



AMERICAN SOCIETY OF
NEUROREHABILITATION

A black and white photograph of a Chicago cityscape. In the foreground, a silver elevated train is moving along a steel track. The background is filled with tall, multi-story buildings, including one with a prominent sign that reads "STANDARD BUILDING". The overall scene is a dense urban environment.

2019 Annual Meeting

OCTOBER 16-18
DOUBLETREE BY HILTON HOTEL
CHICAGO MAGNIFICENT MILE

GENERAL MEETING INFORMATION

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HANDOUTS

All attendees will receive a link to available meeting handouts. The link will be sent from info@asnr.com. There will not be any hard copies of handouts made available unless provided by the speaker.

ABSTRACTS

Abstract titles and presenters can be found on pages 20-33. Full text abstracts can be found online at www.asnr.com.

ANNUAL MEETING WIFI

Complimentary WiFi will be available in the Annual Meeting space. Please visit registration for WiFi password.

ONSITE ASNR ANNUAL MEETING SURVEY

Please complete and return the Annual Meeting survey you received in your email prior to the meeting before you leave the meeting on Friday. Your responses will prove crucial to the future success of ASNR. Thank you!

ASNR TRAVEL FELLOWSHIPS FOR DIVERSITY

ASNR would like to thank the Eunice Kennedy Shriver National Institute Of Child Health & Human Development of the National Institutes of Health for their generous support of our Annual Meeting and in particular for support of the Diversity Travel Fellowship program.

REGISTRATION HOURS

Wednesday, October 16.....	12:00 pm - 5:30 pm
Thursday, October 17.....	7:00 am - 6:00 pm
Friday, October 18.....	7:00 am - 4:00 pm

JOIN THE DISCUSSION!



@ASNRRehab



#ASNRRehab19

WELCOME

TO THE 2019 ASNR ANNUAL MEETING



On behalf of the American Society of Neurorehabilitation (ASNR), we are excited you are joining us for the 2019 Annual Meeting. Our meeting provides interactions among neurorehabilitation clinicians, basic scientists, industry representatives, and funders in a dynamic environment of presentations and discussion. This year symposia topics include:

- Theory to Therapy: Negotiated equilibrium-based approaches to inducing targeted neuroplasticity that enhances recovery of function
- Advances in Noninvasive Neuromodulation for Aphasia Treatment
- Structure in Complexity: Using machine learning in neurorehabilitation research
- Why Do Animals Recover Post-Stroke but Our Patients Do Not?

We are also looking forward to our popular Controversies in Neurorehabilitation panel in which experts and audience members will debate Proportional Recovery: Maxim or Myth? An oral abstract session will feature four of the top science abstracts.

An additional feature of this year's program is the focus of ASNR on providing valuable content for career development. This will

include an interactive presentation and discussion on Reliability and Reproducibility in Neurorehabilitation Research. We will also have a presentation on Funding and Grant-Writing Opportunities for Early and Transitioning Career along with a variety of early career roundtables. We have left ample time for two poster sessions, which always generate stimulating discussion and provide outstanding opportunities for sharing science and networking.

Also, do attend the ASNR Business Meeting for a chance to learn how the society works, find out who are this year's poster award winners, and enjoy a boxed lunch.

It will be an exciting three days of learning and interacting together. Enjoy the meeting and the city of Chicago!

Sincerely,
Lewis A. Wheaton, PhD
2019 ASNR Program Committee Chair
School of Biological Sciences
Georgia Institute of Technology

ON BEHALF OF THE PROGRAM COMMITTEE:

Ahmet Arac, MD
Cathrin Buetefisch, MD, PhD, FASNR
Laurel Buxbaum, PsyD
Jason Camel, MD, PhD
Matthew Edwardson, MD
Teresa Kimberley, PT, PhD
Catherine Lang, PT, PhD

Sangeetha Madhavan, PT, PhD
Kelsey Potter-Baker, PhD
W. Zev Rymer, PhD, MD
Heidi Schambra, MD
Steven Wolf, PhD, PT, FASNR
Steven Zeiler, MD, PhD

AMERICAN SOCIETY OF NEUROREHABILITATION 2019 ANNUAL MEETING

October 16 - 18, 2019 | Chicago, IL

TARGET AUDIENCE

This activity is designed to meet the needs of neurologists, neurosurgeons, neuroradiologists and other neuroscientists.

LEARNING OBJECTIVES

Upon completion of the educational activity, participants should be able to:

- Recognize advances in the experimental application of transcranial magnetic stimulation toward treatment of aphasia in the setting of stroke
- Identify progress in the experimental use of transcranial direct current stimulation for the rehabilitation of post-stroke aphasia
- Discuss emerging evidence supporting the potential use of transcranial direct current stimulation for treatment of primary progressive aphasia in the context of neurodegenerative disorders
- Describe best practices for reproducible science, including data management, analysis, and visualization and open science
- Execute and adapt reproducible software pipelines for data management and analysis using open-source documented code in R, Python, and/or Matlab
- Perform quality control of data before, during, and after analyses using data visualization techniques
- List the basic concepts and terminology of machine learning and deep learning
- Recognize how machine learning can be used to identify patterns in complex data, such as speech, movement, and images
- Recognize how machine learning algorithms can be used to extract data and promote quality control
- Gain a broad perspective on the opportunities now available for developing new rehabilitation therapies and on the difficult challenge of determining how to take maximum advantage of these opportunities
- Describe the strategy of targeted neuroplasticity (TNP) starting from its origin in the negotiated equilibrium model of CNS function
- Evaluate two promising classes of TNP therapeutic protocols and the initial studies indicating that they are effective in enhancing functional recovery
- Discuss the value of a simple computational model for evaluating the potential functional impact of a new TNP protocol and for optimizing the parameters of the protocol (e.g., dosage, target specifications) prior to actual clinical studies
- Gain theoretical understanding and practical knowledge about a principled and powerful new strategy for inducing and guiding beneficial plasticity so as to enhance recovery of function for people with SCI, stroke, cerebral palsy, or other neuromuscular disorders
- Explain spontaneous recovery and how the proportional recovery rule was created

- Discuss possible problems with experimental paradigms leading to animal-based recovery that is not seen in humans
- Discuss how to better use and interpret data from animal models
- Relate data between pre-clinical and clinical care

METHOD OF PARTICIPATION

Statements of credit will be awarded based on the participant's attendance. A statement of credit will be available upon completion of an online evaluation/claimed credit form available at: akhcme.com/akhcme/pages/asnr

Please claim your credit by November 15, 2019.

If you have questions about this CME activity, please contact AKH inc. at jgoldman@akhcme.com.

CME Credit Provided by AKH Inc., Advancing Knowledge in Healthcare

PHYSICIANS

This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of AKH Inc., Advancing Knowledge in Healthcare and American Society of Neurorehabilitation. AKH Inc., Advancing Knowledge in Healthcare is accredited by the ACCME to provide continuing medical education for physicians.

AKH Inc., Advancing Knowledge in Healthcare designates this live activity for a maximum of 9.5 *AMA PRA Category 1 Credit(s)*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

PHYSICIAN ASSISTANTS

NCCPA accepts *AMA PRA Category 1 Credit*[™] from organizations accredited by ACCME.

PLANNER AND REVIEWER DISCLOSURES

The following planners and reviewers have no significant financial relationships with pharmaceutical or medical product manufacturers:

- Dorothy Caputo, MA, BSN, RN - Director of Accreditations
- ASNR Staff and Planners
- AKH Inc. Staff and Planners

COMMERCIAL SUPPORT

- The Eunice Kennedy Shriver National Institute Of Child Health & Human Development of the National Institutes of Health
- MSquare Healthcare, a MindMaze Company
- Northwestern University: Physical Therapy & Human Movement Sciences
- Sage Publishing
- Select Medical

DISCLOSURES

It is the policy of AKH Inc. to ensure independence, balance, objectivity, scientific rigor, and integrity in all of its continuing education activities. The author must disclose to the participants any significant relationships with commercial interests whose products or devices may be mentioned in the activity or with the commercial supporter of this continuing education activity. Identified conflicts of interest are resolved by AKH prior to accreditation of the activity and may include any of or combination of the following: attestation to non-commercial content; notification of independent and certified CME/CE expectations; referral to National Author Initiative training; restriction of topic area or content; restriction to discussion of science only; amendment of content to eliminate discussion of device or technique; use of other author for discussion of recommendations; independent review against criteria ensuring evidence support recommendation; moderator review; and peer review.

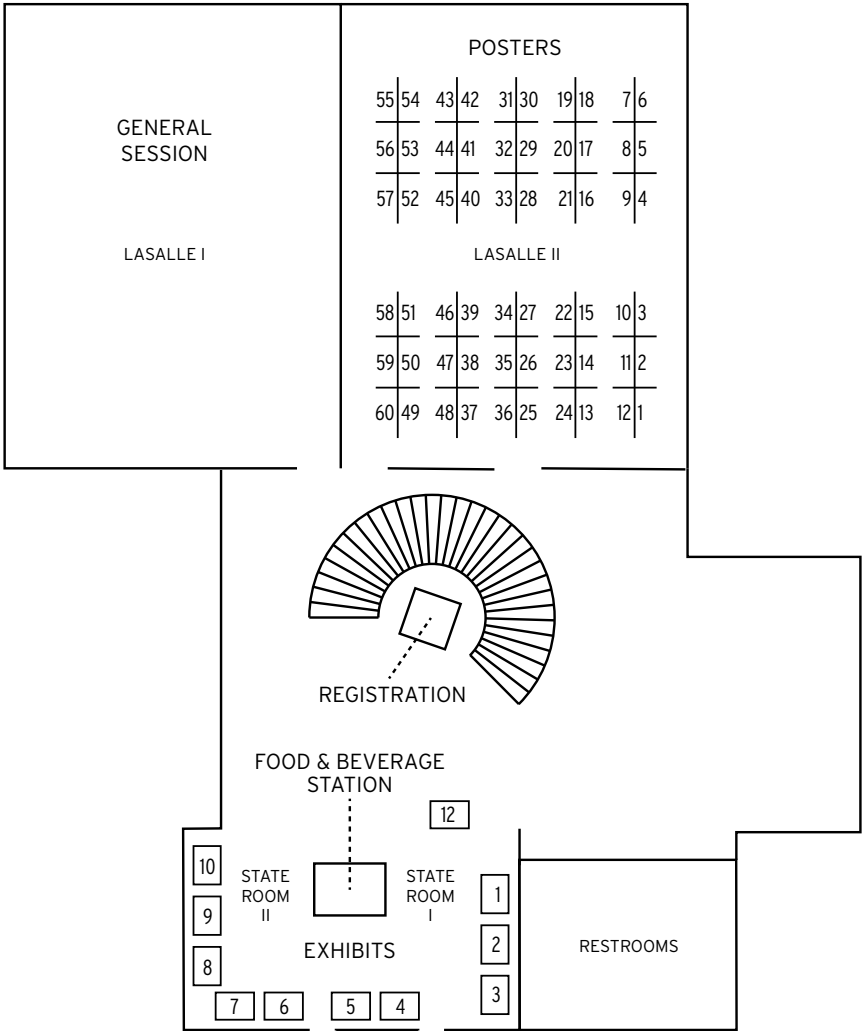
DISCLOSURE OF UNLABELED USE AND INVESTIGATIONAL PRODUCT

This educational activity may include discussion of uses of agents that are investigational and/or unapproved by the FDA. Please refer to the official prescribing information for each product for discussion of approved indications, contraindications, and warnings.

