



# E-Program & Abstract Book

## **ASIA OCEANIAN CONGRESS OF NEUROREHABILITATION (AOCNR 2023)**

*in conjunction with the 2023 Annual Scientific Meeting of the Royal College  
of Psychiatrists of Thailand and the Thai Rehabilitation Medicine Association*

*“Multifaceted NeuroRehabilitation: from Tradition to Innovation”*

 13<sup>TH</sup>-16<sup>TH</sup> DECEMBER 2023 |  TRUE ICON HALL, ICONSIAM, BANGKOK, THAILAND

ORGANIZED BY:



**WFNR**  
World Federation for  
Neurorehabilitation

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## Welcome message from AOCNR 2023 Congress President



On behalf of the Congress Chairman, I am delighted to cordially invite and welcome you to join the **5<sup>th</sup> Asia Oceanian Congress of NeuroRehabilitation, AOCNR 2023**, which is held during **December 13-16, 2023** at **TRUE ICON HALL, ICONSIAM, Bangkok, Thailand**. It is in conjunction with the 2023 Annual Scientific Meeting of the Royal Colleague of Physiatrists of Thailand and the Thai Rehabilitation Medicine Association, as well as the Thai Society of NeuroRehabilitation, under the theme "**Multifaceted NeuroRehabilitation: from Tradition to Innovation**". It will be a good time to bring our life back

into society in the post-pandemic era for academic activities to link-share-learn and travelling to absorb the beauty of culture and nature where Bangkok, Thailand is one of the best destinations in the world.

This congress is supported by the Asia Oceanian Society for Neurorehabilitation (AOSNR) and the World Federation for Neurorehabilitation (WFNR). It will be a stage of new researches, ideas and concepts in neurorehabilitation including keynotes, plenary sessions, symposium, guest lectures, parallel sessions, meet the expert, teaching courses and workshops. Oral presentations and E-poster presentations are also the interesting sessions. A variety of sessions will ensure inter-professional education with interactive communication among experts and participants.

Ultimately, I hope everyone enjoy our programs and the knowledge and skills gained from this conference will have an impact on your practice to improve the patient care and enhance quality of life of your patients.

I hope you have a wonderful time in the AOCNR 2023 and wish you a most enjoyable and pleasant stay in Thailand.

Sincerely yours,

Sawasdee,

**Witsanu Kumthornthip, MD.**

Congress Chairman, AOCNR 2023 Congress  
President, Royal College of Physiatrists of Thailand and Thai Rehabilitation Medicine Association (TRMA)  
Founding President, Thai Society of NeuroRehabilitation (TSNR)  
Regional Vice-President of the World Federation for Neurorehabilitation (Southeast Asia)

## Welcome all to the 5th Asia Oceanian Congress of Neurorehabilitation 2023!



The Asia Oceanian Society of Neurorehabilitation (AOSNR) is an important dynamic association focused on the practice and study of Neurorehabilitation, with special emphasis on our region, the Asia Oceania, the region of the 60% of the world's population.

This organization is unique – combining Rehabilitation Medicine with other medical specialties, and inclusive too to allied health professionals, who are our partners in the care of our patients with Neurorehab disorders.

In 2008 we held the Tripartite Meeting of Neurorehabilitation in the Philippines with Hongkong and Thailand experts, and from then on, we have had strong partnerships with Thailand in the field of NeuroRehabilitation, with Thailand and the Philippines, as leading and founding members of AOSNR.

The AOSNR has aligned with the objectives of the World Federation for Neurorehabilitation, which includes the development and improvement of the quality of NeuroRehabilitation across the region, collaboration of practitioners with similar interest, and cooperation amongst National Societies with facilitating exchange of scientific research and the best practices in each area.

This conference is exciting, as we focus on conditions and treatments more common to our region. We will also include complementary and traditional medical practices. We will update and discuss challenges, which include new findings, new technology, and new treatments through Computers.

We continue to study and practice to ultimately achieve our aim: that of uplifting our people with Neurorehabilitation disorders

It is nice to see you all in AOCNR Bangkok 2023! Welcome and Long Live AOSNR!

**Teresita Joy P. Evangelista, MD**  
President  
Asia Oceanian Society of NeuroRehabilitation



## 5<sup>th</sup> Asia Oceanian Congress of NeuroRehabilitation

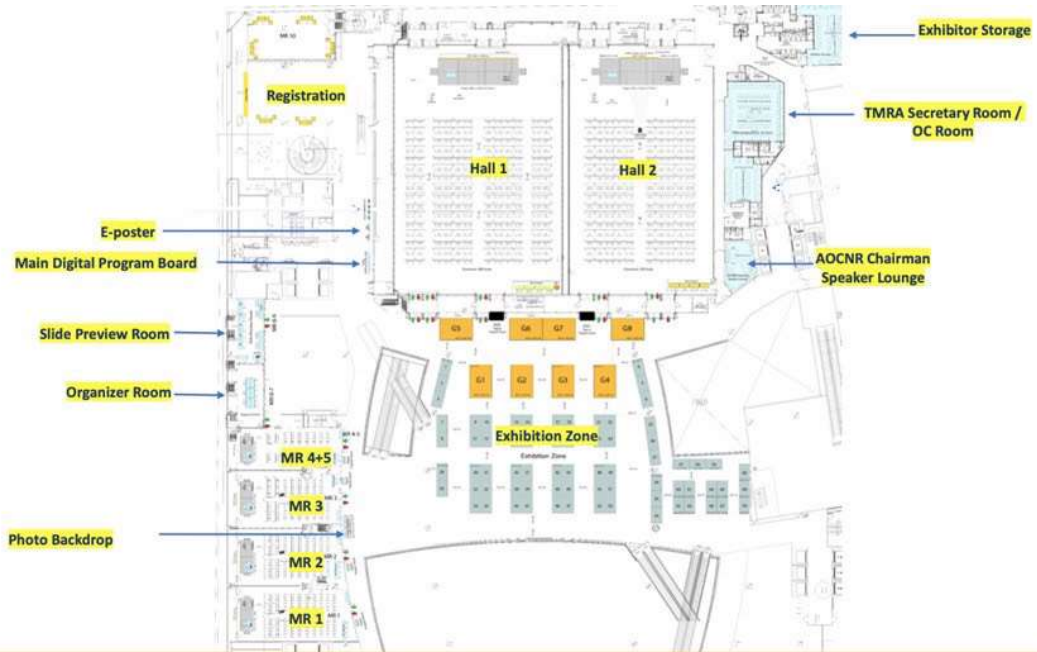
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### Local Organizing Committee

|                                 |  |
|---------------------------------|--|
| President/ Congress Chairman    | Asst. Prof. Witsanu Kumthornthip, M.D.       |
| Congress Vice-chair             | Assoc. Prof. Wasuwat Kitisomprayoonkul, M.D. |
| Congress Secretary              | Assoc. Prof. Gulapar Srisawasdi, M.D.        |
| Secretary General               | Asst. Prof. Woraphon Aramrussameekul, M.D.   |
| Scientific Committee            | Asst. Prof. Dr. Paitoon Benjapornlert, M.D.  |
| Research & Innovation Committee | Prof. Areerat Suputtitada, M.D.              |
| Treasurer                       | Pol. Col. Dr. Piyavit Sorachaimerha, M.D.    |
| Sponsor & Exhibition            | Dr. Attarit Srinkapaibulaya, M.D. Committee  |
| Sponsor & Exhibition            | Dr. Puenthai Thephmontha, M.D. Committee     |
| Public Relation                 | Dr. Phattaraphon Atimetin, M.D. Committee    |



## Overview Plan



7<sup>th</sup> Floor Plan



# Scientific Program

13 December 2023

| Time        | Room 1  | Room 2  | Room 3   | Room 4-5   |
|-------------|---|---|--|--|
| 08:00-09:00 | Registration  |   |  |  |
| 09:00-10:00 | <p><b>Workshop 1</b><br/>                     Transcranial Pulse Stimulation (TPS) - an innovative method in brain stimulation<br/>                     Lars Wojtecki (Germany)<br/>                     Pak Wing Calvin Cheng (Hong Kong)<br/>                     Moderator: Somrot Phonglamai (Thailand)</p> | <p><b>Workshop 3</b><br/>                     Swallowing instrument hands-on and interpretation<br/>                     Eiichi Saitoh (Japan)<br/>                     Yoko Inamoto (Japan)<br/>                     Yi-Chian Wang (Taiwan)<br/>                     Thai team<br/>                     Moderator: Chompunut Pongakkasira (Thailand)</p> | <p><b>Workshop 5</b><br/>                     Pitfalls in EDx<br/>                     Lawrence R. Robinson (Canada)<br/>                     Somkiat Hemtasilpa (Thailand)</p>  | <p><b>Workshop 6</b><br/>                     Workshop on advance locomotor training with exo-skeletal robots and gamified balance rehabilitative therapy<br/>                     Waswat Kitisomprayoonkul (Thailand)<br/>                     Komwudh Konchalard (Thailand)<br/>                     Pornprom Surakul (Thailand)<br/>                     Gianluca Sesenna (Italy)<br/>                     Ales Hribar (Slovenia)<br/>                     Moderator: Komwudh Konchalard (Thailand)</p> |
| 10:00-11:00 |   |   |  |  |
| 11:00-12:00 |   |   |  |  |
| 12:00-13:00 | Lunch   |   |  |  |
| 13:00-14:00 | <p><b>Workshop 2</b><br/>                     TMS &amp; PMS in Specific Disease<br/>                     In Seok Moon (Korea)<br/>                     Pannawish Wongwiwattananon (Thailand)<br/>                     Ratanapat Chanubol (Thailand)</p>   | <p><b>Workshop 4</b><br/>                     Botulinum toxin<br/>                     Chueh-Hung Wu (Taiwan)<br/>                     Yi-Chian Wang (Taiwan)<br/>                     Moderator: Witsanu Kumthornthip (Thailand)</p>   | <p><b>Workshop 5</b><br/>                     Workshop "Hand Paresthesia"<br/>                     Lawrence R. Robinson (Canada)<br/>                     Somkiat Hemtasilpa (Thailand)<br/>                     Norarit Luanchumroen (Thailand)</p> | <p><b>Workshop 7</b><br/>                     DIR/Floortime approach to overcome challenges in pediatric rehabilitation<br/>                     Naomi Wong (Singapore)<br/>                     Kingkaew Pajareya (Thailand)<br/>                     Moderator: Teerada Ployetch (Thailand)</p>  |
| 14:00-15:00 |   |   |  |  |
| 15:00-16:00 |   |   |  |  |



# Scientific Program

## 14 December 2023

| Time        | Hall 1   | Hall 2   | Room 1   | Room 2   | Room 3   | Room 4-5   | Room 10  | Room 11 |                           |                            |
|-------------|--|--|--|--|--|--|--|---------|---------------------------|----------------------------|
| 08:00-08:30 | <b>Registration</b>  |  |  |  |  |  |  |         |                           |                            |
| 08:30-09:15 | <b>Opening Ceremony</b><br>WFR President: Volker Heusinger (Germany)<br>AOCNR President: Teresita Joy Ples Evangelista (Philippines)<br>AOCNR 2023 Congress Chairman Report: Wisanu Kumbhomthip (Thailand)<br>Opening Speech: His Excellency Anutin Chavarmakul, Deputy Prime Minister and Minister of Interior of Thailand<br>Opening and Group Photo<br>Opening Performance<br>VTR: Lesson to learn... Life After Stroke How to live your life... by Off Pongpat Weerawatwong (Thailand) |  |  |  |  |  |  |         |                           |                            |
| 09:15-10:00 | <b>Honorary Keynote Lecture</b><br>Future perspectives in neurorehabilitation: From EBM to digital technologies<br>Volker Heusinger (Germany)<br>Chair: Wisanu Kumbhomthip (Thailand)  |  |  |  |  |  |  |         |                           |                            |
| 10:00-10:45 | <b>Plenary Lecture 1</b><br>Neuroplasticity for motor recovery<br>Mary F Galke (Australia)<br>Chair: Nam Jong Park (Korea)   |  |  |  |  |  |  |         |                           |                            |
| 10:45-11:15 | <b>Coffee Break / Industry Exhibition</b>  |  |  |  |  |  |  |         |                           |                            |
| 11:15-12:15 | <b>Educational Session</b><br><b>Motor recovery</b><br>Stroke-related motor deficiency: Gait and balance problem in stroke<br>Hiroaki Kubano (Japan)<br>Gait disturbance: The shifting of double support during gait cycle<br>Park Insook (Thailand)<br>Chair: Mary F Galke (Australia)<br>Co-Chair: Park Insook (Thailand)  | <b>Educational Session</b><br><b>Parkinson's disease</b><br>Understanding the clinical of Parkinson's disease: A magic piece of the Parkinson's treatment<br>Rongroj Bhayavari (Thailand)<br>Chair: Preeyia Ruitiphong (Thailand)  | <b>Educational Session</b><br><b>Dementia</b><br>Update on dementia diagnosis, assessment and treatment<br>Wiratrak Muangsoonthorn (Thailand)<br>Update on non-pharmacological treatment in dementia<br>Jusan Kondo (Japan)<br>Update on pharmacological treatment in dementia<br>Yutachai Likitvoron (Thailand)<br>Chair: Jusan Kondo (Japan)<br>Co-Chair: Jitima Sangsuan (Thailand) | <b>Educational Session</b><br><b>Pediatric DTR Routine</b><br>Unlocking the potential of children with developmental challenges: DTR Routine approach<br>Kinglawe Pajanya (Thailand)<br>Chair: Teresita Joy Ples (Thailand)  | <b>Educational Session</b><br><b>Pain</b><br>Lab and electrophysiological approach in polyneuropathy<br>Kongkai Kulavornvong (Thailand)<br>Chair: Lawrence R. Robinson (Canada)<br>Co-Chair: Uraed Sittewongkiet (Thailand)  | <b>Oral Presentations: Geriatric neurorehabilitation "Research and Innovation Awards Competition"</b><br>Neuroprotective equivalence comparison of Erythropoietin-ferrocenone nanobots with Erythropoietin<br>Chang Ho Heung (Korea)<br>Effect of transcranial pulse stimulation on ADHD: a double-blind, randomized, sham-controlled trial<br>Tommy Hong (Hong Kong)<br>A double-blind, randomized, sham-controlled trial of transcranial pulse stimulation on ASD<br>Joyce Lee (Hong Kong)<br>Long term data of TIPS in Alzheimer's: a detailed analysis of different neurophysiological domains<br>Carole Cret (Germany)<br>The backside surface EEG-based fatigue index: a digital biomarker of human neurovascular aging<br>Gerald Beniczky (Austria)<br>Method for dementia tracking: sum neurorehabilitation (neurophysiology) recommendation<br>Souvik Das (India)                               |  |         |                           |                            |
| 12:15-13:00 | <b>Lunch Symposium 1 (BTL)</b><br>R-gait: End effector gait robot: What the evidences tell us about robotic gait rehabilitation in stroke patients<br>Dragana Zarkovic (Czech Republic)<br>Chair: Ming Hsueh (Taiwan)  | <b>Lunch Symposium 2 (VIATRIS)</b><br>From Brain To Pain<br>Kongkiat Kulavornvong (Thailand)<br>Napaphaphan Kongsarnpanang (Thailand)<br>Moderator: Uraed Sittewongkiet (Thailand)   |  |  |  |  |  |         |                           | <b>AOCNR Board meeting</b> |
| 13:00-13:30 | <b>Industry Exhibition</b>   |  |  |  |  |  |  |         |                           |                            |
| 13:30-14:30 | <b>Educational Session</b><br><b>Neurological treatment for enhancing neural recovery after stroke</b><br>Pharmacological neurogenic therapy<br>Volker Heusinger (Germany)<br>Application of brain-computer interface in neurorehabilitation<br>Han-Geul Kim (Korea)<br>Chair: Min Wook Kim (Korea)<br>Co-Chair: Jitima Sangsuan (Thailand)  | <b>Educational Session</b><br><b>New innovation in Parkinson's disease treatment</b><br>Whole-body cryotherapy: A new rehabilitation booster for Parkinson patients?<br>Hans Cornelissen (Italy)<br>Digital therapeutics for Parkinson's disease: Rehabilitation perspective<br>Han Gil Seo (Korea)<br>Chair: Areeat Supattitada (Thailand)                            | <b>Educational Session</b><br><b>New innovation in Alzheimer's treatment</b><br>Source and basis of changes in Alzheimer's disease<br>Lars Holtzman (Germany)<br>Efficacy and safety of transcranial pulse stimulation (TPS) in older adults with mild neurocognitive disorder<br>Pak Wing Ching (Hong Kong)<br>Chair: Chakrag Pongpattom (Thailand)                                   | <b>Educational Session</b><br><b>Congenital limb deficiency: Multidisciplinary team</b><br>Congenital limb deficiency of lower extremities: orthopedic management<br>Willem Vrijalim (Thailand)<br>Clinical application of myoelectric upper limb prosthesis for children with congenital upper limb defects<br>Toruaki Asami (Japan)<br>Electrostimulation in pediatric<br>Jerico Santiago Ido Cruz (Philippines)<br>Chair: Teresita Joy Ples Evangelista (Philippines)<br>Co-Chair: Samerthan Khamsan (Thailand) | <b>Case based discussion</b><br><b>Pain</b><br>Combination pharmacotherapy in real-world management of neuropathic pain and New physical medicine concept in NDR pain<br>Reyvaldo R. Ray-Matias (Philippines)<br>Kongkai Kulavornvong (Thailand)<br>Uraed Sittewongkiet (Thailand)<br>Chair: Napaphaphan Kongsarnpanang (Thailand) | <b>Oral Presentations: Neurorehabilitation engineering "Research and Innovation Awards Competition"</b><br>Robotic-assisted lower limb rehabilitation in adult Motor Neuron Disease: a pilot study<br>Jodi Pei Guan (Malaysia)<br>AI-driven prognostic mapping safe balance after stroke<br>Siwanee Lee (Korea)<br>A Virtual Reality based post stroke rehabilitation approach: analysis of safety and user acceptance<br>Arnon Suwattana (Thailand)<br>Quantitative hand muscle classification using AI training: preliminary study<br>Suk Joon Park (Korea)<br>The development, and validity of a finger therapeutic device with integrated motion sensors<br>Pornsaree Kuvitthawan (Thailand)<br>Feasibility effect of music with augmented-binaural beats on sleep quality in adults<br>Pornsaree Kuvitthawan (Thailand)   | <b>E-Poster Presentations "Research and Innovation Awards Competition"</b><br>Main Judges (Based on E-poster):<br>Areeat Supattitada (Thailand), Binn Sangmanee (Thailand), Ruchawan Sukkathien (Thailand) |         |                           |                            |
| 14:30-15:00 | <b>Coffee Break/Exhibition</b>   |  |  |  |  |  |  |         |                           |                            |
| 15:00-16:30 | <b>Educational Session</b><br><b>Cancer rehabilitation</b><br>Neuro-related cancer rehabilitation and innovation<br>Rany Khan (Australia)<br>Chair: Wisanu Kumbhomthip (Thailand)  | <b>Educational Session</b><br><b>Brain fatigue and neurological outcome</b><br>Brain fatigue after stroke<br>Ruzmah Isnan (Indonesia)<br>Hyperbaric oxygen therapy as an adjunct to neuro-rehabilitation in persons with disorders of consciousness<br>Abhishek Srivastava (India)<br>Chair: Tassim Robin (Bangladesh)<br>Co-Chair: Sangkida Rongpaewattana (Thailand) | <b>Educational session and Short Workshop</b><br><b>Dementia</b><br>Harnessing Neuroplasticity: The Impact of Auditory Training on Listening Skills and Cognitive Abilities in Individuals with Hearing Loss<br>Norma Wang (Singapore)<br>Chair: Yoko Yamato (Japan)<br>Co-Chair: Teresita Joy Ples (Thailand) (15:00 - 16:00)   | <b>Case based discussion</b><br><b>Central Palsy</b><br>Central palsy: A team approach, case-based discussion<br>Teresita Joy Ples Evangelista (Philippines)<br>Park Wongsakul (Thailand)<br>Samerthan Khamsan (Thailand)<br>Ruchawan Sukkathien (Thailand)<br>Napuan Kumbhomthip (Thailand)<br>Chair: Samerthan Khamsan (Thailand)  | <b>Short workshop</b><br><b>Pain</b><br>Peripheral injection therapy: what, where, when, why, how?<br>Chueh-Hung Wu (Taiwan)<br>Chair: Napaphaphan Kongsarnpanang (Thailand)   | <b>Oral Presentations: Pediatric and adult neurorehabilitation "Research and Innovation Awards Competition"</b><br>Sleep disturbance among children with neurodevelopmental disorders: A case-control study<br>Mei Yin Fong (Malaysia)<br>Electrical stimulation in task exercise enhance manual fine motor function in cerebral palsy<br>Sakira Parmita Salsaji (Indonesia)<br>The Physical and mental health issues of caregivers of children with cerebral palsy<br>Shiv Lal Yadav (India)<br>Inpatient intensive rehabilitation on functional outcome in SCI due to syringomyelia: a case report<br>Binn Sangmanee (Thailand)<br>Rehabilitation of urinary retention and dyscoordination syndrome in postpartum tuberculous meningitis<br>Sakira Parmita Salsaji (Indonesia)<br>Deciphering the role of multiple white matter tracts in post-stroke aphasia through TRACULA<br>Seungyeon Lee (Korea) | <b>E-Poster Presentations "Research and Innovation Awards Competition"</b><br>Main Judges (Based on E-poster):<br>Areeat Supattitada (Thailand), Binn Sangmanee (Thailand), Ruchawan Sukkathien (Thailand) |         |                           |                            |
| 16:30-17:30 | <b>Plenary Lecture 2</b><br><b>Telehealth</b><br>Tele-rehabilitation: Pioneering the future of rehabilitation<br>Nimal Suna (India)<br>Concepts and Challenges of Tele-rehabilitation in Neurogenic Dysphagia Practice<br>Reyvaldo R. Ray-Matias (Philippines)<br>Chair: Pichetnark Tsutika (Thailand)   |  |  |  |  |  |  |         | <b>ARMA Board Meeting</b> |                            |
| 18:00-21:00 | <b>Oral Presentations: Stroke rehabilitation "Research and Innovation Awards Competition"</b>  |  |  |  |  |  |  |         |                           |                            |
|             |  |  |  |  |  | Deciphering the role of multiple white matter tracts in post-stroke aphasia through TRACULA<br>Seungyeon Lee (Korea)<br>Functional outcomes of stroke rehabilitation program in intermediate care care<br>Korla Suswanta (Thailand)<br>Temporal interference stimulation device of low-cost effect<br>Geotchee Heung (Korea)<br>Rehabilitation strategies for Claustrum's syndrome<br>Sazzana Sirin (Thailand)<br>Mirror Therapy: review and novel equipment approach<br>Gonada Srinivasan (India)<br>Integrated post-stroke rehabilitation for upper limb motor function recovery: a case series<br>Mei Yin Fong (Malaysia)   |  |         |                           |                            |
|             |  |  |  |  |  | <b>Session Judges:</b><br>Chair: Rany Khan (Australia)<br>Co-Chair: Preeyia Ruitiphong (Thailand)<br><b>Main Judges:</b><br>Chair: PC Chen (Taiwan), Chuehchun Chuehchun (Thailand), Srip Patanakul (Thailand)   |  |         |                           |                            |



# Scientific Program

**15 December 2023**

| Time        | Hall 1   | Hall 2   | Room1   | Room2   | Room3  | Room4-5   |
|-------------|--|--|---|---|--|---|
| 8:00-8:45   |  |  |   |   |  |   |
| 8:45-10:00  | <p><b>Plenary Lecture 3</b><br/> <b>Emerging therapies in stroke rehabilitation</b><br/>                     Advancement of botulinum toxin for complex regional pain syndrome<br/>                     Carl PC Chen (Taiwan)</p> <p>Advancement of segmental neuromyotherapy using mechanical needling and sterile water injection<br/>                     Areerat Suputtitada (Thailand)</p> <p>Advancement of rehab-engineering and biomechanics<br/>                     Izumi Kondo (Japan)</p> <p>Advancement of assistive technology<br/>                     Eiichi Saitoh (Japan)<br/>                     Chair: Areerat Suputtitada (Thailand)</p> |  |   |   |  |   |
| 10:00-11:00 | <p><b>Panel Discussion</b><br/> <b>Spasticity</b><br/>                     Thai clinical practice guidelines for spasticity management in stroke and cerebral palsy<br/>                     Supattana Chaitanyom (Thailand)<br/>                     Peera Ya Ruchirapong (Thailand)<br/>                     Montana Buntragulpootawe (Thailand)<br/>                     Teerada Ploygeth (Thailand)<br/>                     Chair: Areerat Suputtitada (Thailand)<br/>                     Co-chair: Rattana Rattanasarn (Thailand)</p>   | <p><b>Educational Session</b><br/> <b>Applied rehabilitation system</b><br/>                     Neuro rehab across region session leadership in rehabilitation teamwork: Challenges for developing countries<br/>                     Taslim Uddin (Bangladesh)</p> <p>Nature-based rehabilitation for operationalization of lived health and wellness<br/>                     Zailha Omar (Malaysia)<br/>                     Chair: Nirmal Surya (India)<br/>                     Co-chair: Songsuda Roongsawatana (Thailand)</p>                | <p><b>Educational Session and VDO</b><br/> <b>Utilizing ultrasound in hemiplegic shoulder pain management</b><br/>                     Hemiplegic shoulder pain, a burden on our shoulders<br/>                     Nuttasert Manimmankorn (Thailand)</p> <p>Ultrasound guided interventions in adhesive capsulitis<br/>                     Napattaphan Kanjanapanang (Thailand)</p> <p>Ultrasound guided interventions for peripheral nerves and spasticity in hemiplegic shoulder pain<br/>                     Chueh-Hung Wu (Taiwan)<br/>                     Chair: Nattiya Tartirirwat (Thailand)<br/>                     Co-Chair: Napattaphan Kanjanapanang</p> | <p><b>Educational Session</b><br/> <b>Swallow</b><br/>                     Swallowing physiology: from basic to advance technology, guided to innovation<br/>                     Perspective of swallowing rehabilitation<br/>                     Eiichi Saitoh (Japan)</p> <p>A mechanical throat simulator for studying oral phase swallowing of liquid thickeners<br/>                     Chaiwat Gamornpias (Thailand)<br/>                     Chair: Yoko Inamoto (Japan)<br/>                     Co-chair: Pimchanok Tuakta (Thailand)</p> | <p><b>Educational Session</b><br/> <b>Spinal cord injury</b><br/>                     Peripheral nerve dysfunction after spinal cord injury<br/>                     Mary P Galea (Australia)</p> <p>Intraoperative monitoring to prevent spinal cord injury<br/>                     Jerico Santiago Dela Cruz (Philippines)<br/>                     Chair: Apichana Kovindha (Thailand)<br/>                     Phuricha Chalwraich</p>  |   |
| 11:00-11:15 | <b>Coffee Break / Industry exhibition</b>  |  |   |   |  |   |
| 11:15-12:15 | <p><b>Educational Session</b><br/> <b>Spasticity</b><br/>                     State of the art in botulinum toxin injection and neurolysis for enhanced stroke recovery<br/>                     Carl PC Chen (Taiwan)<br/>                     Min Wook Kim (Korea)<br/>                     Chair: Areerat Suputtitada (Thailand)</p>  | <p><b>Panel Discussion</b><br/> <b>Applied rehabilitation system</b><br/>                     Neurorehab in a big picture for health care system IBC in Thailand<br/>                     Daungjitt Smithsarasath (Thailand)</p> <p>International ICF<br/>                     Masahiko Mukaino (Japan)</p> <p>Healthcare system in Philippine<br/>                     Teresita Ivy Pina Evangelista (Philippines)<br/>                     Chair: Zailha Omar (Malaysia)<br/>                     Co-chair: Donnuadee Srisupphaphon (Thailand)</p> | <p><b>Educational Session and VDO</b><br/> <b>Ultrasound utility in TOS</b><br/>                     Ultrasound guided interventions for TOS<br/>                     Yi-Chian Wang (Taiwan)</p> <p>Electrodiagnosis of TOS<br/>                     Ratna Soebadi (Indonesia)<br/>                     Chair: Montana Buntragulpootawe (Thailand)<br/>                     Co-Chair: Napattaphan Kanjanapanang</p>   | <p><b>Educational Session</b><br/> <b>Swallow</b><br/>                     Swallowing investigation FEES &amp; VFSS<br/>                     Paltoon Benjapornlert (Thailand)</p> <p>Swallowing CT, airway protection during swallowing<br/>                     Yoko Hamoto (Japan)<br/>                     Chair: Sun Im (Korea)<br/>                     Co-chair: Chanasak Hothairereeng (Thailand)</p>  | <p><b>Educational Session</b><br/> <b>Spinal cord injury</b><br/>                     Process of developing a dataset for investigating lived experience of persons with spinal cord injury living in the community<br/>                     Taslim Uddin (Bangladesh)<br/>                     Chair: Rumishah Hassan (Indonesia)<br/>                     Co-chair: Jerico Santiago Dela Cruz (Philippines)<br/>                     Phuricha Chalwraich</p> <p><b>Spinal cord injury</b><br/>                     Cardiovascular complications in chronic SCI<br/>                     Sinitip Pattanakuhar (Thailand)<br/>                     Chair: Julia Anak Patrick Engkasan (Malaysia)</p> |   |
| 12:15-13:00 | <p><b>Lunch Symposium 3 (ISEN)</b><br/>                     Spotlight on Abobotulinum toxin in adult and pediatric spasticity management<br/>                     Witsanu Kumbharpit (Thailand)<br/>                     Teerada Ploygeth (Thailand)<br/>                     Chair: Areerat Suputtitada (Thailand)</p>  | <p><b>Lunch Symposium 4 (INDIBA)</b><br/>                     Photobiostimulation effect on "CTS" and 448 KHz electro biostimulation on human tissue healing<br/>                     Chikang Pongyogorn (Thailand)<br/>                     Moderator: Nichanart Wattayagorn</p>  |   |   |  |   |
| 13:00-13:45 | <b>Annual General Meeting (45 mins) (13:00-13:45)</b>  |  |   |   |  |   |
| 13:45-14:45 | <p><b>Workshop</b><br/> <b>Ultrasound demonstration and VDO</b><br/>                     Ultrasound demonstration and VDO<br/>                     Carl PC Chen (Taiwan)<br/>                     Areerat Suputtitada (Thailand)<br/>                     Chair: Areerat Suputtitada (Thailand)</p>  |  | <p><b>Educational session</b><br/> <b>WHO</b><br/>                     Global perspective and future vision of neurorehab: New measurement in rehabilitation: The WHO ClinFit tool<br/>                     Fary Khan (Australia)</p> <p>Rehabilitation 2030 initiative: Holistic approach to managing neuro-disability with epilepsy<br/>                     Nirmal Surya (India)<br/>                     Chair: Taslim Uddin (Bangladesh)<br/>                     Co-chair: Wasuwat Ketsomsriyotsookul (Thailand)</p>  | <p><b>Educational Session</b><br/> <b>Swallow</b><br/>                     Dysphagia treatment: Overview of dysphagia treatment<br/>                     Chompunut Pongkaksira (Thailand)</p> <p>Update in neuromodulation techniques for dysphagia management<br/>                     Sun Im (Korea)<br/>                     Chair: Eiichi Saitoh (Japan)<br/>                     Co-chair: Pongkhaew Thitsakulchai (Thailand)</p>  | <p><b>Workshop</b><br/> <b>Workshops on NLTD management</b><br/>                     Case discussion in NLTD management based on ASCoN recommendation<br/>                     Julia Anak Patrick Engkasan (Malaysia)<br/>                     Apichana Kovindha (Thailand)<br/>                     Chair: Apichana Kovindha (Thailand)</p>   | <p><b>Educational session</b><br/> <b>Traditional Medicine</b><br/>                     Traditional Medicine across AO<br/>                     Pichet Sangat (Thailand)<br/>                     Chair: Parit Wongphat (Thailand)</p>      |
| 14:45-15:15 | <b>Coffee Break/Exhibition</b>   |  |   |   |  |   |
| 15:15-17:00 | <p><b>Gala Dinner Room Preparation</b></p>   |  | <p><b>Short workshop</b><br/> <b>Research</b><br/>                     Developing research and meta-analysis<br/>                     Fary Khan (Australia)<br/>                     Mary P Galea (Australia)<br/>                     Chair: Sinitip Pattanakuhar (Thailand)</p>   | <p><b>Short workshop</b><br/> <b>Swallow</b><br/>                     Diet modification: from labs to lips<br/>                     Chewing<br/>                     Sirima Kujarath (Thailand)</p> <p>Flavor: Combination of taste, smell, and mouthfeel<br/>                     Inthawoot Suppavorasati (Thailand)<br/>                     Sound and sight<br/>                     Paltoon Benjapornlert (Thailand)<br/>                     Chair: Pim Terachinda (Thailand)</p>  | <p><b>Workshop</b><br/> <b>Workshops on NLTD management</b><br/>                     Case discussion in NLTD management based on ASCoN recommendation (cont.)<br/>                     Julia Anak Patrick Engkasan (Malaysia)<br/>                     Apichana Kovindha (Thailand)<br/>                     Chair: Apichana Kovindha (Thailand)</p>   | <p><b>Short workshop</b><br/> <b>Traditional Medicine</b><br/>                     Thai traditional medicine workshop<br/>                     Pongchai Sawangwong (Thailand)<br/>                     Chair: Parit Wongphat (Thailand)</p> |
| 18:00-21:00 | <b>Gala Dinner and Entertainment</b>   |  |   |   |  |   |





# Scientific Program

**16 December 2023**

| Time        | Hall 1   | Hall 2   | Room1  | Room2  |
|-------------|--|--|--|--|
| 8:00-8:45   |  | ลงทะเบียน  |  |  |
| 8:45-10:00  | <p><b>Plenary Lecture 4</b><br/> <b>Neuroplasticity</b><br/>                     The key to success in enhancing neuroplasticity through neuromodulation<br/>                     Mary P Galea (Australia)<br/>                     Nam Jong Paik (Korea)<br/>                     Somrot Phonglamai (Thailand)<br/>                     Chair: Nirmal Surya (India)<br/>                     Co-chair: Komwudh Konchalard (Thailand)</p>  |  |  |  |
| 10:00-10:45 | <p><b>Educational Session</b><br/> <b>Neuroplasticity</b><br/>                     Diagnostic transcranial magnetic stimulation is beneficial in developing a more effective treatment plan and achieving better outcomes<br/>                     Pakorn Wivatongvana (Thailand)</p>  | <p><b>Educational Session</b><br/> <b>Robot</b><br/>                     Wearable robots in neurorehabilitation<br/>                     Won-Seok Kim (Korea)<br/>                     Abnormal gait and role of robotic<br/>                     Masahiko Mukaino (Japan)<br/>                     Chair: Eiichi Saitoh (Japan)<br/>                     Co-chair: Wasuwat Kitsomprayoonkul (Thailand)</p>  | <p><b>Educational Session</b><br/> <b>Electrodiagnosis</b><br/>                     Using electrodiagnosis (EDx) for surgical decision<br/>                     Lawrence R. Robins on (Canada)<br/>                     Chair: Ratna Soebadi (Indonesia)<br/>                     Co-chair: Somkiat Hemsatipa (Thailand)</p>   | <p><b>Educational Session</b><br/> <b>Training Technique</b><br/>                     Evaluation and training of proprioception: Focusing on its role in neurorehabilitation<br/>                     Han Gil Seo (Korea)<br/>                     Optimizing prism adaptation for stroke recovery and neglect in stroke<br/>                     Hitav Someshwar (India)<br/>                     Chair: Poramed Charayattanasin (Thailand)</p> |
| 10:45-11:15 | Coffee Break / Industry Exhibition   |  |  |  |
| 11:15-12:15 | <p><b>Educational Session</b><br/> <b>Neuromodulation</b><br/>                     Application of non-invasive brain monitoring (EEG, fNIRS) in stroke rehabilitation<br/>                     Won-Seok Kim (Korea)<br/>                     rTMS in post stroke with dysphagia; clinical applications<br/>                     Chutiratn Pramaksun (Thailand)<br/>                     rPMS for nerve recovery: from neurophysiology to real world practice<br/>                     Komwudh Konchalard (Thailand)<br/>                     Chair: Han Gil Seo (Korea)<br/>                     Co-chair: Komwudh Konchalard (Thailand)</p> | <p><b>Case Based Discussion</b><br/> <b>Robot</b><br/>                     Implement robotics in rehabilitation medicine: How to choose robotic gait training (research based)<br/>                     Eiichi Saitoh (Japan)<br/>                     Masahiko Mukaino (Japan)<br/>                     Parit Wongphaet (Thailand)<br/>                     Witsanu Kumthornthip (Thailand)<br/>                     Chair: Witsanu Kumthornthip (Thailand)</p> | <p><b>Educational session</b><br/> <b>Electrodiagnosis</b><br/>                     Traumatic BPI: electrodiagnosis and PMR role in management before and after reconstructive surgery<br/>                     Ratna Soebadi (Indonesia)<br/>                     Chair: Lawrence R. Robins on (Canada)<br/>                     Co-chair: Chanasak Hathaiareerag (Thailand)</p> <p><b>Case Based Discussion</b><br/>                     The challenge of ulnar neuropathy<br/>                     Chanasak Hathaiareerag (Thailand)<br/>                     Chair: Priyarat Burusnukul (Thailand)</p> | <p><b>Short Workshop</b><br/> <b>Training Technique</b><br/>                     Music and medicine: From box to bench<br/>                     Jakkrit Klaphajone (Thailand)<br/>                     Wilasinee Duangantit (Thailand)<br/>                     Nawaporn Jitngam (Thailand)<br/>                     Chair: Jakkrit Klaphajone (Thailand)<br/>                     Co-chair: Pimchanok Tuakta (Thailand)</p>                     |
| 12:15-13:00 | <p><b>Lunch Symposium 5 (TMGI)</b><br/>                     Beyond one-size-fits-all: The art of high efficacy personalized gait rehabilitation<br/>                     Parit Wongphaet (Thailand)</p>  | <p><b>Lunch Symposium 6</b></p>  |  |  |
| 13:00-13:15 | Exhibition   |  |  |  |
| 13:15-14:15 | <p><b>Educational Session</b><br/> <b>Neuromodulation</b><br/>                     Cochrane systematic review and research on repetitive peripheral magnetic stimulation after spinal cord injury<br/>                     Julia Anak Patrick Engkasan (Malaysia)<br/>                     Review on rPMS in promoting post stroke motor recovery and spasticity<br/>                     Peeraya Ruthiraphong (Thailand)<br/>                     Chair: Peeraya Ruthiraphong (Thailand)</p>  | <p><b>Case Based Discussion</b><br/> <b>Botulinum therapy and robotic rehab</b><br/>                     Effect of combine treatment of botulinum therapy and robotic rehab<br/>                     Toyoko Asami (Japan)<br/>                     Witsanu Kumthornthip (Thailand)<br/>                     Chair: Masahiko Mukaino (Japan)<br/>                     Co-chair: Witsanu Kumthornthip (Thailand)</p>   | <p><b>Case Based Discussion</b><br/> <b>NM Challenging Case</b><br/>                     Neuromuscular challenging cases<br/>                     Lawrence R. Robins on (Canada)<br/>                     Priyarat Burusnukul (Thailand)<br/>                     Ratna Soebadi (Indonesia)<br/>                     Chair: Chanasak Hathaiareerag (Thailand)<br/>                     Co-chair: Paitoon Benjapomlert (Thailand)</p>   | <p><b>Short Workshop</b><br/> <b>Training Technique</b><br/>                     Perfetti method<br/>                     Parit Wongphaet (Thailand)<br/>                     Chair: Parit Wongphaet<br/>                     Co-chair: Songsuda Roongsaiwatana (Thailand)</p>   |
| 14:15-14:45 | Coffee Break/Exhibition  |  |  |  |
| 14:45-16:00 | <p><b>Closing Ceremony</b><br/>                     Closing Remark<br/>                     Award Ceremony<br/>                     Introduction of AOCNR2025 International Conference<br/>                     Group Photo</p>  |  |  |  |

**5<sup>th</sup> Asia Oceanian Congress of NeuroRehabilitation**

**Multifaceted NeuroRehabilitation: from Tradition to Innovation**

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**Invited Speakers  
Abstract**



## NEUROCOGNITIVE DISORDERS – HOW CAN WE IMPROVE OUR PATIENT COGNITION IN CLINICAL SETTING

Calvin, Cheng Pak Wing

Department of Psychiatry, The University of Hong Kong, Hong Kong China

### **Abstract:**

Neurocognitive disorder (NCD) is a very important health issue both for individual and society. There are various interventions and approach for the Neurocognitive disorder (NCD). In the presentation, we are going to discuss the different options of treatment. Besides, as a clinician, what advice should we give to our patients suffering from NCD to improve their cognition.

