FINAL PROGRAM

ANA2022

147TH ANNUAL MEETING
OF THE AMERICAN NEUROLOGICAL ASSOCIATION

OCTOBER 22–25, 2022
CHICAGO, IL

Opening Symposium: October 22, 2022

AMERICAN NEUROLOGICAL ASSOCIATION
INNOVATORS IN DISCOVERY, EDUCATION, AND CARE

2022.myana.org • #ANA2022

Please note: all session times are listed in Central Daylight Time.

Corium

Booth #1

Discover a novel treatment option for Alzheimer's disease symptom management

Visit Corium at booth #1 to experience firsthand our proprietary Corplex™ technology

Corium

COM-ADL-003070 07/22

147TH ANNUAL MEETING
OF THE AMERICAN NEUROLOGICAL ASSOCIATION

Enjoy scientific symposia highlighting cutting-edge research in neurology, poster sessions with the latest emerging science, and professional development courses to help academic neurologists and neuroscientists at all career levels connect and excel at ANA2022. We are excited to be holding the meeting in-person for the first time in three years at the Hyatt Regency Chicago, Chicago, IL, October 22–25, 2022, with the Opening Symposium taking place on October 22.

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BROOKE COLLINS

OFFICE OF THE MAYOR

CITY OF CHICAGO

LORI E. LIGHTFOOT
MAYOR

October 20, 2022

Dear Friends:

On behalf of the City of Chicago, I am honored to welcome all those gathered for the American Neurological Association's 147th Annual Meeting.

Since its founding, the American Neurological Association (ANA) has worked to advance neurology through training and education, research, discovery, and clinical care. For the past 140 years, the ANA has been a strong advocate for its members and the field of neurology by expanding our understanding of the nervous system and the ability to treat them.

This year's meeting will bring together residents, medical students, academic, neurologists, and other health professionals to network, inspire, and learn. With a full schedule of symposium's, plenary sessions, workshops, developmental sessions, and networking events attendees will gain the tools and resources needed to move neurological science forward. I commend the American Neurological Association for their ongoing efforts to advance neurology.

I hope that during your stay in Chicago you take the time to see all the City has to offer. Explore our downtown and lakefront areas, tour the vibrant neighborhoods across our city, sample our diverse cuisine, visit our distinguished universities, and our world-class museums.

I hope your event is memorable and enjoyable. Best wishes for continued success.

Sincerely,

Lori E. Lightfoot

Mayor

Dear ANA2022 Annual Meeting attendees,

Rebecca Gottesman, MD PhD

Welcome to the 147th Annual Meeting of the American Neurological Association! How we have missed you! We are delighted to join together once again for our first in-person meeting in three years, for the 2022 American Neurological Association Annual Meeting, to be held October 22nd through October 25th in the great city of Chicago, Illinois. This will be a chance to gather to discuss science, cultivate new ideas and collaborations, network with colleagues, engage in professional development opportunities, and learn about cutting-edge developments in how we model, evaluate, diagnose, and treat neurologic disease.

We have an exciting program this year, with plenary topics ranging from "Brain Organoid Models of Neurological Disorders", as our Opening Symposium (to be held the evening of October 22nd), to sessions on new developments in neurodegeneration, somatic mutations, peripheral contributions to neurologic disorders, and health disparities in neurologic disease. The Presidential Symposium this year, "Neurologic Dark Matter: Exploring the Exposome that Drives Neurological Disorders", will address current research on the role of the environment in neurologic disease, and the Derek Denny-Brown Young Neurological Scholar Symposium will showcase leading research by future leaders in the field.

Beyond the opportunities for scientific inspiration from the plenaries, this meeting will provide numerous opportunities to interact with colleagues. We are excited about our new "Cross-cutting" Special Interest Groups (SIGs). These expand beyond the standard specialty-based SIGs (which will still be held) to allow opportunities to bring together investigators and trainees working in cross-cutting fields such as ***Neurodevelopment***, or ***Neurorecovery and Neuroplasticity***, or ***Neuroinflammation and Neuroinfection***; there are six of these new sessions in total. Our Interactive Lunch Workshop series will address important topics in research and clinical care, and our Professional Development courses offer an array of topics for individuals across the range of career stages. We will have lively poster sessions with opportunities to network and hear about (and present) new advances in the field.

New and junior members will not only enjoy the rigor of the scientific discussions and plenaries, lunch workshops, SIGs, and Professional Development courses, but there will be selected abstracts submitted by trainees and early career members presented at the plenary sessions as Emerging Scholar talks. We also offer, new this year, the "Research Careers Reimagined" Course, directed by Dr. Laura Balcer, and immediately preceding the meeting (October 21-22nd). This session will provide input from experts in multiple career paths, with a focus on both traditional and nontraditional pathways for career success. Early career attendees may also enjoy the kickoff Junior and Early Career Member Reception on the night of October 22nd, after the Opening Symposium. The ANA provides numerous networking opportunities for junior and early career members, and we hope you will come take advantage of them.

On behalf of ANA President Dr. Frances Jensen, the Scientific Program Advisory Committee (SPAC), the Board of Directors, the Interactive Lunch Workshops subcommittee, and the Career Development subcommittee, I'm delighted to welcome you—in-person—to the ANA2022 Annual Meeting.

Best wishes,

Rebecca Gottesman

Rebecca Gottesman, MD,PhD, FANA

Chair, Scientific Program Advisory Committee (SPAC)

Stroke Branch Chief and Senior Investigator

National Institute of Neurological Disorders and Stroke
Intramural Research Program, NIH

Bethesda, MD

ANA 2022
SCHEDULE AT A GLANCE

147TH ANNUAL MEETING
OCTOBER 22–25, 2022
Opening Symposium: October 22, 2022

All session times are listed in Central Daylight Time.

Friday, October 21, 2022

4:00 PM–8:45 PM	**ANA–NINDS Career Development Symposium Welcome Reception** *(Invitation only)*
5:00 PM–7:00 PM	**Research Careers Reimagined (RCR) Course** NEW **Welcome Reception** *(Pre-registration required)*

Saturday, October 22, 2022

7:00 AM–5:45 PM	**ANA–NINDS Career Development Symposium** *(Invitation only)*
7:00 AM–4:30 PM	★ **Research Careers Reimagined (RCR) Course** NEW *(Pre-registration required)*
2:00 PM–7:30 PM	**Registration**
5:00 PM–5:45 PM	**Opening Reception***
5:45 PM–7:15 PM	**Plenary Session** Opening Symposium: Brain Organoid Models of Neurological Disorders*
7:30 PM–9:00 PM	★ **Junior and Early Career Networking Reception***

Sunday, October 23, 2022

6:00 AM–5:30 PM	**Registration**
7:00 AM–9:00 AM	**Breakfast**
7:00 AM–7:30 AM	★ **Trainee Breakfast with ANA Board of Directors***
7:30 AM–9:00 AM	**Professional Development Courses** ★ Early Career & Early to Mid-Career Level Course 1: View from the NINDS, NIA, NICHD, and the DOD. AUPN Chair Career Level Course 1: Governmental Advocacy for Neurology Departments
9:00 AM–9:15 AM	**Break**
9:15 AM–11:30 AM	**Plenary Session** Novel Perspectives on Neurodegeneration*
11:30 AM–11:45 AM	**Break**
11:45 AM–1:00 PM	**Lunch**
12:00 PM–7:00 PM	**Poster Viewing***

Sunday, October 23, 2022 *continued*

11:45 AM–1:00 PM	**Interactive Lunch Workshops** A String of Pearls: Key Considerations in the Care of Neurological Infections Advancing the Science in Autoimmune Encephalitis Clinical Logic Neurological Complications in Women Neurological Complications of COVID-19—Part 1 Updates on Functional Neurological Disorder
11:45 AM–1:00 PM	**Additional Lunch Workshops** 22nd Annual Women of the ANA Lunch Program Career Advancement: Hurdles and Successes
1:15 PM–3:15 PM	**Plenary Session** Presidential Symposium—Neurologic Dark Matter: Exploring the Exposome that Drives Neurological Disorders
3:15 PM–3:30 PM	**Break**
3:30 PM–5:30 PM	**Cross-Cutting Special Interest Groups** NEW Health Services and Health Equity Research Neurodegeneration and Cell Death Neurodevelopment Neurogenetics and Gene Therapy* Neuroinflammation and Neuroinfection Neurorecovery and Neuroplasticity
5:30 PM–7:00 PM	**Poster Presentation & Reception***
6:30 PM–8:30 PM	**ANA–AUPN Career Fair***

Monday, October 24, 2022

6:30 AM–5:45 PM	**Registration**
6:30 AM–8:30 AM	**Breakfast**
7:00 AM–8:30 AM	**Professional Development Courses** ★ Early Career & Early to Mid-Career Level Course 2A: Early Career Development for International Graduates ★ Early Career & Early to Mid-Career Level Course 2B: Career Tracks in Academic Neurology AUPN Chair Career Level Course 2: Neuroscience Service Line: What's the Best Model?
8:30 AM–8:45 AM	**Break**
8:45 AM–10:45 AM	**Plenary Session** Emerging Role of Somatic Mutations in Neurology
10:45 AM–11:45 AM	**Executive Session of Membership***

★ Recommended for Junior and Early Career attendees.

Note: The Annual Meeting offers CME to eligible participants. Complete CME information, including a breakdown of the credits offered for each session and the instructions for claiming credit, is available online at 2022.myana.org/continuing-medical-education.

The American Neurological Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Schedule Subject to Change: The event's operating hours, schedules, and speakers are subject to change or cancellation without notice. Refunds will be not issued for failure to attend a live session.

All session times are listed in Central Daylight Time.

SCHEDULE AT A GLANCE, *continued*

All session times are listed in Central Daylight Time.

Monday, October 24, 2022 *continued*

11:45 AM–12:00 PM	**Break**
12:00 PM–1:00 PM	**Lunch**
12:00 PM–7:30 PM	**Poster Viewing***
12:00 PM–1:00 PM	**Interactive Lunch Workshops**
	Advances in Neuro-Imaging for Clinical Neurology
	An Update on Neurotoxicity After Cellular Therapies
	Epilepsy in Older Adults—Dilemmas, Challenges and Paradigms
	Teaching the Teachers—A Role for Clinical Educators
	Neurological Complications of COVID-19—Part 2
	The Impact of Gut Microbiome in Clinical Neurological Conditions
	Synergies for Global Bi-directional Learning and Research
12:00 PM–1:00 PM	**Additional Lunch Workshops**
	American Board of Psychiatry and Neurology (ABPN) Maintenance of Certification*
	AUPN-ANA Meet the Chairs Interactive Workshop*
1:00 PM–1:15 PM	**Break**
1:15 PM–3:30 PM	**Plenary Session**
	Derek Denny-Brown Young Neurological Scholar Symposium*
3:30 PM–3:45 PM	**Break**
3:45 PM–5:45 PM	**Traditional Special Interest Groups**
	Autoimmune Neurology & MS
	Behavioral Neurology and Dementia
	Epilepsy
	Global Neurology
	Neurocritical Care and Traumatic Brain injury
	Neuromuscular Disease
6:00 PM–7:30 PM	**Poster Presentation & Reception***
7:30 PM–10:30 PM	**President's Reception***

Tuesday, October 25, 2022

6:30 AM–2:00 PM	**Registration**
6:30 AM–8:30 AM	**Breakfast**
7:00 AM–8:30 AM	**Professional Development Courses**
	★ Early Career Level Course 3: Strategies for Landing your Target Fellowship/Faculty
	★ Early to Mid-Career Level Course 3: Demystifying the Academic Promotion Process
	AUPN Chair Career Level Course 3: Chair Evaluations of Faculty
8:30 AM–8:45 AM	**Break**
8:45 AM–10:45 AM	**Plenary Session**
	Peripheral Contributions to Neurologic Disorders: Adaptive Immunity and Metabolic Influences
10:45 AM–11:00 AM	**Break**
11:00 AM–12:30 PM	**Lunch**
11:00 AM–12:30 PM	**Traditional Special Interest Groups**
	ANA-AHS Headache
	Cerebrovascular Disease
	Movement Disorders*
	Neuro-Oncology
	Neuro-Ophthalmology and Neurovestibular Disease NEW
	Sleep Disorders and Circadian Rhythms
11:00 AM–12:30 PM	**Additional Lunch Workshops**
	Media Roundtable*
	AUPN Networking Lunch for Small Academic Departments*
12:30 PM–12:45 PM	**Break**
12:45 PM–2:30 PM	**Plenary Session**
	Advancing Neurologic Equity: Challenges and Paths Forward
2:30 PM	**Meeting Adjourns**

★ Recommended for Junior and Early Career attendees.

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All session times are listed in Central Daylight Time.

General Information

On-Site Registration: Grand Ballroom Foyer

Saturday, October 22	2:00 PM–7:30 PM
Sunday, October 23	6:00 AM–5:30 PM
Monday, October 24	6:30 AM–5:45 PM
Tuesday, October 25	6:30 AM–2:00 PM

Poster Session: Riverside East Center

Sunday, October 23	12:00 PM–7:00 PM

Poster presenters and poster judges will be in attendance from 5:30 PM–7:00 PM

Monday, October 24	12:00 PM–7:30 PM

Poster presenters and poster judges will be in attendance from 6:00 PM–7:30 PM

Speaker Ready Room: Grand Suite 5

Saturday, October 22	2:00 PM–7:30 PM
Sunday, October 23	6:00 AM–5:30 PM
Monday, October 24	6:30 AM–5:45 PM
Tuesday, October 25	6:30 AM–2:30 PM

Breakfast: Grand Ballroom Foyer

Sunday, October 23	7:00 AM–9:00 AM
Monday, October 24	6:30 AM–8:30 AM
Tuesday, October 25	6:30 AM–8:30 AM

Lunch: Grand Ballroom Foyer

Boxed Lunches will be distributed in the foyer and attendees are encouraged to bring them to the Interactive Lunch Workshops.

Sunday, October 23	11:45 AM–12:45 PM
Monday, October 24	11:45 AM–12:45 PM
Tuesday, October 25	11:00 AM–12:00 PM

Exhibit Hall: Riverside East Center

Sunday, October 23	12:00 PM–7:00 PM
Monday, October 24	12:00 PM–7:30 PM

Press Room: Grand Suite 2A

Sunday, October 23	8:00 AM–5:00 PM
Monday, October 24	8:00 AM–5:00 PM
Tuesday, October 25	8:00 AM–5:00 PM

Wireless Connection

All Hyatt Regency Chicago guest rooms booked under the ANA block will be equipped with complimentary high-speed wireless internet access during the official meeting dates (Saturday to Tuesday). To connect, enable WiFi on the device. While in the designated ANA meeting rooms at the Hyatt Regency Chicago, look for the network SSID: **Hyatt Conference**. When prompted, enter the passcode **ANA2022** (*Please note that the password is case sensitive*). Proceed to the internet as normal.

Disclaimer

Please note that some session titles may have changed since this program was posted online. Please refer to the ANA Mobile App for the most current information.

Continuing Medical Education: Accreditation & Designation Statement(s)

The American Neurological Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. The Annual Meeting offers CME to eligible participants. Detailed information pertaining to CME can be found in your conference bag and at the following website: **2022.myana.org/continuing-medical-education**

Annual Meeting Evaluations

Within a week following the event, you will receive an email containing a link to the evaluation. Please complete the online evaluation within a week of receipt in order to obtain any CME credit. You will be provided with a certificate within three weeks following completion of the evaluation. If you have any questions, please contact the ANA Meeting Coordinator at: **meetings@myana.org**

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Registration and attendance at, or participation in ANA meetings and other related activities constitutes attendee's authorization to ANA's use and distribution (both now and in the future) of the attendee's image or voice in photographs, video recordings, electronic reproductions, audio recordings, and other media throughout the world and royalty free.

Photography

Photography in the Annual Meeting Poster Area and Exhibit Area is restricted to the official conference photographer.

Language

The official language of the Annual Meeting is English. No simultaneous translation is available.

ADA

ANA fully complies with the legal requirements of the Americans with Disabilities Act rules and regulations. If any participant is in need of special accommodations, they should notify the hotel and indicate the type of assistance needed. ANA cannot ensure the availability of appropriate assistance without advance notice.

Stay in the know and join in on Social Media

#ANA2022

Program By Day

Friday, October 21, 2022

4:00 PM–8:45 PM **GRAND HALL I-J**

ANA-NINDS

ANA-NINDS Career Development Symposium

Welcome Reception *(Invitation only)*

COURSE DIRECTOR: *Lauren Sansing, MD, MS, FAHA, FANA, Yale University*

MODERATOR: *Argye Hillis, MD, MA, FANA, Johns Hopkins University*

This symposium is a joint collaborative effort between the ANA and NINDS which is designed for clinician-scientists with NIH career development awards (K08 and K23) and is chaired by senior neurologists and neuroscientists who have proven success in career building and navigation, scientific grant writing, networking, and balancing clinical and research efforts.

5:00 PM–7:00 PM **GRAND BALLROOM L-N**

RCR Course

Research Careers Reimagined (RCR) Course *NEW*

Welcome Reception *(Pre-registration required)*

COURSE DIRECTOR: *Laura J. Balcer, MD, MSCE, FANA, New York University*

COURSE CO-DIRECTOR: *Craig D. Blackstone, MD, PhD, FANA, Massachusetts General Hospital*

Saturday, October 22, 2022

7:00 AM–5:45 PM **GRAND BALLROOM G-J**

ANA-NINDS

ANA-NINDS Career Development Symposium

(Invitation only)

COURSE DIRECTOR: *Lauren Sansing, MD, MS, FAHA, FANA, Yale University*

This symposium is a joint collaborative effort between the ANA and NINDS which is designed for clinician-scientists with NIH career development awards (K08 and K23) and is chaired by senior neurologists and neuroscientists who have proven success in career building and navigation, scientific grant writing, networking, and balancing clinical and research efforts.

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

7:00 AM–4:30 PM GRAND BALLROOM L-N

RCR Course

★ **Research Careers Reimagined (RCR) Course** *NEW*

(Pre-registration required)

COURSE DIRECTOR: *Laura J. Balcer, MD, MSCE, FANA, New York University*
COURSE CO-DIRECTOR: *Craig D. Blackstone, MD, PhD, FANA, Massachusetts General Hospital*

This is an update to the prior Translational and Clinical Research Course (TCRC). The goal of the course is to educate a select group of young neurologists who are committed to academic careers, and to help them to explore the potential resources available while networking with nationally-renowned mentors and colleagues.

7:00 AM–8:00 AM
Breakfast

8:00 AM–8:15 AM
Welcome and Introductions

8:15 AM–8:40 AM
Development of Neurological Therapies: Update from 30,000 Feet
SPEAKER: *Walter J. Koroshetz, MD, National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH)*

8:40 AM–9:05 AM
Perspective: Research Careers Reimagined
SPEAKER: *Frances E. Jensen, MD, FANA, FACP, University of Pennsylvania*

9:05 AM–9:30 AM
Treatments and Guidelines: Paths to Clinical Application
SPEAKER: *Jacqueline A. French, MD, FANA, New York University*

9:30 AM–9:55 AM
Advancing Academic Careers through Participation in Research Networks: Examples from the Huntington Study Group
SPEAKER: *Andrew Feigin, MD, New York University*

9:55 AM–10:25 AM
Panel Discussion and Q&A

10:25 AM–10:55 AM
Coffee Break and Networking

10:55 AM–11:20 AM
Life and Investigation in Industry
SPEAKER: *Michael Panzara, MD, MPH, Neurvati Neurosciences*

11:20 AM–11:40 AM
Q&A

11:40 AM–12:10 PM
Philanthropic Support for Research: A Perspective
SPEAKER: *Deven Parekh, Insight Partners*

12:10 PM–1:00 PM
Lunch and Networking

1:00 PM–1:25 PM
CTSI and Other Resources for Research at Your Institution
SPEAKER: *Anthony S. Kim, MD, FANA, University of California, San Francisco*

1:25 PM–1:50 PM
Nontraditional Research: Education, Quality Improvement and Bioethics
SPEAKER: *Ariane Lewis, MD, New York University*

1:50 PM–2:20 PM
Panel Discussion and Q&A

2:20 PM–2:50 PM
Coffee Break and Networking

2:50 PM–3:15 PM
The Path to Achieving K-Level Funding
SPEAKER: *Craig D. Blackstone, MD, PhD, FANA, Massachusetts General Hospital*

3:15 PM–3:40 PM
Keys to Non-NIH Mechanisms of Funding
SPEAKER: *Justin C. McArthur, MBBS, MPH, FANA, Johns Hopkins University*

3:40 PM–4:05 PM
The Intramural NIH Research Experience
SPEAKER: *Avindra Nath, MD, FANA, National Institutes of Health (NIH)*

4:05 PM–4:30 PM
Panel Discussion and Q&A

4:30 PM
Closing Remarks & Adjourn
CHAIR: *Laura J. Balcer, MD, MSCE, New York University*

Saturday, October 22, 2022

2:00 PM–7:30 PM GRAND BALLROOM FOYER
Registration

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

5:00 PM–5:45 PM GRAND BALLROOM B

Opening Reception*

5:45 PM–7:15 PM GRAND BALLROOM A

Plenary Session

Opening Symposium: Brain Organoid Models of Neurological Disorders*

CHAIR: *Jack M. Parent, MD, FANA, University of Michigan*

CO-CHAIR: *Sally Temple, PhD, Neural Stem Cell Institute*

Human brain organoids are an exciting new approach to study brain disorders using 3D human cerebral structures. Brain organoid methods involve growing human pluripotent stem cell (hPSC) aggregates in suspension, with or without patterning factors, that then differentiate into self-organizing cerebral-like 3D neural structures. Depending upon the specific protocol, the structures resemble diverse regions of brain and recapitulate several key in vivo features of brain organogenesis. Because of limited access to human brain tissue and critical differences between human and mouse brain, brain organoids are attractive models for studies of unique aspects of brain development and function, and allow modeling of human brain disorders in 3D human tissue. A growing number of protocols have been developed to differentiate organoids that partly recapitulate specific CNS regions such as the cortex, hippocampus, thalamus, choroid plexus and others. Other protocols may be used to enrich for specific cell types, including oligodendrocytes. In addition, the recent development of assembloid protocols enables modeling of multiple brain regions and their connections, and advances are ongoing to combine brain organoids with other cell types (e.g., microglia, vascular cells). The techniques are being applied for mechanistic studies and pharmacological assays for various neurological disorders. This symposium will highlight recent work using brain organoid models to explore neurodegenerative disease, genetic epilepsies, CNS infections, brain evolutionary mechanisms and neurodevelopmental disorders.