DISCLAIMER

This course is designed solely to provide the healthcare professional with information to assist in his/her practice and professional development and is not to be considered a diagnostic tool to replace professional advice or treatment. The course serves as a general guide to the healthcare professional, and therefore, cannot be considered as giving legal, nursing, medical, or other professional advice in specific cases. AKH Inc. specifically disclaim responsibility for any adverse consequences resulting directly or indirectly from information in the course, for undetected error, or through participant's misunderstanding of the content.

MAP



PROGRAM AT-A-GLANCE

WEDNESDAY OCTOBER 16

ASNR Mentoring Track

1:00 - 3:00 pm

Reliability and Reproducibility in Neurorehab Research

Organizer: Sook-Lei Liew, PhD, OTR/L

3:00 - 3:15 pm

Stretch Break

3:15 - 3:40 pm

The Road and the Map Forward: Funding and grant-writing opportunities for early and transitioning career

Organizer: Heidi Schambra, MD

3:40 - 5:00 pm

Early and Transitioning Career Roundtables

How and When to Talk with your Program Officer

Theresa Cruz, PhD; Alexander Dromerick, MD, FASNR

Developing an Elevator Pitch

Laurel Buxbaum, PsyD; Eric Wade, PhD

How (and When) to Collaborate Effectively

S. Thomas Carmichael, MD, PhD; Julius Dewald, PhD, PT

Increasing your Writing Productivity

Dale Corbett, PhD; Catherine Lang, PT, PhD

Mentoring Up: Optimizing your relationship with your mentor
Laurie Dromerick, RN, BSN, CPC; Carolee Winstein, PhD, PT, FAPTA, FAHA, FASNR

Effective (and Efficient) Manuscript Review

Randolph Nudo, PhD, FASNR; George Wittenberg, MD, PhD, FASNR

Understanding Tenure and Promotion
Michael Ellis, PT, DPT; Sangeetha Madhavan, PT, PhD

5:00 - 6:00 pm

Mentoring Reception

THURSDAY OCTOBER 17

7:00 - 8:00 am

Exhibits and Registration

8:00 - 10:00 am

Theory to Therapy: Negotiated equilibrium-based approaches to inducing targeted neuroplasticity that enhances recovery of function

Organizers: Aiko Thompson, PhD and Jonathan R. Wolpaw, MD

10:00 - 10:15 am

Break

10:15 am - 12:15 pm

Poster Session I and Exhibits

12:15 - 1:30 pm

Lunch on own

12:30 - 1:30 pm

NNR Editorial Lunch

(Invitation Only)

1:30 - 2:30 pm

Oral Abstracts

2:30 - 2:45 pm

Break

2:45 - 4:15 pm

**Advances in Noninvasive Neuro-
modulation for Aphasia Treatment**

Organizer: Roy Hamilton, MD, MS

4:15 - 4:30 pm

Break

4:30 - 5:30 pm

ASNR Award Ceremony

5:30 - 6:00 pm

**ASNR Foundation Lecture: Will
Rehabilitation Ascend to the Top
of the Medical Totem Pole**

V. Reggie Edgerton, PhD

6:00 - 8:00 pm

ASNR Foundation Reception

Ticketed Event

FRIDAY OCTOBER 18

7:00 - 8:00 am

Exhibits and Registration

8:00 - 10:00 am

**Structure in Complexity:
Using machine learning in
neurorehabilitation research**

Organizer: Heidi Schambra, MD

10:00 - 10:15 am

Break

10:15 am - 12:15 pm

Poster Session II and Exhibits

12:15 - 1:10 pm

ASNR Business Meeting

**All are welcome and lunch is provided*

1:30 - 3:00 pm

**Why Do Animals Recover Post-
Stroke but Our Patients Do Not?**

Organizer: Steven Zeiler, PhD, MD

3:00 - 3:30 pm

Break

3:30 - 5:30 pm

**Controversies in Neurorehabilita-
tion Session Proportional
Recovery: Maxim or Myth**

Moderator: John Krakauer, MD

5:30 - 6:30 pm

Closing Reception

**Subject to change*

PROGRAM DETAILS

Reliability and Reproducibility in Neurorehabilitation Research

Wednesday, October 16, 2019 • 1:00 - 3:00 pm • La Salle I Ballroom

Organized by Sook-Lei Liew, PhD, OTR/L

There is a crisis of reproducibility in science, with many researchers finding it difficult to replicate previous findings. Two key reasons for this are: (1) small study populations with many degrees of freedom in how the data are handled, and (2) incomplete recording and reporting of methods and results. This hands-on workshop will equip attendees with tools to address both of these problems. First, we will lay out principles of reproducible science, including proper data management, reproducible protocols and analysis pipelines, data visualization, and open science. Then, we will dive into three hands-on tutorials using open-source MRI, EEG, and kinematic datasets and executable code that we will provide for participants so they can easily follow along with presenters. All code will also be openly shared on Github so attendees can modify it for their own purposes afterwards. The first tutorial will cover database structures, management and organization, including standardized naming conventions (e.g., Brain Imaging Data Structure), and tools for manipulating databases (PANDAS, SQLite). The second tutorial will review the basics of reproducible data analysis pipelines, including common statistical tests for data distribution and outliers, and will provide some common analysis pipelines using Python, R, and/or Matlab. Finally, the third tutorial will cover how to produce compelling data visualizations for visual quality control and accurate representation of data. Overall, this workshop aims to equip neurorehabilitation researchers and trainees with the tools to perform reproducible research, improving transparency and accelerating innovation in the field.

SCHEDULE:

1:00 - 1:30 pm *Introduction to Reproducible Science* - Sook-Lei Liew, PhD, OTR/L

1:30 - 2:00 pm *Hands on Database Management* - Sook-Lei Liew, PhD, OTR/L

2:00 - 2:30 pm *Hands on Analysis Pipelines* - James Finley, PhD

2:30 - 3:00 pm *Hands on Data Visualization* - Keith Lohse, PhD, Pstat

SPEAKERS:



Sook-Lei Liew,
PhD, OTR/L



James Finley,
PhD



Keith Lohse,
PhD, Pstat

MENTORING RECEPTION

State Room I and II • 5:00- 6:00 pm

Keep the discussion going over small bites and cash bar.

MENTORING TRACK

Wednesday, October 16, 2019 • 3:15 - 5:00 pm • La Salle I Ballroom
 Organizer: Heidi Schambra, MD

3:15 - 3:40 pm

The Road and the Map Forward: Funding and Grant-Writing Opportunities for Early and Transitioning Career - Heidi Schambra, MD



Gaining skills and conducting research are paramount for a research career, but these take time and money. In this presentation, we will discuss how you can get both. We will first review funding mechanisms that are available to trainees, junior faculty, and transitioning faculty. We will then discuss grant-writing courses and workshops that can position you for a successful application. At the end of the presentation, attendees should know how to take the next step in building their careers.

3:40 - 5:00 pm

Early and Transitioning Career Roundtables

Attendees can participate in 4 roundtables, each lasting 20 minutes. Come with questions for your seasoned and approachable roundtable mentors!

How and When to Talk with your Program Officer

Theresa Cruz, PhD; Alexander Dromerick, MD, FASNR

Developing an Elevator Pitch

Laurel Buxbaum, PsyD; Eric Wade, PhD

How (and When) to Collaborate Effectively

S. Thomas Carmichael, MD, PhD; Julius Dewald, PhD, PT

Increasing your Writing Productivity

Dale Corbett, PhD; Catherine Lang, PT, PhD

Mentoring Up: Optimizing your relationship with your mentor

Laurie Dromerick, RN, BSN, CPC; Carolee Winstein, PhD, PT, FAPTA, FAHA, FASNR

Effective and Efficient Manuscript Review

Randolph Nudo, PhD, FASNR; George Wittenberg, MD, PhD, FASNR

Understanding Tenure and Promotion

Michael Ellis, PT, DPT; Sangeetha Madhavan, PT, PhD



Laurel Buxbaum, PsyD



S. Thomas Carmichael, MD, PhD



Dale Corbett, PhD



Theresa Cruz, PhD



Julius Dewald, PhD, PT



Alexander Dromerick, MD, FASNR



Laurie Dromerick, RN, BSN, CPC



Michael Ellis, PT, DPT



Catherine Lang, PT, PhD



Sangeetha Madhavan, PT, PhD



Randolph Nudo, PhD, FASNR



Eric Wade, PhD



Carolee Winstein, PhD, PT, FAPTA, FAHA, FASNR



George Wittenberg, MD, PhD, FASNR

Theory to Therapy: Negotiated equilibrium-based approaches to inducing targeted neuroplasticity that enhances recovery of function

Thursday, October 17, 2019 • 8:00 - 10:00 am • La Salle I Ballroom

Organized by Aiko Thompson, PhD and Jonathan R. Wolpaw, MD

From cortex to spinal cord, the CNS undergoes many kinds of plasticity throughout life. The therapeutic challenge is to guide this complex plasticity to restore motor skills lost to spinal cord injury, stroke, or other neuromuscular disorders. How to do this, how to choose among the many conceivable therapeutic regimens, is an extremely difficult problem, especially given the time, effort, and expense required to test each one. The new negotiated equilibrium (NE) model of CNS function (J Physiol 2018;596.16:3469-91) provides a strategy for guiding restorative plasticity - targeted neuroplasticity (TNP). TNP protocols produce beneficial plasticity at critical CNS sites (e.g., specific spinal cord pathways or neuronal populations). By doing so, they improve the ongoing negotiation among motor skills. This enables CNS neuronal and synaptic properties to escape a suboptimal local minimum and reach a superior new equilibrium that enhances recovery. For example, a TNP protocol that reduces triceps surae reflex hyperactivity underlying spasticity enables better gait execution, which gradually produces further beneficial plasticity at many sites and thereby improves walking. This symposium introduces the NE model and TNP strategy and discusses two TNP methods that have proved promising in early studies: operant conditioning protocols that modify specific spinal reflexes; and paired-stimulation protocols that strengthen specific corticospinal connections. The final talk presents a computational study predicting the impact, and illuminating the mechanisms, of a TNP protocol for stroke recovery. This symposium engages three of the five topics highlighted by the Program Committee: Computational Neuroscience in Neurorehabilitation; Neuromodulation; and Spinal Cord Injury.

