP1–044

Diagnostic imaging methods in disc herniation

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Introduction: Based on recent studies about disc hernia it is noted that the factors that affect its appearance are numerous. In general these factors vary ranging from disturbing the anatomic integrity, protrosiones, over ageing, trauma and infections.
Disc hernia is a result of rupturing of the tissue that separates the vertebral bones of the spinal column.
A small-sample study examining the cervical spine in symptom-free volunteers has found focal disc protrusions in 50 % of participants, which suggests that a considerable part of the population can have focal herniated discs in their cervical region that do not cause noticeable symptoms.
There is a relation between disturbance of the content of integrity of the intervertebral disc and methods of diagnostic imaging that are important in detecting hernis disc. Degenerative changes occur in the MRI and CT images where the protrusion is included.
Purpose: The purpose of this study is to analyze the potential relation between abnormalities of the spinal disc caused from different factors and contemporary imaging methods in the diagnosis of disc hernia.
Material and methods: In this article there were used different literatures from 13 scientific publications obtained from the PubMed medical libraries, eMedicine, and Wikipedia that have been published from 2005 up to 2012.
Results: In this study we expect to achieve the best results of MRI in the prompt diagnosis of pathologies of disc hernia.
Conclusion: Obtained images with MRI offer better performance in diagnosing diseases of disc hernia, and they open a large window to the sophistication of this method in the diagnosis of disc hernia.
Key words: disc hernia, diagnostics, computerized tomography, magnetic resonance.

eP1–045

Utilizing diffusion and magnetization transfer MRI in predicting T2 spinal cord signal change in compressive cervical myelopathy: preliminary report

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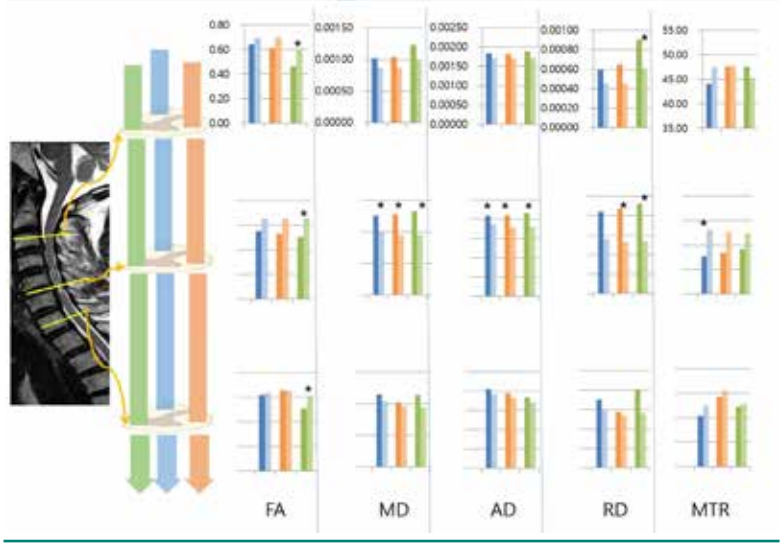
Introduction: There is discrepancy between conventional MRI and clinical findings in compressive cervical myelopathy. Diffusion weighted (DW) and magnetization transfer (MT) imaging have been utilized to detect unrevealed pathology of spinal cord on conventional MRI.
Objectives: In this study, we aimed to test two sensitive modalities, the diffusion image and the magnetization transfer (MT) image, whether each has some benefit to others in detecting pathology of spinal cord in compressive cervical myelopathy patient.
Patients and methods: Eight patients with clinical symptom or sign of compressive cervical myelopathy were enrolled. Patients with spinal cord signal change on conventional T2 MR were assigned to group I (n = 3) and patients without spinal cord signal change were assigned to group II (n = 5) respectively.
For clinical manifestation, Douleur Neuropathique 4 (DN4), modified Japanese Orthopaedic Association (mJOA) score, ASIA motor and sensory score, hand grasp power and lateral pinch power were collected.
Compression ratio was measured with MR image. We performed column-specific (dorsal, lateral and anterior) analysis at the most compressed lesion level, above the lesion level (C2/3) and below the lesion level (C7/T1). Fractional anisotrophy (FA), mean diffusivity (MD), axial diffusivity (AD), radial diffusivity (RD) were extracted from diffusion image while magnetization transfer ratio (MTR) was extracted from MT image.

eP1–045. Table 1: Compression ratio and clinical measures in each group

	Group1	Group2	p-value
Age	76.00 ± 6.08	71.20 ± 5.40	0.393
Compression ratio	0.35 ± 0.05	0.48 ± 0.08	0.039*
DN4	4.00 ± 3.46	4.00 ± 0.71	0.571
mJOA	14.00 ± 2.65	15.80 ± 0.45	0.250
ASIA motor score	91.67 ± 14.43	97.00 ± 4.58	1.000
ASIA sensory score	193.67 ± 51.68	221.00 ± 3.32	1.000
Hand grasp power, Lt	52.22 ± 16.36	66.80 ± 12.48	0.143
Hand grasp power, Rt	60.89 ± 12.89	72.33 ± 5.85	0.250
Lateral pinch, Lt	15.56 ± 7.12	16.50 ± 2.93	0.786
Lateral pinch, Rt	15.67 ± 5.77	19.07 ± 1.57	0.393



eP1–045. Fig. 1: MR metrics from dorsal (blue), lateral (orange), and anterior (green) column in above, at and below the lesion level

Results: There was no significant difference between groups in all clinical measures while compression ratio was lower in group I **(table 1)**. In respect to diffusion metrics, FA value from ventral column was lower in above, at, and below the lesion level. MD and AD values from dorsal, lateral and anterior column were higher in group I in at the lesion level. RD value from dorsal column was higher in above and at lesion level, and value from lateral column was higher in at lesion level respectively. MTR from dorsal column in at lesion level was lower in group I. Results are schemed in **figure 1**.
Conclusion: Clinical symptom or sign cannot predict spinal cord signal change in compressive myelopathy. MD and AD from dorsal, lateral and anterior column are sensitive at lesion level. FA and RD from anterior column were sensitive in above and at the lesion level. While MTR from dorsal column at the lesion level were sensitive to predict spinal cord signal change. DW and MT image together can be utilized to detect subclinical change in compressive cervical myelopathy.

eP1–046

Alteration of white matter in patients with central post-stroke pain

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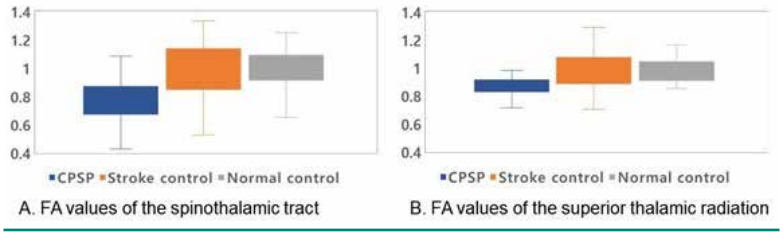
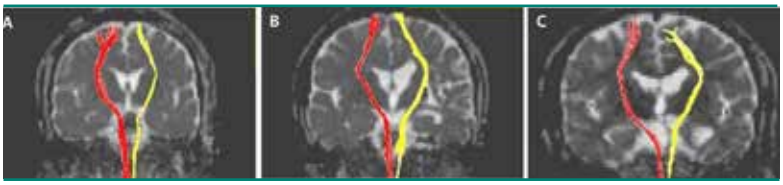
A stroke may be followed by central post-stroke pain (CPSP), which is characterized by chronic neuropathic pain. The exact mechanism has not yet been fully uncovered. We investigated alterations in the white matters in patients with CPSP compared with stroke patients without CPSP and normal controls. Our retrospective cross-sectional, case-control study were assigned to three groups: CPSP; stroke patients with CPSP (n = 17), stroke control; stroke patients without CPSP (n = 26), normal control; normal subjects (n = 34). The investigation of white matter for CPSP were focused on the values of fiber numbers (FN) and fractional anisotrophy (FA) for spinothalamic tract (STT), anterior thalamic radiation (ATR), superior thalamic radiation (STR) and posterior thalamic radiation (PTR), and corticospinal tract (CST), were measured separately. The FA for the STT and STR of the CPSP group were lower than those for the stroke control and normal control groups **(Figure 1, 2, 3)**. There were no differences in the FA values of STT and STR between the stroke control and normal control groups. The FA of CST and ATR did not differ between the CPSP and stroke groups, but both differed from the normal control. The FA of PTR in the stroke control group differed from the normal control but not from the CPSP group. The FN of CST, STT, ATR, and STR for the CPSP and stroke control groups did not differ from each other, but both differed from those of normal controls. FN of PTR did not differ between the CPSP and normal control groups. The alterations in the spinothalamic tract and superior thalamic radiation after stroke would be play a role in the pathogenesis of CPSP.



eP1–046. Fig. 1: Normalized fractional anisotropy (FA) values of the spinothalamic tract and superior thalamic radiation. The median values with quartiles are shown as lines. For all values, the rectangular shape shows the range between the first and third quartiles. The FA value of STT in the CPSP group was lower than those in the stroke control and normal control groups (left, p-value < 0.001). The FA value of STR in the CPSP group was lower than those in the stroke control and normal control groups (right, p-values 0.03, 0.01, respectively)

eP1–046. Fig. 2: Representative diffusion tensor tractography images of the spinothalamic tract in typical subjects from the (A) CPSP, (B) stroke control, and (C) normal control groups. The non-affected tract is shown in red, and the affected tract in yellow



eP1–046. Fig. 3: Representative diffusion tensor tractography images of superior thalamic radiation in typical subjects from the (A) CPSP group, (B) stroke control, and **(C)** normal control groups. The non-affected tract is shown in red, and the affected tract in yellow

eP1–047

Non-linear dose response effect of cathodal transcranial direct current stimulation on muscle strength in young healthy: a randomized sham-controlled study

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Introduction: Transcranial direct current stimulation (tDCS), a non-invasive brain stimulation has been known to modulate cortical excitability in a polarity-dependent manner. Recent studies have reported the non-linear relationship between intensity of tDCS and the induced cortical excitability response in human brain. Nonetheless, there is no reported of different intensity of cathodal tDCS on clinical outcome.
Objectives: This study aimed to investigate the immediate effect of different intensities of cathodal tDCS on muscle strength in healthy adults.
Materials and Methods: Thirty healthy participants mean aged 21.2 (± 1.97) years were recruited and randomly allocated into 3 groups (1.5 mA cathodal tDCS, 2 mA cathodal tDCS and sham tDCS). All participants and assessors were blinded from participant allocation. Cathodal electrode (35 cm2) was applied over the primary motor cortex (M1) of the dominant hemisphere, the reference electrode was applied over the contralateral supraorbital area. Participants received real tDCS for 20 minutes and sham tDCS for 30 sec. Maximal isometric torque (MIT) of elbow, wrist, hip, knee, and ankle muscle was measured on both sides by a specific hand-held dynamometer before and after tDCS.
Results: Our results showed that 1.5 mA of cathodal tDCS resulted in a decrease of strength for all muscles of the dominant limbs, while 2.0 mA of cathodal tDCS increased most of muscle strength of both sides over sham tDCS.
Conclusion: It seems likely that cathodal tDCS has a non-linear effect on muscle strength. Higher intensity (2 mA) was led to an increase, rather than decrease muscle strength. This should be warrant in clinical use in further study.

eP1–048

A controlled study of low frequency repetitive transcranial magnetic stimulation in the upper limb rehabilitation of chronic stroke patients

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Introduction: Only 5% to 20% of hemiplegic stroke patients show complete functional recovery at 6 months, with impaired upper limb function impacting on quality of life. Following a stroke, inhibition of the ipsilesional motor cortex by the contralesional motor cortex can occur through a transcallosal pathway. It was hypothesized that following down-regulation of the contralesional motor cortex by low frequency navigated repetitive transcranial magnetic stimulation (rTMS), the paretic hand would improve. Previously, a variety of regimes of non-invasive stimulation of the contralesional motor cortex have shown variable success rates. Since the effect of rTMS is immediate, the rationale was to follow it with immediate rehabilitation therapy (RT). It was estimated a thrice-weekly, six week course would be sufficient to consolidate functional gain.
Objective: The primary objective was to investigate whether a course of rTMS to the non-affected hemisphere in conjunction with upper limb RT could improve paretic hand function in chronic stroke patients. Secondary objectives were to note adverse effects and assess the feasibility of incorporating rTMS in clinical practice.
Patients and Methods: This was a self-controlled pilot study of 12 patients with chronic stroke (6 to 180 months) and residual severe functional impairment in the upper limb Fugl-Meyer (FMUE) score <27 (mean 11, range 6 – 26) and previous rehabilitation. They first completed 6 weeks of RT only, to the upper limb, then 6 weeks of rTMS with RT. Prior to rTMS, patients underwent 10 minutes of exercise; then received 15 minutes of 1Hz rTMS targeted to the cerebral representation of the extensor digitorum communis in the motor cortex (M1) of the intact hemisphere; followed by 50 minutes of RT. Patients underwent a total of 18 sessions. The FMUE was used to evaluate progress.
Results: One patient, taking baclofen, experienced a first and only epileptic seizure approximately 8 hours after rTMS. The FMUE scores before and after the rTMS course improved (mean change 3.92, range 0 - 15) with statistical significance of $p < 0.01$ in the Wilcoxson sign rank test for paired data, compared to no significant improvement after RT only. 4 patients had an improvement of 5 points or more, an indication of clinical improvement. There was anecdotal evidence of an effect on neural networks outside the targeted area region, in particular improvement in speech and trunk mobility.
Conclusion: Neuromodulation of the intact hemisphere, combined with rehabilitation therapy can improve arm function in patients with chronic stroke. Caution is required with medication reducing the epileptogenic threshold. There is a suggestion that rTMS of the motor cortex affects networks beyond the target area. rTMS was easily incorporated into the rehabilitation program. Further research to identify which patients benefit is necessary.

eP1–049

High frequency rTMS to Cz can improve gait apraxia in patients with Incidental Cerebral Small Vessel Disease

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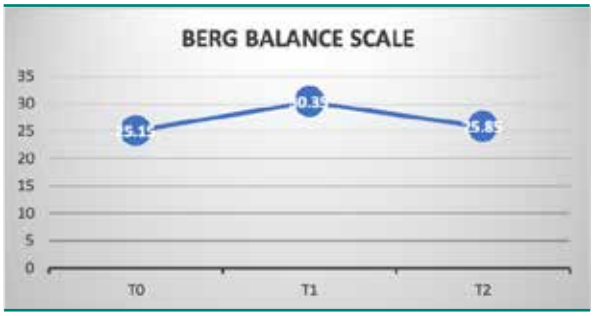
Question: Can high frequency rTMS to Cz improve gait apraxia and other manifestations of incidental cerebral small vessel disease?
Methods: 40 patients are included, with MRI documented small vessel disease, symptomatic by either gait or cognitive or urinary symptoms or all. Randomized to 20 active and 20 sham groups, Active group received 6 sessions of high frequency Cz of intensity of 110% Motor Threshold. Sham group received 6 Sham sessions. Baseline line demographic data, vascular risk factors, radiological scales (Fazekas and Global cortical atrophy scale) were done to all patients, Baseline, post-sessions and 1 month follow up assesments were done regarding gait (10 Meter walk test, Minibest, Berg Balance test), cognitive (FAB, Addenbrooke's test) and Urinary symptoms (ICIQ). Baseline and post-sessions IL-1B Levels were withdrawn from all the patients.
Results: Comparing active group to sham group. Active rTMS has statistically significant improved the Minibest and Berg



eP1–049. Fig. 1

eP1–049. Fig. 2

eP1–049. Fig. 3

Balance test (P < 0.001) decreased the 10 Meter walking test velocity (10 MWT) and maximum 10 MWT velocity results (P < 0.001) improved FAB scores (P < 0.001) and Addenbrooke's.
Conclusions: High frequency Cz applied rTMS sessions can improve gait apraxia, in addition to cognitive and urinary performance in patients with small vessel disease.

eP1–050

The implementation of a locomotion program reflex according to Vojta produces short-term automatic postural control changes in patients with multiple sclerosis – A pilot study

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Objective: To examine the effectiveness of a Vojta locomotion reflex program as short-term automatic postural control in patients with Multiple sclerosis.
Design: Pre-test; post-test controlled trial.
Setting: Three physiotherapist centres within the same city.
Participants: People with Multiple Sclerosis (N = 21) able to walk 100m but unable to maintain 30-second tandem stance with arms alongside the body.
Intervention: in two consecutive weeks two interventions were conducted: Vojta group(A) and standard therapy group(B). The last one is based on balance exercises targeting core stability, Bobath concept and sensory strategies. In the Vojta group (n12) 5 sessions were conducted for a duration of 2 weeks and the same was realised on the standard group (n9). In addition, during the study, a daily activity was prescribed in both groups: Vojta exercise during 20 minutes for group A and walking for 20 minutes in group B.
Main Outcome Measures: The variables tested were: Berg scale, 6m Tandem test, 10m Walk and Core Activation were measured in the 1st session (pre and post) then at the end of the study 2 weeks later.
Results: Intervention A had significant results in contrast to intervention B in Berg test when referred to equilibrium variables (p = 0.026) and Tandem (p = 0.01). In the 10m walk test both interventions were significant: p = 0.00 in group A, p = 0.038 in group B. In addition, an association was found between the variable Core activation and the main equilibrium variable (Berg test) in the intervention A.
Conclusions: The results show that the Vojta therapy has a short-term effect on the improvement of automatic postural control in people with MS compared to a standard therapeutic procedure.
Keywords: Vojta Therapy; Core stability; multiple sclerosis; postural balance; automatic postural control.

eP1–051

The effects of simultaneous speech practice with rTMS on dysarthric patients after stroke

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Introduction: Recovery from the dysarthria following a stroke is an important factor for quality of life. Previous studies proved repetitive transcranical magnetic stimulation (rTMS) had a treatment effect on the dysarthria caused by a stroke. And other studies showed that simultaneous exercise of the target muscle which was stimulated by rTMS had a better effect than only rTMS did. Thus, we hypothesized that if patients practice speech simultaneously during rTMS session, the patients would have better outcome.
Objectives: The aim of this study is to evaluate whether simultaneous speech practice with rTMS has an additional effect on improving dysarthria in stroke patients.
Materials and Methods: This study is a prospective, randomized, controlled trial. We enrolled 16 stroke patients with dysarthria. We found hot spot, which will be stimulated during rTMS sessions, by searching for the evoked motor potential of the orbicularis oris muscle on the non-affected side. And all patients got rTMS treatment at a low frequency, 15 minutes per day for a total of 10 times. In simultaneous group, the patient practiced speech of Korean vowels and consonants during rTMS sessions. But only rTMS group, the patients did nothing during rTMS sessions. The patients in both groups received speech therapy for 20 minutes, 3 days a

eP1–051. Table 3

	Study group (n=8)	Control group (n=8)	P-value
Age	62.00±16.42	55.50±17.51	0.445
Sex (Male/Female)	5/3	6/2	0.445
Lesion (Left/Right)	3/5	4/4	0.534
K-MBI	55.00±16.92	48.83±26.31	0.628
MMSE	25.57±3.10	22.50±3.83	0.138
AMR-Pa	29.95±7.93	32.73±5.90	0.534
AMR-Ta	30.58±7.23	30.85±4.62	0.836
AMR-Ka	32.81±8.87	34.21±9.68	0.836
SMR-PaTaKa	11.16±3.27	10.58±3.12	0.731
U-TAP (Consonant)	89.84±18.27	97.16±4.49	0.628
U-TAP (Vowel)	92.85±18.89	98.33±4.08	0.987
MPT	14.75±7.45	13.93±8.84	0.836

eP1–051. Table 2

	Study group (n=8)			Control group (n=8)		
	Pre	Post	P-value	Pre	Post	P-value
AMR of Pa	29.95±7.93	35.52±7.90	0.027*	32.73±5.90	34.30±6.94	0.600
AMR of Ta	30.58±7.23	33.68±8.26	0.018*	30.85±4.62	33.53±7.76	0.043*
AMR of Ka	32.81±8.87	33.65±7.41	0.600	34.21±9.68	29.80±8.74	0.144
SMR-PaTaKa	11.16±3.27	11.71±1.30	0.018*	10.58±3.12	12.11±4.27	0.043*
U-TAP (Consonant)	89.84±18.27	97.00±5.50	0.109	97.16±4.49	94.93±5.80	0.581
U-TAP (Vowel)	92.85±18.89	97.14±7.55	0.317	98.33±4.08	100.00±0.00	0.677
MPT	14.75±7.45	21.57±10.49	0.499	13.93±8.84	22.11±12.09	0.028*

eP1–051. Table 3

	Study group (n=8)	Control group (n=8)	P-value
Δ AMR of Pa	2.57±1.61	1.56±9.32	0.731
Δ AMR of Ta	3.10±2.43	2.68±6.73	0.836
Δ AMR of Ka	0.84±3.60	-4.41±6.23	0.138
Δ SMR-PaTaKa	1.71±1.30	1.52±1.65	0.534
Δ U-TAP (Consonant)	7.15±13.41	0.40±4.76	0.366
Δ U-TAP (Vowel)	4.28±11.33	0.00±0.00	0.731
Δ MPT	6.22±5.70	8.18±4.16	0.366

week for 2 weeks. The speech therapist measured alternative motion rate (AMR), sequential motion rate (SMR), maximal phonation time (MPT), Urimal test of articulation and phonology (UTAP) accuracy before and after intervention.
Results: Sixteen patients were enrolled in this study, and three patients were excluded due to old ischemic history and the patient's denial. Among 13 patients, 7 patients were allocated to simultaneous speech practice group (Simultaneous group) and other 6 patients were to only rTMS group. There were no significant differences in the baseline characteristics and initial values between the two groups. After interventions, both groups showed improvement in all measurements. Andin Simultaneous group, there were significant differences between before and after treatment in AMR of Pa, AMR of Ta, SMR. And in Only rTMS group, there were significant differences between before and after treatment in AMR of Ta, SMR, MPT. But the changes in all measurements between groups had no significance.
Conclusion: Even though the results showed that the changes after intervention between Simultaneous group and Only rTMS group in AMR, SMR, U-TAP accuracy and MPT had statistically no significance, we found the tendency that Simultaneous group had a better outcome than Only rTMS group in AMR and SMR. So, further study in a larger population is required to confirm this tendency.

eP1–052

Pilot study to observe changes in independence in everyday life through intensive wheelchair mobility training in wheelchair-dependent children

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Introduction: It is often observed that children have to learn to use a wheelchair with difficulty and lack the necessary self-confidence to deal with it in everyday life. For this reason, a wheelchair course was set up in the Department of Neuropaediatrics of Charité in spring 2021. The parcours has various surfaces and obstacles and on which children can learn and intensify their handling of the wheelchair in a protected setting. Currently, only a five-day course is offered by the health insurance companies. Within the scope of the present study, an intensified weekly training course is to take place over 3 months and the success of the treatment is to be compared with the standard method. They should feel for themselves that they can overcome obstacles in the literal sense and learn to master their everyday life better in the future. They will become less dependent on help from others and hopefuly learn to accept their disability better.
Method: The study participants are randomly assigned to the case or control group. The case group receives intensified weekly wheelchair mobility training over 3 months, while the subjects in the control group complete the standard five-day course. All study participants will be evaluated at three defined time points: at the start of treatment, at the end of training (1 week or three months) and six months after the end of training, using standardized physiotherapeutic test methods as described below.
The following standardized physiotherapeutic tests are used in the context of wheelchair training:

- Independence questionnaire: PEDI-CAT
- Quality of life questionnaire KINDL
- Strength: SKALA
- Trunk Control Measurement Scale
- Together with the participants and their parents, goals are set using the Goal Attainment Scale (GAS) and their achievement is assessed at each contact.