LEARNING OBJECTIVES:

1. **Describe the use of brain organoids to study development, function and diseases of the brain.**
2. **Discuss the advantages and limitations of brain organoid models.**
3. **Explain recent advances and future directions in the brain organoid field.**

Brain Organoids to Study Evolution and Disease

SPEAKER: *Arnold R. Kriegstein, MD, PhD, University of California, San Francisco*

Human Neurodevelopmental Disorders Modeled in 2-D and Brain Organoid Cultures

SPEAKER: *Margaret Elizabeth Ross, MD, PhD, FANA, Cornell University*

Fusion Brain Organoid Studies to Uncover Circuit Dysfunction in Genetic Epilepsy

SPEAKER: *Ranmal Samarasinghe, MD, PhD, University of California, Los Angeles*

Human Brain Organoid Modeling of Neurodegenerative Disease

SPEAKER: *Sally Temple, PhD, Neural Stem Cell Institute*

7:30 PM–9:00 PM ROOSEVELT 3A-3B

★ Junior and Early Career Networking Reception*

Learn how to make the most of your ANA Meeting. Join the members of the Junior Membership Committee for a reception to discuss how to take advantage of the ANA, identify mentors and discuss career tracks in academic neurology and neuroscience.

Sunday, October 23, 2022

6:00 AM–5:30 PM GRAND BALLROOM FOYER

Registration

7:00 AM–9:00 AM GRAND BALLROOM FOYER

Breakfast

7:00 AM–7:30 AM PLAZA B

★ Trainee Breakfast with ANA Board of Directors*

Join the Board for breakfast and an informal discussion on preparing for, entering, and succeeding in a career in academic neurology and neuroscience. This is a wonderful opportunity to interact with leading academic physician-scientists and discuss the selection of an academic path, areas of research focus, or how to navigate the faculty position seeking process.

7:30 AM–9:00 AM GRAND BALLROOM K

Professional Development Courses

★ Early Career & Early to Mid-Career Level

Course 1: View from the NINDS, NIA, NICHD, and the DOD.

CHAIR: *Claire Henchcliffe, MD, DPhil, FANA, University of California, Irvine*

CO-CHAIR: *Daniela M. Menichella, MD, PhD, Northwestern University*

This is a panel session of the leadership of NINDS, NIA, NICHD, and DOD.

LEARNING OBJECTIVES:

1. **List opportunities for neuroscience and neurology research at the NINDS, NIA, NICHD, and DOD.**
2. **Describe the infrastructure of the NINDS, NIA, NICHD, and DOD, as it pertains to neurology and neuroscience research.**
3. **Identify training and career development opportunities available for academic neurologists and neuroscientists at the NINDS, NIA, NICHD, and DOD.**

View from the NIA

SPEAKER: *Eliezer Masliah, MD, National Institute on Aging (NIA)*

View from the NINDS

SPEAKER: *Walter Koroshetz, MD, National Institute of Neurological Disorders and Stroke (NINDS)*

View from the NICHD

SPEAKER: *Ralph Nitkin, PhD, NCMRR/NICHD/National Institutes of Health*

View from the DOD

SPEAKER: *Melissa R. Miller, PhD, Congressionally Directed Medical Research Programs*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

7:30 AM–9:00 AM GRAND BALLROOM L

Professional Development Courses

AUPN Chair Career Level

Course 1: Governmental Advocacy for Neurology Departments

MODERATOR: *Larry B. Goldstein, MD, FANA, University of Kentucky*

The session will review the role of state and federal governmental advocacy for Department Chairs as a means of supporting their academic, educational, and patient care missions.

LEARNING OBJECTIVES:

1. **Following this session, attendees will be able to identify areas for departmental state and federal governmental advocacy programs.**
2. **Following this session, the attendees will be able to discuss departmental opportunities to develop or participate in state or federal governmental advocacy programs.**

SPEAKER: *Derek C. Brandt, JD, American Academy of Neurology*

SPEAKER: *Eddie L. Patton, Jr., MD, Vyripharm Enterprises*

9:00 AM–9:15 AM

Break

9:15 AM–11:30 AM GRAND BALLROOM C-F

Plenary Session

Novel Perspectives on Neurodegeneration*

CHAIR: *Krishnankutty Sathian, MBBS, PhD, FANA, Pennsylvania State University*

CO-CHAIR: *Stefanie Geisler, MD, Washington University in St. Louis*

Discussions of neurodegenerative disorders typically focus on specific disease such as Alzheimer's disease. This symposium instead examines cross-cutting mechanisms and approaches, the importance of which is increasingly being appreciated. Dr. Julie Schneider will open the symposium with an account of the very frequent co-existence of multiple neuropathologies at autopsy, in large samples, implying that a focus on a single causal cascade may be too limited. Dr. David Holtzman will next present a therapeutic approach targeting apolipoprotein E4, showing how this can ameliorate levels of both amyloid and tau, as opposed to an isolated emphasis on amyloid-directed therapies with monoclonal antibodies that predominates current therapeutic research. Dr. Ana Maria Cuervo will then discuss chaperone-mediated autophagy and its role in aging and neurodegeneratiom. Finally, Dr. Vassilis Koliatsos will talk about mechanisms of axonal degeneration in the CNS, with a focus on traumatic brain injury.

LEARNING OBJECTIVES:

1. **Appreciate the frequent coexistence of multiple neuropathologies in aging-associated neurodegeneration, and incorporate into clinical diagnosis and management.**
2. **Appreciate the multiple genetic factors and pathophysiologic processes underlying neurodegeneration and stimulate thinking about common mechanisms across multiple disorders.**
3. **Enhance understanding of therapeutic approaches to neurodegeneration and modify counseling and treatment accordingly.**

Multiple Neuropathologies in Aging

SPEAKER: *Julie Schneider, MD, Rush University*

The Genetics of Neurodegenerative Diseases: From Rare Populations to Common Variants

SPEAKER: *Rita Guerreiro, MSc, PhD, Van Andel Institute*

APOE4 As a Therapeutic Target in Neurodegeneration

SPEAKER: *David Holtzman, MD, Washington University in St. Louis*

Mechanisms of Axonopathy in the CNS

SPEAKER: *Vassilis Koliatsos, MD, Johns Hopkins University*

Multiple Coexisting Pathologies Were Associated with Rapid Cognitive Decline in Dementia with Lewy Bodies: An Autopsy Study of 62 Prospectively Followed Patients

EMERGING SCHOLAR: *Shunsuke Koga, MD, PhD, Mayo Clinic*

Tissue MR Signal Heterogeneity Follows Disease Severity and Reflects Underlying Ischemia in Cerebral Small Vessel Disease

EMERGING SCHOLAR: *Peter Kang, MD, MSCI, Washington University in St. Louis*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

11:30 AM–11:45 AM

Break

11:45 AM–1:00 PM GRAND FOYER BALLROOM

Lunch

Boxed lunches will be available to take into the Interactive Lunch Workshops

12:00 PM–7:00 PM RIVERSIDE EAST CENTER

Poster Viewing*

Poster presenters will be in attendance from 5:30 PM - 7:00 PM

11:45 AM–1:00 PM GRAND GH

Interactive Lunch Workshops

A String of Pearls: Key Considerations in the Care of Neurological Infections

CHAIR: *Felicia Chow, MD, MAS, University of California, San Francisco*

CO-CHAIR: *Jayantee Kalita, DM, FIAN, FANA, FAMS, Sanjay Gandhi Post Graduate Institute of Medical Sciences*

Case-based interactive workshop that will pose several clinical scenarios to global experts to generate discussion around how to approach the management of neurologic infections in both low-resource and high-resource settings. Examples include: approach to brain tuberculomas, duration of treatment in subarachnoid cysticercosis and management of elevated intracranial pressure in cryptococcal meningitis.

LEARNING OBJECTIVES:

1. **Following this session, learners will be better equipped to manage complex neurologic infections and will be able to describe differences in the approach to neurologic infections in high and low-resource settings.**
2. **Learners will gain high-yield, practical pearls from diverse experts through a case-based interactive dialogue on the approach to neurologic infections.**

Cases #1, #2, #3

SPEAKERS: *Monica Maria Diaz, MD, MS, University of North Carolina*
Jayantee Kalita, DM, FIAN, FANA, FAMS, Sanjay Gandhi Post Graduate Institute of Medical Sciences
Deanna Saylor, MD, MHS, Johns Hopkins University School of Medicine

Sunday, October 23, 2022, *continued*

11:45 AM–1:00 PM GRAND BALLROOM B

Advancing the Science in Autoimmune Encephalitis

CHAIR: *Stacey L. Clardy, MD, PhD, University of Utah*

CO-CHAIR: *Gregory S. Day, MD, MSc, MSCI, FAAN, Mayo Clinic*

The recognition of autoimmune encephalitis (AE) is increasing, owing to improvements in diagnostic testing, the implementation of reliable diagnostic criteria, and increased awareness amongst the broader medical community. Consequently, the diagnosis is increasingly considered in clinical practice by subspecialty and general neurologists alike. This session will review common contributors to AE and explore experimental models that have been tactfully applied to study rare neurological disease, and which may be applied to further advance contributors to AE and optimal management strategies that will improve long-term patient outcomes.

LEARNING OBJECTIVES:

1. **Participants will become familiar with approaches to research and clinical trials that can be utilized to expand research in Autoimmune Encephalitis.**
2. **Participants will appreciate the barriers that impede the study of rare neurologic disease, and learn about strategies to nonetheless pursue meaningful research in Autoimmune Neurology.**
3. **Participants will be aware of the currently ongoing work (and opportunities) in Autoimmune Neurology, specifically relating to basic science and clinical trials.**

The Virus-Autoimmune Interaction in AE

SPEAKER: *Jenny Linnoila, MD, PhD, BS, Massachusetts General Hospital*

Successful Strategies for Studying Rare Disease, as can be Applied to AE

SPEAKER: *Avindra Nath, MD, FANA, National Institutes of Health (NIH)*

Novel Methods to Study AE

SPEAKER: *Marianna Spatola, MD, PhD, Massachusetts General Hospital*

11:45 AM–1:00 PM GRAND BALLROOM L

Clinical Logic

CHAIR: *Raymond Price, MD, FANA, University of Pennsylvania*

CO-CHAIR: *Neeraj Badjatia, MD, MS, FANA, University of Maryland*

This case based session will emphasize general neurology, systemic disease with neurological involvement and neuro-ophthalmology. The cases will be presented as unknowns to the audience including history, examination and diagnostic testing that was performed. Lessons learned and sources of diagnostic and management error will be emphasized. Attendees will be encouraged to participate as each case unravels.

SPEAKER: *S. Andrew Josephson, MD, FANA, FAAN, University of California San Francisco*

SPEAKER: *Raymond Price, MD, FANA, University of Pennsylvania*

SPEAKER: *Martin Samuels, MD, DSc(hon), FAAN, MACP, FRCP, Brigham and Women's Hospital*

SPEAKER: *Steven Galetta, MD, FANA, New York University*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Sunday, October 23, 2022, *continued*

11:45 AM–1:00 PM GRAND BALLROOM I

Neurological Complications in Women

CHAIR: *Dina Jacobs, MD, University of Pennsylvania*

CO-CHAIR: *Tanya Simuni, MD, FANA, Northwestern University*

There are many neurologic disease states that affect women differently than men due to issues such as hormonal changes across the life-span as well as the effects of pregnancy on the nervous system. We aim to cover the impact of hormones, pregnancy, post-partum period, and menopause on neurologic disease processes including headache, epilepsy, multiple sclerosis, and neurovascular disorders. Medications used to treat these disorders need to be adjusted around family planning due to safety considerations at the time of pregnancy and breastfeeding. In addition, these disorders may manifest differently during times of hormonal changes that occur in association with menarche, menses, pregnancy, breastfeeding and menopause. Our panel of experts will address these considerations that should be taken into account in treating epilepsy, MS, neurovascular disease, and headaches in women.

LEARNING OBJECTIVES:

1. **Identify and treat neurologic disorders during pregnancy and in association with women's issues across the life-span.**
2. **Describe the impact of pregnancy, the post-partum period, and breastfeeding in neurologic disorders.**
3. **Acquire the skills to manage multiple sclerosis symptoms across the life-span.**
4. **Learn how to approach neuromyelitis optic and myelin oligodendrocyte disorders in women across their life spans in particular during pregnancy.**

Women's Issues in Neurovascular Disease

SPEAKER: *Donna George, MD, University of Pennsylvania*

Epilepsy Management in Pregnancy and Across the Age-Span in Women

SPEAKER: *Taneeta Mindy Ganguly, MD, University of Pennsylvania*

On the Basis of Sex: Women's Issues in MS and Related Disorders Across the Life Span

SPEAKER: *Dina Jacobs, MD, University of Pennsylvania*

Migraine Treatment During Pregnancy

SPEAKER: *Seniha Ozudogru, MD, University of Pennsylvania*

11:45 AM–1:00 PM GRAND BALLROOM J

Neurological Complications of COVID-19—Part 1

CHAIR: *Ken Tyler, MD, University of Colorado School of Medicine*

CO-CHAIR: *Igor Koralnik, MD, FAAN, FANA, Northwestern University*

COVID-19 continues to be a major cause of both acute neurological disability through a diverse array of mechanisms and a key and often dominant component of both the post-acute sequelae of COVID-19 (PASC) and so-called "long COVID". We intend to cover the pathogenesis of neurological manifestations of COVID-19, the neurology of acute COVID-19, the neuropathology and neuroimaging of disase, and the emeging neurological syndromes associated with long covid.

LEARNING OBJECTIVES:

1. **Following the session, learners will be able to describe the major categories of acute COVID-19 neurological complications, the underlying neuropathology and mechanisms, and the proposed treatments.**
2. **Understand the major signs and symptoms of long COVID related to the nervous system and their diagnosis, proposed mechanism(s), and potential treatment.**

Pathogenesis of Neurological Manifestations of COVID-19

SPEAKER: *Avindra Nath, MD, FANA, National Institutes of Health (NIH)*

Neuropathology and Neuroimaging of COVID-19

SPEAKER: *Kiran Thakur, MD, Columbia University Irving Medical Center/New York Presbyterian Hospital*

Neurology of Acute COVID-19

SPEAKER: *Serena Spudich, MD, Yale School of Medicine*

11:45 AM–1:00 PM GRAND BALLROOM A

Updates on Functional Neurological Disorder

CHAIR: *Seemant Chaturvedi, MD, FANA, University of Maryland*

Update on advances in functional neurological disorder (FND), including FND pathophysiology, diagnostic criteria, evidence-based management, as well as an overview of the increasing visibility of FND in the news and popular culture.

LEARNING OBJECTIVES:

1. **Appreciate the importance of FND in office-based and hospital-based neurology practice.**
2. **Understand the importance of early and accurate FND diagnosis.**
3. **Learn about techniques for optimal FND management.**

Functional Movement Disorders: Diagnostic Clues

SPEAKER: *Stephen G. Reich, MD, FANA, University of Maryland*

Update on Pathophysiology of Functional Neurological Disorders

SPEAKER: *Mark Hallett, MD, National Institutes of Health (NIH)*

Clinical Pearls on FND Diagnosis and Management

SPEAKER: *Sara Finkelstein, MD, MsC, Massachusetts General Hospital*

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11:45 AM–1:00 PM GRAND BALLROOM K

Additional Lunch Workshops

22nd Annual Women of the ANA Lunch Program

Career Advancement: Hurdles and Successes

CHAIR: *Junie Paula Warrington, PhD, FAHA, University of Mississippi*
CO-CHAIR: *Christa O'Hana S. Nobleza, MD, MSCI, University of Tennessee*

In this interactive workshop, we will discuss some of the common hurdles faced by neurologists with an emphasis on women neurologists and neuroscientists in the area of career advancement. This session will be chaired by Junie Paula Warrington, PhD, assistant professor at the University of Mississippi Medical Center, and co-chaired by Christa O'Hana Nobleza, MD, MSCI, an Associate Professor at University of Tennessee Health Science Center/ Baptist Medical Group. A diverse team of panelists will share their experiences navigating career advancement, common hurdles faced by them and their colleagues and/ or trainees, strategies used to get past any hurdles, and advice for those facing similar problems in their current positions/ career. This session is open to neurologists, neuroscientists, and neurosurgeons of all career stages.

SPEAKER: *Michel Torbey, MD, MPH, FNCS, FAHA, FANA, FAAN, FCCM, University of New Mexico*

SPEAKER: *Alyx Porter, MD, Mayo Clinic*

SPEAKER: *Karina Alviña, PhD, University of Florida*

1:15 PM–3:15 PM GRAND BALLROOM C-F

Plenary Session

Presidential Symposium—Neurologic Dark Matter: Exploring the Exposome that Drives Neurological Disorders

CHAIR: *Frances E. Jensen, MD, FANA, FACP, University of Pennsylvania*
MODERATOR: *Walter Koroshetz, MD, National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH)*
MODERATOR: *Rick Woychik, PhD, National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health (NIH)*

Recent and emerging research is revealing the exquisite sensitivity of the nervous system to environmental toxicants. The exposome refers to all of an individual's environmental exposures — chemicals but also factors such as psychological stress and diet — experienced during the lifespan. Environmental neurotoxicology is a relatively new scientific area, whereas pollutants and other exposures have long been studied for their roles in neurodevelopment, other organ systems, immune disorders, and cancer. This plenary has been inspired by a recent National Academy of Medicine Neuroscience Forum and will provide an overview of what is known about neurotoxic exposures and how they lead not only to neurodevelopmental but a wide range of neurological and neurodegenerative disorders. This symposium will also consider the consequences on public health and health disparities, and discuss research gaps and collaborative opportunities between neuroscientists and environmental health scientists.

LEARNING OBJECTIVES:

1. **Understand the role of environmental chemical exposure on neurodevelopmental disorders and neurodegenerative diseases.**
2. **Recognize how the convergence of social disadvantage and pollutant exposures impacts the higher risk of disease.**
3. **Identify research gaps and collaborative opportunities between neuroscientists and environmental health scientists.**

Chemical Exposures: The Ignored Environmental Risk Factor(s) for Neurodegenerative Diseases and Neurodevelopmental Disorders

SPEAKER: *Deborah Cory-Slechta, PhD, University of Rochester*

Racial Disparities in Exposures to Environmental Contaminants

SPEAKER: *Devon Payne-Sturges, DrPh, University of Maryland*

Leveraging the Exposome for ALS Prevention

SPEAKER: *Eva Feldman, MD, PhD, FANA, University of Michigan*

Convergent Mechanisms of Environmental Toxicant-Induced Parkinson's Disease

SPEAKER: *J. Timothy Greenamyre, MD, PhD, FANA, University of Pittsburgh*

Is the Rise in Incidence of Parkinson's Largely Human-Made?

SPEAKER: *E. Ray Dorsey, MD, FANA, University of Rochester*

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Sunday, October 23, 2022, *continued*

3:15 PM–3:30 PM

Break

3:30 PM–5:30 PM GRAND BALLROOM L

Cross-Cutting Special Interest Groups *NEW*

Health Services and Health Equity Research

CHAIR: *Sahar Zafar, MD, MBBS, Massachusetts General Hospital*

CO-CHAIR: *Neha Dangayach, MD, Mount Sinai Health System*

Health services research (HSR) is a rapidly growing area of research within Neurology. HSR focuses on developing evidence-based solutions to increase access and equity in healthcare, delivering high quality and cost-efficient care, and ultimately improving outcomes across the patient journey. There is increasing recognition of racial and ethnic inequalities in the delivery of neurologic care, and an urgent need to address these disparities. These inequities have been further amplified by the COVID-19 pandemic. This SIG focuses on the application of different HSR approaches to improve the quality and value of adult and pediatric neurologic care. The SIG will provide an overview on the development and clinical implementation of quality measures that have been shown to improve patient care across a spectrum of neurologic diseases. The SIG will also review the process of developing clinical and community partnerships to address disparities in healthcare. Finally, the SIG will review the utility of big data and combine multiple clinical and administrative data sources to assess quality, safety and efficiency of care in chronic neurologic diseases.

LEARNING OBJECTIVES:

1. **Define health services research approaches to improve the quality of neurologic care and address healthcare disparities.**
2. **Discuss the role of clinical and community partnerships in improving delivery of neurologic care.**
3. **Demonstrate the utility of big data in evaluating patient outcomes, healthcare safety and efficiency.**

Big Data to Assess Quality, Safety and Efficiency of Care in Chronic Neurologic Diseases

SPEAKER: *Lidia Maria Moura, MD, MPH, Massachusetts General Hospital*

Health Disparities in Pediatric Movement Disorders

SPEAKER: *Marisela Dy-Hollins, MD, MS, Massachusetts General Hospital*

Community and Clinical Care Team Partnerships to Address Disparities in Neurologic Care

SPEAKER: *Barbara Vickrey, MD, MPH, Mount Sinai Health System*

Virtual Neurology Clerkship - Practical Implementation and Student Satisfaction

ORAL ABSTRACT PRESENTATION: *Dinanath Attele, DO, University of Missouri*

Race/Ethnicity Disparities Among Migraine Clinical Trials Between 1995-2021: An Assessment of Race/Ethnicity Reporting and Prevalence of Participants Across Race/Ethnicity Categories

ORAL ABSTRACT PRESENTATION: *Maya Pandit, MPH, New York Medical College*

3:30 PM–5:30 PM GRAND BALLROOM GH

Neurodegeneration and Cell Death

CHAIR: *Aimee W. Kao, MD, PhD, FANA, University of California, San Francisco*

CO-CHAIR: *Alice Chen-Plotkin, MD, PhD, FANA, University of Pennsylvania*

Many recent advances have been made in the field of neurodegeneration that will impact our ability to diagnose, treat and prevent neurodegenerative diseases like Alzheimer's Disease, Parkinson's Disease, frontotemporal dementia and Huntington's Disease. Proteinaceous inclusions were once thought to be viable targets in these diseases. We now know that they serve as excellent biomarkers, but that upstream mechanisms need to be targeted for effective therapeutics. This session will focus on the basic science and translational advances that have been made recently.