SCHEDULE:

8:00 - 8:10 am *Introduction: The Problem, the Model, and the Strategy*

- Jonathan R. Wolpaw, MD

8:10 - 8:40 am *Targeted Spinal Cord Plasticity Enhances Voluntary Motor Output after SCI*

- Monica Perez, PT, PhD

8:40 - 9:10 am *Changing a Spinal Reflex Improves Locomotion after SCI*

- Aiko Thompson, PhD

9:10 - 9:40 am *Targeted Neuroplasticity and Its Functional Impact After Stroke:*

A Computational Study - Sumner Norman, PhD

9:40 - 10:00 am *Discussion*

SPEAKERS:



Jonathan R. Wolpaw,
MD



Monica Perez,
PT, PhD



Aiko Thompson, PhD



Sumner Norman,
PhD

Oral Abstract Session

Thursday, October 17, 2019 - 1:30 - 2:30pm - La Salle I Ballroom

Introduction - Lewis Wheaton, PhD, 2019 ASNR Program Chair

1:30 - 1:45 pm **EEG-informed Machine Learning of Movement Primitives for Neurorehabilitation Robots** - Konstantinos Michmizos, PhD

1:45 - 2:00 pm **Residual Ruins: The effect of spinal cord injury edema on potential functional recovery** - Alondra Medina

2:00 - 2:15 pm **Emotion recognition impairments after right-hemisphere stroke - an important factor for long-term outcomes?** - Anna Seydell-Greenwald, PhD

2:15- 2:30 pm **Effects of Timing and Sex on Neuroprotective Efficacy of Remote Ischemic Conditioning in a Rat Stroke Model** - Matthew McDonald, PhD



Konstantinos
Michmizos, PhD



Alondra Medina



Anna Seydell-
Greenwald, PhD



Matthew McDonald,
PhD

Advances in Noninvasive Neuromodulation for Aphasia Treatment

Thursday, October 17, 2019 • 2:45 - 4:15 pm • La Salle I Ballroom

Organized by Roy Hamilton, MD, MS

Aphasia is the most common focal cognitive deficit associated with stroke, affecting approximately 80,000 persons annually in the United States alone. Aphasia can also emerge as the cardinal feature of certain neurodegenerative syndromes, collectively referred to as primary progressive aphasias (PPAs). Unfortunately, behavioral speech therapies—the standard of care for aphasia—remain limited in their efficacy. However, a mounting body of evidence suggests that noninvasive neuromodulation techniques like transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) can be employed to enhance language recovery in persons with aphasia. This course will review recent evidence related to the use of TMS in patients with chronic post-stroke aphasia, as well as the use of tDCS in patients with both chronic stroke and PPA. The course will also address how brain stimulation in the setting of aphasia further informs understanding of the intact language network and also sheds light on how the language system reorganizes in the context of injury.

SCHEDULE:

- 2:45 - 3:00 pm *TMS in the Treatment of Post-stroke Aphasia* - Roy Hamilton, MD, MS
- 3:00 - 3:25 pm *tDCS in the Treatment of Post-stroke Aphasia* - Julius Fridriksson, PhD
- 3:25 - 3:50 pm *tDCS in the Treatment of Primary Progressive Aphasias*
- Kyrana Tsapkini, PhD
- 3:50 - 4:15 pm *Discussion*

SPEAKERS:



Roy Hamilton, MD,
MS



Julius Fridriksson,
PhD



Kyrana Tsapkini, PhD

2019 ASNR AWARD CEREMONY

THURSDAY, OCTOBER 17 - 4:30-5:30 PM - LASALLE I BALLROOM



2019 FELLOW OF AMERICAN SOCIETY OF NEUROREHABILITATION RECIPIENT

The title of Fellow of the American Society of Neurorehabilitation is reserved for individuals who have contributed significantly to the field of Neurorehabilitation, and also to the American Society of Neurorehabilitation.

Catherine Lang, PT, PhD



2019 OUTSTANDING NEUROREHABILITATION CLINICIAN-SCIENTIST AWARD RECIPIENT

The award, based on the evaluation of his or her peers, honors scholarly achievements and contributions to knowledge about mechanisms of neural repair, translational research from mechanisms of repair to clinical practice, or clinical Neurorehabilitation. Nominations are invited from the membership of the American Society of Neurorehabilitation. The American Society of Neurorehabilitation Education Foundation Board of Directors, made up of Past Presidents of the American Society of Neurorehabilitation (ASNR) selects the recipient of the award.

Travels Along the Translational Highway

Dale Corbett, PhD



2019 KENNETH VISTE, JR., MD MEMORIAL LECTURESHIP RECIPIENT

Kenneth M. Viste, Jr., MD was a tireless advocate for Neurorehabilitation and ASNR, and was active in the organization since its inception as President, Membership Committee Chair and a member of the Practice Issues Committee. ASNR honors his memory by presenting the award

annually to an individual that has supported the mission and vision of ASNR over the course of his or her career, by supporting neurorehabilitation as a field, engaging in clinical and educational work, and making our medical peers aware of the importance of neurorehabilitation.

Smart Mice to Smart Humans: Molecular Memory Systems in Stroke Recovery

S. Thomas Carmichael, MD, PhD

ASNR FOUNDATION LECTURE

THURSDAY, OCTOBER 17 - 5:30-6:00 PM - LASALLE I BALLROOM

Featured Talk:

WILL REHABILITATION ASCEND TO THE TOP OF THE MEDICAL TOTEM POLE

- V. Reggie Edgerton, PhD



Observations over the last 10 years particularly has led to the necessity of dumping multiple dogmas that will impact the discipline of rehabilitation. These dogma have been exposed primarily as a result of decades of basic research focused on the biology of the control of the neural networks.

Surprising to many, the spinal cord has been the principal focus of this biology. I will attempt to lead you through my own mere decades of thinking of how more than 200 million years of evolution tells us how the smartness and plasticity of spinal networks tells us why the discipline of rehabilitation should ascend to the top of the medical totem pole.

Surprising to many, the spinal cord has been the principal focus of this biology. I will attempt to lead you through my own mere decades of thinking of how more than 200 million years of evolution tells us how the smartness and plasticity of spinal networks tells us why the discipline of rehabilitation should ascend to the top of the medical totem pole.

ASNR FOUNDATION RECEPTION

THURSDAY, OCTOBER 17 - 6:00-8:00 PM - LASALLE I BALLROOM

JOIN US FOR AN EVENING OF NETWORKING AND NOSH!

Ticketed Event

RECEPTION TICKETS:

\$75 for Guests

\$25 for Student, Postdoc, and Resident

(Tickets will be available to purchase at registration for the reception.)

Structure in Complexity: Using machine learning in neurorehabilitation research*Friday, October 18, 2019 • 8:00 - 10:00 am • La Salle I Ballroom**Organized by Heidi Schambra, MD*

The widespread deployment of machine learning in home-use technologies has recently made it an accepted and ubiquitous part of our lives. But what exactly is machine learning, and how can researchers and clinicians benefit from it? Machine learning enables computers to learn without being explicitly programmed and stands to be a powerful tool in one's methodological arsenal. In this symposium, we will explore conceptual and practical considerations for implementing machine learning in neurorehabilitation research. Our first speaker will provide a primer on machine learning and deep learning, and will discuss their use in the treatment of childhood apraxia of speech. Our second speaker will discuss the use of deep learning and unsupervised machine learning techniques to extract and analyze kinematic data, and to identify patterns of motor impairment in humans and rodents with stroke. Our third speaker will discuss the use of deep learning to extract motor rehabilitation doses in humans with stroke. Our final speaker will discuss the use of machine learning for large-scale MRI image segmentation, lesion classification, and quality control. By the end of the symposium, we aim to have attendees thinking about using machine learning for therapeutic applications and for extracting meaningful information from their data.

Funding sources: HS - R01 NS110696, R01 LM013316, K02 NS104207, NCATS 1UL1 TR001445; AA - K08 NS109315, NVIDIA GPU Grant; SL- K01HD091283.

SCHEDULE:

8:00 - 8:03 am *Introduction* - Heidi Schambra, MD

8:03 - 8:28 am *Machine Learning: A primer and application in childhood apraxia of speech* - Avinash Parnandi, PhD

8:28 - 8:54 am *Machine Learning for Kinematic Analysis of Upper Extremity Movements in Humans and Rodents* - Ahmet Arac, MD

8:54 - 9:20 am *Machine Learning for the Quantitation of Human Rehabilitation after Stroke* - Heidi Schambra, MD

9:20 - 9:46 am *Machine Learning for the Large-scale Segmentation of MRI Images after Stroke* - Sook-Lei Liew, PhD, OTR/L

9:46 - 10:00 am Discussion

SPEAKERS:

Avinash Parnandi,
PhD



Ahmet Arac, MD



Heidi Schambra, MD



Sook-Lei Liew, PhD,
OTR/L

Why Do Animals Recover Post-Stroke but Our Patients Do Not?

Friday, October 18, 2019 • 1:30 - 3:00 pm • La Salle I Ballroom

Organized by Steven Zeiler, MD, PhD

Since Ogden and Franz recorded the results of rhesus monkey recovery from extensive motor cortical lesions in 1917, we have been trying to translate interventions known to work in animal models to our patients. The last 100 years have seen a tremendous number of behavioral, physiological, and pharmacological rehabilitative interventions successfully employed in rodent and primate studies. However, patient-based outcomes of translational studies have been dismal with no intervention proving better than spontaneous recovery. Interventions derived from rodent and primate work have been informative, but ultimately not transformative of clinical practice, creating a “recovery gap” existent between animal models and patients. In this symposium, we will explore three ideas relating to the “recovery gap.” First, we will explore possible problems with experimental paradigms leading to animal-based recovery not seen in humans. Second, we will explore recovery mechanisms that transcend species that may be reasonably targeted by interventions. Finally, we will discuss a “path forward,” which we hope will help direct future experimental notions of rehabilitation trials in both animal models and in humans.

SCHEDULE:

1:30 - 1:35 pm *Introduction* - Steven Zeiler, MD, PhD

1:35 - 1:55 pm *Of Mice and Men: Is it the experiments, the anatomy, or both that distinguish pre-clinical and clinical recovery* - Randolph Nudo, PhD, FASNR

1:55 - 2:00 pm *Questions and Answers*

2:00 - 2:20 pm *Translational mechanisms - How do we use animal models to inform type, dosing, and timing of interventions* - Mary Teena Joy, MD, PhD

2:20 - 2:25 pm *Questions and Answers*

2:25 - 2:45 pm *The Path Forward - Finding harmony between pre-clinical and clinical care* - S. Thomas Carmichael, MD, PhD

2:45 - 3:00 pm *Discussion*

ORGANIZER:

SPEAKERS:



Steven Zeiler, MD,
PhD



Randolph Nudo, PhD,
FASNR



Mary Teena Joy, PhD



S. Thomas
Carmichael, MD, PhD

CLOSING RECEPTION

State Room I and II • 5:30- 6:30 pm

Controversies in Neurorehabilitation Session

- Proportional Recovery: Maxim or Myth

Friday, October 18, 2019 • 3:30 - 5:30 pm • La Salle I Ballroom

Moderated by John Krakauer, MD

Spontaneous biological recovery takes place in the initial days and weeks after stroke and is the most powerful form of post-stroke recovery ever described. Remarkably, this results in most patients recovering about 70% of the available improvement in motor impairment. This “proportional recovery” rule asserts that most stroke survivors recover a fixed proportion of lost function. To the extent that this is true, recovery from stroke can be predicted accurately from baseline measures of acute post-stroke impairment alone. However, recent analyses suggest that these effect sizes may be inflated and biased because of the properties (including mathematical coupling and ceiling effects) used to derive the proportional recovery rule. The implication is that recovery after stroke may not be as proportional as recent studies suggest. Nevertheless, a decade of data continues to empirically support proportional recovery; further, there is an underlying anatomical and physiological mechanism to explain proportional recovery. In this debate, Gert Kwakkel, one of the most prolific publishers on the topic of proportional recovery, will define and defend its use, as well discuss an underlying mechanism. Rachel Hawe and Thomas Hope will use their recent data to question the mathematical and clinical utility of this model. Finally, Jeff Goldsmith, will describe new insights into proportional recovery and defend proportional recovery’s utility. John Krakauer, the investigator who originally described proportional recovery, will serve as moderator.