The study will enroll patients who will be observed over a period of 9 months and regularly tested and examined during this time. Planned start of the studies: 01.07.2021.
Hypothesis: It is expected that the results of the described examinations will lead to an improvement in independence, quality of life and participation in everyday life. This effect is not only expected for the training period, but the learned skills and self-efficacy can also be transferred to everyday life afterwards.
Discussion: Many children with neurological or orthopaedic disorders are dependent on their wheelchair in everyday life. For social participation, it is important to (be able to) operate this wheelchair independently and to be able to overcome everyday obstacles. Now, wheelchair mobility training is not a fixed offer that all children in wheelchairs have access to. We would like to expand the knowledge about the advantages of wheelchair mobility on participation in everyday life. In addition to the purely therapeutic aspects of such a course, we hope that our patients will learn to use wheelchairs in a fun and enjoyable way.

eP1–053

Acute torticollis revealing an epidural hematoma: case report

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Introduction: Torticollis is mainly due to a unilateral contracture of the muscles of the neck, and more particularly of the sternocleidomastoid (SCM) muscle.
Contractures of neurological origin are also called dystonias. They are iatrogenic (drugs), or due to damage to the central nervous system or the cervical cord which controls the tone of the cervical muscles.
Aim: Think about the different etiology in front of an acute torticollis.
Case presentation: Patient aged 2 years with no particular pathological history, no notion of trauma, vaccinated according to the national vaccination program, sent to a physical medicine and rehabilitation consultation for an isolated torticollis evolving for one day.the clinical examination objective: conscious patient afebrile no meningeal stiffness, neurological examination was normal.But in front of the acute evolution the indication of a CT was posed the latter had objectified a posterior cervical epidural hematoma.the patient was taken in charge by the team of neurosurgery and referral in our department postoperatively for additional management.
Conclusion: A child's stiff neck is a common problem. In the majority of cases, this acute torticollis is trivial, but one should not miss a hematoma or a tumor and, in the slightest doubt, carry out a paraclinical assessment to rule out the serious causes.

eP1–054

Effect of motor imagery training on motor learning in children and adolescents: A systematic review and meta-analysis

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Introduction: Motor imagery is essential in everyday life for numerous human motor activities. It refers to the mental simulation of action in the absence of any evident motor output. Motor imagery was initially used to improve athletic performance and has subsequently been suggested for the rehabilitation to promote motor re-learning. There is a growing body of literature on children's ability to perform motor imagery tasks and on the effect of MI training on motor learning at a young age.
Objective: There is an urgent need to systematically evaluate and meta-analyze the growing body of literature on the effect of a motor imagery training (MIT) in children and adolescents.
Methods: Seven databases and clinicaltrials.gov were searched. Two reviewers independently screened references and full texts, and extracted data (studies' methodology, MI elements, temporal parameters). Two studies were meta-analyzed providing the standard mean difference (SDM). Selected studies were evaluated with the Risk of Bias (RoB) and GRADE tools.
Results: 7238 references were retrieved. The sample size of the 22 included studies, published between 1995 and 2021, ranged from 18 to 136 participants totaling 934 (9 to 18 years). Studies included healthy athletes/pupils, mentally retarded adolescents, children with motor coordination difficulties or with mild mental disabilities. The motor learning tasks focused on upper, lower and whole body movements. Overall results indicated a general positive effect of a MIT compared to a control group. However, the combination of a MIT and physical practice was more successful than MIT only. Three studies applied the PETTLEP approach. Two studies could be meta-analyzed with 66 participants in total investigating the effect of MIT versus no intervention (watching videos) in young tennis players on the tennis service performance (ball stroke velocity, accuracy). SMDs for the primary outcome of the pooled studies for tennis service performance varied between 0.83 and 1.87 (95% CI ranged between 0.33 and 3.10; p = 0.001; I2 ranged between 0 and 74%; T2 ranged between 0 and 0.59). Subgroups for secondary analyzes could not be defined due to the lack of standardized evaluation at every measurement event, e.g. imagery ability was not always assessed before and at the end of an MIT.
Number of total MIT sessions varied between one and 24 with a intervention duration between one day and eight weeks. One MIT session took about three to 34 minutes while between three and 80 MI trials were performed summing up to 720 MI trials over one MIT intervention period.
RoB varied between some concerns and high risk. GRADE rating was low.
Conclusion: MI combined with physical practice might have a high potential for healthy and impaired children and adolescents. However, important reporting recommendations (PETTLEP, TIDieR, CONSORT) should be adhered to.

The systematic literature review was registered with PROSPERO: CRD42021237361

eP1–055

Factors associated with cardiopulmonary and physical fitness in children with spastic cerebral palsy

J. Choi, S. S. Yang, J. Park, M. K. Sohn (Daejeon/KR)

Objective: To investigate the factors associated with cardiopulmonary and physical fitness in children with cerebral palsy (CP).
Design: Cross-sectional, prospective single center study
Subjects: Twenty-seven children with spastic cerebral palsy, gross motor functional classification system (GMFCS) level II to IV, aged 3 – 16 years (mean: 6.6 ± 3.1).

OP1–055. Table 1: Cases

Characteristic	Number/Value*
Number of participants	27
Age at assessment	6.6±3.1 (3–16)
Gender, male/female	17/10
GMFCS level, II, III, IV	11; 10; 6

GFMCS Gross motor function classification system
*Values are mean ± standard deviation (range)

eP1–055. Table 2: Cardiopulmonary function and Body Composition according to Gross Motor Function

	GMFCS			*P*-value	
	II	III	IV	overall	Post-hoc
BIA					
Skeletal muscle mass	6.83 (2.49)	8.59 (5.95)	8.9 (3.59)	0.535	-
PBF	24.47 (5.72)	20.98 (9.11)	31.06 (14.29)	0.167	-
RT leg lean mass	1.72 (0.61)	1.99 (1.78)	2.06 (0.80)	0.657	-
LT leg lean mass	1.71 (0.59)	1.98 (1.80)	2.11 (0.84)	0.669	-
CPET					
Mean VO2/kg resting	9,24 (1.92)	13.16 (5.74)	8.57 (1.75)	0.143	-
Max VO2/kg resting	18.45 (4.20)	24.82 (10.42)	13.99 (3.08)	0.062	
Max VO2/kg exercise	27.17 (5.96)	35.72 (14.26)	24.41 (5.21)	0.200	-
BMI	16.96 (2.21)	15.44 (2.32)	17.85 (4.20)	0.263	-

eP1–055. Table 3: Correlation coefficient between Gross Motor Function and Cardiopulmonary Function and Body Composition

	GMFCS-88		
	C	D	E
BIA			
Skeletal muscle mass			
– Correlation	-0.253	-0.295	-0.3498
– p-value	0.212	0.143	0.082
PBF			
– Correlation	-0.058	-0.035	-0.064
– p-value	0.777	0.865	0.757
RT leg lean mass			
– Correlation	-0.006	-0.054	-0.119
– p-value	0.975	0.794	0.561
LT leg lean mass			
– Correlation	-0.032	-0.085	-0.149
– p-value	0.878	0.678	0.468
CPET			
Mean VO2/kg resting			
– Correlation	-0.017	-0.174	-0.071
– p-value	0.939	0.426	0.747
Max VO2/kg resting			
– Correlation	0.162	0.045	0.153
– p-value	0.462	0.840	0.486
Max VO2/kg exercise			
– Correlation	-0.011	-0.085	-0.045
– p-value	0.959	0.686	0.838
BMI			
– Correlation	-0.060	-0.023	-0.114
– p-value	0.803	0.924	0.632

Methods: The mean and peak VO(2) were obtained with cardiopulmonary exercise test (CPET) during resting and walking at 1.0 km/h on the treadmill with or without assist. Multifrequency bioelectrical impedance analysis (BIA) was conducted to assess skeletal muscle mass (SMM) and percent body fat (PBF). In addition, gross motor function measue-88 (GMFM-88) was measured.
Results: There were no significant group difference in SMM, PBF, or CPET measurements according to GMFCS level. In Univariate linear regression analysis, age and mean VO(2)/kg resting was significantly related with SMM. In multivariable analysis, only age was significantly related with skeletal muscle mass.
Conclusion: Age was only significant factors associated with muscle mass in children with cerebral palsy. In this study, gross motor function shows no significant relationship with cardiopulmonary functions. However, Further studies in larger groups are needed to delineate the factors associated with cardiopulmonary and physical fitness in children with CP.

eP1–056

Study of knowledge attitude and practice toward epilepsy among parents and care givers of children with epilepsy seen Fathalrahman Elbashir Clinic, Khartoum 2019 – 2020

M. Ismaeil (Khartoum/SD)

Background: Epilepsy is one of the most common pediatric neurological disorders. Lack of awareness regarding epilepsy among the general population influences the lives of epileptic children.
Objective: The aim of this study was to assess the knowledge, attitude and practice towards epilepsy in parents and care givers of children with epilepsy in Fath al-Rahman al-Bashir clinic.
Methods: 120 parents and care givers were included in the Case finding study conducted at Fath-al-Rahman al-Bashir clinic, Khartoum from (September 2019 – January 2020). An interviewing questionnaire was designed to collect data from the participant families.
Results: Total of 120 parents and care givers were interviewed 48.3% were mothers, the age of children ranged from 1 – 18 years. 41.7%, believed that epilepsy is caused by evil eye. About 85% said epilepsy is curable disease. 91.6% think the best treatment is antiepileptic drugs, but 51.6% still believed in non-medical treatment usually traditional helps and 100% use holy Quran as a method of religious treatment for epilepsy.
Conclusion: Many parents and care givers have significant misconceptions, negative attitudes, and poor practices toward epilepsy. These correlated with their educational levels and had significant implications on the medical management. Level of knowledge and understanding among parents and care givers of children with epilepsy needs improvement.

eP1–057

Some aspects of rehabilitation of patients with trigeminal neuralgia

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Summary: Being one of the chronically persistent neuropathic pain syndromes, trigeminal neuralgia (TN) significantly affects almost all aspects of the patient's life. The accumulation of knowledge about the anatomy, the pathology that causes facial pain has led to the current idea of the negative impact of various arterial and venous structures on the root of the trigeminal nerve with the development of a demyelinating process in the area of their contact. This led to the development of P. Janetta underwent microvascular decompression (MVD) surgery (the »gold standard« in the treatment of TN) has demonstrated high efficacy, safety, and a low frequency of pain syndrome recurrence.
Purpose: Assessment of the dynamic change in the quality of life of patients with TN after MVD as a parameter characterizing postoperative rehabilitation
Materials and methods: The study included 40 patients with TN type 1 according to Burchiel K.J. aged 21-76 years, median 45 years. 80% were women and 20% were men. All the subjects were tested on the VAS, SF-36, BNIPS scales, the McGill pain intensity scale, the PGIC – before surgery, 5 – 7 days, 6 and 12 months after surgery.
Results: Patients noted the presence of pain syndrome according to VAS (8 points), BNIPS (4.2 points), in addition, according to the SF-36 of physical, role, social and emotional functioning, worse indicators were noted compared to the control group in the preoperative period. All the studied patients underwent MVD of the trigeminal nerve, using retrosigmoid access in a sitting position. According to the results of the PGIC, there is a significant improvement, which is achieved after 6 months (from 0 to 100), and with some deterioration of indicators by 12 months after surgery (from 100 to 78.2). We revealed a significant decrease in the severity of pain syndrome according to the VAS (8 – 3 – 0 – 5 points) and BNIPS (4.2 – 1.4 – 0 – 1.6 points). The patients showed positive dynamics in the late postoperative period in the form of a significant decrease in the sensory, affective, evolutional scales of the McGill ($p < 0.05$), on all scales of the SF-36 ($p < 0.05$). A year after surgery, 3 patients (7.5%) had a resumption of pain syndrome. One of them underwent radiofrequency ablation of the Gasser node, two more were prescribed anticonvulsants, in a lower dosage than before the start of treatment. Focusing on the indicators of the affective scale of the McGill,5 patients were prescribed anti-anxiety (ataractics) drugs and therapy with a psychotherapist, against which an improvement in the emotional sphere was noted.
Conclusions: according to the results of a comprehensive assessment of the quality of life, it was revealed that in patients with type I of TN after MVD in the late postoperative period, there is a significant improvement in the quality of life, emotional functioning, and a decrease in the intensity of pain syndrome. Nevertheless, a number of patients require further treatment due to the high level of anxiety.

eP1–058

Ultrasound evalution of medial knee pain patterns for targeted dry needling

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Background and aims: Knee pain is widespread problem, includes various conditions, recognizing patterns for targeted pain treatment and rehabilitation is a challenge. Myofascial pain evoked by myofacia trigger points (MTrPs). Ultrasound, precise muscle dry needling (DN) under ultrasound guidance (DN-US) is a crucial therapeutic approach to

treat myofascial pain [1], restore muscle function and motion and posture [2], isefficient for treatment knee pain.
The aim was to test US evaluation of patterns of medial knee pain relevant for targeted DN, personalized rehab.
Materials and methods: We included 18 patients (8 females, 20 – 65 years old) with medial knee pain, postural imbalance, low back pain. Rheumatic, trauma background, advanced knee arthrosis excluded. All patient underwent physical exam, posture analysis, functional musculoskeletal US and then patients received targeted DN-US protocol by R. Bubnov [1]: MTrPs were identified according to clinical examination, referred pain pattern, US identification; single fine (28G) steel needle DN under US guidance was applied to elicit LTR and/or »needle grasp«.
Results: We detected knee joint effusion in 17 patients, meniscal tears in 12 patients, MCL injury (9), patelofemoral ligament injury (3), ACL injury (2 patients); lateral muscles dystonia and tight iliotibial band, patella instability (in 16 patients). All patients had postural imbalance, had multiple MTrPs: multifidus muscles at lumbar level (L3 – 5 –S1), soleus and foot muscle were the dominant localizations of MTrPs; sacroiliac joint dysfunction, shoulders impingment, other associated postural abnormalities. We found neuropathy of sciatic nerve, its branches in 7 patient. We detected pain relief in all patients, movement restored in 100 % in all areas after muscles US-DN; full recovery was in 15 patients after DN-US.
Conclusion: Medial knee pain is associated with muscular dystonia and postural imbalance. US can be an easy and fast approach to determine patternhelpful for effective targeted dry needling and rehabilitation.

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eP1–059

Efficiency of a complex method of neurorehabilitation of clinically manifested herniated intervertebral discs of the lumbar spine, based on stimulated resorption of herniated discs

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Introduction: clinically active herniated discs (HMD) of the lumbar spine are manifested by pain in both the back and the leg, often sensory and motor disorders, which leads to a significant decrease of the quality of life and is often an indication for surgery. The phenomenon of stimulated resorption of HMD is reliably associated with clinical improvement, and is an effective non-surgical method of treatment aimed at enhancing this sanogenetic process, which becomes a significant task in the practical neurorehabilitation of such patients. Objective of the study: to evaluate the effectiveness of a comprehensive physiotherapeutic therapeutic approach aimed at maintaining the inflammatory response and accelerating the process of hernia resorption among patients in the acute period of HMD of the lumbar spine, and, therefore, to promote their rapid recovery.
Methods: The study involved 75 people from 28 to 70 years old (49.65 + 7.95 years), of whom 47 were women, 28 men; the number of weeks of radicular pain before follow-up was 1.46 + 0.93. MRI was performed before the start of the study, 2 and 4 months after therapy. All patients received 2 courses of treatment: the first – at the 1st month (12 days) and the second after 2 months from the start of therapy.The course of treatment consisted of 12 Laser therapy procedures from an M6 MLS® Laser device (ASA, Italy) in a robotic mode »Increasing of local microcirculation« (for a total of 1035 J, with a dose of 3.5 J/cm^2 in scanning mode) for the entire territory from L2 to S2 daily, 12 acupuncture procedures (the session was performed at standard and trigger points for 20 minutes), 2 paravertebral autoplasma procedures, gabapentin intake (the dose was selected individually by daily titration – as needed for sufficient the decision of the patient of anesthesia from 900 to 1800 mg per day). Such courses were continued until the pain syndrome was eliminated and HMD resorption occurred.
Results: After the second MRI study and assessment of the clinical state, 23 (30.6 %) patients met the criteria for discontinuation of treatment (group 1). After the third MRI study, treatment was completed in 35 (46.6 %) patients, after the fourth – in 12 (16.0 %) patients (group 3). Only 5 (6.1 %) patients required a longer treatment period and complete resorption of HMD was observed only after the fifth MRI study (group 4). The average time for hernia resorption was 4.4 months.
Conclusion: a comprehensive method of neurorehabilitation of clinically manifested hernias of the intervertebral disc of the lumbar spine with preservation of the natural inflammatory response and stimulation of sanogenetic resorption processes makes it possible to achieve a quick clinical effect and a significant reduction in the size of the hernia in a non-surgical way.

eP1–060

Prevalence, Clinical Characteristic of Headache in Medical Students at ALzaiem Alazhzri University in 2020, Khartoum, Sudan

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Background and Aims: Headache is one of the most common disorders of the nervous system. Headache means pain in the head. The (WHO) reports that almost half of the adults worldwide will experience headache in any time at any given year. The study aims to determine the prevalence rate and clinical characteristics of headache among medical students in ALzaiem ALazhari university in Khartoum state, Sudan in 2020.
Methods: A descriptive cross-sectional study using a 41 items questionnaire was introduced to 71 medical students from Alzaeim ALazhari university in the period from January 1st to 15th of February.
Results: Out of the 71 respondents 35 (49.3 %) were Male and 36 (50.7 %) were female while most of them were in the (21 – 24) age group by (69.01 %). Most of the participants responded that they headaches (74.65 %) with (32.31 %) of them having continuous and (67.69 %) of them with no continuous headache. 32 (45.07 %) of them had headaches, half of them lasted for 1 – 2 hours and the other half lasted more than 10 hours per day. The most common location for the headache was both sides (23.02 %) followed by the fore head (22.22 %). The most common characteristic of headache was pulsating (48.48 %) followed by pressure like (37.88 %).
Conclusions: There is a high prevalence rate of headache among medical students with migraine as the most common cause of headache.

eP1–061

MRI diagnosis in paraneoplastic trigeminal neuropathy and rehabilitation

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Trigeminal neuropathies (TN) are well known disorders characterized and manifested as cutaneous numbness in mucosal region innerved from the trigeminal nerve.
Facial drowsiness indicates trigeminal sensitive changes affecting the trigeminal system. TN always causes difficulties in different locations as a feature of multiple diseases: they can be as a result of trauma (injuries), tumors, connective tissue diseases, infectious diseases and demyelinating disease, or may be idiopathic origin.
Their importance can be explained by the fact that TN could represent the first manifestation of the tumor or recurrence in patients with earlier neoplastic process. As such, these events (performances) are threatening and usually life expectancy of the patient is short.
Clinical trials discover loss of cutaneous sensitivity in the cutaneous space that corresponds to the affected nerve, which can be partial (hypoesthesia) and completely (anesthesia). Sensitivity defect occasionally accompanied by hyperesthesia the patient suffers a reduction in sensory perception, but when accepted sensation causes no small concern.
Additional studies (complementary) are necessary to determine the etiological diagnosis, laboratory tests made possible elimination and differentiation from other diseases such as trigeminal neuropathy basic disease, also simple radiological examination, cranial computerized tomography, CT are proper examinations.
Imaging studies are indicated, because distinguishing between classic and symptomatic forms of trigeminal neuralgia is not always clear.
Approximately 15% of patients with trigeminal neuralgia (any form) have abnormalities on neuroimaging (computed tomography [CT] scanning and/or magnetic resonance imaging [MRI]). The most common findings are cerebello-pontine angle tumors and multiple sclerosis.u

eP1–062

Unusual median neuropathy: suggestive of marinnaci anastomosis (case report)

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Unusual median neuropathy in a 27-year old man with a blunt trauma to his left forearm A guided us to do more evaluation to find Marinnaci anastomosis, the least common ulnar-median anastomosis among four prevalent types.

eP1–063

Visual feedback to modulate pain perception: what effects in chronic migraine patients?