**Keywords:** Dementia; Intervention; Neurocognitive disorder

December 13, 2023 / Meeting Room 1  
9.00-12.00 hr.

## NEUROPLASTICITY FOR MOTOR RECOVERY

Mary P Galea

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The University of Melbourne, Parkville VIC. 3010, Australia

Neuroplasticity is the ability of the nervous system to respond to intrinsic or extrinsic stimuli by reorganizing its structure, function and connections. The brain is a self-organising system that adapts to its specific environment throughout pre- and post-natal life. Understanding adaptive behaviour in response to nervous system injury requires an understanding of the interaction between the subsystems of the body, the environment, and the continuous feedback between the nervous system, the body and environment. Post-injury experience is a potent modulator of recovery of function. Exposure to complex, stimulating environments can optimise functional recovery from various forms of experimental brain damage. Such environments not only provide complex perceptual and spatial stimuli and afford opportunities for movement. Questions have been raised as to whether the rehabilitation environment is conducive to recovery, since outside of therapy sessions, patients undergoing rehabilitation spend most of their time alone and inactive. In the area of traumatic brain injury, there is evidence that a lack of environmental enrichment may play a role in post-acute cognitive and neural decline. Key factors in rehabilitation for motor recovery are early intervention, task-specific training and practice, and the incorporation of context-relevant task-specific meaningful activities compared to rote exercise or passive modalities.



## APPLICATION OF BRAIN-COMPUTER INTERFARCE IN NEUROREHABILITATION

**Won-Seok Kim**  
Seoul National University Bundang Hospital, Korea

In the field of neurorehabilitation, the impact of Brain-Computer Interface (BCI) technologies on stroke recovery, particularly in the context of motor rehabilitation, stands as a promising avenue for exploration. Recent advances in technology enable better brain signal acquisition in daily practice and various forms of feedback using wearable robots, virtual reality, and haptic devices, which can potentiate and enrich the effects of BCI.

In this presentation, I will provide a basic introduction to BCI, specifically non-invasive BCI using EEG, in motor rehabilitation after stroke. Additionally, I will discuss the current clinical evidence supporting the use of BCI in stroke recovery. I will also share my personal experiences with BCI in motor rehabilitation, offering insights into the practical aspects and challenges associated with its implementation.

December 14, 2023 / Hall 1  
13.30-14.30 hr.

## VIRTUAL REALITY PRACTICE IN STROKE PATIENTS

**Jakkrit Klaphajone**

**Department of Rehabilitation Medicine,  
Faculty of Medicine, Chiang Mai University, THAILAND**

In the field of stroke rehabilitation, the level of patient engagement often serves as a critical factor in determining recovery outcomes. While traditional approaches are effective, they can sometimes become tedious, leading to waning enthusiasm from patients. Recognizing this challenge, we have explored the use of Virtual Reality (VR) in neurorehabilitation, creating vivid, immersive experiences that captivate patients both visually and through sound, enhancing their motivation through scoring systems and rewards that monitor their progress.

Our VR system immerses patients in a culturally resonant Thai temple fair setting, where they engage in specific games tailored to meet therapeutic objectives. For instance, the "Ice-cream Selling" game targets extension movements, while the "Gun Shooting" game focuses on lateral arm sweeps. The "Star Picking" game, on the other hand, is designed to refine vertical arm movements. All of these games also incorporate complex motor functions, like grasping virtual objects, providing a comprehensive rehabilitation experience.

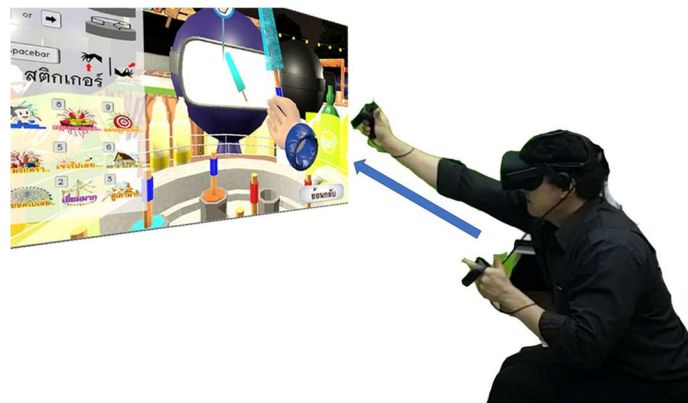
Uniquely designed to accommodate both the patient (Player) and the healthcare provider (Instructor), our VR games feature customizable settings ranging from difficulty levels to time duration and control options. This flexibility allows for individualized therapy plans. Furthermore, during gameplay, instructors can interact directly with patients through a separate interface, offering real-time encouragement and guidance, thus making the rehabilitation process not just effective, but also interactive and genuinely engaging.

Our initial findings indicate that integrating VR into conventional therapy regimes appears to be more effective for stroke patients, particularly in arm and shoulder recovery. The Fugl Meyer Arm assessment (FMA) scores displayed a moderate correlation with scores from the "Ice-cream Selling" game ( $r = 0.57$ ), suggesting its potential impact on arm recovery. Similarly, the "Ice-cream Selling" and "Star Picking" game scores showed moderate to high correlation with the Arm Activity measure (ArmA) score ( $r = 0.65$ ). Additionally, the Barthel Index (BI) scores were also moderately to highly correlated with both "Ice-cream Selling" and "Star Picking" games, underscoring their effectiveness in promoting postural stability and balance training ( $r = 0.64$  and  $0.61$ , respectively).

## VIRTUAL REALITY PRACTICE IN STROKE PATIENTS

## VIRTUAL REALITY PRACTICE IN STROKE PATIENTS (CONT.)

In summary, our VR-based approach, when combined with traditional methods, offers a promising pathway for enhanced stroke rehabilitation, presenting not just improved efficacy but also a more engaging and interactive patient experience.



December 14, 2023 / Hall 1  
15.00-16.15 hr.

## TELEREHABILITATION: PIONEERING THE FUTURE OF REHABILITATION

**Nirmal Surya**

Bombay Hospital & Medical Research Centre, Mumbai

Saiffee Hospital, Mumbai

Northcot Police Hospital, Nagpada, Mumbai

Telerehabilitation, a dynamic and evolving branch of healthcare delivery, harnesses digital technology to provide rehabilitation services remotely. This transformative approach expands access to care, overcoming geographical barriers and improving the reach of rehabilitation services to a wider population. This abstract outlines the key elements and potential benefits of telerehabilitation, positioning it as a crucial component of modern healthcare.

Key Components of Telerehabilitation:

**Virtual Assessment and Monitoring:** Telerehabilitation utilizes telecommunication technologies to conduct comprehensive assessments, enabling healthcare providers to remotely evaluate patients' functional abilities and progress. Advanced tools for remote monitoring, including wearable devices and sensor technology, offer real-time insights into patients' movements and vital signs.

**Personalized Treatment Plans:** Based on virtual assessments, individualized treatment plans are designed to target specific rehabilitation goals. These plans encompass a range of interventions, including physical therapy exercises, occupational therapy activities, speech-language therapy, and cognitive rehabilitation, tailored to the unique needs of each patient.

**Interactive Communication Platforms:** Videoconferencing and secure messaging platforms facilitate direct communication between patients and healthcare providers, creating a virtual connection that enables ongoing support, guidance, and adjustments to treatment plans. This interactive element ensures that patients receive timely feedback and encouragement throughout their rehabilitation journey.

**Education and Empowerment:** Telerehabilitation extends beyond one-on-one sessions to include educational resources and self-management tools. Patients are equipped with information about their condition, strategies for managing symptoms, and techniques for maximizing their functional independence. Empowering patients to take an active role in their rehabilitation fosters a sense of ownership and enhances long-term outcomes.



## TELEREHABILITATION: PIONEERING THE FUTURE OF REHABILITATION (cont.)

### Potential Benefits of Telerehabilitation:

- Increased Accessibility
- Convenience and Flexibility
- Cost-Effectiveness
- Optimized Outcomes

**In conclusion**, telerehabilitation emerges as a groundbreaking approach that has the potential to revolutionize rehabilitation services. By harnessing the power of digital technology, telerehabilitation offers a dynamic and patient-centred solution that enhances accessibility, convenience, and cost-effectiveness, without compromising the quality of care. As the healthcare landscape continues to evolve, telerehabilitation stands as a pivotal tool in ensuring that rehabilitation services remain adaptive, accessible, and effective for all individuals, regardless of geographical location or physical limitations.

## WHOLE-BODY CRYOSTIMULATION: A NEW REHABILITATION BOOSTER FOR PARKINSON PATIENTS?

**Paolo Capodaglio**

Rehabilitation Unit, Istituto Auxologico Italiano IRCCS, Piancavallo, Italy  
Physical and Rehabilitation Medicine, Dept. Surgical Sciences, University of Torino, Italy

Parkinson's disease (PD) is a progressive neurodegenerative disorder. Its clinical symptoms are not only restricted to motor impairment as a result of dopamine deficit, but they also include olfactory loss, constipation, mood disorder, cardiac sympathetic denervation, reduction in heart rate variability, orthostatic hypotension and Rem behaviour disorder. Autonomic dysfunction in PD covers a broad spectrum that includes gastrointestinal, cardiovascular, sexual, urological and thermoregulatory dysfunctions. The latter are quite common in PD and associated with abnormalities both in the central nervous system and in the peripheral nervous system. Cognitive impairment is also a frequent event in the late stage of PD. Whole-body cryostimulation (WBC) is currently being used to relieve symptoms in rheumatoid arthritis, fibromyalgia, ankylosing spondylitis, depression and anxiety, multiple sclerosis, sleep disturbances, muscle soreness after strenuous physical exercise, post-Covid syndrome and obesity and holds some potential to become a promising adjuvant therapeutic option in PD. WBC has been indicated as a "training method" for the autonomic nervous system. Cold activates afferent signals from the peripheral receptors converge in the medial preoptic region of the hypothalamus, from which efferent signals cause reflex cutaneous vasoconstriction, leading to a shift in blood volume toward the core resulting in increased central pressure. This effect is responsible for reducing sympathetic nerve activity through baroreflex activation and shifting autonomic control of heart rate toward parasympathetic dominance. It has been shown that cooling of the limb resulted in a reduction in the amplitude of physiologic tremor and better target shooting performance. Its reported effects on mood, sleep and fatigue may contribute to reducing eventual barriers in compliance with rehabilitation programmes. Preliminary pre-clinical and clinical data on cooling in PD pave the way for its application on autonomic dysfunction, motor symptoms, fat and muscle metabolism and neuroprotection. In patients with other neurological disorders than PD, WBC proved to have beneficial effects on sleep quality, restless leg syndrome and cognitive performance. In this view, WBC could become a "rehabilitation booster" in Parkinson's disease.

### References

Capodaglio P., Cremascoli R., Piterà P., Fontana J.M. (2022). Whole-Body Cryostimulation. A rehabilitation booster. *J Rehabil Med Clin Commun*. Sep 19;5:2810. doi: 10.2340/jrmcc.v5.2810. eCollection 2022.

## DIGITAL THERAPEUTICS FOR PARKINSON'S DISEASE: REHABILITATION PERSPECTIVE

Han Gil Seo

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Republic of Korea

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Parkinson's disease (PD) is a progressive neurodegenerative disease that presents with complex nonmotor symptoms as well as classic motor symptoms. Although medical and surgical treatments alleviate these symptoms, there are no treatments that slow the neurodegenerative process. In the late stages of the disease, most patients experience treatment-resistant motor and nonmotor features, such as postural instability, freezing of gait, falling, dysphagia, and cognitive impairment. Therefore, rehabilitation therapies are used as an adjunct treatment to reduce disability and improve the quality of life in PD patients. Moreover, recent studies suggest that intensive rehabilitation and exercise may be beneficial in the early stages of PD and have potential disease-modifying effects.

PD patients face many obstacles to rehabilitation and exercise, including the disease itself and personal and environmental factors. Thus, few patients maintain the levels of physical activity suggested by the evidence. However, evolving digital technology has begun to facilitate innovative paradigms for therapeutic interventions, offering promise for more personalized, effective, and accessible treatments. Technologies such as mobile applications, wearable sensors, and virtual/augmented reality (VR/AR) are being researched and developed as digital therapeutics for patients with PD. In particular, mobile apps are being tried to assess and monitor symptoms and improve adherence to medication and exercise. We developed a customized mobile app for home-based exercise management for PD patients, and the pilot study showed its beneficial effect on improving exercise adherence, physical activity level, depression, and quality of life after 8 weeks. VR may be suitable for training PD patients in complex tasks in various contexts, with other benefits such as motivating patients, objectively measuring behaviors, and providing telerehabilitation. Our feasibility study demonstrated that fully immersive VR exergames combined with physical and cognitive tasks could be acceptable for rehabilitating patients with PD without causing serious adverse effects. Furthermore, 10 sessions of training using the VR exergames improved executive function and balance in PD patients.

In this presentation, I would like to discuss the potential application of digital therapeutics for PD, focusing on mobile applications and virtual reality for rehabilitation and exercise.

## HYPERBARIC OXYGEN THERAPY AS AN ADJUNCT TO NEURO-REHABILITATION IN PERSONS WITH DISORDERS OF CONSCIOUSNESS

Abhishek Srivastava

Center for Rehabilitation, Kokilaben Hospital, Mumbai, India

Hyperbaric Oxygen Therapy (HBOT) is defined as the inhalation of 100% oxygen under the pressure greater than 1 atmosphere absolute (ATA). HBOT has been shown to inhibit apoptosis, suppress inflammation, protect the integrity of blood-brain barrier, and promote angiogenesis and neurogenesis. HBOT has been used along with multidisciplinary rehabilitation in persons with disorders of consciousness due to stroke, traumatic brain injury and hypoxic encephalopathy. HBOT is commonly used in the management of stroke since 1960 and is proved safe and beneficial. Recent studies have illustrated to accomplish neuroprotective effects in stroke via a variety of complex molecular, biochemical and hemodynamic mechanisms. Cochrane review, in people with traumatic brain injury, showed a significant reduction in the risk of dying when HBOT was used ( $P = 0.003$ ) and suggests we would have to treat seven patients to avoid one extra death. Two small trials reported a significant improvement in GCS for patients treated with HBOT (MD 2.68 points,  $P < 0.0001$ ). Efficacy of hyperbaric oxygen therapy (HBOT) in patients with hypoxic ischemic encephalopathy (HIE) was evaluated and found a significant difference in Coma Recovery Scale favouring HBOT.

The aim of the talk is to discuss the role of HBOT with comprehensive multidisciplinary neurorehabilitation in sub-acute stage in improving neurological and functional outcome in patients with disorders of consciousness due to severe brain injury. The discussion will be based on the literature review, available guidelines and personal experience & studies conducted at the institute.

December 14, 2023 / Hall 2  
15.30-16.30 hr.



## COGNITIVE THERAPY FOR MCI AND EARLY-STAGE ALZHEIMER DISEASE (AD): WORLDWIDE FINGER NETWORK TO PREVENT AD WITH NON-PHARMACOLOGICAL TREATMENT

Izumi Kondo, Aiko Osawa, Takashi Sakurai  
National Center for Geriatrics and Gerontology

From the WHO report, it was indicated that currently more than 55 million people have dementia worldwide. Every year, there are nearly 10 million new cases. Recently, in a two-year large-scale randomized trial (FINGER study) that included exercise, diet, cognitive training, and vascular risk management in patients at risk of developing dementia (mild cognitive impairment: MCI). When compared with the control group, it was found that cognitive function clearly got better, with a 25% improvement of neurological composite score. In addition, significant improvements were observed in executive functions and processing speed. For this reason, it is necessary for MCI patients to undergo cognitive training along with exercise, diet, and vascular risk management. In 2017, World Wide FINGER (WWF) NETWORK was launched and now includes more than 60 countries. Many studies are underway to test the effectiveness of multidomain interventions across races and different lifestyles in the world. In 2019, the Japan-multimodal intervention trial for prevention of dementia (J-MINT), as one of the WWF NETWORK, was initiated and our center led it. From the results of this study, we found that although there was not significant statistical difference in cognitive function between whole study and control group, in sub-analysis with and without APOE  $\epsilon$  4 allele (ApoE), intervention effect was significant among subjects with ApoE. In a couple of months, clinical use of disease-modifying drug, Lecanemab to the patients with MCI and early-stage dementia begins in Japan. However, this drug has the side-effect, amyloid-related imaging abnormalities (ARIA), and it was reported ARIA prevalence was high in patients with ApoE. Based on these findings, J-MINT type non-pharmacological therapy is likely to be a good indication for ApoE-positive patients who are resistant to the use of the drug. We have been providing outpatient rehabilitation for dementia patients for over 10 years, and we will now begin using Lecanemab and our rehabilitation treatment with the elements of J-MINT type non-drug therapy (particularly nutritional therapy) is planned to be introduced in subsequent clinical trials for the patients with MCI and early-stage Alzheimer disease.

## SOUND BASED THERAPY IN ALZHEIMER'S DISEASE

Lars Wojtecki<sup>1,2</sup>

<sup>1</sup>Clinic for Neurology and Neurorehabilitation, Hospital zum Heiligen Geist, Academic Teaching Hospital of the Heinrich-Heine-University Duesseldorf, Kempen, Germany

<sup>2</sup>Institute of Clinical Neuroscience and Medical Psychology, Medical Faculty, Heinrich-Heine-University Düsseldorf, Germany

Transcranial Pulse Stimulation (TPS) is a sound based (sonic) technique to treat the brain. It uses shockwaves and is in use for the treatment of Alzheimer's Disease (AD).

In this presentation, I outline the technique in comparison to other sound-based therapies such as high- and low-intensity focused ultrasound (FUS).

I give insights in mechanisms of action and state of evidence of clinical trials in AD.

The presentation will also include data from our own cohort from Germany with short-term results after the first treatment cycle and long-term data. First insight into possible biomarkers (EEG, MRI) will be provided. Practical aspects, such as of patient selection and stimulation protocols will be addressed.

December 14, 2023 / Meeting Room 1  
13.30-14.30 hr.

## EFFICACY OF TRANSCRANIAL PULSE STIMULATION (TPS) IN OLDER ADULTS WITH MILD NEUROCOGNITIVE DISORDER

1. Tommy, Kwan Hin Fong<sup>1</sup>
2. Teris Cheung<sup>2</sup>
3. Joanna, Ngan Sze Ting<sup>1</sup>
4. Vivian, Lui Wai Yan<sup>1</sup>
5. Wai Chi Chan<sup>1</sup>
6. Corine, Wong Sau Man<sup>3</sup>
7. Calvin, Cheng Pak Wing\*<sup>1</sup>

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2. School of Nursing, The Hong Kong Polytechnic University, Hong Kong, China
3. Division of Community Medicine and Public Health Practice, The University of Hong Kong, Hong Kong, China

### Objectives:

There are limited effectiveness and potential alarming side effects of pharmacological approach for the Neurocognitive disorder (NCD). Transcranial pulse stimulation (TPS) has been shown to be a potential tool to bring the benefit. We aim to evaluate the effectiveness and tolerability of TPS intervention in this study.

### Materials and Methods:

We have conducted an open-label study. Older adults with the diagnosis of mild NCD received 2-week 6 sessions neuro-navigated TPS interventional. 19 eligible subjects (with 12 females and 7 males) were recruited in this study and completed the whole TPS interventions.

### Results:

Repeated measures ANOVA showed statistically significant effects of time on Hong Kong Montreal Cognitive Assessment (HK-MoCA) ( $F(3,54) = 4.99, p = 0.004$ ), 30-second interval of Verbal Fluency Test ( $F(3,54) = 2.94, p = 0.041$ ), Stroop interference ( $F(3,54) = 3.46, p = 0.023$ ), and Chinese IADL ( $F(3,54) = 2.78, p = 0.050$ ) after received the intervention. Bonferroni post-hoc comparisons on HK-MoCA showed that both scores from immediate post (Mean = 21.16, SD = 3.98) and 12-week follow-up (Mean = 20.58, SD = 4.29) were significantly higher than that of 12-week Treatment-as-usual (Mean = 18.74, SD = 3.87) ( $p < 0.05$ ). There were no serious adverse effects reported.

### Conclusions:

TPS has brought significant improvement in cognition of elderly with mild NCD. It has a great potential to delay the deterioration of cognition in older adults. The effectiveness and the long-term effect of TPS in cognition still need to have further large-scale study to support. Our team already started the second phase of TPS study to evaluate the effectiveness of long-term TPS stimulation.

**Keywords:** Dementia; Intervention; Neurocognitive disorder; Transcranial pulse stimulation

## HARNESSING NEUROPLASTICITY: THE IMPACT OF AUDITORY TRAINING ON LISTENING SKILLS AND COGNITIVE ABILITIES IN INDIVIDUALS WITH HEARING LOSS

**Naomi WONG, Speech Therapist.**

**BSpPath(Hons), AHPC (Singapore)**

### Abstract:

This presentation explores the pivotal role of auditory training in enhancing listening skills and cognitive abilities in individuals with hearing loss. By capitalizing on the brain's remarkable neuroplasticity, auditory training offers promising opportunities for improving communication and cognitive function. Through a review of evidence-based approaches and practical interventions, this session aims to provide valuable insights into the transformative potential of auditory training in aural rehabilitation for this population.

### Key Points to be Covered:

1. Understanding the challenges faced by individuals with hearing loss and dementia: the interplay between communication deficits and cognitive decline.
2. Unveiling the neuroplasticity of the auditory system: exploring how targeted auditory training can promote rewiring and adaptation.
3. The impact of auditory training on listening skills: evidence from studies demonstrating improved speech perception, sound discrimination, and auditory comprehension.
4. Cognitive benefits of auditory training: examining research findings on enhanced attention, working memory, and processing speed.
5. Incorporating technology in auditory training: leveraging advancements in hearing aids, assistive devices, and virtual platforms to optimize outcomes.
6. Personalized approaches to auditory training: tailoring interventions based on individual needs, preferences, and cognitive profiles.
7. Practical strategies for implementing auditory training: incorporating structured exercises, environmental modifications, and multisensory integration.



## CONGENITAL LIMB DEFICIENCY; MULTIDISCIPLINARY TEAM CONGENITAL LIMB DEFICIENCY OF LOWER EXTREMITIES; ORTHOPEDIC MANAGEMENT

**Assist. Prof. Kitiwan Vipulakorn**  
**Department of Orthopedics, Faculty of Medicine, Khon Kaen University**

Treatment in congenital limb deficiency in lower limbs depend on the percentage of shortening compared to the contralateral limb in skeletal maturity.

Reconstruction surgery aimed for limb preservation including lengthening, epiphysiodesis of contralateral limb, correction of bony or joint deformity and stabilization of unstable joint either fusion or reconstruction are proposed. Multiple and staged procedures are required in a proper plan with patient and family.

Indication of amputation is not definite. In previous, amputation is indicated in non-functional foot and/or significant future limb length discrepancies.

Timing of amputation depends on the child development. Amputation of lower limbs designed to aid prosthetic fitting; amputation is best performed a few months before the child is ready to walk. Bony overgrowth at the end of residual limb after amputation is common in pediatric patients, disarticulation through joint is recommend.

Congenital limb deficiency in upper extremities required less surgical treatment, most of patients should be adapt in function or prosthetic fitting. Surgery is in specific condition as the patient cannot adapt to the function or prosthetic fitting.

## CEREBRAL PALSY: A TEAM APPROACH, CASE BASED DISCUSSION

Samerduen Kharmwan, MD

Kitiwan Vipulakorn, MD

Parit Wongphaet, MD

Narupon Kunbootsri, PT

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Thailand

December 14, 2023 / Meeting Room 2  
15.00-16.30 hr.

Cerebral palsy, the most common childhood disability, poses complex challenges. Coordinating developmental training, tone management, and timely surgery can significantly improve development and quality of life. This session aims to demonstrate, using real case examples and multidisciplinary discussions, how specialists can collaborate to optimize children's rehabilitation. This will help the audience understand and visualise long-term treatment planning and outcomes which will in turn be useful for the audience to apply in their clinical practices.

NDT involves various therapeutic techniques, traditional NDT is commonly used by physiotherapists to improve disabled children's functions for a long period. Its key mechanisms involve promoting normal movements and inhibiting spasticity. Physiotherapists use techniques to stimulate key points like the head, neck, shoulders, and hips to enhance normal movement and reduce spasticity. Vojta therapy is widely used in Germany and other countries for treating CP by stimulating innate reflex locomotion. The therapy can prevent high-risk infants from developing full-blown CP, improve motor performance, reduce spasticity, and prevent musculoskeletal complications. It works even without traditional range of motion and stretching exercises. Tone abnormality encompasses various types, spasticity is the most common and challenging type to manage, with treatment options including botulinum toxin injections, chemoneurolysis with phenol or alcohol, and antispastic medication. A combined approach of physical, occupational, or orthotic therapy, as well as serial casting, may be recommended for effective management. At appropriate ages, some children may need surgery to correct soft tissue contractures or malalignment of bones. Surgical intervention, specifically soft tissue and skeletal surgery, is critical in treating unresponsive conditions causing increased disability. Soft tissue surgery includes releasing, lengthening, or transferring muscle tendon units, with the selective surgical lengthening technique minimizing weakness. Split or complete transfer of muscle tendon units can address dynamic muscle imbalances. Skeletal surgery, including osteotomy and arthrodesis, is used for malalignment and fixed deformities. Combining multiple tendon surgery and osteotomy into a single event multilevel surgery (SEMLS) provides optimal results.

## EMERGING THERAPIES IN STROKE REHABILITATION: ADVANCEMENT OF BOTULINUM TOXIN FOR COMPLEX REGIONAL PAIN SYNDROME

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Supraclavicular brachial plexus nerve block can be performed to achieve effective anesthesia and postoperative analgesia of the upper limb. This procedure can also be used for the treatment of various upper limb disorders such as spasticity, neuropathic pain, and complex regional pain syndrome (CRPS). The aim of this block is the placement of an injection needle into the corner pocket, as practiced by most practitioners. The corner pocket is located between the first rib or the pleura inferiorly, the subclavian artery medially, and the inferior trunk of the supraclavicular brachial plexus superiorly. This approach is preferred for brachial plexus nerve block because of its ulnar sparing property. This procedure can be performed using the blind anatomical palpation method combined with the application of a nerve stimulator. Since musculoskeletal ultrasound can be used as an effective tool in guiding the needle to the designated injection target site, supraclavicular brachial plexus nerve block is often performed nowadays using ultrasound guidance with higher accuracy. Conventionally, an ultrasound-guided supraclavicular brachial plexus nerve block is performed with the patient lying in a reclined supine position of approximately 30°, with a pillow under the head. A high-frequency linear transducer was used, and the block was performed in an in-plane, lateral-to-medial approach by inserting the needle into the corner pocket. Even if the block is performed meticulously using ultrasound guidance, delayed pneumothorax can still occur. The complication of pneumothorax might be due to the short distance from the pleura to the inferior trunk. Studies that aim to improve the safety of ultrasound-guided supraclavicular brachial plexus block with the adjustment in body positioning are limited. The traction force of the brachial plexus can be affected by the human body posture. Factors such as the degrees of spine retroflexion, latero-flexion, and rotational movements of the humerus can affect the traction force of the brachial plexus.

In this study, stroke patients with upper limb spasticity and CRPS were recruited for ultrasound-guided supraclavicular brachial plexus nerve block. The distance between the pleura and the inferior trunk of the supraclavicular brachial plexus was measured with the patients in the supine position, turned sideways at 45°, and in the lateral decubitus position. The BMI of these patients was also calculated and further correlated with the measured distances in these three different body positions. BMI is positively correlated with the distance from the pleura to the inferior trunk, and that this distance is the longest in the lateral decubitus body position. Therefore, the lateral decubitus body position can be the preferred body position when performing ultrasound-guided supraclavicular brachial plexus nerve block and botulinum toxin injection in the treatment of CRPS. With the increased distance from the pleura to the brachial plexus, the complication of pneumothorax can be reduced.

### PLENARY 3

## ADVANCEMENT OF SEGMENTAL NEUROMYOTHERAPY USING MECHANICAL NEEDLING AND STERILE WATER INJECTION

**Professor Areerat Suputtitada, MD.**

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The plenary lecture will include an analysis of spinal segmental sensitization (SSS) and its significance in the persistence of pain. The process of SSS entails the propagation of nociceptive signals from sensitized, damaged tissue to neurons located in the dorsal horn of the spinal cord. The process of sensitization can give rise to a range of clinical manifestations include musculoskeletal pain, dermatomal allodynia (pain by non-painful stimulus) and hyperalgesia (increased pain by painful stimulus) in addition to sclerotome tenderness within the involved myotomes. Then, segmental sensitization occurs throughout neuron hypertrophy as well as upregulation of excitatory neurons and neurotransmitters at the dorsal horn. Hemiplegic shoulder pain (HSP), which is a consequence of stroke, serves as an illustration of how SSS can give rise to difficulties for patients and their rehabilitation. Additionally, the therapeutic approach of segmental neuromyotherapy (SNMT) by Andrew Fisher is seen as a potential method for managing sensitization. SNMT is a therapeutic approach that entails the targeted delivery of local anesthetic medicines to the specific dermatome and paraspinal muscles affected by SSS. Recently, the research highlighted the unique treatment discovered by Areerat Suputtitada in advancing the application of mechanical needling and sterile water injection as effective methods for eliminating calcification and fibrosis, sources of sensitization. The objective of these treatments is to reduce sensitivity, stimulate pain-blocking pathways, and elicit alterations in neurochemistry in order to alleviate pain, particularly in cases where sensitization occur.

**Keywords:** Spinal Segmental Sensitization (SSS), Segmental neuromyotherapy (SNMT), mechanical needling and sterile water injection, hemiplegic shoulder pain (HSP)

#### **Conflicts of interest**

The author declares no conflicts of interest.



PLENARY 3  
ADVANCEMENT OF SEGMENTAL NEUROMYOTHERAPY USING  
MECHANICAL NEEDLING AND STERILE WATER INJECTION  
(cont.)

References

1. Fischer AA. New approaches in the treatment of myofascial pain. 13. Fischer AA, editor. Myofascial pain – updates in diagnosis and treatment. Phys Med Rehab Clin North Am 1997; 8: 153–169
2. Fischer AA, Imamura M. New concepts in the diagnosis and management of musculoskeletal pain In: Lennard TA, editor. Pain procedures in clinical practice. 2nd edn. Philadelphia: Henley & Belfus; 2000, p. 213–229.
3. Ratmansky M, Defrin R, Soroker N. A randomized controlled study of segmental neuromyotherapy for post-stroke hemiplegic shoulder pain. J Rehabil Med. 2012 Oct;44(10):830-6. doi: 10.2340/16501977-1021.
4. Chen CPC, **Suputtitada A\***. Prolotherapy at Multifidus Muscle versus Mechanical Needling and Sterile Water Injection in Lumbar Spinal Stenosis. J Pain Res. 2023 Jul 18;16:2477-2486. doi: 10.2147/JPR.S417444.
5. **Suputtitada A\***. Emerging theory of sensitization in post-stroke muscle spasticity. Front Rehabil Sci. 2023 Sep 15;4:1169087. doi: 10.3389/fresc.2023.1169087.
6. **Suputtitada A\***, Chen CPC, Pongpirul K. Mechanical Needling With Sterile Water Versus Lidocaine Injection for Lumbar Spinal Stenosis. Global Spine J. 2022 May 4:21925682221094533. doi: 10.1177/21925682221094533.
7. **Suputtitada A\***, Chen CPC, Pongpirul K. Mechanical Needling with Sterile Water versus Steroids Injection for Facet Joint Syndrome: A Retrospective Observational Study. Pain Res Manag. <https://doi.org/10.1155/2022/9830766>
8. **Suputtitada A\***. Myofascial pain syndrome and sensitization. In: Sharan D, Samuel RJ, eds. MYOPAIN 2017 Breakthroughs in muscle pain research & practice, 1<sup>st</sup> ed. 2017:11-5

## DETECTION OF MOTOR DISORDER FOR MCI AND NOVEL USE OF DIFFICULTY MAP TO MAKE EFFECTIVE USE OF ROBOT EXERCISE

Izumi Kondo, Shota Suzumura, Kenichiro Maki  
National Center for Geriatrics and Gerontology

There are many technologies advanced in the field of neurorehabilitation. Here, we are going to introduce two of them and both are novel and interesting.

- 1) Analysis of finger tap movement to detect the existence of MCI
- 2)

In a couple of months, clinical use of disease-modifying drug, Lecanemab to the patients with MCI and early-stage Alzheimer disease (AD) begins in Japan. Reflecting this current situation, screening tests to detect the early sign of dementia, would be warranted and those should be easy and not expensive considering the size of the population that should be tested. We have been studying the fine movement disorder in patients with MCI and early-stage AD with using the analysis of finger tap movement and found that several parameters were very useful for capturing MCI risk.

- 2) Difficulty map to carry over effect of robot exercise to functional skills in daily life

In several reviews, it was reported that robot exercise (RE) did not improve upper limb function after stroke compared with usual care. We consider that the RE has the role to overcome the most difficult initial phase of motor learning and after that patient can carry over it to daily life through the ample use of arm function. However, the difficulty level of skills in daily life must not be too high compared to RE. Functional Skills Measure After Paralysis (FSMAP) was developed for the purpose to set the appropriate functional goal for the patient after stroke. 58 patients after stroke were recruited and Rasch analysis was performed to define the scaled score (SS), indicator of difficulty level, for 50 items in FSMAP and three assist modes for three training modes (9 tasks) in the ReoGo-J, exercise robot for the stroke patients. From the result of this study, we made the difficulty map from the scaled score calculated for the items of FSMAP and tasks in ReoGo-J. With the use of this difficulty map, we expect that it would be easier to carry over the effect of RE to functional skills in daily life for the patients after stroke.

## THAI CLINICAL PRACTICE GUIDELINES FOR SPASTICITY MANAGEMENT IN STROKE AND CEREBRAL PALSY

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### Abstract

Spasticity management in stroke and cerebral palsy are challenges in neurological recovery and functional outcome. Pharmacological interventions have traditionally been employed as common treatments. However, in recent years, non-pharmacological modalities have increasingly been considered. The Thai Clinical Practice Guidelines for Spasticity, developed by multidisciplinary experts, cover botulinum toxin, neurolysis, oral medications, basic and advanced rehabilitation techniques, and surgical interventions. The evidence between January 1, 2000, and March 20, 2023, was gathered from PubMed searches, including randomized trials, systematic reviews, meta-analyses, cohort studies, crossovers, and case series. The reviewers assessed therapies using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) criteria, and the recommendations aligned with the Thai Medical Council guidelines. Each therapy clinical practice guideline required at least 80% experts' agreement by the voting system. The CPGs aim to furnish health professionals with up-to-date evidence and recommendations for enhanced stroke and cerebral palsy rehabilitation care.

**Keywords:** Spasticity, Stroke, Cerebral palsy, Thai Clinical Practice Guidelines

The authors declare no conflicts of interest.

### References

1. Thai Clinical Practice Guidelines for Stroke Spasticity, 2023
2. Thai Clinical Practice Guidelines for Cerebral palsy Spasticity, 2023

## THE ADVANCEMENTS OF BOTULINUM TOXIN INJECTION AND NEUROLYSIS FOR ENHANCING STROKE REHABILITATION OUTCOMES

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The emergence of Botulinum Neurotoxin Type A (BoNT-A) is necessitated by the impact of post-stroke spasticity. While high-quality Grade A evidence supports its efficacy in reducing spasticity, debates persist regarding its role in functional recovery (1)(2)(3). Our experience underscores the critical importance of timing, as injections targeting flexor muscles in fingers and wrists within 4 to 6 weeks post-stroke prove optimal (4). Mitigating maladaptive plasticity and preventing contractures are potential benefits, with BoNT-A influencing cortical excitability (5). Careful muscle selection and precise administration are crucial; lower the dosages in warm climates where heat can affect muscle extensibility (6)(7). Customized rehabilitation programs tailored to individual patient needs following injections are essential for maximizing functional outcomes (7)(8). This educational session will explain and demonstrate BoNT-A injections in stroke patients, focusing on the selection of muscles, dosages, and guided injections (9). The adjunctive or alternative neurolysis will also be addressed, with a focus on safety, precautions, nerve selection, and precision of neurolysis (10).

**Keywords: Botulinum Neurotoxin Type A (BoNT-A) , Grade A evidence, post-stroke spasticity, maladaptive plasticity, functional recovery, neurolysis**

### Conflicts of interest

The authors declare no conflicts of interest.



## THE ADVANCEMENTS OF BOTULINUM TOXIN INJECTION AND NEUROLYSIS FOR ENHANCING STROKE REHABILITATION OUTCOMES (cont.)

### References

1. Li S, Francisco GE. The Use of Botulinum Toxin for Treatment of Spasticity. *Handb Exp Pharmacol.* 2021;263:127-146. doi: 10.1007/164\_2019\_315. Erratum in: *Handb Exp Pharmacol.* 2021;263:281.
2. Simpson DM, Hallett M, Ashman EJ, Comella CL, Green MW, Gronseth GS, et al. Practice guideline update summary: Botulinum neurotoxin for the treatment of blepharospasm, cervical dystonia, adult spasticity, and headache: Report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology.* 2016;86(19):1818-26.
3. Doan TN, Kuo MY, Chou LW. Efficacy and Optimal Dose of Botulinum Toxin A in Post-Stroke Lower Extremity Spasticity: A Systematic Review and Meta-Analysis. *Toxins (Basel).* 2021;13(6).
4. Hesse S, Mach H, Fröhlich S, Behrend S, Werner C, Melzer I. An early botulinum toxin A treatment in subacute stroke patients may prevent a disabling finger flexor stiffness six months later: a randomized controlled trial. *Clin Rehabil.* 2012 Mar;26(3):237-45. doi: 10.1177/0269215511421355.
5. Huynh W, Krishnan AV, Lin CS, Vucic S, Katrak P, Hornberger M, Kiernan MC. Botulinum toxin modulates cortical maladaptation in post-stroke spasticity. *Muscle Nerve.* 2013 Jul;48(1):93-9. doi: 10.1002/mus.23719.
6. Suputtitada A, Suwanwela NC. The lowest effective dose of botulinum A toxin in adult patients with upper limb spasticity. *Disabil Rehabil.* 2005;27(4):176-84.
7. Turner-Stokes L, Ashford S, Esquenazi A, Wissel J, Ward AB, Francisco G, Lains J, Suputtitada A, Serrano S, Baguley IJ, Barnes M, Simpson DM. A comprehensive person-centered approach to adult spastic paresis: a consensus-based framework. *Eur J Phys Rehabil Med.* 2018 Aug;54(4):605-617. doi: 10.23736/S1973-9087.17.04808-0.
8. Schillebeeckx F, Mills PB, Ip A, Schinwelski M, Teixeira JEM, Ashford S, Bayle N, Chemello E, Jacinto J, Nayar M, Suzigan E, Deltombe T. Worldwide Survey of Clinician Practice on use of Adjunctive Therapies Following Botulinum Toxin Injection for Spasticity. *J Rehabil Med.* 2022 Sep 19;54:jrm00320. doi: 10.2340/jrm.v54.334.
9. Grigoriu AI, Dinomais M, Rémy-Néris O, Brochard S. Impact of Injection-Guiding Techniques on the Effectiveness of Botulinum Toxin for the Treatment of Focal Spasticity and Dystonia: A Systematic Review. *Arch Phys Med Rehabil.* 2015 Nov;96(11):2067-78.e1. doi: 10.1016/j.apmr.2015.05.002.
10. Escaldi S. Neurolysis: A Brief Review for a Fading Art. *Phys Med Rehabil Clin N Am.* 2018 Aug;29(3):519-527. doi: 10.1016/j.pmr.2018.03.005.