LEARNING OBJECTIVES:

1. **Describe new tools for detecting cell death and neurodegeneration that could serve as biomarkers for future therapeutic trials.**
2. **Understand the genes and molecules that contribute to neurodegenerative diseases such as Alzheimer's, Parkinson's and Huntington's Disease.**
3. **Gain up-to-date knowledge on the basic and translational investigations in neurodegeneration, and future potential therapeutics.**

Cell Death, Its Importance in Neurodegenerative Disease, and New Technologies to Predict it in Time to Intervene

SPEAKER: *Steve Finkbeiner, MD, PhD, FANA, University of California, San Francisco*

How Do We Get From GWAS Locus to Therapeutic Target in Parkinson's Disease?

SPEAKER: *Alice Chen-Plotkin, MD, PhD, FANA, University of Pennsylvania*

Tangled Tau - Live Free or Die

SPEAKER: *Judith Steen, MD, PhD, Boston Children's Hospital*

Synucleinopathy-Associated Microglia Uncovered by a Novel Multiple System Atrophy-Cerebellar Type (MSA-c) Mouse Model

ORAL ABSTRACT PRESENTATION: *Jun-ichi Kira, MD, PhD, International University of Health and Welfare*

Integrative Whole Brain and Neuron-Specific Native-State Proteomics Identifies Molecular Vulnerabilities of PV Interneurons

ORAL ABSTRACT PRESENTATION: *Srikant Rangaraju, MD, MS, Emory University School of Medicine*

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Sunday, October 23, 2022, *continued*

3:30 PM–5:30 PM — GRAND BALLROOM MN

Neurodevelopment

CHAIR: *Jodi Lindsey, MD, West Virginia University*

CO-CHAIR: *Miya Asato, MD, Kennedy Krieger Institute*

Mitochondrial disease includes a broad and diverse array of conditions that impact the health of multiple organ systems in the body. Onset of disease during development may have significant impacts on developmental outcomes, and presentations during adulthood may elude timely diagnosis due to poor recognition of cardinal symptoms. The prolonged time to reach diagnosis may increase morbidity and patients may miss opportunities to have access to clinical trials and multi-system symptomatic treatments. The panel of presenters will discuss later childhood and adult presentations of seizure, stroke, and neuropathies using a case-based format to illustrate the importance of eliciting key history and clinical features that should prompt molecular testing for mitochondrial disorders. An advocacy based perspective will also be represented to illustrate a multigenerational impact and disease burden of many mitochondrial disorders.

LEARNING OBJECTIVES:

1. **To recognize "common" presentations of mitochondrial disorders in different aged patients presenting with neurological symptoms.**
2. **To identify appropriate molecular diagnostic testing and other clinical testing to more accurately diagnose a mitochondrial disorder.**
3. **To list available resources for specialized diagnostic and therapeutic care for patients with mitochondrial disorders.**

Updates on Clinical Management and Clinical Trials for Adults with Primary Mitochondrial Disease

SPEAKER: *Amy Goldstein, MD, University of Pennsylvania*

Genetic Testing

SPEAKER: *Lisa Kinsley, MS, CGC, Northwestern University*

Presentation of Mitochondrial Disorders and Implications Across the Lifespan

SPEAKER: *Margaret Moore, MS, The United Mitochondrial Disease Foundation (UMDF)*

Mitochondrial Malfunctions and Inherited Axonal Neuropathies

SPEAKER: *Steven S. Scherer, MD, PhD, FANA, University of Pennsylvania*

Unraveling the Role of TBCK in Human iPSC-Derived Neurons: Mitochondrial Dysfunction Due to mRNA Transport Defects as Mechanism of Neurodegeneration?

ORAL ABSTRACT PRESENTATION: *Xilma Ortiz-Gonzalez, MD, PhD, University of Pennsylvania*

Psychometric Outcome Measures in Beta-Propeller Protein-Associated Neurodegeneration (BPAN)

ORAL ABSTRACT PRESENTATION: *Laura Adang, MD, PhD, The Children's Hospital of Philadelphia*

3:30 PM–5:30 PM — GRAND BALLROOM I

Neurogenetics and Gene Therapy*

CHAIR: *Suman Jayadev, MD, University of Washington*

CO-CHAIR: *Andrea L. Gropman, MD, FANA, Children's National Medical Center*

This session will highlight recent advances in our understanding of pathogenic mechanisms and treatment for neurogenetic disease. Through rapidly developing technologies the field of neurogenetics has extended beyond increased capacity for genetic diagnoses but also to broaden our repertoire of disease modifying therapies in gene specific manners. We will have four speakers who will span topics from pediatric to adult onset genetic syndromes and novel therapies including compounds to target gene expression, viral gene delivery and gene editing.

LEARNING OBJECTIVES:

1. **Be aware of the different approaches to genetic manipulation.**
2. **Be aware of different delivery methods being employed to deliver therapies.**
3. **Be aware of the difference between delivery a gene, removing a gene and editing a gene.**

Individualized Oligonucleotide Interventions for Orphan Neurogenetic Disease

SPEAKER: *Timothy Yu, MD, PhD, Boston Children's Hospital*

Liver-Directed Gene Therapy for Inborn Errors of Metabolism

SPEAKER: *Cary Harding, MD, Oregon Health & Science University*

Moving Neurogenetics into Neurotherapeutics: ALS as an Example

SPEAKER: *Bryan Traynor, MD, PhD, MMSc, FRCPI, FRCP, FANA, National Institutes of Health (NIH)*

The Genetic Rationale Underlying Gene Therapy of Duchenne Muscular Dystrophy

SPEAKER: *Jeffrey Chamberlain, PhD, University of Washington*

A Novel Missense Variant in HIKESHI: Clinical Phenotype, In Vitro Functional Testing, and Potential for Gene Therapy

ORAL ABSTRACT PRESENTATION: *Eric Mallack, MD, Weill Cornell Medicine*

Blood-Brain-Barrier (BBB) Penetrating DNA/RNA Heteroduplex Oligonucleotide Regulating CNS Genes by Systemic Administration

ORAL ABSTRACT PRESENTATION: *Takanori Yokota, MD, Tokyo Medical and Dental University*

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3:30 PM–5:30 PM **GRAND BALLROOM J**

Neuroinflammation and Neuroinfection

CHAIR: *Serena Spudich, MD, MA, Yale School of Medicine*

CO-CHAIR: *Kiran Thakur, MD, Columbia University*

As the first session of the new Neuroinflammation and Neuroinfection SIG, we will introduce concepts of how inflammation in the nervous system associates with neurological injury and clinical disease, and review state of the art methods now available to interrogate these questions using a variety of methods in humans and animal models. We will use the timely of neurologic effects of SARS-CoV-2 and HIV-1 as central examples of how inflammation and immune activation in response to a pathogen may lead to clinical disease, how this may be investigated, and future areas for research and clinical intervention relevant to these and other neuroinflammatory states.

Humanity's First Chance - Understanding What (Pandemic) Infection Can Do to the Human Brain

SPEAKER: *Benedict Michael, MD, MBChB, FRCP, PhD, University of Liverpool, UK*

Cerebrospinal Fluid Biomarkers of CNS Inflammation and Injury in COVID-19 and Viral CNS Infections

SPEAKER: *Arvid Eden, MD, PhD, University of Gothenburg, Sweden*

Contribution of Immune Responses in Neuroinflammation: Lessons from HIV Infection

SPEAKER: *Lydie Trautmann, EngD, PhD, Oregon Health and Science University*

Epigenetics of Neuroinflammation in HIV and COVID-19

SPEAKER: *Michael Corley, PhD, Weill Cornell Medical Center*

RT-QuIC Testing for Prions: Applying a Sensitive but Imperfect Test in Clinical Practice

ORAL ABSTRACT PRESENTATION: *Samuel Jones, MD, Mayo Clinic*

Blood-CSF-Barrier Permeability in Tuberculous Meningitis and Its Association with Clinical, MRI and Inflammatory Cytokines

ORAL ABSTRACT PRESENTATION: *Ruchi Shukla, PhD, Institute of Medical Sciences Lucknow*

A Multi-Institutional Collaboration for Deep Phenotyping of Undiagnosed Neuroinflammatory and Neuroinfectious Diseases

ORAL ABSTRACT PRESENTATION: *Yair Mina, MD, National Institutes of Health (NIH)*

3:30 PM–5:30 PM **GRAND BALLROOM K**

Neurorecovery and Neuroplasticity

CHAIR: *S. Thomas Carmichael, MD, PhD, FANA, University of California, Los Angeles*

CO-CHAIR: *Steve C. Cramer, MD, FANA, University of California, Los Angeles*

As the first session of the new Neurorecovery SIG, this session will develop a consensus of what neurorecovery is across neurological diseases, how this is studied, emerging principles, and directions forward. Topics covered will include mechanisms of recovery in the setting of stroke, multiple sclerosis, and spinal cord injury, spanning domains including motor and cognitive function.

LEARNING OBJECTIVES:

1. **Following this session, learners will be better prepared to discover or understand the mechanisms of nervous system repair.**
2. **Develop valid outcome measures and clinical trials for emerging therapies.**
3. **Integrate the protocols in clinical trials and the understanding of nervous repair biology with the activity patterns of patients with these diseases and in the rehabilitation of these diseases.**

Defining Neurorecovery and Moving the Field Forward

SPEAKER: *S. Thomas Carmichael, MD, PhD, FANA, University of California, Los Angeles*

Promoting Remyelination in MS: Oligodendroglial Biology to Clinical Translation

SPEAKER: *Jonah Chan, PhD, University of California, San Francisco*

Strategies for Limiting and Repairing Damage after Traumatic Injury to the Nervous System

SPEAKER: *John Kessler, MD, Northwestern University*

Neuroplasticity and Neurorecovery of Aphasia

SPEAKER: *Argye E. Hillis, MD, MA, FANA, Johns Hopkins University*

Intensive Rehabilitation Therapy Using Telehealth Methods Early After Stroke

ORAL ABSTRACT PRESENTATION: *Steven Cramer, MD, MMSc, University of California, Los Angeles*

Myoelectric Interface for Neurorehabilitation (MINT) Conditioning Improves Arm Function in Severely Impaired Chronic Stroke Survivors

ORAL ABSTRACT PRESENTATION: *Marc Slutzky, MD, PhD, Northwestern University*

5:30 PM–7:00 PM **RIVERSIDE EAST CENTER**

Poster Presentation & Reception*

6:30 PM–8:30 PM **GRAND BALLROOM C-D NORTH**

ANA-AUPN Career Fair*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Monday, October 24, 2022

6:30 AM–5:45 PM GRAND BALLROOM FOYER

Registration

6:30 AM–8:30 AM GRAND BALLROOM FOYER

Breakfast

7:00 AM–8:30 AM GRAND BALLROOM K

Professional Development Courses

★ **Early Career & Early to Mid-Career Level**

Course 2A: Early Career Development for International Graduates

CHAIR: *Jayant N. Acharya, MD, DM, FAES, FACNS, FAAN, FANA, Southern Illinois University*

CO-CHAIR: *Erica A. Schuyler, MD, FANA, University of Connecticut*

International medical graduates (IMGs) make up approximately a third of neurology trainees and active neurologists in the USA. They play a major role in providing greater access to health care for millions of patients, especially in underserved regions. With the current shortage of neurologists, which is projected to increase in the next few decades, and increased role for neurologists during the global health care crisis with the pandemic, there is an even greater need for IMG neurologists. In order to remain in the US after training, IMGs face numerous visa-related and other challenges that can limit their scope of practice and range of opportunities in academic medicine. Advocacy and legislation efforts to address immigration complexities, increased recruitment of IMG neurologists in academic departments and a systematic approach to reducing bias and supporting diversity are necessary. During this session, speakers will present the landscape, challenges, and opportunities for in-training and early-career IMGs for a successful academic career in neurology.

LEARNING OBJECTIVES

1. **Illustrate visa issues faced by IMG neurologists.**
2. **Highlight challenges and opportunities for IMG neurologists pursuing academic careers.**
3. **Provide recruitment and counseling strategies for IMG neurologists.**

The Glass Ceiling of J1 Visas

SPEAKER: *Abhimanyu Mahajan, MD, MHS, Rush University*

Mentorship Matters: Pay it Forward

SPEAKER: *Neha S. Dangayach, MD, Mount Sinai Health System*

Opportunities for Academic Career Development for IMG Neurologists

SPEAKER: *Imama A. Naqvi, MD, Columbia University*

Recruiting and Counseling IMG Neurologists: Chair's Perspective

SPEAKER: *Brett Kissela, MD, MS, FANA, University of Cincinnati*

7:00 AM–8:30 AM GRAND BALLROOM L

★ **Early Career & Early to Mid-Career Level**

Course 2B: Career Tracks in Academic Neurology

CHAIR: *Tracey A. Cho, MD, FANA, University of Iowa*

CO-CHAIR: *Romergryko G. Geocadin, MD, FANA, Johns Hopkins University*

Speakers will discuss the various pathways in academic neurology including physician-scientist, clinician-teacher, clinician-administrator, and scientist-teacher.

LEARNING OBJECTIVES

1. **Detail career track options in academic neurology.**
2. **Identify the most appropriate career track for their interests and goals.**
3. **List strategies for exploring and advancing within their career track.**

Clinician-Scientist Track

SPEAKER: *Peter K. Todd, MD, PhD, FANA, University of Michigan*

Scientist-Educator Track

SPEAKER: *Cassie S. Mitchell, PhD, Georgia Institute of Technology*

Clinician-Educator Track

SPEAKER: *Tracey A. Cho, MD, FANA, University of Iowa*

7:00 AM–8:30 AM GRAND BALLROOM MN

AUPN Chair Career Level

Course 2: Neuroscience Service Line: What's the Best Model?

CHAIR: *Jun Li, MD, PhD, FANA, Houston Methodist Hospital*

There has been a rapid development of the Neuroscience Service Line in many hospitals across the nation. This effort often requires the collaboration of multiple departments, which aim to provide multi-disciplinary care with higher quality. On the other hand, this reformation also brings challenges such as coordination between various teams and its impact on revenue and research activities. In this course, several speakers involved in this process will share their experiences and thoughts on this subject.

LEARNING OBJECTIVES

1. **Understand various models at present and their pros and cons.**
2. **Understand effective ways to collaborate with neurosurgery partners.**

SPEAKER: *Sanjay Singh, MD, FANA, Creighton University*

SPEAKER: *Sarah Benish, MD, FAAN, University of Minnesota*

8:30 AM–8:45 AM

Break

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

8:45 AM–10:45 AM GRAND BALLROOM C-F

Plenary Session

Emerging Role of Somatic Mutations in Neurology

CHAIR: *Annapurna Poduri, MD, MPH, Boston Children's Hospital*

CO-CHAIR: *Sattar Khoshkhoo, MD, Brigham and Women's Hospital*

In this plenary session, we will discuss the recently recognized role of somatic (post-zygotic) mutation in neurological conditions across the lifespan. We will discuss somatic mutation in the context of cancer, where it was recognized early to play a role in disease. We will then discuss somatic mutation that, in the developing brain, leads to childhood neurodevelopmental disorders, such as epilepsy and autism. We will then discuss somatic mutation that occurs in post-mitotic neurons in normal aging and in neurodegenerative disease. Finally, we will outline a path to translation from gene discovery to pre-clinical models of mosaic neurological disorders.

LEARNING OBJECTIVES

1. **To understand that somatic mutation occurs as a normal process during development and post-natally and has a role outside of cancer.**
2. **To understand the extent to which somatic mutation influences normal development and aging as well as neurological diseases.**
3. **To recognize which neurological disorders are likely to have resulted from somatic mutation.**
4. **To understand how models of mosaic variants can lead to targeted, mechanism-based, 'precision' therapies.**

Telomeres and Clonal Evolution with Aging

SPEAKER: *Mary Armanios, MD, Johns Hopkins University*

Somatic Mutation in Neurodevelopmental Disorders

SPEAKER: *Annapurna Poduri, MD, MPH, Boston Children's Hospital*

Single-Cell Analysis of Somatic Mutations in the Human Brain

SPEAKER: *Mike Lodato, PhD, University of Massachusetts*

Somatic Mutations and Pediatric Surgical Epilepsy: Translating Genomic Findings to Precision-based Medicine

SPEAKER: *Ghayda (Rayda) Mirzaa, MD, Seattle Children's Hospital*

Micro-Grid Recordings from the Human Hippocampal Surface Reveal Spatiotemporal Properties of Oscillations, Ripples, and Interictal Discharges

EMERGING SCHOLAR: *Jonathan Kleen, MD, PhD, University of California, San Francisco*

Hippocampal Somatic Mutations in Mesial Temporal Lobe Epilepsy

EMERGING SCHOLAR: *Sattar Khoshkhoo, MD, Brigham and Women's Hospital*

Monday, October 24, 2022, *continued*

10:45 AM–11:45 AM GRAND BALLROOM C-F

Plenary Session

Executive Session of Membership*

All ANA members are encouraged to attend this session. New officers and directors will be elected to the ANA Board of Directors during the Executive Session of Membership.

11:45 AM–12:00 PM

Break

12:00 PM–1:00 PM GRAND FOYER BALLROOM

Lunch

Boxed lunches will be available to take into the Interactive Lunch Workshops

12:00 PM–7:30 PM RIVERSIDE EAST CENTER

Poster Viewing*

Poster presenters will be in attendance from 6:00 PM - 7:30 PM

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

12:00 PM–1:00 PM GRAND BALLROOM I

Interactive Lunch Workshops

Advances in Neuro-Imaging for Clinical Neurology

CHAIR: *Neeraj Badjatia, MD, MS, FANA, University of Maryland*

CO-CHAIR: *Sarah Nelson, MD, Mount Sinai Health System*

This session will review the recent advances in sophisticated imaging platforms to manage neurological disease. Aneurysmal subarachnoid hemorrhage (aSAH) is associated with an unacceptably high mortality and chronic disability in survivors, underscoring a need to validate new approaches for treatment and prognosis. This session will review the use of advanced imaging, magnetic resonance imaging (MRI) to help address this gap given its versatile capacity to quantitatively evaluate and map changes in brain anatomy, physiology and functional activation. Recent advances in CT and MR imaging in acute ischemic stroke reperfusion therapies have been centered on the ability to rapidly and accurately assess large vessel occlusions and stroke burden. Since the publication of pivotal randomized clinical trials in 2015, endovascular thrombectomy has become part of the standard of care in selected cases of AIS from large-vessel occlusions up to 6 hours after the onset of symptoms. However, the association between endovascular reperfusion and improved functional outcome is not strictly time dependent. Advances in imaging-based management of AIS provide crucial information about vessel occlusion, infarct core, ischemic penumbra, and degree of collaterals. This information is invaluable in identifying patients who are likely to benefit from reperfusion therapies and excluding those who are unlikely to benefit or are at risk of adverse effects. Malignant cerebral edema develops in a small subset of patients with hemispheric strokes, precipitating deterioration and death if decompressive hemicraniectomy (DHC) is not performed in a timely manner. Predicting which stroke patients will develop malignant edema is imprecise based on clinical data alone. Head computed tomography (CT) imaging is often performed at baseline and 24-h. Utilizing quantitative imaging features from baseline and follow-up CTs, including CSF volume, intracranial reserve (CSF/cranial volume), as well as midline shift (MLS) and infarct-related hypodensity volume may aid in the accurate identification of potentially lethal malignant edema.

LEARNING OBJECTIVES

1. **Understand the utility of advanced MRI techniques in the acute management of SAH.**
2. **Recognize the importance of advanced vessel imaging and stroke burden prediction on outcomes for acute ischemic stroke patients undergoing reperfusion therapies.**
3. **Recognize the emerging importance of machine learning techniques on identifying clinically relevant endpoints after ischemic stroke.**

Advances in Neuroimaging in Subarachnoid Hemorrhage

SPEAKER: *Sarah Nelson, MD, Mount Sinai Health System*

Artificial Intelligence Approach Towards Imaging Cerebral Edema After Ischemic Stroke

SPEAKER: *Raj Dhar, MD MSc, Washington University*

Mechanical Stroke Thrombectomy: Advanced Imaging Selection

SPEAKER: *Sameer Ansari, MD, PhD, Northwestern University, Feinberg School of Medicine*

12:00 PM–1:00 PM GRAND BALLROOM A

An Update on Neurotoxicity After Cellular Therapies

CHAIR: *Thomas E. Lloyd, MD, PhD, FANA, Johns Hopkins University*

CO-CHAIR: *Matthew Frank, MD, PhD, Stanford University*

Neurotoxicity associated with cellular therapies is an often devastating complication seen in patients undergoing treatment for an ever growing range of cancers. Yet, who is most at risk remains unclear. This session examines different potential mechanisms underlying this disorder and will explore its long-term side effects.