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Background: To date, a large amount of pharmacological and non-pharmacological treatments have been considered for

eP1–062. Table 1

SNCV	Site/Segment	Latency ms	Amplitude uV	Duration ums	Area uVms	Distance mm	NCV m/s
Sensory antidromic conduction study							
Medianus L	wrist-III-finger	3.8	24.3	2.5	17.2		
Midpalm L	PALM	2.1	11.3	2	5.5		
Radialis L	1st web	2.3	16.2	1.4	10.7		
Ulnaris L	wrist-V finger	4.3	18.6	3.7	17.9		
Ulnaris R	wrist-V finger	4.3	19.5	2.5	55		
Cut antebr lat R	*****	1.9	13.6	2.1	31		
Cut antebr lat L	*****	1.9	14.8	45.1			
Medianus R	wrist-III finger	4.3	28.4	2.9	33.3		
Cut antebr med R	*****	2.6	14.4	1.4	27.5		
Cut antebr med L		3.6	8				
Ulnar and median conduction study (every 4 cm)							
Medianus L	wrist-III-finger	2.5	22.5	2.6	22		
	4 cm above wrist	4.1	18.4	3.2	20		
	8 cm above wrist	5.1	16.9	3.3	17.0		
	12 cm above wrist	5.6	13.5	3.8	13.6		
	15 cm above wrist	6.2	7	4.5	8		
	>15 cm above wrist	unobtainable					
Ulnaris L	elbow to 3rd finger	13.3	6.7	5.6	17.9		
	4 cm below elbow 3rd finger	11.9	7	5.4	11		
	8 cm below elbow	8.8	7.5	4.9	14.6		
	at wrist	unobtainable					

eP1–062. Table 2: Motor conduction study

MNCV	Site/Segment	Latency ms	Amplitude mV	Duration ms	Area mVms	Distance mm	NCV m/s
Routine Motor conduction study							
Medianus L	wrist-Abp	4	24.3	11.3	30.9		55
Ulnaris L	wrist-Adm	3.8	18.6	8.1	22.1		52
Radialis L	Torsion-Ecr	3.2	2.5	2.8	1.2		73
Motor study median from wrist and ulnar from elbow stimulation and recording from thenar muscles							
Medianus L	wrist-III-abp	3.9	9.8	11.6	35.1		
	8 cm above wrist	5.2	7.1	11.9	26.2		
Ulnaris L	elbow-abp	11.6	2.8	9.2	8.8		
	8 cm below elbow-abp	6.3	2.8	8.7	7.1		

eP1–062. Table 2: Electromyography

EMG	Insertion activity	Spontaneous				Motor unit potential			Recruitment pattern
		Fibrillat.	PSW	Fasciculat.	Other discharges	Amp	Dur	Poly	
paraspinal C5, C6, C7	NL	0	0	0	None	NL	NL	NL	NL
Biceps brachii L	NL	0	0	0	None	NL	NL	NL	NL
Latoissimus dorsi L	NL	0	0	0	None	NL	NL	NL	NL
Deltoid L	NL	0	0	0	None	NL	NL	NL	NL
Supinator L	NL	0	0	0	None	NL	NL	NL	NL
Triceps brachii L	NL	0	0	0	None	NL	NL	NL	NL
PT L	Inc	3+	4+	0	None	None	None	None	No voluntary MUAPS
FCR L	Inc	3+	4+	0	None	None	None	None	No voluntary MUAPS
FDP 2nd finger L	Inc	3+	4+	0	None	None	None	None	No voluntary MUAPS
FPL L	Inc	3+	4+	0	None	None	None	None	No voluntary MUAPS
ABP L	Inc	2+	3+	0	None	Inc	Inc	Inc	Single MUAPS
FDP 4TH and 5TH Finger L	NL	0	0	0	None	NL	NL	NL	NL
FCU L	NL	0	0	0	None	NL	NL	NL	NL
FDI L	NL	0	0	0	None	NL	NL	NL	NL
EDC L	NL	0	0	0	None	NL	NL	NL	NL
E.I	NL	0	0	0	None	NL	NL	NL	NL

reducing pain perception in patients with chronic migraine. Among non-pharmacological approaches, there are novel and alterative possibilities such as »visual feedback« techniques allowing the dynamic modification of the virtual body that is perceived as one's own and provide positive and relaxing feedback to patients.
Objective: The present study is aimed to investigate whether the exposure to different visual stimulating conditions may modulate pain perception in chronic migraine patients.
Materials and methods: To this aim, 35 female chronic migraine (ICHD-3 criteria) patients (mean age: 46.39 ± 10.77) recruited at the Headache Science and Neurorehabilitation Center of the IRCCS C. Mondino Foundation were enrolled. In this 1 x 4 within-subjects study design, all chronic migraine patients were first evaluated on personal, clinical, psychological variables, level of pain (VAS) and body image perception at the baseline. During the experimental session, subjects were then randomly exposed to 4 different types of visual stimulus conditions (facial expressions): positive, neutral, negative and control. After the observation of each visual condition, subjective perception of pain and the level of identification with each visual stimulus was assessed.
Results: A repeated measure analyses and the following multiple comparisons by using the Scheffe test showed a significant difference in pain decrease between the positive (32.4 ± 31.0) and the negative (38.6 ± 29.7) facial expressions ($z = -4.46$, $p < 0.001$), or the positive (32.4 ± 31.0) and the neutral (37.2 ± 28.36) facial expression ($z = 3.41$, $p = 0.009$), used a control condition. Spearman's correlation test showed a positive relationship between the negative affective state of the patients at baseline (15.5 ± 6.8) and the pain ratings reported during the experimental session ($rs = 0.32$, $p = 0.05$).
Conclusion: Our results show that a positive visual feedback is a stimulus strong enough to modulate subjective pain perception via the mediation of empathy mechanisms for positive emotions. Our study paves the way to the integration of conventional therapy with new cognitive behavioral training based on the adoption of visual feedback to further control pain perception.

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eP1–064

Peculiarities of the influence of foot afferentation on statokinetic stability in patients with balance disorder

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Question: Maintenance of statokinetic stability (SS) is microoscillatory process of the sensorimotor systems interaction. The biomechanical model of the SS is represented by the hinge-rod system, the links of which rely on each other, the anti-gravity muscles ensure the maintenance of the body in an upright position. There are known motor strategies aimed at preserving the SS: ankle, femoral and an step's strategy, where the effectiveness of application the ankle strategy often depends on proprioception. The supporting zones of foot and condition of the muscles and ligaments plays importamt role in maintaining static balance. Objective: to clarify the features of foot afferentation on the SS in patients with impaired balance.
Materials and methods: 75 patients examined, including 42 patients with multiple sclerosis (MS) in the subcompensation stage, mild and moderate coordination disorders (age 34 ± 5.6); 33 patients with peripheral vestibular syndrome (PVS) in the subacute stage (age 39 ± 4.8). To studed SS used stabilometric analyzer with biofeedback Stabilan-01-2 (OCO »Rhythm«, Russia), diagnostic test »Isometric tension of the lower leg muscles«, which examines the process of holding a static load by the legs and pattern of foot movement during the effort; »Stability test«, evaluates the total area of arbitrary stability; the Romberg's test.
Results: In the »Test of isometric contraction of leg muscles«, no significant asymmetry in the extremities was noted in patients with PVS: left 64.7 (27.08; 77.51) kg, right 76.8 (59.3; 95.6) kg. In patients with MS, was a significant asymmetry in limbs: left 27.4 (29.7; 48.4) kg, right 65.2 (20.3; 75.6) kg, $p < 0.05$. The coefficient of asymmetry (CA) % was calculated as the ratio of difference in the foot pressure force. In the group of MS, CA amounted to 45.2%, PVS-33.3%. A moderate direct relationship was established between the parameters of CA and ellipse area in Romberg's test ($Rxy = 0.316$, $p < 0.05$), where an increase in CA leads to decrease in the static area of the support. A moderate inverse relationship was established between the CA and stability area in »Stability Test« ($Rxy = -0.319$, $p < 0.05$). In PVS patients was weak inverse relationship between the CA and ellipse area in Romberg's test ($Rxy = -0.29$, $p < 0.05$).
Conclusions: The obtained data of the assessment SS in MS patients demonstrate a significant increase the CA in the foot pressure force compared to patients with PVS, which correlates with an increase in PE at rest and a significant restriction of PE when evaluating arbitrary postural control.

eP1–065

Neuroprotective effect of macrophage migration inhibitory factor (MIF) in ischemic stroke mice model

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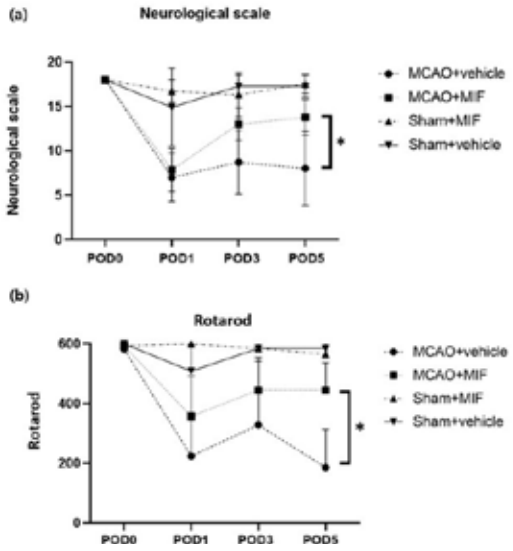
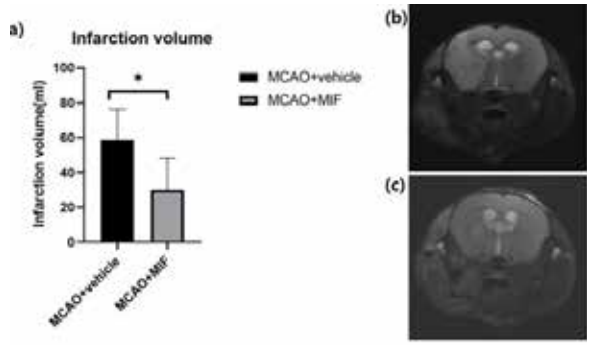
Objective: Macrophage migration inhibitory factor (MIF) is multifunctional immune cytokine which is known to play neuroprotective role in in vitro ischemic stroke models, however the neuroprotective effect in vivo model is not yet clear. This study aimed to investigate if the MIF promotes neurological recovery in vivo stroke mice model.
Methods: The group was allocated to sham vehicle (n = 15), sham MIF (n = 11), middle cerebral artery occlusion (MCAO) vehicle (n = 14), and MCAO MIF (n = 14). Transient middle cerebral artery occlusion is performed to male mice in MCAO groups. Vehicle and MIF was administered through intracerebroventricular route. We evaluated the neurological functional scale, rotarod test, and T2-weighted magnetic resonance imaging. As secondary outcome, the expression level of microtubule-associated protein 2 (MAP2), Bcl2, brain-derived neurotrophic factor (BDNF), IL-1β, and TNF-α was measured by western blot assay.
Results: The neurological scale was significantly higher in MCAO MIF group compared to MCAO vehicle group **(Figure 1a)**. MCAO vehicle group exhibited significantly poorer performance on the rotarod test than MCAO MIF group **(Figure 1b)**. MCAO MIF group had significantly reduced total infarct volume compared with MCAO vehicle group in T2-weighted MRI image **(Figure 2)**. Expression levels of neuronal marker, such as BDNF, Bcl2, and MAP2, and inflammatory marker, IL-1β, and TNF-α, tend to be higher in MCAO MIF group than MCAO vehicle group.



eP1–065. Fig. 1: Behavioral test. Neurological fuinction was evaluated in sham vehicle (n = 15), sham MIF (n = 11), MCAO vehicle (n = 14), and MCAO MIF (n = 14). **(a)** The graph shows neurological behavioral test scale, and 20 items in the highest score. Note that the neurological scale is significantly higher in MCAO MIF group compared to MCAO vehicle. **(b)** Rotarod latency (s) is to measure the tome the mice hang on the rolling cylinder. Mice in MCAO MIF group hang significantly longer than MCAO vehicle group



eP1–065. Fig. 2: Infarction volume.T2 weighted MRI imaging was performed in the sham vehicle (n=15), sham MIF (n = 11), MCAO vehicle (n = 14), and MCAO MIF (n = 14). **(a)** Infarction volume of MRI image measured in MCAO vehicle, and MCAO MIF group. The infarction volume was significanbtly smaller in MCAO MIF group compared to MCAO vehicle group. **(b)** The representative picture shows T2 weighted MRI image of MCAO vehicle brain sample. **(c)** The representative picture shows T2 weighted MRI image of MCAO MIF brain sample

Conclusion: This study suggests that MIF has neuroprotective effect on in vivo ischemic stroke model. MIF seems to facilitate neurological recovery, and protect the brain tissue from ischemic injury. This offers possibility of future novel therapeutic agents for stroke patients.

eP1–066

What is the role of social cognition in the therapy of neurological patients?

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Introduction: Social cognition comprises processes involved in the perception, decoding, storage, retrieval and regulation of information from other people and oneself. Neurological diseases can lead to reduced social cognition. Guidelines and everyday clinical practice in the outpatient neurological setting do not yet integrate the investigation and treatment of social cognition and its processes. During the rehabilitation stay, the patients enter into social contact directly with other patients and therapists due to individual and group therapies, which makes communication and mutual interaction within the therapies inevitable. Due to the lack of studies, it is still unknown whether participation in neurological rehabilitation already has an impact on social cognition without being explicitly treated in the therapies of rehabilitation. The patients still show significant limitations of social cognition years after the event, which further led to a restriction of social contacts and to an impairment of the quality of life.
Objective: The aim of the work is to investigate the extent to which neurological rehabilitation has an influence on the social cognition of patients with cerebral disease in the subacute stage without social cognition being treated in separate therapy units.
Patients and Method: The investigation of the empathy ability of neurological subjects with subacute cerebral disease (e.g stroke, traumatic brain injury, hypovolemic shock) took place from April to June 2021 in the Neurologisches Therapiecentrum (NTC) Köln, Germany. The social cognition in seven male subjects (Age: 63.57 years, ± 27.5) was evaluated using the Read the Mind in the Eyes test at the beginning of the rehabilitation and after a two-week stay. The therapy goals, the treatments carried out and the test results are analyzed and interpreted against the background of further literature.
Results: The test results of the Read the Mind in the Eyes test showed a lower overall score in the retest for four subjects (pre test 16.5 to post test 12). One subject achieved the same total score (pre test 17 to post test 17) and two subjects achieved a higher total score (pre test 15.5 to post test 18.5) in the retest. The treatment goals and therapeutic interventions did not differ fundamentally from each other.
Conclusion: The results of the study suggest that social cognition tends to worsen in patients with subacute cerebral disorders without treatment in neurological rehabilitation. Despite participating in neurological rehabilitation and participating in the various therapeutic measures that required social interactions, the subjects' social cognition deteriorated. Wearing the mouth and nose mask, which had to be worn by both the medical staff and the test persons due to the corona pandemic, may have had an impact on the ability of social cognition. In order to check the extent of the influence and for statistically relevant results, further investigations are required.

eP1–067

Atypical subjective sensory sensitivity after acquired brain injury: insights on the underlying mechanisms, prevalence and treatment

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Introduction: Patients with acquired brain injury frequently report experiencing sensory stimuli as abnormally under- (sensory hyposensitivity) or overwhelming (sensory hyper-

sensitivity). These subjective changes in sensory sensitivity after acquired brain injury are rarely recognized by healthcare providers due to a lack of evidence-based knowledge regarding the underlying mechanisms of these symptoms. Furthermore, to date, there is uncertainty about the prevalence of atypical sensory sensitivity and the available treatment options for rehabilitation. Since these symptoms can negatively impact quality of life and functional recovery, a better understanding of atypical subjective sensory sensitivity is essential to improve patient care.
Objectives: To provide an overview of the current evidence on the underlying mechanisms, the prevalence and treatment of atypical subjective sensory sensitivity after acquired brain injury, we conducted a systematic literature review.
Methods: A qualitative synthesis was conducted to summarize the results of 76 included studies.
Results: The synthesis suggested that abnormal sensory thresholds and reduced information processing speed are candidate behavioural mechanisms underlying atypical subjective sensory sensitivity in acquired brain injury patients. Regarding the neural mechanisms, there was evidence for an association between subjective sensory sensitivity and structural grey or white matter abnormalities, and to functional abnormalities in sensory cortices. Furthermore, atypical sensory sensitivity was prevalent across all sensory modalities and across different acquired brain injury populations (i.e., stroke and both mild and severe traumatic brain injury). A small number of studies described treatments of atypical subjective sensory sensitivity. They focused on maladaptive coping related to maintenance of symptoms or providing external tools that provide relief of symptoms.
Conclusion: Further research is needed to identify how the different results can be unified into a comprehensive framework on atypical subjective sensory sensitivity after acquired brain injury. More specifically, investigating the behavioural and neural mechanisms of atypical subjective sensory sensitivity across different modalities and acquired brain injury populations will increase our understanding of which mechanisms could be targeted in rehabilitation enhancing treatment efficacy.

eP1–068

Case report of a 34-years-old patient with young-onset dementia: What should be the target of intensive cognitive rehabilitation?