## NEURO REHAB ACROSS REGION SESSION LEADERSHIP IN REHABILITATION TEAMWORK: CHALLENGES FOR DEVELOPING COUNTRIES

Md Taslim Uddin, Anika Tasnim, Mohammad Tariqul Islam  
Bangabandhu Sheikh Mujib Medical University, Dhaka

The endorsement of "Strengthening Rehabilitation in Health Systems" by the World Health Organization (WHO) and the vision of WHO Rehabilitation 2030 reflect the global need for capacity building in the field of rehabilitation. With the rise in injuries and non-communicable chronic diseases, the number of people with disabilities is increasing, yet the demand for rehabilitation services remains largely unmet worldwide. This mini-review focuses on leadership challenges in rehabilitation teamwork, particularly in developing countries.

Rehabilitation involves a multidisciplinary team of healthcare professionals, including physicians, therapists, and nurses, who collaborate to provide comprehensive care tailored to different settings and stages of neurological conditions. Effective leadership is crucial for coordinating the team's efforts, promoting communication, and optimizing resource utilization. Neurological rehabilitation interventions typically encompass functional assessment, goal setting, and the implementation of recommended therapeutic modalities. The most common neurological disabilities are complex in nature and include stroke, brain injury, and spinal cord injury, which require well-organized rehabilitation teamwork.

Developing countries often grapple with financial, technological, and human resource limitations in their healthcare systems, adversely affecting specialized rehabilitation services, equipment availability, and facilities. Additionally, inadequate infrastructure, including a lack of specialized rehabilitation centers, assistive devices, and accessible environments, further hinders rehabilitation services. Shortages of skilled professionals in the rehabilitation field are prevalent in developing countries, which impede the delivery of quality care and limit interprofessional collaboration.

Effective team management is essential for rehabilitation goal-setting meetings and subsequent coordination. The Union of European Medical Specialists (UEMS) PRM Section has explored teamwork patterns and recommended best practices. They have found that PRM physicians are well-positioned to lead and coordinate PRM programs and develop and evaluate new management strategies. Although rare, some success stories exist of physician-led rehabilitation teams operating in developing countries.

**NEURO REHAB ACROSS REGION SESSION**  
**LEADERSHIP IN REHABILITATION TEAMWORK: CHALLENGES FOR**  
**DEVELOPING COUNTRIES**  
(cont.)

Leadership roles in the rehabilitation profession face numerous challenges, including a lack of relevant curriculum content, inadequate training monitoring and feedback systems, scarcity of trained professionals, insufficient infrastructure development and funding, overburdened professionals with negative attitudes, low education rates among persons with disabilities influenced by political interference, potential ethical dilemmas in team functioning, and limited preparedness for disaster-related casualties. Addressing these challenges systematically is crucial to ensure effective team functioning, deliver quality care, and achieve positive outcomes in the rehabilitation sector.

Key words: Rehabilitation Leadership, Team Works, Goal setting, Developing Country

December 15, 2023 / Hall 2  
10.00-10.45 hr.

## NEUROREHAB IN A BIG PICTURE FOR HEALTH CARE SYSTEM IMC IN THAILAND

Mrs. Daungjit Smithnaraseth

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In the past, rehabilitation service in Thailand developed mainly in university hospital, National Medical Rehabilitation Institute or acute care hospital than in rural area.

Under Public Health Ministry, every provincial hospital also has this service but with a small number of professional staffs. There are only 250 physiatrist, 3,300 physical therapist, 281 occupational therapist and 60 speech therapist nationwide (Data update in 2023)

Due to limited number of therapist, patient could not properly access this service. Hence, the number of disable people, who could not live without the aid from caregiver is increasing.

10 years ago, we developed a pilot model of rehabilitation system with easier access near patients' home. This includes even in the smallest 10-bed hospital.

Rehabilitation team from provincial hospital periodically visit their patient in rural hospital. Telemedicine is also used in some situation, for example, speech therapy service. This system is called Intermediate care service plan. (IMC service plan)

Developed rehabilitation model had been successful and used overall in Thailand by Public Health Ministry policy, in collaboration with National Health Security Office and local government organization.



## SHORT WORKSHOP

### ULTRASOUND IN COMMON SPINAL NERVES ENTRAPMENT: ULTRASOUND DEMONSTRATION AND VDO

Professor Areerat Suputtitada, MD.<sup>1</sup>      Professor Carl PC Chen, MD, Ph.D., CIPS<sup>2</sup>

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#### Abstract

Ultrasound (US) -guided interventions in spinal and peripheral nerve treatments offer precise, radiation-free guidance. Our comprehensive technique for lumbar medial branch block, facet joint, and multifidus muscle injections, utilizing a single needle insertion site, demonstrates significant progress in spinal procedures (1). Areerat Suputtitada's innovation involving US-guided mechanical needling and sterile water injection for calcification and fibrosis removal aims at improving blood circulation and joint and nerve regeneration (2). Carl PC Chen's research advocates for the safety and efficacy of US-guided cervical nerve root block (US-CRB) as a secure method for treating upper limb radicular pain (3),(4). US-guided caudal epidural injection, as described by Chen, proves effective in addressing low back pain stemming from lumbosacral nerve root compression (5). Additionally, our biomechanical analysis of an US-guided supraclavicular brachial plexus nerve block highlights body postures and movements influencing traction force, potentially reducing pneumothorax occurrences (6). The upcoming workshop on challenging US-guided interventions underscores the importance of targeting specific nerves for diagnostic and therapeutic purposes in the field of neurorehabilitation.

**Keywords:** ultrasound (US) -guided, lumbar medial branch block ,mechanical needling and sterile water injection, US-guided cervical nerve root block (US-CRB), US-guided caudal epidural injection, US-guided supraclavicular brachial plexus nerve block

#### Conflicts of interest

The authors declare no conflicts of interest.

**SHORT WORKSHOP**  
**ULTRASOUND IN COMMON SPINAL NERVES ENTRAPMENT: ULTRASOUND**  
**DEMONSTRATION AND VDO**  
(cont.)

**References**

1. Chen CPC, Chen JL, Ho CS, Suputtitada A. Ultrasound-guided Medial Branch Blocks, Facet Joint, and Multifidus Muscle Injections: How It Is Done under One Needle Insertion Point! *Anesthesiology*. 2020 Mar;132(3):582-583. doi: 10.1097/ALN.0000000000003043.
2. Suputtitada A, Chen CPC, Pongpirul K. Mechanical Needling With Sterile Water Versus Lidocaine Injection for Lumbar Spinal Stenosis. *Global Spine J*. 2022 May 4:21925682221094533. doi: 10.1177/21925682221094533.
3. Chen CP, Lew HL, Tang SF. Ultrasound-guided caudal epidural injection technique. *Am J Phys Med Rehabil*. 2015 Jan;94(1):82-4. doi: 10.1097/PHM.0000000000000047.
4. Chen CPC, Lew HL, Huang PC, Yu CW. Ultrasound-Guided Injection to the Fifth Cervical Spinal Nerve Root Level. *Am J Phys Med Rehabil*. 2017 Nov;96(11):e199-e200. doi: 10.1097/PHM.0000000000000768.
5. Chen CPC, Huang PC, Lew HL, Yu CW. Ultrasound-Guided Injection to the Fifth Cervical Spinal Nerve Root Level. *Am J Phys Med Rehabil*. 2017 Jun;96(6):e115-e116. doi: 10.1097/PHM.0000000000000691.
6. Chen CH, Chen CPC, Chen JL, Cheng WJ, Suputtitada A. The Change in Body Positioning to Improve Safety in Performing Ultrasound-Guided Supraclavicular Brachial Plexus Nerve Block. *Am J Phys Med Rehabil*. 2021 Apr 1;100(4):e60-e61. doi: 10.1097/PHM.0000000000001527.

## REHABILITATION 2030 INITIATIVE: HOLISTIC APPROACH TO MANAGING NEURO-DISABILITY WITH EPILEPSY

Nirmal Surya

Neuro-disabilities, encompassing a wide range of conditions affecting the central nervous system, pose significant challenges to individuals, families, and society at large. Among these, epilepsy stands as one of the most prevalent and complex neurological disorders. The Rehabilitation 2030 Initiative is a forward-looking, multidisciplinary framework designed to revolutionize the management and rehabilitation of individuals with neuro-disability, with a specific focus on those living with epilepsy.

This initiative recognizes the multifaceted nature of neuro-disabilities, acknowledging that effective rehabilitation extends beyond medical interventions to encompass social, psychological, and environmental factors. By integrating cutting-edge research, evidence-based interventions, and a patient-centered approach, the Rehabilitation 2030 Initiative aims to empower individuals with neuro-disability, fostering their independence, quality of life, and societal inclusion.

Key pillars of the Rehabilitation 2030 Initiative include:

1. Comprehensive Assessment and Personalized Care Plans
2. Integrative Therapeutic Modalities
3. Technology-Enabled Interventions
4. Empowering Caregivers and Communities
5. Research and Innovation

In conclusion, the Rehabilitation 2030 Initiative represents a paradigm shift in the management of neuro-disability, specifically targeting individuals living with epilepsy. By adopting a holistic, patient-centered approach, this initiative aspires to not only enhance clinical outcomes but also empower individuals to lead fulfilling, meaningful lives within their communities. Through the integration of advanced technology, research-driven interventions, and inclusive care models, the Rehabilitation 2030 Initiative aims to set a new standard for neuro-disability rehabilitation in the years to come.

## SHORT WORKSHOP: DEVELOPING RESEARCH AND META-ANALYSIS (REHABILITATION RESEARCH)

Fary Khan<sup>1</sup>, Mary P Galea<sup>2</sup>

1. Department of Rehabilitation Medicine, Royal Melbourne Hospital)
2. Department of Medicine (Royal Melbourne Hospital),  
The University of Melbourne, Parkville VIC. 3010, Australia

This intensive and interactive workshop is designed for all rehabilitation and allied health professionals who wish to develop their knowledge and skills in conducting research and in evidence-based practice. Further, it will help participants to design and conduct quantitative and/or qualitative research, critically appraise research, and acknowledging and incorporating values and preferences in clinical decision making.

Participants will receive examples of different types of studies (e.g. systematic reviews, RCTs, observational studies), critical appraisal tools and guidelines, and useful links to additional readings. By the end of this workshop the participants will have learned how to:

- Formulate clear research questions
- Understand different study designs (qualitative, quantitative, systematic reviews)
- Undertake critical appraisal of research
- Judge comparative effectiveness of health care interventions



## A MECHANICAL THROAT SIMULATOR FOR STUDYING ORAL PHASE SWALLOWING OF LIQUID THICKENERS

**Chaiwut Gamonpilas**<sup>1\*</sup>, Akapong Kongjarern<sup>1</sup>, Pawadee Methacanon<sup>1</sup>, Wuttipong Sritham<sup>2</sup>, Jenwit Soparat<sup>2</sup>, Chi-na Benyajati<sup>2</sup>, Paitoon Benjapornlert<sup>3</sup>, and Pimchanok Tuekta<sup>3</sup>

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The examination of swallowing process is clinically performed either by a videofluoroscopic swallowing study (VFSS) or fiberoptic endoscopic evaluation of swallowing (FEES) test. Both techniques are invasive and unweildy and need to be conducted specifically in a hospital by a specialist, i.e., a speech pathologist or radiologist. The need to obtain research ethical approval prior to performing VFSS is also a big obstacle for non-medical personnel working in dysphagia research. In this regard, the concept of *in vitro* throat model for simulating swallowing is somewhat attractive and can be useful for the development of innovative liquid thickeners suitable for dysphagia management. In this work, a simple mechanical throat simulator, based on the original "Cambridge throat" model (Mackley et al., 2013), was redesigned and fabricated. Subsequently, it was used to obtain quantitative measurements and comparisons of oral flow of a range of thickened fluids with different rheological characteristics. The action of the tongue was modeled using a roller that provided a constant torque through a weight on a pulley wheel. This action simulated oral phase swallowing by forcing fluid contained within a thin flexible membrane along the model throat. Video recordings of fluid behavior were taken during the experiment and showed that for a constant tongue torque, the transit time within the model throat increased with increasing fluid viscosity and decreasing roller weight. These results correlated well with those obtained from VFSS, which was carried out on subjects without impaired swallowing. Moreover, the bolus aspect ratio determined from the swallowing experiment with the throat model showed a decreasing value, thus indicating a more cohesive characteristic, with increasing fluid consistency. This trend was, however, not observed in the VFSS, likely due to the confinement of bolus by throat muscles that were not mimicked by the throat simulator. Essentially, the rheology of the fluid can be expected to influence the process of swallowing and the application of the mechanical throat model could provide systematic study of different effects relevant to swallowing, leading to improved understanding and better design of novel thickener formulation.

## A MECHANICAL THROAT SIMULATOR FOR STUDYING ORAL PHASE SWALLOWING OF LIQUID THICKENERS (cont.)

### KEYWORDS:

*In-vitro* throat model, swallowing, oral transit, dysphagia, rheology, thickener

### Reference

Mackley, M.R., Tock, C., Anthony, R., Butler, S.A., Chapman, G., & Vadillo, D.C. (2013).  
The rheology and processing behavior of starch and gum-based dysphagia thickeners.  
*Journal of Rheology*, 57(6), 1533–1553.

## UPDATE IN NEUROMODULATION TECHNIQUES FOR DYSPHAGIA MANAGEMENT

Sun Im

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The Catholic University of Korea, Seoul, Republic of Korea

Dysphagia, a challenging and multifaceted disorder affecting swallowing function, poses significant clinical and quality-of-life concerns for individuals, especially those with stroke. In some cases, conventional treatment methods may fall short of solving complex cases of dysphagia. Therefore, emerging strategies such as neuromodulation have garnered increasing attention as a supplementary form that may help induce neuroplasticity in the brain. This lecture aims to provide an insightful overview of the latest advancements in neuromodulation techniques for managing post-stroke dysphagia.

The lecture will commence by elucidating the pathophysiology of dysphagia, emphasizing the intricate neural control mechanisms involved in swallowing and the disruptions that can occur due to various underlying conditions. The lecture will delve into the principles of neuromodulation, highlighting its potential to modulate neural circuits and reestablish optimal swallowing function. Various neuromodulation approaches will be explored, including transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS), each with their distinctive mechanisms of action and clinical applications.

Based on recent research studies and clinical trials, the lecture will present evidence supporting the effectiveness of neuromodulation in post-stroke dysphagia. Attendees will gain insights into the selection criteria for appropriate candidates, optimal stimulation parameters, and the potential risks and benefits associated with these innovative interventions. Furthermore, the lecture will shed light on the evolving landscape of dysphagia management through neuromodulation techniques.

## FLAVOR: COMBINATION OF TASTE, SMELL, AND MOUTHFEEL

Inthawoot Suppavorasatit<sup>1,\*</sup>

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10330, Thailand*

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Flavor is a combination of taste, smell, and mouthfeel, which is really important in term of the perception by human senses. In comparison to other senses, smell is the one that human can not be denied. In term of social significant, flavor can be related to culture, emotional, and also nutritional aspects. The important of aroma compound is that there are more than 10,000 compounds identified, but relatively few volatile compounds are the active compounds in the foods. In addition, aroma or flavor can be perceived during food consumption because of the volatile aroma/flavor compounds are released from the food matrices. Therefore, understanding of the interactions between aroma/flavor compounds and food matrices can help to design the types and amounts of flavors that can be put into the food. Among three main macromolecules containing in foods, including proteins, lipids, and carbohydrates, the proteins are the main compounds that can interact with aroma/flavor compounds both individually or competitively. Beside the significant important in term of foods for consumption, aroma/flavor can be used as a tool for medical purposes. The aromas are used as a tool to diagnose or early detect some diseases, such as Parkinson's disease. Furthermore, the aroma/flavor can be used to enhance the tastes of the foods as well. For example, vanillin can be used to enhance sweetness of the food without adding more sugar or sweeteners, as well as savory aroma can enhance the saltiness of the food. Thus, the aroma/flavor can be use to produce the products that suitable for specific patients, especially in the rehabilitation purposes.

**Keywords:** flavor; aroma; taste; perception; human senses



## DIET MODIFICATION: FROM LABS TO LIP – “EXPLORING MASTICATORY PERFORMANCE.”

Sirima Kulvanich

Department of Gerodontology & Community Dentistry, Faculty of Dentistry, Thammasat University

Chewing is a fundamental process in the digestion of food, serving as the initial step in breaking down food into manageable particles. Beyond its physiological role, chewing also contributes to the sensory experience of food, allowing individuals to savor tastes and appreciate food textures. Effective chewing involves intricate movements of the tongue, the moistening of particles by saliva, and the formation of a cohesive bolus.

Masticatory performance, defined as the ability to comminute or mix test foods, is a crucial aspect of chewing evaluation. Several methods have been developed to assess masticatory performance, which can be broadly categorized into three main categories: comminution methods, mixing ability methods, and other innovative approaches.

Comminution methods involve the reduction of test food into smaller particles, with the size and volume of these particles serving as indicators of masticatory performance. Smaller particle sizes typically signify more effective chewing.

Mixing ability methods, on the other hand, often employ two-color gum or wax as test materials. These materials undergo color changes during mastication, enabling the evaluation of the form and color of the resulting bolus. Mixing ability tests offer a convenient and practical alternative to traditional comminution methods and have shown good reliability.

This workshop focuses on the utilization of mixing ability testing as an easily implementable method in clinical settings to assess chewing performance and provide valuable insights into its applicability and effectiveness.

## PERIPHERAL NERVE DYSFUNCTION AFTER SPINAL CORD INJURY

Mary P Galea

Department of Medicine (Royal Melbourne Hospital),  
The University of Melbourne, Parkville VIC. 3010, Australia

Spinal cord injury (SCI) leads to an immediate loss of sensory and motor function below the level of injury mostly affecting people in the prime of life. In addition to the primary injury there is accumulating neurophysiological and histological evidence of dysfunction in the peripheral nerves, not related to direct damage from the primary injury, which exacerbates muscle wasting, and contributes to further functional loss and poor recovery. Among the potential contributing factors are systemic inflammation, and motor neuron and myelin abnormalities that result from a lack of neural traffic. The reversibility of these factors, and prevention strategies and possible therapies that may be of benefit to the peripheral nerves in spinal cord injury require further investigation. Preventing or reversing peripheral nerve dysfunction after SCI is essential to maintain this critical component of the nervous system in readiness for the application of other emerging interventions focused on spinal cord repair.

## PROCESS OF DEVELOPING A DATASET FOR INVESTIGATING LIVED EXPERIENCE OF PERSONS WITH SPINAL CORD INJURY LIVING IN THE COMMUNITY

Md Taslim Uddin, Anika Tasnim, Mohammad Tariqul Islam  
Bangabandhu Sheikh Mujib Medical University, Dhaka

Spinal cord injury (SCI) is a significant health issue that requires lifelong care, but there is a lack of a comprehensive database to track individuals with SCI in countries like Bangladesh. To address this gap, it focuses on the development of a dataset for Bangladesh as part of the International Spinal Cord Injury (InSCI) community survey in 2023.

In collaboration with InSCI, a research facility called Bangladesh Spinal Cord Injury (BanSCI) was established. It comprises physiatrists, neurologists, spinal neurosurgeons, physiotherapists, and public health experts. A meeting was held to select 18 tertiary hospitals, rehabilitation centers, and specialist clinics known for providing SCI care. Ethical permissions were obtained from all selected institutes with administrative orders from the Directorate General of Health Services (DGHS) and Military Services of Bangladesh.

Subjects with traumatic and non-traumatic SCI and cauda equina syndrome were included in the study, and a team of trained physicians collected data using a questionnaire. The collected information included name, age, sex, address, etiology of SCI, clinical diagnosis, spinal level, bowel and bladder involvement, and other relevant details. The initial results were cross-checked, and additional information was obtained through telephone calls.

Although 4,300 patients were included at the outset, 57% were finally enrolled in the study. The reasons behind non-enlistment were having no contact number ( $n = 246$ ), having an incorrect mobile number ( $n = 47$ ), having duplicate entries in the registry ( $n = 475$ ), death ( $n = 247$ ), refusal to enroll ( $n = 235$ ), incorrect or wrong address ( $n = 186$ ), unwillingness to disclose identity ( $n = 53$ ), being out of reach in mobile contact ( $n = 121$ ), not being in touch with the contact address ( $n = 65$ ), diagnostic dilemma ( $n = 71$ ), and non-cooperativeness on the part of the participants ( $n = 85$ ). Furthermore, the lengthy process of obtaining permission for data collection, the imposition of fees for ethical clearance, incomplete medical records, and the COVID-19 situation act as barriers.

## PROCESS OF DEVELOPING A DATASET FOR INVESTIGATING LIVED EXPERIENCE OF PERSONS WITH SPINAL CORD INJURY LIVING IN THE COMMUNITY

(Cont.)

The journey toward building this database was a complex process; marked by several steps and obstacles. The successful development of such a database in a resource-limited setting has significant implications for other developing countries and underscores the importance of leveraging technology, including the introduction of a patient unique ID, proper training of the health care workers for obtaining and keeping records, digitalizing patient registration, and maintaining admission and discharge.

Keywords: Spinal cord injury, Dataset, Lived experience, Developing Country, Process Paper

Figure 1: Methods

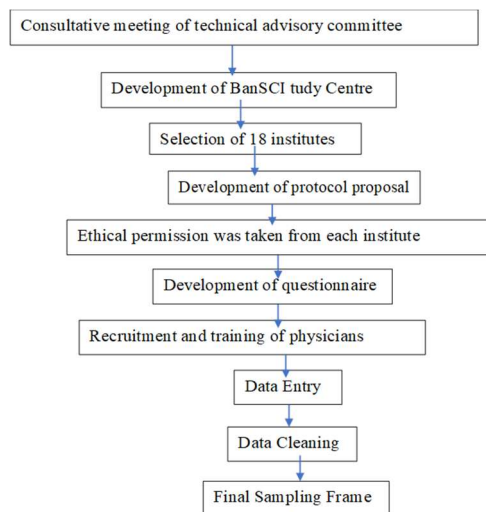
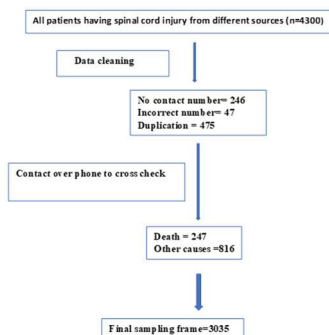


Figure 2: Results





## CARDIOMETABOLIC HEALTH IN PEOPLE WITH SPINAL CORD INJURY: AN EVIDENCE-BASED PRACTICAL APPROACH AND MANAGEMENT

Sintip Pattanakuhar

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Cardiovascular disease CVD is one of the leading causes of death in people with spinal cord injury (SCI). However, CVD and its cardiometabolic risks are usually overlooked by healthcare providers who take care people with SCI and people with SCI themselves. This presentation aims to increase awareness and provide evidence-based recommendation regarding the cardiometabolic health issues to healthcare providers who take care people with SCI. Firstly, epidemiology of CVD and its risk factors in people with SCI would be presented. People with SCI have relatively higher prevalence of CVD when compared with the general population (30-50% vs 5-10%, respectively). People with SCI also have relatively higher prevalence of traditional CV risk factors, especially insulin resistance and diabetes type 2, obesity, hypo-HDL cholesterolemia, and physical inactivity, when compared with the general population. Secondly, pathophysiology of increasing risk of CVD in people with SCI would be discussed, including increased prevalence of traditional CV risk factors, development of SCI-specific mechanisms (e.g., autonomic dysfunction, altered metabolic homeostasis, chronic inflammation, sarcopenia, and physical deconditioning), and psychosocial contributors (e.g., health literacy, health disparity in people with disabilities, health care access). Next, a schedule for screening of CVD and CVD risk factors would be proposed. In brief, at least fasting blood glucose, lipid profile, obesity status, and physical condition test should be measured annually together with blood pressure evaluation in each visit. Traditional CV risk scores, including Framingham Risk Score (FRS), Pooled Cohort Equation, and QRISK3 Score, may underestimate CV events in people with SCI and should be avoided or applied with caution. Finally, managements aiming to primarily prevent CVD would be discussed, including using lifestyle intervention as a primary managements and pharmacological intervention as a secondary management. Some specific recommendation for people with SCI would be discussed, e.g., using metformin as a first line drug for diabetic treatment, avoiding using diuretics as a first line drug in people with SCI who have neurogenic urinary tract dysfunctions. Proper managements of cardiometabolic health issues in people with SCI may reduce CVD burdens and should be encouraged in real-life clinical settings, both for primary and SCI-specialized rehabilitation services.

**Keywords:** spinal cord injury, cardiovascular disease, cardiometabolic risk factors

## THE KEY TO SUCCESS IN ENHANCING NEUROPLASTICITY THROUGH NEUROMODULATION

Mary P Galea

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This presentation will provide examples of our group's experience in the use of different forms of non-invasive neuromodulation for different purposes. While functional electrical stimulation has been used to enhance muscle mass and maintain circulation, especially of the lower limbs after spinal cord injury, we have applied it to maintain peripheral nerve function after spinal cord injury. Transcranial direct current stimulation has been used to modulate cognitive and motor skills. We have used it to modulate chronic neuropathic pain in people with multiple sclerosis. Translingual nerve stimulation is delivered using a Portable Neuromodulation Stimulation (PoNST<sup>TM</sup>) device that stimulates two cranial nerve nuclei (trigeminal and facial nerve nuclei) using electrodes embedded in a mouthpiece that rests on the tongue. Used in conjunction with intensive physiotherapy, it has been shown to improve gait and balance deficits in people with vestibular disorders, multiple sclerosis and traumatic brain injury. Our group is the first to undertake a pilot trial in people with subacute stroke. We are currently undertaking a trial of transcutaneous spinal cord neuromodulation in conjunction with intensive physiotherapy to improve upper limb and trunk function in people with tetraplegia.

December 16, 2023 / Hall 1  
08.45-10.00 hr.

## DIAGNOSTIC TRANSCRANIAL MAGNETIC STIMULATION IS BENEFICIAL IN DEVELOPING A MORE EFFECTIVE TREATMENT PLAN AND ACHIEVING BETTER OUTCOMES.

Pakorn Wivatvongvana

Department of Rehabilitation Medicine, Faculty of Medicine, Chiang Mai University

The Transcranial Magnetic Stimulation (TMS) technique is a valuable tool for diagnosing central nervous system diseases. It can also be used to create personalized rehabilitation programs and set appropriate patient goals. At our institute, we utilized a parabolic coil with biphasic pulse stimulation to obtain typical values for the TMS parameters that are used for diagnosis.

In diagnostic TMS, six key elements are crucial. By using single-pulse TMS, we can collect data on the motor threshold, motor evoked potentials (MEPs), central motor conduction time, and silent period via surface electromyography (EMG). Additionally, we can evaluate intracortical facilitation and short-interval intracortical inhibition through paired-pulse TMS. For more information on waveform morphology and normal values, please refer to <sup>(1)</sup>.

This technique is not only useful for predicting stroke recovery but also for planning the appropriate dosage of the TMS regimen and managing rehabilitation. It helps physicians interpret the corticospinal tract's excitability and infer the cerebral hemisphere's excitability in certain diseases through physiological means. The physician can track the patient's progress while also devising a better treatment regimen. For the recommended treatment procedure, please refer to <sup>(2, 3)</sup>.

In this lecture, we will learn about how to interpret the diagnostic values of specific diseases. We will discuss common and unexpected findings that we may observe, what to be cautious of during the operation, and the difference between the setting with and without surface EMG.

After a subacute stroke, we often observe hyperexcitability in the unaffected hemisphere and hypoexcitability in the affected hemisphere. The motor area of the affected hemisphere is usually harder to locate compared to the unaffected side. However, the magnitude of MEPs is not necessarily correlated with motor recovery. It is important to note that sleep deprivation can affect the results of MEPs. Even without EMG equipment, we can still observe limb contractions. Depending on the skill of the physician, we may witness the same intensity of contraction or a 10% increment in maximum stimulation output. Voluntary contraction is often helpful in identifying motor regions.

1. Jitsakulchaidej P, Wivatvongvana P, Kitisak K. Normal parameters for diagnostic transcranial magnetic stimulation using a parabolic coil with biphasic pulse stimulation. *BMC Neurol.* 2022;22(1):510.
2. Pipatsrisawat S, Klaphajone J, Kitisak K, Sungkarat S, Wivatvongvana P. Effects of combining two techniques of non-invasive brain stimulation in subacute stroke patients: a pilot study. *BMC Neurol.* 2022;22(1):98.
3. Wivatvongvana P, Soonthornthum C, Kitisak K. Intermittent tetraburst stimulation combined with transcranial direct current stimulation once weekly for treatment-resistant depression: a case report. *J Med Case Reports.* 2023;17(1):415.

## APPLICATION OF NON-INVASIVE BRAIN MONITORING IN STROKE REHABILITATION

**Won-Seok Kim**

**Seoul National University Bundang Hospital, Korea**

Traditional stroke rehabilitation approaches have historically been phenotype-based, lacking direct insights into the evolving brain states during the rehabilitation process. Nonetheless, there is a shared belief in the potential of neuroplasticity, the brain's ability to adapt, to be positively influenced by rehabilitation, leading to enhanced recovery. Recent technological advancements open avenues for monitoring brain activity non-invasively during rehabilitation, with notable examples being EEG and fNIRS.

These signals from EEG or fNIRS not only hold promise for Brain-Computer Interface applications but also offer a means to monitor changes in brain activity during various rehabilitation modalities, including emerging technologies like virtual reality and non-invasive brain stimulation. While these technologies may not be commonplace in daily rehabilitation practice, a wealth of research has been conducted, revealing promising results.

In this brief presentation, I will share experiences and insights into the integration of brain monitoring technologies into stroke rehabilitation. By exploring the potential of EEG and fNIRS in monitoring the dynamic changes in brain activity, especially in the context of innovative rehabilitation technologies, I aim to contribute to the ongoing dialogue on the future of stroke rehabilitation practices.

December 14, 2023 / Hall 1  
15.00-16.15 hr.



## RPMS FOR NERVE RECOVERY: FROM NEUROPHYSIOLOGY TO REAL WORLD PRACTICE

Komwudh Konchalard

Queen Savang Vadhana Memorial Hospital, Thai Red Cross Society, Thailand

Repetitive Peripheral Magnetic Stimulation (rPMS) recently gained FDA clearance for treating chronic, intractable, post-traumatic, and post-surgical pain in adults. Unlike standard electrical stimulation, rPMS induces pain relief without needing electrodes and is generally painless for patients. This presentation aims to explore how rPMS works on peripheral nerves, emphasizing its differences from electrical stimulation. Case studies will be presented to highlight protocols for treating nerve injuries, demonstrating their effectiveness and potential as an emerging approach for pain management and nerve recovery.

December 16, 2023 / Hall 1  
11.15-12.15 hr.

## COCHRANE SYSTEMATIC REVIEW AND RESEARCH ON REPETITIVE PERIPHERAL MAGNETIC STIMULATION AFTER SPINAL CORD INJURY

**Julia Anak Patrick Engkasan**

**Department of Rehabilitation Medicine, Universiti Malaya, Kuala Lumpur, Malaysia**

Repetitive Peripheral Magnetic Stimulation (rPMS) has emerged as a promising non-invasive treatment modality for people with spinal cord injury (SCI). rPMS is based on the principles of electromagnetic induction; it induces electric currents in the underlying neural tissues, which in turn activate or modulate the neural pathways. It has been reported to promote motor recovery, and reduce pain and spasticity following a SCI by influencing motor neuron excitability, synaptic plasticity, and motor function. This lecture will summarize findings from existing review articles on the use of rPMS on spasticity, motor function and activities of daily living (ADL) in patients with SCI lesion."

## WEARABLE ROBOTS IN NEUROREHABILITATION

Won-Seok Kim

Seoul National University Bundang Hospital, Korea

December 16, 2023 / Hall 2  
10.00-10.45 hr.

Stroke is the leading cause of disability in developed countries. Timely stroke treatment and early rehabilitation are crucial achieving favorable functional outcomes. However, a significant portion of patients with stroke requires long-term rehabilitation. Since a single conventional rehabilitation approach cannot guarantee a full recovery, repetitive, intensive rehabilitation have been recognized as a significant factor in the recovery process. Therefore, rehabilitation robots, designed to deliver intensive rehabilitation with reduced therapist involvement, have been developed and utilized in stroke rehabilitation over the past decade. Gait and arm rehabilitation using nonportable exoskeletal or end-effector type robots are now widely employed and have demonstrated clinical efficacy in randomized clinical trials and meta-analyses. However, these non-portable, ground-based rehabilitation robots have limitations in adapting to variable environments during rehabilitation and assisting or compensating for functions in patients with chronic stroke, who have minimal potential for recovery of motor impairments. With recent advancement in soft materials, batteries, and sensors, soft wearable robots have gained active attention and research interest in stroke rehabilitation. In this presentation, I will introduce the concept of wearable rehabilitation robots and provide a brief overview of the technologic aspects of soft wearable robots. Additionally, I will discuss the clinical efficacy of wearable rehabilitation robots and their potential integration with other technologies, such as brain-computer interfaces based on my modest experiences in wearable rehabilitation robot research.

**MUSIC AND MEDICINE: FROM BOX TO BENCH**  
Jakkrit Klaphajone, Nawaporn Jitngam, Wilasinee Duangartit  
Department of Rehabilitation Medicine,  
Faculty of Medicine, Chiang Mai University, THAILAND

For decades, a wealth of research has underscored the manifold benefits of music, both physical and psychological. Recognizing the potential of music as a therapeutic tool, Assoc. Prof. Jakkrit Klaphajone, M.D., the head of the Department of Rehabilitation Medicine at Chiang Mai University in Thailand, leveraged his expertise in music to create a multi-faceted therapy plan. His primary aim was to address the specific needs of children with physical disabilities at Srisangwan School, such as improving muscle strength, enhancing finger dexterity, and mitigating muscle stiffness.

With music therapy still in its infancy in Thailand, Klaphajone initiated the 'Music Therapy Group' (MTG), a collaborative effort that brings together colleagues from various disciplines and volunteers passionate about the healing power of music. The group was further enriched by the contributions of Annette Janine George, a certified music therapist based in the U.S., who works at Payap University's College of Music. George imparted foundational principles that have since become integral to MTG's methodological approach.

MTG's work has revealed remarkable results, notably in fostering enhanced learning abilities, self-esteem, muscle flexibility, and even lung capacity among the participating children. Compared to those undergoing conventional treatments, children in the music therapy program reported significantly higher levels of happiness and emotional well-being. Their musical performances not only captivated audiences but also had a transformative impact on the children's self-perception and emotional health.

In a further diversification of their therapeutic strategies, MTG incorporated the Melodic Intonation Therapy (MIT) approach, designed specifically for patients suffering from aphasia. This technique employs singing as a form of alternative communication, as it activates different neural pathways than those used in regular speech, potentially bypassing damaged language centers in the brain. MTG's therapists make use of rhythmic patterns and melodies, reinforced through visual aids and rhythmic tapping, to facilitate the recall and articulation of words or phrases. The process of repetition and consistent practice forms the cornerstone of this therapy, aiming to solidify these alternative neural pathways for speech.

Moreover, Klaphajone is currently spearheading research into the therapeutic applications of other auditory stimuli, including binaural beats, white noise, ASMR, and various soundwaves, all combined with music to treat conditions such as anxiety, insomnia, and stress. In a groundbreaking development, he introduced a novel sound frequency known as "Superimposed binaural beats." Unlike traditional binaural beats, which employ stable carrier frequencies, Klaphajone's innovative technique uses fluctuating carrier frequencies while keeping the beats between the ears constant. Early studies indicate that this novel approach may be more effective in treating anxiety than conventional binaural beats, paving the way for further research and application.



## USING ELECTRODIAGNOSIS FOR SURGICAL PLANNING

Larry Robinson

University of Toronto and Sunnybrook Health Sciences Centre

Over the last 2 decades the surgical treatment of brachial plexus and peripheral nerve injuries has advanced considerably. Nerve transfers have become an important surgical tool in addition to nerve repair and grafting. Electrodiagnosis has traditionally played a role in the diagnosis and localization of peripheral nervous system injuries, but a different approach is needed for surgical decision-making and monitoring recovery. When patients have complete or severe injuries they should be referred to surgical colleagues early after injury, as outcomes are best when nerve transfers are performed within the first 3 to 6 months after onset. Patients with minimal recovery of voluntary activity are particularly challenging, and the presence of a few motor unit potentials in these individuals should be interpreted on the basis of timing and evidence of ongoing reinnervation. Evaluation of potential recipient and donor muscles, as well as redundant muscles, for nerve transfers requires an individualized approach to optimize the chances of a successful surgical intervention. Anomalous innervation takes on new importance in these patients. Communication between surgeons and electromyographers is best facilitated by a joint collaborative clinic. Ongoing monitoring of recovery post-operatively is critical to allow for decision making for continued surgical and rehabilitation treatments. Different electrodiagnostic findings are expected with resolution of neurapraxia, distal axon sprouting, and axonal regrowth. As new surgical techniques become available, electrodiagnosticians will play an important role in the assessment and treatment of these patients with severe nerve injuries.

December 16, 2023 / Meeting Room 1  
10.00-10.45 hr.

## EVALUATION AND TRAINING OF PROPRIOCEPTION: FOCUSING ON ITS ROLE IN NEUROREHABILITATION

Han Gil Seo

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Proprioception is the part of somatosensation that enables perception of body position and motion based on information derived from internal sensing structures. Proprioception has a substantial role in motor control, and loss of proprioception can result in sensory ataxia, impaired balance, and incoordination that are exacerbated in the absence of visual compensation. Beyond motor control, the somatosensory system plays a role in motor learning and functional recovery. In post-stroke individuals, proprioceptive deficits predicted the possibility to benefit from constraint-induced therapy, and finger proprioception and somatosensory system integrity predicted treatment-related hand function gains from robot-based therapy. Therefore, proprioception needs to be further emphasized as a critical element of rehabilitation.

Because of the complex neurophysiological processes related to proprioception, there is no single gold standard assessment technique to quantitatively measure proprioceptive acuity. Among the different assessment techniques, joint position reproduction (JPR) and threshold to detection of passive motion (TTDPM) have been widely used by clinicians and researchers. Each assessment technique arguably assesses different aspects of proprioception involving different neurophysiological processes.

Several systematic reviews have found that various forms of proprioceptive training improve proprioception in healthy subjects and patients with various medical conditions. However, these reviews have not analyzed the learning dynamics associated with proprioceptive training. Therefore, we conducted a systematic review on the key aspects of learning that are well-known in motor learning literature. In conclusion, proprioceptive learning appears to exhibit several features similar to motor learning, including specificity to the training type, two-time constant learning curves, good retention, and improvements that are correlated between different assessments, suggesting a possible, common mechanism for transfer of training.

The challenge ahead is to develop strategies to optimize the effect of proprioception training in patients with neurologic disorders and to determine whether this can enhance motor recovery through rehabilitation.

## OPTIMIZING PRISM ADAPTATION IN STROKE RECOVERY AND REHABILITATION

1. **Dr. Hitav Someshwar**, Assistant Professor, Physiotherapy School & Centre, Early Intervention and Rehabilitation Centre for children, Topiwala National Medical College & BYL Nair Ch. Hospital, Mumbai.
2. Dr. Nirmal Surya, Chairman, Surya Neuro Centre, President, Indian Federation of Neurorehabilitation.
3. Dr. Geeta Bhatt, Professor & Head, Department of Neurophysiotherapy, KJ Somaiya College of Physiotherapy, Mumbai.
4. Dr. Hutoxi Writer, Ex- Professor & Head, Physiotherapy School & Centre, Topiwala National Medical College & BYL Nair Ch. Hospital, Mumbai.

Stroke-induced hemispatial neglect (HSN) is a debilitating condition characterized by an impaired awareness of one side of space, often leading to significant functional limitations in daily life activities. Prism adaptation, a promising therapeutic approach, has gained considerable attention in stroke rehabilitation due to its potential to ameliorate HSN symptoms. This review aims to provide a comprehensive overview of the current state of research on optimizing prism adaptation as a rehabilitation intervention for stroke survivors with HSN.

The review begins with a concise introduction to the pathophysiology of HSN and its impact on functional recovery, emphasizing the critical need for effective interventions. It then delves into the theoretical underpinnings of prism adaptation, elucidating the mechanisms through which visuomotor recalibration and neuroplasticity contribute to its therapeutic effects.