Introduction to Session and Neurotoxicity of Cellular Therapies

SPEAKER: *Matthew Frank, MD, PhD, Stanford University*

Understanding Patients' Factors Associated with Neurotoxicity After Cellular Therapies

SPEAKER: *Juliane Gust, MD, PhD, University of Washington*

Pre-Infusion NfL as a Blood Biomarker for the Development of Neurotoxicity after Cellular Therapy

SPEAKER: *Omar Butt, MD, PhD, Washington University in Saint Louis*

The Blood Brain Barrier and Neurotoxicity After Cellular Therapies

SPEAKER: *Avery Posey, Jr., PhD, University of Pennsylvania*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Monday, October 24, 2022, *continued*

12:00 PM–1:00 PM GRAND BALLROOM B

Epilepsy in Older Adults—Dilemmas, Challenges and Paradigms

CHAIR: *Cassie S. Mitchell, PhD, Georgia Institute of Technology*

CO-CHAIR: *Vineet Punia, MD, MS, Cleveland Clinic*

The area of epilepsy in older adults has made rapid and fascinating advancements in recent years. There is now a better understanding of the pathophysiology, epidemiology and clinical management of these patients. However, clinical practice has lagged behind the rate of discovery. Akin to the pediatric population with epilepsy, older adults with epilepsy require specialized knowledge and training. This session will cover varied practical aspects of medical and surgical management of epilepsy in older adults with or without dementia and address the existing dilemmas, challenges, and paradigms. Each talk will review relevant data.

LEARNING OBJECTIVES

1. **Understand differences in pathophysiology and treatment of epilepsy in older adults compared to pediatric populations.**
2. **Apply pharmaceuticals to enhance epilepsy in older adults with cases complicated by dementia.**
3. **Assess whether surgical interventions are the correct therapy and when they can be safely applied to older adults with epilepsy with or without dementia.**

Management of Epilepsy in an Older Adult with Multiple Comorbidities and Polypharmacy

SPEAKER: *Rohit Marawar, MD, FAES, Wayne State University*

Surgical and Neurostimulation Management of Drug-Resistant Epilepsy in Older Adults

SPEAKER: *Vineet Punia, MD, MS, Cleveland Clinic*

12:00 PM–1:00 PM GRAND BALLROOM J

Teaching the Teachers—A Role for Clinical Educators

CHAIR: *Alissa A. Thomas, MD, University of Vermont*

CO-CHAIR: *Romergryko G. Geocadin, MD, FANA, Johns Hopkins University*

This session is aimed at supporting neurologists and neuroscience faculty who want to build a career in medical education. Neurologists have extensive training in neuroscience and neurologic disease and are often called upon as content experts to teach medical students, residents, and fellows. Fewer neurologists have formal training and mentoring in education or how to teach. Academic medical centers have a growing need to recruit and retain physicians with a passion and talent for teaching, and many academic centers now have designated promotions pathways for the clinical educator. There is a growing demand for neurologists nationally, and we need to have a pipeline of well-educated medical students and residents who will become our future neurologists. The neurology curriculum in medical schools and residency programs is shifting to adapt to a more diverse group of learners, to incorporate more adult learning theory and active learning, and to transition to more virtual platforms for content delivery. This requires dedicated faculty with a strong interest in medical education. This session is an opportunity to teach the teacher. The goals of this session are to discuss how a neurologist can start a career path in medical education, to learn how to grow as a medical educator through curriculum design and development, and to understand how to earn academic credit and find a path to promotion through work in medical education.

LEARNING OBJECTIVES

1. **To understand the desired experience of a successful candidate for a position in medical education in neurology.**
2. **To learn how to structure and redesign a curriculum for neurology trainees.**
3. **To understand the criteria for promotion for a clinical educator in neurology.**

Starting a Career in Neurology Education

SPEAKER: *Deborah Bradshaw, MD, FAAN, SUNY Upstate Medical University*

Criteria for Promotion for the Clinical Educator

SPEAKER: *Laurie Gutmann, MD, FANA, Indiana University*

Curriculum Design and Development for the Neurology Educator

SPEAKER: *Sean J. Evans, MD, University of California, San Diego*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Monday, October 24, 2022, *continued*

12:00 PM–1:00 PM GRAND BALLROOM MN

Neurological Complications of COVID-19—Part 2

CHAIR: *Ken Tyler, MD, University of Colorado School of Medicine*

CO-CHAIR: *Igor Koralnik, MD, FAAN, FANA, Northwestern University*

COVID-19 continues to be a major cause of both acute neurological disability through a diverse array of mechanisms and a key and often dominant component of both the post-acute sequelae of COVID-19 (PASC) and so-called "long COVID-19". We intend to cover the pathogenesis of neurological manifestations of COVID-19, the neurology of acute COVID-19, the neuropathology and neuroimaging of disease, and the emerging neurological syndromes associated with long COVID-19.

LEARNING OBJECTIVES

Following the session learners will be able to:

1. **Describe the major categories of acute COVID-19 neurological complications, the underlying neuropathology and mechanisms, and the proposed treatments.**
2. **Understand the major signs and symptoms of long COVID-19 related to the nervous system and their diagnosis, proposed mechanism(s), and potential treatment.**

Therapeutics for Neurological Sequelae of COVID-19

SPEAKER: *Jennifer Frontera, MD, New York University*

Neurology of Long COVID-19

SPEAKER: *Igor Koralnik, MD, FAAN, FANA, Northwestern University*

12:00 PM–1:00 PM GRAND BALLROOM GH

The Impact of Gut Microbiome in Clinical Neurological Conditions

CHAIR: *Beau M. Ances, MD, PhD, MSc, FANA, Washington University in St. Louis*

CO-CHAIR: *Louise McCullough, MD, PhD, FANA, University of Texas at Houston*

Increasing clinical and preclinical evidence implicates the microbiome as a possible key susceptibility factor for neurological disorders, including Alzheimer's disease, autoimmune disorders, multiple sclerosis, Parkinson's disease, and stroke. Cross-sectional clinical studies are bolstering the concept of altered microbial composition contributing to the pathophysiology of neurological disorders. However, the field is nascent, and interpretation of such data is often difficult given that the composition of the microbiome is influenced by various factors such as diet and exercise.

LEARNING OBJECTIVES

1. **Learners will understand that there is a gut brain axis and that there are potential early changes in the gut microbiome and that these can be modified.**

Neurodegenerative Diseases and the Gut Microbiome

SPEAKER: *Beau M. Ances, MD, PhD, MSc, FANA, Washington University in St. Louis*

The Gut Microbiome in Parkinson's Disease

SPEAKER: *Kathleen Shannon, MD, FANA, University of Wisconsin*

Stroke and the Microbiome

SPEAKER: *Louise McCullough, MD, PhD, FANA, University of Texas at Houston*

12:00 PM–1:00 PM GRAND BALLROOM L

Synergies for Global Bi-directional Learning and Research

MODERATOR: *Frances E. Jensen, MD, FANA, FACP, University of Pennsylvania*

During this session speakers will present examples of bi-directional learning and research collaborations between academic neurologists and neuroscientists in Sub-Saharan Africa and the United States.

LEARNING OBJECTIVES

1. **Identify research gaps and collaborative opportunities between Sub-Saharan and North American academic neurologists and neuroscientists.**
2. **Understand the relevance and impact of bi-directional research and learning for academic neurologists and neuroscientists.**
3. **Understand how to conduct collaborative neurologic research in resource limited settings.**

PANELIST: *Deanna Saylor, MD, MHS, Johns Hopkins University School of Medicine*

PANELIST: *Bruce Ovbiagele, MD, University of California, San Francisco*

PANELIST: *Melody Asukile, BSc, MBChB, MMED, FC Neurol, University Teaching Hospitals (UTH)*

PANELIST: *Fred Stephen Sarfo, MD, PhD, Kwame Nkrumah University of Science and Technology*

PANELIST: *Angelina Kakooza, MBChB, MMed, PhD, Makerere University College of Health SciencesSchool of Medicine*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

12:00 PM–1:00 PM RANDOLPH 1B

Additional Lunch Workshops

American Board of Psychiatry and Neurology (ABPN) Maintenance of Certification*

CHAIR: *John Bodensteiner, PhD, FAHA, ABPN Board Chair and Child Neurology Director*

Dr. John Bodensteiner, ABPN Board Chair and Child Neurology Director, will lead the session by providing background on the ABMS Continuing Certification (CC) program, recent changes to the CC program, and perspective on the future of CC. Dr. Bodensteiner will detail the four-part ABPN CC Program, giving specific requirements related to licensure, self-assessment, CME, and performance in practice components. The new option for opting out of the 10 year secure examination using the Article Based Continuing Certification program will be discussed in detail.

LEARNING OBJECTIVES

1. **To become familiar with the rationale and background of MOC.**
2. **To learn the 4-part ABPN MOC Program components.**
3. **To become familiar with the online ABPN personalized physician Folios system.**
4. **To learn about the future direction for the ABPN MOC Program.**

12:00 PM–1:00 PM GRAND BALLROOM K

AUPN-ANA Meet the Chairs Interactive Workshop*

MODERATOR: *L. John Greenfield, MD, University of Connecticut Health*

Prominent chairs of neurology will discuss how they handle their position, including what's involved with being a chair; what the process is for attaining their position, and how to interact with chairs.

PANELIST: *Barbara G. Vickrey, MD, MPH, Mount Sinai Health System*

PANELIST: *Amy Brooks-Kayal, MD, FANA, FAAN, FAES, University of California, Davis*

PANELIST: *Sanjay Singh, MD, FANA, Creighton University*

1:00 PM–1:15 PM

Break

Monday, October 24, 2022, *continued*

1:15 PM–3:30 PM GRAND BALLROOM C-F

Plenary Session

Derek Denny-Brown Young Neurological Scholar Symposium*

The Derek Denny-Brown Young Neurological Scholar Symposium is an opportunity for young researchers to share groundbreaking research in the field of Neurology and Neuroscience. This symposium will feature presentations from the 2022 Derek Denny-Brown awardees, the Wolfe Neuropathy Research Prize, the Grass Foundation-ANA Award in Neuroscience recipients and the Audrey S. Penn Lectureship awardee. Awardees receiving the Distinguished Teacher Award, the ANA-Persyst IDEAS Professional Development Award, and the ANA Awards for Excellence will also be recognized during this session.

CHAIR: *Michael D. Geschwind, MD, PhD, FANA, University of California, San Francisco*

CO-CHAIR: *Laurie Gutmann, MD, FANA, Indiana University*

Therapeutic Implications of Convergent Disease Mechanisms in ALS and FTD

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN BASIC SCIENCE: *Sami Barmada, MD, PhD, University of Michigan*

Beyond the Exome in the Rare Genetic Epilepsies: New Challenges and Opportunities

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN NEUROSCIENCE: *Gemma Carvill, PhD, Northwestern University*

Mapping the Connectivity of Consciousness

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN CLINICAL SCIENCE: *Brian Edlow, MD, Massachusetts General Hospital*

Curbing Mitochondrial Damage in Neurodegeneration: Lessons from Neurogenetics

THE GRASS FOUNDATION–ANA AWARD IN NEUROSCIENCE: *Derek Narendra, MD, PhD, National Institutes of Health (NIH)*

Schwann Cells in Diabetic Neuropathy: Drivers of Disease or just the Passengers?

WOLFE NEUROPATHY RESEARCH PRIZE: *Stephanie Eid, PhD, University of Michigan*

Training in Research for Academic Neurologists to Sustain Careers & Enhance Numbers of Diverse Scholars: So Far, So Transcendent

AUDREY S. PENN LECTURESHIP AWARD: *Bruce Ovbiagele, MD, MSc, MAS, MBA, MLS, University of California, San Francisco*

ANA AWARD FOR EXCELLENCE–CLINICAL AND SCIENTIFIC EXCELLENCE: *Wolf-Dieter Heiss, MD, Max Planck Institute for Neurological Research*

ANA AWARD FOR EXCELLENCE–SERVICE TO THE ANA: *Shri Kant Mishra, MD, MS, ABMS, FANA, University of Southern California*

ANA AWARD FOR EXCELLENCE–SERVICE TO THE ANA: *Romergryko G. Geocadin, MD, FANA, Johns Hopkins University School of Medicine*

DISTINGUISHED NEUROLOGY TEACHER AWARD: *Deanna Saylor, MD, MHS, Johns Hopkins University School of Medicine*

ANA-PERSYST IDEAS PROFESSIONAL DEVELOPMENT AWARD: *Wilfreda Lindsey, MD, MS, Kennedy Krieger Institute*

3:30 PM–3:45 PM

Break

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

3:45 PM–5:45 PM GRAND BALLROOM GH

Traditional Special Interest Groups

Autoimmune Neurology & MS

Preserving Wellness and Cognition in Patients with Progressive CNS Inflammatory Diseases

CO-CHAIR: *Stephanie K. Tankou, MD, PhD, Mount Sinai Health System*

CO-CHAIR: *Gregory S. Day, MD, MSc, MSCI, FAAN, Mayo Clinic*

The goal of our session is to gain a better understanding of the challenges of treating aging patients with progressive CNS inflammatory diseases and to learn approaches to support wellness and cognition in these patients. The prevalence of CNS inflammatory diseases and the age of affected patients are increasing owing to increased longevity of the general population and the availability of effective DMTs. Currently approved therapies for multiple sclerosis and related diseases are effective in preventing relapse but are not as effective in preventing the accumulation of disability associated with aging and disease progression. Thus, aging patients with CNS inflammatory diseases represent a uniquely challenging population that is currently underserved by existing therapeutic regimens. Managing CNS inflammatory diseases in aging populations presents unique challenges including the complexity of the relationship between aging and inflammatory disease, the lack of clarity regarding the safety and efficacy of DMTs in aging individuals, controversy over when and whether discontinuation of therapy is appropriate, and the importance of supporting wellness and cognition.

LEARNING OBJECTIVES

1. **Understand the unique challenges of treating aging people with progressive MS and other CNS inflammatory diseases.**
2. **Know which lifestyle modifications promote wellness and cognition in aging patients with CNS inflammatory diseases.**
3. **Learn how aging influences the pathophysiology of chronic CNS inflammatory diseases as well as potential novel therapeutic target to treat progressive MS and other CNS inflammatory diseases.**

Preserving Wellness and Cognition in Elderly with CNS Autoimmune Diseases

SPEAKER: *Dejan Jakimovski, MD, PhD, University at Buffalo, State University of New York*

Therapeutic Opportunities for Targeting Cellular Senescence in Progressive Multiple Sclerosis

SPEAKER: *Stephen Crocker, PhD, University of Connecticut*

NMDAR Encephalitis: The Long Road to Recovery After Discharge

SPEAKER: *Stacey L. Clardy, MD, PhD, University of Utah*

Neurosarcoidosis: Strategies to Improve Outcomes and Preserve Wellness

SPEAKER: *Jeffrey Gelfand, MD, MAS, FAAN, University of California, San Francisco*

The Extinguish Trial: A Multi-Site Phase-2B Randomized Placebo-Controlled Trial to Study the Safety and Efficacy of Inebilizumab in Anti-NMDA Receptor Encephalitis

ORAL ABSTRACT PRESENTATION: *Gregory S. Day, MD, MSc, MSCI, FAAN, Mayo Clinic*

Early Readmissions After Hospitalization for Neurosarcoidosis

ORAL ABSTRACT PRESENTATION: *Hisham Abdelmotilib, MD, PhD, The University of Alabama at Birmingham*

Mitochondrial Measures in Neuronally-Enriched Extracellular Vesicles Predict Brain and Retinal Atrophy in Multiple Sclerosis

ORAL ABSTRACT PRESENTATION: *Dimitrios Ladakis, MD, Johns Hopkins University School of Medicine*

3:45 PM–5:45 PM GRAND BALLROOM J

Behavioral Neurology and Dementia

CHAIR: *Richard (Ryan) Darby, MD, Vanderbilt University*

CO-CHAIR: *Thomas Wingo, MD, Emory University*

This session will aim to discuss scientific advances and insights into the subspecialty fields of behavioral neurology and dementia. The session will include several established researchers discussing scientific discoveries, as well is top selected abstracts for cutting edge findings from more junior investigators. The session will aim to address a diverse range of research methodologies, diseases, and behavioral symptoms.

LEARNING OBJECTIVES

1. **Learn about mechanisms leading to dementia disease processes.**
2. **Learn about mechanisms leading to behavioral and neuropsychiatric symptoms in dementia.**

Dopamine and Behavioral Impulsivity in Parkinson Disease

SPEAKER: *Daniel Claassen, MD, MS, Vanderbilt University*

Decision Neuroscience in Dementia - Science, Ethics and Policy

SPEAKER: *Winston Chiong, MD, PhD, FANA, University of California, San Francisco*

Transactive Response DNA-Binding Protein 43 (TDP-43) Pathology Effect on Regional Volumes and Flortaucipir Uptake in Older Adults with Alzheimer's Disease Neuropathologic Change

ORAL ABSTRACT PRESENTATION: *Arenn Faye Carlos, MD, Mayo Clinic, Rochester*

Determining Etiologic Diagnoses in Rapidly Progressive Dementia: A Clinical Study

ORAL ABSTRACT PRESENTATION: *Gregory S. Day, MD, MSc, MSCI, FAAN, Mayo Clinic*

Multimodal Machine Learning to Identify Risk of Progression in Asymptomatic Alzheimer's Disease

ORAL ABSTRACT PRESENTATION: *Cassie Mitchell, PhD, Georgia Institute of Technology*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

3:45 PM–5:45 PM GRAND BALLROOM A

Traditional Special Interest Groups

Epilepsy

CHAIR: *Chloe E. Hill, MD, MS, University of Michigan*

Sudden Unexpected Death in Epilepsy (SUDEP), the non-traumatic and non-drowning death of a person with epilepsy in which post-mortem examination does not reveal a toxicologic or anatomic cause, is the leading cause of death for persons with uncontrolled epilepsy. The incidence of SUDEP ranges from 0.09 per 1000 patient-years to 0.9 per 1000 patient-years, depending on epilepsy severity and patient population studied. While awareness about SUDEP has grown in recent years, still much is unknown about SUDEP or how to prevent it. Proposed mechanisms of SUDEP include cardiac arrhythmia and respiratory depression. Additionally, several clinical risk factors have been identified, including frequent generalized tonic-clonic seizures. In this session, we will review the contemporary understanding of SUDEP pathophysiology and clinical risk factors, identify challenges and future directions of SUDEP research, and explore current applications to the clinical care of patients with epilepsy.

LEARNING OBJECTIVES

1. **Demonstrate an understanding of SUDEP pathophysiology and clinical risk factors.**
2. **Identify challenges and future directions of SUDEP research.**
3. **Apply contemporary SUDEP research to the clinical care of patients with epilepsy.**

Exploring SUDEP Cardiac Mechanisms with Human Cellular and Novel Animal Models

SPEAKER: *Jack M. Parent, MD, FANA, University of Michigan*

Sleep-wake and Respiratory Mechanisms of SUDEP

SPEAKER: *Gordon F. Buchanan, MD, PhD, FAES, FANA, University of Iowa*

Making Sense of SUDEP

SPEAKER: *Elizabeth Donner, MD, MSc FRCPC, The Hospital for Sick Children, University of Toronto*

SUDEP and Brainstem Mechanisms

SPEAKER: *Samden D. Lhatoo, MD, University of Texas, Houston*

VIP Interneuron Dysfunction Underlies Impaired Neocortical State Transitions and Behavior in a Model of Dravet Syndrome

ORAL ABSTRACT PRESENTATION: *Ethan Goldberg, MD, PhD, University of Pennsylvania*

Monday, October 24, 2022, *continued*

3:45 PM–5:45 PM GRAND BALLROOM I

Global Neurology

Advancing Equity in Research and Training in Global Neurology

CHAIR: *Felicia Chow, MD, University of California, San Francisco*

CO-CHAIR: *Monica Maria Diaz, MD, MS, University of North Carolina*

Research and training in global neurology is critical to combat the rising toll of neurological diseases and the growing gap in neurologic health outcomes in low and middle-income countries and in underserved and vulnerable populations in high-income countries. Advancing equity to attain the highest level of health for all people is an important component of global neurology research and training. In this session, a diverse group of seasoned and up-and-coming leaders in global neurology from around the world will discuss progress and challenges in advancing equity in global neurology research and training.

LEARNING OBJECTIVES

1. **Following this session, learners will be better equipped to consider inequities in global neurology research and training and how they may address them by learning from diverse leaders and peers about progress and challenges in global neurology research and training.**
2. **Participating in a dialogue with global leaders and peers from diverse settings about solutions to address inequities in global neurology research and training.**
3. **Applying innovative strategies to continue to advance equity in global neurology research and training.**

Inequities in Neurological Care and Research in Urban vs. Rural LMIC Settings in Sub-Saharan Africa

SPEAKER: *Gretchen Birbeck, MD, MPH, DTMH, FANA, University of Rochester*

Inequities in Neurological Care and Research in Urban vs. Rural LMIC Settings in Latin America

SPEAKER: *Maritza Pintado-Caipa, MD, Universidad Nacional Mayor de San Marcos*

Gender Inequities in Neurologic Care and Research Participation in LMIC

SPEAKER: *Riley Bove, MD, MSc, University of California, San Francisco*

Pathways to Diagnosis of Multiple Sclerosis in Zambia

ORAL ABSTRACT PRESENTATION: *Mashina Chomba, MBChB, University of Zambia*

Inequities in Neurology Research Training for LMIC Trainees

SPEAKER: *Joe Zunt, MD, MPH, University of Washington*

Inequities in Neurology Research Training from the LMIC Perspective

SPEAKER: *Abdu Kisekka Musubire, MD, PhD Student, Makerere University*

Assessment of the Perceived Benefit and Barriers of a Virtual Neuroscience Course for Practitioners in Low- and Middle-Income Countries

ORAL ABSTRACT PRESENTATION: *Deanna Saylor, MD, MHS, Johns Hopkins University*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Monday, October 24, 2022, *continued*

3:45 PM–5:45 PM GRAND BALLROOM B

Neurocritical Care and Traumatic Brain injury

CHAIR: *H.E. Hinson, MD, MCR, Oregon Health & Science University*

CO-CHAIR: *Marion Buckwalter, MD, PhD, Stanford University*

Biomarker (fluid-based, imaging, electrophysiological) research in neurocritical care has significantly expanded over the last decade, but there has been incomplete adoption of biomarkers due to several distinct factors. Not all modalities are readily available in all clinical settings (advanced imaging, labs equipped to test for certain biomarkers), or there may be considerable delay in obtaining this information if it is available (e.g. neuron specific enolase after cardiac arrest). Clinicians are not always knowledgeable about what biomarkers are under investigation versus which are validated. In parallel, there is a knowledge gap regarding what circumstances and the timing surrounding multimodal prognostication. This session will explore the emerging use of biomarkers and prediction of long term outcomes in adults and children after acute neurologic injury.