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Question: Cognitive training and cognitive rehabilitation are the main approaches used with patients who have early-stage dementia. What should be the target of intensive cognitive rehabilitation in patients with young-onset dementia?
Patient and methods: A 34-year-old, right-handed, highly educated and married with two children woman was referred to Neuropsychological and Rehabilitation Unit for Brain Injury, ELEPAP, Athens (01/2021) by her neurologist for neuropsychological assessment and intervention. At the age of 33 she presented with cognitive decline, in terms of memory impairments, which was attributed by her family to emotional factors and fatigue due to demands of everyday living. After the birth of her second child she suffered frequent sudden falls and a seizure and was admitted to the hospital. Brain MRI showed few focal hyperintensities in the subcortical white matter demonstrated by FLAIR images. In addition, benign enlargement of sub-arachnoid space was revealed, mainly in the frontotemporal regions. Finally, minor bilateral and symmetrical hippocampal reduction was shown. The above findings were in line with mild cortical atrophy, not consistent with her age. A series of neuroimaging and genetic tests for further diagnostic examination followed. An extended baseline neuropsychological assessment was administered revealing severe deficits in all cognitive domains.
Results: The most profound finding was her great difficulty in visual and visual-spatial processing in respect of distorted visual perception, difficulties in locating and perceiving objects, as well as apraxia. Furthermore, her episodic memory was also severely impaired and she presented with apathy and very low levels of vigilance and alertness. An intensive individualized cognitive training program was provided, aiming at enhancement of vigilance, alertness and visual-spatial perception. However, the emphasis was given on improving everyday functioning in real life context, in terms of facilitating goal-oriented behavior and maximizing activity and participation in valued social roles in collaboration with family members. Six months after intensive cognitive rehabilitation she maintains an adequate level of everyday functioning and well-being, by participating in the child care and in everyday situations, with the necessary supervision. Also, the strain of family givers is reduced. Visual-spatial perception as well as memory ability is still severely impaired, however in automated and repeated situations she is capable of compensating, by using learned methods and techniques and memory aids.
Conclusions: Given the trajectory of progressive impairment, training should focus on personally-relevant goals, motives and needs and follow the course of change over time, targeting in optimal level of functioning according to the person's life and expectations.

eP1–069

Cognitive Rehabilitation in Multiple Sclerosis: a case study

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Introduction: This case study presents a 32-year-old, right-handed woman, with a diagnosis of MS for the past 8 years and Hashimoto's thyroiditis. The last MRI does not show active foci. Multiple foci have been reported in the subcortical, pericardial white matter, the middle lobe, the stem, the cerebellum, and the cervical and upper thoracic spinal cord.
Objectives: The purpose of this case study is to investigate the possibility of a patient with Multiple Sclerosis (MS) to benefit from the Neuropsychological Rehabilitation Day Treatment Program.
Materials and methods: The first neuropsychological evaluation (NE) showed difficulties in all cognitive functions and more specifically in endogenous alertness, sustained attention, perception, memory and executive functions. At the behavioral level, mental fatigue, intense impulsivity, thought derailment, childish behavior and obsessive thinking were observed. The patient joined the Brain Injury Day Treatment Program (5 hours/day, 4 days/week) for 12 months with a therapeutic plan of cognitive training, self-awareness, goal-setting and counseling. The last 10 months she partici-

pates in the Day Treatment Program remotely via teleconferencing (3 hours/day, 2 days/week).
Results: Neuropsychological re-assessment showed improvement in the cognitive domains of attention, with the patient showing a satisfactory level of alertness and mental endurance. She still has deficits in areas such as perception, processing speed, visual-spatial abilities, memory, as well as in areas of executive functions such as organization, problem solving and mental flexibility. At the behavioral level, the patient today has some difficulty in properly regulating her behavior in relation to the circumstances but to a lesser extent than her initial image. At present, she shows a good level of awareness while she seeks for feedback from her significant others and use compensatory techniques. At a functional level, she is able to manage her daily duties and she shows improved communication with her social network.
Conclusions: Consequently, we could argue that MS patients with cognitive, emotional and behavioral difficulties could benefit from an intensive Neuropsychological Rehabilitation program.

eP1–070

Functional neurological disorders: Place of physical medicine and rehabilitation

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Introduction: Functional neurological disorder refers to the set of disorders, including motor disorders, sensory disorders, non-epileptic seizures, sensory deficit, language disorders, and cognitive disorders that are not explained by a known lesion or dysfunction of the central nervous system.
Aim: Focus on the place of physical medicine and rehabilitation in the multidisciplinary management of functional neurological disorders.
Case presentation: 33-year-old patient followed for type 2 diabetes on insulin (5 years). Presents for a year a left hemiparesis, language disorder. The diagnosis of functional neurological disorder was retained based on clinical examination and normal paraclinical investigations. The patient was referred to our department by neurology for her walking disorder, the clinical examination did not show any abnormality, the initial management consists of a protocol for rehabilitation that include work on walking and balance and follow-up.
Conclusion: Functional neurological disorders, although frequent pose diagnostic and therapeutic difficulties for practitioners. The care involves a multidisciplinary team including a psychiatrist norologist as well as a physical medicine and rehabilitation doctor.

eP1–071

Lesion-symptom mapping corroborates lateralisation of verbal and nonverbal memory processes and reveals distinct memory networks

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Introduction: It has long been assumed that the material-specific lateralisation of memory function in the brain, i.e., verbal content, is processed in memory critical structures of the left (usually language dominant) hemisphere, while nonverbal content is processed in memory critical structures of the right (usually non-language dominant) hemisphere. Likewise, in neuropsychological memory assessment, verbal and nonverbal memory tests are assumed to be sensitive and specific to dysfunction of memory critical structures of the left and right hemisphere, respectively. However, the dichotomy between verbal and nonverbal memory and their lateralised representation in the brain is not quite so clear-cut and further studies have not always confirmed this assumption of material-specific lateralisation of memory function in the brain.
Objectives: Using univariate and multivariate lesion analyses, our aim was to identify the anatomical correlates of verbal and nonverbal aspects of classical memory tests in a large cohort of patients with first-time cerebrovascular stroke.
Patients and Methods: In a cohort of 113 patients, cognitive performance in seven classical memory tests was analysed using a factor analysis and extracting two factors that distinguished the verbal and nonverbal components of classical memory tests. The factor scores of the verbal and nonverbal factors were subsequently tested for their neural correlates using advanced assumption-free univariate (voxel-based lesion-symptom mapping VLSM; [1]) and multivariate (Lesymap; [2]) lesion-symptom mapping.
Results: The lesion mapping analysis revealed for the verbal factor exclusively left-hemispheric insular and adjacent white matter regions and for the nonverbal factor exclusively right-hemispheric regions with temporal, occipital, insular, subcortical, and adjacent white matter structures. The identified memory network differed from the critical anatomical structures of the executive control analysis (word and design fluency).
Conclusion: These results reinforce the long-standing hypothesis of a material-specific lateralisation of memory function in the brain. Particularly the right-hemispheric distribution of critical anatomical memory structures implied a distinct memory network that includes cortical and subcortical structures known not only for explicit memory, but also for visual perception and implicit memory processes.

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eP1–072

Visuospatial neglect assessment in neurorehabilitation: A clinical validation of a new paper-pencil screening task

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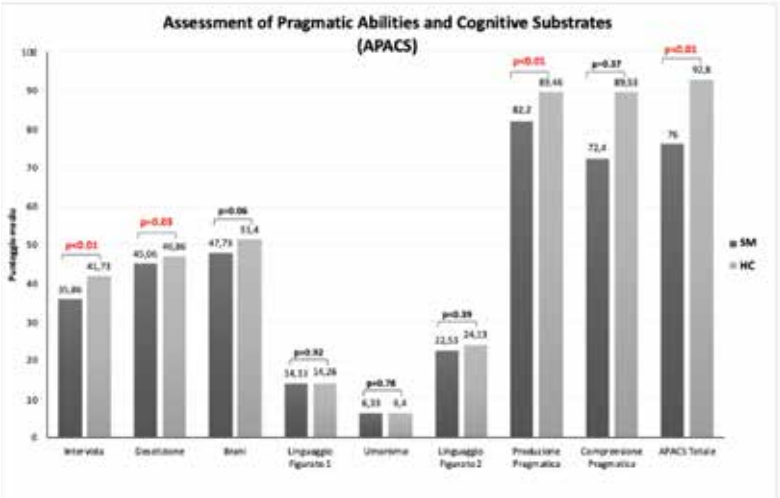
Introduction: After right-hemispheric brain lesions, visuospatial neglect, i.e. an attentional deficit for the contralesional side is frequently observed. Numerous assessments of neglect symptoms are available, differencing in regard to diagnostic targets, complexity, and technical effort. The

present study evaluated the validity and reliability of a new paper-pencil screening task which merges two popular test concepts, Line Bisection Tasks (LBT) and the Star Cancellation Test (SCT; Wilson et al., 1987), which address separate cognitive concepts, room perception and visual search.
Objectives: To prove whether a combined task may replace multiple testing with paper pencil and computerized assessment.
Methods: Twenty-seven patients with right-hemispheric stroke were assessed with the LBT&Search task (LBT&S), the SCT (Fels & Geissner, 1997), the subtest »neglect« from the Test of Attentional Performance (TAP; (Zimmermann & Fimm, 2007), a computer-based neglect test, and a routine lickert scale behavioral rating done by nursing staff. The LBT&S comprises 18 lines of three different lengths distributed in equal distances in the left and right side of a horizontal A4 page. Patients were followed up weekly with repeated testing. Normative data from 100 healthy age matched control subjects were available. Absolute deviations and deviations per line surpassing 2SD of the norm were taken for statistical analyses.
Results: All patients were clinically expected to display neglect pathology. Patients showed significantly more deviations from the midline as well as line omissions in the LBT compared to the healthy control subjects (U = 5450.00, z = 6.04, p < .001, r = 0.46 and U = 5464.00, z = 5.17, p < .001, r = 0.39). Sensitivity of the LBT&S was excellent (100 %) and higher than the sensitivity reported for the SCT (80 %; Jehkonen et al.,1998). The LBT&S' internal consistency was high (Cronbach's a = .83 and .86, respectively). Construct validity (convergent validity) was confirmed by significant correlations of the LBT with the SCT (rs = -.511, p < .001) and the TAP neglect test (rs = .680, p < .001). In addition, performance on the LBT&S was related to the staff rating of visual attentional deficits (rs LBT line omissions and ADL rating = -.459 [-.745, -.068], p = .005). The LBTs' ability to monitor neglect symptoms over time could not be evaluated terminally due to small sample subgroups and missing data.
Conclusion: LBT&S appears an innovative approach providing added value for the rapid and easy neglect screening. The test has a high feasibility since it is bedside portable and does not require a certain response speed like other tests do and will next be translated to A4 tablets. Overall, this LBT&S is a reliable and valid neglect test. Future work focuses on the further evaluation of the criterion validity, the LBT&Ss' specificity in regard to patients without visuospatial neglect, and the repeated application along with treatment.



eP1–073. Fig. 1: Comparison of the average scores obtained by the study group (SM) and control group (HC) in the 6 APACS battery tasks and composite scores

eP1–073

Communicative and pragmatic competence in people with Multiple Sclerosis

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Introduction: Cognitive functions have been extensively studied in Multiple Sclerosis (MS). Less investigated are pragmatic skills, despite their relevant impact on the quality of life. The pragmatic damage is characterized by a difficulty in producing coherent, cohesive, informative discourse and reduced inferential abilities and verbal fluidity [1].
Such impairments could be traced to demyelination at the level of neural circuits involved in pragmatics: dorsolateral and medial left prefrontal cortex and right temporoparietal junction [2].
Objectives: This study aims to investigate the communicative-pragmatic profile in MS.
Materials and methods: 15 people with MS and 15 healthy controls were recruited **(Table 1).** The two groups, homogeneous by sex, age and education, have been evaluated for pragmatic verbal skills through the administration of APACS [3]. The results obtained by the groups were compared with the t-student test for independent samples; the correlations between the variables were assessed with the Pearson coefficient.

eP1–073. Table 1

		Groups				
		MS Patients (n = 15)		Healthy Controls (n = 15)		
		n	%	n	%	
Sex	M	5	33	5	33	
	F	10	67	10	67	
		Mean	SD	Mean	SD	*P* value
Age		46.1	11.4	45.8	12.9	0.83
Education		14.2	3.4	14.3	3.6	0.72
Age at onset		28	5.9			
Disease duration		16	13.1			
Disease severity (EDSS		4.3	1.4			
		n	%			
Clinical Form	RR	8	53.3			
	SP	4	26.7			
	PP	3	20			

RR Relapsing-remitting; **SP** secondary progressive; **PP** primary progressive

Results: A significant difference between the two groups emerged from the comparison of APACS composite scores Total Apacs (p < 0.01) and Pragmatic Production (p < 0.01) but not Pragmatic Comprehension (p = 0.37).
The MS group showed worse performance in all pragmatic tasks, except for Figurative Language 1 and Humor, in which the scores of the two groups resulted almost superimposable **(Fig. 1).**
By analyzing the clinical features of the cases, it was found that pragmatic production correlates with illness duration (r = -0.72) and age at diagnosis (r = 0.51) but not with the severity of disease (r = 0.005).

People with higher education obtained significantly higher scores at single APACS subtests ($p < 0.01$).
Conclusions: The study supports the initial hypothesis of pragmatic damage that is more evident in production than in comprehension.
The analysis of patients' discourse, compared with controls, highlighted poor coherence and cohesion, incomplete sentences, incorrect use of cohesive links, frequent autocorrections, hesitations and false starts. People with greater cognitive reserve are more protected from the onset of a communicative-pragmatic deterioration.
A limit of this survey is the small size of the sample, which is already in expansion intending to draw up a specific program to train pragmatic disorders for people living with MS.

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eP1–074

Ventral and dorsal stream contribution to interaction with objects in a patient with a profound occipital lesion

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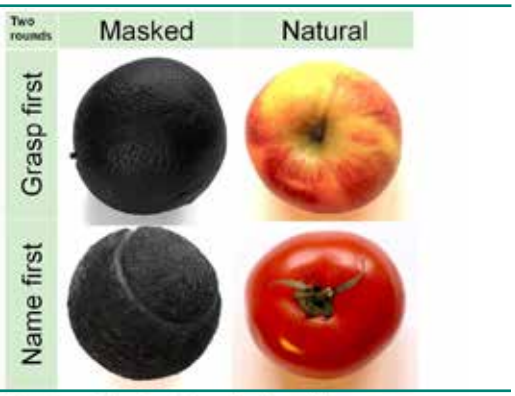
Question: A dual-route model has been proposed, according to which action knowledge for visual object stimuli can be retrieved either through a direct, from-vision-to-action, nonsemantic route that is associated with the visual dorsal stream (DS), or through an indirect semantic route associated with the visual ventral stream (VS). We conducted a kinematic reach-and-grasp study on a patient with dissociation between manipulation and identification skills for common objects. We aimed to investigate in detail his functional deficit as well as the interplay between the two streams.
Methods: The patient had a wide hypoxic lesion in the parieto-occipital cortex after cardiac arrest. Although he recovered from initial cortical blindness, he remained with impaired objects recognition, while partially compensating it using color information. Kinematic data was collected with infrared high-speed cameras and markers fixed on his right hand (wrist and fingers). Reach-and-grasp actions on common objects were investigated in the Patient and in 11 healthy participants. Objects were either reached-and-grasped as soon they were presented, or after naming them first. One subset was black painted (masked objects) whereas the other subset was not (natural objects). Moreover, each object was grasped two times in consecutive rounds and matched in size-shape between conditions. An Instruction (grasp_first vs. name_first) X Objects (masked vs. natural) X Grasp (1st vs. 2nd grasp) design was implemented.
Crawford's Tvardiff statistical analysis was used to compare the patient's performance between conditions to control group's performance. We analyzed movement duration and trajectory (maximum velocity- acceleration, time of max. velocity-acceleration).



eP1–074. Experimental set-up: 2 rounds, 4 conditions, exemplary objects (orange, apple, tennis ball, tomato)

Results: In the 1st round the patient was unable to identify masked objects and correctly named natural ones; in the 2nd round he could name them all.
Compared to the control group, in the 1st round, the patient's movement duration with natural objects decreased in the name_first relative to the grasp_first condition. However, in the 2nd round his movement duration increased for masked-natural objects in the name_first condition. Likewise, in this same condition the Patient's maximum velocity decreased and time of maximum acceleration delayed.
Conclusions: Overall, these results suggest that lesions in the Patient's brain mostly impaired his ventral stream, while leaving substantially unaltered his dorsal stream. Indeed, when the task settings required pure visuomotor processing of objects (i.e., grasp_first instructions–dorsal stream involvement) performance was basically comparable to the control group. However, when semantic features of objects needed to be processed (i.e., in the name_first condition), even if all objects were correctly identified; the impaired ventral stream could not contribute to efficient programming of grasp actions.

eP1–075

From shunt to recovery: a multidisciplinary approach in severe acquired brain injury rehabilitation. Hydocephalus treatment and rehabilitation

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Introduction: Hydrocephalus among Severe Acquired Brain Injury (SABI) patients remains overlooked during inpatient rehabilitation1 and delays in dignosis and start of therapeutic strategies may have deleterious effects on patient's outcome [2, 3].
Objectives: the aim of this study was to investigate the relationship between hydrocephalus treatment and recovery during SABI inpatient rehabilitation.
Patients and Methods: This is a retrospective cohort study conducted in a tertiary referral specialized rehabilitation hospital. We analyzed traumatic and non-traumatic SABI adult patients consecutively admitted over 9 years, diagnosed with hydrocephalus and treated with ventriculoperitoneal shunt (VPS) before or during inpatient rehabilitation. The patients were assessed on admission and discharge

eP1–075. Table 1: Factors associated with LCF score at discharge: results from univariate **(Model 1)** and Multiple **(Model 2)** linear regression analyses. Significant associations are shown in boldface

	Model 1		Model 2	
	b (95 % CI)	p-value	b (95 % CI)	p-value
Age	0.02 (0.00–0.04)	**0.032**		
Male	-0.46 (-1.22–0.31)	0.239		
Etiology		0.164		
Hemorrhagic (ref. cat.)	1.00			
Traumatic	1.41 (-1.45–4.28)			
Other	0.99 (-3.88–5.87)			
Time to hospitalization (weeks)†	0.04 (-0.12–0.20)	0.636		
Time to surgery (weeks)§	0.06 (-0.06–0.19)	0.301		
VPS during rehabilitation	1.14 (-1.81–4.09)	0.445		
Valve type fixed	-1.89 (-4.56–0.78)	0.162		
VPS complications	-2.12 (-1.37– -5.62)	0.230		
Cranioplasty	3.02 (-0.26– 6.30)	0.071	2.66 (0.33–4.99)	**0.026**
Length of hospital stay (weeks)*	0.15 (0.07–0.24)	**0.001**	0.08 (0.01–0.14)	**0.020**
Score on admission	0.87 (0.67–1.07)	**<0.001**	0.79 (0.59–0.99	**<0.001**

Note: two patients who died before discharge were excluded; † it indicates time between injury and hospital admission, one patient with time >600 days was excluded; § it indicates time between injury and VPS placement, two patients with time 600 days were excluded; *one patient with length of hospital stay >900 days was excluded.

eP1–075. Table 2: Factors associated with DRS score at discharge: results from univariate **(Model 1)** and Multiple **(Model 2)** linear regression analyses. Significant associations are shown in boldface.

	Model 1		Model 2	
	b (95 % CI)	p-value	b (95 % CI)	p-value
Age	-0.08 (-0.15– -0.01)	**0.029**		
Male	-1.50 (-1.16–4.16)	0.265		
Etiology		0.610		
Hemorrhagic (ref. cat.)	1.00			
Traumatic	1.41 (-1.45–4.28)			
Other	0.99 (-3.88–5.87)			
Time to hospitalization (weeks)†	0.04 (-0.12–0.20)	0.636		
Time to surgery (weeks)§	0.06 (-0.06–0.19)	0.301		
VPS during rehabilitation	-0.31 (-1.16–0.55)	0.478		
Valve type fixed	0.06 (-0.73–0.84)	0.885		
VPS complications	-0.91 (-1.91–0.09)	0.073		
Cranioplasty	-1.03 (-1.97– -0.09)	**0.032**	-0.85 (-1.55– -0.14)	**0.026**
Length of hospital stay (weeks)*	-0.04 (-0.04– -0.02)	**0.001**		**0.020**
Score on admission	0.90 (0.69–1.12)	**<0.001**	0.89 (0.68 – 1.10	**<0.001**

Note: two patients who died before discharge were excluded; † it indicates time between injury and hospital admission, one patient with time >600 days was excluded; § it indicates time between injury and VPS placement, two patients with time 600 days were excluded; *one patient with length of hospital stay >900 days was excluded

using the Level of Cognitive Functioning scale (LCF) and the Disability Rating Scale (DRS). Logistic regression models were used to identify the predictors of post-surgical complications. Multiple regression models were used to investigate the predictors of hospital lenght of stay (LOS), disability and cognitive function.

Results: 82 patients (49 % M, mean age = 49.7, SD = 17.8) were included. Fifteen (18 %) had ≥1 post-surgical complications and 16 (20 %) underwent cranioplasty. VPS placement complication risk was higher when fixed vs programmable valves were used (OR = 16.1, p = 0.001). 97.5 % achieved functional improvement at discharge and 88.7 % improved in cognitive function; 56 % were discharged at home. In multiple regression analyses, cranioplasty was related to higher disability (b = 2.7, p = 0.026) and poorer cognitive function (b = -0.9,p = 0.019) at discharge. LOS increased with increasing time to VPS (b = 0.01, p = 0.005) and decreasing age (b = -0.01, p = 0.001). Worse functional outcome at discharge was associated with higher LOS (b = 0.08, p = 0.020).

Conclusions: Our findings indicate that even in complex hydrocephalus, a significant improvement in cognitive anf functional outcomes can be achieved, with more than 1 in 2 patients being discharged at home. Treatment delay results in increased LOS, and the use of fixed pressure valves is associated with markedly higher complication risk. Craniectomy and subsequent cranioplasty are related to worse outcomes and their benefits and risks should be carefully considered by the multidisciplinary team. There is a need for larger prospective studies to better clarify the diagnosis assessment protocol, the timing of treatment of hydocephalus in SABI during inpatient rehabilitation and the advantage of using programmable pressure valves placement to achieve recovery.

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eP1–076

The scientific basis of neuro-rehabilitations methodology

O. Dimos, E. Saleptsi, C. S. Karatosidi, A. Varotsi, N. Karra, C. Kattami (Athens/GR)

Introduction: There is a general feeling that although scientists do have different opinions, they are confined mainly to theories. What is less known, though a bit surprising, is that sometimes they argue about the relevant evidence. In case of science-based neuro-rehabilitation, the evidence for the cognitive rehabilitation stem from the ever more sophisticated and high-tech neuroimaging and electro-physiological techniques, combined with the more traditional neuropsychological measurements. Both the above scientific instruments have some inherit flaws that even in the mainstream research are highly overlooked or downsized.

The first group of tools, that of the highly sophisticated instruments (neuroimaging and electrophysiological techniques), although very reliable and valid techniques in terms of structural and neurophysiological measures, tell us nothing about cognition.

On the other hand, the neuropsychological tests that are used in the relative research, were initially constructed to localize the potential side of the brain's malfunction and now are used to assess cognitive functions without taking into account the specificity and modularity of the contemporary cognitive models and their cognitive constructions.