The subsequent sections focus on methodological considerations for implementing prism adaptation, covering key factors such as dosage, duration, and timing of intervention. A critical analysis of the various prism configurations and their impact on treatment outcomes is provided, highlighting the importance of personalized approaches tailored to individual patient needs.

Furthermore, the review explores the integration of multimodal approaches, including virtual reality, robotics, and cognitive training, to enhance the efficacy of prism adaptation. The potential synergistic effects of combining prism adaptation with other evidence-based interventions are discussed, offering insights into the development of comprehensive rehabilitation protocols.

Additionally, the review addresses emerging technologies and neuroimaging techniques that facilitate real-time monitoring of neuroplastic changes during prism adaptation, providing valuable feedback for personalized treatment optimization.

A critical evaluation of the existing literature is presented, highlighting gaps in knowledge and avenues for future research. The review concludes with a synthesis of key findings and practical recommendations for optimizing prism adaptation in stroke recovery and rehabilitation, emphasizing the importance of a multidisciplinary approach and individualized treatment plans.

**Keywords:** Prism adaptation, hemispatial neglect, stroke recovery, rehabilitation, visuomotor recalibration, neuroplasticity, personalized intervention, multimodal approaches, emerging technologies.

**5<sup>th</sup> Asia Oceanian Congress of NeuroRehabilitation**

**Multifaceted NeuroRehabilitation: from Tradition to Innovation**

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**Oral Presentation  
Abstract**





## Geriatric Neurorehabilitation (Research and Innovation Awards Competition)

**December 14, 2023 (Thu)**  
**11.15-12.15 hr.**

### **Judges Panel**

#### **Session Judges:**

Chair: *Areerat Suputtitada (Thailand)*

Co-Chair: *Supattana Chatromyen (Thailand)*

#### **Main Judges:**

*Carl PC Chen (Taiwan)*

*Chuenchom Chueluecha (Thailand)*

*Sintip Pattanakuhar (Thailand)*

## Neuroprotective equivalence comparison of Erythropoietin-ferric/ferrous nanobots with Erythropoietin

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**Objectives:** Erythropoietin (EPO) acts essential roles in neuro-protection and –regeneration in CNS injuries. Their limitations, short therapeutic-time window after injury and co-existence of hematopoietic and nonhematopoietic receptors showing phylogenetic and heterogenic differences, can be solved using quick targeted delivery vehicles such as nanobots. To do so, EPO has to be released in-situ from encapsulating materials, such as polymers, of nanobots in high efficiency as well. However, self-assembling of polymers usually occurs after breakdown. To approve therapeutic feasibility of EPO-nanobots (ENBs) after disassembling in-situ, an in-vitro bioequivalence comparison was conducted between EPO and ENBs.

**Materials and Methods:** Nanoparticles (NPs) were manufactured using a chemical coprecipitation method. ENBs consisting of 7.5 mg biodegradable polymer alginate, 1000 IU EPO, and 150 mg ferric-ferrous NPs were synthesized under a nano spray-drying technique. First, as for EPO release rate under control, the ENBs were preemptively treated by preconditioning sonication in various degrees (Fig. 1). Second, Thapsigargin, endoplasmic reticulum Ca<sup>2+</sup> ATPase inhibitor, was co-prepared with either EPO only or ENBs.

**Results:** Low frequency preconditioning sonication (from 50 to 60 KHz) up-regulated the accumulative EPO release constantly from ENBs over 24 hours compared with non-sonication. At early period (2 to 6 or to 12 hours after treatment), each biomolecular level of JAK2, PDI, PERK, GRP78, AFT6, TGF- $\beta$ , Casp3, CHOP in ENBs-treated cells was similar to - but significantly different from - that of EPO only-treated cells. However, every marker in ENBs-treated cells reached as the same values as EPO only-treated cells did at 24 hours (Fig. 2 & 3)

**Conclusions:** The ENBs constructed here could display in-vitro as the similar level of neuro-regeneration and neuro-protection cascade markers as EPO only did until 24 hours after treatment. In theory, ENBs may make EPO be released under the in-vivo control via preconditioning sonication, depending on the degree of sonication.

**Keywords:** neuroprotection 1; nanoparticles 2; erythropoietin 3; sonication 4; therapeutic equivalency

## Effects of transcranial pulse stimulation on attention-deficit/hyperactivity disorder: a double-blind, randomized, sham-controlled trial

Teris Cheung<sup>1,2</sup>, Kwan Hin Fong<sup>1\*</sup>, Joyce Lam<sup>1</sup>, Benjamin K. Yee<sup>2,3</sup>, Bolton Chau<sup>3</sup>, Herman Lo<sup>4</sup>, Tim Man Ho Li<sup>5</sup>, Albert Martin Li<sup>6</sup>, Sun Lei<sup>7</sup>, Yu-Tao Xiang<sup>8</sup>, Roland Beisteiner<sup>9</sup>, Calvin Pak Wing Cheng<sup>10</sup>

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**Objectives:** This is the first study to evaluate the efficacy and safety of transcranial pulse stimulation (TPS) for the treatment of attention-deficit/hyperactivity disorder (ADHD) among young adolescents in Hong Kong.

**Materials and Methods:** This double-blind, randomized, sham-controlled trial included a verum TPS group and a sham TPS group, encompassing a total of 30 subjects aged 12–17 years who were diagnosed with ADHD. Baseline measurements SNAP-IV, ADHD RS-IV, CGI and executive functions (Stroop tests, Digit Span (forward/backward)) and post-TPS evaluation were collected. Both groups were assessed at baseline, immediately after the 2-week intervention, and at 1-month and 3-month follow-ups. Repeated-measures ANOVAs were used to analyse data. Missing data were managed by multiple imputations. The level of significance was set at  $p < 0.05$ .

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**Results:** The verum TPS group had significantly lower mean SNAP-IV scores at posttest, with a large effect size ( $d=0.75$ ) ( $d=2.45$ ). Additionally, the verum TPS group also had significantly lower SNAP-IV scores at the 1-month and 3-month follow-ups (all  $p < 0.001$ ) than the sham TPS group. The effect of group on the primary outcome (SNAP-IV scores) was medium to large (Cohen's  $d$  values at posttest, 1-month follow-up, and 3-month follow-up: 2.32, 2.45, and 2.40, respectively). Regarding secondary outcomes, the effect on ADHD-RS-IV ( $d=1.04$ ), CGI-I ( $d=1.04-5.63$ ), and CGI total scores was large ( $d=1.13-2.69$ ).

**Conclusions:** Our findings provide new understanding and insight to the field of neuroscience. We demonstrated that TPS is an effective, safe, and scientific NIBS that can be used to treat most (but not all) ADHD core symptoms. The long-lasting effects of TPS indicate that this new treatment modality has sustained effects. Thus, its incorporation as a potential standard of care/adjunct treatment option for ADHD should be seriously considered by health policymakers in the near future.

**Keywords:** transcranial pulse stimulation; RCT; ADHD; neuromodulation; adolescents



## A double-blind, randomized, sham-controlled trial of transcranial pulse stimulation on ASD

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**Objectives:** Transcranial pulse stimulation (TPS) has been shown to improve cognition, memory, and depressive symptoms in Alzheimer's disease, but its effectiveness in other neurological or neuropsychiatric disorders is unclear. This study aimed to investigate the effects of TPS on the right temporoparietal junction (rTPJ), a key node for social cognition in Autism Spectrum Disorder (ASD).

**Materials and Methods:** This double-blind randomized, sham-controlled trial involved 32 subjects (27 males) aged 12-17 with ASD. The subjects were randomized into either the verum or sham TPS group. Sixteen subjects received six verum TPS sessions in two weeks on alternate days, while the remaining sixteen received sham TPS stimulation. The primary outcome measure was changes in CARS score evaluated by parents from baseline to 3-month follow-ups. Secondary outcomes included self-reported questionnaires responded by parents and cognitive tests responded by subjects. Clinical global impression (CGI) scores were evaluated by a licensed mental health professional.

**Results:** Results showed significant interaction effects in CARS and other secondary outcomes, with significant group and time effects found in most secondary outcomes. There were also significant differences between two groups in CARS, CGI-I, and CGI-T at posttest (all  $P$ s < .05), and effects were sustainable at 1- and 3-month follow-up compared with baseline. The effect size of CARS ( $d=0.83-0.95$ ) and CGI-I ( $d=4.12-4.37$ ) was large to medium at posttest and sustained at 1-month post-stimulation, although effects were reduced at 3-month post-stimulation ( $d=2.31$ ). The findings suggested that TPS over rTPJ was effective in reducing the core symptoms of ASD, with a 24% reduction in the total CARS score in the verum TPS group.

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Additionally, the CGI total score had a 53.7% reduction in the verum TPS group at 3-month follow-up compared with baseline. Although some of the neuropsychological tests' results were statistically insignificant, subjects in the verum TPS group showed substantial improvement at 1- and 3-month follow-up compared with baseline.

**Conclusions:** This study provides evidence that TPS over rTPJ may be considered as an alternative top-on treatment in neuropsychiatry. Future replication of this study should include a larger sample derived from multi-nations to determine the effectiveness of TPS in other neurological or neuropsychiatric disorders.

**Keywords:** transcranial pulse stimulation; randomised controlled trial; autism spectrum disorder; neuromodulation; adolescents

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## Long Term Data of Transcranial Pulse Stimulation (TPS) in Alzheimer's: A Detailed Analysis of Different Neuropsychological Domains

Celine Cont\*<sup>1,2</sup>, Anastasia Galli<sup>1</sup>, Nathalie Stute<sup>1</sup>, Christina Schulte<sup>1</sup>, Lars Wojtecki<sup>1,2</sup>

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**Objectives:** Transcranial Pulse Stimulation (TPS) uses shockwaves for the treatment of Alzheimer's Disease (AD). Our group published short term results after the first treatment cycle (Cont et al. 2022). Here, we present new short-term and long-term data with a larger group sample, and show a detailed review on the effect on different cognitive domains from TPS.

**Materials and Methods:** A consecutive number of 25 TPS-treated patients was examined. All patients received 4Hz TPS of about 6000 pulses of 0.2 mJ/mm<sup>2</sup> (navigated bifrontally, biparietally, bitemporally and praecuneus) using the Neurolith System (Storz Medical). After the initial treatment cycle of 6 session over 2 weeks patients were planned to receive monthly booster sessions. Cognitive scores were assessed (e.g. ADAS, MMST, MoCA) up to 6 and 12 months. Moreover, a detailed analysis on the different cognitive domains were included (orientation, speech, visuoconstruction, alertness).

**Results:** Short term effects on cognition showed significant improvement in all scores. Mean scores were stable over 12 months. Results in different cognitive domains will be presented.

**Conclusions:** These pilot results show that initial improvement of cognitive functions can be maintained up to 1 year in TPS treated patients. More extensive long-term assessments need to be performed in larger groups. Long prospective controlled trials need to show the efficacy of both treatments.

**Keywords:** Transcranial Pulse Stimulation, Alzheimer's Disease, Neuromodulation

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## The back-muscle surface electromyography-based fatigue index: a digital biomarker of human neuromuscular aging?

Gerold Ebenbichler<sup>1,2,\*</sup>, Richard Habenicht<sup>1</sup>, Peter Blohm<sup>1</sup>, Paolo Bonato<sup>3</sup>, Josef Kollmitzer<sup>4</sup>, Patrick Mair<sup>5</sup> and Thomas Kienbacher

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**Objectives:** As part of our quest for digital biomarkers of neuromuscular aging, and encouraged by recent findings in healthy volunteers, this study investigated if the instantaneous median frequency (IMDF) derived from back muscle surface electromyographic (SEMG) data monitored during cyclic back extensions could reliably differentiate between younger and older individuals with chronic low back pain (cLBP).

**Materials and Methods:** A total of 243 persons with cLBP participated in three experimental sessions: at baseline, one to two days after the first session, and then again approximately six weeks later. During each session, the study participants performed a series of three isometric maximal voluntary contractions (MVC) of back extensors using a dynamometer. These were followed by an isometric back extension at 80% MVC, and - after a break - 25 slow cyclic back extensions at 50% MVC. SEMG data were recorded bilaterally at L5 (multifidus), L2 (longissimus dorsi), and L1 (iliocostalis lumborum).

**Results:** Linear mixed-effects models found the IMDF-SEMG time-course changes more rapidly in younger than in older individuals, and more prominently in male participants. The absolute and relative reliabilities of the SEMG time-frequency representations were well compared between older and younger participants. The results indicated an overall good relative reliability, but variable absolute reliability levels.

**Conclusions:** IMDF-SEMG estimates derived from cyclic back extensions proved to be successful in reliably detecting differences in back muscle function in younger vs. older persons with cLBP. These findings encourage further research, with a focus on assessing whether an IMDF-SEMG-based index could be utilized as a tool to achieve the preclinical detection of back muscle aging, and possibly predict the development of back muscle sarcopenia.

**Keywords:** aging; low back pain; surface electromyography; muscle fatigue; cyclic exercise



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## Method for Dementia Tracking Cum Neurorehabilitation (Neurophysiotherapy) Recommendation

Pushkraj Marne  
*Manastik, India*

This research presents a groundbreaking invention aimed at revolutionizing dementia care and management by seamlessly integrating advanced technologies and innovative methodologies. The invention addresses critical challenges such as delayed detection and inaccurate diagnosis by employing state-of-the-art screening methods and precise diagnostic procedures. Through the creation of a comprehensive digital tracking system, it effectively bridges gaps in dementia care, providing stage-specific monitoring mechanisms and amalgamating diverse data sources to facilitate informed decision-making.

Furthermore, the innovation surpasses existing tracking platforms by introducing an advanced digital system capable of continuous and comprehensive progression tracking. This feature offers valuable insights into the disease trajectory over time, facilitating treatment adjustments and efficient care planning. Leveraging patient-specific tracking data, a personalized rehabilitation platform recommends tailored strategies aligned with individual progression, thereby optimizing rehabilitation outcomes.

A pivotal aspect of this invention is the integration of an AI-driven evaluation system, which significantly enhances its impact. Through dynamic analysis of medical inputs and patient responses, the system adapts treatment recommendations to maximize efficacy. The ultimate goal is to create a cohesive ecosystem that transforms dementia care and management, providing crucial support to patients, caregivers, and healthcare providers.

In summary, this holistic and comprehensive digital solution addresses the entire spectrum of dementia care - encompassing early detection, accurate diagnosis, continuous tracking, personalized rehabilitation, and dynamic evaluation. This multifaceted approach strives to elevate the quality of life for individuals with dementia and advance the standard of care within the medical community.

## Neurorehabilitation engineering (Research and Innovation Awards Competition)

**December 14, 2023 (Thu)**  
**13.30-14.30 hr.**

### Judges Panel

#### Session Judges:

Chair: *Nam Jong Paik (Korea)*

Co-Chair: *Suttipong Tipchatyotin (Thailand)*

#### Main Judges:

*Carl PC Chen (Taiwan)*

*Chuenchom Chueluecha (Thailand)*

*Sintip Pattanakuhar (Thailand)*

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**Robotic-assisted lower limb rehabilitation in adult Motor Neuron Disease: a pilot study.**

Jade Pei Guan,<sup>1</sup> Nur Azah Hamzaid,<sup>2</sup> Nortina Shahrizaila,<sup>3</sup> Sakinah Sabirin,<sup>1</sup> Sorfina Ilham Rozman,<sup>2</sup> Norhamizan Hamzah<sup>1</sup>

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**Background:** Altered gait rhythm is an early feature of Motor neuron disease(MND). Experimental data had demonstrated benefits of submaximal resistive exercises especially in the early stages of the MND. ExoMotus M4 is wearable powered exoskeleton with an integrated balancing support frame that provides physical gait assistance for safe walking and re-training through a combination of in-house developed motion control unit, multi-dimensional force sensor, and smooth high-performing motors at the joints. Robotic-assisted rehabilitation is promising because it maximizes motor training by individually controlling motor activation, thus improving functional ambulation in patients. The aim of this study is to apply structured robotic rehabilitation to measure its effect on gait ability in patients with MND.

**Objectives:** To measure physical capacity specifically in walking and apply gait training protocol using ExoMotus M4 in the early stage of selected MND patients. To compare the physical outcomes between intervention group and conventional treatment group.

**Materials and Methods:**

Individuals diagnosed with motor neuron disease experiencing gait disorder and receiving neurorehabilitation in Universiti Malaya Medical Centre are assigned into robotic and control group based on patient's preferences. Robotic rehabilitation targeting lower limb training while control group receive conventional therapy of lower limbs. Both groups undergo 20-minute session of therapy twice weekly. Outcome measures such as muscle strength of lower limbs using Medical Research Council(MRC), 6-minute walking test(6MWT) and 10-meter walk test(10mWT) are assessed at baseline and at the end of 16 therapy sessions.

**Results:** Ongoing recruitment in progress. Outcome measures compared pre and post program and analyzed by dependent T-Test for significance.

**Conclusions:** Robotic-assisted lower limb rehabilitation for patients with MND is a promising approach. This concept combines technology with human expertise to enhance treatment outcome and preserve walking ability in patients with MND.

**Keywords:** Robotic-assisted rehabilitation; ExoMotus M4; exoskeleton; motor neuron disease

## AI-driven prognosis: mapping safe balance after stroke

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**Objectives:** This study aims to develop an explainable artificial intelligence (AI) model to predict safe balance at 3 and 6 months post-stroke using clinical, neurophysiological, and neuroimaging data collected within the first month following the stroke.

**Materials and Methods:** We analyzed data from 92 first-time stroke patients from January 2016 to June 2023. The Berg Balance Scales (BBS) were used to assess safe balance, with scores of 0 (below 45) or 1 (above 45) at three (BBS\_3) and six months (BBS\_6). We examined 29 predictors, including age, gender, stroke type, side of stroke, mini-mental state examination score, functional assessment data including Fugl-Meyer assessment (FMA), initial BBS, motor strength, neurophysiological data, and neuroimaging data on corticospinal tracts. The Random Forest algorithm assessed variable importance (VI) and was compared with logistic regression analysis. Shapley Additive Explanation (SHAP) values were computed to elucidate the relationships.

**Results:** The random forest model demonstrated a higher or equivalent area under the curve than logistic regression: 91% vs. 87% for BBS\_3 and 92% vs. 92% for BBS\_6. Based on random forest VI, BBS\_3 was strongly associated with initial BBS, FMA, ipsilesional corticospinal tract fractional anisotropy (CST-IP-FA), fractional anisotropy laterality index, and age. Additionally, BBS\_6 was significantly related to the FMA, initial BBS, and muscle strength including ankle plantar flexion, knee extension, and hip flexion. Regarding the max SHAP values for BBS\_3, associations like the initial BBS (0.11), FMA (0.08), and CST-IP-FA (0.08) were found to be positive. Adding initial BBS, FMA, or CST-IP-FA into the random forest model could increase the probability of BBS\_3 by 0.11, 0.08, or 0.08, respectively.



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**Conclusions:** Safe balance is significantly correlated with initial motor function, Fugl-Meyer assessment, and CST-IP-FA. These findings highlight the importance of various evaluation results, including early post-stroke neuroimaging data, in shaping an AI model for safe balance prediction.

**Keywords:** Artificial Intelligence; Mobility Limitation; Diffusion Tensor Imaging; Postural Balance; Pyramidal Tracts

**Acknowledgments:** This work was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIT) (no. 2022R1A2B5B02001673).

## A Virtual Reality (VR)-Based Post-Stroke Rehabilitation Approach: Analysis of Safety and User Acceptance

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**Objectives:** Stroke is a common health problem with a high impact on the biopsychosocial aspect. The long duration of post-stroke rehabilitation could cause the patient to lose their motivation to finish the entire course of treatment. VR rehabilitation approach provides realistic and engaging solutions to patient's problems. This study evaluated the safety and user acceptance of the virtual reality (VR)-based stroke rehabilitation approach.

**Materials and Methods:** This is a cross-sectional, pre-post-intervention study. Patients who had recently experienced a stroke were chosen to participate in the VR-based therapy. Accepting phone calls, shopping, and payment processing were the main elements of our VR. Safety and user acceptance factors were evaluated using vital signs at pre and post-VR exercise, the Montreal Cognitive Assessment-Indonesian version (MOCA-Ina), the modified technology acceptance model (m-TAM), and the motion sickness questionnaire.

**Results:** A total of 31 stroke patients (21 males, 10 females) were recruited for this study. The average score of MOCA-Ina was 22.5. Most of our respondents completed all tasks with a mean duration of 476 sec. Results demonstrate that VR-based post-stroke rehabilitation is relatively safe to use based on vital sign score;  $\Delta$  systole: -0.13 mmHg,  $\Delta$  diastole: -1.61 mmHg, and  $\Delta$  MAP: -1.12 mmHg) with a low risk of motion sickness (mean score: 1.22, SD $\pm$ 0.29). Positive technology acceptance and willingness to continue the rehabilitation in the future were also revealed in this study (mean score of usefulness: 4.95, ease of use: 4.89, ease of learning: 4.80, satisfaction; 4.91).

**Conclusions:** The VR-based post-stroke rehabilitation approach is safe and accepted by post-stroke patients for treatment.

**Keywords:** Virtual reality, Stroke, Rehabilitation, Safety, User Acceptance

## Quantitative Hand Gesture Classification Using AI Training: Preliminary Study

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**Objectives:** Sensory integration-based clinical observation refers to the process of integrating various sensory inputs to make observations. While this sensory integration is crucial for children, when there is damage to the motor coordination system, developmental coordination disorder may arise, potentially leading to delays in simple tasks such as writing or language development. Clinical observations like these are qualitative since therapists rely on visual confirmation, making them subject to subjective judgments based on the therapist's experience.

**Materials and Methods:** To address the limitations of qualitative assessments, this study attempted quantitative analysis by capturing subjects' hands through a webcam and later extracting joint coordinates from the resulting human model. The analysis aimed to derive various quantitative metrics such as the number of times the subject flipped their hand, angles, success rates, and the correlation coefficient between both hands. Additionally, in future research, the study aimed to utilize AI training to compare the accuracy and efficiency of the therapist's assessments with those of AI.

**Results:** The results showed that when analyzing the RFR (Reaching, Flipping, and Returning) task of 21 subjects with normal hand function, the subjects performed an average of 14.6 (2.73) flips during a 15-second task, with a success rate of approximately 95.5% (6.43) for the left hand and 93.5% (8.13) for the right hand. Furthermore, there was similarity between the measurements judged by the therapist and those measured using AI training.

**Conclusions:** Thus, it was confirmed that AI-based quantitative assessment can assist in analyzing existing tasks, and future research is needed to determine whether it is possible to analyze patients with hand function impairments through actual clinical application.

**Keywords :** AI; Quantitative Assessment; Classification;

## The development, and validity of a finger therapeutic device with integrated position sensors

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**Objectives:** To report the development and validation of a new hand therapeutic device that is integrated with orientation sensors and designed to measure the range of metacarpophalangeal (MCP) joint position. These joints play a significant role in pinch and grasp functions.

**Materials and Methods:** The hand therapeutic device, the Air-guitar system, focuses on finger exercises with adjustable resistance to facilitate hand rehabilitation in either a clinical setting or at home (Figure 1,2). It consists of a joint-monitoring glove with adjustable resistance for muscle strengthening, a USB controller, a serious game with grip exercises available in English and Thai, and specifically designed music therapy for motivation. Ten self-reported asymptomatic participants were recruited to test the validity and reliability of the system. The active range of MCP joint motion of the dominant hands was measured using a finger goniometer and the air-guitar system. Two measuring sessions were conducted on the same day.

**Results:** The test-retest reliability of flexion of MCP measurements indicated by intraclass correlation coefficients (ICC) from the Air-Guitar glove (range of 0.82-0.99) was acceptable as a clinically meaningful measurement tool as they were higher than 0.7. The SEM (1.1–3.4°) of the Air-Guitar and the mean difference (0.9–1.42) between the two instruments are well below the limit of 5° set a priori by the clinical routine measurement using a goniometer.

**Conclusions:** The Air-Guitar tracking features, when used as a home-based therapy tool, may assist in monitoring MCP change over a time course with good reliability and be comparable to the goniometer.

**Keywords:** hand therapeutic device; telerehabilitation; metacarpophalangeal joint; validation; reliability



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Figure 1 a new low-cost hand therapeutic Air-guitar system: Glove (Patent submission on 2303001869 July 10th, 2023)

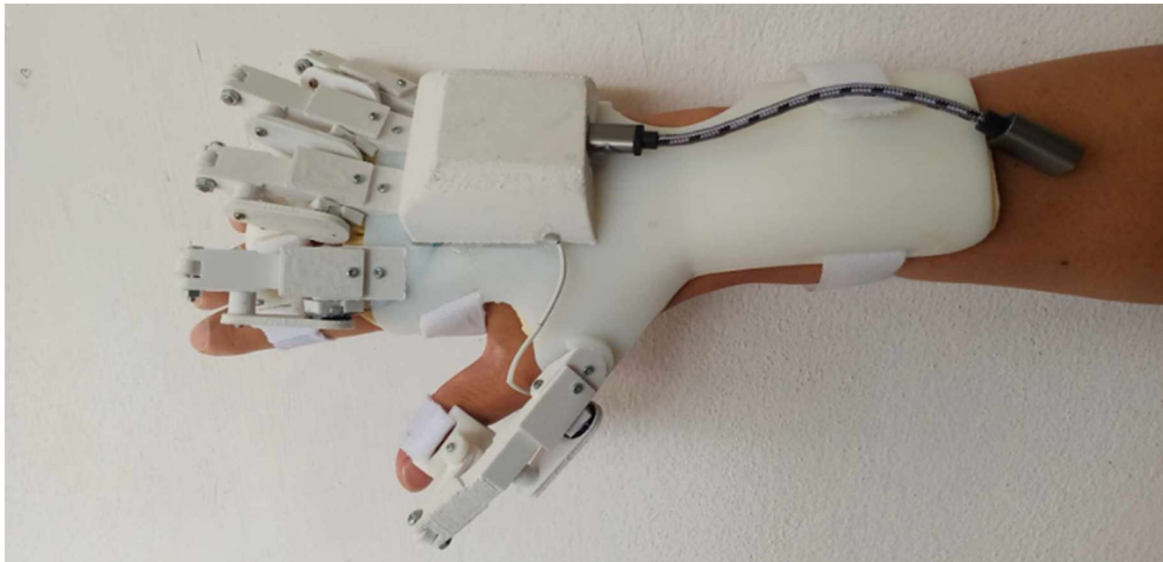


Figure 2 Game interface of Air-guitar system



VDO attachment on Air-guitar system and report

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**Feasibility: effect of music with superimposed binaural beats on sleep quality in adults**

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**Objectives:** To investigate the immediate effect of music with superimposed binaural beats (SBB) on sleep quality as a potential intervention in adults with poor sleep quality. SBB are synthesized based on a subtle frequency difference of the carrier sound waves between ears. The mechanisms involve the limbic system, which regulates mood, and brainwave entrainment.

**Materials and Methods:** Ten adults with a Pittsburgh Sleep Quality Index >5 participated in the study. The participants were exposed to music with SBB prior to sleep, and their satisfaction level was measured on a scale of 0 to 10. Changes in sleep parameters, including sleep onset latency (SOL), wake after sleep onset (WASO), sleep efficiency (SE), total sleep time (TST), rapid-eye-movement (REM) latency, and sleep cycle, were assessed using polysomnography (PSG). Adverse events were also monitored.

**Results:** Data from seven participants was described based on the completion of PSG data. The mean satisfaction level with the intervention was 6.8 (SD 3.1). The changes in SOL, WASO, SE, and TST between the two conditions were unclear. One participant clearly exhibited prolonged SOL, lessened SE and TST due to personal music preferences. The intervention appeared to decrease REM latency and WASO in five participants while prolonging the REM stage of sleep in six participants. No adverse events were reported.

**Conclusions:** This feasibility study demonstrates that SBB has the potential to prolong the REM stage of sleep, which is crucial for psychological and emotional well-being, and can enhance perceived rested sleep. The intervention was found to be safe. The rate of successful data collection should be considered for sample size calculation. These findings warrant further investigation in a larger sample size with a more robust protocol to comprehensively investigate the effects of SBB on sleep quality in adults with poor sleep.

**Keywords:** superimposed binaural beats; sleep quality; adults; music therapy

## **Pediatric and adult neurorehabilitation (Research and Innovation Awards Competition)**

**December 14, 2023 (Thu)  
15.00-16.00 hr.**

### **Judges Panel**

#### **Session Judges:**

Chair: *Areerat Suputtitada (Thailand)*

Co-Chair: *Montana Buntragulpoontawee (Thailand)*

#### **Main Judges:**

*Carl PC Chen (Taiwan)*

*Chuenchom Chueluecha (Thailand)*

*Sintip Pattanakuhar (Thailand)*



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## Sleep disturbances among children with neurodevelopmental disorders: A case-control study

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### Objectives

Variations in sleep practices exist between Asian and Western countries. However, comprehensive epidemiological studies comparing sleep disturbances in neurodevelopmental disorders (NDD) and neurotypical children in Malaysia are lacking. The primary objective of this study was to assess the demographic distribution of sleep disturbances in a paediatric NDD population within a Malaysian tertiary hospital. The secondary objective was to identify potential differences in sleep disturbance parameters between children with NDD and their neurotypical peers of similar age group.

### Materials and Methods

A case-control study was conducted. Cases encompassed pre-school NDD patients (aged 2 to 6 years) from University Malaya Medical Centre. Controls were typically developing well siblings of children from the same hospital. Study participants included English-proficient parents or next-of-kin. Children with ongoing treatment for acute medical conditions or actively using psychogenic-related medications were excluded. Data were collected using the validated, English-version Japanese Sleep Questionnaire - Preschoolers (JSQ-P). Descriptive analysis was performed, and univariate analysis was conducted using student's t-test for continuous variables.

### Results

Recruitment is ongoing, with the current preliminary analysis comprising 69 cases (mean age = 4.28 years, 50.7% females) and 69 gender-matched controls (mean age = 3.94 years, 49.3% females). Notably, all NDD children co-slept with family members, while 1.4% of neurotypical children slept alone. Most NDD children had earlier bedtimes and less screen time in comparison to neurotypical children.



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Children with NDD exhibited significantly higher mean scores for Factor VI (Daytime excessive sleepiness) while displaying lower mean scores for Factor I (Restless leg syndrome, sensory) and Factor IX (Insufficient sleep) compared to the neurotypical group. There was no statistically significant difference in the presence of sleep disturbances (Total JSQ-P scores  $\geq 84$ ).

### Conclusions

Although certain disparities in sleep-related factors were observed between NDD and neurotypical children, further associative analysis was warranted to quantify the sleep disturbance symptomatology.

**Keywords:** Japanese Sleep Questionnaire – Preschoolers; daytime excessive sleepiness; restless leg syndrome; insufficient sleep; Malaysia

## Electrical stimulation in task exercise enhance bimanual fine motor function in cerebral palsy

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**Objectives:** This case illustrates a potential effect of electrical stimulation during task exercise in aim to enhance bimanual fine motor function with hemiplegic Cerebral Palsy with limitation in time and duration of intervention

**Materials and Methods:** We present a 6.5 years old boy with left hemiplegic cerebral palsy, with spastic on elbow and wrist flexion sinistra, limits hand function, struggle to perform bimanual activities, with Bimanual Fine Motor Function Class III. Neuromuscular electrical stimulation (NMES) was targeted to increase muscle torque during one handed exercise, continue with bimanual task and observed during daily life from parents. Due to limitation of Indonesian health care system, patient administered 2 times/week for 30 minutes in 6 weeks conjunction with occupational therapies.

**Results:** The subject reported 100% adherence to the program, muscle torque for wrist extension increased from neutral to  $\pm 15^\circ$ , improvement was observed during activity in precision, cylindrical and hook grip, parents notice improvement within daily activity and evaluate with assisting hand assessment ABILHAND-Kids, otherwise muscle tone of elbow flexor also improving during walking

**Conclusions:** Limitation in time and duration of neuromuscular electrical stimulation indicates potential effect to improve muscle torque, hand grip, bimanual motor function and muscle tone during perform daily activity in Hemiplegic cerebral palsy, with Bimanual Motor Function Class II.

**Keywords:** Cerebral palsy, bimanual fine motor function

## The Physical and mental health issues of caregivers of children with cerebral palsy

Shiv Lal Yadav, Ramita Sardana

*All India Institute of Medical Sciences, India*

**Background:** While the hardships faced by children with cerebral palsy are well known, there is a crying need to understand if their caregivers also suffer both mentally and physically due to the disability of the children.

**Aim:** To study the physical and mental health of the caregivers of children with cerebral palsy and how various factors may influence the same.

**Settings and Design:** This was a descriptive study and was conducted in the Department of Physical Medicine and Rehabilitation, All India Institute of Medical Sciences, New Delhi.

**Materials and Methods:** Study sample consisted of 65 primary caregivers of children with cerebral palsy. Questionnaires about physical and mental health from family burden scale were used. Descriptive statistics and multiple regressions were used for data analysis.

**Results:** Both physical and mental healths of the caregivers were affected to some extent. A significant association was found between physical health of caregivers and duration of knowing the diagnosis, seizures, and mental retardation in the children. Moreover, impact on mental health was significantly associated with total number of children, duration of care giving, knowing the diagnosis, speech disturbance, seizures, and mental retardation in children.

**Conclusions:** Caregivers of children with cerebral palsy experience some effects on their physical and mental health, which are associated with various factors. Therefore, healthcare professionals should also provide care and support to these caregivers, so that they can effectively and efficiently care for their children with cerebral palsy.

## Inpatient intensive rehabilitation on functional outcome in SCI due to syringomyelia: a case report

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\*vindymiguna@gmail.com

### Objectives:

This study aims to evaluate effect of inpatient intensive rehabilitation towards functional outcome in long-standing cervicothoracic syringomyelia with predicted poor prognosis.

### Materials and Methods:

A 41-year-old man was diagnosed with chronic SCI AIS D NL C2 with history of stabbing trauma in upper back 24 years ago. MRI showed syringomyelia C2-thoracic and multiple discs bulging. Post laminectomy and fenestration, there was worsening level of SCI to AIS C NL C1, MMT lower extremities 3 for the right side, 2 for left side, bilateral intrinsic minus hand, and persisting ankle spasticity of MAS 1. Patient was provided MCP extension block orthosis, TLSO triplanar control brace followed by daily functional training of sitting progressing to standing, transfer exercise and wheeling practice on even surface and ramp. Cardiopulmonary endurance training with twice daily arm ergocycle starting from 15 minutes, 0-watt, 30-40 RPM increased gradually was prescribed with early repolarization V2-V4 recorded on ECG as caution. Exercise was combined with resistance training for upper extremities with intensity 50% 1 RM. Patient also presented with NLUTD. Training for intermittent catheterization was done after fluid correction due to polyuria. Self-digital stimulation was trained for reflexogenic neurogenic bowel.

### Results:

After 2 weeks of inpatient rehabilitation, patient was able to stand with walker, transfer by pivot, and ambulate with wheelchair independent. There was 100 m increase in distance during wheeling for 6 minutes (78 to 178 m). Incremental test with arm ergocycle showed METS of 2.01. SCIM III improved from score 42 to 66, ICP and digital stimulation is independent by the end of hospitalization.

### Conclusions:

Inpatient intensive rehabilitation program is necessary to improve functional outcome in chronic syringomyelia despite predicted poor prognosis. Provision of rehabilitation ward for SCI independency training is therefore needed.

**Keywords:** rehabilitation; spinal cord diseases; syringomyelia; functional outcome



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## Rehabilitation of urinary retention and deconditioning syndrome in postpartum tuberculous meningitis

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<sup>1</sup>Physical Medicine & Rehabilitation, Padjadjaran University

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**Objectives:** Postpartum reflects an alteration of immune system and predisposes to an active disease such as meningitis tuberculosis. Meningitis retention syndrome often remains undiagnosed, an over-distended bladder will occur and dwelling catheter is needed. Over time, sensory neurogenic bladder will disrupt and resulting in a hypotonic bladder and increase post-void residual volumes. Prolong hospitalization and immobilization also contribute to poor general physical endurance. This case illustrates the importance of Clean Intermittent Catheterization (CIC) with the aim of improving sensitivity of urinary function, general physical endurance and quality of life in patient with urinary retention and deconditioning condition after postpartum and prolong hospitalization due to Meningitis TB grade III.

**Materials and Methods:** We present a 27 years old woman after 2 weeks of post-partum was diagnosed with grade III Tuberculosis Meningitis and was hospitalized for 2.5 months, came to PMR clinic; with complain of inability to sit independently due to orthostatic hypotension and using indwelling catheter after no voluntary micturition and incomplete voiding. Rehabilitation target was enhanced general physical endurance for independence mobilization and self-care, achieving complete voiding and avoiding urological complications.

**Results:** Sitting with assist was achieved after 2 weeks of home-based rehabilitation and she could begin removal of IDC and being trained of CIC. Patient able to urinate voluntarily and mobilize out of bed for toileting. There was significant improvement in general physical endurance (2 minute walk test: 22 m)

**Conclusions:** The outcomes following third-grade Tuberculosis Meningitis and extended immobilization can be ameliorated through the timely implementation of a two-week rehabilitation program. This program encompasses the restoration of complete voiding through Clean Intermittent Catheterization (CIC) and enhancements in walking performance. Long-term rehabilitation remains essential for attaining complete voluntary micturition and the full restoration of independence in functional abilities

**Keywords:** TB Meningitis; Urinary Retention; CIC, rehabilitation

## Stroke rehabilitation (Research and Innovation Awards Competition)

**December 14, 2023 (Thu)**  
**16.30-17.30 hr.**

### **Judges Panel**

#### **Session Judges:**

Chair: *Fary Khan (Australia)*

Co-Chair: *Peeraya Ruthiraphong (Thailand)*

#### **Main Judges:**

*Carl PC Chen (Taiwan)*

*Chuenchom Chueluecha (Thailand)*

*Sintip Pattanakuhar (Thailand)*

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## Deciphering the role of multiple white matter tracts in post-stroke aphasia through TRACULA

Sekwang Lee,<sup>1</sup> Hyeonji Park,<sup>2</sup> Been Woo,<sup>2</sup> Sumin Jeong,<sup>2</sup> Yu Mi Hwang,<sup>3</sup> Yoonhye Na,<sup>3</sup> Minjae Cho,<sup>4</sup> Eunyoung Lee,<sup>5</sup> Woo-Suk Tae,<sup>3</sup> Sung-Bom Pyun,<sup>1,3,4\*</sup>

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**Objectives:** This study aims to investigate the relationship between white matter tracts and language impairment in post-stroke aphasia using advanced neuroimaging techniques. Beyond the traditionally examined arcuate fasciculus (AF), we investigated various white matter tracts using the automated reconstruction of 42 tracts.

**Materials and Methods:** A retrospective study was conducted on 66 patients with left hemispheric stroke, gathering demographic data, clinical information, diffusion tensor imaging (DTI) data, and language assessment scores. Fractional anisotropy (FA) values from 42 tracts were extracted using the Tracts Constrained by Underlying Anatomy (TRACULA) technique from DTI data. Multiple linear regression analysis included FA values of white matter tracts with significant correlations to language scores and demographic data as independent variables to predict language scores. Simple linear regression assessed the influence of only the AF's FA value on language results.

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**Results:** In the multiple linear regression analysis, the significant variables for predicting aphasia quotient were the FA of the left AF, left extreme capsule, and left fornix (adjusted  $R^2$  0.425). A simple linear regression highlighted the FA value of AF alone contributing an adjusted  $R^2$  of 0.320. In language detail evaluation, fluency was influenced by FA of left AF and left extreme capsule (adjusted  $R^2$  0.343). For comprehension, FA of left AF and left fornix played a role (adjusted  $R^2$  0.316). Repetition was impacted by FA of left AF (adjusted  $R^2$  0.285), and naming by FA of left AF and left extreme capsule (adjusted  $R^2$  0.390). Simple linear regression revealed that the FA value of AF alone showed adjusted  $R^2$  values of 0.217 to 0.280 in predicting language sub-assessment domains.

**Conclusions:** To predict language function post-stroke, considering FA values from multiple white matter tracts is more informative than relying solely on AF. Analyzing the integrity of various white matter tracts proves valuable for understanding post-stroke aphasia.