LEARNING OBJECTIVES

1. **Following this session, learners will identify ancillary testing that may provide assistance with long term prognostication in acute neurological injury (e.g. TBI, cardiac arrest, etc.).**
2. **Learners will distinguish between validated and promising emerging biomarkers of long-term prognosis after traumatic brain injury (TBI).**
3. **Attendees will define Post-Pediatric Intensive Care Unit Syndrome and identify emerging prognostication methods in children suffering acute, severe neurologic injury.**

Post-Pediatric Intensive Care Unit Syndrome and Long-Term Outcomes

SPEAKER: *Cydni N. Williams, MD, MCR, Oregon Health & Science University*

Long-term Prognosis after Cardiac Arrest Incorporating Imaging Biomarkers

SPEAKER: *Karen G. Hirsch, MD, Stanford University*

Long-term Prognosis after Traumatic Brain Injury - Novel Biomarker Insights

SPEAKER: *Ramon Diaz-Arrastia, MD, PhD, University of Pennsylvania Perelman School of Medicine*

Discrepancy Between Surrogate Estimated and Observed Patient Outcomes After Severe Stroke

ORAL ABSTRACT PRESENTATION: *Roland Faigle, MD, PhD, Johns Hopkins University School of Medicine*

Repeated Mild Traumatic Brain Injury is an Exogenous Trigger for Neurodegeneration in Transgenic Mice Expressing Human C9orf72 Hexanucleotide Repeat Expansions

ORAL ABSTRACT PRESENTATION: *Aydan Kahriman, MD, University of Massachusetts Medical School*

3:45 PM–5:45 PM GRAND BALLROOM K

Traditional Special Interest Groups

Neuromuscular Disease

CHAIR: *Michelle Mauermann, FANA, MD, Mayo Clinic*

CO-CHAIR: *Teerin Liewluck, MD, Mayo Clinic*

This special interest group session will focus on three areas of contemporary interest in neuromuscular disease. One session will review muscular dystrophies and examine the recent development and release of several novel therapies for treatment of muscular dystrophies. Another session will review the challenges of therapy development for ALS, particularly for the genetic forms. The third session will focus on the expanding number of recognized autoantibodies in peripheral neuropathy and discuss the testing and implications for diagnosis and treatment in this heterogeneous group of neuropathies. Three short presentations will be selected from the best accepted neuromuscular abstracts.

LEARNING OBJECTIVES

1. **Identify the antibodies associated with specific peripheral neuropathy phenotypes.**
2. **Describe treatment strategies for distinct autoimmune neuropathy syndromes.**
3. **Identify novel therapies for muscular dystrophies.**
4. **Identify novel therapies for genetic forms of ALS.**
5. **Recognize the challenges of therapy development in amyotrophic lateral sclerosis.**

Treatment Update for Muscular Dystrophies

SPEAKER: *Nancy Kuntz, MD, FAAN, Ann & Robert H. Lurie Children's Hospital of Chicago*

Evolving Paradigms in ALS Therapy Development

SPEAKER: *Michael Benatar, MD, PhD, FANA, University of Miami*

Antibody Testing in Peripheral Neuropathy

SPEAKER: *Divyanshu Dubey, MBBS, Mayo Clinic*

Disease-Responsive Gene Therapy for the Treatment of Myotonic Dystrophy

ORAL ABSTRACT PRESENTATION: *Samuel Carrell, MD, PhD, University of Pennsylvania*

The Genome, Epigenome, and Schwann Cell Transcriptome Implicate the Immune System as a Mediator of Neuropathy in Both Patients and Murine Models

ORAL ABSTRACT PRESENTATION: *Stephanie Eid, PhD, University of Michigan*

Safety and Activity of Anti-CD14 Antibody IC14 (Atibuclimab) in ALS: Experience with an Expanded Access Protocol

ORAL ABSTRACT PRESENTATION: *Dario Gelevski, BS, Healey Center at Mass General Hospital*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

6:00 PM–7:30 PM — RIVERSIDE EAST CENTER

Poster Presentation

Poster Presentation & Reception*

7:30 PM–10:30 PM — GRAND BALLROOM C-D

President's Reception

President's Reception*

Tuesday, October 25, 2022

6:30 AM–2:00 PM — GRAND BALLROOM FOYER

Registration

6:30 AM–8:30 AM — GRAND BALLROOM FOYER

Breakfast

7:00 AM–8:30 AM — GRAND BALLROOM K

Professional Development Courses

★ **Early Career Level**

Course 3: Strategies for Landing your Target Fellowship/ Faculty

CHAIR: *Peter K. Todd, MD, PhD, FANA, University of Michigan*
CO-CHAIR: *Christa O'Hana S. Nobleza, MD, MSCI, University of Tennessee*

Successfully navigating the search for a fellowship or faculty position is a critical step in launching and advancing your career. In this session, academic leaders will share their advice from beginning the search to finding the best fit and negotiating your first position. Their talks will be followed by an interactive panel discussion with questions from the audience.

LEARNING OBJECTIVES

1. **Learn what to expect during the fellowship and faculty application process.**
2. **Understand how to negotiate for an academic neurology position.**
3. **Discover advice on best approaches to apply to and obtain your ideal fellowship or faculty position.**

Strategies for Landing your Target Faculty Position: A Chair's Perspective

SPEAKER: *Claire Henchcliffe, MD, DPhil, FANA, University of California, Irvine*

Strategies for Landing your Target Fellowship Position: A Fellowship Director's Perspective

SPEAKER: *Charles Flippen II, MD, FANA, University of California, Los Angeles*

Strategies for Landing your Target Faculty Position: A Clinician Educator and Researcher's Perspective

SPEAKER: *Lori Shutter, MD, FNCS, FCCM, FANA, University of Pittsburgh*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

7:00 AM–8:30 AM GRAND BALLROOM L

★ Early to Mid-Career Level

Course 3: Demystifying the Academic Promotion Process

CHAIR: *Anna M. Bank, MD, Lennox Hill Hospital, Northwell Health*
CO-CHAIR: *Larry Charleston IV, MD, MSc, FAHS, Michigan State University*

The promotion process in academic medical centers can be opaque and difficult for early career faculty members to navigate. This is likely to adversely affect promotion outcomes, particularly for women and physicians from ethnic groups underrepresented in medicine. Moreover, it has been demonstrated that current efforts to encompass a diverse workforce of academic physician faculty are inadequate and improvements are needed. While specific procedures vary across institutions, many requirements for promotion are shared among institutions, including selection of a "track" (typically research, clinical care, or medical education), establishment of a regional or national reputation, and input from external reviewers. This session will include talks from a mid-career academic neurologist who recently completed the process of promotion to associate professor, as well as a senior academic neurologist with experience evaluating candidates for promotion. These speakers will present a clear and practical overview of the process and take questions from attendees in a candid, informal environment.

LEARNING OBJECTIVES

1. **Learners will know the tracks available for academic promotion at most institutions.**
2. **Learners will know the typical requirements for promotion in each track.**
3. **Learners will understand the importance of building a regional and national reputation, and gain ideas about strategies for doing so (e.g. networking at regional and national meetings or via social media, invited talks, publications).**
4. **Learners will know that letters from external reviewers are required for promotion and gain ideas about how to select appropriate reviewers.**

Charting your Path to Associate Professor: Practical Tips for the Process

SPEAKER: *Heidi M. Munger Clary, MD, MPH, Wake Forest University*

Readiness for Promotion

SPEAKER: *Barbara G. Vickrey, MD, MPH, Mount Sinai Health System*

Tuesday, October 25, 2022, *continued*

7:00 AM–8:30 AM GRAND BALLROOM MN

AUPN Chair Career Level

Course 3: Chair Evaluations of Faculty

CHAIR: *Michel Torbey, MD, MPH, FNCS, FAHA, FANA, FAAN, FCCM, University of New Mexico*

This course is designed for physician leaders to improve their feedback skills. Leaders will gain insight into goal setting, defining expected behavior, and optimizing communication tools.

LEARNING OBJECTIVES

1. **Review effective communication for physicians' leaders.**
2. **Explore strategies for goal setting.**
3. **Understand the role of chairs in managing and measuring faculty expectations.**

SPEAKER: *David Greer, MD, MA, FANA, Boston University*

8:30 AM–8:45 AM

Break

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Tuesday, October 25, 2022, *continued*

8:45 AM–10:45 AM GRAND BALLROOM C-F

Plenary Session

Peripheral Contributions to Neurologic Disorders: Adaptive Immunity and Metabolic Influences

CHAIR: *Sheng-Han Kuo, MD, Columbia University*

CO-CHAIR: *Matthew Robert Burns, MD, PhD, University of Florida*

In this session, panelists will discuss the recent discovery of peripheral contributions to the pathomechanisms of neurological disorders, including Alzheimer's disease and Parkinson's disease. While these neurological disorders have the primary pathology in the central nervous system, the metabolic controls and immune-mediated mechanism from the body have recently been found to be critically important in modulating the neurodegenerative processes. These novel pathways are now at the forefront of therapeutic development. Specifically, insulin and metabolic controls are known to influence how the proteins accumulate and aggregate in the brain, which could be the common pathways across neurodegenerative disorders. Immunological cells, such as T cells coming from the peripheral system, can accelerate the neurodegeneration in the parkinsonism disorders and the antigen-specific mechanism may explain selective vulnerability in these diseases, To review the field, panelists will gather evidence from animal models as well as patients to provide context for attendees and the overview for recent advances. This session will further create dialogues between neurologists and neuroscientists to develop ways to treat these neurodegenerative diseases.

LEARNING OBJECTIVES

1. **Understand the role of insulin in metabolic control of neurodegenerative disease.**
2. **Appreciate the interaction between T cells and synuclein in Parkinson's disease.**
3. **Recognize the regulatory influence of meningeal lymphatics on microglia.**
4. **Identify mechanisms of peripheral immune cells in multiple system atrophy.**

Metabolic Controls and Insulin across Neurodegenerative Diseases

SPEAKER: *Josephine Egan, MD, FRCPI, National Institutes of Health (NIH), National Institute on Aging (NIA)*

Synuclein Recognizing T Cells Contribute to Parkinson's Disease

SPEAKER: *David Sulzer, PhD, Columbia University*

Meningeal Lymphatics Regulate Microglia in Alzheimer's Disease

SPEAKER: *Jonathan Kipnis, PhD, Washington University in St. Louis*

Infiltration of Peripheral Immune Cells in Multiple System Atrophy

SPEAKER: *Ashley Harms, PhD, University of Alabama, Birmingham*

A Novel Mouse Model of Cerebral Demyelination in X-Linked Adrenoleukodystrophy Highlights NLRP3 Activation in Lesion Pathogenesis

EMERGING SCHOLAR: *Isha Srivastava, MD, PhD, Stanford University*

Proinflammatory Cytokines within the Cerebrospinal Fluid of Patients with Intraventricular Hemorrhage Are Associated with Outcomes

EMERGING SCHOLAR: *Jessica Magid-Bernstein, MD, PhD, Yale School of Medicine*

10:45 AM–11:00 AM

Break

11:00 AM–12:30 PM GRAND FOYER BALLROOM

Lunch

Boxed lunches will be available to take into the Interactive Lunch Workshops

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Tuesday, October 25, 2022, *continued*

11:00 AM–12:30 PM GRAND BALLROOM GH

Traditional Special Interest Groups

ANA-AHS Headache

CHAIR: *Will Renthal, MD, PhD, Brigham and Women's Hospital*

CO-CHAIR: *Charles Flippen II, MD, FAAN, FANA, University of California, Los Angeles*

Headache is the second to third leading cause of global years lived with disability. Migraine headaches represent one of the most disabling headache diagnoses, affecting 12% of the general population. The economic and social impact of migraine, particularly in women, highlight the need to better understand mechanisms involved in migraine headache generation and its accompanying symptoms. Basic science and clinical research in migraine have culminated in new translational targets, providing hope for migraine patients. Despite these recent advances, there are still many unanswered questions about disease mechanism. The focus of this session is to highlight emerging discoveries in migraine research that increase our understanding of the biological mechanisms of trigeminal pain, cortical events involved in migraine aura and accompanying incapacitating symptoms like light sensitivity.

LEARNING OBJECTIVES:

1. **Discuss pathophysiological mechanisms of migraine.**
2. **Identify emerging concepts from preclinical migraine models.**
3. **Describe mechanisms involved in accompanying features of migraine including photophobia.**

Risk Factors of Migraine in Men

SPEAKER: *Elizabeth Seng, PhD, FANA, Yeshiva University*

A Healthcare System Perspective of Headache, Headache Care, and Outcomes Among Veterans

SPEAKER: *Jason Sico, MD, MHS, FANA, Yale School of Medicine and Veterans Health Administration*

Investigating Electrical Connectomics in Migraine: Toward Network-Based Therapies

SPEAKER: *Rainbo Hultman, PhD, University of Iowa*

Genomics and Migraine Preventative Treatment

SPEAKER: *Michael Cutrer, MD, Mayo Clinic*

Peroxynitrite Contributes to Behavioral and Neuronal Sensitization in Preclinical Migraine Models

SPEAKER: *Greg Dussor, PhD, University of Texas At Dallas*

Transcriptomic Analysis of Dural Plasticity Sex Differences in Sleep Disruption-Induced Migraine

ORAL ABSTRACT PRESENTATION: *Skyler Kanegi, BA, BBA, University of Texas Health Science Center at San Antonio*

11:00 AM–12:30 PM GRAND BALLROOM A

Cerebrovascular Disease

CHAIR: *Alexandra L. Czap, MD, Univeristy of Texas, Houston*

CO-CHAIR: *Andrei Alexandrov, MD, University of Tennessee*

Stroke management has substantially changed over the past decade, with advances in the selection and treatment of acute ischemic and hemorrhagic stroke. There remain areas where the evidence is insufficient to formulate clear recommendations for the practicing neurologist, or where new evidence from recent trials has emerged that challenges the current consensus. Through case-based presentations and overview of current evidence, faculty will present novel research and applications of stroke and neurointerventional treatments. This session will cover important topics, in particular: 1) emerging prehospital triage and treatment, 2) advances in diagnostic neuroimaging and 3) long term sequelae on brain health and cognition, and provide participants with evidence-based approaches to increase their competence and performance in clinical practice and research. Faculty will facilitate discussions of innovative research in mobile stroke units, bypass of traditional emergency protocols and treatment, emerging imaging techniques and its role in selection for interventional therapies and secondary prevention, and brain resilience and vulnerability on an individual's potential for recovery from acute stroke, which will bridge the gap in knowledge, competence, performance for attendees and subsequent patient outcomes.

LEARNING OBJECTIVES

1. **Upon completion of this session, participants will be able to describe prehospital and emergency best-practice protocols and technologies to facilitate patient triage and treatment.**
2. **Identify clinical pathways to improve accuracy of stroke diagnosis and treatment.**
3. **Discuss the burden of vascular-related cognitive impairment and impact on recovery from acute injury.**

Working Outside the Box: Evidence Supporting Mobile Stroke Units

SPEAKER: *James C. Grotta, MD, Memorial Hermann Hospital*

Inside Out: Vessel Wall Imaging

SPEAKER: *Edgar A. Samaniego, MD, MS, University of Iowa*

Brain Health: Injury, Repair and Recovery

SPEAKER: *Farzaneh Sorond, MD, PhD, FANA, Northwestern University*

Placental Growth Factor as a Sensitive Diagnostic Biomarker for Vascular Cognitive Impairment

ORAL ABSTRACT PRESENTATION: *Jason Hinman, MD, PhD, University of California, Los Angeles*

Serial Assessment of Aspects Regions as a Stronger Predictor of Outcomes

ORAL ABSTRACT PRESENTATION: *Rebecca Stafford, BA, Boston University Medical Center*

Spinal Cord Ischemia Following Peripheral Venoarterial Extracorporeal Membrane Oxygenation (PVA-ECMO)

ORAL ABSTRACT PRESENTATION: *Sara Berman, MD, PhD, University of Pennsylvania*

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Tuesday, October 25, 2022, *continued*

11:00 AM–12:30 PM — GRAND BALLROOM B

Movement Disorders*

Therapeutic Intervention Using Gene Modifying Strategies—Progress and Setbacks

CHAIR: *Michelle Gray, PhD, University of Alabama, Birmingham*

CO-CHAIR: *Erin F. Stimming, MD, FAAN, University of Texas, Houston*

Therapeutic intervention using antisense oligonucleotide therapies in movement disorders and neurodegenerative diseases more broadly is an ever-increasing approach being taken in these diseases. The antisense oligonucleotide approach uses antisense drugs of various designs. The different designs allow ASOs to modulate RNA function either by targeting pre-mRNA or mature RNA for degradation. In addition, ASOs can modulate RNA function by altering splicing to increase specific RNA levels. Using an ASO approach in some of these diseases have been shown to be an effective therapeutic approach while some setbacks associated with the use of an ASO approach has also been observed. This SIG seeks to educate neurologists about the most recent findings using this approach.

LEARNING OBJECTIVES

1. **Following this session, learners will be more knowledgeable about the antisense oligonucleotide technology being employed to treat various neurological diseases.**
2. **Be better equipped to educate their patients concerning the types of clinical trials being performed using the antisense oligonucleotide technology.**
3. **The feasibility of employing the technology in their clinical practice.**
4. **Understand the risks associated with the use of antisense oligonucleotide technology.**

Treatments for Spinal Muscular Atrophy

SPEAKER: *Perry B. Shieh, MD, PhD, University of California, Los Angeles*

Tominersen in Huntington's Disease

SPEAKER: *Blair Leavitt, MDCM, FRCPC, University of British Columbia*

Antisense Oligonucleotides for Spinocerebellar Ataxias

SPEAKER: *Henry Paulson, MD, PhD, University of Michigan*

Allele-Selective Inhibition of Mutant HTT Transcription Throughout the Brain After Subcutaneous Administration of a PATrOL™-Enabled Genome-Targeting Compound in the R6/2 Huntington's Disease Transgenic

ORAL ABSTRACT PRESENTATION: *Robert Friedlander, MD, University of Pittsburgh*

Distribution of α-Synuclein Oligomers in Brains of Parkinson's Disease Patients with LRRK2 Mutations

ORAL ABSTRACT PRESENTATION: *Hiroaki Sekiya, MD, PhD, Mayo Clinic*

Reverse Translating Dystonia Assessment Following Neonatal Brain Injury Across Species: From Men to Mice

ORAL ABSTRACT PRESENTATION: *Kat Gemperli, BA, Washington University of St. Louis*

11:00 AM–12:30 PM — GRAND BALLROOM I

Neuro-Oncology

Detecting the Tumor: How Non-invasive Diagnostic Testing is Shaping the Future of Neuro-oncology

CHAIR: *Megan Mantica, MD, University of Pittsburgh*

CO-CHAIR: *Kevin Elmore, MD, Mount Sinai Health System*

Diagnosis and treatment of primary central nervous system (CNS) tumors such as Glioblastoma multiforme, an extremely aggressive and invariably fatal primary brain tumor, relies on prompt evaluation with gadolinium enhanced magnetic resonance imaging followed by highly risky and potentially morbid surgical resection or biopsy for definitive tissue diagnosis. Noninvasive diagnostic testing may avoid surgical risk and permit the early identification and treatment of CNS tumors. Furthermore, these techniques may be incorporated into tumor surveillance to identify progression and genetic changes as treatment resistance develops. Presently, there is only limited availability of these technologies for a variety of reasons including insufficient exposure, cost, time constraints, reproducibility, and a lack of standardization about how best to incorporate these techniques to our current methods. Ongoing studies are needed to clarify the role of liquid biopsy and artificial intelligence. This year's Neuro-Oncology Special Interest Group Session titled "Detecting the tumor: how non-invasive diagnostic testing is shaping the future of neuro-oncology" will delve into the current understanding and role of non-invasive diagnostic testing of CNS tumors and elucidate the role of circulating tumor cells, circulating tumor DNA in primary CNS tumors and metastases, and discuss the application of artificial intelligence and its potential role to help further improve our diagnostic approach to CNS tumors and aide in predicting and monitoring treatment response.