Objectives: In this ePoster, I will discuss three different problematic areas in the epistemology of cognitive neurorehabilitation. That is a) neuroimaging and how the relevant

evidence relates to cognition, b) neuropsychological tests and what they measure and c) the efficacy of research in cognitive neuro-rehabilitation.
In the end, some guidelines are proposed to overcome the above clinical and epistemological deficiencies.
Materials and Methods: I will state some relative arguments from the field of epistemology of cognitive neuroscience, logical arguments, reviews and clinical observations.
Results: A common use of no suitable measures and tools in contemporary science-based neurorehabilitation is prosposed.
Conclusions: There is an urgent need for a paradigm shift in neurorehabilitation in clinical and academic settings. We have to move from quantitative to qualitative scientific methods in neurorehabilitation, in regards to measurement and clinical interpretation, both in research and clinical settings.

eP1–077

Surgical treatment of acoustic neurinoma: changes in the quality of life in the postoperative period

M. Kurnukhina, A. Gusev, V. Cherebillo (St. Petersburg/RU)

Introduction: Pathological formations of the VIII pair of cranial nerves account for approximately 6 – 8 % of all primary intracranial tumors and 80 % of neoplasms of the bridge-cerebellar angle. The study of the quality of life is an important parameter for evaluating the effectiveness of surgical treatment, providing the possibility of long-term monitoring of the condition of patients during rehabilitation and tracking early and late complications of the disease.
Purpose. Assessment of changes in the quality of life of patients with acoustic neurinoma after surgical treatment.
Materials and methods: A clinical study of 28 patients aged from 26 to 68 years (median 44.5 years) was conducted.The clinical study included an analysis of the disease history, assessment of laboratory and instrumental data, features of surgery, results of histological and immunohistochemical studies, determination of changes in the quality of life of the subjects before surgery, in the early postoperative period (the first 5-7 days after surgery – the time of discharge from the hospital), in the late postoperative period (0,5-1 year after surgery). A retrosigmoid approach was used in all patients. The EORTC QLQ-C30 quality of life questionnaire was used to assess the quality of life.
Results: The patients showed positive dynamics in the late postoperative period according to the scales of cognitive, emotional, role functioning, regression of pain syndrome, dyspeptic phenomena, improvement of appetite, stabilization of sleep, improvement of the overall health index ($p < 0,05$). However, 3 – 6 months after surgery, patients were less satisfied with their position in society (social status), due to the persistence of complaints of hearing loss ($p < 0,05$).
Conclusions: Surgical intervention, using retrosigmoid access to remove acoustic neurinoma, mainly leads to an improvement in the quality of life of patients in the late postoperative period.

eP1–078

Mirror therapy in the treatment of algohallucinosis post transfemoral amputation

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Introduction: Phantom limb pain is a common complication of limb amputation, experienced by 60 to 85 % of patients. The use of mirror therapy was developed in the 90s. The principle is to reflect the healthy limb on the amputated side.
Aim: The aim of our case is to note the importance of this therapy as a complement to medical treatment in the treatment of phantom limb pain.
Case presentation: 54-year-old patient, victim of a high-kinetic public highway accident (hit by a truck) that caused left transfemoral amputation. The patient was referred to our department after amputation, Clinical examination objectified phantom limb pain. Management consisted of medical treatment (Pregabalin 150 mg / day) with mirror therapy.
Conclusion: Medical treatment remains the most effective modality of choice for treating phantom limb pain, but mirror therapy is also a pillar to relieve this type of pain in amputees in a complementary way.

eP1–079

Prevalence and comparison of depression rates in the geriatric population of an old age home and a community, and its association with demographic factors

S. Singhvi, P. Singh (Ahmedabad/IN)

Question: Depression is the most common mental health problem in the elderly. This adds severe burden on the patient, also affecting their families and their financial situation. Finding out the prevalence of depression among older adults living in an old age home and a community provides information about the impetus one should give on mental health. Therefore, the results of this study will help the entire health care community to understand the severity of depression in the geriatric age group, find the leading causes of depression and help with the intervention of the linkage.
Methods: A cross section study of the geriatric group of population was performed, two sections of the geriatric group were taken for the study – geriatric population residing in an old age home (80) and geriatric population residing in a community (80). There were two forms used for data collection – a Geriatric Depression Scale (GDS), a standardized tool used to assess the level of depression and a demographic form was used to collect the demographic information. To find the association between different factors, the statistical method of Chi-square test and P-value was taken. A null hypothesis was formed with no association taken into consideration and Chisquare values and P-value was calculated to find the possible association between the decided factors. The confidence interval taken for P-value is 95 % with 0.05 level of significance.
Results: It was found that the depression rate in the old age home was 36 %, while in the community it was 24 %. The following factors were found to be associated with these depression rates – gender (chi-square value 13.804, p-value

eP1–079. Table 1

Item		Non-Depressed	Depressed	Chi-Square Value	p-value	Association
Age	>84	1	4	5.373	0.471	No
	60–64	10	7			
	65–69	18	13			
	70–74	37	20			
	75–79	18	10			
	80–84	16	6			
Gender	Female	38	41	13.804	0.0002029	Yes
	Male	62	19			
Educational Status	Illiterate	7	4	11.941	0.008	Yes
	Primary	31	33			
	Secondary	22	13			
	Graduate	40	10			
Chronic Illness	Present	72	53	5.854	0.0155	Yes
	Absent	28	7			
Marital Status	Divorced	1	2	9.62	0.047	Yes
	Married	23	55			
	Unmarried	2	3			
	Widow	24	18			
	Widower	10	22			

eP1–079. Table 2: LTS

Variable	Depressed	Not Depressed	Total
Old age home	36 (45%)	44 (55%)	80
Community	24 (30%)	56 (70%)	80

0.00029), educational status (chi-square value 11.941, p-value 0.008), chronic illness (chi-square value 5.854, p-value 0.0155), marital status (chi-square value 9.62, p-value 0.047).
Conclusions: Our study has highlighted a very critical issue, depression was prevalent in both, the geriatric population of the old age home and that of the community, being more prevailing in the former as compared to the latter. Therefore, increased attention to mental health care should be encouraged. Further, multiple factors were found associated with depression and therefore preventive management of such factors should be our goal.

eP1–080

Contextualization and validation of the Greco version of Mini Mental State Examination (MMSE) in a population of brain lesions in Benin

A. Hountondji Étienne, N. N. D. Didier, G. Gérard, S. Emmanuel, O. Jean, O. IAA Lucas, K. G. Toussaint (Cotonou/BJ)

Introduction: Cognitive impairment is objectively assessed using neuropsychological tests. The best known and most used toward the world is unequivocally the Mini Mental State Examination (MMSE) of Folstein et al. As the latter use especially European considerations, it is essential to contextualize that important scale to others socio- cultural realities. So, adaptation versions of MMSE have been developed throughout the world.
Objective: To adapt the MMSE GRECO version to socio-cultural characteristics of Benin.
Patients and methods: Cross-sectional study with descriptive and analytical aims. Data collection covered the period from October 2019 to February 2020. Initially, associated with the GRECO version of the MMSE, others items were proposed, for a total of 30 items. These were submitted to a group of 8 health professionals identified as experts in neurorehabilitation. They were asked to assess the level of understanding of each item, the concordance of the item with the evaluated domain. Thus, experts accepted, reformulated, refused or proposed others items. The adaptation version of MMSE was administered to 57 patients who suffered of stroke, were admitted to CNHU HKM services from 2018 to 2020 and consented to paticipated to the study. The calibration of the scale was done according to Rasch model and it validity assessment with Montreal cognitive assessment (MoCA) version 7.1. Data analysis was done using Pearson, Mann-Whitney and Kruskal Wallis chi-square tests.
Results: Patients average age was 58.35 ± 10.05 years. Their sex ratio was 1.19. Almost the entire sample was educated (92.8%), with a high proportion (38.6%) of secondary education. The contextualized MMSE included 33 items, including 11 deleted after calibration with the Rasch model. The MMSE thus calibrated has a moderate correlation ($r = 0.64$ and $p < 0.001$) with MoCA version 7.1. MMSE scores are influenced by educational attainment ($p = 0.006$) and by gender ($p = 0.05$).
Conclusion: We present a one-dimensional and linear scale evaluating cognitive disorders in the Beninese population. The MMSE 22 is a scale with moderate pre-validity compared to the Montreal Cognitive Assessment (MoCA).
Keywords: Cognition, MMSE, adaptation, Benin.

eP1–081

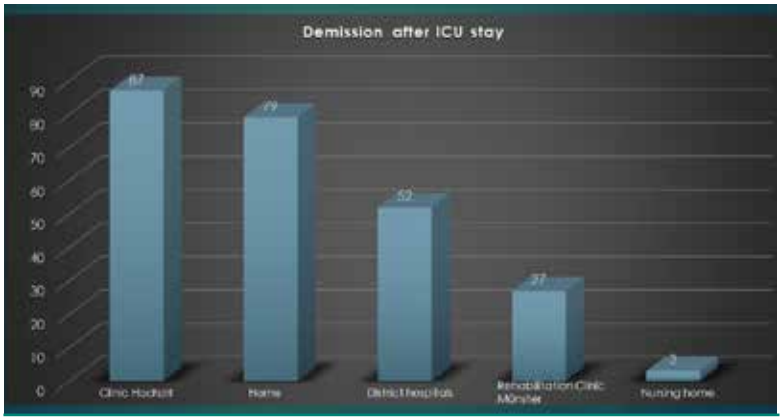
Long-term clinical trajectory of patients with subarachnoid hemorrhage – linking acute care and neurorehabilitation after subarachnoid hemorrhage

E. Pucks-Faes (Zirl/AT), R. Helbok, A. Lindner, L. Brunelli, V. Rass, B. A. Ianosi, M. Kofler, A. Schiefecker, B. Pfausler, R. Beer (Innsbruck/AT)

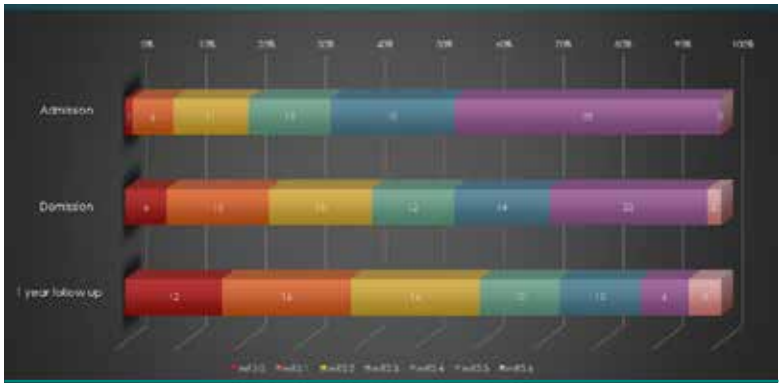
Introduction: Despite improvements in the critical care management of subarachnoid hemorrhage (SAH), a substantial number of patients still suffer from disability after the bleeding. In most areas in the world longitudinal follow-up is not routinely performed and the patient's trajectory remains unknown.
Methods: We prospectively collected data of 298 consecutive spontaneous SAH-patients and evaluated clinical trajectories based on the modified Rankin Scale (mRS) at discharge, 3 months and 1 year after SAH. In a subgroup of patients – transferred to a local neurorehabilitation-center (Rehab-Hochzirl) – we studied the effect of rehabilitation intensity on clinical trajectories. Any decrease in the mRS was defined as improvement, with mRS ≤ 2 indicating good outcome. We used multivariate generalized linear models to investigate associations with clinical trajectories.
Results: Of the 250 surviving patients, 35% were directly transferred to Rehab-Hochzirl (n = 87/250; mRS at discharge 4), 11% to another rehabilitation-center (n = 27/250; mRS 1), 1% to a nursing home (n = 3/250; mRS 5), 21% were repatriated (n = 52/250; mRS 4), and 32% (n = 79/250; mRS 1) were discharged home. Functional outcome improved in

57 % (n = 122/215) of patients during the first 3 months with further improvement between 3 and 12 months in additionally 16 % (35/215) resulting in an overall improvement in 73 % (n = 157/215) of survivors. After one year 60 % (n = 179/250) of patients were functionally independent. A lower H & H-score at ICU admission (p = 0.015), younger age (< 60 years, p = 0.004), a lower mRS at ICU discharge (p = 0.021), fewer days on mechanical ventilation (p = 0.031) and male sex (p = 0.027) were independently associated with functional recovery. The subgroup of patients transferred to Rehab-Hochzirl were more severely affected (ICU-discharge mRS 4). Still, 60 % (52/87) improved during inpatient neurorehabilitation resulting in a median mRS of 2.

Conclusions Our results indicate ongoing functional improvement in a substantial number of SAH patients throughout a follow-up period of 12 months. This effect was also observed in patients with severe disability after acute disease receiving inpatient neurorehabilitation.



eP1–081. Fig. 1: Path of treatment



eP1–081. Fig. 2: mRS in the course of the disease

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eP1–082

How are the surfaces and shape important to prevent pressure sores?

M. Avellis, D. Carnevale, R. Prosdocimo, E. Cometto (Asso/IT), M. Rossini, F. Molteni (Costa Masnaga (LC)/IT)

Introduction: The contact surfaces shape and the material type which they are made from, are very crucial to figure out better the consequences on the skin integrity of the users sitting on a wheelchair. More, we have to consider how a contact surfaces can grant breathability and moisture absence, in order to avoy the increasing skin temperature and local humidity

Objectives: In this study, we demonstrated that a particular backrest shape (a V-shape) and a innovative material used for the backrest as well as for the seat, can work decreasing significantly the interface pressure on the user's skin, even without using a specific antidecubitus cushion (for those patients with no so high level of risk, according to Braden, Norton, Waterlow Scale, etc.)

Methods: We evaluated two patients: one with severe outcome of Sub Aracnoid Haemorragie by Brain Aneurism followed by a non-response period, with high pressure sore risk (weight 45 kg), and another with an outcome of a Stroke Ischemic and Haemorragic followed by a non-response period (weight 78 kg). They were seated in a tilt-in-space wheelchair with a specific V-shape backrest and with a particular surfaces material, totally breathable and with a visco-elastic effect

Results and discussion: We tried to put them in different position according with the items of the study (no tilt, -20° of tilting, max tilting, max tilting and backrest reclination, max tilting and backrest reclination plus rised legrest), with and without the upholstery. The acquisition with Pressure Mapping Sensor were done immediately after positioning, after 10 minutes and after 1 hour and half of sitting

Conclusion: The data obtained showed in both patients a good distribution of the pressures, bearing in mind that there was not any interface cushion between the seat and the user's bottom. The records without upholstery showed that the back in the middle was completely unloaded and the pressure has been spread effectively.

eP1–083

Assessing morphological aspects of peripheral nerve dysfunction after spinal cord injury using G-ratio and fiber parameter analyses.

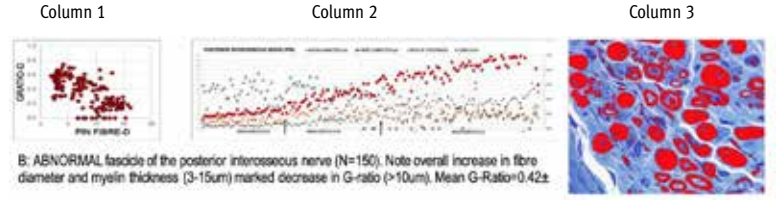
M. Galea (Parkville/AU), N. Van Zyl (Melbourne/AU), A. Messina (Parkville/AU)

Introduction: Spinal cord injury causes immediate loss of sensory and motor neuron function below the level of injury, but it is generally assumed that the spinal circuitry and peripheral nervous system remain relatively normal. However, *nerve conduction* studies show abnormalities that maybe attributed to axon loss and or aberrant myelination and demyelination of axons. Morphological studiesshow that 80 % of nerves have myelin and axon abnormalities. The myelin abnormalities described in recipient nerves are probably due to loss of neural electrical »traffic« resulting in disruption of Schwann cell/axon communication. Thus, electrical stimulation hasbeen proposed as a suitable intervention to preserve muscle and nerve. Nerve excitability studies show that the axonal dysfunction can be reversed by a regime of electrical stimulation.

Objectives: In our project we will examine the effects of functional electrical stimulation (FES) on the axon/myelin

relationship in people with SCI to provide insight into the mechanisms underlying this intervention.
Patients and methods: Donor and recipient nerve specimens are collected from each patient at the time of nerve transfer surgery and processed for image analysis. They will undergo quantitative analyses along with similar analyses of historical controls (who did not have FES pre-operatively), to determine G-ratios, axon and fibre size and myelin thickness.
Results: In this study, we calculated the G-ratios (inner v/s outer diameters of a fibre) in representative nerves from SCI patients (Column 1) and we compared these data to a scatter plots of individual fibre parameters versus fibre diameter, (Column 2). G-ratios changed as the fibre diameter increased as did the scatterplot pattern.

eP1–083. Fig. 1: Relatively normal supinator (donor) nerve showing regions of small (< 4), medium (4–9) and large axons (9–12 μm) (n=220). Note varying G-Ratio between each fibre group. Mean G-Ratio = 0.53 ± 0.1



eP1–083. Fig. 2: ABNORMAL fascicle of the posterior interosseus nerve (n=150). Note overall increase in fibre diameter and myelin thickness (3–15 μm) marked decrease in G-Ratio (> 10 μm). Mean G-Ratio = 0.42 ± 0.1

Conclusion: Although G-ratio is considered the gold standard for assessing nerve health it does not readily identify subtle changes, heterogeneity, or relationship between morphological parameters accompanying nerve injury and recovery such as clusters or patterns of fibresmorphology. A combination of G-Ratio and scatter plot analyses will be used to evaluate the effect of FES intervention on SCI peripheral nerves to maximize sensitivity. If FES intervention is found to reverse the myelin abnormalities, it will provide a sound rationale for further clinical evaluation of FES in maintaining nerve health.

eP1–084

Combination of intrathecal autologous BMC (Bone Marrow Concentrate) with 5 days robotic movement therapy + Electric Muscle Stimulation (EMS) + intravenous modulation improve trunk control and completely recover sensibility in patients with chronic SCI

J. Bodziony (Lucerne/CH), H. Hassanzadeh (Teheran/IR)

Patient 1: 40 years old female, C6 spinal cord injury 5 years before therapy in our Clinic. ASIA A complete, no sensory or motor function preserved in the sacral segments S4 – 5. Ashworth Spasticity Scale 1+, slight increase in muscle tone, stool and urine incontinent. Many years therapy in different Rehabilitation Centres, without improvement.
Patient 2: 31 years old male, Th4 – 5 spinal cord injury 2,5 years before therapy in our Clinic. ASIA A complete, no sensory or motor function preserved in the sacral segments S4 – 5. Ashworth Spasticity Scale 2, more marked increase in muscle tone, stool and urine incontinent. Many years therapy in Rehabilitation Centre, without improvement.
We could make only once therapy as above in our clinic. After this therapy booth patients received intensive rehabilitation. Thus, it was interesting if this single therapy could made any improvement.
Results: The most important improvement is trunk control and balance. Booth patients can stand with braces. They can now feel the bladder, and feel if it is full. They can partially control the bowel function and can tell exactly when they needs to use the bathroom. Booth have complete sensation of their S3, 4, 5. Some difficulty in pin prick but the light touch is complete. They can tell the difference between cold and hot in most of their dermatomes.
Conclusions: Combination of Intrathecal Autologous BMC (Bone Marrow Concentrate) with 5 days Robotic Movement Therapy + Electric Muscle Stimulation (EMS) + Intravenous Modulation is a real game changer in therapy of chronic spinal cord injury.

eP1–085

Effects and rehabilitative implications of spinal nerve roots stereotactic radiosurgery for the treatment of malignant spasticity following spinal cord injury

F. Ferrari, E. Rossato (Negrar di Valpolicella/IT), F. Alongi (Brescia/IT, Negrar di Valpolicella/IT), L. Nicosia, M. Zamperini, F. Marchioretto, G. Armani, R. Avesani (Negrar di Valpolicella/IT)

Background: spasticity is a velocity-dependent increase in muscle stretch reflexes, associated with increate muscle tone as a component of upper motor neuron syndrome.
The aim of the present study is to evaluate the therapeutical effectiveness and rehabilitative consequences of stereotactic radiosurgery in the treatment of malignant spasticity in spinal cord injury (SCI) patients.
Material and methods: Two tetraplegic and one paraplegic patients affected by malignant lower-limbs spasticity failed to conventional medical treatment were enrolled within a prospective observational trial (n. 51262).
All patients underwent a single fraction dose (45 Gy) of stereotactic radiosurgery. It was delivered to the spinal nerve roots clinically more involved in the spastic pattern for each patient.
End-points were the reduction of spasticity measured with the Modified Ashworth Scale (MAS), the impact on patient life measured with the Quality of Life Scale (QOLS) and treatment safety.
Results: between November 2020 and March 2021, three SCI patients with motor complete lesion have been treated at our Institution.
Patient 1 was a tetraplegic patient treated bilaterally at L4-L5-S1 roots. Before treatment he presented high-level spasticity (MAS 3) at both lower limbs, with triceps clonus causing abdominal spasms. Immediately after RT treatment

both legs resulted flaccid, with reduction of abdominal spasms. Immediately after procedure he reported a transient reduction in trunk control and upper-limb muscle tone, with difficulties in driving his wheelchair. He also noticed a reduction in tights and gluteus muscle size, even though pressure ulcers never occurred. At the fourt-month follow-up he had very little increase in one leg triceps tone (MAS 1).
Patient 2 was also tetraplegic. He was treated bilaterally at L3 – L4 – L5 roots because of hip-flexion and knee-flexion spasms. After treatment his lower-limb and abdominal spasms reduced by 20 %. Not further information is available since he refused follow-up.
Patient 3 was paraplegic: she was treated bilaterally at L4 roots and right L5-S1 roots because of left L5 – S1 denervation. Before treatment she had high-level spasticity (MAS 3) for both legs, with abdominal spasms affecting her breath and postures.
After treatment, at the third-week follow-up, spasticity had reduced (MAS 2), with a decrease in abdominal spasms and discomfort.
Conclusions: these preliminary results document a potential clinical effect of stereotactic radiosurgery in the treatment of SCI malignant spasticity.
These results also highlight how lower limb muscle tone and spasms may affect posture, especially for tetraplegic patients, with several rehabilitative implications.
Further studies are needed to better assess effectiveness, duration of response and rehabilitative implications of spinal nerve roots stereotactic radiosurgery for the treatment of malignant spasticity following SCI.