SCHEDULE:

3:30 - 3:40 pm *Introduction and Setting Ground Rules* - John Krakauer, MD

3:40 - 3:55 pm *PRO: Proportional Recovery - Clinical description and utility*

- Gert Kwakkel, PhD, PT

3:55 - 4:10 pm *ANTI: Proportional Recovery - Mathematical coupling*

- Rachel Hawe, DPT, PhD

4:10 - 4:25 pm *ANTI: Proportional Recovery - Ceiling effects* - Thomas Hope, PhD

4:25 - 4:40 pm *PRO: Proportional Recovery* - Jeff Goldsmith, PhD

4:40 - 5:30 pm *AUDIENCE DEBATE* - Moderated by John Krakauer, MD

MODERATOR:

SPEAKERS:



John Krakauer, MD



Gert Kwakkel,
PhD, PT



Rachel L. Hawe,
DPT, PhD



Thomas Hope, PhD



Jeff Goldsmith, PhD

POSTER SESSION I

THURSDAY, OCTOBER 17 • 10:15 AM - 12:15 PM • LASALLE II BALLROOM

T1: Effects of Remote Limb Ischemic Conditioning in Conjunction with Rehabilitation Training After Acute and Chronic Motor Cortical Infarcts in Rats

Bryan Barksdale^{1,2}, Albert Lee¹, Jill Rosow¹, Mathilda Nicot-Carstonis¹, Darius Miranda-Sohrabji¹, Theresa Jones¹

¹Univ. of Texas at Austin, Austin, USA. ²Univ. of Texas Medical Branch, Galveston, USA

T2: A Robot for Split-Force Body Weight-Supported Treadmill Training Modulates Gait Patterns of Patients with Hemiparetic Stroke: Case studies

Hiroaki Fujimoto¹, Tatsuya Teramae², Tomoyuki Noda², Asuka Takai², Nobukazu Fujita³, Megumi Hatakenaka¹, Hiramatsu Yuichi¹, Akihiro Jino³, Jun-ichiro Furukawa², Hajime Yagura¹, Teiji Kawano^{1,4}, Hironori Otomune¹, Jun Morimoto², Ichiro Miyai¹

¹Morinomiya Hosp., Neurorehabilitation Research Inst., Osaka, Japan. ²ATR

Computational Neuroscience Labs, Dept. of Brain Robot Interface, Soraku-gun, Japan.

³Morinomiya Hosp., Dept. of Rehabilitation, Osaka, Japan. ⁴Osaka Univ. Graduate School of Medicine, Dept. of Neurology, Suita, Japan

T3: Increased Sensorimotor Inter- and Intra-hemispheric Functional Connectivity is Associated with More Impaired Sensorimotor Upper Limb Function in the Subacute Phase Post Stroke

Nele De Bruyn¹, Leen Saenen¹, Liselot Thijs¹, Eva Ceulemans¹, Sarah Meyer², Kaat Alaerts¹, Geert Verheyden¹

¹Dept. of Rehabilitation Sciences, KU Leuven - Univ. of Leuven, Heverlee, Belgium. ²Jessa Hosp., Rehabilitation Campus Sint-Ursula, Herk-de-Stad, Belgium

T4: A Study of Single Task vs. Dual Task Training on Balance and Gait Performance in Stroke Patients: A single blinded randomized controlled trial

Hiral Gandhi^{1,2}, Neha Verma²

¹Inst. Of Neurosciences, Surat, India. ²SPB Physiotherapy College, Surat, India

T5: The Effectiveness of Robotic-Assisted Gait Training on Walking Speed for Stroke Survivors: Meta-analysis

Faisal Asiri

King Khalid Univ., Abha, Saudi Arabia

T6: High-functioning Stroke Survivors Require Motor Capabilities Beyond Strength

Neha Lodha, Prakruti Patel

Colorado State Univ., Fort Collins, USA

T7: Promoting Study Power of Stroke Rehabilitation Trials Using a Longitudinal Mixture Model

Rick van der Vliet^{1,2}, Gert Kwakkel^{3,4}, Elrozy Andrinopoulou¹, Rinske Nijland^{5,3}, Maarten Frens¹, Erwin van Wegen³, Carel Meskers^{3,6}, Jorrit Slaman², Gerard Ribbers^{1,2}, Ruud Selles¹

¹Erasmus MC, Rotterdam, Netherlands. ²Rijndam Rehabilitation, Rotterdam,

Netherlands. ³VUmc, Amsterdam, Netherlands. ⁴Northwestern Univ., Chicago, USA.

⁵Reade Rehabilitation Center, Amsterdam, Netherlands.

Abstract titles are printed as submitted by the author. Full abstracts can be found at www.asnr.com

T8: Patient-specific Prediction of Arm-hand Capacity Recovery After Stroke: A dynamic approach

Ruud Selles^{1,2}, Elrozy Andrinopoulou¹, Rinske Nijland³, Rick van der Vliet¹, Jorrit Slaman², Erwin van Weegen⁴, Carel Meskers⁴, Dimitris Rizopoulos¹, Gerard Ribbers^{1,2}, Gert Kwakkel⁴

¹Erasmus MC, Rotterdam, Netherlands. ²Rijndam, Rotterdam, Netherlands. ³Reade Rehabilitation Center, Amsterdam, Netherlands. ⁴Amsterdam UMC, Location VU Univ. Medical Center, Amsterdam, Netherlands.

T9: Ipsilateral Corticomotor Control of the Paretic Limb During Bilateral Ankle Movement After Stroke

Brice Cleland, Sangeetha Madhavan
Univ. of Illinois at Chicago, Chicago, USA

T10: Exploring the Use of Visuospatial Tests to Predict Motor Learning Capacity in Older Adults

Jennapher Lingo VanGilder¹, Kevin Duff², Keith Lohse³, Kyle Elliott¹, Peiyuan Wang¹, Sydney Schaefer^{1,3}

¹Arizona State Univ., Tempe, USA. ²Univ. of Utah Hosp., Salt Lake City, USA. ³Univ. of Utah, Salt Lake City, USA

T11: The Effect of Myoelectric Computer Interface Training on Arm Kinematics and Function After Stroke

Siva Nalabothu^{1,2}, Ishaar Ganesan^{1,2}, Torin Kovach^{1,2}, Marc Slutzky²

¹Illinois Mathematics and Science Academy, Aurora, USA. ²Northwestern Feinberg School of Medicine, Chicago, USA

T12: Using Motor Behavior to Predict One-Year Declines in Activities of Daily Living in Older Adults with Amnesic Mild Cognitive Impairment

Sydney Schaefer^{1,2}, Kayla Suhrie², Kevin Duff²

¹Arizona State Univ., Tempe, USA. ²Univ. of Utah, Salt Lake City, USA

T13: Five Simple Rules to Assessing Clinical Literature: A perspective for the practicing clinician in stroke rehabilitation

Jonathan Tsay¹, Carolee Winstein²

¹Univ. of California, Berkeley, USA. ²Univ. of Southern California, Los Angeles, USA

T14: On the Importance of Gait Speed: Perspectives from people with multiple sclerosis and neurologic physical therapists

Prudence Plummer, Andrea Stewart, Jessica Anderson

Univ. of North Carolina, Chapel Hill, USA

T15: Deep Brain Stimulation of the dento-thalamo-cortical pathway modulates motor cortical rhythms in stroke patients

*Fletcher H. McDowell Award Finalist

Raghavan Gopalakrishnan¹, Kenneth Baker², David Cunningham³, Nicole Mathews², Brett Campbell², Alexandria Wyant⁴, Andre Machado^{1,5}

¹Center for Neurological Restoration, Cleveland Clinic, Cleveland, USA. ²Neurosciences, Cleveland Clinic, Cleveland, USA. ³Physical Medicine and Rehabilitation, Case Western Reserve Univ., Cleveland, USA. ⁴Biomedical Engineering, Cleveland Clinic, Cleveland, USA. ⁵Neurosurgery, Cleveland Clinic, Cleveland, USA

T16: Kinematic Measures of Ipsilesional Arm Motor Performance Significantly Predict Both Functional Movement Deficits and Overall Functional Independence in Moderate-to-Severely Impaired Chronic Stroke Survivors

Shanie Jayasinghe¹, Candice Maenza¹, David Good¹, Carolee Winstein², Robert Sainburg³
¹Penn State College of Medicine, Hershey, USA. ²Univ. of Southern California, Los Angeles, USA. ³The Pennsylvania State Univ., Univ. Park, USA

T17: Handedness, Rather Than Injury Side or Severity, Determines Hand Choices After Unilateral Injury

Madeline Thompson, Maureen Hyde, Susan Mackinnon, Benjamin Philip
Washington Univ. School of Medicine, St. Louis, USA

T18: Predicting Upper Limb Recovery After Stroke Following the Extended Proportional Recovery Rule

Rick van der Vliet¹, Ruud Selles¹, Carel Meskers², Gert Kwakkel²
¹Depts. of (1) Neuroscience, (2) Rehabilitation Medicine and (3) Plastic and Reconstructive Surgery, Erasmus Medical Center, Rotterdam, Netherlands. ²Dept. of Rehabilitation Medicine, Amsterdam Univ. Medical Centre, location VU Univ. Medical Center, Amsterdam Neurosciences and Amsterdam Movement Sciences, Amsterdam, Netherlands

T19: Effects of Physical Activity Interventions on Primary Motor Cortex BOLD Profile in Unimanual Movements

Javier Omar¹, Lisa Krishnamurthy^{2,3}, Kevin Mammino^{2,4}, Bruce Crosson^{2,1,3}, Giri Krishnamurthy^{2,1}, Joe Nocera^{2,1}, Keith McGregor^{2,1}
¹Emory Univ., Decatur, USA. ²Atlanta VA Medical Center, Decatur, USA. ³Georgia State Univ., Atlanta, USA

T20: Elucidating the Role of Contralesional Motor Cortices in Upper Limb Functional Motor Recovery after Stroke