LEARNING OBJECTIVES

Following this session, learners will increase their understanding of non-invasive diagnostic testing in the evaluation of CNS tumors including:

1. **The detection and utility of circulating tumor cells and circulating tumor DNA in primary CNS tumors and metastases.**
2. **Applications of artificial intelligence and deep learning.**

Circulating Tumor DNA and Primary CNS Tumors

SPEAKER: *Chetan Bettegowda, MD, PhD, John Hopkins Medicine*

Cerebrospinal Fluid Circulating Biomarkers in Patients with Central Nervous System Tumours

SPEAKER: *Elena Pentsova, MD, Memorial Sloan Kettering*

Deep Learning in Glioma Imaging

SPEAKER: *Christopher Filippi, MD, Tufts University*

Gray Matter Alteration in Cancer Survivors After Chemotherapy: An ALE Meta-Analysis of Voxel-Based Morphometry Studies

ORAL ABSTRACT PRESENTATION: *Yaman Ahmed, MD, Jordan University of Science and Technology*

Oncogenic Long Non-Coding RNA LINC02283 Enhances PDGF Receptor A Mediated Signaling and Drives Glioblastoma Tumorigenesis

ORAL ABSTRACT PRESENTATION: *Anshika Goenka, MD, PhD, Northwestern University*

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Tuesday, October 25, 2022, *continued*

11:00 AM–12:30 PM GRAND BALLROOM J

Neuro-Ophthalmology and Neurovestibular Disease NEW

CHAIR: *Daniel R. Gold, DO, Johns Hopkins University*

CO-CHAIR: *Ali G. Hamedani, MD, MHS, University of Pennsylvania*

Neuro-ophthalmic and neuro-otologic diseases are a common cause of neurologic symptoms and reason for referral to neurologists. However, many of these diseases are poorly understood, with limited exposure during neurology training, and teachings from as little as five years ago are outdated as our understanding of them has changed dramatically thanks to active cutting-edge research. In this Special Interest Group session, leaders in the fields of neuro-ophthalmology and neuro-otology will present exciting research on important and emerging topics covering the full spectrum of the afferent and efferent visual and balance systems. The audience will learn about the pathophysiology of eye movement abnormalities in cerebellar disease and their potential value as disease biomarkers, mechanisms and functional imaging correlates of chronic dizziness and vertigo, and future of optic nerve regeneration and targeting therapies. These will add to the listener's clinical armamentarium when evaluating patients and facilitate a deeper appreciation of future research advances.

LEARNING OBJECTIVES

1. **Describe the pathophysiology of abnormal eye movement in cerebellar disease.**
2. **Understand pharmacotherapy and its mechanistic underpinning for the treatment of eye movement disorders in cerebellar disease.**
3. **Apply eye movements as a potential biomarker of cerebellar disorders.**
4. **To describe the diagnostic criteria for MdDS and contrast it with other neurotological disorders.**
5. **Explain how non-motion triggered POV is different from MdDS.**
6. **Describe the yield of diagnostic testing in chronic dizziness.**
7. **Explain the overall approach to managing POV and MdDS.**
8. **Describe the current state of knowledge and challenges in optic nerve regeneration research.**

Cerebellar Control of Eye Movements

SPEAKER: *Aasef G. Shaikh, MD, PhD, Case Western Reserve University*

Mal de Débarquement Syndrome

SPEAKER: *Yoon-Hee Cha, MD, University of Minnesota*

Electric Fields Direct Full Length Optic Nerve Regeneration and Partial Restoration of Visual Function

SPEAKER: *Kimberly K. Gokoffski, MD, PhD, University of Southern California*

Rapid Picture and Number Naming App for Concussion Assessment in a Division 1 Football Cohort

ORAL ABSTRACT PRESENTATION: *Scott Grossman, MD, New York University Grossman School of Medicine*

MBCT-Vision Improves Visual Snow Syndrome and Changes Resting-State Connectivity in the Visual Network on Functional Magnetic Resonance Imaging

ORAL ABSTRACT PRESENTATION: *Sui Wong, MD, FRCP, Moorfields Private Eye Hospital*

11:00 AM–12:30 PM GRAND BALLROOM K

Sleep Disorders and Circadian Rhythms

CHAIR: *Lynn Marie Trotti, MD, MSc, FANA, Emory University*

CO-CHAIR: *Sabra Abbott, MD, PhD, Northwestern University*

In this session, attendees with special interest in sleep and circadian rhythms will gather to discuss recent scientific advancements, ranging from basic science to clinical practice. Two Leader-In-The-Field presentations will be given, selected abstracts will be presented, and time will be allotted for discussion of these scientific presentations. One leader in the field presentation will bring together expertise in neurocritical care and hepatology with assessments of rest-activity rhythm to discuss how sleep and circadian systems may impact critical illness in patients with liver disease. One leader in the field presentation will discuss how artificial intelligence can be used to extract richer, more informative data from polysomnography and how such AI tools will be incorporated into the future of personalized, predictive medicine.

LEARNING OBJECTIVES

1. **Discuss the potential impact of the circadian system on cognition in people with liver disease.**
2. **Recognize how artificial intelligence tools may be harnessed in coming years to improve clinical practice and predictive ability of polysomnography.**
3. **Give examples of recent highlights in sleep and circadian science presented in abstract form at the ANA meeting.**

Sleep-Wake Rhythms and Cognition in People with Liver Disease

SPEAKER: *Minjee Kim, MD, Northwestern University*

Artificial Intelligence and Sleep

SPEAKER: *M. Brandon Westover, MD, PhD, Massachusetts General Hospital*

Neuroimaging in Kleine-Levin Syndrome: A Systematic Review

ORAL ABSTRACT PRESENTATION: *Alex Aguirre, MD, Universidad San Francisco de Quito*

Acute Effect of Suvorexant on CSF Amyloid-Beta, Tau, and Phospho-Tau Dynamics

ORAL ABSTRACT PRESENTATION: *Brendan Lucey, MD, Washington University School of Medicine in St. Louis*

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Tuesday, October 25, 2022, *continued*

11:00 AM–12:30 PM GRAND BALLROOM L

Additional Lunch Workshops

Media Roundtable*

The ANA will host an interactive panel for members of the press to learn from top neurologists about the key science being presented at the meeting.

PANELIST: *Jack M. Parent, MD, FANA, University of Michigan*

PANELIST: *Krishnankutty Sathian, MBBS, PhD, FANA, Pennsylvania State University*

PANELIST: *Frances E. Jensen, MD, FANA, FACP, University of Pennsylvania*

PANELIST: *Sheng-Han Kuo, MD, Columbia University*

PANELIST: *Roy H. Hamilton, MD, MS, FANA, University of Pennsylvania*

11:00 AM–12:30 PM GRAND BALLROOM MN

AUPN Networking Lunch for Small Academic Departments*

While all Neurology departments share some common attributes, there are challenges unique to smaller academic departments, including handling teaching and clinical service responsibilities, while protecting time for research and faculty development. This lunch, sponsored by the AUPN, provides an opportunity for chairs of smaller departments to meet, discuss issues and share strategies.

MODERATOR: *Sanjay Singh, MD, FANA, Creighton University*

12:30 PM–12:45 PM

Break

12:45 PM–2:30 PM GRAND BALLROOM C-F

Plenary Session

Advancing Neurologic Equity: Challenges and Paths Forward

CHAIR: *Roy H. Hamilton, MD, MS, FANA, University of Pennsylvania*

CO-CHAIR: *Lesli E. Skolarus, MD, FANA, University of Michigan*

Many of the most common and burdensome neurologic disorders disproportionately affect persons belonging to marginalized and minoritized groups. These persons face challenges that increase their likelihood of developing a range of neurologic disorders, impose barriers to their ability to access neurologic care, and give rise to inequities in how they are treated by health professionals. Addressing these disparities is critical to ensuring that excellent neurologic care is provided to an increasingly diverse population. In this symposium, presenters will discuss how racial and ethnic disparities impact two highly prevalent neurologic disorders, Alzheimer's disease and multiple sclerosis. Special attention will be paid to the topic of cognitive and behavioral assessment in diverse populations. Presenters will also address how neurologic disorders impact LGBTQ health. In addition to discussing the causes and consequences of neurologic disparities, speakers will point to approaches to ameliorating these disparities in order to advance more equitable, inclusive neurologic care.

LEARNING OBJECTIVES

1. **Following this session, learners will better understand the degree to which marginalized and minoritized populations are disproportionately impacted by neurologic disorders such as Alzheimer's disease and Multiple Sclerosis, and the causes and consequences of these disparities.**
2. **Following this session, learners will better understand how to apply demographic information appropriately when evaluating cognitive and behavioral performance in neurologic patients from marginalized and minoritized groups.**
3. **Following this session, learners will be better prepared to recognize and address neurologic issues as they occur in LGBTQ patients.**

A Roadmap for Advancing Dementia Equity in Science and Care

SPEAKER: *Monica Rivera-Mindt, PhD, ABPP, Fordham University*

Diagnosis and Management Disparities in Multiple Sclerosis

SPEAKER: *Lilyana Amezcua, MD, University of Southern California*

LGBTQ Care in Neurology

SPEAKER: *Nicole Rosendale, MD, University of California, San Francisco*

Social Determinants of Health, the Exposome and Dementia: A Focus on Action

SPEAKER: *Amy Kind, MD, PhD, University of Wisconsin*

Low Neighborhood Socioeconomic Status is Associated with Increased 30-Day Mortality and Readmission Rates for Patients with Common Neurological Disorders

EMERGING SCHOLAR: *Jay Lusk, BSc, Duke University*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

Tuesday, October 25, 2022, *continued*

2:30 PM

Adjourn

Meeting Adjourns

★ Recommended for Junior and Early Career attendees.

Note: The Annual Meeting offers CME to eligible participants. Complete CME information, including a breakdown of the credits offered for each session and the instructions for claiming credit, is available online at 2022.myana.org/continuing-medical-education.

The American Neurological Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Schedule Subject to Change: The event's operating hours, schedules, and speakers are subject to change or cancellation without notice. Refunds will be not issued for failure to attend a live session.

★ Recommended for Junior and Early Career attendees.

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Satellite Symposia

The ANA values the participation of our corporate partners and is supportive of the role that members of this community continue to play in our efforts to provide neurologists and neuroscientists with quality educational programs. These symposia are not part of the ANA official educational program, and the sessions and content are not endorsed by ANA.

Saturday, October 22

3:00 PM–4:00 PM — **GRAND BALLROOM K**

Dopamine Receptor Pharmacology in Parkinson's Disease

To discuss the clinical implications of dopamine receptor pharmacology on efficacy and tolerability, how dopamine receptor pathways differ, and how different pathways may have distinct clinical efficacy and safety profiles.

PRESENTED BY: CEREVEL

SPEAKER: *Robert Hauser, MD, MBA, University of South Florida College of Medicine*

SPEAKER: *Stuart H. Isaacson, MD, Parkinson's Disease and Movement Disorders Center of Boca Raton*

SPEAKER: *Richard Mailman, PhD, Penn State University*

Sunday, October 23

6:30 AM–7:30 AM — **GRAND BALLROOM A**

Defining Meaningful Benefits for Patients with Alzheimer's Disease: Timely Diagnosis and Interpreting Treatment Outcomes

Discussions will dive deep into the challenges of timely diagnosis, most meaningful treatment outcomes to patients, and use of biomarkers throughout the Alzheimer's disease treatment pathway.

PRESENTED BY: EISAI

SPEAKER: *Malaz Boustani, MD, Eskenazi Health*

SPEAKER: *Sharon Cohen, MD, FRCPC, Toronto Memory Program*

6:00 PM–7:00 PM — **GRAND BALLROOM A**

Clinical Considerations for Certain Patients With von Hippel-Lindau (VHL) Disease

PRESENTED BY: MERCK

SPEAKER: *Ian McCutcheon, MD, CM, FRCS(C), FACS, University of Texas, MD Anderson Cancer Center*

Sunday, October 23, *continued*

7:00 PM–8:00 PM — **GRAND BALLROOM B**

The Role of Dopamine and Adenosine in Parkinson's Disease

While dopamine is well understood to play a key role in Parkinson's disease, studies over the last 20 years have shown that the neuromodulator adenosine is also involved in regulating movement through the indirect pathway in the basal ganglia. In this presentation, we will discuss how adenosine and dopamine work together in the direct and indirect pathways to control normal movement and how disruptions to adenosine signaling result in disordered movement, such as occurs in Parkinson's disease.

PRESENTED BY: KYOWA KIRIN

SPEAKER: *Sandeep Thakkar, DO, Hoag Health*

Monday, October 24

6:00 AM–7:00 AM — **GRAND BALLROOM A**

Introduction to AMVUTTRA™ (vutrisiran)

Join our distinguished faculty as he discusses recognizing, diagnosing, and managing adult patients with polyneuropathy caused by hereditary transthyretin-mediated (hATTR) amyloidosis. He will provide an overview of hATTR amyloidosis and review the clinical profile of AMVUTTRA, a new treatment for the polyneuropathy of hATTR amyloidosis in adults.

PRESENTED BY: ALNYLAM

SPEAKER: *Thomas Brannagan, MD, Columbia University Medical Center*

★ Recommended for Junior and Early Career attendees. * This session is not available for ***AMA PRA Category I Credit(s)***™ All session times are listed in Central Daylight Time.

ANA2022 AWARDEES

Saturday, October 22, 2022

F.E. BENNETT MEMORIAL LECTURESHIP AWARD

The F.E. Bennett Memorial Lectureship began in 1979 to recognize outstanding neuroscientists.

SATURDAY, OCTOBER 22, 2022 FROM 5:45 PM–7:15 PM CDT

Arnold R. Kriegstein, MD, PhD
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Presentation Title: Brain Organoids to Study Evolution and Disease

This award will be presented during the Opening Symposium: Brain Organoid Models of Neurological Disorders.

Dr. Arnold Kriegstein received a BA from Yale University and MD and PhD degrees from New York University. He completed a neurology residency at the Brigham and Women's, Children's, and Beth Israel Hospitals in Boston. He has held academic appointments at Stanford, Yale, and Columbia Universities. In 2004, he became the John Bowes Distinguished Professor and Founding Director of the Broad Center for Stem Cell Research at UC San Francisco. Dr. Kriegstein's research focuses on mechanisms of neurogenesis in the embryonic brain and how this information can be used for cell-based therapies.

Sunday, October 23, 2022

SORIANO LECTURESHIP AWARD

This award was established in 1987 by ANA member Dr. Victor Soriano and his wife to provide a "brilliant lecture delivered by an outstanding scientist" who is a member of the Association.

SUNDAY, OCTOBER 23, 2022 FROM 3:30 PM–5:30 PM CDT

Argye E. Hillis, MD, MA, FANA
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

Presentation Title: Neuroplasticity and Neurorecovery of Aphasia

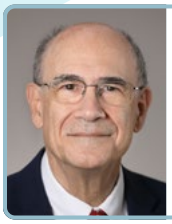
This award will be presented during the SIG Session: Neurorecovery and Neuroplasticity.

Dr. Argye E. Hillis is a Professor of Neurology, Physical Medicine & Rehabilitation, and Cognitive Science at Johns Hopkins. She was a Speech-Language Pathologist and Director of Neurological Rehabilitation prior to medical training and continues to focus on studies of aphasia and cognitive recovery. Her research combines longitudinal functional and structural imaging with detailed cognitive and language assessments to reveal the dynamic neural networks that underlie language and cognitive functions. Her lab studies changes from acute stroke through the first year of recovery, to improve our understanding of how language and cognitive functions recover after stroke and how to facilitate recovery.

RAYMOND D. ADAMS LECTURESHIP AWARD

This award honors Dr. Raymond D. Adams, emeritus Bullard Professor of Neuropathy at Harvard Medical School and emeritus Chief of Neurology Service at the Massachusetts General Hospital.

SUNDAY, OCTOBER 23, 2022 FROM 11:45 AM–1:00 PM CDT



Mark Hallett, MD

NATIONAL INSTITUTES OF HEALTH (NIH)

Presentation Title: Update on Pathophysiology of Functional Neurological Disorders

This award will be presented during the Interactive Lunch Workshop: Updates on Functional Neurological Disorder.

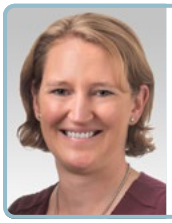
Dr. Mark Hallett is an NIH Distinguished Investigator and the Chief of the Human Motor Control Section, NINDS, NIH, Bethesda. He is currently past President of the newly founded Functional Neurological Disorder Society. Dr. Hallett is also remote past President of the Movement Disorder Society and past Editor-in-Chief of "Clinical Neurophysiology". He has won many awards including, in October 2019, the World Federation of Neurology Medal for Contributions to Neuroscience. His work mainly deals with principles of motor control and the pathophysiology of movement disorders. The work in his Section has a major focus on Functional Movement Disorders.

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLARS

The Derek Denny-Brown Young Neurological Scholars Awards are awards given each year during the Annual Meeting to new members of the association who have achieved significant stature in neurological research, and who show promise and will continue making major contributions to the field of neurology.

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN NEUROSCIENCE

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT



Gemma Carvill, PhD

NORTHWESTERN UNIVERSITY

Presentation Title: Beyond the Exome in the Rare Genetic Epilepsies: New Challenges and Opportunities

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Gemma Carvill is an Assistant Professor in the Department of Neurology at Northwestern University Feinberg School of Medicine. Her lab uses genomic technologies to define the molecular basis of epilepsy, including coding and non-coding variants, as well as the development of novel DNA-based biomarkers. Her group also uses patient-derived stem cell models to study how rare variants in genes involved in epigenetic mechanisms cause epilepsy. At Northwestern, Dr. Carvill interfaces with the adult and pediatric clinical teams to expand neurogenetics research and to facilitate genetic diagnoses for patients and families.

THE DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN BASIC SCIENCE

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT

Sami Barmada, MD, PhD
UNIVERSITY OF MICHIGAN

Presentation Title: Therapeutic Implications of Convergent Disease Mechanisms in ALS and FTD

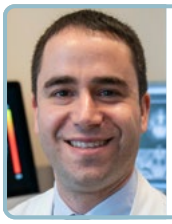
This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Sami Barmada received his M.D. and Ph.D. from Washington University in St. Louis in 2006, and completed his neurology residency at the University of California, San Francisco, in 2010. He moved to the University of Michigan as Assistant Professor of Neurology in 2013. In recognition of his original research on RNA and protein metabolism in ALS and FTD, he was awarded the Young Physician Scientist Award from the American Society for Clinical Investigation in 2014, received the distinguished Angela Dobson and Lyndon Welch Research Professorship in 2015, and was promoted to Associate Professor in 2020.

Monday, October 24, 2022, *continued*

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN CLINICAL SCIENCE

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT



Brian Edlow, MD
MASSACHUSETTS GENERAL HOSPITAL

Presentation Title: Mapping the Connectivity of Consciousness

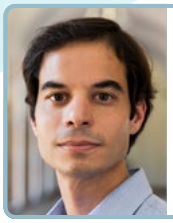
This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Brian Edlow is a critical care neurologist at Massachusetts General Hospital, where he is Associate Professor of Neurology, Associate Director of the Center for Neurotechnology and Neurorecovery, and Director of the Laboratory for NeuroImaging of Coma and Consciousness. His lab's research focuses on detecting consciousness, predicting outcomes, and facilitating new therapies for patients with severe traumatic brain injury. Dr. Edlow serves on the Scientific Advisory Board of the Neurocritical Care Society's Curing Coma Campaign, the Editorial Board of the Journal of Neurotrauma, and is Co-Chair of the NINDS Common Data Elements Project on Disorders of Consciousness.

THE GRASS FOUNDATION—ANA AWARD IN NEUROSCIENCE

Established in 2007, the award honors outstanding young investigators conducting research in basic or clinical neuroscience.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT



Derek Narendra, MD, PhD
NATIONAL INSTITUTES OF HEALTH

Presentation Title: Curbing Mitochondrial Damage in Neurodegeneration: Lessons from Neurogenetics

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

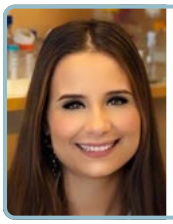
Dr. Derek Narendra received his BA from Columbia University in 2002, PhD from University of Cambridge in 2012, and MD from the University of Michigan in 2012. He completed clinical training in the Harvard Neurology Residency Program at Brigham and Women's Hospital & Massachusetts General Hospital in 2016 followed by a fellowship in movement disorders at the University of Pennsylvania. In 2017, Dr. Narendra joined the NINDS as an Assistant Clinical Investigator within the Neurogenetics Branch and became a Lasker Clinical Research Scholar and Tenure-Track Investigator in 2020. His laboratory focuses on mitochondrial drivers and stress responses in neurodegenerative disorders.

Monday, October 24, 2022, *continued*

WOLFE NEUROPATHY RESEARCH PRIZE

The Wolfe Research Prize was established in 2009 by Mr. Winston Wolfe and the ANA to honor outstanding investigators who identify a new cause or novel treatment of axonal peripheral neuropathy.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT



Stephanie Eid, PhD
UNIVERSITY OF MICHIGAN

Presentation Title: Schwann Cells in Diabetic Neuropathy: Drivers of Disease or just the Passengers?

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Stephanie Eid is a Research Assistant Professor in the Neurology Department at the University of Michigan. She received her Ph.D. in neuroscience from Paris Descartes University, France, in 2017, and then joined Eva Feldman's laboratory to pursue postdoctoral work on the contribution of dyslipidemia to diabetic neuropathy. Dr. Eid has a track-record of high-quality publications, has competed successfully for NIH and internal grants, and recently received the NEURODIAB Angelika Bierhaus Prize in Basic Research. She is currently exploring the metabolic interaction of neurons with Schwann cells in neuropathy, beyond the conventional role of Schwann cells in myelination.

AUDREY S. PENN LECTURESHIP AWARD

Provided to ANA members who conduct outstanding research, program-building, or educational scholarship to promote health equity on health care disparities.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT

Bruce Ovbiagele, MD, MSc, MAS, MBA, MLS

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Presentation Title: Training in Research for Academic Neurologists to Sustain Careers & Enhance Numbers of Diverse Scholars: So Far, So Transcendent

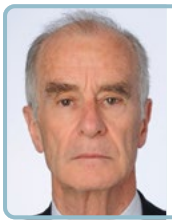
This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Bruce Ovbiagele, MD, MSc, MAS, MBA, MLS is Professor of Neurology and Associate Dean at the University of California, San Francisco. He is a clinical epidemiologist and health equity scholar, leading several National Institutes of Health research programs on stroke. He has received the American Academy of Neurology Wartenberg Lectureship Award and American Stroke Association Feinberg Lectureship Award. He has published more than 575 peer-reviewed articles and edited five textbooks. Dr. Ovbiagele is a fellow of the World Stroke Organization, Royal College of Physicians (London), and American Neurological Association; and an elected member of the National Academy of Medicine.