eP1–086

The efficiency of the wearable exoskeleton on self-reported walking impairment in patients with multiple sclerosis

S. Kotov, A. Gevorkyan, V. Lizhdvoy (Moscow/RU)

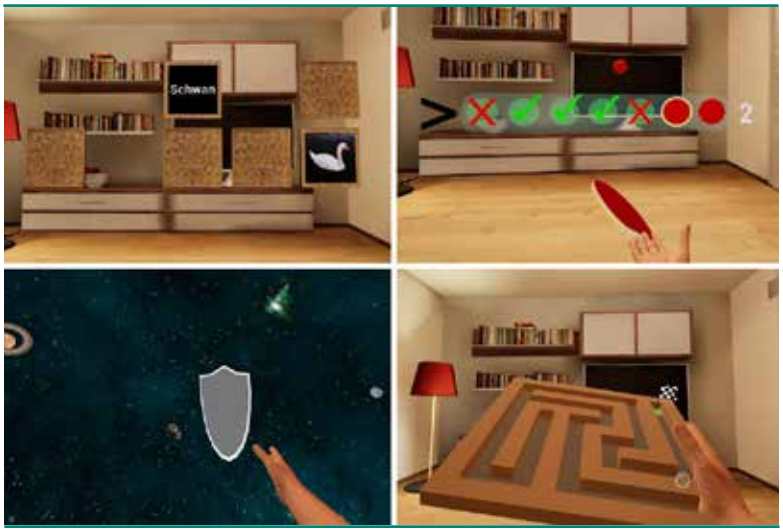
Question: Walking impairment is one of the most common symptoms that leads to reducing independence and health-related quality of life. And the main task of rehabilitation is to improve these indicators. Non-pharmacological therapies, including robotic mechanotherapy, allows to influence both the physical component of the disease and the psychological aspect, increasing motivation and improving self-reported walking ability and the quality of life of patients.
Methods: 10 patients with multiple sclerosis in remission were involved in the study. EDSS was varied from 3 to 6.5 points. The outcome measures included The Montreal Cognitive Assessment (MoCA), Timed 25-Foot Walk (T25FW), 9-Hole Peg test (9-HPT), Symbol Digit Modalities Test (SDMT), The 12-item Multiple Sclerosis Walking Scale (MSWS-12). Patients received 10 sessions on wearable exoskeleton for lower limb.
Results: None of the participants reported any adverse effects. Next data was obtained: Significant change in the »T25FW« score has not been received. »9-HPT« improvement was 4.45 sec (from 30,4 [27.8 ; 34.1] to 25.95 [22.25 ; 38]) for the dominant hand and 4,9 sec (31.05 [26.65 ; 45.9] to 26.15 [22.65 ; 47.65], $p < 0,05$) for the non-dominant hand. Improvement of cognitive functions was observed in the assessment of the SDMT by 10,5 points (from 27,0 [23 ; 38] to 32 [23 ; 46], $p < 0.05$). Changes in MSWS-12 were significant and amounted to 8,5 points (from 55,5 [51 ; 58] to 47 [44 ; 51], $p < 0.05$). No significant improvement was noted in the assessment of the MoCA test.
Conclusions: During the research, it was found that application of lower limb exoskeleton can improve self-reported walking in patients with multiple sclerosis. A significant improvement (15,4 %) of MSWS-12 was obtained in the examined patients. It is an important factor, which indicates an improvement in the quality of life and socialization of patients with multiple sclerosis.

eP1–087

Digital aids using the practical example of digital mirror therapy

P. Zajac, J. Höfener, A. Ochsenfahrt, T. Kreidler (Leipzig/DE)

Introduction: Digital health apps (DiGA) are relatively new to Germany – and the world. They exist in a wide variety of fields and are reimbursed digital applications. From improving sleep disorders to supporting behavioral therapy, apps available via prescription have also arrived in the rehabilitation sector.
Objectives: Rehago aims to help hemiplegic patients suffering from various neurological disorders (e. g. stroke, traumatic brain injury, and more) to retrieve independence of their daily living more quickly. With exercises in virtual reality, Rehago offers patients a safe, independent and cost-effective way of training from the clinical settings to their homes.
Materials and Methods: Stroke patients usually receive the mirror therapy in the early stage of their rehabilitation sessions. Mirror therapy by its nature is a long-term rehabilitative approach to show improvement. However, due to the lack of therapists and the high demand of rehabilitation appointments, training in the clinics with the guidance of therapy is often not available, which may slow down patients progress and elongate the rehabilitation process.
Results: With Virtual Reality, Rehago offers an alternative and complement to the existing conventional rehabilitation by allowing digital exercises to take the principle of mirror therapy and bring it to a new, motivating and fun level. In addition, patients' progress and all the training details can



eP1–087. Fig. 1

eP1–087. Fig. 2

be displayed and tracked by therapists in real-time, which also gives therapists a more precise idea about their patients.
Conclusion: Rehago is a class I medical device and included in the digital health care law. This makes Rehago eligible for prescription and thus able to support more people in their journey of rehabilitation.

eP1–088

The use of C-Mill VR+ for balance and gait adaptability training with a patient with chronic traumatic brain injury

N. Küçükçakir, N. Çalisir, B. Tefenli (Bursa/TR)

Introduction: The patient, who has come to a certain stage but stopped on the way, is modeled on gait and balance with a different method and a newly developed one.
Objectives: We aimed to bring balance and walking down to daily life.
Patients and methods: In our patient who had a traumatic brain injury after weight loss 9 years ago; During this period, he was able to stand up with support with the rehabilitation applied. There was no obvious motor deficit, but his problems with balance-coordination-gait such as imbalance, ataxic gait, and frequent falls continued. Even when walking with the support of two people, the risk of falling was very high, and therefore he was afraid of walking. The most important problem was that we could not work effectively in the rehabilitation hall because the sound, speech, other people, and the things next to us disturbed his walking and balance.
We added the C mill program to the rehabilitation practiced with physiotherapists.
We applied gait adaptation training with C mill for 45 minutes, 3 days a week. We took the tests at 1, 8, and 17 wee and the data on the C-mill.
Results: Tinetti balance and walking test, Berg balance scale, Tandem stance and gait test, and functional ambulation classification were made. 1. week, 8. week and 17. week.
We worked with adjustable speeds on the treadmill by connecting with a parachute system and a corset up on the C mill device. After our patient understood that he would not fall with safety precautions, we were able to practice standing, balance and walking for 45 minutes under the supervision of a single physiotherapist. Seeing parameters such as step width, walking speed and distance, weight transfer in the computer environment during and after the C mill sessions, comparing the weekly developments and seeing the reports increased the motivation of the patient. Thanks to the visual and auditory stimuli on the opposite screen and in the walking area, we were able to practice not being distracted.
Walking parameters improved each week. There was a significant difference in the clinical tests performed at the 1st, 8th and 17th weeks.

eP0–88. Table 1: Patient progression on the different functional scales during the C-mill therapy program

	Normal/ maximum	1. week	8. week	17. week
		20/10/2020	24/12/2020	10/03/2021
Tinetti Balance-Gait Test	35	12	17	21
Balance	26	10	15	18
Gait	9	2	2	3
Berg Balance Test	56	11	31	35
Tandem stance test				9 sn
FES Falls Efficacy Scale Interna-tional	64	not	not	36
FAC: Functional Ambulation Classification	5	1	2----(3)	3

Conclusion: Along with classical rehabilitation, working with the C mill, which has virtual reality and safety applications, was able to adapt the patient to walking independently after 9 years.

eP1–089

Evaluation of the Keeogo Exoskeleton in patients during neurorehabilitation

F. Müller, K. Brüderlein, M. Egger (Kolbermoor/DE)

Introduction: Gait rehabilitation is one of the core elements in patients with severe neurological diseases like stroke, or critical illness polyneuropathy/-myopathy (CIP/CIM). Different robotic devices belonging to the group of end-effectors and exoskeletons are adjuncts to conventional gait training. Keeogo (B-Temia Inc., Quebec City, Canada) is a lower-extremity powered exoskeleton intended to assist with ambulatory activities. In contrast to other exoskeletons, Keeogo does not take full control nor initiate or terminate movements, rather it actively assists or resists during key phases of gait. So far, benefits of Keeogo were primarily reported for patients with multiple sclerosis [1]. Therefore, the aim of this clinical trial was to evaluate usability, effectiveness and patient satisfaction in neurorehabilitation for other conditions.
Material and methods: Patients (≥18 years) with neurological deficits and a walking ability of ≥2 according to the functional ambulation categories (FAC, 0–5) are included in the trial. Feasibility, usability, safety and patient satisfaction (modified version of the Quebec user evaluation of assistive

eP1–089. Fig. 1

technology (mQUEST) will be evaluated. Walking ability will be assessed in conditions with and without Keeogo by the means of the two minute walking test (2MWT), timed-up-and-go test (TUG) and a gait analysis with a pressure-sensitive carpet (GAITRite). Patients will receive ≥3 gait trainings with the Keeogo.

Results: So far, six patients (2 female) received some first Keeogo therapies (mean age 63.8 years (range 18-79)). Patients suffered from stroke (3/6), spinal ischemia, CIP/CIM and Guillain-Barré-Syndrome (GBS). Keeogo therapies were feasible in patients after severe neurologic disease and no safety issues occurred. Two first gait evaluations were conducted. In one patient after stroke, walking with the Keeogo improved velocity (+ Δ6.1 cm/sec), cadence (+ Δ 1 step/min) and step length (+ Δ 5.0 cm), whereas time needed for the TUG increased (3.2 sec). In contrast, gait parameters did not improve in a patient with GBS (e.g. velocity − Δ 1.0 cm/sec; step length - Δ 0.2 cm). However, this measurement was done on his second Keeogo training. Three patients completed the mQUEST; the median of 4 out of 5 points indicated a convincing satisfaction. Particularly appreciated were safety, secureness and durability. Patients valued the up to 3 times enhanced endurance when walking with the Keeogo.

Discussion: As Keeogo is lighter than comparable devices and does not support feet or pelvis, it acts as a promising and helpful adjunct for patients in neurorehabilitation with beginning walking ability, but deficits in endurance. However, walking narrow curves and walking backwards is challenging, as Keego only supports walking straight, which might explain problems in tasks like the TUG. In patients where the device assisted as ideally postulated, effect and satisfaction were high. Conditions of optimal use have to be developed.

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eP1–090

Brain computer interface in traumatic brain injuries: a narrative review

D. Mazzarotto (Jesolo/IT)

I conducted a Narrative Review for a Master course in Neurorehabilitation in Rome, Italy. From this narrative review it emerged that traumatic brain injury represents a major clinical and economic challenge for health systems worldwide, and it is considered one of the leading causes of disability in young adults. The recent development of Brain-computer interfaces tool target cognitive and motor impairments has led to the exploration of these techniques as potential therapeutic tools in patients with Traumatic Brain Injury. After a TBI, patients with disorder of consciousness suffer from awareness deficits. Comorbidities such motor disabilities or visual problems hamper clinical assessment, which can lead to misdiagnosis of the level of consciousness and render the patient unable to communicate. Objective measures of consciousness can reduce the risk of misdiagnosis and could enable patients to communicate by voluntarily modulating their brain activity. At this point, the use of BCIs for DOC patients in clinical applications is still preliminary. However, perspectives on the improvements in BCIs for disorder of consciousness patients seem positive, and implementation during rehabilitation shows promise.

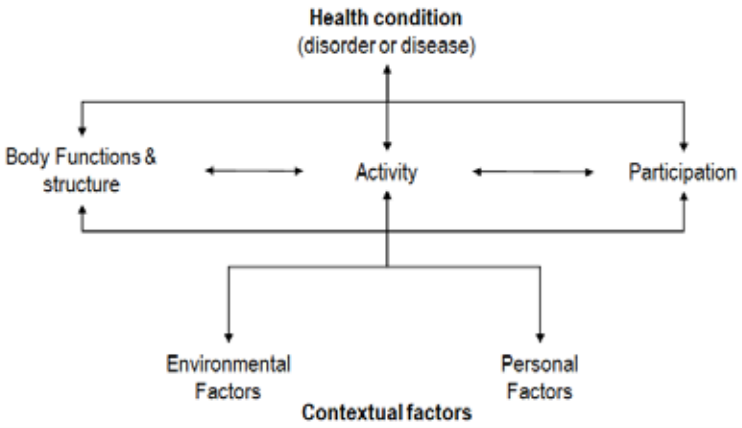
eP1–091

The value of clinical functions and activities in the assessment of robot-assisted neuro-rehabilitation – Can a value function be derived from a generic instrument?

C. Juhnke, A. Sadler, A. Mühlbacher (Neubrandenburg/DE)

Objectives: The joint project »E-BRAiN« investigates the possible use of humanoid robots as therapy assistance in neurorehabilitation for arm paresis and neglect following stroke. Robots have the potential to make a contribution and could expand the sphere of action of therapists. Even if considered successful, questions arise about user acceptance and preferences, clinical effects, and thus relevance for future medical care. Clinical studies within »E-BRAiN« measure clinical parameters that are an expression of arm mobility or visuospatial perception. These indicate certain bodily functions. However, it is unclear whether measurable functions or improvement in function have an impact on assessable (patient) benefit and patients preferences.

Methods: Within the ongoing study, several components of the International Classification of Functioning, Disability & Health (ICF) [1] are valuated. The classification describes human physical functioning and disability. For every function and activity the ICF gives a generally valid, very clinical definition. But the question arises of how to assign a value to these functions. Assuming that the stabilization or improvement of body functions has effects on patients' activities and that these activities have measurable influences in terms of patients' (health-related) quality of life raises the question on what body functions do patients value most in neurorehabilitation following stroke? What are the most severe impairments in arm function or visuospatial perception from a patient/population perspective? Three planned



eP1–091. Fig. 1: WHO 2001. The International Classification of Function, Disability and Health (ICV). Geneva

choice experiments using best-worst scalings address the questions, how can a value function be derived from a generic instrument and how can a latent utility scale, such as from an experiment, be linked to or translated into a (cardinal) utility measure.
Results: The broad framework puts assessment in context and provides the focus for selecting relevant aspects of functioning and disability for assessment. The credo of the ICF is: »From body functions arise activities«. Since the value of a body function is derived from associated activities, another choice experiment is planned on the activities in order to subsequently link this to the functions and measure their value. A uniform or 'generic' qualifier scale is provided to record the extent of the 'problem' in relation to impairment, activity limitation and participation restriction.
Conclusions: It is assumed that regaining physical functions has effects on patients' activities and that activities have effects in terms of health-related quality of life. Moreover, it is assumed that unlike the ICF where all problems are equally important, patients value various body functions and/or activities differently.

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eP1–092

Patients preferences for robotic and assistance technologies in healthcare – A discrete choice experiment with stroke patients in neurorehabilitation

A. K. Fischer (Neubrandenburg/DE)

The following submission is for a study protocol for a Health Preference Research Study (HPR) as a PhD thesis.
Objectives: Stroke and other diseases leading to physical limitations and thus restrictions in everyday life, as well as the aging society with increasing physical and cognitive limitations, lead to an increase in the need for rehabilitative therapy services.
The increasing need for rehabilitative services such as neurorehabilitation, the shortage of professionals and rising costs, leads to the need for new healthcare solutions. Robots and assistive technologies in a neurorehabilitation can counteract the problems. In order to integrate the new digital solutions and to achieve high effectiveness by maximizing acceptance, patient preferences and acceptance should be integrated in the assessment of digital therapies.
The primary objective is to evaluate the criteria that lead to patient acceptance.
The secondary objectives are: Benefit-burden assessment. Assessing the relative importance of attributes for comparing alternatives. Identify key attributes that influence patient adherence.
Methods: By using a stated preference study, therapy characteristics that patients consider when evaluating digital therapy options are identified and compared. In the Experimental Group, the study population includes stroke patients experienced in neurorehabilitation. The general population is also surveyed as a comparison group (control group).
Results from pre-study have led to a selection of therapy attributes that will be incorporated into a quantitative evaluation of relative attribute importance through a discrete choice experiment (DCE) or best-worst scaling (BWS).
The analysis will use logit-based approaches to analyze treatment preference data collected from respondents, including random parameter logit (RPL) to model unobserved variation in preferences within the sample. The initial model specification will only consider main effects characterized by the attribute variables. Heterogeneity will be analyzed using latent class analysis (LCA).
Results: This HPR will document patients preferences for robotic and assistance technologies in neurorehabilitation. Treatment attributes for the survey of patient preferences and acceptance include technical aspects and therapy-related attributes, such as financial, clinical and digital-administrative attributes.
Conclusions: Research on patient preferences helps to support healthcare decisions and promote an effective and efficient healthcare system with met care needs and low costs. Incorporating preferences and acceptance criteria has positive short-, medium-, and long-term effects on patients and the health care system.

eP1–093

Possibilities of using the brain-computer interface with neurofeedback for cognitive rehabilitation of post-stroke patients

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Question: Cerebral stroke is an actual problem in the modern world. After a stroke, most patients (60-90 %) experience cognitive impairment of varying severity. In the rehabilitation of such patients, non-pharmacological methods are especially important. Brain-computer interface (BCI) and neurofeedback (NFB) technologies are widely used for post-stroke cognitive impairment. The aim of our study is to evaluate the effectiveness of using BCI with NFB in patients with cognitive impairment after stroke.
Materials: The study included 20 patients with post-stroke cognitive impairment. The patients were divided into two equal groups (10 patient in the main group, 10 – in the comparison group). Trainings for patients of the main group were conducted on neuro-headset »GARANT-EEG« (NeuroChat, Russian Federation) which performs the function of BCI, allows the patient to mentally control the flow of visual and verbal information on the monitor screen. Trainings for the patients of the comparison group were carried out on the neural interface brain-computer + exoskeleton with NFB,

where the patient was demanded to imagine the movement of the hand. MoCA, Stroop test were used to assess cognitive function and HADS was used to assess affective disorders. There were 8-10 sessions during trainings for patients of all groups.
Results: During the study, the following results were obtained. In the main group on the MoCA scale before the course of trainings 22 [21; 24], after 25 [24; 26], the results are statistically significant (p

eP1–094

Competing with peers boosts rehabilitation of attention impairments after stroke

M. D. Navarro, R. Llorens, A. Borrego, E. Noé, J. Ferri (Valencia/ES)

Question: Although the high prevalence of attention deficits after stroke, there is only very limited evidence of the effectiveness of rehabilitation interventions that target attention impairments in stroke survivors. Virtual reality (VR)-based and computerized applications have been used to motivate individuals while providing real-time performance feedback in gamified tasks [1]. However, the number of controlled studies is scant and the potential of multiplayer interaction has not been explored yet.
The objective of this study is to compare the effectiveness and the motivating abilities of an experimental intervention that combined VR-based and paper-and-pencil gamified tasks administered either in a competitive or in a non-competitive way in individuals with stroke with attention impairments.
Methods: A group of 43 participants, 19 women and 24 men, with a mean age of 52.3 ± 14.8, with either an ischemic (n=21) or hemorrhagic stroke (n=22) and a mean time since injury of 403.3 ± 243.2 days were randomized into a competitive (n=22) or a non-competitive group (n=21). All the participants underwent 20 one-hour group-based sessions. Participants allocated in the competitive group competed with peers. Participants allocated in the non-competitive group worked individually.
The cognitive condition of the participants was assessed pre and post-intervention with the Conners' Continuous Performance Test, the d2 Test of Attention, the Color Trail Test, the Digit Span Test, and the Spatial Span Test. Their motivation was assessed with the Intrinsic Motivation [2] after the intervention.
Results: Competition boosted the effectiveness of the intervention, as evidenced by significantly greater improvements in all cognitive abilities (p=0.05), but divided attention. In addition, participants who competed reported greater enjoyment than participants who did not (p=0.026). Both groups reported comparable levels of perceived competence, pressure, and usefulness.
Conclusions: Our results support a positive effect of competition to enhance the effectiveness and enjoyment of rehabilitation interventions focused on attention impairments post-stroke, with no negative effects on the perceived pressure and competence.

eP1–094. Fig. 1

Funding:
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eP1–095

Application of using the eye-tracking method for rehabilitation oculomotor disorders in patients who have suffered a stroke: a pilot study

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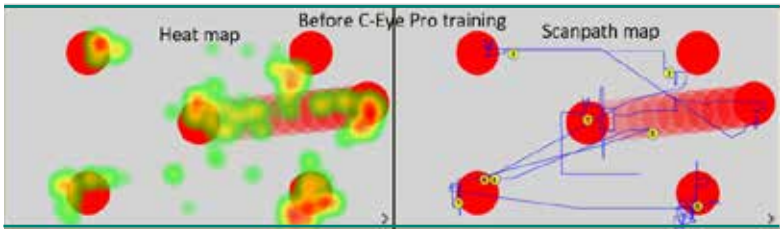
Question: After a stroke the impairments of the visual-oculomotor system occur in 8 – 31% of cases. As a result, such patients experience loss of visual fields, hemianopia, tunnel vision, diplopia. The eye-tracking method allows to diagnose and evaluate the effectiveness of training aimed at improving the functioning of the saccadic system, reducing the volume of visual deficit. Currently, eye tracking is represented by various technological solutions, but not all of them are used in the clinic.
Objectives: Our study aimed to apply an eye tracking-based device in cerebral stroke survivors for the correction of oculomotor disorders and visual attention functions.
Materials and methods: The study involved ten patients (6 males; 50.8 ± 11.17) who had suffered a cerebral stroke (8-ischemic, 2-hemorrhagic). For 3 weeks, patients received daily training on the C-Eye Pro, AssisTech Sp. z. o. o, Poland. The patients interacted with the device only by using eye movements. They underwent a primary assessment of cognitive functions (memory, thinking skills, language, visual-spatial and communicative functions). According to the diagnosis results, they were offered a scheme of correctional training and secondary assessment at the end of the training. Firstly, correction training consisted of 10-minute exercise at the beginning of each session, aimed at improving visual functions and attention. Patients had to follow the spontaneously moving object. The result was evaluated qualitatively using heat and scanpath maps. Secondly, the correctional training included a block of neurorehabilitation (simple cognitive exercises similar to the tasks presented in the assessment).
Results: Patients reported that they liked sessions on this device that were effective for correcting their oculomotor disorders, increased motivation, and emotional sphere.
Since all the study participants had high scores of primary assessment, the secondary assessment did not reveal strong changes in cognitive functions. However, small improve-



eP1–095. Fig. 1: Heat and scanpath maps before training

eP1–095. Fig. 2: Heat and scanpath maps after training

ments were observed in language functions (95.7 vs 99.3%) and memory (90.1 vs 100.0%).