**Keywords:** aphasia, language, diffusion tensor imaging, stroke, white matter

**Acknowledgments:** This work was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIT) (no. 2022R1A2B5B02001673).



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## Functional outcomes of stroke patients receiving three months rehabilitation program in intermediate care plan

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Maharat Nakhon Ratchasima Hospital, Nakhon Ratchasima, Thailand

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**Objectives:** To study functional outcomes of stroke rehabilitation in IMC services.

**Materials and Methods:** Sixty-two patients with moderate stroke (NIHSS 5-15) admitted at Maharat Nakhon Ratchasima Hospital, enrolled in intermediate care service (IMC) were studied for 3 months. The Barthel index score (BI) was recorded at IMC enrolled day, 2 weeks and 3 months after enrolling in IMC by telephone interview. The number of physical therapies, occupational therapy sessions, intensive rehabilitation, other IMC service and alternative treatment were recorded from telephone interviews and medical records. The BI  $\geq$  75 indicates good functional outcomes.

**Results:** Forty-nine patients (79%) reach good functional outcomes at 3 months. The mean age was 61 years (42-74, SD 9.32). Eighty-two percent of cases were ischemic strokes. The mean NIHSS after 24 hours is 9.43 (5-15, SD 0.39) and median of BI at IMC enrolled day was 35 (25,50). Fifty-two patients got physical therapy from the in-patient department for acute stroke, 36 patients from out-patients department at Maharat Nakhon Ratchasima hospital and community hospital and 33 patients from home visit. The number of patients who received occupational therapy at acute stroke were 37 and outpatient's department were 31. The median total physical therapy sessions were 8 sessions (4,13) and occupational therapy sessions were 1 (0,1). The adjusted odds ratio of physical therapy session greater than or equal to ten times, occupational therapy session greater than or equal to three times and good functional outcomes was 3.25 (95% CI, 0.43 to 24.79, P = 0.256) and 3.64 (95%CI, 0.19 to 71.12, P = 0.395).

**Conclusions:** Most stroke patients in IMC services reach good functional outcomes at 3 months. More rehabilitation sessions are associated with good functional outcomes.

**Keywords:** Stroke; Rehabilitation; Intermediate care service; Functional outcome

## Temporal Interference Stimulation device of Low-cost effect

Seungmin Hwang,<sup>1</sup> Youngjin Jung,<sup>2\*</sup>

<sup>1</sup>Department of Biomedical Engineering, Chonnam National University, Korea

<sup>2\*</sup>School of Healthcare Medical and Biomedical Engineering, Chonnam National University, Korea

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**Objectives:** In order to address stroke and mental disorders, invasive and non-invasive rehabilitation therapies are primarily employed. Invasive methods have spatial limitations and require a lot of cost and time, while non-invasive methods have no spatial limitations and are inexpensive, but deep brain stimulation is difficult. However, research has recently emerged that can stimulate the deep brain through interference using two different frequencies, but the device has not yet been sold or developed, making it difficult to use in practice due to low accessibility and high cost. Therefore, in this study, we attempted to develop a device that includes both transcranial Direct Current Stimulation(tDCS) and transcranial Alternating Current Stimulation(tACS) functions by manufacturing Temporal Interference Stimulation(TIS) equipment at a low cost.

**Materials and Methods:** This study employed TI's OPAMPs and switches for current control and utilized the C2000 series MCU to achieve precise timing calculations during device fabrication. The device specifications are as follows: it offers functionalities for TIS, tDCS, and tACS, with a total of 10 channels. Current can be adjusted within the range of 0.5 to 1.5 mA, and frequencies can be set from 1 to 405Hz. Additionally, supplementary features such as Sham, ramp time, internal trigger, and external trigger functionalities have been implemented.

**Results:** In the experiments, stimulation parameters were set as follows: tDCS with a current of 1 mA, tACS with a current of 1 mA at a frequency of 20 Hz, and TIS with frequencies of 400 Hz and 405 Hz. These parameters were connected to the output with an uncontrolled resistance of 5 k $\Omega$  for oscilloscope measurements.

**Conclusions:** Through this study, we have developed an affordable TIS stimulation device. We hope that this device will be utilized in actual clinical settings to enhance the accessibility of rehabilitation therapy for the increasing incidence of stroke and mental disorders in an aging society. Furthermore, we aspire for it to expedite research in the fields of neurology and psychiatry.

**Keywords:** TIS; tACS; tACS; Non-Invasive; Stimulation;

**Acknowledgement:** This results was supported by "Regional Innovation Strategy(RIS)" through the National Research Foundation of Korea(NRF) funded by the Ministry of Education(MOE) (2021RIS-002) & The Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2022S1A5A2A03051993)

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## Rehabilitation Strategies for Claude's Syndrome

Syazana Syimah Mohd Hanifa, Mei Yin Pong<sup>1</sup>, Sakinah Sabirin<sup>1</sup>, Tze Yang Chung<sup>1</sup>, \*Soo Chin Chan<sup>1</sup>

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### Background

Claude syndrome (CS) is characterized by ipsilateral third cranial nerve palsy with contralateral hemiataxia, typically arising from a midbrain lesion either intrinsic or extrinsic in nature. This resulted from cerebral infarction in the precommunal segment (P1) of posterior cerebral artery. We report a case of CS patient that received rehabilitation.

### Report

A 39-year-old man with no prior medical history presented with left eye diplopia, which spontaneously resolved. Two days later he developed bilateral eye diplopia, left eye partial ptosis and gait instability. Upon clinical examination, he had right ataxia and areflexia with no sign of hemiparesis. Initial Computed Tomography scan brain showed no abnormalities. Serial investigations ruled out infection, connective tissue diseases and paraneoplastic syndromes. He was initially treated for Miller Fisher Syndrome and received intravenous immunoglobulin (IVIG). Unfortunately, his ataxia worsened, and he developed hemiparesis in his right limbs. Magnetic Resonance Imaging of the brain showed a left midbrain acute infarct with intimal thickening at the distal basilar artery. Cerebral angiography revealed beaded appearance in the bilateral P1 segment of the posterior cerebral arteries. His diagnosis was revised to CS and post stroke rehabilitation was initiated.

His impairments include double vision, gait instability and hemiparesis which affected his ability to walk and perform personal activities of daily living (pADL). Additionally, his ataxia caused him difficulty to execute fine motor activities and maintain balance. Initially, he required minimal assistance with pADL and used a walking frame for ambulation. Over time, he made progress and achieved complete independence through rehabilitation. He also had functional capacity evaluation in preparation for vocational reintegration.

### Conclusion

CS is a rare syndrome that can pose a diagnostic challenge for clinicians. Hence, accurate diagnosis is crucial for effective post stroke rehabilitation.

**Keywords:** Claude's Syndrome; rehabilitation; ataxia

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## Mirror Therapy: Review and Novel Equipment Approach

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**Objectives:** Since its introduction in 1996, mirror therapy has proven to be a very effective treatment solution for paresis secondary to stroke and phantom limb pain following amputation. The treatment effect is possible due to tricking the brain that the movement of the affected limb occurred without pain, neuroplasticity and visual feedback being superior to somatosensory or proprioceptive feedback, which is considered to cause cortical reorganization and consequently form new neural pathways.

**Materials and Methods:** There are several types of mirror therapy today, including original, digital and VR aided mirror therapy. Original mirror therapy requires an ordinary mirror and is a safe and cost-effective way of treatment that can be practiced both in clinical or home conditions. Implementing digital technology into mirror therapy showed even better results since new functions, such as showing reciprocal or time-delayed image of the healthy limb movement, were achieved. VR mirror therapy showed to have least constraints when it comes to the representation of the phantom limbs, for instance, since patient's imagination of the same can vary greatly from the actual limb.

**Results:** Because it's a non-invasive treatment procedure, it is very welcomed by both patients and clinical experts. Many researches have proved its benefits in improving range of motion or the ability to perform fine motor actions in after stroke patients. Moreover, it proved to successfully decrease or eliminate phantom limb pain post amputation.

**Conclusions:** However, the cost of equipment is still a huge barrier in accessibility of the digital mirror therapy to a wider range of patients. We introduce a user-friendly production process of digital mirror therapy equipment, with low financial burden, convenient for inpatient rehabilitation. The system proves reliable in treating the upper limb, however with little modifications it has a potential to be used in lower extremity treatment, as well.

**Keywords :** mirror therapy; digital mirror therapy; stroke; hemiparesis; hemiplegia; phantom limb pain;

**Acknowledgement:** This results was supported by "Regional Innovation Strategy(RIS)" through the National Research Foundation of Korea(NRF) funded by the Ministry of Education(MOE) (2021RIS-002) & The Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2022S1A5A2A03051993)



## Integrated post-stroke rehabilitation for upper limb motor function recovery: A case series

Mei Yin Pong<sup>1</sup>, Syazana Syimah Mohd Hanifa<sup>1</sup>, Tze Yang Chung<sup>1</sup>, Sakinah Sabirin<sup>1</sup>,  
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### Introduction

Repetitive transcranial magnetic stimulation (rTMS) represents a novel approach to neurorehabilitation following strokes. This off-label, non-invasive neuromodulation technique serves as an adjunctive treatment to conventional rehabilitation therapies. Currently, there is limited local data in Malaysia supporting the combination of rTMS with intensive rehabilitation for stroke patients.

### Objective

We aimed to investigate whether there is upper limb motor function recovery in post-stroke survivors through a combination therapy approach.

### Materials and Methods

We recruited three subacute ischemic stroke patients with entirely paretic upper limb [0 to 1 Medical Research Council (MRC) scale of muscle strength] at University Malaya Medical Centre, Kuala Lumpur, Malaysia. These three patients commenced combined therapies on post-stroke day 20, 16, and 15, respectively. They underwent rTMS sessions with inhibitory protocols at five days/week for two weeks (10 sessions in total). Stimulation was given to the contralesional primary motor area (M1) with 1800 pulses/session at 1 Hz, and at an intensity of 120% resting motor threshold for 40 minutes. Conventional therapies including 60 minutes of upper limb motor-function training were given immediately following rTMS and continued for another three months.

### Results

Neurological recovery was observed in all three patients. They had significant improvement in MRC and Fugl-Meyer Assessment-Upper Extremity Motor (FMA-UEM) scores immediately after the 10 rTMS sessions and at three months post-stroke. Patients 1 and 2 exhibited remarkable improvement of their paretic hands with functional gains. All patients reported positive improvement in their condition. No serious adverse events were reported.

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**Conclusion**

Combination of rTMS and conventional rehabilitation therapies during the subacute phase of stroke is safe. It demonstrates positive effects on post-stroke upper limb motor function recovery. The positive gains are still observed at three months post-stroke with continuation of conventional rehabilitation therapies. Modulating interhemispheric imbalance via non-invasive brain stimulation methods shows promise for enhancing motor-function recovery.

**Keywords:** neuromodulation; post-stroke rehabilitation; combination therapy; neuroplasticity; Malaysia


**5<sup>th</sup> Asia Oceanian Congress of NeuroRehabilitation**

**Multifaceted NeuroRehabilitation: from Tradition to Innovation**

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**Poster Presentation**  
**Abstract**

**Research and Innovation Awards Competition**

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## Station 1

### Pediatric rehabilitation and ultrasonography

**December 14, 2023 (Thu)**  
**13.30-14.30 hr.**

**Session Judges (live presentation):**

Chair: *Chueh-Hung Wu (Taiwan)*

Co-Chair: *Rattana Rattanatharn (Thailand)*

**Main Judges (based on E-posters):**

*Areerat Suputtitada (Thailand)*

*Jittima Saengsuwan (Thailand)*

*Rachawan Suksathien (Thailand)*



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## Gait Restoration with Early Brace Therapy Following Postoperative Refractory Epilepsy

Takatoshi Hara<sup>1</sup>, Daisuke Nishida<sup>1</sup>, Yuta Miyazaki<sup>1</sup>, Kazuki Hagiwara<sup>1</sup>, Tatsuya Yamamoto<sup>1</sup>, Mizuki Takeuchi<sup>1</sup>, Ayaka Tsubouchi<sup>1</sup>, Ayaka Matsunaga<sup>1</sup>, Akiko Kamimura<sup>1</sup>, Mayumi Yamano<sup>1</sup>,

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**Objectives:** This study aims to investigate the effect of the oil damper-equipped lower limb orthosis for addressing lower limb paralysis following surgery for refractory epilepsy and explore the potential for novel gait restoration.

**Materials and Methods:** The subjects included pediatric patients who underwent hemispherectomy and corpus callosotomy for refractory epilepsy. A custom-made orthosis with a oil damper at the ankle joint was employed for early postoperative use to address lower limb paralysis. The orthosis was worn under the supervision of a physical therapist, used during a stable postoperative phase, and implemented in conjunction with conventional physical therapy.

**Results:** The intervention was conducted in several patients exhibiting flaccid paralysis during the early postoperative phase. Early orthotic training involving standing and walking exercises facilitated by the orthosis was effective in improving paralysis and achieving walking ability, including the ability to stand up. Furthermore, it allowed for modifications to gait patterns.

**Conclusions:** It is possible that implementing orthotic therapy for lower limb paralysis following hemispherectomy and corpus callosotomy for refractory epilepsy in the early postoperative period contributes to the acquisition of normal gait patterns, thus contributing to gait restoration.

**Keywords:** Brace Therapy; Gait; Refractory Epilepsy

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## Deep learning-based quantitative analyses of limb-movement complexity and their association with motor developmental delay in preterm infants

Jung Hyun Kim<sup>1</sup>, Yae Lim Lee<sup>1</sup>, Moon Suk Bang<sup>1,2</sup>, Hyung-Ik Shin<sup>1</sup>, Sung Eun Hyun<sup>1</sup>, Hyun Iee Shin<sup>3\*</sup>, Eun ji Son<sup>1</sup>, Sung joon Lim<sup>1</sup>, Hee young Cha<sup>1</sup>, Woo Hyung Lee<sup>1\*</sup>

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**Objectives:** Reduced complexity during the writhing period is the crucial characteristic of general movements in high-risk infants for cerebral palsy. This study aimed to develop quantification methods for the complexity of the upper- and lower-limb movements that are associated with motor developmental delay in preterm infants.

**Materials and Methods:** This prospective, longitudinal cohort study enrolled very preterm or very low birth weight infants. Video images of spontaneous movements were recorded at the term-equivalent age and quantitatively analyzed using a pretrained pose-estimation model based on deep learning-based algorithms. The values of joint angle and joint angular velocity at the bilateral shoulders, elbows, hips, and knees during infantile spontaneous movements were calculated. Complexity indices of the upper and lower limbs in terms of sample entropy were compared between the infants with and without motor developmental delay. Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III), was performed to evaluate motor development of infants at 9 months of corrected age.

**Results:** Among 90 infants, 11 infants exhibited motor developmental delay. In most of the upper- and lower-limb movements, sample entropy measures were significantly different between infants with and without motor developmental delay. The composite scores in the motor domain of BSID-III were positively correlated with sample entropy measures at most of the joints.

**Conclusions:** This study verified the associations between motor developmental outcomes and sample entropy measures of spontaneous movements in high-risk infants. The sample entropy of the limb movements can be potentially useful parameters to develop automatic assessment tools for evaluating general movements in preterm infants.

**Keywords:** complexity; deep learning; motor developmental delay; preterm

## Distinguishing motor developmental delay and cerebral palsy through neuroanatomical features

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**Objectives:** This study aimed to investigate neuroanatomical features between preterm infants with Motor developmental delay (MDD) and cerebral palsy (CP) by quantitatively analyzing the periventricular white matter (PVWM) lesions.

**Materials and Methods:** Clinical information and brain MRI images in preterm infants with MDD or CP were retrospectively collected. Motor development was assessed using the Bayley Scales of Infant and Toddler Development, Third Edition at 18-24 months of corrected age, and CP was diagnosed by experienced physiatrists based on neurologic examinations, brain lesions, and motor function. The PVWM lesions in brain MRI images were quantitatively analyzed using the anteriority and laterality indices with respect to the location of the anterior and posterior horns of the lateral ventricles and insular cortex.

**Results:** Among a total of 79 preterm infants, 35 (44.3%) infants were diagnosed as MDD, and others were as CP. The number of PVWM lesions was 9 (25.7%) and 34 (77.3%) in infants with MDD and CP, respectively. The proportion of intraventricular hemorrhage ( $p=0.031$ ), PVWM lesions ( $p<0.001$ ), and hydrocephalus ( $p=0.001$ ) are significantly increased in preterm infants with CP compared to those with MDD. In analyses of the PVWM lesions, there were significant differences in the upper margin of the anteriority index ( $p=0.007$ ), lateral margin of the laterality index ( $p=0.015$ ), length of the anteriority index ( $p=0.005$ ) and the laterality index ( $p=0.003$ ), and lesion area within the upper and lower margins of the anteriority index and lateral and medial margins of the laterality index ( $p=0.005$ ) between the infants with MDD and CP.

**Conclusions:** PVWM lesions, specifically involving more length of anterior and lateral locations, are significantly associated with CP compared to MDD. The lateral margin of laterality index of PVWM lesions can be a predictive factor distinguishing CP and MDD.

**Keywords:** brain imaging; cerebral palsy; motor developmental delay; periventricular white matter

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**A digital healthcare protocol providing at-home training for parents of preterm infants.**

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**Objectives:** The birth rate of premature and very low birth weight infants, which are major risk factors for developmental delay and cerebral palsy, is continuously increasing, and early rehabilitation during the period of active brain plasticity is very important for a good prognosis. Since parents are a very important environmental factor that affects the survival and development of premature infants, expert monitoring is needed to provide a systematic and practical guide to developmental treatment for early intervention of non-specialist parents. We designed a protocol for a digital health system to provide an in-home developmental treatment guide for parent-centered early intervention of preterm or very low birth weight infants.

**Materials and Methods:** The study protocol is a randomized controlled trial with home-based intervention for 9 months after discharge from the neonatal intensive care unit. After the hospital discharge, physiotherapist monitoring is conducted weekly using a digital platform for parent-centered early intervention in the home. Parents record the developmental treatment process using a smartphone, and the therapist analyzes the video data to provide new treatment goals and guidelines.

**Results:** Developmental evaluation is performed as an outpatient visit at 0, 2, 4, 6, and 9 months of corrected age, and the evaluation tools are the test of infant motor performance, general movement assessment, Hammersmith infant neurological examination, gross motor function measure, and Bayley scales of infant development according to each corrected age.

**Conclusions:** This study is a clinical trial to estimate after hospital discharge, parent-centered developmental treatment at home can increase the amount of rehabilitation dose for infants and maximize the effect of developmental treatment, thereby improving the prognosis for developmental delay and cerebral palsy.

**Keywords:** premature infants, parent-centered, early intervention, developmental treatment, digital health care



## Resistance training in children with cerebral palsy: a scoping review

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**Objectives:** This study aimed to evaluate research related to resistance training (RT) in children with cerebral palsy (CP) regarding research methodology, findings, and areas requiring further investigation.

**Materials and Methods:** Electronic searches were conducted using MEDLINE, PEDro, Cochrane Central Register of Controlled Trials, and Thai Journal Online for experimental or quasi-experimental studies published between 2013 and 2023, focusing on the impact of RT on children with CP. Two independent reviewers assessed studies based on title/abstract and full text. Subsequently, we extracted data, including study methods, intervention protocols, results, and any reported adverse events.

**Results:** This analysis included 14 studies (2 pretest-posttest designs and 12 two-arm randomized controlled trials) predominantly involving children with Uni-bilateral Spastic CP, classified as Gross Motor Function Classification System (GMFCS) levels I–III. Common interventions included loaded functional training and progressive RT. Repetitive maximal testing was primarily used for training protocol design. Exercise frequency ranged from 2 to 5 sessions per week, lasting 6 to 14 weeks. Outcome measures varied, generally covering function activity, muscle strength, and muscle morphology. Most studies indicated that RT improved muscle strength and morphology compared to conventional training. However, the impact on functional activity varied across studies, with some showing superior results while others did not. Occasional adverse events such as soreness and fatigue were reported.

**Conclusions:** RT demonstrates potential in enhancing muscle strength and structure in children with CP compared to conventional training. Nevertheless, its effects on functional activity remain inconclusive. Further research involving larger sample sizes, diverse CP types, and long-term follow-up assessments is recommended.

**Keywords:** Resistance training; Cerebral Palsy

## Ankle-Foot Orthosis in DMD: A 4-year Experience in a Neuromuscular Disorders Clinic

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**Objective:** To assess Ankle-Foot-Orthosis (AFO) requirement and ambulation in Duchenne Muscular Dystrophy (DMD) patients seen over a period of 4 years at a Multi-disciplinary Neuromuscular disorders clinic (NMD).

**Patients & Methods:** Study conducted in university quaternary research hospital with DMD patients confirmed by MLPA (multiplex ligation – dependent probe amplification) method and evaluated between January 2012 and December 2015. Their ambulatory status, detailed neurological and functional status were recorded. Requirement of AFOs was determined and provided.

**Results:** In total 126 DMD children reported to the NMD clinic. Mean age at presentation was 7.6 years (range 2 to 12 years, SD 2.1). Mean duration of illness at first evaluation was 3.4 years (range 0.5 to 10 years, SD 2.0). AFO's were advised at a mean age of 8.5 years (range 7 to 12 years, SD 1.8). Fifty-nine patients were advised AFO as resting or walking splint. At last follow-up 113 patients were still ambulatory whereas 13 had become wheel chair bound. Out of 59 patients, 48 were still wearing AFOs and remaining discontinued them for various reasons.

**Conclusions:** Children with DMD require wearing of AFOs as resting or walking splint, mostly in first or early second decade of life. As there is some gap between onset of clinical signs and requirement of orthosis, follow-up preferably at a multidisciplinary clinic at regular intervals is desirable for timely intervention in the form of AFOs or other splints to prolong ambulatory status in these patients.

**Key words:** Duchenne muscular dystrophy; ankle-foot-orthosis; locomotion

## Serial Magnetic Resonance Imaging in a Patient with X-linked Myotubular Myopathy: A Case Report

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**Keywords:** X-linked myotubular myopathy; female carrier, MRI; electromyography; chromosomal microarray analysis

**Objective:** We reported for the first time the serial findings of magnetic resonance imaging (MRI) in a female carrier of X-linked myotubular myopathy [XL-MTM]. Until now, there are approximately 40 cases of female adults have been reported. This paper presents an atypical case of the XL-MTM in female carrier.

**Material and Methods:** We analyzed serial magnetic resonance imaging (MRI) in a 56-year-old female patient who diagnosed XL-TMT. The patient presented with progressive motor weakness of all extremities with pseudo-hypotrophy of both calves.

She had been suffering from both lower limb weakness and low back pain for the past three years. Recently, she complained of upper limb weakness with mild hand weakness. Her upper limb muscle strength was graded as 3/5 on both sides, while her lower limb muscle strength was graded as 2/5 on both sides.

**Results:** MRI on lumbar and upper sacral levels from 14 years ago showed fatty atrophy on erector spinae and psoas muscles and gluteal muscles were almost absent. The current MRI findings showed that the degree of fatty atrophy appeared to be more severe compared to the previous MRI findings. Nerve conduction study was normal and electromyography showed characteristic myopathy patterns.

The grip strength was reduced to 11.7kg in the right hand and 2.7kg in the left hand. And a pulmonary function test confirmed moderate restrictive ventilation impairment. In the performed lab, LDH and CK-MB were high at 246IU/L and 5.6ng/ml, each.

Chromosomal microarray analysis confirmed XL-MTM, showing a deletion of approximately 424 kb in the Xq28 region.

**Conclusion:** These combined diagnostic tools contribute to a deeper understanding of the atypical presentation of XL-MTM and its implications for diagnosis and management. Radiologic findings may reveal the progression of muscle findings over time.

## Rehabilitation in postural control in children with spastic diplegic cerebral palsy: a systematic review

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**Objectives:** The aim of this study was to evaluate the efficacy and effectiveness of several rehabilitation intervention that may improve postural control in children with spastic diplegic cerebral palsy (SDCP).

**Material and methods:** A systematic review was performed using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology. Six databases were searched using the following keywords: ('cerebral palsy' OR 'brain injury'); AND ('postur\*' OR 'balance' OR 'posturalbalance' [MeSH]); AND ('intervention' OR 'therapy' OR 'exercise' OR 'treatment'). Articles were evaluated based on their level of evidence and conduct.

**Results:** Searches yielded 60 studies reporting 12 exercise interventions with postural control outcomes for children with CP. Twelve interventions were: positioning, neurodevelopmental therapy (NDT), progressive resistance exercise (PRE), hippotherapy, reactive balance training (RBT), treadmill training with various bodyweight support, functional electrical stimulation (FES), trunk-targeted training (TTT), visual biofeedback, virtual reality, constraint-induced movement therapy (CIMT) for upper limb, Hand-arm intensive bimanual therapy (HABIT or BIT) for upper limb

**Conclusion:** There has been a substantial increase in the utilization of rehabilitation strategies aimed at enhancing postural control in children diagnosed with SDCP over the past decade. Enhanced research design offers more clarity pertaining to the overall effectiveness of treatments on a wide scale. Conducting research is necessary to establish the connections between impairments in postural control, available treatment choices, and the metrics used to assess outcomes. Low-burden, low-cost, child-engaging, and mainstream solutions also need to be examined

**Keywords:** cerebral palsy; spastic diplegic; rehabilitation; postural control; posture



## Diagnostic Performance of Sonographic Ulnar Nerve for Cubital Tunnel Syndrome in Wheelchair Users

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**Objectives:** The cubital tunnel syndrome (CuTS) is the second most common entrapment neuropathy of the upper extremity associated with elbow flexion; resulting in fourth and fifth finger numbness, weakness, and impaired function. The prevalence of CuTS in wheelchair users (8.57-31.43%) is greater than in able-bodied (5.9%). Apart from electrodiagnosis, the Ulnar nerve ultrasonography can provide additional information for diagnosis. There has been no previous ulnar nerve ultrasonography study in Thai wheelchair users. The primary outcome is to evaluate the diagnostic performance and discrimination ability of CuTS ultrasound.

**Materials and Methods:** Participants from Maharaj Nakorn Chiang Mai Hospital underwent clinical ultrasonography for cross-sectional area (CSA) at medial epicondyle (ME) to forearm ratio (EFR), and electrodiagnostic evaluation. Participants with history of ulnar nerve injury, upper extremity bone fracture, pregnancy, or peripheral polyneuropathy were excluded. Statistical analysis was performed using STATA 16 with a significant p-value < 0.05.

**Results:** Total 92 arms, with 13 females (26%) of Mean age 46.84 (12.10), duration of disability 16.42 (11.21) yrs. CuTS was seen in 12 arms (13.04%). Average CSA at ME in CuTS cases 0.099 (0.048), non-cases 0.082 (0.039), p=0.137. Average CSA at forearm for CuTS cases 0.056 (0.010), non-cases 0.059 (0.024), p=0.572. Average EFR for CuTS cases 1.71 (0.575), non-cases 1.42 (0.630), p=0.029. Total EFR area under receiver operating characteristic curve (AuROC) was 0.7, Proposed EFR cutoff value was 1.5, with a sensitivity of 58.3% and specificity 74.4%.

**Conclusions:** The Ulnar EFR has a favorable discrimination and diagnostic performance for CuTS in Thai wheelchair users. With its moderate specificity, ultrasonographic measurement of ulnar EFR could be an additional diagnostic tool alongside clinical evaluation to ascertain CuTS.

**Keywords:** Cubital Tunnel Syndrome, Diagnosis, Ultrasound, Ulnar Nerve, Cross Sectional Area Ratio

## Electrodiagnosis of a thoracic outlet syndrome case

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**Objectives:** Establishing the diagnosis of patients presenting with weakness of one upper extremity can be challenging. One of the differential diagnosis is a thoracic outlet syndrome. The purpose of this case presentation is to discuss the role Electrodiagnosis and challenges in contributing supporting data to the diagnosis of thoracic outlet syndrome.

**Materials and Methods:** A woman age 26 years presented with progressive weakness of the right arm. Electrodiagnosis revealed a thoracic outlet syndrome. Surgery dramatically reduced the pain and weakness. Unfortunately the weakness and pain reoccurred several months after surgery. Can a repeat electrodiagnosis help in finding the answer?

**Results:** Electromyography can show the distribution of muscle involvement. The clinical information should be clear and detailed. Other co-existing factors should be identified.

**Conclusions:** Electrodiagnosis can provide topographical distribution of the lesion and an impression of the level of severity. Clinical information based on neuro-patho-physiology should be provided to the electromyographer in order to design the most informative electrodiagnosis.

**Keywords:** electrodiagnosis, thoracic outlet syndrome, surgery

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## A Case Report of Pectoral Nerve Block Breaking Elbow Flexion Synergy

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Motor Nerve Blocks (MNB) are commonly used in patients with motor disorders from central nervous system cause, such as stroke patient with spasticity.

In this case, Mr MK is a 68-year-old man with diagnosis of Left Middle Cerebral Artery (MCA) Infarction, 11 years ago. Consequently, he developed right hemiparesis with multilevel spasticity and contracture, as well as expressive dysphasia and functional limitation. His right upper limb flexion synergy pattern has been affecting his activities of daily living (ADL) especially in cleaning the armpit and dressing upper garment. The initial measurement of right upper limb range of motion (ROM): right shoulder abduction; R1: 40 degree, R2: 65 degree (spasticity MAS 3). Right elbow flexion R1: 90 degree, R2: 130 degree (MAS 3). Right fingers spasticity is MAS 3.

### Objectives:

1. To improve hygiene of right armpit
2. To improve dressing upper garment
3. To assess spasticity or contracture status

### Materials and Methods:

Motor nerve block injection to right pectoral nerve and right median nerve using combination of 5 cc buffered dextrose 5%, 5 cc Bupivacaine and 5 cc Lignocaine 1%.

### Results:

First, we injected the right pectoral nerve under ultrasound guidance. Immediately, the passive ROM of right shoulder abduction improved from R2: 65 (pre-injection) to 90 degree (post injection) with spasticity becoming MAS 2. Surprisingly, the elbow extension ROM improved from R2: 130 degree (pre-injection) to 180 degree (post-injection) with spasticity becoming MAS 2. Thus, we did not proceed with the MNB of musculocutaneous nerve. The right median nerve injection was done and subsequently the wrist extension ROM improved from R2: 10-degree wrist flexion to 30 degree wrist extension.

### Conclusion:

MNB of pectoral nerve is indicated to improve the shoulder adduction, as well as the medial rotation of the shoulder. However, in this case, we demonstrate that it also does improve the ROM of elbow to full extension and lead to the improvement of the elbow flexion synergy.

**Keywords:** Motor nerve block, elbow flexion synergy

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## Hemiplegic Shoulder Pain Management Using Shoulder Anterior Capsular Block: A Case Report

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**Objectives:** Hemiplegic Shoulder Pain (HSP) could affect function and quality of life. Thus, improving pain became an important goal. The aim of this study is to assess the efficacy of the Shoulder Anterior Capsular Block (SHAC) in the management of HSP in stroke patients.

**Case Description:** A 67-year-old gentleman with an ischemic stroke, presented with HSP after 2 months of stroke. The pain was previously managed with medications and physical modalities. Upon assessment, his Numerical Rating Scale (NRS) for pain was 7 mainly upon movement. The Active Range of Motion (AROM) for the abduction was 80 degrees and forward flexion was 90 degrees.

The procedure was performed in an outpatient setting, using an aseptic technique with ultrasound guided. The local anaesthetic used was 2mls of 1% lignocaine plus 5mls of dextrose 5% in water solution. The patient was positioned supine with prop up at 30 degrees with the arm in extension and shoulder abduction. A 21-gauge needle was used for this procedure. The injection is targeted to the interfascial space between the deep layer of the deltoid fascia and the superficial layer of the subscapularis fascia, anterior to the subscapularis myotendinous junction. This is where lies the axillary nerve, subscapular nerves, the lateral pectoral nerve, and the musculocutaneous nerve. There were no complications from the procedure. He was reassessed 4 months after the procedure.

**Results:** His NRS for pain improved from 7 to 1. AROM for shoulder abduction was 160 degrees, and forward flexion 170 degrees. He can perform right upper limb function better in dressing, eating, and toilet activities.

**Conclusions:** Shoulder Anterior Capsular Block (SHAC) is safe, effective, and is applicable in outpatient settings for the management of hemiplegic shoulder pain.

**Keywords:** Hemiplegic Shoulder Pain; Shoulder Anterior Capsular Block; Ultrasound



## Station 2

# Neurorehabilitation engineering and SCI

**December 14, 2023 (Thu)**  
**13.30-14.30 hr.**

**Session Judges (live presentation):**

Chair: *Taslim Uddin (Bangladesh)*

Co-Chair: *Jakkrit Klaphajone (Thailand)*

**Main Judges (based on E-posters):**

*Areerat Suputtitada (Thailand)*

*Jittima Saengsuwan (Thailand)*

*Rachawan Suksathien (Thailand)*

## Efficacy of Assistive Technology in Dementia Care

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**Objectives:** The study aims to improve the functions of activities of daily living (ADL) in people with dementia and to reduce the burdens of caregivers by implement of an assistive technology for individuals with dementia and their caregivers.

**Materials and Methods:** 69 cases diagnosed with dementia, with CDR level between 0.5 to 2 or long-term care case-mix system (CMS) between 2-5, complaints of impaired daily functions have been recruited and divided into experimental & control groups. Except regular care, the experimental group received additional AT devices and support from the AT services team. In contrast, the control group received regular care only. We compared the QoL, NPI, CZB 3-month after intervention with the baseline 0-month in both groups.

**Results:** The study reveals that there was no significant improvement observed in the group monitored over a 3-month period after receiving AT devices and services, as compared to their baseline measured at month 0. The lack of progress can be attributed to two primary factors. Firstly, our findings suggest that certain devices used in the AT demonstrated suboptimal performance, resulting in a less than satisfactory user experience. Secondly, the training provided to members of the AT services team had not yet reached a mature level.

**Conclusions:** The construction of the AT service is currently underway. We will continue to monitor the effectiveness of home-based implementations, optimize the system to improve the quality of life for individuals with dementia and caregivers. Feedbacks will be incorporated into the model system persistently for continuous improvement. (Acknowledgement: sponsored by Taiwan NSTC 112-2627-M-038-001-)

**Keywords:** Dementia; Assistive Technology; QoL; Care Burden

## Effect of Soft Wearable Robot for Ankle Assistance in Chronic Stroke Patients

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**Objectives:** This study aimed to determine whether soft wearable robot (SWR) for ankle assistance can help stroke patients walk more symmetrically and effectively.

**Materials and Methods:** 12 chronic hemiplegic stroke patients, who could walk 10 meters independently, were enrolled. All patients were assessed 1) gait asymmetry, 2) energy consumption, 3) clinical walking tests after five adaptation trainings within 2 weeks. All evaluation were conducted in three conditions: 1) control without wearing the SWR, 2) wearing the SWR without actuation, and 3) wearing the SWR with actuation. We assessed gait asymmetry through 3D motion analysis (MX-T10, Vicon Motion Systems Ltd UK). Clinical walking tests included maximal walking speed, self-selected walking speed, 6minutes walking test. We also obtained O<sub>2</sub> cost during 6minutes walking test using KB1-C (Aerosports Inc., Ann Arbor, USA). Using SPSS (SPSS Inc., Statistic27, USA), one-way analysis of variance (ANOVA) with post-hoc test was used to verify the effect of the wearable robot.

**Results:** One-way ANOVA test revealed a significant interaction between three conditions in root mean square error between the affected side and the unaffected side data at ankle joint (RMSE) ( $F= 5.928, p < 0.05$ ). In post-hoc analysis, RMSE significantly decreased in "wearing the SWR with actuation" condition on average by 35 % and 30% ( $p < 0.05$ ) compared to "control without wearing the SWR" and "wearing the SWR without actuation" conditions, respectively. However, other parameters did not show significant interaction between three conditions.

**Conclusions:** The SWR for ankle assistance may help stroke patients walk symmetrically. However, this study did not confirm that the robot helped to reduce O<sub>2</sub> cost and to increase the walking speed. Further study is needed to elaborate about the effect of the weight of the SWR on O<sub>2</sub> cost and walking speed.

**Keywords:** Soft wearable robot; Soft exosuit; Stroke ankle orthosis

**Table 1. Comparison of study results between three conditions**

|                              | Wearing the SWR<br>with actuation | Wearing the SWR<br>without actuation | Without wearing<br>the SWR | p-<br>value |
|------------------------------|-----------------------------------|--------------------------------------|----------------------------|-------------|
| Root mean square error*      | 7.90 ± 3.05                       | 11.23 ± 2.31                         | 12.11 ± 3.90               | 0.006       |
| Gait deviation index         | 65.51 ± 11.33                     | 68.80 ± 9.64                         | 67.89 ± 10.48              | 0.733       |
| Gait profile score           | 13.67 ± 4.84                      | 11.74 ± 3.80                         | 12.88 ± 4.07               | 0.542       |
| Gait profile score at ankle  | 8.41 ± 3.81                       | 10.56 ± 4.71                         | 9.64 ± 4.38                | 0.481       |
| <b>Asymmetrical index**</b>  |                                   |                                      |                            |             |
| Maximal DF at stance         | -0.18 ± 0.38                      | 0.16 ± 0.94                          | 0.50 ± 1.26                | 0.225       |
| PF at push off               | -2.74 ± 9.56                      | 1.58 ± 5.14                          | 33.70 ± 102.90             | 0.278       |
| Range of motion***           | -0.31 ± 0.48                      | -0.69 ± 0.52                         | -0.40 ± 0.53               | 0.179       |
| Cadence                      | 0.00 ± 0.03                       | 0.01 ± 0.03                          | 0.00 ± 0.06                | 0.913       |
| Walking speed                | 0.00 ± 0.06                       | -0.01 ± 0.04                         | 0.02 ± 0.07                | 0.322       |
| Step length                  | 0.05 ± 0.15                       | 0.09 ± 0.15                          | 0.16 ± 0.16                | 0.278       |
| Step time                    | 0.34 ± 0.20                       | 0.26 ± 0.20                          | 0.28 ± 0.18                | 0.588       |
| Step width                   | 0.02 ± 0.12                       | 0.02 ± 0.05                          | -0.08 ± 0.14               | 0.053       |
| Stride length                | 0.00 ± 0.06                       | -0.02 ± 0.03                         | 0.03 ± 0.05                | 0.156       |
| Stride time                  | 0.00 ± 0.03                       | -0.01 ± 0.03                         | 0.00 ± 0.06                | 0.812       |
| Opposite foot contact        | -0.35 ± 0.21                      | -0.27 ± 0.18                         | -0.28 ± 0.21               | 0.607       |
| Opposite foot off            | -0.14 ± 0.36                      | -0.26 ± 0.38                         | -0.28 ± 0.37               | 0.607       |
| Foot off                     | -0.20 ± 0.15                      | -0.16 ± 0.10                         | -0.14 ± 0.11               | 0.434       |
| Gait deviation index         | -0.02 ± 0.17                      | 0.03 ± 0.15                          | 0.03 ± 0.17                | 0.708       |
| Gait profile score           | 0.10 ± 0.30                       | 0.05 ± 0.25                          | -0.04 ± 0.30               | 0.520       |
| Gait profile score at ankle  | -0.18 ± 0.56                      | -0.03 ± 0.56                         | 0.08 ± 0.58                | 0.531       |
| <b>Energy consumption</b>    |                                   |                                      |                            |             |
| O <sub>2</sub> Cost          | 0.39 ± 0.10                       | 0.41 ± 0.15                          | 0.38 ± 0.10                | 0.832       |
| <b>Clinical walking test</b> |                                   |                                      |                            |             |
| Self-selected walking speed  | 0.62 ± 0.21                       | 0.62 ± 0.21                          | 0.66 ± 0.25                | 0.879       |
| Maximal walking speed        | 0.79 ± 0.31                       | 0.75 ± 0.28                          | 0.81 ± 0.30                | 0.887       |
| 6 minutes walking test       | 207.37 ± 75.00                    | 211.94 ± 80.26                       | 230.94 ± 77.91             | 0.736       |

\* Root mean square error between affected side data and the unaffected side data at ankle joint

\*\* Asymmetrical index calculated by following formula:  $(affected\ side - unaffected\ side) / (0.5 * (affected\ side + unaffected\ side))$  \*\*\* Range of motion between maximal dorsiflexion and plantar flexion at push off



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## Diagnosing Carpal Tunnel Syndrome Using AI-Assisted Quantitative Muscle Ultrasound Image Analysis

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**Objectives:** Carpal tunnel syndrome(CTS) is a common focal neuropathy. The median nerve that goes to the wrist is damaged and fatty changes and fibrous tissue changes of the muscle fibers occur due to denervation of the thenar muscles(T). These changes cause an increase in muscle echo intensity(EI) in ultrasonography. By calculating the ratio of the EI of unaffected hypothenar muscle(HT) to the EI of affected T in CTS patients, we can obtain a new parameter that can be analyzed in CTS patients. Using the image analysis technique of machine learning(ML), we also can diagnose CTS by having ML quantitatively analyze ultrasound images of thenar and hypothenar muscles. In this study, we aim to compare the diagnostic accuracy of pixel-based conventional method and ML-based classification method.