ANA AWARD FOR EXCELLENCE— CLINICAL AND SCIENTIFIC EXCELLENCE

The award was established to recognize outstanding innumerable contributions to the field of neurology and neuroscience in the form of senior administrative roles over a sustained period of time.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT



Wolf-Dieter Heiss, MD

MAX PLANCK INSTITUTE FOR NEUROLOGICAL RESEARCH

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Wolf-Dieter Heiss was born in Zell am See, Austria, and graduated in medicine from the University of Vienna in 1965. He achieved his training in neurology, neurophysiology, psychiatry and nuclear medicine at the University hospital in Vienna and spent research fellowships at the MIT, Cambridge, USA, the Physiological Institute in Stockholm, Sweden, the Department of Physiology of SUNY, Buffalo, NY, and the Department of Neurology of the University of Minnesota, Minneapolis, USA. In 1976, he was appointed associate professor at the Department of Neurology of the University of Vienna. In 1978, he became director of the Center for Cerebrovascular Research of the Max Planck Institute for Brain Research and of the Department of Neurology of the City Hospital Cologne-Merheim, Germany. In 1981, he was appointed as director at the Max Planck Institute for Neurological Research. From 1985 to 2005, he was professor of neurology and chairman of the Department of Neurology of the University of Cologne and director of the Department of General Neurology at the MPI in Cologne. He was president of the International Stroke Society from 1992 to 1996, was on the board of directors of the Society for Cerebral Blood Flow and Metabolism, deputy editor of the Journal of Cerebral Blood Flow and Metabolism and at present is associate

continued

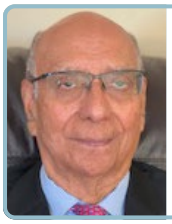
editor of the Journal of Nuclear Medicine and section editor of Stroke. He was chairman of the program committee of the European Federation of Neurological Societies (EFNS) 1998–2001 and was president of the EFNS 2001–2005. Since 2005 he is Visiting Professor at the Danube University in Krems, Austria, and since 2009 Adjunct Professor at the McGill University in Montreal, Canada, and since 2013 Associate Professor at the University of Cluj, Romania, where he received a Doctor Honoris Causa in December 2014.

Monday, October 24, 2022, *continued*

ANA AWARD FOR EXCELLENCE—SERVICE TO THE ANA

This award was established to recognize an individual who has made high impact contributions to the ANA in the form of service as an officer, board member, committee chair, task force leader, or in some other administrative role that results in substantial, meaningful, and measurable positive change in the ANA's ability to serve its membership and the field.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT



Shri Kant Mishra, MD, MS, ABMS, FANA
UNIVERSITY OF SOUTHERN CALIFORNIA

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Shri Kant Mishra is an award-winning distinguished Professor in Neurology currently serving as Professor of Neurology Keck School of Medicine Of USC. He is the director of the Neuromuscular Program at Olive View UCLA Medical Center. Ever since he became a member of the ANA in 1995, he has contributed tremendously to the development and advancement of ANA. He was appointed as a member of the History section of ANA and quickly advanced to become Chair of the committee. He recruited innumerable young, energetic scholars to become a part of ANA. He played a critical role in establishing the International Outreach Committee (IOC) for ANA to advance its global outreach. Dr. Mishra is currently serving as a member of the Awards committee of ANA.

Monday, October 24, 2022, *continued*

ANA AWARD FOR EXCELLENCE—SERVICE TO THE ANA

This award was established to recognize an individual who has made high impact contributions to the ANA in the form of service as an officer, board member, committee chair, task force leader, or in some other administrative role that results in substantial, meaningful, and measurable positive change in the ANA's ability to serve its membership and the field.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT

Romergryko G. Geocadin, MD, FANA
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Romergryko G. Geocadin, MD, Professor of Neurology, Anesthesiology-Critical Care Medicine, and Neurosurgery, with joint appointment in Medicine at the Johns Hopkins University School of Medicine (JHSOM). His undergraduate degree is from the University of the Philippines, medical degree from UERM College of Medicine in the Philippines, general neurology training at NYU, and clinical and research fellowship in neurocritical care at Johns Hopkins University. He has been a ANA fellow since 2008. He became chair of the neurocritical care SIG in 2017 and in 2018, chaired the Online Education Taskforce. This taskforce became the Education Innovation Subcommittee in 2020. This ANA workgroup helped initiate and maintain ANA online education programs and website education platforms (e.g., ANA Investigates Podcast). In 2020 he was also elected to the ANA Board of Directors and appointed chair of the Professional Development Committee.

He has been co-director of the Johns Hopkins Encephalitis Center since 2009. Previously, he was director of the Neuroscience Critical Care Units (NCCU) at Johns Hopkins Hospital and Johns Hopkins Bayview (JHB) and founding chair of the Multidisciplinary Critical Care Practice Committee at JHB. He was President of the Neurocritical Care Society in 2015. He has been active in formulation of practice guidelines and scientific statements related to neurologic care of patients after cardiac arrest. He is Principal Investigator of NIH-funded translational studies and multicenter clinical trial focusing on brain injury after cardiac arrest.

DISTINGUISHED NEUROLOGY TEACHER AWARD

The award recognizes and rewards contributions by gifted and talented teachers of neurology.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT

Deanna Saylor, MD, MHS
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Deanna Saylor is an Associate Professor of Neurology and Director of the Global Neurology Program at the Johns Hopkins University School of Medicine. Dr. Saylor completed medical school, residency and neuro-infectious diseases fellowship training at Johns Hopkins. She has been living and working full-time in Zambia since 2018 as Director of the first and only neurology post-graduate training program in the country. Dr. Saylor has dedicated much of her career to increasing the availability of quality neurology education to learners across sub-Saharan Africa and to exposing US-based learners to the practice of neurology in resource-limited settings.

ANA-PERSYST IDEAS PROFESSIONAL DEVELOPMENT AWARD

This award is provided to an individual who identifies as an underrepresented in medicine early career academic neurologist or neuroscientist and is an ANA member specializing in the field of epilepsy.

MONDAY, OCTOBER 24, 2022 FROM 1:15 PM–3:30 PM CDT

Wilfreda Lindsey, MD, MS
KENNEDY KRIEGER INSTITUTE

This award will be presented during the Derek Denny-Brown Young Neurological Scholar Symposium.

Dr. Wilfreda Lindsey is a pediatric neurologist at Kennedy Krieger Institute who completed her Neurodevelopmental Disabilities residency at Baylor/Texas Children's Hospital. While in residency she further committed to her vision of treating patients with intellectual and developmental disabilities throughout their lifespan. Her clinical, educational and research interests are in neurogenetic syndromes diagnosed in childhood and their natural history. She is especially interested in the less published behavioral and psychiatric comorbidities that may evolve as this patient population ages. Dr. Lindsey is dedicated to the improvement of the quality of life for not only her patients but also their families and caregivers.

SPEAKER ABSTRACTS

All abstract information listed below has been provided to the ANA by plenary session speakers.

Saturday, October 22, 2022

OPENING SYMPOSIUM: BRAIN ORGANOID MODELS OF NEUROLOGICAL DISORDERS

Brain Organoids to Study Evolution and Disease

Arnold Kriegstein, MD, PhD
University of California, San Francisco

The human cerebral cortex is more than three times expanded compared to our closest non-human primate relatives. The cortex emerges from an initially pseudostratified neuroepithelium that gives rise to radial glia, the neural stem cells of the cortex. A number of subtypes of radial glia have been identified in developing human cortex, and single cell RNA sequencing has highlighted human-specific features of cortical development. Due to significant differences in cortical size and composition between humans and rodents, there is a need for human-specific models to study normal development and disease. Recent studies have begun to utilize brain organoids, self-organizing three-dimensional models derived from pluripotent stem cells that recapitulate aspects of human brain development, to model cortical development and neurodevelopmental disease. In this presentation, organoids will be used to discover human-specific features of lissencephaly, to identify glioblastoma-initiating stem cells and mechanisms of tumor spread, and to study the evolutionary emergence of human-specific cellular features. Above all, comparison of single cell gene expression in neuronal and progenitor populations has revealed important similarities but also differences between primary tissue and organoid systems. The extent to which developmental processes are accurately represented in organoids is currently unclear, and reported limitations regarding structural organization, cellular health, and the stability of the cultures over time have demonstrated the need for a thorough comparison between organoids and primary cells. We have performed a direct comparison of cortical organoids and primary human cortical samples throughout neurogenesis using single cell RNA sequencing and complementary immunohistochemical analyses. We find that the specificity of cellular subtype is not as clearly resolved in organoids as during normal development. This lack of specificity in crisp cellular identity may be problematic for maturation of these cells. Interestingly, differentially expressed genes enriched in organoids highlight pathways reflective of metabolic and ER stress. Although organoids are a powerful model system, a better definition of their limitations and how best to utilize these models is required as we strive to both improve our understanding of the brain and how best to study neurodevelopmental diseases.

References:

1. Bhaduri A, Andrews MG, Mancia Leon W, Jung D, Shin D, Allen D, Jung D, Schmunk G, Haeussler M, Salma J, Pollen AA, Nowakowski TJ, Kriegstein AR. Cell stress in cortical organoids impairs molecular subtype specification. Nature. 2020 02; 578(7793):142-148.
2. Bhaduri A, Di Lullo E, Jung D, Müller S, Crouch EE, Espinosa CS, Ozawa T, Alvarado B, Spatazza J, Cadwell CR, Wilkins G, Velmeshev D, Liu SJ, Malatesta M, Andrews MG, Mostajo-Radji MA, Huang EJ, Nowakowski TJ, Lim DA, Diaz A, Raleigh DR, Kriegstein AR. Outer Radial Glia-like Cancer Stem Cells Contribute to Heterogeneity of Glioblastoma. Cell Stem Cell. 2020 Jan 2;26(1):48-63.
3. Andrews MG, Kriegstein AR. Challenges of Organoid Research. Annu Rev Neurosci. 2022 Jul 8;45:23-39.

Human Neurodevelopmental Disorders Modeled in 2-D and Brain Organoid Cultures

Margaret Elizabeth Ross, MD, PhD, FANA
Weill Cornell Medical College

Advances in genome sequencing and genetic engineering in animal models, mice, in particular, have revolutionized translational research into mechanisms and therapeutic approaches to human neurological disorders. However, murine models have some limitations in their ability to illuminate the pathogenesis of human diseases. For example, mice and humans share only about 70% of the same protein-coding sequences. Human genes often have more RNA isoforms than mice and different regulatory regions that alter the cell type usage of a particular gene so that a given variant may have significantly different consequences in mice than in human organs. Mice have conserved regions (syntenic blocks) with human genomes,

but they are arranged differently in their 20 chromosome pairs compared to the 23 chromosome pairs in humans. This becomes increasingly important as the nuances of single nucleotide variants and mutations in the less well-conserved non-protein coding regions of the human genome are associated with neurological disorders. In order to complement the biological system's advantage of animal models, human pluripotent stem cells (hPSCs) are providing exciting opportunities to probe the consequences of human genome variation for neurodevelopment and brain function. Examples will be presented in which patient-derived induced and gene-edited embryonic hPSCs in culture are providing new molecular insights into several neurodevelopmental disorders, enriching options for exploring potential therapeutics.

References:

1. Bendriem RM, Singh S, Aleem AA, Antonetti DA, Ross ME, Tight junction protein occludin regulates progenitor self-renewal and survival in developing cortex. Elife, 2019. 8: p. 10.7554/eLife.49376.
2. Aguiar-Pulido V, Wolujewicz P, Martinez-Fundichely A, Elhaik E, Thareja G, Abdel Aleem A, Chalhoub N, Cuykendall T, Al-Zamer J, Lei Y, El-Bashir H, Musser JM, Al-Kaabi A, Shaw GM, Khurana E, Suhre K, Mason CE, Elemento O, Finnell RH, Ross ME, Systems biology analysis of human genomes points to key pathways conferring spina bifida risk. Proc Natl Acad Sci U S A, 2021. 118(51).
3. Wolujewicz P, Aguiar-Pulido V, AbdelAleem A, Nair V, Thareja G, Suhre K, Shaw GM, Finnell RH, Elemento O, Ross ME, Genome-wide investigation identifies a rare copy-number variant burden associated with human spina bifida. Genet Med, 2021. 23(7): p. 1211-1218.

Fusion Brain Organoid Studies to Uncover Circuit Dysfunction in Genetic Epilepsy

Ranmal Samarasinghe, MD, PhD
University of California, Los Angeles

Neural circuit dysfunction is a hallmark of neurological disease, including in genetic epilepsies. This not only involves neuronal loss and anatomical changes, but also the electrophysiological dysfunction of brain circuits. However, neuronal circuit dysfunction has been largely ignored as an endpoint of disease in cellular disease models– representing a major gap in our capacity to use technological innovations like high-throughput genetic and drug screens to discover novel therapeutics. One promising new platform to model circuit dysfunction in epilepsy is human brain organoids (or simply organoids), 3D brain-like structures that are created from either human embryonic or induced pluripotent stem cells (hESCs or hiPSCs). In recently completed studies we generated "fusion" organoids in which cortex-like organoids predominantly containing excitatory neurons and ganglionic eminence (GE)-like organoids primarily with inhibitory neurons integrate. These fusions resulted in organoids with complex network activity including neural oscillations with similar frequencies as observed in the human cortex in vivo (1). Here we expanded on this approach and generated hippocampus-GE in addition to cortex-GE fusion organoids (2). Like cortex, hippocampal fusions generated neural oscillations at multiple frequencies but additionally generated sharp-wave ripple (SWR) complexes and stereotyped patterns of theta-gamma phase-amplitude coupling (PAC). These patterns of circuit activity are associated with hippocampal learning and memory (3,4). We next generated organoids from the iPSCs of a patient with developmental epileptic encephalopathy-13 (DEE-13) due to a pathogenic gain of function mutation in the SCN8A sodium channel. Using extracellular recordings of local field potentials we found substantial hyperexcitability as well as a loss of sustained oscillatory activity in the cortex-GE fusions compared to isogenic controls. In contrast, in DEE-13 hippocampus-GE fusion organoids, we did not observe overt hyperexcitability. Instead, we found more subtle changes including reduced frequency of SWRs and disordered patterns of theta-gamma PAC. The changes in hippocampal activity were associated with a selective loss in interneuron expression, not seen in cortex-GE fusions. These data suggest that (1) hippocampus and cortex fusion organoids generate complex and distinct circuit activities and (2) that human brain organoids may provide unique insights into brain-region specific circuit changes that result from the identical pathogenic gene mutation.

References:

1. Samarasinghe, R.A., O.A. Miranda, J.E. Buth, S. Mitchell, I. Ferando, M. Watanabe, T.F. Allison, A. Kurdian, N.N. Fotion, M.J. Gandal, P. Golshani, K. Plath, W.E. Lowry, J.M. Parent, I. Mody, and B.G. Novitch, Identification of neural oscillations and epileptiform changes in human brain organoids. Nat Neurosci, 2021. 24(10): p. 1488-1500.
2. Sakaguchi, H., T. Kadoshima, M. Soen, N. Narii, Y. Ishida, M. Ohgushi, J. Takahashi, M. Eiraku, and Y. Sasai, Generation of functional hippocampal neurons from self-organizing human embryonic stem cell-derived dorsomedial telencephalic tissue. Nat Commun, 2015. 6: p. 8896.
3. Buzsaki, G., Hippocampal sharp wave-ripple: A cognitive biomarker for episodic memory and planning. Hippocampus, 2015. 25(10): p. 1073-188.

4. Lega, B., J. Burke, J. Jacobs, and M.J. Kahana, Slow-Theta-to-Gamma Phase-Amplitude Coupling in Human Hippocampus Supports the Formation of New Episodic Memories. Cereb Cortex, 2016. 26(1): p. 268-278.

Human Brain Organoid Models of Neurodegenerative Diseases

Sally Temple, PhD
Neural Stem Cell Institute

Frontotemporal dementia (FTD) due to MAPT mutation is associated with the pathological accumulation of tau and selective neuronal vulnerability caused by unknown mechanisms. We used human-induced pluripotent stem cell (iPSC)-derived cerebral organoids expressing tau-V337M and isogenic corrected controls as model systems to discover early alterations preceding tauopathy and neurodegeneration. At six months, tau-V337M organoids show a specific loss of glutamatergic neurons, which was accompanied by accumulation of tau and phosphorylated tau, and impaired autophagy-lysosomal function. Notably, this selective cell loss is preceded by an early increase in expression and altered splicing of glutamatergic network and synaptic signaling genes, followed by an increased vulnerability to glutamate-induced excitotoxicity. The neuronal vulnerability is rescued pharmacologically by treatment with the PIKFYVE kinase inhibitor Apilimod. Toxicity is also rescued by tau lowering with novel bifunctional intrabodies that specifically bind and reduce tau protein. We have made improvements in human brain organoid consistency and reproducibility that broaden the opportunity to test candidate therapeutics in these cellularly complex models.

References:

1. Human Tau Mutations in Cerebral Organoids Induce a Progressive Dyshomeostasis of Cholesterol
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Sunday, October 23, 2022

NOVEL PERSPECTIVES ON NEURODEGENERATION

Multiple Neuropathologies in Aging

Julie Schneider, MD
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Progressive episodic memory loss in aging has long been considered synonymous with "Alzheimer's Disease" (AD) in the absence of structural, metabolic, infectious, or other contributing factors. AD is confirmed pathologically by the presence of amyloid plaques and tau neurofibrillary tangles. Studies show that most (70-90%) but not all dementia cases presumed to be Alzheimer's disease during life will be found to harbor sufficient plaques and tangles to confirm the diagnosis after death. Other causes of amnestic dementia, such as Vascular Dementia, Dementia with Lewy bodies, Frontotemporal Dementia, and Limbic-predominant Age-related TDP-43 Encephalopathy (LATE) account for many of the "misdiagnosed" cases. Even more striking are the studies accumulating over the past couple of decades that have shown that AD pathology (i.e. plaque and tangles) only rarely occur in isolation from other neurodegenerative and vascular pathologies. Furthermore, these additional "non-AD" pathologies contribute to cognitive impairment and the threshold for exhibiting dementia. The majority of older persons with Alzheimer's dementia have vascular pathologies in their brain including gross or microscopic infarcts, arteriolosclerosis, atherosclerosis, or cerebral amyloid angiopathy. Each of these pathologies independently contributes to lowering the threshold for dementia. Most commonly, older persons have multiple vascular pathologies that contribute to cognitive decline. In addition to the well-known role of vascular pathologies, other neurodegenerative pathologies are also very common. Over 20% of persons with AD, also harbor Lewy bodies in their brain, and when the Lewy bodies reach the limbic or neocortical regions, they markedly enhance the likelihood that a person will exhibit dementia. Significant nigral degeneration is not as common and motor changes may be minimal. More recently, there has been recognition of TDP-43 proteinopathy. This proteinopathy, first described in FTLD/ALS, was found to be common in the brains of older persons with and without AD. Alone TDP-43 pathology is associated with a syndrome of amnestic memory loss that is less severe and rapid than AD. In combination with more common AD, TDP-43 results in more rapid decline and more severe memory loss. There are numerous different combinations of pathologic factors contributing to AD dementia. Both genetic (eg. ApoE e4) and environmental factors (eg. head trauma) may drive multiple pathologies and pathways to dementia. Mixed pathologies are more common with advancing age and may be more common in ethnic or racial minorities. Brain factors such as clearance and inflammation may also play a role in multiple pathologies. Resistance to pathology is important, but older persons are also resilient to the effects of pathology, and determining those factors that impact resilience is of paramount importance in aging.

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The Genetics of Neurodegenerative Diseases: from Rare Populations to Common Variants

Rita Guerreiro, MSc, PhD
Van Andel Institute

The overlapping genetic factors among different clinical entities and phenotypes can add a layer of complexity to the diagnosis processes. It can also point to shared molecular mechanisms and potential shared drug targets between diseases.

The application of exome and genome sequencing to the study of neurodegenerative diseases has revealed the wide scope of pleiotropic events in these diseases. *TREM2* is a prime example of a pleiotropic gene: mutations were originally identified as the genetic cause of Nasu-Hakola disease, later shown to cause frontotemporal dementia in families, and more recently associated with genetic risk of Alzheimer's disease. The same type of pleomorphic risk can be seen for other genes and phenotypes, often crossing from monogenic to complex diseases.

With the ever-increasing numbers of samples studied in GWAS and the consequent identification of risk loci with smaller effects on disease risk, identifying loci in one disease previously associated with risk in a related phenotype has

become more frequent. For example, *GRN* and *MAPT* genes known to cause Mendelian forms of FTD, have now been associated with sporadic AD in large GWAS. Given the multiple parallels between the two diseases, sharing such genetic loci may be real. However, the lack of clinical characterization of the vast numbers of samples studied in the latest GWAS can lead to the inclusion of other diagnoses in sufficient numbers to bias the results. To help address this problem, we have performed a GWAS of polygenic risk extremes in AD. As expected, this approach pushed the significance levels above what is seen for typical GWAS, introducing false positives. At the same time, it allowed us to start critically evaluating some of the risk loci previously identified that may not be real for AD, including many FTD-related loci.

In summary, genome-wide genotyping and sequencing techniques reveal the true extension of pleiotropic events in neurodegenerative diseases. Studying the genetic similarities and contrasts between the different causes of these diseases may help us build a framework of neurodegeneration pathways common to all or many of these disorders that ultimately can contribute to more informed diagnoses and the development of treatments. Nonetheless, these cross-disease genetic overlaps are currently being seen as validation for genetic associations without further evidence and may create a genetic Pangea that will limit clinical and research efforts.