The results of visual training are presented in **Fig. 1, 2** on the example of performing the assessment test »Test of consciousness« by a patient with an ischemic stroke with complaints of diplopia.

In **Fig. 2**, an increase in the stability of the gaze and the accuracy of fixations, a decrease in the number of saccades were detected after training. At the moment, algorithms for quantitative processing of the saccadic system are under development.

Conclusion: Our results show the possibility of successfully applying the device based on the eye-tracking method to correct oculomotor disorders and visual attention functions in patients with cerebral stroke. This type of oculomotor rehabilitation is necessary for a cohort of patients suffering from visual impairment in medical practice.

eP1–96

Telerehabilitation in acute ischemic stroke patients on Padre Hurtado Hospital, Santiago of Chile

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Introduction: Acute ischemic stroke (AIS) is an important cause of disability and the second cause of mortality in Latin America and all over the world [1].

Thirty percent of people that suffered AIS require a carer in the acute setting and 63 percent need some help six month after diagnosis [2]; therefore, multidisciplinary rehabilitation becomes an important strategy to achieve a better performance in daily life activities, walking and cognitive function.

Telerehabilitation emerges as a part of telemedicine and its goal is to facilitate the access to health services [3]. Moreover, it benefits people who has transfer difficulties, economic or mobilization issues [4, 5]

We aim to establish the satisfaction level of our patients that go under the telerehabilitation model.

Methods: Unicenter observational prospective study. We implement a combined model of rehabilitation that includes synchronous sessions of telerehabilitation with physical and occupational therapists and asynchronous videos availables on our hospital's website. Then, a survey was administered to evaluate satisfaction level by two blind evaluators. Data was analyzed with Excel 2013.

Results: We included thirty patients who suffered AIS between July 2020 and June 2021. Of these, 66% were female. Median age was 60 years. Seven patients did not reach final evaluation; two died before the survey was administered, two were suffering a terminal disease and discontinued their participation and three could not be contacted. Of the 23 remaining, 95% declared to be satisfied or very satisfied with telerehabilitation in the areas of quality of care, therapeutic support, experience and objectives achieved. 91% declared they were very satisfied or satisfied with the platform used. 43.5% stated that telerehabilitation is the same as conventional therapy and 39% stated that telerehabilitation was better than conventional therapy. 95% would recommend this type of therapy to others.

Conclusions: Overall, results from this study suggest that telerehabilitation services are a feasible alternative when convencional therapies are not available.

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eP1–97

When can I eat again? Development and validation of a prognostic model for oral intake of food in patients with acquired brain injury

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Background: Dysphagia is the most common cause of tube feeding, but risk factors such as malnutrition can also influence whether patients are tube-fed. The disadvantages of tube feeding are lack of taste sensation, risk of medical complications, social isolation, and reduced quality of life [1–5]. Many patients therefore seek a qualified answer to the question »When can I eat again?«. This can be difficult to answer, because an estimate may be subjected to memory bias. By using prognostic models, it is possible to present patients with a prognosis, which is based on the sum of experiences from the hospital in question.

Objective: To develop and validate a prognostic model and online tool for termination of tube feeding during inpatient neurorehabilitation. The prognostic model will be based on experiences from a published prognostic tool for decannulation from a tracheostomy tube, which was recently published [6].

Methods: A multivariable prediction model. Data from patients with moderate to severe acquired brain injury who were tube fed upon admission for rehabilitation. Predictors for the prognostic model will be based on evidence from scientific literature along with availability from electronic

medical records. The model will be based on time-to-event data using a cox proportional hazard function and validation of the prognostic model will follow recommendations proposed by TRIPOD.

Results: Data from 1.445 patients will be included in development and internal validation of the prognostic model. The population encompass 670 (46%) patients with stroke, 218 (15%) patients with subarachnoid hemorrhage, 277 (19%) with traumatic brain injury, and (20%) with other brain injuries. A total of 651 (45%) of patients had a tracheostomy tube at admission for rehabilitation and the median Functional Independence Measure was 19 (IQR: 18-26).

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eP1-98

Factors Influencing the Progression and Direction of Scoliosis in Children with Neurodisability

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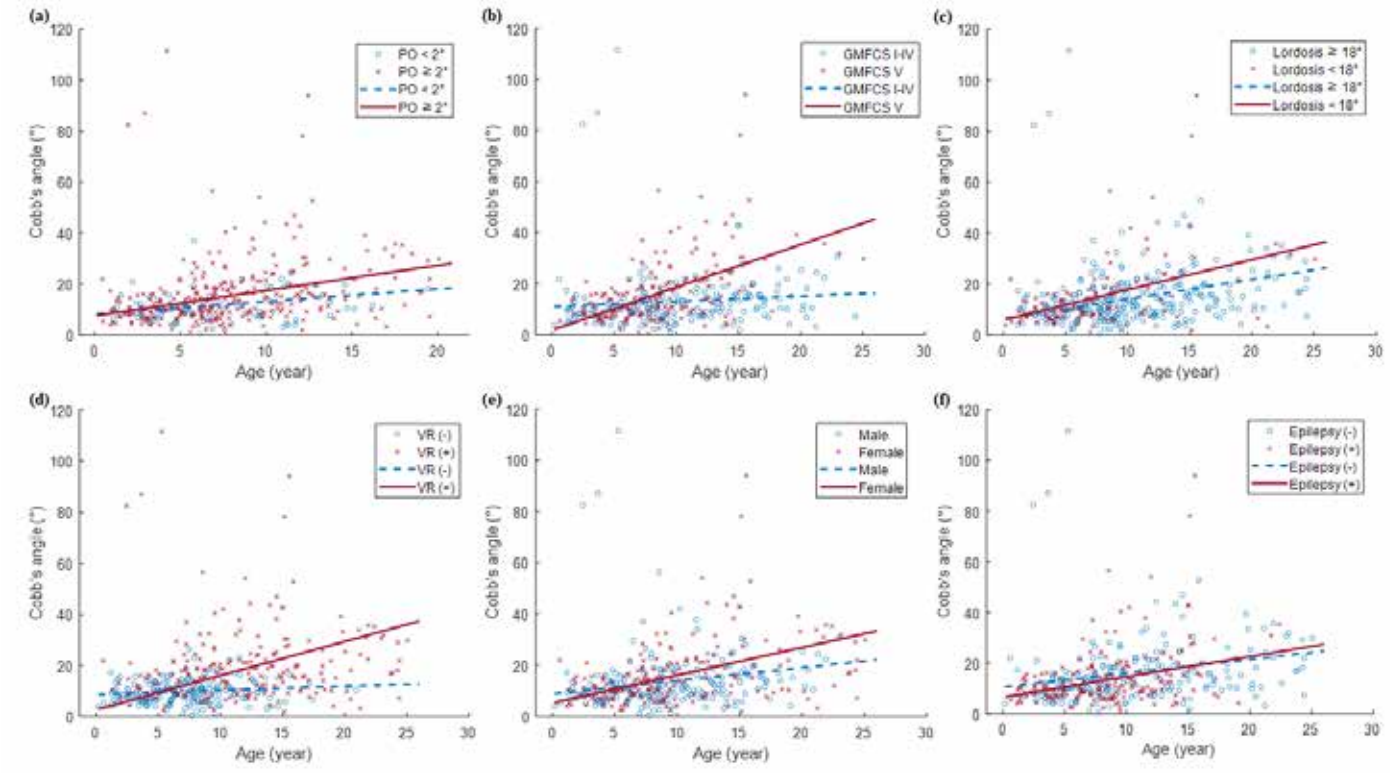
Background: Scoliosis is relatively common in children with neurodisability, and detecting the progression is essential for proper treatment. However, studies predicting the progression and direction of scoliosis have been insufficient. Therefore, we investigated the factors associated with the progression and direction of scoliosis in children with neurodisability.

Method: Retrospectively, patients with neurodisability under age twenty who had taken whole spine radiographs three or more times between January 2005 and December 2020 at St. Vincent's hospital were recruited. Factors affecting the progression of scoliosis over time and factors associated with the apex side of the scoliosis were analyzed.

Results: Whole spine radiographs were analyzed from 116 patients, and 518 adequate longitudinal scoliosis radiographs were available for analysis; the median follow-up duration was five years. In the linear mixed-effects model, pelvic obliquity (PO) greater than 2°, gross motor function classification system (GMFCS) level V, vertebral rotation, and female sex were significantly affecting the progression of the scoliosis curve ($p = 0.04$, < 0.001, < 0.001, 0.005, respectively). There was a significant association with PO and scoliosis curve direction, with the higher side of PO was opposite to the apex side of scoliosis ($\chi^2 = 14.58$, $p < 0.001$).



eP1–098. Fig. 1: Figure legends: Subject-specific (scatterplot) and predicted progression line of cobb's angle (°) versus age (years) according to clinical parameters; **(a)** pelvic obliquity (PO); **(b)** GMFCS; **(c)** lumbar lordosis; **(d)** vertebral rotation (VR); **(e)** sex; **(f)** epilepsy. There was a significant increase in the progression rate of scoliosis in patients with PO > 2°, GMFCS level V, vertebral rotation (Nash-Moe grade ≥ 1), and in female patients. Reduced lumbar lordosis (< 18°) in ≥ 2 years of age and the presence of epilepsy did not significantly affect scoliosis progression

eP1–098. Table 1: The direction of apex of scoliosis and clinical parameters (functional asymmetry of upper limbs, handedness, and higher side of pelvic obliquity)

		Apex of scoliosis, N (%)			*p* value
		Right	Left	Total	
Functional asymmetry of upper limbs	Yes	13 (33.3)	26 (66.7)	39 (100)	0.39
	No	14 (43.8)	18 (56.3)	32 (100)	
	Unknown	6 (5.45)	5 (45.5)	11 (100)	
Handedness	Right	13 (41.9)	18 (58.1)	31 (100)	0.12
	Left	4 (21.1)	15 (78.9)	19 (100)	
	Unknown	16 (50.0)	16 (50.0)	32 (100)	
Higher side of pelvic obliquity	Right	13 (28.3)	33 (71.7)	46 (100)	< 0.001
	Left	12 (85.7)	2 (14.3)	14 (100)	

Conclusions: Severely impaired gross motor function, PO, vertebral rotation, and female sex were significantly related to the progression of scoliosis. Asymmetrical neurological upper extremity involvement did not, but PO affects the direction of scoliosis. By identifying the factors that accelerate scoliosis, patients at high risk could be more actively intervened to minimize the harmful effects.

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eP1–99

Clinical effects of functional repetitive neuromuscular magnetic stimulation targeting the gluteus muscles in children and adolescents with cerebral palsy

M. Späh, J. Schnabel, A. Meuche, B. Parzefall, C. Börner, L. Grosse (München/DE), L. Klich (Vogtareuth/DE), U. Breuer, B. Warken (München/DE), M. Hösl, S. Berweck (Vogtareuth/DE), S. Schröder, F. Heinen, M. Bonfert (München/DE)

Background: Spasticity, weakness and insufficient selective motor control are key characteristics of bilateral spastic cerebral palsy (BSCP). Independent walking ability is an important goal for children and adolescents with BSCP and strengthening the gluteus muscle can improve endurance and gait stability. Combining physiotherapy with a neuromodulatory, non-invasive intervention on behalf of repetitive neuromuscular magnetic stimulation (rNMS) could enhance effects. This study examines the efficacy of functional rNMS intervention in children and adolescents with BSCP.
Methods: Within this prospective study, so far, seven patients with BSCP aged 6 to 14 years (mean 10.7y; SD 2.5y) participated. They received 12 customized sessions of physiotherapeutic exercises combined with simultaneous rNMS (aiming at 11.550 total stimuli per session) targeting the gluteus muscles. Each session comprised five exercises , repeated for two minutes bilaterally. Pre- and post-assessments take place prior and after treatment, including 10-m-walking-test, 6-minute-walking-test, GMFM assessment as well as COPM and GAS interviews.
Results: The 10-meter-walking-test self-selected and maximum velocity did not change from pre- to post-assessment, as did distance covered in 6-minute-walking-test. The GMFM dimension E raw score increased from mean 66 to mean 68. COPM performance changed from 4.5 to 5.1, satisfaction improved from 4.4 to 5.4. The GAS was-2 and -1.5 pre/post, respectively.
Conclusion: Functional rNMS is a well-accepted and safe non-invasive intervention for children and adolescents with BSCP demonstrating positive trends in patient reported outcome and motor function in this preliminary analysis. However, its clinical efficacy will have to be further investigated during controlled studies.

eP1–100

Feasibility of functional repetitive neuromuscular magnetic stimulation as intervention for the gluteal muscles in children with bilateral cerebral palsy

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Background: In children with bilateral spastic cerebral palsy (BSCP), besides spasticity, weakness and a reduced selectivity are the most prominent reasons for motor impairment. Due to the latter, conventional physiotherapy exercises can often be limited. This might also affect the hip extending gluteal muscle group. Their weakness particularly contributes to a less erected gait in BSCP. Repetitive neuromuscular magnetic stimulation (rNMS) combined with physiotherapy may help to overcome this limitation. This study assessed the feasibility, acceptance, and safety of rNMS for children and adolescents with BSCP.
Methods: Within this monocenter prospective study, so far, seven participants with BSCP aged 6 to 14 years (mean 10.7 y; SD 2.5y) participated. They received 12 customized sessions of physiotherapeutic exercises combined with simultaneous rNMS (aiming at 11.550 total stimuli per session) targeting the gluteus muscles. Each session comprised five exercises, repeated for two minutes bilaterally each. Customized questionnaires and the Gait Outcome Assessment List (GOAL) are used to assess feasibility, acceptance, and safety of the functional rNMS intervention.
Results: The outpatient rNMS intervention was highly accepted by participants and caregivers, and very well feasible for therapists. Protocol adherence was 100 % with no missed sessions. 100 % of patients and caregivers would repeat and 83.3 % would recommend rNMS treatment. In 77.8 % of all together 72 sessions, no side effects were reported. During 22.2 % of sessions, a temporarily tingling on the skin of the stimulated region was reported. Feelings of pressure, warmth or cold were recorded during 6 sessions (8.3 %). The mean total GOAL score improved from 60 to 64 and therefore showed an improvement of self reported motor abilities.
Conclusion: Functional rNMS promises to be a well-accepted, feasible and safe non-invasive treatment method for gluteal weakness in BSCP. Larger, scale-controlled studies are needed to explore its neuromodulatory effects both on the muscular and central level.

eP1–101

Feasibility, acceptance and safety of functional repetitive neuromuscular magnetic stimulation for dorsiflexors in pediatric patients with spastic hemiparesis.

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Background: Spasticity, decreased selective motor control, and weakness are limitations following congenital and acquired brain injury. Recently, repetitive neuromuscular magnetic stimulation (rNMS), a non-invasive, non-pharmacological approach, has been applied in adult stroke-patients. Data on the feasibility, acceptance, and safety of a rNMS intervention in pediatric patients is missing so far.
Methods: Within this prospective monocenter study, so far, 8 participants aged 8.6 years (SD 1.32) with spastic hemiparesis completed the study and received a customized functional rNMS intervention. Intervention consisted of 10 sessions of physiotherapeutic exercises combined with rNMS (aiming at 9.435 total stimuli per session) during 5 days. Sessions last 15 minutes each and comprise three different exercises targeting the tibialis anterior muscle.
Results: The frNMS setting was well perceived by participants and caregivers, and very well feasible. Seven out of eight children (87.5%) adhered to 9 out of 10 scheduled sessions. 100% of caregivers and 87.5% of patients (n=7) would repeat and recommend frNMS to other patients, respectively. 100% of the participants rated the treatment as positive or neutral. In 63 out of 68 sessions (92.6%) no side effects were reported. During 10 sessions (14.7%) a temporarily tingling was experienced by the participants in the stimulated region. None of the affected patients rated the tingle as discomforting.
Discussion: According to preliminary experience, frNMS promises to be a well-accepted, well feasible and safe, non-invasive intervention. Large-scale controlled studies are needed to explore its mechanisms of action and clinical effects in detail.

eP1–102

Ganglionopathy preceding Sjögren Syndrome - a clinical case

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Introduction: Ganglionopathies are sensory neuronopathies related to dorsal root ganglia neuronal degeneration and characterized by early ataxia without motor deficiency, along with asymmetrical, non-length dependent, positive sensory symptoms.
Unlike typical sensory neuropathies these are disabling syndromes. Differentiation is essential because of Ganglionopathies association with underlying systemic disease, usually inflammatory or neoplasia related. These are often diagnosed after the neurologic presentation, even though half of ganglionopathies remain idiopathic.
Objectives: We aim to describe a clinical case of ganglionopathy as an inaugural presentation of Sjögren Syndrome (SS) and alert to the role of electrophysiology in the diagnosis and subsequent proper management of this pathology.
Methods: Clinical case report through review of in-hospital investigation and clinical records. Discussion of rationale for diagnosis based on literature review.
Results: A 78 years-old female, presented with ascending distal hand and foot dysthesia, with 1 month evolution, followed by an unsteady gait and occurrence of falls. On examination we highlight a global hyporeflexia, algic hypoesthesia of limbs and trunk, appendicular postural errors, and an ataxic gait.
Patient presentation initially mimicked cerebellar ataxia or mielorradiculitis, ruled out by complementary exams - cerebrospinal fluid, full rachis CT, spinal MRI and cerebral CT had no relevant alterations. Peripheral involvement was suspected and Nerve Conduction Studies revealed an asymmetrical absence of sensory nerve action potentials with normal motor conduction studies, diagnosing a possible Ganglionopathy.
Investigation proceeded based on common Ganglionopathy causes. Infectious, paraneoplasic and toxic causes were ruled out. A SS was confirmed analytically and by salivary gland biopsy. Sicca symptoms were retrospectively found. Intravenous Immunoglobulin was started, according to EULAR 2020 recommendations, with positive treatment response.
The coexistence of ganglionopathy, investigation focusing on main aetiologies (infectious, paraneoplasic, toxic and autoimmune) and a favourable response to immunosuppression, were key features to correctly diagnose a Ganglionopathy associated to SS that met previously reported diagnosis criteria. Polyneuropathies occur in 5 to 15% of SS patient, including sensorimotor axonal polyneuropathy, small-fibre neuropathy and ganglionopathy in only 0.6 – 4.8%.
Conclusion: We present a complex rare neurologic presentation of a systemic disease. Emphasize the role of nerve conduction studies in confirming sensory peripheral nervous involvement, in differentiating from a subacute areflexic polyneuropathy or other peripheral neuropathies and in identifying a possible Ganglionopathy. Concluding, an inaugural diagnosis of a SS was possible with guided treatment and neurological improvement.

eP1–103

Systematic neuropsychological rehabilitation and return to work after stroke: presentation of two cases

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Introduction: Stroke is the third leading cause of disability worldwide and stroke survivors commonly develop post-stroke cognitive impairment that have a great impact in every day functionality, participation and return to work. Systematic neuropsychological rehabilitation is considered an optimal choice for dealing with cognitive and behavioral impairments in post-stroke patients according to the literature.
Case 1: CE is a right-handed, 42 years old, highly educated, married with two children man, who suffered a stroke in 2017, while driving. Brain CT and angiography showed exacerbate intracerebral hematoma in the basal ganglia, surrounded by peripheral edema oppressing the right ventricle, resulting in a midline shift. Open craniotomy was performed frontotemporally and a ventriculostomy catheter

was placed. He presented left-sided hemiparesis. He was referred for rehabilitation one year post-stroke.
Case 2: SN is a right-handed, 54 years old, highly educated married with two children man, who suffered a stroke in 2016.Brain CT and MRI showed a right frontoparietal subdural hematoma. Open craniotomy was performed. After the surgical procedure he suffered a post-operative hemorrhage, leading to a second brain surgery. He also suffered drug-resistant epilepsy. He was referred for rehabilitation two years post-stroke.
Both patients were referred to the Neuropsychological and Rehabilitation Unit for Brain Injury, ELEPAP, Athens by their neurologists for neuropsychological assessment and intervention. The appropriate therapeutic intervention and treatment goals were formed according to the findings of baseline neuropsychological assessment, following the holistic neuropsychological approach. After one year of rehabilitation a neuropsychological re-assessment was administered. During the rehabilitation process return to work was prepared and attempted for both patients.
Results: The neuropsychological re-assessment revealed significant improvement for both patients in cognitive, behavioral as well as emotional domains. Enhancement of self-awareness regarding the deficits following stroke, as well as learning coping and compensatory strategies seem to have contributed to the abovementioned improvement. Both patients returned to work after 5 and 10 months respectively.
Discussion: Systematic neuropsychological rehabilitation enhances social and vocational re-integration. Cognitive rehabilitation interventions should be tailored to address individual cognitive problems and other impairments of post stroke patients. Returning to work should be a gradual process, with the necessary guidance and support by the therapeutic team in collaboration with the working environment. Family engagement and motivation is also of great importance. Personal characteristics, cognitive, behavioral and emotional changes, as well as intact functions should be taken into consideration for the optimal adjustments to take place in the workplace.

eP1–104

Group training as a rehabilitation tool for patients with neglect syndrome

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Question: There are currently few universal non-medicated rehabilitation options for patients with visual neglect.
In this regard, we have developed and implemented rehabilitation training for patients with NS. The training does not require the use of special equipment.
We assumed that the training would improve the indicators of visual-spatial search in patients with NS, minimizing its manifestations.
Methods:
1) A.R. Luria test battery; Trail Making Test (Part A); the Bells Test;
2) Authors' methods: the Puzzles Test, the Red Shapes Test;
3) Rehabilitation training.