Ela Plow¹, Yin-Liang Lin², Vishwanath Sankarasubramanian³, Kelsey Potter-Baker⁴, David Cunningham⁵, Kyle O'Laughlin¹, Adriana Conforto⁶, Ken Sakaie¹, Xiaofeng Wang¹, Jayme Knutson^{5,7}, Andre Machado¹
¹Cleveland Clinic Foundation, Cleveland, USA. ²Dept. of Physical Therapy and Assistive Technol., Natl. Yang-Ming Univ., Taipei, Taiwan. ³Univ. of Michigan, Ann Arbor, USA. ⁴Univ. of Texas, Rio Grande Valley, USA. ⁵MetroHealth, Cleveland, USA. ⁶Univ. of Sao Paulo, Sao Paulo, Brazil

T21: The Effects of Heel Lifts on Dynamic Measures of Gait and Static Posture and in Individuals with Parkinson's Disease

Liz Jusko, Breanna Roderos, Sarah Uno, Jennifer Hastings
Univ. of Puget Sound, Tacoma, USA

T22: Through Thick and Thin: How sparing of the spinal cord after injury influences motor recovery

Aaron Carrillo, Kelsey Baker
Univ. of Texas Rio Grande Valley, Edinburg, USA

T23: Performance Differences Between Electroencephalography and Electromyography Biofeedback Training in Stroke Rehabilitation

Octavio Marin-Pardo, Athanasios Vourvopoulos, Meghan Neureither, David Saldana, Esther Jahng, Sook-Lei Liew
Univ. of Southern California, Los Angeles, USA

T24: Corticospinal Tract Lesion Load, but Not Lesion Volume, Improves Hippocampal Volume Prediction Model in Chronic Stroke Patients

Artemis Zavaliangos-Petropulu^{1,2}, Neda Jahanshad¹, Paul Thompson¹, Sook-Lei Liew^{2,1}
¹Imaging Genetics Center, Mark and Mary Stevens Neuroimaging and Informatics Inst., Keck School of Medicine, Univ. of Southern California, Marina Del Rey, USA. ²Neural Plasticity and Neurorehabilitation Lab., Univ. of Southern California, Los Angeles, USA

T25: A Knowledge Base for Human Motor Circuitry

Souvik Roy¹, Kara Bocan², Natasa Miskov- Zivanov², Wittenberg George^{3,4,5}
¹Univ. of Pittsburgh School of Medicine, Pittsburgh, USA. ²Univ. of Pittsburgh Dept. of Electrical Engineering, Pittsburgh, USA. ³Univ. of Pittsburgh Dept. of Neurology, Pittsburgh, USA. ⁴Center for Neural Basis of Cognition, Pittsburgh, USA. ⁵Rehab Neural Engineering Labs, Pittsburgh, USA

T26: Gait Abnormality Detection in Patients with Parkinson's Disease

Nader Naghavi, Eric Wade
 Univ. of Tennessee, Knoxville, USA

T27: Measuring Transcallosal Inhibition for the Lower Extremity: Methodology and reliability in stroke

Anjali Sivaramakrishnan, Sangeetha Madhavan
 Univ. of Illinois at Chicago, Chicago, USA

T28: Atypical Motor Evoked Potentials from Single-Pulse Transcranial Magnetic Stimulation in Children with Hemiparetic Cerebral Palsy

Samuel Nemanich¹, Ephrem Zewdie², HsingChing Kuo², Sunday Francis¹, Colum MacKinnon¹, Gregg Meekins³, Adam Kirton², Bernadette Gillick¹
¹Univ. of Minnesota, Minneapolis, USA. ²Univ. of Calgary, Calgary, Canada. ³Tomah VA Medical Center, Tomah, USA

T29: Comparison of Corticospinal Tract Fractional Anisotropy Extracted from Native Versus Standard Space in Chronic Stroke

Allison Lewis, Jill Stewart
 Univ. of South Carolina, Columbia, SC, USA

T30: Brain Derived Neurotrophic Factor Gene (BDNF) Polymorphism Predicts Response to Continuous Theta Burst Stimulation (cTBS) in Chronic Stroke Patients

*Presidential Award Finalist
 Shreya Parchure¹, Denise Harvey¹, Priyanka Shah-Basak¹, Laura DeLoretta¹, Rachel Wurzman¹, Daniela Sacchetti¹, Olufunsho Faseyitan¹, Falk Lohoff², Roy Hamilton¹
¹Laboratory for Cognition and Neural Stimulation, Dept. of Neurology, Univ. of Pennsylvania, Philadelphia, USA. ²National Inst. for Alcohol Abuse and Alcoholism, National Insts. of Health (NIH), Bethesda, USA

T31: The Effects of Interval Training with Blood Flow Restriction and Body Cooling on the Cognitive Function of Individuals with Post-Concussive Symptoms for More than One Year

Andrew Stanwicks¹, Caroline Stark¹, Terrie Enis², Robert Cantu², Jess Gravel², Matthew White², Yi-Ning Wu¹
¹UMass Lowell, Lowell, USA. ²Emerson Hosp., The Robert Cantu Concussion Center, Concord, USA

T32: Neuroplasticity Following Interlimb Training Differs Between Transradial Versus Partial-Hand Prosthesis Use

Bennett Alterman, William Hendrix, Jade Lee, Katrina Binkley, Emily Keeton, Saif Ali, Lewis Wheaton
Georgia Inst. of Technology, Atlanta, USA

T33: A Dynamics-Based Approach to Quantifying Post-Stroke Upper Extremity Impairment using Wrist-Worn Wearable Sensors

Fengpei Yuan, Eric Wade
Univ. of Tennessee, Knoxville, USA

T34: Patient-reported and Performance-based-measures of Physical Function after Stroke Measure Different Components of Recovery

Margaret French¹, Darcy Reisman¹, Allen Heinemann², David Tulskey¹, Daniel White¹
¹*Univ. of Delaware, Newark, USA.* ²*Shirley Ryan AbilityLab, Chicago, USA*

T35: Implementation and Evaluation of the Graded Repetitive Arm Supplementary Program (GRASP) in the Community

Chieh-ling Yang^{1,2}, Marie-Louise Bird³, Janice Eng^{1,2}
¹*Univ. of British Columbia, Vancouver, Canada.* ²*GF Strong Rehab Centre, Vancouver, Canada.* ³*Univ. of Tasmania, Launceston, Australia*

T36: Motor Recovery and Sleep after Brain Injury

Melanie K. Fleming^{1,2,3}, Tom Smejka^{1,2}, David Henderson Slater^{2,1}, Veerle van Gils^{1,4}, Emma Garratt³, Ece Yilmaz-Kara^{2,1}, Heidi Johansen-Berg¹
¹*Wellcome Centre for Integrative Neuroimaging, Univ. of Oxford, Oxford, UK.* ²*Oxford Centre for Enablement, Oxford Univ. Hospitals NHS Foundation Trust, Oxford, UK.* ³*Oxfordshire Stroke Rehabilitation Unit, Oxford Health NHS Foundation Trust, UK.* ⁴*Faculty of Psychology and Neuroscience, Maastricht Univ., Maastricht, Netherlands*

T37: Altered Upper Limb Motor Modules and Their Contribution to Post-Stroke Limitations in the Feasible Force Space

Jinsook Roh¹, Gang Seo¹, Sang Wook Lee², Amani Alamri³, Randall Beer⁴, Preeti Raghavan⁵, Yi-Ning Wu⁶, William Rymer⁴
¹*Univ. of Houston, Houston, USA.* ²*Catholic Univ. of America, Washington, USA.* ³*WuXi Advanced Therapies, Philadelphia, USA.* ⁴*Northwestern Univ., Chicago, USA.* ⁵*Johns Hopkins Univ., Baltimore, USA.* ⁶*Univ. of Massachusetts Lowell, Lowell, USA*

T38: Development of a Quantitative Tool to Measure Ankle Proprioception in Stroke Survivors

Ahlam Salameh^{1,2}, Margaret Skelly¹, Jessica McCabe¹, Svetlana Pundik^{1,2}
¹*Louis Stokes Cleveland Dept. of Veterans Affairs Medical Center, Cleveland, USA.* ²*Case Western Reserve Univ., Cleveland, USA*

T39: The EEG Power Spectrum as a Possible Biomarker for Age-Related Cognitive Decline: A pilot study

Anupriya Pathania, Mindie Clark, Rhiannon Cowen, Matt Euler, Kevin Duff, Keith Lohse
Univ. of Utah, Salt Lake City, USA

T40: Enhancing Motor Recovery with Two Types of Intense and High-Dose Training in the Sub-Acute Period After Stroke: The SMARTS2 study

John Krakauer¹, Tomoko Kitago^{2,3,4}, Jeff Goldsmith³, Omar Ahmad¹, Promit Roy¹, Joel Stein³, Lauri Bishop^{5,3}, Kelly Casey¹, Belen Valladares⁶, Michelle Harran^{1,3}, Juan Camilo Cortes^{1,3}, Forrence Alexander¹, Jing Xu¹, Sandra DeLuzio¹, Benjamin Hertler⁶, Jeremia Held⁶, Bert Eenhoorn⁶, Levke Steiner⁶, Kelly Jordan⁷, Daniel Ludwig¹, Megan Moore⁷, Marlena Casey¹, Isha Vora¹, Steven Zeiler¹, Meret Branscheidt⁸, Gert Kwakkel¹⁰, Andreas Luft^{6,11}

¹Johns Hopkins Univ., Baltimore, USA. ²Burke Neurological Inst., White Plains, USA.

³Columbia Univ., New York, USA. ⁴Weill Cornell Medicine, New York, USA. ⁵Univ. of Southern California, Los Angeles, USA. ⁶Univ. Hosp. Zurich, Zurich, Switzerland. ⁷Johns Hopkins Univ., White Plains, USA. ⁸Univ. Hosp. Zurich, Zurich, USA. ¹⁰Amsterdam Univ. Medical Center, Amsterdam, Netherlands. ¹¹Cereneo Center for Neurology and Rehabilitation, Vitznau, Switzerland

T41: Comparison of Between Arm Muscle Activation During Unilateral Reaching in Individuals with Pediatric Hemiplegia

Nayo Hill, Julius Dewald
Northwestern Univ., Chicago, USA

T42: Further Consensus building at the Second Stroke Recovery and Rehabilitation Roundtable (SRRR II)

Julie Bernhardt^{1,2}, Kathryn Hayward^{1,3,2}, Gert Kwakkel^{4,5}, Jane Burridge⁶, Janice Eng⁷, Marion Walker⁸, Marie-Louise Bird^{7,9}, Karen Borschmann^{1,2}, Steven Cramer¹⁰, Michael O'Sullivan¹¹, Andrew Clarkson¹², Matthew McDonald^{13,14}, Matthew Jeffers^{13,14}, Dale Corbett^{13,14}, On behalf of the SRRR II Collaboration¹⁵