**Materials and Methods:** This is a prospective study and ultrasonography was performed on CTS patients diagnosed by electromyography(EMG). Short-axis ultrasonographic images were obtained at the wrist level which can include both the thenar and hypothenar muscles. Ten ultrasonographic images were captured from each wrist. Ultrasonography was conducted in the same setting and by one experienced physician. ROI of the images was set using ImageJ software and binary classification analysis was done using ultrasonographic image features acquired by Pyradiomic. Random Forest, AdaBoost, Linear SVC, and XGB classifiers were used in this ML approach.

**Results:** A total of 34 affected wrists and 44 non-affected wrists were analyzed. All four types of ML classifiers are showing performance in the 70% range. The pixel-based conventional quantitative method has an accuracy of 0.62632 and an AUC of 0.67744, indicating performance in the 60% range. Our machine-learning based classifier outperforms the pixel-based method in diagnosing carpal tunnel syndrome.

**Conclusions:** By continuous additional data collection, we believe that the AI-assisted ultrasonographic image analysis can be a future diagnostic tool for CTS.

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**Keywords:** Artificial Intelligence; Wrist; Carpal Tunnel Syndrome; Ultrasonography; Area Under Curve

**Acknowledgement:** This research was supported by the MSIT (Ministry of Science and ICT), Korea, under the ICT Creative Consilience program (IITP-2023-2020-0-01819) supervised by the IITP (Institute for Information & communications Technology Planning & Evaluation)

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## Deep learning model for classification of abnormal electromyography in post-stroke dysphagia

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**Objectives:** Dysfunction of laryngeal muscles including supra-hyoid muscles is believed to be related to PSD (post-stroke dysphagia PSD). Surface electromyography (sEMG) of those muscles has been used to evaluate the swallowing function in PSD. However, it is still not easy to differentiate between normal and abnormal sEMG activities clearly and accurately. In this study, we designed a AI (artificial intelligence) model using deep learning algorithm, which can classify abnormal sEMG activities recorded from supra-hyoid muscles of PSD patients more accurately and efficiently.

### Materials and Methods:

The subjects included thirty normal subjects and eighteen patients who showed aspiration or deep penetration in videofluoroscopic swallowing study after stroke. The sEMG signals were collected using a wireless EMG analysis system connected to electrodes attached to skin over both supra-hyoid muscles. Collected sEMG signals were separated signals according to each swallowing event and preprocessed. Preprocessing was performed in the following order: rectification, frequency filtering (bandpass 20-330 Hz) and smoothing (moving average filter with a window width of 200 ms). Preprocessed signals and stored in computer as a dataset. A deep learning model for classification of normal and abnormal sEMG activities was constructed and trained using the LSTM (Long short-term memory) algorithms and its accuracy was tested.

### Results:

The proposed model showed performance for classifying abnormal sEMG as follows: accuracy 90.61%; precision 0.92; recall 0.94; F1 score 0.93; AUC (area under curve) in ROC (Receiver operating characteristics) curve 0.94.

### Conclusions:

The deep learning model proposed in this study classified PSD patients' supra-hyoid sEMG with a high accuracy. The results suggest that the deep learning technology can improve accuracy and usefulness of sEMG in evaluation of swallowing function in the patients with PSD.

**Keywords:** Dysphagia; Stroke; Artificial Intelligence; Evaluation; Performance

## Microcurrent Therapy Efficacy for Cerebral Aneurysms in an Intracranial Arterial Dolichoectasia Mouse Model

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**Objective:** To investigate the therapeutic effect of microcurrent in intracranial arterial dolichoectasia (IADE) mice model.

**Materials and Methods:** Twenty mice were randomly allocated to five groups: healthy control (group 1-C), the IADE model (group 2-D), microcurrent applied (daily, 12 hours) before nephrectomy and continued until brain surgery for IADE prevention (group 3-M+D), microcurrent applied for 4 weeks after brain surgery for IADE treatment (group 4-D+M), and microcurrent applied for 4 weeks to evaluate toxicity (group 5-M) (Figure 1). IADE occurred in 8-week-old C57BL/6J male mice through the induction of hypertension and elastase injection into a basal cistern (Figure 1). Based on group 4, after 4 weeks of microcurrent application starting from week 0, the time of brain surgery, all five groups were euthanized and their brains were harvested. The diameter and thickness of cerebral arteries were measured on the microscopic scale (Figure 2). Using ImageJ software, the extracellular matrix components of the cerebral arterial wall, such as smooth muscle cells (SMCs), elastin, and collagen, were assessed by measuring the selected region of interest (ROI) within the image. The area of the region of interest (ROI) was measured and then divided by the area of the entire cerebral artery. This calculation allowed for the estimation of the percentage of each component present in the cerebral artery.

**Results:** The cerebral arterial diameter was significantly higher in group 2-D ( $117.79 \pm 17.05$ ) compared to group 1-C ( $76.64 \pm 12.03$ ), and group 3-M+D ( $77.29 \pm 24.47$ ). Additionally, the cerebral arterial thickness in group 2-D ( $9.31 \pm 2.26$ ) was significantly lower than in group 1-C ( $16.16 \pm 1.6$ ), and group 3-M+D ( $15.67 \pm 2.86$ ) (Figure 2, Table 1). The diameter of group 4-D+M ( $100.28 \pm 25.99$ ) was lower than that of group 2 and the thickness of group 4-D+M ( $12.82 \pm 5.17$ ) was higher than that of group 2-D although no significant difference was observed (Figure 2, Table 1).



The proportion of SMC and elastin in the cerebral arterial wall was significantly lower in group 2-D (SMC:  $38.05 \pm 10.32$ , elastin:  $53.13 \pm 9.08$ ) compared to group 1-C (SMC:  $70.93 \pm 7.18$ , elastin:  $53.13 \pm 9.08$ ), group 3-M+D (SMC:  $67.03 \pm 6.17$ , elastin:  $47.22 \pm 8.73$ ) and group 4-D+M (SMC:  $70.45 \pm 9.35$ , elastin:  $51.2 \pm 6.82$ ), respectively. Additionally, the proportion of collagen in the cerebral arterial wall was significantly lower in group 2-D ( $42.46 \pm 14.12$ ) compared to group 1-C ( $6.94 \pm 2.76$ ), group 3-M+D ( $13.31 \pm 4.67$ ), and group 4-D+M ( $13.3 \pm 3.84$ ), respectively (Figure 2, Table 1). However, no statistically significant differences were observed in the proportion of SMC, elastin, and collagen in cerebral arterial wall among groups 1, 3, and 4 (Figure 2, Table 1).

In group 5-M, there was no evidence of toxicity observed by histology in the liver and brain.

**Conclusion:** The study showed that microcurrent is effective in preventing the development of IADE and has some beneficial effects on its progression. Further study is needed.

**Keywords:** Cerebral, Aneurysms, Dolichoectasia, Mouse, Microcurrent

## Measuring consciousness: evidence from a case series using a virtual reality-based eye-tracking

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**Objective:** It has long suggested that consciousness can be measured by relating behavioral and neurophysiological responses. In this study, we aimed to present a novel biomarker of measuring consciousness using a virtual reality-based eye-tracking system with the evidence of correlation between behavior and neurophysiological responses.

**Materials and Methods:** We screened patients with disorders of consciousness (DoC) secondary to brain injury from July 2020 to June 2021. We included the patients with continuous eye-opening for at least 30 minutes, and excluded those without visual-evoked potential response and brainstem auditory evoked potential response. The enrolled individuals' eye movements were recorded using a pupil tracking model with a 60Hz sampling rate. We presented 9 types of visuoauditory (VA) stimuli to the patients through a virtual reality system with head-mount display. We defined and calculated relative pupil trajectory length (RPTL) as a value quantifying the relative change of pupil movement when the VA stimuli were given compared to when a blank stimulus was given. We also enrolled six healthy individuals and performed the same procedure as described above. We examined whether VA stimulation activates brain regions required for processing audio-visual stimuli by comparing lesions activated when presented with VA stimuli to lesions activated when presented with blank stimuli. We also sought to determine the superiority of RPTL over CRS-R by performing a logistic regression analysis utilizing the presence or absence of clinically meaningful changes in consciousness at 1 year as the dependent variable and the coma recovery scale-revised (CRS-R) visual and auditory domains and RPTL as the respective explanatory variables.

**Results:** We enrolled 7 patients with DoC due to various type of brain injury. We found that the auditory and visual cortex are the areas that are activated when presented with VA stimuli compared to blank stimuli. In addition, the analysis of fMRI data from six healthy individuals confirmed that the same areas were activated. Logistic analysis showed that the model utilizing RPTL as an explanatory variable had a higher level of explanatory power than the model utilizing CRS-R visual and auditory domains as explanatory variables ( $\Delta AIC = -131.7$ ).

**Conclusion:** Through the results of this study, we demonstrated that RPTL as a novel biomarker with neurophysiological support has the superiority to CRS-R, the standardized assessment tool for consciousness. The use of virtual reality-based eye-tracking systems provides a promising avenue for developing new biomarkers for measuring consciousness in patients with DoC.

**Key Words:** Disorders of consciousness; Virtual reality; Eye-tracking; CRS-R; Biomarker

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## Dialectic Learning Poles to Train Hemiplegic Care via Experiential Learning

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**Introduction:** Effective knowledge acquisition on basic hemiplegic care is vital to ensure high-level quality care can be rendered to individuals with hemiplegia. This can be performed via adopting the Experiential Learning theory. Active Experimentation-Reflective Observation and Concrete Experience-Abstract Conceptualization are the pairs of dialectic learning poles of opposing modes embedded in the Experiential Learning cycle. These dialectic learning poles are deemed important in learning new skills; and necessary to ensure deeper understanding and transition of knowledge into real-world clinical practice.

**Objectives:** To narrate and illustrate the dialectic poles of learning in the Experiential Learning theory which underpins the initiative to enhance transfer of knowledge on basic hemiplegic care amongst health care providers.

**Materials and Methods:** The narrative-illustrative content is derived from the continual service improvement initiatives by a neurological rehabilitation unit in a free-standing rehabilitation hospital. The continual service initiatives aim to develop a structured training module for hemiplegic care amongst health care providers of different disciplines and training backgrounds. This effort is achieved through embedding the important dialectic poles in the Experiential Learning cycle.

**Results:** Participants' performance tests showed improved understanding of the basic skills of hemiplegic care. The pre-and-post course tests showed increment in composite scores of the tested skills (hemiplegic positioning, transfers, mobility, activities of daily living). Narrative reports highlighted better understanding with semi-structured reflection sessions.

**Conclusions:** The dialectic poles embedded in the experiential learning act as motivating forces and perpetuates the learning cycle, resulting in deeper learners' engagement and higher understanding of basic hemiplegic care. Skill-based hemiplegic care training sessions must be designed to utilize the advantage of these dialectic polarities of learning to gain deeper understanding of basic hemiplegic care amongst health care providers.

**Keywords:** hemiplegic care, dialectic poles, experiential learning, knowledge acquisition

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### 3D virtual reality prism adaptation simulation system for hemispatial neglect

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**Objectives:** Prism glass adaptation training is a treatment for hemispatial neglect syndrome. The aim of the study is to develop a 3D VR prism adaptation simulation system and to evaluate the effects of the VR training with the simulation system for hemispatial neglect.

**Materials and Methods:** The 3D VR prism adaptation simulation system was developed to implement the prism adaptation treatment. The VR prism training program consisted of 3 sessions, 10 times over 2 weeks. In the first session, the subjects were instructed to move their virtual hand straight to a midline target in the VR. The first session finished when the subjects succeeded the task 20 times continuously. In the second session, the virtual hand path was programmed to move 10° deviated rightwards, simulating the prism glass applied condition. The subjects missed the target to the right side initially. After adaptation to the deviation condition, the third session started, in which the deviation was eliminated. The subjects showed left side target missing initially, which was similar to 'the after effect' of prism glass training. Neglect tests (star cancellation test, line bisection test and Albert's test) were performed before and one week after the intervention.

**Results:** Ten subjects(M:F=7:3) with hemispatial neglect due to right brain lesion were recruited. All neglect test scores became improved after the virtual prism adaptation simulation training (Star cancellation 41.25% → 59.82%, Line bisection 48.51 → 64.76%, Albert's 62.75 → 92.50%)( $p < 0.01$ ).

**Conclusions:** Hemispatial neglect improved significantly using the 3D VR prism adaptation simulation program.

**Keywords:** Hemispatial Neglect; Virtual Reality; Prism; Rehabilitation.



## Different peak expiratory flow between interfaces among patients with spinal cord and brain injury

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**Objectives:** This study aimed to compare peak expiratory flow (PEF) achieved during mechanical insufflation-exsufflation (MI-E) through a tracheostomy tube (TT) versus a facemask (FM) in patients with brain or spinal cord injury.

**Materials and Methods:** In a nonrandomized controlled trial, 15 brain injury patients with TTs and 15 participants with cervical spinal cord injury without TTs who lack cough capacity (peak cough flow <4.5 L/s) were included. MI-E was administered through TT or FM at pressure settings from +30/-30 to +60/-60 cmH<sub>2</sub>O. PEF values were obtained during every MI-E assisted cough and compared between interfaces (TT vs. FM). PEF differences based on cuffed vs. uncuffed tubes, total treatment days, completion rates, and sputum elimination were also assessed.

**Results:** Thirty participants (TT: 55.7±18.0, FM: 42.8±17.2 years) underwent MI-E treatment. PEF generated through TT was significantly slower than through FM at all pressure ranges (p<0.001). The mean (SD) PEF was -2.251(0.22) L/s in TT and -2.894(0.32) L/s in FM at +30/-30 cmH<sub>2</sub>O; and -3.212(0.47) L/s in TT and -3.921(0.41) L/s in FM at +60/-60 cmH<sub>2</sub>O. The mean PEF reached the optimal cut-off value of -2.7 L/s at a pressure as low as +30/-30 cmH<sub>2</sub>O through FM, while a pressure of +40/-40 cmH<sub>2</sub>O was necessary to generate -2.7 L/s through TT. There was no significant difference of PEF according to the type of the TT (cuffed vs. uncuffed) or the total number of treatment days. Although PEF increased with higher pressure, the degree of sputum clearance was not correlated with the pressure. Every participant with TT completed all pressure settings up to a maximum of +60/-60 cmH<sub>2</sub>O, while only 86.7% at +40/-50, 66.7% at +50/-50, 0% at +50/-60 cmH<sub>2</sub>O completed the specified pressure through FM.

**Conclusions:** MI-E through a TT requires higher pressure than a FM for equivalent PEF. MI-E is feasible with TT at higher pressures, up to +60/-60 cmH<sub>2</sub>O, to achieve PEF exceeding -2.7 L/s.

**Keywords:** spinal cord injury, cough, mechanical insufflation-exsufflation, tracheostomy tube, peak expiratory flow.

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**Synergistic effect of manual assisted cough in people with cervical spinal cord injury**Chae Hyeon Lee,<sup>1</sup> Sung Eun Hyun, Woo Hyung Lee,<sup>1</sup> Jeongsu Lee,<sup>1</sup> Jieun Oh,<sup>1</sup> Hyung-Ik Shin<sup>1\*</sup><sup>1</sup>Department of Rehabilitation Medicine, Seoul National University Hospital, Seoul National University College of Medicine, Seoul, Republic of Korea.\*E-mail: [hyungik1@snu.ac.kr](mailto:hyungik1@snu.ac.kr)

**Objectives:** This study aims to evaluate the synergistic effect of manual assisted cough (MAC) when combined with mechanical insufflation-exsufflation (MI-E) by investigating its influence on generated peak expiratory flow (PEF) and exploring other potential associated factors in individuals with cervical spinal cord injury (CSCI).

**Materials and Methods:** In a single-center prospective study, 15 patients with CSCI with a peak cough flow (PCF) of <270 L/min underwent five consecutive days of MI-E treatment, with or without MAC (five sessions per day). Continuous in-expiratory airflow was obtained during every MI-E-assisted cough, and PEF and total insufflation volume (TIV) were calculated. Linear mixed-effect models (LMMs) were used to assess the cumulative effects of MI-E with through analyzing the influence of a total number of treatment days and sessions on final PEF. MAC and TIV were included as fixed effects and participant-specific intercepts and MAC were considered as random effects in the final LMM.

**Results:** The average PEF value for MI-E with and without MAC were 4.00±0.53 L/s and 3.73±0.45 L/s, respectively, both exceeding the initial voluntary PCF (1.65±0.53 L/s) and the recommended PEF threshold of 2.7 L/s, which is considered as a cutoff for effective secretion clearance. Increasing the number of treatment sessions did not yield improved PEF. However, both MAC and TIV were associated with PEF, with MAC demonstrating a higher effect estimate (0.283 [95% CI 0.165-0.402] L/s) compared to TIV (0.045 [95% CI 0.017-0.074] L/s). The estimated mean PEF values were 3.723 L/s and 4.006 L/s for MI-E alone and MI-E assisted with MAC, respectively.

**Conclusions:** This study is the first to demonstrate the synergistic effect of MAC on generated PEF during MI-E in CSCI patients. Both MAC utilization and adequate TIV were important to generate optimal PEF for effectively clearing airway secretions. Moreover, the absence of cumulative effects with increasing treatment sessions highlights the necessity of combining MI-E with MAC in every trial to achieve successful coughing.

**Keywords:** spinal cord injury, manual assisted cough, peak expiratory flow, mechanical insufflation-exsufflation.

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## Role Of Motor Nerve Block Assessment and Botulinum Toxin in Palliative Spinal Metastasis Patient

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**Introduction:** Metastatic spinal cord compression may cause debilitating complications that further impaired patient's quality of life. Here we illustrate the role of motor nerve block assessment and Botulinum Toxin (BoNT) intervention in a case of palliative spinal metastasis patient with the aim of promoting comfortable sitting posture and easing perineal hygiene.

**Case Presentation:** 70-year-old lady with history of late presentation of advanced breast cancer and multiple spinal metastases with cord compression, in which she underwent surgical intervention. It was complicated with paraplegia and severe spasticity requiring oral antispastic medication. She presented 20 months after her diagnosis, examination revealed generalized spasm and spasticity of lower limbs, especially hip adductors and knee flexors group (MAS generally 2-3) complicated with limited knee extension range of 0° to 75° and 80° bilaterally, leading to improper wheelchair sitting position. Motor nerve block under ultrasound and EMG nerve stimulator guidance was performed in stages to the motor branch of bilateral hamstring, adductors, rectus femoris and sartorius, which shows improvement in passive ROM post adductors and sartorius block indicating spasticity component, but not with hamstring. Following this, BoNT intervention was given to bilateral adductor magnus, adductor longus and sartorius.

**Results:** Post-intervention, her hip adductors spasticity improves to MAS 1+ with improvement of passive ROM by 15°. Hip flexors remains at MAS 3 however passive ROM has improved markedly by 15°-60°. She demonstrates fewer spasms, good sitting posture with longer sitting time tolerability and her perineal hygiene is easier to perform.

**Conclusions:** BoNT intervention is beneficial in palliative spinal metastasis cases to improve their passive function. Motor nerve blocks can aid in deciding the suitability of BoNT intervention and targeted muscles selection.

**Keywords:** Metastatic spinal cord injury; motor nerve block; botulinum toxin

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## Effectiveness of mirabegron in adults with spinal cord injury: a systematic review and meta-analysis

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**Objectives:** Mirabegron is a beta-3 adrenergic agonist that is commonly used for treating neurogenic lower urinary tract dysfunction (NLUTD) in individuals with spinal cord injury (SCI). Since the effectiveness of mirabegron has not been clearly demonstrated, this study aims to systematically evaluate urodynamic and clinical effectiveness of mirabegron in adults with neurogenic detrusor overactivity following spinal cord injury.

**Materials and Methods:** Studies were searched from online databases then duplicated or non-relevant abstracts and articles were excluded. Randomized control trials, single-arm trials, and retrospective studies were included. Risks of bias of each study was evaluated using Cochrane Risk of Bias (RoB) tool. A meta-analysis of both clinical outcome (incidence of incontinence) and urodynamic outcome (maximum detrusor pressure (MaxPdet), volume at the first detrusor overactivity (VFDO), cystometric capacity (CC), and bladder compliance (BC)) was presented using a forest plot with random-effect model. Certainty of the evidence from each meta-analysis was evaluated using GRADE protocol.

**Results:** Of 237 studies being screened, 6 studies were included. One study was categorized as low, one study as unclear, and 4 studies as high risk of bias. The random-effect meta-analysis demonstrated that when compared with no treatment or placebo, mirabegron could not reduce the incidence of incontinence (RR 1.11 [95%CI: 0.45, 2.75]), might decrease MaxPdet (SMD -0.27 [95%CI: -0.62; 0.08], N=380), might increase VFDO (SMD 0.42 [95%CI: -0.01, 0.86]), may increase BC (SMD 0.37 [95%CI: 0.00, 0.74]), and improve CC (SMD 0.47 [95%CI: 0.35, 0.59]). All evidence from meta-analyses has low certainty due to serious inconsistency and imprecision.

**Conclusions:** In adults with neurogenic detrusor overactivity following SCI, mirabegron might have beneficial effects on urodynamic outcome (cystometry capacity) but not clinical outcome. Since the supportive evidence has very low certainty, further high-quality randomized control trials are needed.

**Keywords:** spinal cord injury, detrusor overactivity, urodynamic, cystometry, mirabegron



## Maximizing diaphragm facilitation through transcutaneous, repetitive phrenic nerve stimulation

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**Objectives:** This study aims to show that percutaneous, noninvasive repetitive phrenic stimulation is feasible and safe and to find the optimized phrenic stimulation protocol with the best monitoring method of diaphragm facilitation. It can be used to aid proper inspiration and prevent diaphragm atrophy for people with high spinal cord injuries (SCI) who suffer respiratory muscle weakness

**Materials and Methods:** Healthy volunteers aged 20-39 were recruited for phrenic compound motor action potential (CMAP) measurement and diaphragm ultrasound during percutaneous repetitive phrenic nerve stimulation. After identifying optimal stimulation location and intensity, repetitive stimulations with frequencies ranging from 1 to 30Hz were applied for 3s at end-expiratory pause and during voluntary inspiration. Diaphragm thickness was measured using a 10-15MHz linear array transducer with the intercostal approach at the zone of apposition between the antero-mid axillary line in 9-11th intercostal space. Video clips were recorded in B-mode to measure diaphragm thickness.

**Results:** Nine participants were recruited (age 28[23-33] years, female n=5), and three completed all stimulations, while others discontinued due to discomfort in the neck area. Stimulation during inspiratory phase reported to be more comfortable. Phrenic CMAP showed low correlation with stimulation intensity ( $r=0.146$ ,  $p=0.008$ ) and stimulation frequency correlated with the percent change of CMAP relative to the baseline CMAP ( $r=0.149$ ,  $p=0.007$ ). While increasing stimulation intensity did not significantly alter diaphragm thickness, optimal stimulation frequency was determined to be 15-20Hz, generating comparable or thicker diaphragm compared to voluntary maximal inspiration

**Conclusions:** Noninvasive, percutaneous, and repetitive phrenic nerve stimulation at 15-20Hz for 3s is a safe and effective method to facilitate diaphragm activity. Diaphragm ultrasound can visualize diaphragm activation in real time and monitor effectiveness of repetitive phrenic stimulations. These findings introduce the potential for a new pulmonary rehabilitation approach to prevent diaphragmatic atrophy, particularly beneficial for patients with SCI who need long-term ventilatory support.

**Keywords:** spinal cord injury, phrenic nerve stimulation, compound motor action potential, diaphragm ultrasound, pulmonary rehabilitation

## Station 1

# Geriatric neurorehabilitation and dysphagia

**December 14, 2023 (Thu)**  
**15.00-16.00 hr.**

**Session Judges (live presentation):**

Chair: Paolo Capodaglio (Italy)

Co-Chair: Chanasak Hathaiareerug (Thailand)

**Main Judges (based on E-posters):**

*Areerat Suputtitada (Thailand)*

*Jittima Saengsuwan (Thailand)*

*Rachawan Suksathien (Thailand)*

## Movement characteristics during functional movement according to knee varus type

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Knee varus is a typical alignment seen in patients with degenerative arthritis. It can be classified into 2 types of knee varus alignment (Type 1: hip internal rotation, knee hyper-extension, tibia internal rotation, Type 2: hip external rotation, slightly knee flexion, tibia external rotation). Type 1 and Type 2 have similar knee varus alignment, but the mechanism by which varus alignment is formed is different. This difference in alignment formation results in different movement characteristics when performing various functional movements. However, there is no study comparing the characteristics of movement patterns according to the knee varus alignment type.

**Objectives:** To investigate the characteristics of lower extremity movements during functional activities according to knee varus types.

**Materials and Methods:** Thirty subjects with knee varus alignment (Type 1: 15 subjects, Type 2: 15 subjects) were recruited. Subjects performed the 4 functional movements (gait, one leg standing, stair up & down tasks). During functional movements, lower extremities kinematics (vertical/horizontal displacement) were video-recorded and analyzed using kinovea software. Independent t-test was used to compare the characteristics among different knee alignment.

**Results:** There were significant differences in lower extremity kinematics between the two groups. Knee varus thrust (horizontal displacement), hip lateral sway (horizontal displacement), and movement were significantly increased in type 1 in gait, one-leg standing, and stair up tests.

**Conclusions:** It was possible to confirm the difference in movement characteristics between the two types during functional activities. Compared to type 2, when evaluating subjects with type 1, it is important to identify problems through tests that cause abnormal horizontal displacement. In addition, it explains the importance of establishing a therapeutic strategy that can minimize the occurrence of such movements during therapeutic intervention.

**Keywords:** Characteristics, Functional movement, Kinematics, Knee, Varus

## Measurement of coping strategies of PWD group and its association with depression and anxiety

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Coping has been defined as a response aimed at diminishing the physical, emotional and psychological burden that is linked to stressful life events and daily hassles. The Persons with Disabilities (PWD) Act of 2008 defines persons with disabilities as "those who have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society". Adults PWD more often report depression and anxiety, reduced health care access, and health-related risk behaviors than do adults without disabilities. It is well documented that active coping strategies can lead to better positive adjustment and psycho-social outcomes among individuals with disabilities and illnesses. However, little information exists related to exploring how coping strategies are associated with development of anxiety and depression among adults PWD.

### Objectives:

4. To determine the socio-demographic profile of adult PWD.
5. To measure the different coping strategies in adult PWD.
6. To screen the prevalence of depression and anxiety symptoms in adult PWD.
7. To explore the association of different types of coping strategies and negative emotional status.

### Materials and Methods:

A single cross-sectional study, using convenient sampling method which is done in Rehabilitation Medicine Clinic, University Malaya Medical Centre (UMMC). Patient selection criteria is above 18 years old, which involve three groups of patients with established diagnosis of stroke/ acquired brain injury/ spinal cord injury for more than 1 year duration, and able to answer self-rated questionnaires in Malay or English languages. Study duration is within 1 year (from August 2023 till August 2024), and the outcome measures used are Brief Coping Orientations to Problems Experienced (BRIEF-COPE), Patient Health Questionnaire-9 (PHQ-9) and General Anxiety Disorder-7 (GAD-7). Suggested sample size is calculated based on the universal sampling method which is 385 samples in total.

### Results & Conclusion:

Data collection is still on-going, and the data will be analyzed using the Statistical Package for the Social Sciences (SPSS) version 28.0, Chi-square test and correlation analysis.

**Keywords:** Coping strategy, PWD, depression, anxiety



P-303

## A protocol for a muscle-mimicking, fabric-type knee orthosis on gait training in geriatric patients

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**Objectives:** The number of older people, those aged 65 and up, is growing, making up about 30-40% of the entire population. For most people, the typical walking speed is about 1.0 m/s. However, for older individuals, this slows down to around 0.78 m/s.

**Materials and Methods:** In this single-blind randomized controlled trial, we compare the gait of geriatric patients without an orthosis to their gait using a muscle-mimicking, fabric-type knee orthosis. This orthosis is designed to offer assistance synchronized with the quadriceps muscle activity. The gait training includes both a 6-minute walking exercise and obstacle-overcoming training. This customization is based on each patient's performance metrics obtained from the 10-meter walking test, Berg Balance Scale, and Five Times Sit to Stand Test. Geriatric patients participate in 30-minute exercise sessions over two days. After enrolling and receiving trial-specific numbers, patients are grouped through randomization.

**Results:** Evaluations are performed before wearing the orthosis, after wearing it with power off, and after wearing it with power on. The primary outcome measure is the 10-meter walking test. The secondary outcome measures include the 6-minute walking test, Numerical Rating Scale, Timed Up and Go, Five Times Sit to Stand Test, Berg Balance Scale, and Electromyography. The results will be described in future studies.

**Conclusions:** The results of this study will shed light on the potential benefits of orthosis in geriatric gait training.

**Keywords:** knee; orthosis; gait; exercise; geriatric patients

## Development of a Korean patient-reported questionnaire for the Osteoarthritis Quality Indicator

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Osteoarthritis (OA) is a joint inflammation disease that causes pain and disability. Many OA patients report a decrease in various aspects of their life performance and a deterioration of their quality of life due to OA. Using quality indicators (QIs) to monitor and improve the quality of care for OA patients is an effective method. However, there is no study developing a questionnaire for Korean version of OA-QIs.

**Objectives:** To develop and test a new instrument for patient self-reported quality of OA care, the Korean version of the Osteoarthritis Quality Indicator (Korean version of OA-QI) questionnaire, and to investigate the content validation of the Korean version of the OA-QI questionnaire.

**Materials and Methods:** The Korean version of the OA-QI questionnaire was developed modifying published OA-QIs. The Korean version of OA-QI was completed with a total of 19 questions by adding 3 questions and deleting 1 question from the existing OA-QI questionnaire. Ten allied health professionals completed the content validity of the Korean version of OA-QI questionnaire. To measure content validity, content validity was measured using a Likert scale for each of 19 items.

**Results:** As a result of content validity measurement, it was found that the average was 4.87 out of 5 out of 19 items.

**Conclusions:** This study developed to patient-reported the Korean version of OA-QI questionnaire. In the process of developing the Korean version of OA-QI questionnaire, three items were added and one item was deleted.

**Keywords:** Osteoarthritis, Quality Indicator, Content Validity, Questionnaire

P-305

## Development of phase II cardiac rehabilitation in cardiovascular surgery patients at Roi-Et province

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**Objectives:** This study aimed to assess the impact of a cardiac rehabilitation program on the cardiac rehabilitation system and recovery of post-cardiovascular surgery patients in Phase II within the Roi-Et Province.

**Materials and Methods:** The study involved four phases. Firstly, the status of cardiac rehabilitation at 20 district hospitals in Roi-Et Province was evaluated. Second, experts validated the cardiac rehabilitation manual. Third, the manual was used to assess the knowledge of physical therapists. Fourth, the cardiac rehabilitation system and patient outcomes were evaluated from March to July 2023, with an analysis of factors influencing the 6MWD.

**Results:** In the initial phase, it was observed that most district hospitals lacked continuous rehabilitation, therapist confidence, standardized guidelines, equipment, and space. Subsequently, in the second phase of the study, the manual successfully established a standardized guideline (IOC>0.8). Moving on to the third phase, it was evident that the implementation of the manual led to an enhancement in the knowledge scores of physical therapists, a statistically significant improvement ( $p<0.001$ ). Finally, in the last phase of the study, the introduction of the manual led to enhancements in the cardiac rehabilitation infrastructure, encompassing improvements in standardized procedures, therapist training, equipment availability, and the overall facilities within all district hospitals. As a result, the outcome of 124 patients showed a significant average increase of 110.30 meters in the 6MWD ( $p < 0.001$ ). Additionally, the study identified significant associations between 6MWD and certain variables, including gender (male, AOR = 6.45), age (less than 41 years, AOR = 23.23; 41-50 years, AOR = 18.51; 51-60 years, AOR = 18.51), and educational attainment (bachelor's degree, AOR = 20.14) ( $p < 0.05$ ).

**Conclusions:** Implementing a structured cardiac rehabilitation manual enhanced the cardiac rehabilitation system and significantly improved 6MWD among patients in Roi-Et Province.

**Keywords:** 6MWD; Cardiac Rehabilitation; Physical therapy

P-306

## Exploring dementia care practices and challenges among healthcare professionals in Malaysia

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**Objectives:** Dementia presents a healthcare challenge, and its prevalence is steadily increasing in Malaysia. It is essential to understand the current practices of healthcare professionals in dementia care to enhance the quality of care provided to individuals living with dementia. This abstract provides an overview of a study aimed at exploring the prevailing approaches and challenges faced by healthcare professionals (HCPs) in Malaysia regarding dementia care.

**Materials and Methods:** The study utilized a cross sectional quantitative method approach. An online survey was distributed via emails and social media to all HCPs working in healthcare centres in Malaysia who has treated people living with dementia (PLWDs) in the past one year. The survey consists of 68 open-ended and closed-ended questions. A total of 66 HCPs consist of physiotherapists (PT) and occupational therapists (OT) were recruited.

**Results:** A significant percentage of the respondents (57.58%) were specifically assigned to geriatric care, encompassing the provision of care for people living with dementia (PLWDs). Slightly more HCPs work in the public hospitals (47.0% government hospitals and 43.9% university hospitals) as compared to the private centres. A majority of respondents have experience working with PLWDs (78.8%) of less than 5 years and reported dedicating an average of 1-10 hours per week to dementia care (72.7%). They mostly treat patients in the mild to moderate stages of dementia (87.9%). The duration of care was less than 6 months. Only 42.4% treat PLWDs for more than 6 months. Follow-up practices varied among professionals, with once every month follow-ups being the most common (43.9%). A significant portion of respondents did not utilize any specific dementia care guidelines (95.5%). The main barriers in providing dementia care to PLWDs were language barriers (29.7%), cognitive and behavioural complexities (6.1%), and the poor involvement of caregivers (9.0%).

**Conclusions:** Most HCPs dealing with PLWDs were primarily working in the geriatric rehabilitation setting. Challenges in language barriers, managing cognitive and behavioural complexities and poor involvement of caregivers should be highlight in Malaysian dementia care.

**Keywords:** dementia care; PLWDs; healthcare challenges; rehabilitation care



P-307

**Efficacy of blood flow restriction with low-load resistive exercise in irregular exercise adults who have risk factors for symptomatic knee osteoarthritis:  
Double-blind randomized controlled trial**

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**Objective:** To assess the efficacy of blood flow restriction (BFR) to improve knee extensor strength in an irregular exercise of adults with risk factors of symptomatic knee osteoarthritis (OA).

**Design:** Double-blind randomized controlled trial (January 2022 – July 2022)

**Participants:** Irregular exercise adults aged  $\geq 40$  years old who had at least one of the risk factors for symptomatic knee OA.

**Methods:** 44 participants were randomly assigned into intervention (BFR) and control groups using stratified and mixed block randomization. The BFR group exercised 2 times/week for 4 weeks in leg extension exercises at 30% of 1 repetition maximum (1RM) (15 reps $\times$ 4 sets) with cuff pressure according to the protocol of this study, while the control group exercised without using the cuff protocol. Both groups were given the diary book to record any possible confounding factors. The outcomes of interest included 1RM isotonic knee extension, 1RM isotonic leg press, 30-second chair stand test, and knee pain outcome score (KOOS). Pre-exercise and post-exercise tests were recorded. Compare the differences in results between groups using the linear regression test.

**Result:** The **posttest** mean differences of 1RM isotonic knee extensor, 1RM leg press, 30 second chair stand test, and KOOS after 4 weeks of exercise between groups (adjusted mean difference, AMD) were 14.74 kg (95% CI: 4.00, 19.29;  $p < 0.001$ ), 30.83 kg (95% CI: 18.00, 43.66;  $p < 0.001$ ), 7.11 times (95% CI: 4.16, 10.07;  $p < 0.001$ ) and 1.42 points (95% CI: 0.34, 2.50;  $p = 0.01$ ) respectively, which were significantly different in statistics.

**Conclusion:** A 4-week, low-load resistive training program with concurrent application of BFR improves knee extensor strength in irregular exercise of adults who have risk factors of symptomatic knee OA when compared and no further worsened knee symptoms.

**Keywords:** blood flow restriction therapy; resistance training; knee osteoarthritis

## Is electrical stimulation has benefit for chronic dysphagia and dysphonia case ? A case report study

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**Objectives:** This study aimed to investigate the effect of neuromuscular electrical stimulation (NMES) combined with strengthening exercises in a 52-year-old man presenting with pharyngeal dysphagia and dysphonia after a large hypopharynx benign tumor removal surgery.

**Subjects and Methods:** Patient complained difficulty in swallowing liquid and solid food with frequent coughing after swallowing since 10 months of surgery. The Gugging Swallowing Screen (GUSS) score was 8/20 and the swallowing disturbance score (SDS) was 16.5. There was residue on the vallecula and piriform with right vocal cord weakness on fiberoptic endoscopic evaluation of swallowing (FEES) examination and penetration aspiration scale (PASS) score was 1 for all food consistency. He also complained breathy voice, low-pitch voice and low speaking endurance with vocal performance questionnaire score (VPQS) was 40. A 30-minute NMES on supra-infrahyoid muscles bi-weekly for six weeks with the frequency of 80 Pps and 4-7 mA intensity combined with a home-based shaker and breathing exercises were conducted as rehabilitation program.

**Results:** Patient's swallowing function improved in liquid to semisolid consistency and double swallowing for solid ones. GUSS score improved to 17/20, and the SDS to 7.5. He could talk longer, clearer, and improved vocal pitch with the VPQS of 19. Corresponding to those results, NMES had been shown to successfully improve swallowing performance by strengthening the hyoid muscle and enhancing neuronal reorganization and motor relearning through sensory pathway, even in chronic case.<sup>1</sup> The therapeutic effect of NMES on various aspects of dysphonia has a bias, but its combination with exercise showed promising results.<sup>2</sup>

**Conclusions:** NMES and swallowing muscle strengthening exercises were effective in improving swallowing function and voice quality in chronic pharyngeal dysphagia-dysphonia post benign large hypopharyngeal tumor surgery patient. Further study about the benefit of NMES with a good methodological and larger sample is needed, especially in this specific dysphagia-dysphonia case.

**Keywords:** Dysphagia; Dysphonia; Neuromuscular electrical stimulation; Exercise

Reference :

1. Pownall, Enderby, Sproson. Electrical Stimulation for the Treatment of Dysphagia. In *Electroceutical*; 2017. 137-145
2. de Almeida, da Cunha, et al. Effect of Electrical Stimulation on the Treatment of Dysphonia: A Systematic Review. *JVoice*. 2020. 36(5):650-660

P-309

## Validity of the Swallowing Disturbance Questionnaire for Assessing Dysphagia Severity in PD

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**Objectives:** This study aimed to investigate the correlation between the Swallowing Disturbance Questionnaire (SDQ) and objective dysphagia severity based on videofluoroscopic swallowing study (VFSS), and validate the feasibility of SDQ for monitoring dysphagia progression.

**Materials and Methods:** The participants were PD patients who underwent VFSS and SDQ assessments concurrently from 2016 to April 2023. VFSS findings were evaluated using the Videofluoroscopic Dysphagia Scale (VDS) and American Speech-Language-Hearing Association National Outcomes Measurement System (ASHA NOMS) scale, and the scores for each item of SDQ were collected from patients' medical records. The association between VDS and SDQ was analyzed for total score, as well as scores specific to the oral and pharyngeal phases. Additionally, the average SDQ total score was compared across different ASHA NOMS scale categories.