A total of 14 spatial neglect patients after stroke with right hemisphere damage participated in the study and were divided into a target (7 patients who underwent training) and a control (7 patients without training) groups. Patients were examined at admission to the department of medical rehabilitation and after the end of the training course. The training course consisted of 4 group meetings for 2 weeks. Each lesson included a stage of psychoeducation, training in strategies for overcoming NS and tasks, mainly of daily life nature. To assess the effectiveness of the training course, we used the Puzzles Test ($p < 0.001$) and the Red Shapes Test ($p < 0.01$), sensitive to NS.
Objective indicators of the study: total task completion time, the number of left omissions during visuospatial search, overall visual activity of the patient (nominal scale; the presence of head turns to the left was assessed).
Results.: Analysis of the results before and after the training using a non-parametric Wilcoxon signed-rank test showed statistically significant changes in visuospatial search in the experimental group: decrease in the number of left omissions ($p < 0.05$) and increase in overall visual activity ($p < 0.05$).
After the training, while performing tests, patients began to use learned strategies as subsidiary psychological tools to voluntarily control attention directed to the left.
The total task completion time of the Puzzles Test increased after training ($p < 0.05$). Its increase may indicate an increase in consciousness and awareness of this action by patients.
In the control group, there were no statistically significant changes in the indicators of visuospatial search ($p > 0.1$).
Conclusions: As a result of training the number of left omissions decreased and overall visual activity in patients with NS increased. In addition, non-specific effects of training can also be observed: increased motivation, a tendency to help while working in a group, better readiness for individual rehabilitation activities.

eP1–105

Recent data on pharmacological interventions for hemiplegic shoulder pain

I. A. Tzanos, M. Nianiarou (Kifissia/GR), M. Kechagia (Kifissia/GR, Athens/GR), A. Kotroni (Kifissia/GR)

Introduction: Shoulder pain has been identified as a common and multifactorial complication among stroke survivors that inhibits the participation in the rehabilitation process and reduces quality of life.
Objectives: To summarize the current trends on pharmacotherapy options for the effective treatment of shoulder pain after stroke.
Materials and methods: We conducted bibliographic research of the last 8 years in the scientific search engines, »PubMed« and »Cochrane Library«. Keywords used were »hemiplegic shoulder«, »pain« and »pharmacological«. Nineteen studies were selected to be included in this review according to similarity with the main theme.
Results: Acetaminophen can be helpful and without significant side effects, most commonly used as a first line option in conjunction with physiotherapy. Topical application of lidocaine can be useful and well tolerated. Besides their potential serious adverse events in this group of patients (renal damage, bleeding, etc), nonsteroidal anti-inflammatory drugs are widely used for hemiplegic shoulder pain. However, their topical use had been considered as safer. Antiepileptic drugs have been proven as effective for pain that is likely to be of neurogenic origin, as in central pain or shoulder-hand syndrome. Moreover, tricyclic antidepres-

sants seem to have analgesic properties, while they are also helpful with sleep management. On the other hand, serotonin reuptake inhibitors may also be useful regarding neuropathic shoulder pain. Oral drugs with anti-spasticity properties seem to facilitate participation in physical therapy in patients suffering from hemiplegic shoulder pain, primarily if given before sleep to avoid their sedative action during day time. Finally, oral corticosteroids have been also considered as effective, but their prolonged use needs caution due to their potentially serious adverse effects.
Conclusion: Recent research supports that several pharmacologic agents (especially acetaminophen and topical agents) can be considered as useful tools alongside with other therapeutic techniques.

eP1–106

Clinical predictors of probable depression in people with Spinal Cord Injury residing in Greece

I. A. Tzanos (Kifissia/GR), C. A. Rapidi (Athens/GR), A. Kotroni (Kifissia/GR)

Introduction: Spinal cord Injury (SCI) has severe effects in both body function and emotional well-being.
Objectives: The aim of this study is to investigate the association of depressive symptoms in the Greek SCI population with demographic and clinical variables.
Materials and methods: One hundred and sixty-four residents of the Greek territory with SCI living in the community for at least 1 year after the completion of the primary inpatient rehabilitation program were included in the study. They were evaluated for probable depression according to the Patient Health Questionnaire-9 (PHQ-9). Univariable and multiple linear regression analyses were performed to assess the possible association of risk factors with the occurrence of depression.
Results: The multiple linear regression analysis showed that high pain scores (P = 0.001) and suffering from both nociceptive and neuropathic pain (P = 0.005) were associated with depressive mood, while pressure ulcers had a significant effect (P = 0.049) only in the univariable analysis.
Conclusion: Severe pain and pressure ulcers were the main identified predictors of depressive mood.

eP1–107

Music therapy as part of the rehabilitation program in stroke patients: Current review of the literature

M. Nianiarou, I. A. Tzanos, V. Spyropoulou, A. Kotroni (Kifissia/GR)

Introduction: Stroke is one of the leading causes of disability worldwide. According to the World Stroke Organisation, globally one in four adults over the age of 25 will be diagnosed with stroke in their lifespan.
Apart from being a leading cause of death, survivors are often faced with the prospect of long-term disabilities that limit their ability to perform activities of daily life. Therefore, stroke survivors are involved in individualized rehabilitation programs, that are tailored to their needs and consist of physiotherapy, occupational therapy, and speech therapy sessions. In recent years, the rehabilitation approach tends to include a variety of new techniques with the assistance of technology (i. e. robotics). One technique, still not widely used or studied, is the use of music as part of the rehabilitation process.
Objectives: The objective of this review is to shed light on the existing literature concerning the use of
music as part of the rehabilitation process in stroke patients.
Materials and methods: Utilizing PubMed as our search engine, we performed a literature research of the last ten years. The key-words used were »music«, »stroke«, and »neu rorehabilitation«/»rehabilitation«. The database search provided twenty recent studies that were relative with effectiveness of music therapy for stroke patients in the rehabilitation setting.
Results: Separate studies investigate the effectiveness of the addition of music therapy to the traditional therapy programs used in acute, subacute and chronic stages of stroke, in hemiplegic or aphasic patients. Most of these studies are randomized controlled trials. The most often studied techniques are Rythmic Auditory Stimulation (RAS), Therapeutic Instrumental Music Performance (TIMP), and Sonification. It has been reported that the application of these techniques has beneficial effects on gait training and upper limb dexterity, in conjunction with improvement of non-fluent aphasia; however, no improvement has been identified in fluent aphasia yet. Furthermore, music therapy techniques seem to improve mood and facilitate active participation in the rehabilitation program.
Conclusion: Analyzing the current literature, it is evident that various forms of music therapy can be
integrated in the rehabilitation process for stroke patients with promising results regarding their functional progress. However, further larger-scale studies are needed to specifically pinpoint the stage of stroke in which music acts most effectively, and to establish strategies to integrate these new techniques in stroke rehabilitation programs.

eP1–108

Gait recovery in acute ischemic stroke patients: pilot results from the GAITFAST trial

B. Kolářová, D. Šaňák, P. Kolář, H. Haltmar, P. Hluštík (Olomouc/CZ)

Background: Ischemic stroke is a leading cause of long-term disability worldwide [1,2]. Majority of stroke survivors have some walking disabilities and more than two thirds of individuals, who achieve independent ambulation, still walk at speeds that are insufficient to function effectively in the community [3]. Walking is one of the most important activities of daily living (ADL) and restoring gait function has become a critical goal of post-stroke rehabilitation [3].
Aims: As gait speed (GS) has been identified as a determinant of gait independency [4], we aimed to assess a change of GS after intensive rehabilitation (RHB) in the first ever acute IS patients.
Methods: Consecutive middle cerebral artery IS patients enrolled in the prospective GAITFAST trial (NCT04824482) were included in the pilot analysis. Walking disability was classified according to Functional Ambulatory Category (FAC), GS was assessed using 10 meters-walking test (10MWT) and neurological deficit using NIHSS. GS, NIHSS and FAC were assessed at the beginning and at the end of intensive two-week inpatient RHB, which consisted of individual physical therapy, occupational therapy and 10-day treadmill

gait training for up to 150 minutes. Results: Thirty one IS patients (15 males, age 64 ± 11 years) with median (min-max) of NIHSS 4 (2 – 6) and FAC score 4 (2y – 4) were analyzed. RHB started 10,7 ± 3,9 days after IS onset. Mean GS increased after RHB from 0.89 ± 0.34 m/s to 1.13 ± 0.39 m/s ($p < 0.05$) and median of FAC score improved from 4 (2 – 4) to 5 (4 – 5) ($p < 0.05$). Median NIHSS decreased to 1 (0 – 3) ($p < 0.05$).
Conclusions: The pilot analysis showed, that GS and gait dependency improved significantly in acute IS patients after intensive 2-week RHB including treadmill training. The acute or early subacute period (between 4 days to up to few weeks after stroke) offers an optimal therapeutic time window for achieving maximal therapeutic effect of physical rehabilitation. Especially during the acute stages after stroke, repetitive, high dose, task-specific training enhances neuroplasticity and may accelerate gait recovery after stroke [5 – 7].

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eP1–109

Enhancing neuronal activity upon cortical trauma protects neuronal survival and downregulate neuroinflammation

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Neuronal excitation plays an important role in the pathogenesis of traumatic brain injury (TBI). Previous data has shown that increased neuronal firing induces beneficial effects after cortical trauma. However, the mechanisms of these activity dependent benefits and how to harness them for neurorehabilitation purposes remains largely unknown. We have shown that direct and indirect modulation of principal neuron excitability affects vulnerability after injury in mice. When inhibiting PV interneurons, by chemiogenetic modulation using the Pharmacologically Selective Activation Module and Pharmacologically Selective Effector Module (PSAM-PSEM), we show a decreased neuronal loss and increased astrogliosis after TBI, this beneficial effect is reversed when increasing PV interneuron activity. We also show that these cellular beneficial effects are dependent on nuclear calcium signaling in neurons. By blocking nuclear calcium dynamics, using a genetically encoded calcium buffer with a nuclear localization signal, we show an increase in microgliosis and a worsening of fine sensorimotor behaviour after TBI. We have identified a novel role of the neuronal derived cytokine, IL-13, which is increased after TBI in mice and humans. The expression of IL-13 is increased upon PV interneuron inhibition and its transcription is reduced upon buffering nuclear calcium signaling. Immunofluorescence staining and fractionation experiments show that IL-13 and its receptor IL-13Ra1 are located largely, but not only, at synaptic sites. Administration of IL-13 to cortical neuronal cultures shows an increase of synaptic IL-13Ra1 phosphorylation and an early large-scale phosphorylation of glutamatergic receptors followed by an increased phosphorylation of ERK1, CREB STAT6 and STAT3 in a dose dependent manner. Finally, we show that IL-13 treatment reduced the vulnerability of neurons to excitotoxicity through a JAK/STAT6 pathway. These data show that IL-13 has an important role as a regulator of synaptic and neuronal physiology after injury, showing beneficial effects of IL-13 expression in vivo and IL-13 treatment in vitro.

eP1–110

Post-hypoxic myoclonus, a rare and dysfunctional disorder – a case report

J. Alberto, J. Romano, P. Ribeiro, R. Costa, Ú. Martins, J. Pires, R. Vilela (Matosinhos/PT)

Introduction: Myoclonus is a clinical sign characterized by brief involuntary movements with multiple etiologies. Post-hypoxic myoclonus, secondary to an anoxic brain injury, is a rare presentation. Clinically, it is characterized by an action and reflex myoclonus that subsides at rest, with an acute or chronic onset after the anoxic event and a fast progression, causing marked disability.
Objectives: We aim to report a clinical case of a post-hypoxic myoclonus admitted in the Intensive Care Unit (ICU) in a Portuguese hospital.
Patients and methods: A case description through clinical process revision was conducted, followed by discussion of related bibliography focused on post-hypoxic myoclonus.
Results: We report a case of a 59-year-old man, who suffered a 3 meters high fall. The patient was found on respiratory arrest of undetermined duration, when first encountered. After cardiopulmonary resuscitation, was admitted in the ICU under mechanical ventilation through surgical tracheostomy. The trauma resulted in traumatic brain injury with no MRI brain lesions; multiple vertebral fractures with no spinal cord involvement, and multiple facial fractures (LeFort type III), treated surgically; and thoracic trauma with two costal fractures, managed conservatively.
In the first 24 hours after cardiac arrest, severe myoclonic movements of high amplitude and frequency on the orofacial muscles, arms, legs and vocal cords appeared. Serial encephalograms revealed no association between involuntary movement and epileptic activity. A post-hypoxic myoclonus in the context of anoxic brain injury due to respiratory arrest was assumed. Drug titration was challenging, a combination of propranolol, clonazepam, piracetam, diazepam, levetiracetam and zonisamide resulted in partial myoclonus improvement.
After 43 days on the ICU, the patient also presented with ICU-Acquired Weakness, dysphagia with nasogastric tube dependence, abundant sialorrhea, a difficult decannulation process, communication limitations related to poor tolerance to phonatory valve and persistency of the intention myoclonus, resulting in severe functional limitation.
The Physical Medicine and Rehabilitation team intervened early-on and the patient was integrated in a Rehabilitation program with Speech Therapy, global muscular strengthening and gait re-education in order to maximize his functional independence.
Conclusion: We pretended to emphasize the importance of the correct diagnosis and proper management of post-hypoxic myoclonus leading to the reestablishment of the patient's functionality.

MODULE

M5-02

Ernährung in der Neurologischen Rehabilitation

S. B. Schmidt (Hessisch Oldendorf/DE)

Einleitung: Aufgrund der Komplexität neurologischer Erkrankungen, der Multimorbidität neurologischer Rehabilitanden, einem hohen Anteil älterer Personen und der daraus resultierenden großen Spannbreite individueller Charakteristika, kann keine einheitliche ernährungsmedizinische Vorgehensweise für eine adäquate Ernährung neurologischer Rehabilitanden empfohlen werden.
Ziel: Ziel dieser Arbeit war es, übereinstimmende Aussagen verschiedener Leitlinien, die für einen Großteil neurologischer Rehabilitanden zutreffen, herauszuarbeiten, um richtungsweisende Handlungsempfehlungen für neurologische Rehabilitanden ableiten zu können.
Methode: Basierend auf der S3-Leitlinie »Klinische Ernährung in der Neurologie« sowie zwei weiteren Leitlinien für kritisch kranke Patienten auf der Intensivstation und einer Leitlinie für die klinische Ernährung in der Geriatrie wurden Gemeinsamkeiten für die Ernährung neurologischer Rehabilitanden herausgearbeitet.
Ergebnisse: Ein Dysphagie-Screening, ein Mangelernährungs-Screening sowie ein Ernährungs-Assessment (bei Vorliegen eines Ernährungsrisikos) sollen bei Aufnahme des Rehabilitanden sowie in regelmäßigen Abständen durchgeführt werden. Eine Ernährungstherapie ist immer indiziert, wenn eine Mangelernährung oder ein Ernährungsrisiko vorliegen oder ein Intensivaufenthalt über 48 Stunden stattgefunden hat. Die Ernährungstherapie sollte möglichst nach einem standardisierten Protokoll erfolgen und der tägliche Bedarf an Energie, Proteinen und Nährstoffen sollte nach einer tiefgehenden Analyse und anschließende Priorisierung der Ernährungsprobleme/-ziele individuell abgeschätzt werden. Eine orale Ernährung sollte immer die erste Wahl darstellen und einer enteralen bzw. parenteralen Ernährung vorgezogen werden, wenn keine Gründe dagegen (z. B. Aspirationsgefahr) vorliegen. Eine enterale Ernährung ist immer dann indiziert, wenn die Bedarfsdeckung oral nicht möglich ist. Zur Überprüfung der Ernährungstherapie sollten ein Monitoring der Nahrungs- und Flüssigkeitsmenge sowie der gastrointestinalen Toleranz und metabolischen Toleranz erfolgen. Das Monitoring stellt eines der wichtigsten Elemente bei der Ernährung neurologischer Rehabilitanden dar.
Schlussfolgerung: Bestehende Leitlinien decken nur Teilbereiche der neurologischen Rehabilitation ab. Des Weiteren erschwert das Vorliegen zahlreicher ernährungsassoziierter Grund-/Begleiterkrankungen neurologischer Rehabilitanden einheitliche Handlungsempfehlungen für das Gesamtkollektiv. Daher sind ein strukturiertes Vorgehen bei der Identifikation neurologischer Rehabilitanden mit einem Ernährungsrisiko und die Herausarbeitung priorisierter Ernährungsziele für die ernährungsmedizinische Betreuung neurologischer Rehabilitanden unabdingbar. In der Praxis fehlt es dazu oftmals an guten Organisationsstrukturen und ernährungsmedizinischer Fachkompetenz verschiedener im Prozess beteiligter Berufsgruppen.

IMPRESSUM

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Charakteristik
Die Neurorehabilitation hat sich zu einem der spannendsten Gebiete der Neurologie entwickelt. Erkenntnisse zur Neuroplastizität, innovative Pharmaka und eine hochkomplexe Rehatechnik haben die Behandlungsmöglichkeiten nach Schlaganfall und Schädelhirntrauma, aber auch bei entzündlichen und degenerativen Gehirnerkrankungen wie Multiple Sklerose und Morbus Parkinson enorm verbessert. Die zunehmende Akademisierung der therapeutischen Berufe führt darüber hinaus zu einer lebendigen Forschungslandschaft, in der therapeutische Verfahren nach wissenschaftlichen Kriterien evaluiert werden.
Die Zeitschrift NEUROLOGIE & REHABILITATION richtet sich an Ärzte in Neurologischen Rehabilitations- und Fachkliniken, aber auch an Mitglieder des therapeutischen Teams wie Neuropsychologen, Logopäden, Ergotherapeuten, Physiotherapeuten, Sozialpädagogen u. a. Berufsgruppen.
Die Mehrheit der Ausgaben widmen sich einem Themenschwerpunkt, der aktuelle Forschungsergebnisse zu einem bestimmten Thema in Übersichten und Kurzübersichten präsentiert und dieses aus den Blickwinkeln der unterschiedlichen Professionen beleuchtet.
Die Zeitschrift veröffentlicht außerdem Originalarbeiten aus überwiegend deutschsprachigen Forschungsgruppen sowie Übersichten und Kasuistiken und bietet in verschiedenen Rubriken einen Überblick über internationale Forschungsergebnisse. Darüber hinaus werden Fragen der rehabilitativen Versorgung in den deutschsprachigen Gesundheitssystemen diskutiert.
Ziel ist es, den aktuellen Forschungsstand der Neurorehabilitation im internationalen und deutschsprachigen Bereich abzubilden, einen gemeinsamen Wissensbasis für die Mitglieder des therapeutischen Teams zu schaffen und damit einen Beitrag zur Akademisierung der Therapieberufe in Deutschland zu leisten sowie organisatorische Standards der Neurorehabilitation in den deutschsprachigen Ländern zu etablieren.

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