¹Florey Inst. of Neuroscience and Mental Health, Melbourne, Australia. ²NHMRC CRE in Stroke Rehabilitation and Brain Recovery, Melbourne, Australia. ³Univ. of Melbourne, Melbourne, Australia. ⁴Amsterdam UMC Vrije Universiteit, Amsterdam, Netherlands. ⁵Amsterdam Rehabilitation Research Centre, Amsterdam, Netherlands. ⁶Univ. of Southampton, Southampton, United Kingdom. ⁷The Univ. of British Columbia, Vancouver, Canada. ⁸Univ. of Nottingham, Nottingham, United Kingdom. ⁹Univ. of Tasmania, Hobart, Australia. ¹⁰Univ. of California Irvine, Irvine, USA. ¹¹Univ. of Queensland, Brisbane, Australia. ¹²Univ. of Otago, Otago, New Zealand. ¹³Univ. of Ottawa, Ottawa, Canada. ¹⁴Canadian Partnership for Stroke Recovery, Ottawa, Canada

T43: Development of a Novel EMG Controlled Force Tracker Task to Study Motor Learning in Chronic Stroke

Emily L. Hinson¹, Melanie K. Fleming¹, Fylis Van Horssen², Alek Pogosyan¹, Will Clarke¹, Charlotte J Stagg¹

¹Univ. of Oxford, Oxford, United Kingdom. ²Radboud Univ., Nijmegen, Netherlands

T44: Kinematics from Robotic Rehabilitation After Stroke Correlate Motor Recovery Scales

Donghwan Hwang, Suncheol Kwon, Joon-Ho Shin
National Rehabilitation Center, Seoul, Republic of Korea

T45: Elucidating the Mechanisms of Cervical Transcutaneous Spinal Stimulation

*Fletcher H. McDowell Award Finalist

Jaclyn Wehct, Jonah Levine, Hannah Sfredo, James LiMonta, Yu-Kuang Wu, Noam Harel

James J. Peters VA Medical Center, Bronx, USA

T46: A Comprehensive Assessment of Impairment (Flexion Synergy Pattern) Around the Elbow in Stroke: Preliminary findings from the re-arm study

Levinia van der Velden^{1,2}, Bram Onneweer^{1,2}, Joyce Benner¹, Claudia Haarmann³, Marij Roebroek^{1,2}, Gerard Ribbers^{1,2}, Ruud Selles^{1,2}

¹Erasmus MC Univ. Medical Center, Rotterdam, Netherlands. ²Rijndam Rehabilitation, Rotterdam, Netherlands. ³Hankamp Rehab, Enschede, Netherlands

T47: Upper Extremity Motor Assessment and Neuroimaging Factors Important for Discharge Destination after Acute Stroke

David Lin¹, Kimberly Erler², Kelly Sloane¹, Alison Cloutier¹, Julie DiCarlo¹, Nicole Lam², Kristin Parlman¹, Jessica Ranford¹, Seth Finklestein¹, Teresa Kimberley², Lee Schwamm¹, Steven Cramer³, Leigh Hochberg¹

¹Massachusetts General Hosp., Boston, USA. ²MGH Inst. of Health Professions, Boston, USA. ³Univ. of California Irvine, Irvine, USA

T48: Monoaminergic Drive Upregulates the Expression of the Post-Stroke Flexion Synergy

Jacqueline R. Patterson, C.J. Heckman, Julius P.A. Dewald
Northwestern Univ., Chicago, USA

T49: Repetitive Paired Brain and Spinal Cord Stimulation Strengthen Spared Circuits and Reduce Hyperreflexia after Cervical Spinal Cord Injury

Ajay Pal¹, Aditya Ramamurthy¹, HongGeun Park¹, Thelma Bethea¹, Aldo Garcia-Sandoval², Shivakeshavan Ratnadurai-Giridharan³, Walter Voit², Jason Carmel¹

¹Columbia Univ. Medical Center, New York, NY, USA. ²The Univ. of Texas at Dallas, Richardson, TX, USA. ³Burke Neurological Inst., White Plains, NY, USA

T50: Transcranial Direct Current Stimulation Over Lesioned Motor Cortices Reduces the Expression of the Flexion Synergy and Nonlinear Brain-Muscle Connectivity in Hemiparetic Stroke

Yuan Yang, Runfeng Tian, Mark Cummings, Justin Drogos, Julius Dewald
Northwestern Univ., Chicago, USA

T51: Chronic Stroke Hemispheric Dominance and Task Specific fMRI Laterality of Cortical Motor Activation

David Cunningham^{1,2}, Alison Rickert^{1,2}, Ela Plow³, Jayme Knutson^{1,2}

¹Case Western Reserve Univ., Cleveland, USA. ²MetroHealth Rehabilitation Inst., Cleveland, USA. ³Cleveland Clinic, Cleveland, USA

T52: Soft Robotic Exosuits for Targeted Gait Rehabilitation After Stroke: A Case Study

Franchino Porciuncula¹, Teresa C. Baker², Dheepak Arumukhom Revi¹, Jaehyun Bae¹, Regina Sloutsky², Lauren Baker¹, Terry Ellis², Conor J. Walsh¹, Louis N. Awad^{2,1,3}

¹Paulson School of Engineering and Applied Sciences, and Wyss Inst. for Biologically Inspired Engineering, Cambridge, MA, USA. ²College of Health and Rehabilitation Sciences, Sargent College, Boston Univ., Boston, MA, USA. ³Dept. of Physical Medicine and Rehabilitation, Harvard Medical School, Cambridge, MA, USA

T53: Understanding Enablers and Barriers to Using Technology with People with Traumatic Brain Injury

Michael Munsell, Emily Dubas, Sadhvi Saxena, Jason Godlove, Swathi Kiran
The Learning Corp, Newton, USA

Abstract titles are printed as submitted by the author. Full abstracts can be found at www.asnr.com

T54: Virtual Reality Treatment for Phantom Limb Pain

Elisabetta Ambron¹, Laurel Buxbaum², Katherine Kuchenbecker³, Alexander Miller⁴, Branch Coslett¹

¹Univ. of Pennsylvania, Philadelphia, USA. ²Moss Rehabilitation Research Inst., Elkins Park, USA. ³Max Planck Inst. for Intelligent Systems, Stuttgart, Germany. ⁴Univ. of Pennsylvania, Philadelphia

T55: Quantifying Compensatory Trunk Movements During Goal-Directed Arm Reaches in Chronic Stroke Survivors - A pilot study

Bokkyu Kim

SUNY Upstate Medical Univ., Syracuse, NY, USA

T56: Review of Telerehabilitation for Stroke-related Deficits

Jennifer Mao¹, Kurt Knepley¹, Abhi Jain¹, Noam Hare^{1,2}

¹Philadelphia College of Osteopathic Medicine, Philadelphia, USA. ²Icahn School of Medicine at Mount Sinai, New York, USA

T57: Identifying spasticity and Abnormal Synergy Around the Elbow in Stroke Using Linear System Identification, Preliminary Findings from the ReArm Study

Bram Onnweer^{1,2}, Levinia L. van der Velden^{1,2}, Joyce Benner¹, Claudia J. W. Haarman³, Marij E. Roebroek^{1,2}, Gerard M. Ribbers^{1,2}, Ruud W. Selles^{1,2}

¹Erasmus Medical Centre, Rotterdam, Netherlands. ²Rijndam Rehabilitation, Rotterdam, Netherlands. ³Hankamp Rehab, Enschede, Netherlands

T58: How Do Accelerometer Variables Reflect Compensatory Upper Limb Movements?

Jessica Barth, Joseph Klasner

Washington Univ. in St. Louis, Saint Louis, USA

T59: Acamprostate Attenuates Unmitigated Alcoholism Following Severe Traumatic Brain Injury Affecting the Bilateral Frontal Cortical Regions

Chichun E. Sun, Claire Flaherty

Penn State Health Neurology, Hershey, USA

T60: Maintaining Written Communication in Nonfluent Progressive Aphasia with Behavioural Therapy and Transcranial Direct Current Stimulation: A case study

Priyanka Shah-Basak^{1,2}, Alita Fernandez², Sabrina Armstrong², Monica Lavoie^{2,3}, Regina Joke^{2,4,5}, Jed Meltzer^{2,4,6}

¹Dept. of Neurology, Medical College of Wisconsin, Milwaukee, USA. ²Rotman Research Inst., Baycrest Health Sciences, Toronto, Canada. ³Toronto Rehabilitation Inst., Toronto, Canada. ⁴Dept. of Speech-Language Pathology, Univ. of Toronto, Toronto, Canada. ⁵Dept. of Psychiatry, Baycrest Health Sciences, Toronto, Canada. ⁶Dept. of Psychology, Univ. of Toronto, Toronto, Canada

POSTER SESSION II

FRIDAY, OCTOBER 18 • 10:15 AM - 12:15 PM • LASALLE II BALLROOM

F1: Functional Consequences of Upper Extremity Motor Recovery in the First 90 Days after Stroke

**Fletcher H. McDowell Award Finalist*

Kimberly Erler¹, Alison Cloutier², Kelly Sloane², Joseph Locascio², Jessica Ranford², Kristin Parلمان², Nicole Lam¹, Susan Fasoli¹, Teresa Kimberley¹, Seth Finklestein², Lee Schwamm², Leigh Hochberg², David Lin²

¹MGH Inst, of Health Professions, Boston, USA. ²Massachusetts General Hosp., Boston, USA

F2: The feasibility of Using the Kinarm Exoskeleton for Robotic Stroke Rehabilitation

Alexa Keeling^{1,2}, Jennifer Semrau³, Mark Piitz², Stephen Bagg⁴, Andrew Demchuk^{1,2}, Janice Eng⁵, Nils Forkert^{1,2}, Bradley Goodyear^{1,2}, Michael Hill^{1,2}, Albert Jin⁶, Adam Kirton^{1,2}, Stephen Scott⁶, Sean Dukelow^{1,2}

¹Hotchkiss Brain Inst., Univ. of Calgary, Calgary, Canada. ²Dept. of Clinical Neurosciences, Univ. of Calgary, Calgary, Canada. ³Dept. of Kinesiology and Applied Physiology, Univ. of Delaware, Newark, USA. ⁴Dept. of Physical Medicine and Rehabilitation, Queen's Univ., Kingston, Canada. ⁵Dept. of Physical Therapy, Univ. of British Columbia, Vancouver, Canada. ⁶Dept. of Biomedical and Molecular Sciences, Queen's Univ., Kingston, Canada

F3: Disruption of Direct and Indirect Descending Pathways in Post-Stroke Individuals: Effects of stimulation timing and activation state

Alejandro Lopez, Jiang Xu, Justin Liu, Morgan Trees, Michael Borich, Trisha Kesar
Emory Univ., Atlanta, USA

F4: A Computational Model of Astrocytic Modulation: Fine motor skills and central pattern generators

Ioannis E. Polykretis, Konstantinos P. Michmizos
Rutgers Univ., New Jersey, USA

F5: Demand or Reorganization? Task dependent contralesional motor cortex activation during the early subacute phase of stroke recovery

Kate Revill¹, Deborah Barany^{1,2}, Alexandra Caliban¹, Isabelle Vernon¹, Samir Belagaje¹, Fadi Nahab¹, Cathrin Bueteffisch¹

¹Emory Univ., Atlanta, USA. ²Univ. of Georgia, Athens, USA

F6: Is Transcranial Magnetic Stimulation a Reliable Tool for Studying Neurophysiological Changes Associated with Functional Recovery in Individuals with Incomplete Tetraplegia?