**Results:** A total of 72 patients with PD were included in this study. The correlation analysis revealed a significant positive correlation between the total scores of SDQ and VDS ( $r=0.281$ ,  $p=0.017$ ). Similar results were observed in the oral phase, where a significant positive correlation was found between SDQ oral and VDS oral scores ( $r=0.386$ ,  $p<0.001$ ). However, no statistically significant correlation was found between the pharyngeal scores of SDQ and VDS ( $r=0.230$ ,  $p=0.052$ ). Comparing the combined ASHA NOMS level 4 and 5 group to the level 6 and 7 groups, no significant difference in SDQ total scores was observed ( $p=0.613$ , Kruskal-Wallis test).

**Conclusions:** The study demonstrated a weak correlation between subjective symptoms of dysphagia assessed by SDQ and objective findings by VFSS. However, the patient's subjective symptoms were not significantly correlated with the clinician's judgement of dysphagia severity based on ASHA NOMS scale. SDQ can be used for screening purposes in dysphagia, but assessing severity is challenging, particularly in the pharyngeal phase.

**Keywords:** Dysphagia; Parkinson's disease; Swallowing disturbance questionnaire; Symptom; Severity

P-310

## Application of Swallowing Disturbance Questionnaire for Screening Dysphagia in MSA

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**Objectives:** This study aims to evaluate the feasibility of using the Swallowing Disturbance Questionnaire (SDQ) as a screening tool for dysphagia in multiple system atrophy (MSA) patients and determine the appropriate cut-off value.

**Materials and Methods:** This study included MSA patients who underwent videofluoroscopic swallowing study (VFSS) and completed the SDQ between 2016 and April 2023. Subgroup analysis was conducted on a subset of patients who had no dietary modifications at the time of VFSS. Dysphagia was defined by two criteria: Penetration-Aspiration Scale (PAS) score of 3 or higher, or PAS of 3 or higher and/or vallecular/pyriform sinus residue of 10% or more. Sensitivity and specificity were calculated using a cut-off value of 11 as previously reported in patients with Parkinson's disease. ROC curves and the area under the curve (AUC) value were also obtained to determine the optimal SDQ cut-off value.

**Results:** A total of 66 patients and a subgroup of patients (n=37) without dietary modification were included. Applying the cut-off value of 11 showed a sensitivity/specificity of 0.52/0.69 in the total MSA patient group, and 0.71/0.56 in the subgroup. According to the ROC curves, the optimal cut-off values were 12.0 and 12.5 in the total MSA group and the subgroup, respectively, regardless of the definition of dysphagia. In and the subgroup, the AUC was highest (0.612) when dysphagia was defined based on the PAS score, with corresponding sensitivity/specificity values of 0.786/0.565, respectively.

**Conclusions:** Applying the SDQ cut-off value for Parkinson's disease to screen for dysphagia in MSA patients showed lower accuracy. The optimal cut-off value for the SDQ in MSA patients without dietary modifications was 12.5. Due to the relatively low specificity of SDQ in screening for dysphagia, it is necessary to consider scale modification for MSA patients.

**Keywords:** Dysphagia; Swallowing disturbance questionnaire; Multiple system atrophy; Screening



P-311

## No symptoms of dysphagia in stroke patients do not necessarily reflect good swallowing function

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**Introduction:** Stroke is still the most common cause of dysphagia. However, there are no studies that show whether chronic stroke patients who do not complain of difficulty in swallowing function have objectively no problem in swallowing processes. If the patient actually has an impairment in the swallowing process even though without symptoms, this may be a potential decrease in swallowing function in the future as the patient ages.

**Objective:** The aim of the present study is to objectively assess whether there are any problems in swallowing function in all three phases (oral, pharyngeal, and esophageal) in chronic stroke patients without symptoms of dysphagia.

**Material and Methods:** Five patients with chronic ischemic stroke who did not complain of difficulty swallowing, underwent Videofluoroscopic Swallow Study (VFSS).

**Results:** As a result, 4 out of 5 patients examined had impaired swallowing in at least 1 of the 3 swallowing phases. These include a decrease in tongue control, the presence of oral and also pharyngeal residues.

**Conclusions:** Chronic stroke patients who do not complain about their swallowing function may still have an impaired swallowing function objectively. Thus, management to prevent swallowing symptoms in the future can be considered in patients like this.

**Keywords:** dysphagia; stroke; VFSS; swallowing; Deglutition

P-312

**Correlation between cognitive impairment and dysphagia in supratentorial stroke**Myungeun Yoo, M.D.<sup>1</sup>, Jooeun Park, M.D.<sup>1</sup>, Yoon Ghil Park, M.D., Ph.D.<sup>1\*</sup><sup>1</sup> Department of Rehabilitation Medicine, Gangnam Severance Hospital, Yonsei University  
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**Objectives:** Cognitive impairment and dysphagia are common complications after stroke. The aim of this study is to investigate the correlation between cognitive function and dysphagia in supratentorial stroke

**Materials and Methods:** This retrospective cohort study involved 79 patients who experienced the first supratentorial stroke. To assess the severity of dysphagia, videofluoroscopic swallowing studies (VFSS) was conducted, and videofluoroscopic dysphagia scale (VDS) was employed. Cognitive function was evaluated by the Mini-Mental State Examination (MMSE). The correlation between dysphagia and cognitive function was analyzed using Pearson correlation coefficient. MMSE scores were used to categorize patients into different levels of cognitive impairment: normal (score 27 to 30), mild (score 21 to 26), moderate (score 15 to 20), moderately severe (score 10 to 14), and severe (score 0 to 9). Additionally, VDS total score was utilized to classify patients into low risk ( $\geq 47$ ) or high risk ( $<47$ ). The Receiver Operating Characteristic (ROC) curve was used to determine the cutoff-levels cognitive impairment to swallowing difficulty

**Results:** Total score of MMSE had negative correlation with subtotal scores of oral phase and total score of VDS. Additionally, the total score and 'Command' in MMSE were negatively correlated with the all subscales of oral phase in VDS. 'Attention' in MMSE had negative correlations with 'Bolus formation', 'Mastication', 'Apraxia', 'Oral transit time of bolus' and 'Subtotal score of oral phase' in VDS. 'Construction' in MMSE had negative correlations with 'Bolus formation', 'Apraxia' and 'Subtotal score of oral phase' in VDS. The optimal cutoff level of cognitive impairment to severity of swallowing difficulty was 'severe' level.

**Conclusions:** We could suggest that cognitive impairment is correlated with the oral phase of dysphagia. The total score of MMSE could serve as a criterion for identifying severe dysphagia. The cognitive function in dysphagia patients with stroke should be clinically emphasized

**Keywords:** dysphagia; cognitive impairment; stroke; MMSE; VFSS

## Station 2

# Stroke rehabilitation and neuromodulation

**December 14, 2023 (Thu)**  
**15.00-16.00 hr.**

**Session Judges (live presentation):**

Chair: Nirmal Surya (India)

Co-Chair: Komwudh Konchalard (Thailand)

**Main Judges (based on E-posters):**

*Areerat Suputtitada (Thailand)*

*Jittima Saengsuwan (Thailand)*

*Rachawan Suksathien (Thailand)*

P-401

## Accuracy of four sarcopenia screening methods in patients with chronic stroke in Thailand

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**Objectives:** The aim of this study was to evaluate the accuracy of screening tools for sarcopenia and to determine whether the same or different cut-off points should be applied in patients with chronic stroke.

**Materials and Methods:** Sixty-eight participants with residual hemiparetic deficit for over 6 months were enrolled. We evaluated the accuracy of calf circumference, SARC-F questionnaire, SARC-CalF and Ishii's score charts using the Asia Working Group for Sarcopenia (AWGS) 2019 revised criteria as the gold standard.

**Results:** Sarcopenia was identified in 22 participants (32.4 %) based on the AWGS criteria. Overall, SARC-F showed the lowest diagnostic accuracy. The Area Under the receiver operating characteristic Curves (AUC) of calf circumference, SARC-F, SARCCalF and Ishii's score chart were 0.77 (95 % confidence interval [CI], 0.66 - 0.88), 0.58 (95 % CI, 0.42 - 0.74), 0.75 (95 % CI, 0.62 - 0.87), and 0.78 (95 % CI, 0.65 - 0.90), respectively. The mean AUC of SARC-F was inferior to SARC-CalF (0.58 vs. 0.75,  $p = 0.035$ ).

**Conclusions:** The accuracy and diagnostic properties of calf circumference, SARC-CalF and Ishii's score chart were comparable (mean AUC of 0.77, 0.75 and 0.78, respectively). SARC-F showed the lowest accuracy (mean AUC = 0.58). We proposed new cut-off points for each screening instrument, including SARC-F, SARC-CalF, calf circumference in women, and Ishii's score chart for both men and women. The recommended screening tools are calf circumference, SARC-CalF and Ishii's score chart. It is not recommended to rely solely on SARC-F for screening sarcopenia after stroke.

**Keywords:** Sarcopenia; Stroke; Screening tests; Accuracy



P-402

## A protocol for in-bed EMG feedback self-exercise on functional mobility in subacute stroke patients

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**Objectives:** The dosage and intensity of physical therapy are crucial factors influencing the motor recovery of the hemiplegic lower limb in patients with subacute stroke. Biofeedback using wearable sensors may provide opportunities for patients with stroke to effectively guide self-exercise with monitoring of muscular activities in hemiplegic lower limbs. This study aims to explore the feasibility and preliminary effects of in-bed self-exercise based on electromyography sensor feedback on functional mobility in patients with subacute stroke.

**Materials and Methods:** This is a randomized controlled trial comparing conventional physical therapy with additional in-bed self-exercise based on electromyography sensor feedback and conventional physical therapy alone. The interventions will be adjusted according to the muscle strength and Brunnstrom recovery stage in the hemiplegic lower limbs.

**Results:** The primary outcome measure is the Rivermead Motor Assessment score. The secondary outcome measures are the Manual Muscle Test, Brunnstrom recovery stage, Fugl-Meyer assessment, Berg Balance Scale, Functional Ambulation Category, modified Rankin scale, modified Barthel index, Pittsburgh Rehabilitation Participation Scale, and Short-Form Health Survey 36 version 2. The results will be described in future studies.

**Conclusions:** This clinical trial will estimate the effect and feasibility of in-bed self-exercise based on electromyography sensor feedback in patients with subacute stroke. If the expected results are achieved in this study, stroke rehabilitation methods will be enriched.

**Keywords:** biofeedback; clinical trial; electromyography; self-exercise; Stroke

P-403

## Home- based neuromuscular electrical stimulation (NMES) program for lower limb spasticity post stroke

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**Background:** Post-stroke spasticity frequently leads to gait abnormalities, and neuromuscular electrical stimulation (NMES) is one of the treatment options available for spasticity reduction. Presently, a diverse range of portable NMES devices is accessible. Nevertheless, a knowledge gap exists concerning patient perceptions and the effects of home-based NMES programs on lower limb spasticity in post-stroke individuals

**Objectives:** To analyze the feasibility of using NMES at home; and to measure the effects of NMES on the spasticity of the ankle plantar flexors post stroke and functional outcomes

**Materials and Methods:** A single-arm study with pre-test and post-test design were conducted. Participants with plantar flexor spasticity of Modified Ashworth Scale (MAS) 1+ to 3 were recruited and provided with home-based NMES for 20 minutes/day, 5 days/week, for 4 weeks (20 sessions), along with their usual conventional rehabilitation. The primary objective was to measure the retention, adherence rates, and satisfaction of the participants using structured questionnaires. The secondary objective was to evaluate the changes in gastrocnemius MAS, ankle ROM, dorsiflexor strength, 10MWT and FMA-LE. Paired t-test was used to determine statistical significance.

**Results:** This study initially recruited 10 participants, but one dropped out. Eight participants completed 20 sessions, and one patient completed 16 sessions. The participants reported positive feedback with no serious adverse effects. A statistically significant decrease in spasticity by  $0.55 \pm 0.93$  points on the MAS score ( $p=0.013$ ) and a significant increase in ankle ROM by  $5.56$  degrees  $\pm 3.38$  ( $p=0.002$ ) were recorded. However, no significant changes in all the functional outcomes were found.

**Conclusions:** The four-week home-based NMES program is feasible and acceptable for patients with spasticity post-stroke. Improvement in ankle ROM and MAS can be expected, nevertheless its benefit and effectiveness need to be verified by a larger RCT in the future.

**Keywords:** Electric Stimulation Therapy, Spasticity, Lower Extremity, Neurological Rehabilitation, Cerebrovascular disease

P-404

## Neuromuscular Electrical Stimulation On Upper Limb Muscles In Chronic Stage Post Stroke

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**Objectives:** Neuromuscular electrical stimulation (NMES) is one of the upper limb treatment options available for multiple indications after stroke. This case series is aimed to summarize and understand its use in the rehabilitation setting in the chronic stage post stroke.

**Materials and Methods:** The medical records of ten post-stroke patients who were beyond the subacute period of stroke and were prescribed with NMES treatment by the occupational therapists were analyzed. The duration of stroke, upper limb impairment, NMES indication and outcome measures used were listed to understand the pattern of usage among the occupational therapists in our center.

**Results:** Nine patients (5 male, 4 female, average age: 61 years 8 month) were prescribed with NMES at the outpatient occupational therapy gym. The average duration post stroke was 28 months and the average sessions was 14 times, 2-3x/week. The indication for NMES were for motor recovery. The three most common muscles' placement were extensor carpi radialis longus, deltoid and supraspinatus and flexor carpi radialis. The Oxford Scale was used for strength outcome. There was positive outcome seen with Oxford Scale improvement of 1 point for shoulder abduction, wrist extension and flexion, but minimal effect was seen for finger flexors.

**Conclusions:** As the conclusion, motor recovery is still achievable in some chronic stroke patients especially for the proximal upper limb muscles. However, further details on the rehabilitation intervention before the NMES was started need to be clarified.

**Keywords:** Electric Stimulation Therapy, Spasticity, Upper Extremity, Neurological Rehabilitation, Cerebrovascular disease

P-406

## Functional outcomes after in-patient rehabilitation in individuals with severe cerebral venous thrombosis

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**Objective:** To assess the functional outcome after inpatient rehabilitation in individuals with cerebral venous thrombosis (CVT) who underwent decompressive craniectomy

**Material and Methods:** This was a retrospective study done in the Department of Neurological Rehabilitation at a tertiary care research hospital. The in-patient records from Jan 2012 to May 2020 were screened for a diagnosis of CVT managed with surgical decompressive craniectomy. All the participants underwent rehabilitation in the same setting and functional outcomes were measured using Barthel Index, modified Rankin Scale and the Scandinavian Stroke Scale (SSS).

**Results:** There were equal number of males and females with a mean (SD) age of 34.2 (12) years. The mean (SD) time from onset of illness and length of in-patient rehabilitation were 42 (30.7) days and 22.5 (10.4) days, respectively. The most common site of thrombosis was the superior sagittal sinus (66%) with the most common risk factor being hematological abnormality (83.2%). Functional outcomes improved in all participants by the time of discharge as compared to admission. The mean (SD) Barthel Index increased from 20.8 (14.2) at admission to 60 (27.5) at the time of discharge, while the mean (SD) Scandinavian Stroke Scale score changed from 20 (10) to 38 (12) in the same period. In about 50% of the individuals the modified Rankin Scale score was <3 at the time of discharge.

**Conclusion:** In cases of severe CVT, inpatient rehabilitation results in an improvement in functional outcomes.

Keywords: Cerebral Venous Thrombosis, decompressive craniectomy, inpatient rehabilitation



P-407

## Usability and Satisfaction of an ICT-Based Management Program for Post-Acute Stroke Rehabilitation: The Korean Model for Post-Acute Comprehensive rehabilitation (KOMPACT) Study

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**Objectives:** This study aimed to assess the usability and satisfaction of an Information Communication Technology (ICT)-based management program developed for comprehensive post-acute stroke rehabilitation.

**Materials and Methods:** Participants included post-acute stroke patients discharged home within 30 days of onset, with a modified Rankin Scale score of 1-3 and a Functional Ambulatory Category (FAC) score of  $\geq 3$ . They were provided with tablet computers containing self-rehabilitation modules in physical, swallowing, cognition, and language domains. Usability, satisfaction, usage time, and program suggestions were collected at 1 and 3 months. Usability was measured using the System Usability Scale (SUS), and satisfaction was assessed on a 5-point Likert scale across six items. Demographic and clinical subgroups were analyzed for outcomes.

**Results:** A total of 24 patients were enrolled, with 22 and 8 completing the 1-month and 3-month evaluations, respectively. The physical therapy module was the most frequently used, with 68% reporting its benefits. Concerns were raised regarding the appropriateness of program types and difficulty levels. The average 1-month SUS score was 60.34, below the general user-friendly standard of 68. However, patients under 65 years of age ( $n=11$ ) scored significantly higher (68.3 points) compared to older patients (50.8 points;  $p=0.016$ ). Satisfaction scores ranged from 3.68 to 4.23 at 1 month, with the highest satisfaction related to program quality, followed by overall satisfaction, willingness to recommend, and problem-solving assistance. Patients with lower gait function (FAC 3,  $n=11$ ) showed greater satisfaction compared to those with FAC 4 or 5, with marginal statistical significance ( $p=0.084$ ). Results at 3 months were consistent with the 1-month evaluation, without statistical significance.

**Conclusions:** This study underscores the challenges faced by older individuals in using ICT-based rehabilitation systems, highlighting the need to enhance digital literacy in this population. Personalizing program content to align with each patient's rehabilitation requirements is essential for improving usability and satisfaction.

**Keywords:** Stroke Rehabilitation; Information Technology; Telemedicine

## A thematic review of community reintegration post-stroke: From a Malaysian perspective

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**Introduction:** Stroke is the leading cause of disability. The long-term unmet needs of patients with stroke challenge the process of reintegration into the community.

**Objectives:** This study was conducted to highlight issues for post-stroke patients and caregivers upon integration into the community over the past 10 years in Malaysia.

**Materials and Methods:** Articles published in English between 2014 and 2023 that studied issues related to stroke survivors and caregivers were searched using the Web of Science (WoS) and Scopus databases.

**Results:** This review used ATLAS.ti 23 to synthesise data from 22 scholarly articles. The reviewers found 33 unique codes to describe these areas and grouped them into 3 themes, which are healthcare system, patient-related, and caregiver-related.

**Conclusions:** Reintegration of rehabilitation in the community will strengthen post-stroke care. A future study should be conducted to formulate appropriate criteria for step-down care associated with stroke rehabilitation, taking into account the concerns of patients and caregivers.

**Keywords:** Stroke; Caregiver; Community reintegration; Malaysia

P-409

## Overcoming Dual Challenges of Rehabilitating Cognitive and Visual Impairments In Post-CABG Stroke: A Case Report

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**Introduction:** Stroke following Coronary Artery Bypass Grafting (CABG) surgery is an uncommon but critical complication, with the incidence of post-CABG stroke varying from 1.1–5.7%. Its prognosis is often guarded, particularly when resulted in cognitive and visual impairments, making subsequent rehabilitation a challenging task.

**Report:** We present the case of a 59-year-old gentleman with coronary artery disease, who underwent a scheduled CABG. His surgery was complicated with postoperative ventricular fibrillation, a seizure, and a subsequent stroke. These events resulted in moderate cognitive impairment, bilateral visual impairment, and mild unilateral hemiparesis, creating challenges for his post-surgery rehabilitation, including returning to work.

The cognitive deficits primarily affected domains of attention, visuospatial perception, processing speed, and language, while visual deficits predominantly pertained to visual field defect, ocular motility, and extraocular movement. A multidisciplinary approach was adopted, with main interventions focusing on cognitive and visual rehabilitation.

Within the course of 6 months, significant improvements were observed in both aspects of visual and cognitive components, resulting in a substantial recovery in his functional capacity, ultimately enabled the patient to successfully resume work as courier manager.

**Discussion:** Post-stroke visual impairments have been demonstrated to hinder the success of rehabilitation by exacerbating existing impairments and overall disability. Visual impairment often indicates a strong link with cognitive impairment, and both of these non-visible challenges can pose barriers to active therapy participation and reduce their recovery rate. Our case underscores that addressing these issues with targeted therapeutic interventions is essential to ensure rehabilitation outcomes and enhance the quality of life.

**Conclusion:** The case demonstrates the importance of specialized rehabilitation frameworks tailored to address the dual challenges of cognitive and visual impairments following a post-CABG-related stroke. Early intervention, ongoing assessment, and a coordinated effort among rehabilitation team members are pivotal in optimizing outcomes for these patients.

**Keywords:** post-CABG stroke, stroke rehabilitation, cognitive decline, visual impairment

P-410

## Survey on the Status of Community-Based Exercise and Usage of Exercise Facilities in Stroke Patients

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**Objectives:** Community-based exercise is important for stroke patients. However, there are insufficient resources for stroke patients in the community. In this study, we conducted a survey to assess physical activity after discharge and the status, needs, and barriers of community-based exercise among stroke patients.

**Materials and Methods:** One hundred stroke outpatients after discharge were surveyed from April 2022 to December 2022. The questionnaire included health awareness, self-physical activity status after discharge, quality of life, social participation, and needs or barriers to community-based exercise.

**Results:** In this survey, it was observed that while 96% of the patients had knowledge regarding the necessity of exercise, only 67% of them engaged in exercise. Furthermore, among the patients who exercised, 88% were found to perform exercises at a low intensity. When investigating the reasons for not exercising, the most common factor reported by participants was severe disability. This was followed by a lack of suitable facilities, health concerns, and accessibility issues. Only 21% of the patients reported that they had utilized community facilities. Among the patients who did not use these facilities, the most cited reasons were concerns about their health condition. In the survey on the essential elements of community-based exercise, the most identified factors were accurate assessment and identification of the patient's condition. The provision and linkage to welfare services followed these. The European quality of life 5 dimensions and reintegration to normal living index showed higher values in the exercise group than in the non-exercise group.

**Conclusions:** Community-based stroke patients recognize exercise importance post-discharge. Those who exercise benefit from higher quality of life and social participation. Unfortunately, exercise intensity and frequency remain low, and community exercise facilities see limited use. To improve the situation, identify barriers, address patient needs, and promote community-based exercise.

**Keywords:** Stroke, Exercise, Community Health Services, Quality of Life, Social Participation



P-411

## The Electric Field Simulation for Optimized Transcranial Direct Current Stimulation in Stroke

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**Objectives:** Does the optimized tDCS determined by electric field simulation based on brain MRI have advantages over conventional system?

**Materials and Methods:** A comparative within-subject simulation study was conducted with stroke patients enrolled in a randomized controlled study to evaluate the effect of optimized tDCS for improving upper extremity function. Patients with unilateral upper limb motor paralysis more than 4 weeks after stroke onset were studied. Using 'Neurophet tES LAB 3.0', individual brain models were created based on the patient's MRI and simulations for electric field of anatomical hand knob were performed with a conventional tDCS configuration and an optimized tDCS configuration.

**Results:** Optimized tDCS produced a higher median [IQR] electric field in the hand motor region than conventional tDCS, resulting in an average 20% improvement (0.36 [0.29–0.41] V/m with optimized tDCS vs 0.30 [0.26–0.33] V/m with conventional tDCS). The electrode montage of the optimized tDCS was unique to each patient and showed various configurations at a median [IQR] distance of 23.28 [17.60–29.99] mm from the anode and 37.87 [31.19–41.76] mm from the cathode of the conventional tDCS.

**Conclusions:** Optimized tDCS can help achieve a higher electric field at the target in stroke patients compared to conventional tDCS just by properly positioning the electrodes. Our findings may motivate trials to study the effect of optimized tDCS on motor rehabilitation after stroke.

- **Keywords:** Stroke; tDCS; Computer Simulations; Electrode; Neurorehabilitation

P-412

**Additional effects of cerebellar facilitatory rTMS on inhibitory rTMS over unaffected M1 in hemiplegic stroke patients**Ho Seok Lee,<sup>1</sup> Sungwon Kim,<sup>1</sup> Dae Hyun Kim,<sup>1</sup> Won Hyuk Chang<sup>1,2\*</sup>

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**Objectives:** To investigate the enhancing effects of Cbll rTMS on inhibitory rTMS for motor recovery in subacute stroke patients.

**Materials and Methods:** Twenty-seven subacute hemiplegic stroke patients who showed no response in transcranial magnetic stimulation-induced motor evoked potentials (TMS-induced MEPs) of affected M1 were recruited in this double blind randomized controlled study. Each participant in the Cr-Cbll group was received the Cr-Cbll rTMS stimulation consisted with the continuous theta burst stimulation (cTBS) over the contralesional M1 (40 secs), motor task with shoulder mobilization exercise (10 min), and high-frequency rTMS over the contralesional Cbll (10 min). In addition, each participant in the Cr-sham group was received the Cr-sham rTMS stimulation consisted with sham rTMS over Cbll instead of high-frequency rTMS over Cbll. Ten daily sessions were conducted for 2 weeks in all participants. The total, upper, and lower scores of Fugl-Meyer Assessment (FMA) were measured before (T0), immediately after (T1) and 2 months after the intervention (T2).

**Results:** Total 24 participants (10 in Cr-Cbll group and 14 in Cr-sham group) performed the Cr-Cbll rTMS intervention for 2 weeks and were assessed at T2. There was no significant difference in the general and clinical characteristics at T0 between the two groups. The scores of total, upper and lower FMA were significantly improved after the intervention in each Cr-Cbll and Cr-sham group ( $p < 0.05$ ). At T1, each score of FMA in the Cr-Cbll group tended to be higher than in the Cr-sham group without statistical significance. However, there was significant difference in both total and upper FMA at T2 between the two groups ( $p < 0.05$ ).

**Conclusions:** These results demonstrated that the Cbll rTMS might have additional effects on inhibitory rTMS over contralesional M1 for improving motor function in subacute stroke patients.

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**Keywords:** repetitive transcranial magnetic stimulation; stroke; motor learning; cerebellum; rehabilitati

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## Combined Transcranial Direct Current Stimulation (tDCS) and Speech Therapy in Subacute Stroke Patients with Aphasia: A case series

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**Introduction:** Transcranial direct current stimulation (tDCS) represents one of the newer approaches to neurorehabilitation following strokes. This non-invasive neuromodulation complements conventional rehabilitation therapies and aims primarily to transiently modulate cerebral cortex excitability, which can promote language recovery in post-stroke aphasia. Although tDCS is not widely available in Malaysia, it has shown promising results when combined with conventional speech therapy. However, there is limited literature describing the effect of tDCS on subacute stroke patients with global aphasia in this region.

**Objectives:** To evaluate effect and outcome of combined tDCS with speech therapy in subacute post-ischemic stroke patients.

**Materials and Methods:** We have recruited three patients who meet the following inclusion criteria: 1) Subacute post-ischemic stroke (stroke occurring more than 7 days and less than 6 months ago), 2) Global aphasia. All three patients received 10 sessions of TDCS stimulation for 20 minutes combined with simultaneous conventional speech therapy for 1 hour. We assessed all three patients pre- and post-treatment for speech and language impairment using the Boston Speech and Language Classification and measuring their performance in naming object and verb.

**Results:** All three patients showed improvement after 10 session post-intervention. Two of them are emerging from expressive aphasia, and one of them was classified as transcortical motor aphasia. All of them were able to comprehend language to a certain extent, able to reply with at least one meaningful word in a conversation, and showed improvement in naming objects and verbs.

**Conclusions:** The combination of tDCS with concurrent speech therapy has shown promising outcomes for subacute post-stroke global aphasia patients. Further studies on tDCS usage in a local context are necessary to evaluate its benefit as the device is relatively easy to use, safe and inexpensive.

**Keywords:** neuromodulation; transcranial direct current stimulation; subacute stroke; global aphasia

P-414

## Effects Of Transcranial Direct Current Stimulation On Post Stroke Motor Recovery Of The Upper Limb

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**Objectives:** Transcranial direct current stimulation (tDCS) is a non-invasive, portable & simple to use device to modulate cortical excitability. Commencement of tDCS in stroke patient were found to be beneficial to improve upper limb motor function. Our aim is to evaluate the effects of tDCS on the post stroke motor recovery of the upper limb in our center.

**Materials and Methods:** This study included stroke patients who received tDCS for motor recovery of the upper limb in our rehabilitation medicine department, from June 2022 until May 2023. Unilateral tDCS (anode over primary motor cortex M1 area and cathode over contralateral supra-orbital region) were applied. They received 0.057 mA/cm<sup>2</sup> in 20 minutes for 10 consecutive sessions during upper limb training. Modified Barthel Index (MBI), motor and sensory section of Fugl-Meyer Assessment Upper Extremity (FMA-UE) were evaluated pre- and 3 months after completed tDCS session.

**Results:** Eight ischemic stroke patients with a median age of 45 years old and a median stroke duration of 10 months were included. Five of them were chronic stroke patients and the rest are subacute stroke patients. There are no significant changes after completed tDCS in all outcomes. However, MBI, FMA-UE for motor and sensory score pre- and 3 months completed tDCS for chronic stroke patients have greater mean differences compared to subacute stroke patients.

**Conclusions:** tDCS applied during upper limb training shown beneficial in functional, motor and sensory recovery in chronic stroke patients.

**Keywords:** Transcranial Direct Current Stimulation; Ischemic Stroke; Upper Extremity



Poster Presentation  
(Late Breaking)

P-001

## Factors Affecting Life Satisfaction and Depression in Oldest-Old: KLoSA Study

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**Objectives:** This study examined the correlation between life satisfaction and depression and lifestyle (physical activity, eating habits, participation frequency, and participation diversity) in the oldest-old in Korea, and analyzed lifestyle factors that affect life satisfaction and depression.

**Materials and Methods:** Independent variables of this study were life satisfaction and depression, and dependent variables were analyzed including physical activity, regular eating habits, participation frequency, and participation diversity as lifestyle factors. For analysis, correlation analysis and multiple regression analysis were performed through SPSS ver 26.0.

**Results:** As a result of multiple regression analysis, it was confirmed that participation frequency ( $t=6.262$ ,  $p<0.001$ ) and regular diet ( $t=4.627$ ,  $p<0.001$ ) had statistical significance as factors influencing life satisfaction, and depression. As factors influencing the participation frequency ( $t=6.540$ ,  $p<0.001$ ), regular diet ( $t=4.061$ ,  $p<0.001$ ), and residential area ( $t=2.256$ ,  $p<0.001$ ) were found to have statistical significance.

**Conclusions:** Through this study, lifestyle factors that affect life satisfaction and depression of the oldest-old in Korea were identified. Therefore, based on the results of this study, a lifestyle-based multifaceted intervention program is needed to improve life satisfaction and depression in the oldest-old.

**Keywords:** depression; life satisfaction; lifestyle; oldest-old

P-002

## Transcranial Pulse Stimulation as a New Navigated Focal Brain Therapy for Vascular Cognitive Impairment: Case Report

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**Objectives:** To evaluate the cognitive function of vascular cognitive impairment (VCI) after transcranial pulse stimulation (TPS) sessions

**Materials and Methods:** TPS is a non-invasive brain stimulation method. Stimulation was administered using NEUROLITH TPS generator (Storz Medical AG) with 3 Hz ultrashort pulses at 0.25 mJ mm<sup>-2</sup> energy density over 12 sessions (6000 pulses per session), three times a week. Target areas included the bilateral DLPFC (1600 pulses per hemisphere), parietal regions (P3, P4) (800 pulses per hemisphere), and precuneus (PCu) (1200 pulses). Cognitive function tests were conducted before the first and after the last TPS session, including MMSE, MoCa-Ina, 15 Boston Naming Test Patient, Digit Span, CERAD (Visuoconstruction, Delayed Memory, Recognition, Verbal Fluency), and Trail Making Test A & B.

**Results:** Case 1 was a 48-year-old man with VCI and dysphasia post-stroke infarct (10 months prior), affecting the left caudate nucleus, left lentiform nucleus, and left internal capsule. The patient presented memory and executive function issues but preserved recognition. Case 2 was a 62-year-old man with VCI and anomic aphasia, following a cerebral infarction 5 months prior affected the left putamen, corona radiata, internal capsule, and globus pallidus. The patient had memory impairments (immediate, delayed verbal, delayed visual, recognition) and executive function deficits. No complaints during TPS therapy. After 12 sessions, Case 1 showed amplification in working memory but had executive function challenges. Case 2 demonstrated improvement in immediate memory, recognition, and visuoconstruction, but had lingering issues with delayed verbal, visual memory, and executive function.

**Conclusions:** TPS stimulation of areas related to cognitive function appears to enhance memory, recognition, and other cognitive function. TPS may be a novel add-on therapy for VCI post-stroke patients.

**Keywords:** vascular cognitive impairment; stroke; aphasia; non invasive brain stimulation; transcranial pulse stimulation

P-003

## Impact of Rehabilitation in Functional Outcome of Stroke Patients in Middle Low Country Hospital

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**Objectives:** Stroke is one of the main causes of mortality and morbidity worldwide, notably in low and middle-income countries. In Indonesia, the prevalence of stroke increased by 3.9% in 5 years. Rehabilitation plays an important role to accelerate the recovery of stroke patients following the acute phase. The purpose of this study is to have a better understanding about the influence of the rehabilitation program to the functional outcome of stroke patients.

**Materials and Methods:** This research is a retrospective observational study with a cross-sectional design. The data was obtained from the medical record of stroke patients that were consulted to the division of Physical Medicine and Rehabilitation of RSUD Dr. Soetomo Surabaya during the inpatient period of 2019-2022. Researchers analyzed the starting time of the rehabilitation program and the functional status of the patients. The data subsequently was processed and tested by SPSS version 24 through paired T test method.

**Results:** The functional outcome of stroke patients was measured in 403 subjects using Barthel Index (BI) and Functional Independence Measurement (FIM) during the hospital admission and discharge. The mean values of BI during admission and discharge respectively are  $24.67 \pm 21.37$  and  $42.63 \pm 25.33$ . The mean values of FIM during admission and discharge respectively are  $47.91 \pm 26.01$  and  $65.75 \pm 28.99$ . Based on the paired T test result, there is a significant increase of BI and FIM between admission and discharge ( $p < 0.05$ ). The mean onset of the patients starting the rehabilitation program is 3 days after admission.

**Conclusions:** Rehabilitation during inpatient period is impactful to the increase of functional outcome of stroke patients.

**Keywords:** Stroke; Barthel Index; Functional Outcome; Rehabilitation; Health

P-004

## Nutritional factors that contribute to the orthostatic hypotension in Stroke Neurorehabilitation: Retrospective analysis

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**Objectives:** Though orthostatic hypotension (OH) is a hefty challenge in neurorehabilitation of stroke, the impact of the nutritional factors on this condition has been overlooked. The study aims to investigate if malnutrition and micronutrient deficiency contribute to OH in patients admitted for stroke rehabilitation.

**Materials and Methods:** Retrospective analysis of the medical records was conducted among the patients admitted to a tertiary hospital for stroke rehabilitation from March 2022 to April 2023. The patients were divided into those with OH and those without OH. Patients with confounding factors such as dehydration, parkinsonism, heart disease with low ejection fraction, sepsis, thyroid disorders, and autoimmune diseases were excluded. The demographic data, clinical and imaging features of stroke, body mass index (BMI), serum albumin, change in albumin during the hospital stay, serum lipids, serum vitamin D3 and serum vitamin B12 were collected. The difference between the groups was statistically analysed.

**Results:** Among 791 patients initially screened, 99 patients who kept the relevant data and met the selection criteria were included (60 without OH and 39 with OH, 39 females and 60 males, 20 hemorrhagic and 79 ischemic strokes). In patients with ischemic stroke, the group with orthostatic hypotension was associated with a decrease in albumin level during the hospital stay ( $-4.5 \pm 5.3$  vs  $0.84 \pm 4.63$ ,  $p \leq 0.05$ ). In the same cohort, a low BMI was associated with increased incidence of orthostatic hypotension ( $21.45 \pm 3.1$  vs  $26.04 \pm 5.01$ ,  $p \leq 0.05$ ). There was no difference in the lipid profile, serum vitamin B12 and vitamin D3 between the two groups.

**Conclusions:** The decline in serum albumin and low BMI are deemed to be related to an increased incidence of OH, implying a nutritional impact on OH. Given the limitations of retrospective study, larger-scale prospective analysis is warranted to confirm and verify the clinical outcome of supplementary nutritional interventions to overcome OH.

**Keywords:** Orthostatic hypotension; nutritional factors; albumin; serum lipids; micronutrient



P-005

## Pilot Study Comparing the Effect of Action Observation Task Training in the Management of Stroke Patients

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**Introduction:** Stroke-induced motor impairments often lead to significant functional limitations in affected individuals. This pilot study aims to investigate the potential benefits of Action Observation Task Training (AOTT) as an innovative rehabilitation approach for stroke patients, focusing on its impact on motor recovery and functional outcomes.

**Methods:** A randomized controlled pilot study was conducted involving twenty-five post-stroke patients. Participants were randomly assigned to either the AOTT group (n=12) or the control group (n=13) receiving standard rehabilitation. The AOTT group underwent a structured program involving observation and imitation of functional movements. Pre- and post-intervention assessments included the Fugl-Meyer Assessment (FMA) and the Modified Rankin Scale (MRS) for motor function and overall disability, respectively.

**Results:** The AOTT group exhibited a significant improvement in motor function, as indicated by a mean increase of [insert FMA score change] on the Fugl-Meyer Assessment ( $p < 0.05$ ). Moreover, a greater proportion of participants in the AOTT group demonstrated clinically significant motor recovery compared to the control group. The Modified Rankin Scale scores also showed a trend towards reduced disability in the AOTT group, though this did not reach statistical significance.

**Discussion:** The results of this pilot study suggest that Action Observation Task Training holds promise as an effective rehabilitation strategy for stroke patients. The observed improvements in motor function highlight the potential neuroplasticity-inducing effects of AOTT, emphasizing its role in facilitating motor recovery post-stroke.

**Conclusion:** This pilot study provides preliminary evidence supporting the integration of Action Observation Task Training in the rehabilitation of stroke patients. The observed improvements in motor function underscore the potential benefits of this innovative approach. Further research with larger sample sizes and long-term follow-up is warranted to validate these findings and establish the optimal parameters for implementing AOTT in stroke rehabilitation programs.

P-006

## Prevention of scoliosis in Duchenne muscular dystrophy patients by maintaining lumbar lordosis

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**Objectives:** Scoliosis is a major complication in patients with Duchenne muscular dystrophy(DMD). Once a loss of ambulation(LOA) occurs, scoliosis progresses rapidly. Previous studies suggested lumbar hyperextended posture significantly reduces the incidence of scoliosis. We aimed to investigate if portable seat devices(Fig 1) supporting lumbar lordosis posture could reduce the incidence of scoliosis in DMD.

**Materials and Methods:** Twenty-four DMD patients were prospectively enrolled into the 'seat device group' from June 2018 to September 2019 (within 6 months of LOA, on steroid treatment). They were instructed to use their portable seat devices as long as they could. Participants were followed up every 6 months up to 3 years. Whole spine radiographs in supine positions were obtained at each follow-up, and at the time point of 5 years after LOA. Due to ethical issues, the control group was retrospectively recruited by reviewing medical records between August 2005 and July 2018. Spine radiographs were also obtained at the LOA onset and 5 years after LOA.

**Results:** Out of the 24 boys in the seat device group, 12 used seat devices more than 2 hours/day (Good compliance(GC) group). Nine boys used seat devices for less than 2 hours/day (Poor compliance(PC) group), and 2 boys were excluded as they were lost to follow-up or discontinuation of steroid treatment. Forty-six patients were included in the control group. The GC group had significantly lower scoliosis incidence compared to PC group, and also showed a lower, borderline significant incidence compared to the control group(Fig2a). The GC group also showed significantly lower incidence of scoliosis when compared to the combined PC and control group(Fig2b).

**Conclusions:** Maintaining a lumbar lordosis posture prevents scoliosis in DMD. Design improvements may enhance patient compliance and reduce scoliosis risk and reduce scoliosis risk. Clinicians should educate DMD patients about correct posture, especially lumbar lordosis.