Tarun Arora¹, Kelsey Potter-Baker^{2,1}, Kyle O'Laughlin¹, Xiaofeng Wang¹, Ela B. Plow¹

¹Cleveland Clinic Foundation, Cleveland, USA. ²Univ. of Texas Rio Grande Valley, Edinburg, USA

F7: Unplanned Interruption of Acute Rehabilitation after Stroke

Amanda A. Herrmann^{1,2}, Gretchen M. Niemioja^{3,4}, Ella A. Chrenka^{5,3}, Sally I. Othman³, Katherine R. Podoll³, Annika K. Oie³, Haitham M. Hussein^{5,3,4}

¹HealthPartners Neuroscience Center, Minneapolis, USA. ²HealthPartners Inst., St. Paul, USA. ³HealthPartners Neuroscience Center, St. Paul, USA. ⁴Regions Hosp., St. Paul, USA. ⁵HealthPartners Inst., Minneapolis, USA

F8: Premotor Transcranial Direct Current Stimulation Increases Inter-hemispheric Resting-state Functional Connectivity in Patients with Chronic Stroke

Robert H. Unger^{1,2}, Mark J. Lowe³, Katherine A. Koenig³, Kelsey A. Potter-Baker⁴, Francois Bethoux⁵, Erik B. Beall³, Stephen E. Jones³, Xiaofeng Wang⁴, Ela B. Plow⁴, David A. Cunningham⁶

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F9: Does Haptic Feedback Support Motor Learning with a Prosthesis? A neurobehavioral evaluation

*Presidential Award Finalist

John Johnson, Lewis Wheaton

Georgia Inst, of Technology, Atlanta, USA

F10: Mapping of Motor Responses to Epidural Electrical Stimulation of the Cervical Spinal Cord in Humans Suggests Recruitment of Dorsal Root Afferents and Strong Integration Between Segments

Bushra Yasin^{1,2}, Steve Karceski³, Oleg Modik³, Evgeny Shelkov³, Michael Virk², Jason Carmel^{1,4}

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F11: Spatial Aiming and Far Bias to Predict Functional Disability in Spatial Neglect

A.M. Barrett^{1,2,3}, Phalgun Nori^{2,3}, Elizabeth Murray⁴, Jenny Masmela¹

¹Kessler Foundation, West Orange, USA. ²Kessler Inst, of Rehabilitation, West Orange, USA. ³Rutgers New Jersey Medical School, Newark, USA. ⁴JFK Neuroscience Inst., Edison, USA

F12: Towards Quantifying Rehabilitation with Wearable Sensors and Deep Learning

Avinash Parnandi¹, Aakash Kaku², Natasha Pandit¹, Carlos Fernandez-Granda², Heidi Schambra¹

¹New York Univ. School of Medicine, New York City, USA. ²New York Univ. Center for Data Science, New York City, USA

F13: Effect of Visual Distortion on Limb Selections in Virtual Reality System

Jing Wang, Peter Lum, Sang Wook Lee

Rehabilitation Engineering Research Center-DC (RERC-DC), Catholic Univ. of America, School of Engineering, Biomedical Engineering Dept., Washington D.C., USA

F14: A Feasibility Study on Laryngeal Vibro-tactile Stimulation as a New Treatment for the Voice Disorder Spasmodic Dysphonia

Juergen Konczak¹, Arash Mahnan¹, Sanaz Khosravani², Yang Zhang³, Peter J. Watson³
¹Human sensorimotor control lab, Univ. of Minnesota, Minneapolis, USA. ²Harvard Medical School, Boston, USA. ³Dept. of Speech-Language-Hearing Sciences, Univ. of Minnesota, Minneapolis, USA

F15: Effect of Posture and Activation on Transcranial Magnetic Stimulation-evoked Responses in People Post-stroke

Morgan Trees, Jiang Xu, Alejandro Lopez, Trisha Kesar
 Emory Univ., Atlanta, USA

F16: Using Biomarkers of Neuroimaging and Kinematic Measures to Explain the Variability in Stroke

Sandra R. Alouche¹, Melanie C. Baniña^{2,3}, Timothy K. Lam⁴, Kay-Ann Allen⁴, Richard Swartz⁴, Alexander Thiel^{5,6}, Mindy F. Levin^{2,3}, Joyce L. Chen^{4,7,8}
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F17: Shoulder Internal and External Rotation Strength During Abduction and Adduction Loading in Chronic Stroke and Controls

Joseph Kopke^{1,2,3}, Levi Hargrove^{3,1,4}, Michael Ellis²
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F18: Losing Your Mind: Understanding demyelination in the brain after SCI

Gisselle Montemayor, Rogelio Meza, Kelsey Baker
 Univ. of Texas Rio Grande Valley, Edinburg, USA

F19: Acute High-intensity Interval Exercise Modulates Cortical Excitability of the Non-exercised Upper-Limb in Individuals with Chronic Stroke and Healthy Older People

Jason Neva, Brian Greeley, Briana Chau, Jennifer Ferris, Christina Jones, Lara Boyd
 Univ. of British Columbia, Vancouver, Canada

F20: White matter Integrity of Medial Reticulospinal Tract is Increased Post Hemiparetic Stroke

*2019 Fletcher H. McDowell Award Recipient
Haleh Karbasforoushan¹, Julien Cohen-Adad², Julius Dewald¹
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F21: Locus of Interlimb Temporal Coupling After StrokeRini Varghese¹, Robert Sainburg², James Gordon¹, Carolee Winstein¹¹Univ. of Southern California, Los Angeles, USA. ²Pennsylvania State Univ., State College, USA**F22: Minor Stroke, Serious Problems: The impact on balance and gait capacity, fall rate, and physical activity**Vivian Weerdesteyn^{1,2}, Jolanda Roelofs¹, Ingrid Schut³, Anouk Huisinga⁴, Alfred Schouten^{3,5}, Henk Hendricks⁶, Frank-Erik De Leeuw⁷, Leo Aerden⁸, Hans Bussmann⁹, Alexander Geurts¹¹Dept. of Rehabilitation, Donders Inst, for Brain, Cognition and Behaviour, Radboud Univ. medical center, Nijmegen, Netherlands. ²Sint Maartenskliniek Research, Nijmegen, Netherlands. ³Dept. of Biomechanical Engineering, Delft Univ. of Technology, Delft, Netherlands. ⁴Rehabilitation Centre Klimmendaal, Arnhem, Netherlands. ⁵Dept. of Biomechanical Engineering, Technical Medical Centre, Univ. of Twente, Enschede, Netherlands. ⁶Dept. of Rehabilitation Medicine, Rijnstate Hosp., Arnhem, Netherlands. ⁷Dept. of Neurology, Donders Inst, for Brain, Cognition and Behaviour, Radboud Univ. Medical Center, Nijmegen, Netherlands. ⁸Dept. of Neurology, Reinier de Graafgasthuis, Delft, Netherlands. ⁹Dept. of Rehabilitation Medicine, Erasmus Univ. Medical Center, Rotterdam, Netherlands**F23: Does Transcranial Direct Current Stimulation Improve Reaction Times of People After Stroke During Balance Perturbations, Gait Initiation, or Voluntary Ankle Dorsiflexion Movement?**Milou Coppens¹, Wouter Staring¹, Alexander Geurts¹, Vivian Weerdesteyn^{1,2}¹Dept. of Rehabilitation, Donders Inst, for Brain, Cognition and Behaviour, Radboud Univ. Medical Center, Nijmegen, Netherlands. ²Sint Maartenskliniek Research, Nijmegen, Netherlands**F24: Adaptive Arm Training for Children with Hemiparesis (One-Sided Weakness) as a Result of Acquired Brain Injury (ABI)**Talita Campos^{1,2}, Kathleen Friel^{1,2}¹Burke Neurological Inst., White Plains, NY, USA. ²Blythedale Children's Hosp., Valhalla, NY, USA**F25: Electrode Montage and Dose of Non-invasive Stimulation - Important considerations for Stroke Recovery applications**Anant Shinde^{1,2}, David Alsop^{1,2}, Gottfried Schlaug^{1,2}¹Harvard Medical School, Boston, USA. ²Beth Israel Deaconess Medical Center, Boston, USA**F26: Vagus Nerve Stimulation Paired with Rehabilitation for Upper Limb Recovery After Stroke: 1-year follow up**Teresa Kimberley¹, Navzer Engineer², Cecilia Prudente², David Pierce², Gerard Francisco³, Nuray Yozbatiran³, Brent Tarver², Reema Casavant², Danielle Kline¹, Ann Van de Winckel⁴, Jesse Dawson⁵¹MGH Inst, of Health Professions, Boston, USA. ²Microtransponder, Austin, USA.³Univ. of Texas Health Science Center at Houston, Houston, USA. ⁴Univ. of Minnesota,Minneapolis, USA. ⁵Univ. of Glasgow, Glasgow, UK

F27: Assessing the Structural and Functional Impact of Cerebral Microinfarction in Mice

Melissa Filadelfi, Greg Silasi
Univ. of Ottawa, Ottawa, Canada

F29: Hypoxic ventilatory response (HVR) and Burst-to-burst Variability in Spontaneously Breathing Urethane-anesthetized Adult Female Rats with Mid-thoracic Moderate Contusion SCI

Christine Wang, William F. Collins, Irene C. Solomon
Stony Brook Univ., Stony Brook, USA

F30: The Relationship between Hand Function and Posterior Parietal Cortex and Primary Motor Cortex Connectivity during Post-Stroke Recovery

Lauren Edwards, Ashley Mangin, Scott Shaeffer, Jacqueline Palmer, Michael Borich, Cathrin Bueteifisch
Emory Univ., Atlanta, USA

F31: The Impact of AFO-use on Fall Outcomes and Compensatory Stepping Response of Stroke Survivors During Trip-like Treadmill Perturbations

Masood Nevisipour, Claire Honeycutt
Arizona State Univ., Tempe, USA

F32: Sensorimotor Impairments and Cortical Reorganization in a Photothrombosis-induced Perinatal Stroke Model in Mice

Sarah Y. Zhang, Greg Silasi
Univ. of Ottawa, Ottawa, Canada

F33: Proprioceptive Sensitivity, Biases and Adaptability during Post-Stroke Walking

Cristina Rossi^{1,2}, Kristan Leech³, Amy Bastian^{1,2}
¹*Johns Hopkins Univ., Baltimore, USA.* ²*Kennedy Krieger Inst., Baltimore, USA.* ³*Univ. of Southern California, Los Angeles, USA*

F34: Energy Recovery During Gait with Powered Assistance for Individuals with Cerebral Palsy: A pilot study on the impact of increased ankle power

Benjamin Conner¹, Zachary Lerner²
¹*Univ. of Arizona College of Medicine - Phoenix, Phoenix, USA.* ²*Northern Arizona Univ., Flagstaff, USA*

F35: Novel, Academically-focused Cognitive Rehabilitation Program Provides a Ramp to College Success for Young Adults with Acquired Brain Injury

Natalie Gilmore, Swathi Kiran
Boston Univ., Boston, USA

F36: Differential Effects of Internal Versus External Focus of Attention on Action Planning and Execution in Patients with Right and Left Hemispheric Stroke

Shailesh Kantak, Tessa Johnson, William Marsh
Moss Rehabilitation Research Inst., Elkins Park, USA

F37: Implicit and Explicit Locomotor Learning in People with Parkinson's Disease

Elizabeth Thompson^{1,2}, Margaret French², Carole Tucker¹, Darcy Reisman²
¹Temple Univ., Philadelphia, PA, USA. ²Univ. of Delaware, Newark, DE, USA

F38: Developing an Automated System for Identifying Upper Extremity Rehabilitation Exercise Type and Quantifying Exercise Dose Using Biometric Sensors and Machine Learning

Noah Balestra¹, Kyle Choi², Tanzeem Choudhury³, Ania Busza⁴
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F39: Optimizing Video Game Design for Stroke Rehabilitation: A systematic review of important game parameters

Nathan Pinnette¹, Ania Busza²
¹Univ. of Rochester, Rochester, USA. ²Dept. of Neurology Univ. of Rochester, Rochester, USA

F40: Decreased Excitability of Contralesional Cortex in Individuals with Moderate to Severe Upper Limb Impairment

Mary Ellen Stoykov^{1,2}, Fabian David⁴, Erin King⁵, Daniel M. Corcos⁴, Sangeetha Madhavan⁶
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F41: Flexion Synergy is the Principal Detriment to Reaching Function in Individuals with Chronic Moderate to Severe Stroke

Grace C. Bellinger, Michael D. Ellis
 Northwestern Univ., Chicago, IL, USA

F42: The Relation Between Function Connectivity and Clinical Outcomes in Adult Stroke Survivors Undergoing Exoskeleton Upper Limb Home Therapy

Melissa Sandison^{1,2}, Peter Lum^{1,2}
¹The Catholic Univ. of America, Washington DC, USA. ²RERC-DC, Washington DC, USA

F43: Excessive Neural Activation in Cerebellar Network during a Non-Symptomatic Task in Adductor Spasmodic Dysphonia: An fMRI and TMS Study

Yi-Ling Kuo¹, Mo Chen^{2,3}, Rebekah Summers², Cecília Prudente², George Goding⁴, Sharyl Samargia⁵, Christy Ludlow⁶, Teresa Kimberley^{1,7}
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F44: Characterization, Identification, and Mitigation of Movement Artifacts in Electroencephalographic Measurements Toward Robot-aided Neuromuscular Assessment

Sebastian Rueda-Parra, Eric T. Wolbrecht, Joel C. Perry
Univ. of Idaho, Moscow, USA

F45: Finger Force Perception during Pressing Tasks: Comparison of force matching, hypothetical control variables matching, and psychophysical reports

Cristian Cuadra^{1,2}, Mark Latash¹
¹*Penn State, State College, USA.* ²*Universidad Andres Bello, VINA DEL MAR, Chile*

F46: The Neural Mechanisms Underlying tDCS Effects in PPA: Evidence from resting-state functional network analysis

**Presidential Award Finalist*
Yuan Tao¹, Brenda Rapp², Kyrana Tsapkini³
¹*Johns Hopkins Univ., Baltimore, USA.* ²*Dept. of Cognitive Science, Johns Hopkins Univ., Baltimore, USA.* ³*Dept. of Neurology, Johns Hopkins School of Medicine, Baltimore, USA.*

F47: Theta Power is a Longitudinal EEG Spatial and Spectral Biomarker of Spontaneous Motor Recovery after Stroke

Lauren Ostrowski^{1,2}, A. Nicole Dusang^{3,4,1}, Alison Cloutier², Fabio Giatsidis², Sydney Cash^{5,6}, Leigh Hochberg^{1,3,2,6,4}, David Lin^{2,1}
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F48: Role of Erk Phosphorylation and Retrograde Transport in Signaling Axotomy after Spinal Cord Injury

Li-Qing Jin¹, Kristen Hall¹, Samantha Lam¹, Jianli Hu¹, Michael Selzer^{1,2}
¹*Shriners Hosp.s Pediatric Research Center, Lewis Katz School of Medicine at Temple Univ., Philadelphia, USA.* ²*Dept. of Neurology, Philadelphia, USA*

F49: Amantadine Enhances Adaptive Potential in Early Adulthood Following Severe Crush Injury in Infancy

Joseph Malone, Claire Flaherty
Penn State Health Neurology, Hershey, USA

F50: Perturbation Training Rehabilitation of Dynamic Balance for Persons with Acquired Brain Injury: Exploratory, interventional and a neuroimaging trial

Katherin Joubran, Simona Bar-Haim, Lior Shmuelof
Ben-Gurion Univ. of the Negev, Beer Sheva, Israel.

F51: Intense Therapy after a Left Hemisphere Stroke Leads to Structural Adaptation in Right-hemisphere

**Fletcher H. McDowell Award Finalist*
Sebastien Paquette, Andrea Norton, Gottfried Schlaug
Beth Israel Deaconess Medical Center / Harvard Medical School, Boston, USA

F52: Kinematic Improvement Differs Between Transradial Versus Partial-Hand Prosthesis Use Following Interlimb Training

Emily Keeton, Bennett Alterman, William Hendrix, Jade Lee, Katrina Binkley, Saif Ali, Lewis Wheaton

Georgia Inst, of Technology, Atlanta, USA

F53: The Relationship Between Motor and Cognitive Switching During Walking in Stroke Survivors and Age-Matched Healthy Adults

Margaret French, Matthew Cohen, Ryan Pohlig, Darcy Reisman

Univ. of Delaware, Newark, USA

F54: Improvement of TMS Recruitment Curve Data Collection with a Real-Time TMS Display and Analysis System

Margaret Skelly¹, Jessica Mccabe¹, Svetlana Pundik^{1,2}

¹*Louis Stokes Cleveland Dept. of Veterans Affairs Medical Center, Cleveland, USA.* ²*Case Western Reserve Univ., Cleveland, USA*

F56: Alteration in Intermuscular Coordination and EMG-EMG Coherence in the Human Upper Extremity After Stroke

Wei Huang, Yunyuan Gao, Jinsook Roh, Yingchun Zhang

Univ. of Houston, Houston, USA

F57: Using TMS to Inform Paradigms of DBS in Human Stroke Motor Recovery

Kyle O'Laughlin¹, Ela Plow¹, Tarun Arora¹, Alexandria Wyant¹, Kelsey Potter-Baker², Yin-Liang Lin³, Raghavan Gopalakrishnan¹, Darlene Floden¹, Kenneth Baker¹, Andre Machado¹

¹*Cleveland Clinic, Cleveland, USA.* ²*Univ. of Texas, Rio Grande Valley, USA.* ³*Natl. Yang-Ming Univ., Taipei, Taiwan*

F58: Subventricular Zone-derived Neural Precursor Cells Support Tissue Remodeling After Ischemic Cortical Lesions

**2019 Presidential Award Recipient*

Michael Williamson, Stephanie Le, Ronald Franzen, Andrew Dunn, Michael Drew, Theresa Jones

Univ. of Texas at Austin, Austin, USA

F59: Predicting Neuroplasticity Effects of Continuous Theta Burst Stimulation (cTBS) with Motor Evoked Potential Input-Output Slope

Shreya Parchure, Rachel Wurzman, Brian Erickson, Denise Harvey, Daniela Sacchetti, Olufunsho Faseyitan, Roy Hamilton

Laboratory for Cognition and Neural Stimulation, Univ. of Pennsylvania, Philadelphia, USA

EXHIBITORS

National Center of Neuromodulation for Rehabilitation at MUSC

(Booth 1)



The National Center of Neuromodulation for Rehabilitation is an infrastructure resource funded by NIH (NICHD/NCMRR) as part of the Medical Rehabilitation Research Resource Network. The center has opportunities for people interested in neuromodulation. We are located at the Medical University of South Carolina (MUSC). Our primary goal is to develop and support a community of rehabilitation researchers who apply brain stimulation and operant conditioning technologies to both mechanistic and intervention studies to further develop the technology and theory for the field of rehabilitation. To help jump start research in the NM4R we fund pilot grants and collaborative research projects annually. (100)

TMSi

(Booth 2)



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ANT North America

(Booth 3)



ANT Neuro offers high density EEG as well as TMS products tailored to the needs of researchers. ANT's eego line of EEG devices enables efficient collection of high density EEG data (8 - 256 channels) either at rest or during movement. ANT offers specialized devices for study of neonates and infants. ANT's visor2 image guided TMS navigation system enables precise delivery of transcranial magnetic stimulation as well as functional mapping of motor and speech areas. This system is also designed to meet the demanding needs of clinical research. Our team of EEG and neuromodulation experts is happy to discuss how ANT's devices can help you achieve your research aims.

Brain Vision LLC

(Booth 4)



Brain Vision LLC offers cutting-edge research solutions for neurophysiological research including EEG, tES, TMS, EEG/fMRI, fNIRS, eye tracking, and more. Our Scientific Consultant team comprises research scientists from the neuroscience field with a thorough understanding of current experimental needs. Come visit our booth to discuss your ideal research solution!

Movotec
(Booth 5)



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g.tec neurotechnology GmbH
(Booth 6)



g.tec developed the first commercially available BCI system in 1999. All hardware and software developments are done in-house and work with all major BCI approaches (motor imagery, P300, SSVEP and slow cortical potentials). g.tec's BCI technologies have been tested on more than 500 subjects to guarantee a perfect working system.

Cambridge Electronic Design Limited
(Booth 7)



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MSquare Healthcare, a MindMaze Company
(Booth 8 - 9)



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(Booth 10)



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The Journal of Neurorehabilitation & Neural Repair
(Booth 12)



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ASNR FINANCIAL DISCLOSURES

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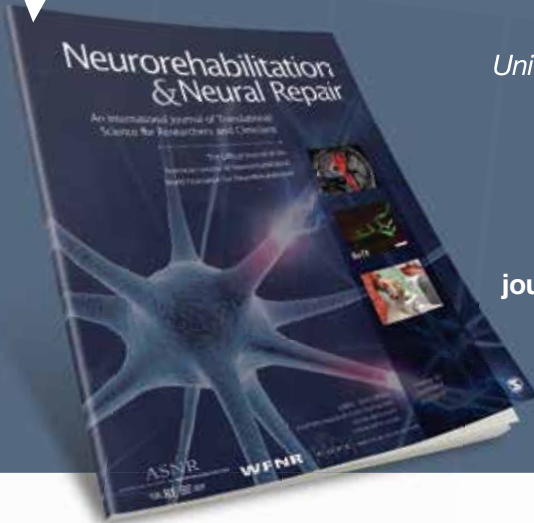
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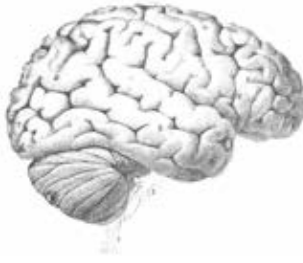
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