**Keywords:** Duchenne muscular dystrophy; scoliosis; prevention; seat device; lumbar lordosis

P-007

## Effects Of Progressive Lower Limb Task Oriented Training on Motor Recovery, Balance and Walking Performance in Patients With Sub-Acute Stroke – A Case Series Report

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**Background:** Stroke rehabilitation helps patients to maximize their functional abilities and improves their quality of life. Recovery of motor control in hemiparetic lower limb and regaining the walking capacities are the primary rehabilitation goals. Task oriented training has been reported as being beneficial for upper limb and lower limb motor performance, balance and walking in late phases of stroke.

**Objective:** To find out the effects of Progressive lower limb task-oriented training on motor recovery, balance and walking performance in patients with Sub -acute Stroke by using motor recovery scales before and after 4 weeks of intervention.

**Methodology:** A case series study was carried out. Eight patients who had moderate standing ability and fulfilled the selection criteria participated in this study. Progressive lower limb task oriented training was given 5 days per week for 4 weeks. The exercise was given as activities in various positions.

**Outcome measures:** Assessment tools included Fugl-Meyer Assessment- Lower Extremity [FMA-LE] for motor recovery, Berg Balance Scale [BBS] for balance, Functional Ambulation Category [FAC] for walking independence. Baseline and post-test measures were taken before and after for all five patients after 4 weeks of intervention.

**Results:** In this case series report of the eight participants showed significant changes on all outcome measures after receiving the four weeks of intervention.

**Conclusion:** The finding shows that four weeks of Progressive lower limb task oriented training yielded significant improvement on the lower limb motor recovery, balance and walking performance among patients with sub acute stroke.

**Key words:** Progressive lower limb task oriented training, sub acute stroke, motor recovery, balance, walking performance.

P-008

## Exploring lifestyle factors affecting life satisfaction in patients with stroke

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**Objectives:** This study aimed to assess the hazard ratios of various lifestyle factors on life satisfaction in patients with stroke using survival analysis.

**Materials and Methods:** The data from the Korean Longitudinal Study of Aging, collected biennially from 2010 to 2020, were utilized, involving a total of 260 stroke patients. Variables included health satisfaction (HS), income satisfaction (IS), spouse satisfaction (SS), and child satisfaction (CS) as dependent variables, and lifestyle factors encompassing health behavior, health status, and social activities as independent variables. Control variables in Cox regression included age, sex, educational attainment, and region of residence.

**Results:** In the study, the participants had a mean age of 74.07 years (SD=8.67), with a higher representation of males (n=161, 61.92%). The results revealed higher hazard ratios for individuals who did not engage in exercise (HS/hazard ratio, HR=1.598, SS/HR=2.076) and those who did not undergo health screenings (HS/HR=1.489, SS/HR=2.078) in terms of health behavior based on HS and SS. For IS and CS, only non-exercisers had higher hazard ratios (IS/HR=1.575, CS/HR=2.111). In terms of health status, individuals with depression (HS/HR=1.746, IS/HR=1.846, SS/HR=4.545) had significantly higher hazard ratios, while those classified as overweight (HS/HR=0.622, IS/HR=0.637, SS/HR=0.500) had lower hazard ratios compared to those with normal weight. For health status based on CS, only individuals with depression had higher hazard ratios (CS/HR=6.343). Lastly, in the context of social relationships and activities based on HS, individuals who were not employed had higher hazard ratios (HS/HR=1.678). Additionally, non-participation in social activities led to higher hazard ratios (SS/HR=1.843, CS/HR=3.021).

**Conclusions:** In this study, we observed variations in the risk ratios of lifestyle factors depending on the types of life satisfaction. The findings of this study enable us to prioritize risk factors to be addressed when implementing lifestyle interventions in patients with stroke, based on their individual levels of life satisfaction.

**Keywords:** lifestyle; life satisfaction; risk of factor; stroke; survival analysis



P-009

## Relationship between Childhood Background and Middle Age Mental Health

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**Objectives:** This study aimed to investigate the association between childhood background and latent mental health constructs in middle-aged adults

**Materials and Methods:** Participants aged 50–64 from the National Social Life, Health, and Aging Project, who retrospectively reported childhood backgrounds, were included in this study. Mental health was modeled as a second-order latent variable with first-order components of depression, anxiety, loneliness, and stress

**Results:** The results showed that family happiness and a healthy childhood were associated with better mental health in midlife, in both the crude ( $\beta = -0.221$ ;  $\beta = -0.201$ ) and adjusted models ( $\beta = -0.128$ ;  $\beta = -0.095$ ). However, parents' education, family financial status, living with both parents, and exposure to violence had no impact on mental health in midlife.

**Conclusions:** These results suggest that for future mental health, it is necessary to focus on family happiness and health conditions during childhood rather than on negative experiences.

**Keywords:** Childhood background, Childhood health, Early origins of mental health, Family happiness, Second-order confirmatory factor analysis

P-010

**Age-Specific Cognitive Function Changes in Older Adults: The Impact of Lifestyle**Seungju Lim,<sup>1</sup> Young-Myoung Kim,<sup>2</sup> Ah-Ram Kim,<sup>2</sup> Sanghun Nam,<sup>2</sup> Ji-Hyuk Park, PhD,<sup>3\*</sup>*1 Dept. of Occupational Therapy, Graduate School, Yonsei University, Doctoral Course Student, South Korea**2 Yonsei New-normal Lifestyle Research Center, Yonsei University, Postdoctoral Researcher, South Korea**3 Dept. of Occupational Therapy, College of Software and Digital Healthcare Convergence, Yonsei University, Professor, South Korea**\*E-mail: Ji-Hyuk Park (otscientist@yonsei.ac.kr)*

**Objectives:** Few longitudinal studies have investigated age-related differences in the relationship between lifestyle factors and cognitive decline. This study investigated lifestyle factors at baseline that slow the longitudinal rate of cognitive decline in young-old (55–64 years), middle-old (65–74 years), and old-old (75+ years) individuals.

**Materials and Methods:** We conducted an 11-year follow-up that included 6189 older adults from the Korean Longitudinal Study of Aging, which is a cohort of community-dwelling older Koreans. Lifestyle factors, including physical activity (PA), social activity (SA), smoking, and alcohol consumption were assessed at baseline. Cognitive function was measured at 2-year intervals over 11 years. Latent growth curve modeling (LGM) and multi-group analysis (MGA) were performed.

**Results:** The influence of lifestyle factors on the rate of cognitive decline differed by age. Smoking at baseline (–0.05, 95% confidence interval [CI] –0.11 to –0.001, per study wave) accelerated cognitive decline in young-old individuals, whereas frequent participation in SA at baseline (0.02, 95% CI 0.01 to 0.03, per study wave) decelerated cognitive decline in middle-old individuals. None of the lifestyle factors in this study decelerated cognitive decline in old-old individuals.

**Conclusions:** Cognitive strategies based on modifiable lifestyle factors such as smoking cessation in young-old individuals and frequent SA participation in middle-old age individuals may have great potential for preventing cognitive decline. Because the influence of lifestyle factors varied by age group, age-specific approaches are recommended to promote cognitive health.

**Keywords:** Cognitive decline, Longitudinal studies, Aging, Republic of Korea, Lifestyle

P-011

## Innovation to communicate using low cost technology for ALS patients

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**Objectives:** This study aimed to develop and assess innovative, cost-effective methods to facilitate communication for patients with Amyotrophic Lateral Sclerosis (ALS). ALS often leads to severe motor function loss, rendering patients unable to communicate effectively as their speech becomes slurred.

**Materials and Methods:** The study employed two distinct approaches. The first, the Audible Alert Technique, involved the use of a stone ring or a coin attached to a patient's functional finger, and a steel plate positioned under the patient's hand. The second approach, the Laser Pointer Communication Technique, employed glasses adapted with a laser light, used in conjunction with an alphabet board and a picture board.

**Results:** The Non-digital Audible Alert Technique enabled patients to create an audible signal by striking the steel plate with the stone ring or coin attached to a patient's functional finger. This simple, yet effective method allowed patients to efficiently capture the attention of caregivers. The Laser Pointer Communication Technique was designed for patients who retain head movement. By wearing the adapted glasses, patients could use the attached laser light to point to letters on the alphabet board or images on the picture board.

**Conclusion:** The study demonstrates simple yet innovative neurorehabilitation tools in ameliorating communication for ALS patients. The non-digital audible call tool provides a practical means for patients to alert caregivers. The laser-pointer tool allows for more elaborate communication, crucial in maintaining the quality of life such patients. These tools are cost-effective, and can be readily integrated into the care regimen, thus offering promise in addressing communication challenges. Implications for improving the quality of life and care for patients through simple, innovative communication methods.

P-012

## Stroke Survivor As A Stroke Rehabilitation Awareness Ambassador To Increase Awareness About Post Stroke Rehabilitation In The Community : A Pilot Study

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**Objectives:** To assess the efficacy of Stroke survivor to act as a brand ambassador of Stroke Rehabilitation in the general public.

**Materials and Methods:** A structured module for increasing awareness about Stroke Rehabilitation was prepared in the local language. It consisted of description of the team involved in the care of Stroke survivor, with the tasks performed by them from acute to Chronic stage. Consent was obtained from the survivor for his inclusion as an ambassador for the specific village around the hospital and was trained to administer this module in the community of his village under the guidance of therapist team. Villages where the Stroke survivor was not available, awareness A self-developed and validated questionnaire to measure awareness was administered before(X1), immediately(X2) and 1 month(X3) after the intervention. The questionnaire consisted of 15 questions with different response formats graded on a numerical scale. The total score of this questionnaire was compared and analysed.

**Results:** 9 villages around the tertiary care hospital were visited, 5 with Stroke survivor as an ambassador and 4 villages with only Rehab team. Unpaired t test [ $t=0.03$ ,  $p<0.05$ (X1-X2) and  $t=0.006$ ,  $p<0.05$  (X2-X3)] revealed a positive impact of this intervention with an improved score on awareness questionnaire out of total 100 score. Additionally, villagers tend to ask more questions to the ambassador and wanted to hear about his personal experiences

**Conclusions:** Having a face one among the community as an ambassador resulted in better awareness with retention of information after a month.

**Keywords:** Post Stroke Awareness; Stroke rehabilitation; long term impact.



P-013

## Bilateral parietal cortex activation in stroke patients with neglect during virtual prism adaptation

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**Objectives:** Prism adaptation has been considered as a potential evidence-based therapy for patients with unilateral spatial neglect (USN). To address the limitations of traditional prism therapy, a novel system has been developed utilizing immersive virtual reality technology and a depth-sensing camera, creating a virtual prism adaptation therapy (VPAT) paradigm. Our study aims to investigate the brain regions activated by the VPAT system and validate these regions using functional near-infrared spectroscopy (fNIRS) to measure cortical activation.

**Materials and Methods:** Six stroke patients with left USN participated the paradigm, which comprised four stages: Pre-VPAT, VPAT-10°, VPAT-20°, and post-VPAT. During the task, fNIRS signals were recorded using thirty-nine channels covering the dorsal frontoparietal cortices based on the international 10-20 system. The region of interest (ROI) was divided into four areas base on Brodmann area, including the bilateral hemispheres of dorsolateral prefrontal (DLPF), and parietal association (PA) areas. The fNIRS data were preprocessed using the NIRSlab software, and the data was epoched for each of the four VPAT conditions. Statistical analysis was conducted by calculating change in oxy-hemoglobin (oxy-Hb) concentration for all combinations of eight ROIs and four experimental conditions.

**Results:** Significant decreases in oxy-HB concentration were observed in the left DLPF during VPAT-10° and VPAT-20° conditions, compared to the pre-VPAT condition (Bonferroni corrected  $p < 0.05$ ). In the partial associate area, bilateral increases in oxy-HB concentration were observed during the post-VPAT condition compared to pre-VPAT condition (Bonferroni corrected  $p < 0.05$ ).

P-013

**Conclusions:** Based on these results, we observed a significant increase in activation in the bilateral parietal cortex during the post-VPAT condition compared to pre-VAPT condition, which aligns with previous research findings with conventional rightward prism adaptation. Further studies using functional imaging techniques with high spatial resolution, such as fMRI, are needed to pinpoint the exact activation areas within the parietal cortex.

**Keywords:** Virtual Prism Adaptation Therapy; Stroke Functional Near Infrared Spectroscopy, Unilateral Spatial Neglect

**Acknowledgement:** This work was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIT) (NRF-2022R1A2C1006046) and the Institute for Information & Communications Technology Planning & Evaluation (IITP) grant funded by the Korea government (No. 2017-0-00451; Development of BCI based Brain and Cognitive Computing Technology for Recognizing User's Intentions using Deep Learning).

**P-014****A case of stroke with motor function and aphasia after modified constraint-induced movement therapy**

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We report a case with upper limb paralysis and motor aphasia after stroke treated with constraint induction therapy (CIMT) as a chronic phase treatment for upper limb dysfunction, resulting in improvement of upper limb function and language function. The patient was a male in his 50s, 25 months after stroke onset, with relatively severe upper limb paralysis due to learned disuse and spasticity of the affected upper limb. Modified CIMT (mCIMT) combined with botulinum therapy and robotic therapy for upper limb was performed on the affected upper limb. The duration and frequency of treatment protocol were adjusted as 1.5 hours per day and three times a week for 10 weeks (total 30 sessions with 45 hours), consisting of 60 minutes of robotic therapy, 30 minutes of task-oriented training, and transfer package (a strategy to generalize upper limb function to daily life) as needed after the end of each treatment session. As a result, the Fugl-Meyer Assessment improved by 4 points, the Action Research Arm Test by 3 points, the Amount of Use in the Motor Activity (MAL) Log by 0.69 point, and the Quality of Movement in the MAL by 0.34 point. In addition, the Standard Language Test of Aphasia also showed some improvements in motor aphasia category. These results suggest that mCIMT, which is tailored to the degree of individual upper limb dysfunction, might be also effective in improving language function as a chronic phase treatment for stroke.

P-015

## Role of Botulinum Toxin in the Management of Upper Esophageal Sphincter Spasm in Patients with Neurogenic Dysphagia: A Case Series

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**Objectives:** To analyze the efficacy of local botulinum toxin injection in the management of upper esophageal sphincter spasm in patients with neurological dysphagia.

**Methods:** Retrospective analysis of consecutive patients with neurogenic dysphagia referred for swallow rehab at the centre for rehabilitation at a tertiary centre who had upper esophageal sphincter spasm confirmed on videofluoroscopic swallow study. Injection botulinum toxin 50-100units was injected under ultrasound guidance. Repeat Videofluoroscopic examination was done after two week as assess the effect on the spasm and improvement in dysphagia.

**Results:** 10 patients (M:F8:2), age range from 25 – 70 years with neurogenic dysphagia and upper esophageal sphincter spasms were identified and all of them were injected botulinum toxin (Botox tm). The primary pathology was posterior circulation stroke -8, traumatic brain injury – 1 and brain stem glioma -1. Injection botulinum toxin dosage given wss 50 units in 6 and 100 units on 4 patients. All patients had significant reduction in the spasm as documented by repeat videofluoroscropy and lead to improvement in dysphagia, thus allowing to start oral feeding.

**Conclusions:** The results from the case series shows that botulinum toxin injection is an effective strategy to reduce upper esophageal sphincter spasm in patients with neurogenic dysphagia. Large double blinded studies are required.



P-016

## Translation and Validation of Zarit Burden Scale in Tamil Language

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**Introduction:** The treatment outcome and the patient's need for the support of family represent the caregiver's significant and essential role. Recent research has highlighted the role of caregivers and the burden involved in it. The Caregiver Burden is always a neglected domain and also, there is no adequate scale to evaluate the level of caregiver burden among people with Tamil caregivers.

**Aim:** The aim of this study was to develop a Tamil version of the Zarit Burden Interview and the translation of this scale to a Tamil version with expert recommendations.

**Objective:** The objective of this study is to develop a translated version of the Zarit Burden scale to assess the level of burden on caregivers in the acute stroke population.

**Materials and methods:** The original English version of the Zarit Burden Interview was translated into Tamil by two eminent persons. It is a self-administered instrument composed of 12 items scored on a Likert-type scale with a 5 response. The scale assesses the impact of psychological well-being, financial situation and social life. Moreover, the two reviewers have been identified with similar translated statements in the translatable version. A convenient sample of caregivers of acute stroke populations ( $n = 25$ ) was recruited for validation. The sample of 25 caregivers self-completed the derived Tamil version of the Zarit Burden Interview repeated the ratings of the measure after a period of three weeks and reported the ease of use by the participants.

**Results:** The Tamil version of the Zarit Burden Interview showed acceptable validity and ease of use among 25 caregivers with acute stroke populations.

**Conclusion:** The Tamil version of the Zarit Burden Interview was developed. Further, it could be used in standardized validation methods. These findings help to assess caregiver's burden and health-related quality of life for caregivers among the acute stroke population.

**Keywords:** Acute stroke, Tamil version, validity, caregiver burden, quality of life

## General Information

### *Congress Venue*

True ICON Hall Floor 7, ICONSIAM, Thailand

### *Date*

13<sup>th</sup>-16<sup>th</sup> December 2023

### *Congress Secretariat*

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### *Official Language*

The official language of the Congress will be English.

### *Official Bank*

The Siam Commercial Bank Public Company Limited has been appointed as the official bank of the Congress.

### *Traveller's Cheques and Credit Cards*

Major credit cards, such as VISA and Master Card are widely accepted in hotels and shops. Traveller's cheques can be conveniently cashed at all commercial banks and authorized money exchanges.

### *Currency*

The Thai currency is Baht, which is divided into 100 Satang. Coins are 25 and 50 Satang, 1, 5 and 10 Baht. Foreign currency may be exchanged at authorized exchange banks, hotels and shops.

(1 USD is approximately 35 Baht).

### *Electricity*

Voltage in Thailand is 220 V AC. However, electric razor outlets, generally with multi-voltage fittings, are available in most hotels.

## ***What to Wear/Dress & Weather***

Definitely cool cottons rather than synthetics and comfortable footwear. To be 'casual' is quite acceptable, but Thais consider it impolite to wear shorts and skimpy tops on city streets. Only the top restaurants demand a jacket and tie.

Being in the Southeast Asia region, Thailand has a subtropical climate. During December the temperature averages 30°C in daytime and 25°C to 27°C at night.

## ***Liability***

The Congress will not assume any responsibility for accidents, losses, damages, delays, or any modifications in the program caused by unforeseen circumstances.

## ***Time Difference***

Thailand time is GMT plus 7 hours.

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Pre-registered delegates are required to produce their confirmation of registration at the registration counters to obtain their registration badges. On-site registration will also be accepted at the registration counters and can be made in cash (Baht and USD) or credit card by VISA and Master card.

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All delegates are kindly requested to wear name badges when attending any meeting or social gathering. Only delegates who are wearing name badges can be admitted to the lecture halls.

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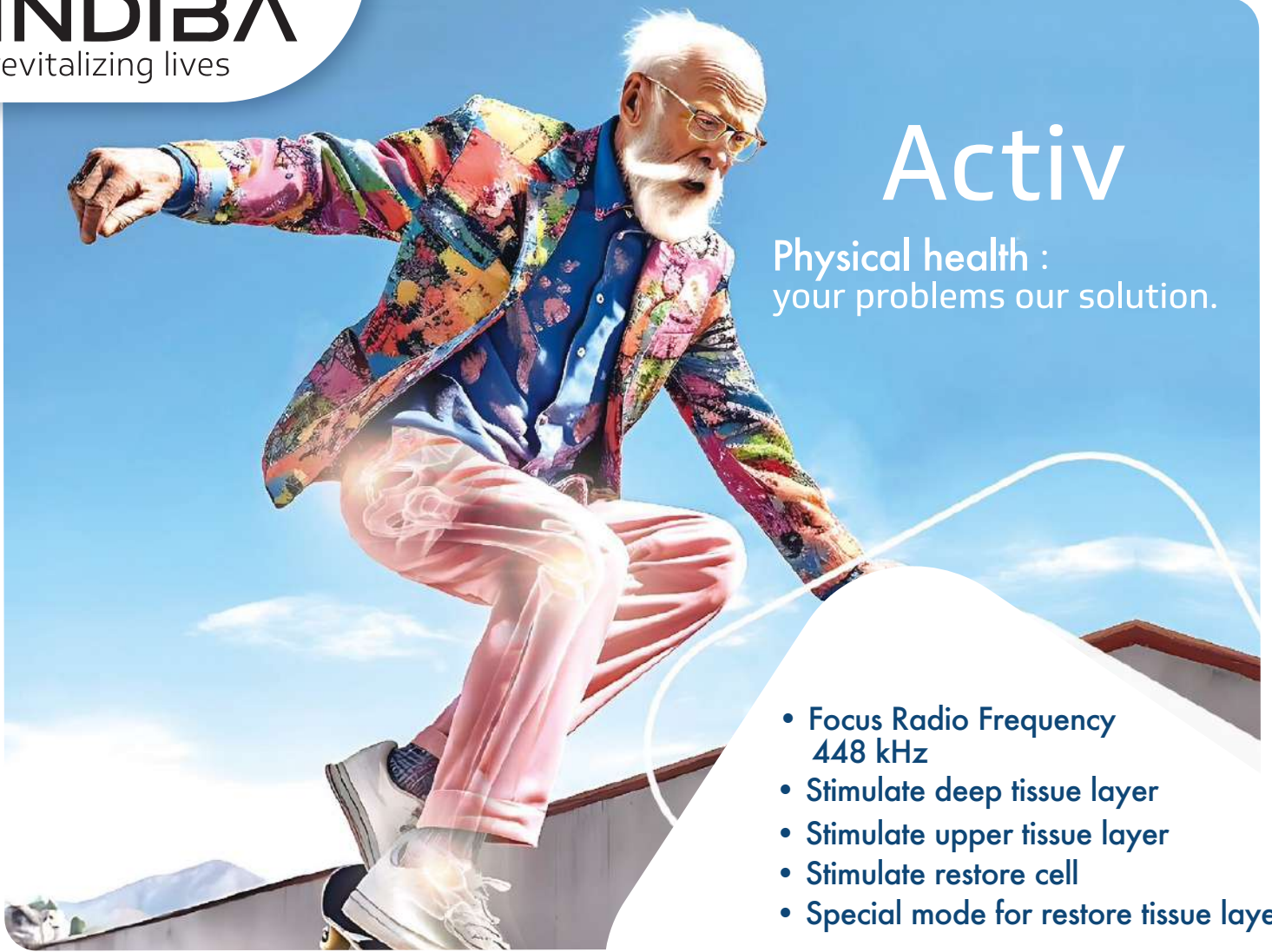


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LIVE YOUR ORIGINAL LIFE

# BEYOND THE PAIN



Pregabalin is an effective first-line treatment option for neuropathic pain<sup>2-4</sup>, and can be used confidently with careful evaluation and gradual dose adjustments<sup>1</sup>

**LYRICA is indicated for the treatment of:<sup>1</sup>**

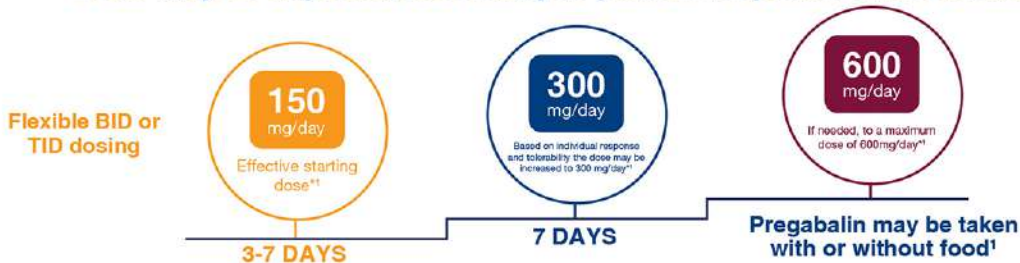
**Neuropathic pain**  
(peripheral and central types);  
Diabetic peripheral neuropathy, post-herpetic neuralgia

**Epilepsy**

**Generalized Anxiety Disorder**

**Fibromyalgia**

**Dose may be adjusted according to patient response and tolerability<sup>1</sup>**



**PRESCRIBING INFORMATION: LYRICA®** Composition: Each hard capsule contains 25 mg, 50 mg, 75 mg and 150 mg of pregabalin. **Indication: Neuropathic pain** Pregabalin is indicated for the treatment of central and peripheral neuropathic pain in adults which includes diabetic peripheral neuropathy and post-herpetic neuralgia. **Epilepsy** Pregabalin is indicated as adjunctive therapy in adults with partial seizures with or without secondary generalization. **Generalized Anxiety Disorder** Pregabalin is indicated for the treatment of Generalized Anxiety Disorder (GAD) in adults. **Fibromyalgia** Pregabalin is indicated for the management of fibromyalgia. **Dosage and administration:** The dose range is 150 to 600 mg per day given in either two or three divided doses. Pregabalin may be taken with or without food. **Neuropathic pain** Pregabalin treatment can be started at a dose of 150 mg per day. Based on individual patient response and tolerability, the dosage may be increased to 300 mg per day after an interval of 3 to 7 days, and if needed, to a maximum dose of 600 mg per day after an additional 7-day interval. **Epilepsy** Pregabalin treatment can be started with a dose of 150 mg per day. Based on individual patient response and tolerability, the dosage may be increased to 300 mg per day after 1 week. The maximum dosage of 600 mg per day may be achieved after an additional week. **Generalized Anxiety Disorder** The dose range is 150 to 600 mg per day given as two or three divided doses. The need for treatment should be reassessed regularly. Pregabalin treatment can be started with a dose of 150 mg per day. Based on individual patient response and tolerability, the dosage may be increased to 300 mg per day after 1 week. Following an additional week, the dosage may be increased to 450 mg per day. The maximum dosage of 600 mg per day may be achieved after an additional week. **Fibromyalgia** The usual dose range for most patients is 300 to 450 mg per day given in two divided doses. Some patients may derive additional benefit at 600 mg per day. Dosing should begin at 75 mg two times a day (150 mg/day) and may be increased to 150 mg two times a day (300 mg/day) within 1 week based on efficacy and tolerability. Patients who do not experience sufficient benefit with 300 mg/day may be further increased to 225 mg two times a day (450 mg/day). If needed, in some patients, based on individual response and tolerability, the dose may be increased to maximum dosage of 600 mg/day after an additional week. **Undesirable effects:** The most commonly reported adverse reactions were dizziness and somnolence. Adverse reactions were usually mild to moderate in intensity. In all controlled studies, the discontinuation rate due to adverse reactions was 14% for patients receiving pregabalin and 5% for patients receiving placebo. The most common adverse reactions resulting in discontinuation from pregabalin treatment groups were dizziness and somnolence. **Drug Interaction:** Pregabalin may potentiate the effects of ethanol and lorazepam. Pregabalin appears to be additive in the impairment of cognitive and gross motor function caused by oxycodone. **Contraindications:** Hypersensitivity to the active substance or to any of the excipients. **Shelf life:** Please see details on the carton. **Special precautions for storage:** Store below 30°C. **Importer:** Viatris (Thailand) Limited, Bangkok, Thailand. **Distributor:** Zuellig Pharma LTD.

**References:** 1. LPD Lyrica Revision No. 18.1. 2. คำแนะนำการใช้ยาในภาวะโรคปวดกล้ามเนื้อจากประสาท (Clinical Guidance for Neuropathic Pain) พ.ศ. 2563 โดยสมาคมโรคประสาทวิทยาแห่งประเทศไทย. 3. Nanna B Finnertup et al. Pharmacotherapy for neuropathic pain in adults: a systematic review and meta-analysis. Lancet Neurol 2015; 162-73. 4. N. Attal et al. EFNS guidelines on the pharmacological treatment of neuropathic pain. 2010 revision. European Journal of Neurology 2010, 17: 1113-1123.

\*โปรดอ่านรายละเอียดเพิ่มเติมในเอกสารอ้างอิงฉบับสมบูรณ์และเอกสารกำกับยา "สวนทุกต้องของโฆษณาเป็นความรับผิดชอบของผู้โฆษณา มิได้ดำเนินการโดยสำนักงานคณะกรรมการอาหารและยา" สำหรับผู้ประกอบโรคศิลป์ โทรศูนย์โฆษณาเลขที่ 02-24342566

Viатris (Thailand) Limited, No. 88 The Parq Building, 11th Floor, Ratchadapisek Road, Klongtoey Subdistrict, Klongtoey District, Bangkok 10110 – THAILAND

LYR-2023-0742





# NEUROLITH®

Transcranial Pulse Stimulation (TPS®)  
for the treatment of patients with  
Alzheimer's disease



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HIGH PEAK  
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MiS

Measure, monitor and  
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Curapuls 670

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Combines the Nd:YAG  
pulsed laser source with a  
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Products Launch**



**UAN.GO  
EXOSKELETON**



**PiezoWave<sup>2</sup>**  
Focus Shockwave

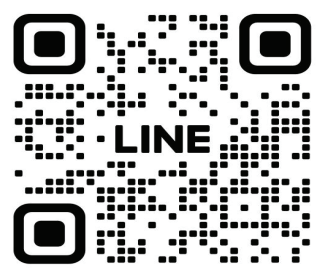
**EMFIELDPRO**  
**Zimmer**  
MedizinSysteme



**CHFLT**  
Cryo Laser



**Equio**  
Balance



# THE DIFFERENCE

# That Makes THE DIFFERENCE<sup>1</sup>



Botulinum toxin A preparations are manufactured by **DIFFERENT** processes that lead to **clinically relevant pharmacotherapeutic dissimilarities** and as such they are **NON-INTERCHANGEABLE<sup>1</sup>**

**References:** 1. Ferrari A, et al. Pharmacological differences and clinical implications of various botulinum toxin preparations: a critical appraisal. *Functional Neurology*. 2018;33(1):7-18. [DOI: 10.11138/fneur.2018.33.1.007]. 2. BOTOX Product Insert, Revised June 2023.

**ABBREVIATED PRODUCT INFORMATION BOTOX® (Botulinum Toxin Type A) Purified Neurotoxin Complex** เลขทะเบียนยา 1C 21/55 (NB)

**Active Ingredient & Strength:** Each vial of BOTOX® 50 Units contains 50 Units of Clostridium botulinum type A neurotoxin complex, 0.25 mg of human albumin and 0.45 mg of sodium chloride in a sterile, vacuum-dried form without a preservative. Each vial of BOTOX® 100 Units contains 100 Units of Clostridium botulinum type A neurotoxin complex, 0.5 mg of human albumin and 0.9 mg of sodium chloride in a sterile, vacuum-dried form without a preservative. **Indication:** BOTOX® is indicated for the treatment of blepharospasm associated with dystonia, including benign essential blepharospasm, hemifacial spasm or Vllth nerve disorders in patients 12 years or older, the correction of strabismus in patients 12 years of age or older, the treatment of spasmodic torticollis (cervical dystonia) in adults, the treatment of dynamic equinus foot deformity due to spasticity in paediatric cerebral palsy patients, two years of age or older, the temporary treatment of glabellar lines associated with corrugator and/or procerus muscle activity in adult patients below 65 years of age, the management of focal spasticity, including the treatment of spasticity associated with stroke in adults, the treatment of focal hyperhidrosis of the axilla, the temporary improvement in the appearance of upper facial rhytides in adults, the prophylaxis of headaches in adults with chronic migraine, the treatment of bladder dysfunction including urinary incontinence due to neurogenic detrusor overactivity in adults and overactive bladder with symptoms of urinary incontinence, urgency, and frequency, in adults who have an inadequate response to or are intolerant of an anticholinergic medication. **Dosage and method of use:** BOTOX® should only be given by physicians with the appropriate qualifications and experience in the treatment of patients and the use of required equipment. Optimum dose levels and the number of injection sites per muscle have not been established for all indications. The exact dosage and number of injection sites should be tailored to the patient's needs based on the size, number and location of muscles involved, the severity of disease, presence of local muscle weakness, response to previous treatment, and the patient's medical condition. As with any drug treatment, initial dosing in a naïve patient should begin at the lowest recommended dose. This dose can be gradually increased in subsequent treatments to the generally maximum studied or indicated dose, if needed. Injection intervals of BOTOX® should generally be no more frequent than every three months. Indication specific dosage and administration recommendations should be followed. Although data are not available from controlled clinical trials for concurrent treatment of multiple indications, as a practical consideration, in treating adult patients, including when treating for multiple indications, the maximum cumulative dose should generally not exceed 400 Units, in a 3 month interval. In treating pediatric patients, the maximum cumulative dose in a 3 month interval should generally not exceed 8 Units/kg body weight or 300 Units, whichever is lower. Dosages for patients >65 years of age are the same as for younger adults. Initial dosing should begin at the lowest recommended dose for the specific indication. Clinical outcomes, including risks, at higher dosages across all age groups are not fully established. The term "unit" upon which dosing is based, is a specific measurement of toxin activity that is unique to Allergan's formulation of botulinum toxin type A. Therefore, the "units" used to describe BOTOX® activity are different from those used to describe that of other botulinum toxin preparations and the units representing BOTOX® activity are not interchangeable with other products. **Contraindications:** BOTOX® is contraindicated in individuals with known hypersensitivity to botulinum toxin type A or to any of its excipients and in the presence of infection at the proposed injection site(s). BOTOX® for treatment of bladder dysfunction is also contraindicated in patients who have a urinary tract infection and in patients with acute urinary retention who are not routinely performing clean intermittent self-catheterization (CIC). **Warning and Precautions:** The relevant anatomy, and any alterations to the anatomy due to prior surgical procedures, must be understood by physicians prior to administering BOTOX® and care should be taken when injecting in or near vulnerable anatomic structures. As is expected for any injection procedure, localized pain, inflammation, paresthesia, hypoesthesia, tenderness, swelling/edema, erythema, localized infection, bleeding and/or bruising have been associated with the injection. Needle-related pain and/or anxiety have resulted in vasovagal responses, including transient symptomatic hypotension and syncope. **Adverse events:** The following list includes adverse drug reactions or other medically relevant adverse events that have been reported since the drug has been marketed, regardless of indication: denervation/muscle atrophy; respiratory depression and/or respiratory failure; dyspnea; aspiration pneumonia; dysarthria; dysphonia; dry mouth; strabismus; peripheral neuropathy, abdominal pain; diarrhea; nausea; vomiting; pyrexia; anorexia; vision blurred; visual disturbance; hypoacusis; tinnitus; vertigo; facial palsy, facial paresis; brachial plexopathy; radiculopathy; syncope; hypoesthesia; malaise; myalgia; myasthenia gravis; paresthesia; rash; erythema multiforme; pruritus; dermatitis psoriasiform; hyperhidrosis; alopecia, including madarosis, dry eye, and localized muscle twitching/ involuntary muscle contractions.

BOTOX® PI Jun 2023 [TH-BTX-230032, 03/OCT/23]

All adverse event should be reported to [drugsafety.pv@abbvie.com](mailto:drugsafety.pv@abbvie.com)

โปรดอ่านรายละเอียดเพิ่มเติมในเอกสารอ้างอิงฉบับสมบูรณ์และเอกสารกำกับยา

ใบอนุญาตโฆษณาเลขที่ ฆศ. 2-1302/2566

การโฆษณาตามใบอนุญาตนี้ต้องกระทำโดยตรงต่อผู้ประกอบการโรคศิลปะ ผู้ประกอบวิชาชีพเวชกรรม หรือผู้ประกอบการบำบัดโรคสัตว์เท่านั้น  
ผู้ใดนำโฆษณานี้ไปเผยแพร่ต่อบุคคลอื่นที่ไม่ใช่ผู้ประกอบการโรคศิลปะ ผู้ประกอบวิชาชีพเวชกรรม หรือผู้ประกอบการบำบัดโรคสัตว์

ถือเป็นการฝ่าฝืนมาตรา 88 และมาตรา 88 ทวิ ต้องระวางโทษปรับไม่เกินหนึ่งแสนบาท ตามมาตรา 124 แห่งพระราชบัญญัติยา.ศ. 2510 และฉบับแก้ไขเพิ่มเติม

ความถูกต้องของโฆษณานี้เป็นความรับผิดชอบของผู้โฆษณาที่ได้ดำเนินการโดยสำนักงานคณะกรรมการอาหารและยา



# One stop service for Innovation pain management device & robotic rehab By Metta Medtech

## Pain Management Product



Salus Talent A



Salus Talent Pro



Salus RSWT



TAMAS



Salus FSWT



VELAS II



Gbox



Fisioline RADIANT

## Robotics Rehabilitation



HIWIN



ALEX RS



Syrebo



ExoAtlet II







ABOBOTULINUM TOXIN A

### HEMIFACIAL SPASM AND BLEPHAROSPASM IN ADULTS



### SPASMODIC TORTICOLLIS IN ADULTS



### ARM SYMPTOMS ASSOCIATED WITH FOCAL SPASTICITY IN CONJUNCTION WITH PHYSIOTHERAPY



### EQUINUS FOOT DEFORMITY DUE TO SPASTICITY IN AMBULANT PAEDIATRIC CEREBRAL PALSY PATIENTS (2 YEARS OF AGE OR OLDER)



#### Abridged Prescribing Information

Trade Name: Dysport® INN: Clostridium botulinum type A toxin-haemagglutinin complex Presentations: Powder for solution for injection, 300 or 500 units

**POSOLGY AND ADMINISTRATION:** The units of Dysport® are specific to the preparation and are not interchangeable with other preparations of botulinum toxin. Dysport® should only be administered by appropriately trained physicians. Ipsen can facilitate training in administration of Dysport® injections. **THERAPEUTIC INDICATIONS:** Arm symptoms associated with focal spasticity in conjunction with physiotherapy: the recommended dose is 1000 units in total were divided among selected muscles. Paediatric cerebral palsy spasticity: the initial recommended dose is 20 units/kg body weight given as a divided dose between both calf muscles. If only one calf is affected, a dose of 10 units/kg bodyweight should be used. The maximum dose administered must not exceed 1000 units/patient. Spasmodic torticollis: the initial recommended dose for the treatment of spasmodic torticollis is 500 units per patient given as a divided dose and administered to the two or three most active neck muscles. Blepharospasm and hemifacial spasm: in the treatment of bilateral blepharospasm the recommended initial dose is 120 units per eye. For injections into the upper lid the needle should be directed away from its center to avoid the levator muscle. **CONTRAINDICATIONS:** known hypersensitivity to any components of Dysport®. **SPECIAL WARNINGS AND SPECIAL PRECAUTIONS:** Dysport® should only be used with caution under close supervision in patients with subclinical or clinical evidence of marked defective neuro-muscular transmission (e.g. myasthenia gravis). **PREGNANCY AND LACTATION:** For the treatment of cerebral palsy in children, Dysport® should only be used in children over 2 years of age. Patients with a history of dysphagia and aspiration should be treated with extreme caution. Patients and their care-givers must be warned of the necessity of immediate medical treatment in case of problems with swallowing, speech or respiratory disorders. **INTERACTION:** Drugs which affect neuromuscular transmission, such as aminoglycoside antibiotics, should be used with caution. **EFFECTS ON ABILITY TO DRIVE AND USE MACHINES:** None known. **COMMON UNDESIRABLE EFFECTS:** Generalised weakness, fatigue, flu-like syndrome, pain / bruising at injection site. In patient treated arm spasticity: dysphagia, arm muscle weakness, accidental injury/falls. In patient treated paediatric cerebral palsy spasticity: diarrhoea, vomiting, leg muscle weakness, urinary incontinence, abnormal gait, accidental injury due to falling. In patient treated spasmodic torticollis: dysphonia, dysphagia, neck muscle weakness. In patient treated blepharospasm and hemifacial spasm: facial muscle weakness, ptosis, diplopia, dry eyes, tearing, eyelid oedema. **SHELF LIFE:** The product may be stored for up to 24 hours at 2-8°C following reconstitution. **SPECIAL PRECAUTIONS FOR STORAGE:** Reconstituted Dysport® may be stored in a refrigerator (2-8°C) for up to 24 hours prior to use. DYSPORT® reconstituted with sodium chloride injection B.P. (0.9%) IS FOR SINGLE USE ONLY. Discard unused portion.

#### Reference

1. Dysport® (Patient Information Leaflet), Ipsen Biopharm Limited. September 2017

ใบอนุญาตโฆษณาเลขที่ ฉศ.0322/2563

DYS-TH-000007

For healthcare professionals only



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# ASIA OCEANIAN CONGRESS OF NEUROREHABILITATION (AOCNR 2023)

*in conjunction with the 2023 Annual Scientific Meeting of the Royal College  
of Psychiatrists of Thailand and the Thai Rehabilitation Medicine Association*  
**"Multifaceted NeuroRehabilitation: from Tradition to Innovation"**

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