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APOE4 As a Therapeutic Target in Neurodegeneration

David Holtzman, MD
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The Apolipoprotein E (APOE) gene is the most important genetic risk factor for late-onset Alzheimer's disease (AD) with ApoE4 increasing risk and ApoE2 decreasing risk relative to ApoE3. The ApoE protein has pleiotropic effects. While it is clear that ApoE influences amyloid-β deposition and metabolism, recent evidence has revealed that it can strongly influence tau-mediated neurodegeneration. In mouse models of tauopathy, there is an increased tauopathy, neurodegeneration, and inflammation relative to other ApoE isoforms. Interestingly, in the absence of ApoE, there is little to no neurodegeneration, and the removal of microglia is also strongly neuroprotective in mouse tauopathy models. Lowering the level of ApoE4 through the use of antisense oligonucleotides, via genetically removing it from astrocytes, or lowering murine ApoE by increasing the expression of the low-density lipoprotein receptor in the brain is strongly neuroprotective in mouse tauopathy models. In a model of amyloid-induced tauopathy, immunotherapy directed against ApoE strongly decreases tau seeding and spreading. Reducing levels of ApoE4 appears to be a novel therapeutic target to be further explored in primary tauopathies and AD.

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Mechanisms of Axonopaty in the CNS

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Wallerian degeneration (WD) is a conserved axonal self-destruction program implicated in several neurological diseases. Recent work in our laboratory has shown that manipulations of NAD+ biosynthetic pathways, i.e. suppression of the Nam recycling pathway and stimulation of the alternative Preiss-Handler pathway, suppress WD in injured mammalian axons. This effect is further augmented with the addition of stress MAPK (DLK) inhibitors to block the degradation of NMNAT2. These interventions seem to exert their effects by inhibiting the WD executor Sterile alpha and TIR motif containing 1 (SARM1). Separate experiments on animal models of traumatic axonopathy involving the optic nerve and long tracts such as the corticospinal tract demonstrate powerful and enduring effects of SARM1 knockout in preventing the degeneration of distal axons, whereas the cell bodies of injured axons and proximal axonal segments are more responsive to stress MAPK interference (DLK-LZK inhibition). Taken together, these experiments rejuvenate historical axonal degeneration concepts initially formulated by Nissl and Waller and propose important biochemical synergies that can be targeted with small molecules and can serve as the basis for a new generation of treatments for axonopathies.

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PRESIDENTIAL SYMPOSIUM—NEUROLOGIC DARK MATTER: EXPLORING THE EXPOSOME THAT DRIVES NEUROLOGICAL DISORDERS

Chemical Exposures: The Ignored Environmental Risk Factor(s) for Neurodegenerative Diseases and Neurodevelopmental Disorders

Deborah A. Corey-Slechta, PhD
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Over 40,000 chemicals are currently active in commerce, and, correspondingly, studies confirm the presence of multiple chemicals in human blood samples. Like other environmental risk factors, chemicals may act on the same sites/pathways involved in neurologically-related diseases and disorders. This presentation describes reasons why chemical exposures have generally been ignored, but how research in environmental neurotoxicology indicates that such reasoning is misplaced, invoking examples including the history of lead exposure, demonstrations of interactive as well as dose-additive effects of chemicals with other chemicals and other environmental risk factors, and the rapidly increasing evidence for a role of air pollution in both neurodevelopmental disorders and neurodegenerative diseases.

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Racial Disparities in Exposures to Environmental Contaminants

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Black and minority ethnic populations are more likely to live in neighborhoods where they are exposed to high levels of neurotoxic pollutants such as lead, pesticides, and air pollution, in addition to other interrelated conditions that are detrimental to brain health (e.g. institutional racism in housing, education, employment; poverty). Numerous studies have demonstrated that it is the joint effects of social disadvantage and pollutant exposures that explain the higher risk of disease. Using neurodevelopment as an example, this presentation will highlight current evidence, implications for policy, and future directions for research.

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Leveraging the Exposome for ALS Prevention

Eva Feldman, MD, PhD, FANA
University of Michigan

ALS is a progressive, neurodegenerative disease that lacks effective treatments. The identification of novel, modifiable risk factors are urgently needed for this lethal disease where survival is only 2 to 4 years after diagnosis. We developed a new multipollutant environmental risk score (ERS) based on concentrations of persistent organic pollutants and pesticides in blood from ALS cases compared to controls. We observed a 7-fold increase in ALS risk in individuals with a high ERS with a concomitant significant decrease in survival. Using both publicly available datasets and our own Michigan ALS cohort, we recently created a robust ALS polygenic risk score (PGS). Combining ERS with PGS allows for the identification of at-risk individuals who may benefit from personalized interventions to either slow disease progression or, in select populations, promote ALS prevention.

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Convergent Mechanisms of Environmental Toxicant-Induced Parkinson's Disease

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University of Pittsburgh

The etiology of Parkinson's disease (PD) is complex and involves both genetic and environmental factors. We have used genetic, cell biological and in vivo studies to investigate the pathogenic mechanisms of environmental toxicants linked epidemiologically to PD. We found that these PD-linked toxicants cause ROS-induced ROS production mediated by neuronal NADPH oxidase 2 (NOX2) which, in turn, activates LRRK2 kinase activation. Downstream effects include alpha-synuclein pathology and mitochondrial toxicity, ultimately resulting in neurodegeneration. These findings have implications for PD pathogenesis and possibly mitigation of toxicant exposures.

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Is the Rise in Incidence of Parkinson's Largely Human-Made?

E. Ray Dorsey, MD, FANA
University of Rochester

Many diseases are man-made, from acne to lung cancer. Parkinson's is (to a great extent) among them. In two centuries, Parkinson's has gone from a very rare disorder when Dr. Parkinson described it in 1817 to the world's fastest growing brain disease. Only environmental factors, not genetic ones, could account for such a change. Prevalence of Parkinson's is tied to rates of industrialization globally (high in U.S./Canada/Western Europe, low in sub-Saharan Africa). Moreover, clusters or contaminated sites (likely in Chicago where we will be) are all around us. Numerous industrial factors (e.g., pesticides, air pollution, trichloroethylene) are linked to Parkinson's. Incidence studies in PD are rare (we are in the dark) and actually offer hope that where these toxins are addressed such as in the Netherlands (where air pollution, pesticides, and use of a degreasing solvent have plummeted), rates could fall. We can imagine and seek a world without Parkinson's.

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Monday, October 24, 2022

EMERGING ROLE OF SOMATIC MUTATIONS IN NEUROLOGY

Telomeres and Clonal Evolution with Aging

Mary Armanios, MD
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Telomeres are the DNA-protein structures at chromosome ends; they are essential for the maintenance of genomic integrity. The length of telomeres has been considered a mitotic clock because telomere length predicts the onset of replicative senescence in cultured cells. Telomere length is heritable, and in the human population, telomere length has a defined distribution with discrete upper and lower boundaries. The short telomere syndromes are the most common premature aging syndromes; they capture segmental aspects of age-related disease phenotypes including stem cell failure in the lung and bone marrow. The long telomere syndromes are a recently recognized group of Mendelian disorders that are increasingly appreciated to drive neoplastic processes including the astrocytoma spectrum. In this session, I will discuss the drivers of recurrent somatic clonal mutations that evolve in these clinical contexts, their clinical significance, and their impact for understanding the biology of aging and age-associated cancer risk.

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Somatic Mutation in Neurodevelopmental Disorders

Annapurna Poduri, MD, MPH

We will discuss the genetic pathways involved in a range of brain malformation phenotypes affected by mosaic variants. Somatic mutation in the developing brain can lead to focal areas of abnormal development with a mosaic pattern of variant-positive and variant-negative cells. Depending on the location and timing of mutation, the gene(s) involved, and the resultant cell types affected, individuals may have focal developmental brain malformations or abnormally functioning regions of the brain without obvious malformations on neuroimaging. We have demonstrated this phenomenon by evaluating brain tissue resected during surgery for refractory epilepsy, which can be successful in reducing or even eliminating seizures in some patients and also yields tissue for neuropathological and molecular analysis. Early genetic investigations of resected brain tissue led to the discovery of mosaic variants in mTOR pathway genes, including AKT3, PIK3CA, PIK3R2, and MTOR itself. We continue to identify mosaic variants in smaller and smaller lesions, some that are MRI-negative but electrically active and sometimes neuropathologically abnormal. As mTOR and non-mTOR-related genes are identified, we face the possibility that genetic discovery in patients with focal epilepsy may have not only diagnostic utility but may point to therapeutic strategies through the development and study of appropriate preclinical models.

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Single-cell Analysis of Somatic Mutations in the Human Brain

Mike Lodato, PhD
University of Massachusetts

The genome is under constant assault from environmental and endogenous genotoxic agents. If not repaired correctly, this damage can result in somatic mutations in cells of the body. Somatic mutations are particularly dangerous in post-mitotic neurons of the human, brain because neurons that gain a deleterious somatic mutation can generally not be replaced during life. We used single-cell, whole-genome sequencing (scWGS) and custom, scWGS-specific bioinformatic algorithms to quantify somatic mutation rates during neurotypical aging and in the neurodegenerative disorder Alzheimer's disease (AD). Furthermore, we applied mutation signature analysis to these data, which identified specific classes of mutation that accumulated during aging generally or preferentially in AD. We found that certain classes of mutation correlated with known molecular markers of DNA damage and repair, linking longstanding hypotheses about DNA damage during AD with single-cell somatic mutation patterns. Our work suggests somatic mutation as an emerging hallmark of brain aging and AD.

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Monday, October 24, 2022, *continued*

Molecular Profiling of PI3K-AKT-MTOR Pathway Mutations in Focal Brain Malformations

Ghayda "Rayda" Mirzaa, MD
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Megalencephaly (MEG), Hemimegalencephaly (HMEG) and focal cortical dysplasia (FCD) are developmental brain disorders characterized by brain overgrowth and cortical abnormalities, associated with significant pediatric morbidity and mortality including epilepsy, autism and intellectual disability. Importantly, FCD is the most common cause of pediatric focal epilepsy. Gain and loss of function mutations in the PI3K-AKT-MTOR pathway have been identified in this spectrum, with variable levels of mosaicism and tissue distribution of causal mutations; however, the mechanisms underlying brain overgrowth, dysplasia, and epileptogenesis are not well understood. Several genetic studies have aimed to better define the molecular landscape of these disorders and delineate relevant genotype-phenotype correlations. In our most recent work, we performed deep molecular profiling of the most common hotspot mutations in the pathway in a large cohort of 128 patients (>200 surgical epilepsy brain tissue) using droplet digital PCR, and subsequently modeled disease pathogenesis in vitro using stem-cell derived human cell lines. Using ddPCR, we were able to molecularly solve a significant fraction of our cohort. Interestingly, individuals with FCD mostly had mutations in MTOR, while those with MEG and HMEG had PIK3CA mutations. Further, only FCD type 2 cases were associated with mutations in the pathway.

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Monday, October 24, 2022, *continued*

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR SYMPOSIUM

Schwann Cells in Diabetic Neuropathy: Drivers of Disease or just the Passengers?

Stephanie Eid, PhD
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The prevalence of prediabetes and type 2 diabetes is increasing worldwide due in part to the overconsumption of energy-dense foods and a sedentary lifestyle. Peripheral neuropathy (PN), a length-dependent and symmetric peripheral nerve degeneration, is a common complication of both disorders and can lead to pain, amputations, and reduced quality of life. Schwann cells are the support cells of peripheral nerves, and their dysfunction has recently been recognized as a key driver of PN. However, the mechanisms by which Schwann cell injury contributes to nerve degeneration are unclear. In our work, we examine the role of Schwann cells in vivo, ex vivo, and in vitro models of prediabetes, type 2 diabetes, and PN. Single-cell RNA-sequencing has identified four major Schwann cell clusters: myelinating, non-myelinating, precursor, and repair, in healthy and neuropathic nerves, in addition to a distinct cluster of nerve macrophages. Myelinating Schwann cells acquire a pro-inflammatory phenotype and become insulin resistant in response to metabolic stress, which may impact axonal health and contribute to PN pathogenesis. Mapping intercellular communication identifies a shift in communication among Schwann cell clusters, primarily in immune response and trophic support pathways, which largely impact non-myelinating Schwann cells. Overall, our research offers a unique resource for interrogating Schwann cell function, communication, and signaling in nerve pathophysiology to help inform Schwann cell-specific therapies.

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Curbing Mitochondrial Damage in Neurodegeneration: Lessons from Neurogenetics

Derek Narendra, MD, PhD
National Institutes of Health

Damaged mitochondria accumulate with age in post-mitotic cells such as neurons and myocytes, contributing to neurodegeneration. To protect tissue in the setting of mitochondrial dysfunction, metazoans have evolved mitochondrial stress responses that sense and respond to damaged mitochondria. We have been uncovering these stress responses through studies of neurogenetic disorders that primarily impact mitochondria, including recessive mutations in PINK1 and Parkin that cause Parkinson's disease, and dominant mutations in the mitochondrial paralogs CHCHD2 and CHCHD10 that cause Parkinson's disease, ALS/FTD, and myopathy.

The best described mitochondrial stress response is mediated by the PINK1-Parkin pathway. We identified that the PINK1-Parkin pathway is activated selectively on damaged mitochondria to target their degradation in lysosomes by autophagy (mitophagy). More recently, a parallel mitochondrial stress pathway has been identified, centered on the stress sensing peptidase OMA1. Activation of OMA1 inhibits mitochondrial fusion and additionally signals outside of mitochondria to the cytosol and nucleus through the integrated stress response (through its substrate DELE1). By putting a break of protein synthesis and transcriptionally upregulating specific metabolic pathways, the OMA1-DELE1 stress response likely increases the metabolic flexibility of specialized tissues like striated muscle and neurons to restore cellular homeostasis. Recently, we have found that this pathway maintains tissue viability and promotes survival, in the setting of mitochondrial damage from misfolded protein in CHCHD10 myopathy. Understanding how the cell senses and responds to damaged mitochondria through these mitochondrial stress response pathways may uncover new

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strategies for the treatment of neurodegeneration and other disorders stemming from mitochondrial dysfunction.

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Training in Research for Academic Neurologists to Sustain Careers & Enhance Numbers of Diverse Scholars: So Far, So Transcendent

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The Training in Research for Academic Neurologists to Sustain Careers and Enhance the Numbers of Diverse Scholars (TRANSCENDS) program specifically targeted early-career individuals underrepresented in neurological research. TRANSCENDS is a collaboration between national research funding agencies, national neurological societies, and academic institutions. Early career individuals from underrepresented groups in the biomedical-research workforce were selected from applicants during the first funding cycle (2016-2020). The TRANSCENDS curriculum comprises an online graduate degree program in clinical research; monthly group webinar conferences; intermittent interactions with research funding agency officials; exposure to scientific workshops at annual neurological society meetings, and year-round communications between matched mentors and mentees. Among accepted scholars (comprising four successive cohorts), 56% were women; 61% were Hispanic, 30% were Black/African American, and 30% were assistant professors. As of February 2022, the 24 scholars had published 201 peer-reviewed publications with 147 as first or corresponding authors. Several mentees had obtained grants or occupied key national academic leadership positions. Mentees' feedback noted that professional skills development (i.e., manuscript and grant writing), networking opportunities, and mentoring were the most beneficial elements of the program. A second funding cycle (2021-2025) has begun. Second cycle changes include expanded eligibility to any diverse physician with research interests in clinical neuroscience, the establishment of formal mentor-mentee expectations, a required health equity research course, required regular reviews of manuscripts submitted to a scientific journal and networking events with scholars in other diversity programs. TRANSCENDS has so far exceeded expectations, and while longer-term outcomes are warranted, programs like this may help raise the numbers of diverse neurological researchers and further boost neurological innovation.

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Therapeutic Implications of Convergent Disease Mechanisms in ALS and FTD

Sami Barmada, MD, PhD
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One of the signature hallmarks of neurodegenerative diseases is the accumulation of misfolded proteins within neurons, suggesting a fundamental deficiency in the pathways responsible for protein clearance. In over 95% of individuals with amyotrophic lateral sclerosis (ALS), and over half of the people with frontotemporal dementia (FTD), affected neurons display cytoplasmic deposition of the RNA binding protein TDP43. Such pathology is accompanied—and likely preceded—by the exclusion of TDP43 from the nucleus, where it typically functions in RNA splicing. These observations establish a crucial pathophysiological link between ALS and FTD that is further supported by genetic, clinical, and epidemiological connections. In addition, the pivotal role of TDP43 in RNA splicing predicts that its mislocalization will be accompanied by profound abnormalities in RNA processing and metabolism, many of which are likely to underlie neurodegeneration in ALS and FTD.

Despite the importance of TDP43 mislocalization, the inciting events responsible for nuclear TDP43 exclusion and/or cytoplasmic aggregation in ALS and FTD remain unclear, as are the downstream consequences for RNA homeostasis in neurons. Here I will discuss our research on the function and dysfunction of TDP43, the earliest events contributing to TDP43 mislocalization in ALS and FTD, and how TDP43 pathology can lead to deficiencies at both the RNA and protein levels, and mechanisms capable of reversing these changes and preventing neurodegeneration in disease. Ultimately, the goal of these studies is to define novel treatments and approaches for ALS and FTD, based on a comprehensive knowledge of TDP43 and its contribution to neurotoxicity in these disorders.

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Mapping the Connectivity of Consciousness

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Patients with severe brain injuries may recover consciousness before self-expression. As a result, multiple studies have shown that 15-20% of patients with severe brain injuries who appear unresponsive on the bedside behavioral examination are covertly conscious, a diagnosis that may predict long-term functional recovery. In this presentation, we will discuss the advanced neuroimaging and electrophysiologic tools that are being used to identify patients who are covertly conscious - tools that are now being endorsed for clinical use in the U.S. and European Guidelines. We will also consider the brain network connectivity properties that are most important for the recovery of consciousness after severe brain injury. Finally, we will discuss future directions in this field, including how a network-based autopsy of the human brain can play an essential role in elucidating mechanisms of recovery from coma.

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Beyond the Exome in the Rare Genetic Epilepsies: New Challenges and Opportunities

Gemma Carvill, PhD
Northwestern University

The genetic etiology of the rare, refractory pediatric epilepsies is now well-established. More than half of individuals with this condition have a genetic diagnosis and for many of these genes, precision therapies are becoming available. For individuals without a molecular diagnosis, the genetic underpinnings are likely to be diverse, thus a creative and multi-faceted approach is required to identify causative genetic variants. This challenge is one of the major focuses of our group. In the protein-coding genomic regions, we highlight how the resolution of variants of uncertain significance using high-throughput screens can lead to answers for patients, but also provide a platform for therapeutic screening. Outside of the coding regions, we demonstrate how deletion of a long non-coding RNA, CHASERR, can lead to altered gene dosage of the known epilepsy gene, CHD2. Finally, we reveal how aberrant splicing of a poison exon in SCN1A leads to haploinsufficiency and clinical phenotypes synonymous with classic truncating SCN1A variants. Collectively, these new mechanisms of disease involving non-coding regions of the genome are likely to account for a significant proportion of unexplained cases of rare epilepsies. In addition, the discovery of these elements, and our understanding of how they control gene expression also presents a unique opportunity for gene-based therapies.

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PERIPHERAL CONTRIBUTIONS TO NEUROLOGIC DISORDERS: ADAPTIVE IMMUNITY AND METABOLIC INFLUENCES

Metabolic Controls and Insulin across Neurodegenerative Diseases

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The role of insulin and its downstream signaling in the brain is an ongoing area of research. It is needed in the brain to maintain normal cognitive health, and because of many reports of its involvement in brain functional decline in aging and neurodegeneration. There is a large body of epidemiological work supporting the role of insulin resistance in cognitive decline/Alzheimer's Disease and reduced life span in humans. However, there are also experimental data for reduced insulin and IGF1 signaling in preventing neurodegeneration in mice and in extending life spans in worms, flies, mice, and even in higher-order mammals. Since, in both cases, there is reduced downstream insulin signaling, these data clearly seem in direct conflict. To reconcile these apparent conflicts, it is possible that there are differences in total metabolic outcomes between insulin resistance in insulin-sensitive tissues (e.g., liver, fat, and muscle) that are reliant on insulin for glucose, fat, and amino acid uptake, and decreased insulin signaling in so-called insulin-insensitive cells (i.e., insulin does not regulate glucose uptake in those cells), such as neurons, which could occur due to reduced availability of the insulin molecule itself within the brain. Both scenarios could indeed be present in the same organism. Overcoming the second scenario can be done by supplying insulin to the brain via intranasal insulin administration in humans to increase the availability of insulin to brain areas and thereby increase its availability at insulin receptors (IRs). Studying its impact on cognition and amyloid β (Aβ) plaque deposition in humans with known insulin resistance is now an experimental treatment.

However, what is the source of brain insulin? Some insulin in circulation, produced in beta cells in islets of Langerhans, is transported into the brain by a putative transporter. In C. elegans, insulin-like peptides are produced by sensory neurons, and in Drosophila, they are expressed exclusively in the brain. In mammals, insulin and C-peptide are produced, not only in beta cells but also in taste receptor cells within taste buds of the lingual epithelium and the presence of immunoreactive insulin has also been reported in sustentacular cells of the olfactory epithelium. We now know that biologically active insulin is produced in the brain in the choroid plexus (ChP) epithelial cell layer (EChP). It is secreted in response to changes in serotonin; it is not secreted in response to changes in circulating glucose; insulin is also synthesized in isolated, cultured EChP; the highest expression of brain insulin is in the ChP of the 3rd ventricle. ChP has a novel cis-chaperone and nonamyloidogenic Cα-peptide, a peptide product of proinsulin that is distinct from the more common C-peptide found in beta cells. Islet amyloidogenic peptide (IAPP, a peptide secreted from beta cells with insulin in response to glucose, and that are highly amyloidogenic in islets) is not expressed by EChP. ChP has the highest amount of insulin binding to IRs compared to any other brain area; under conditions of obesity that is known to cause downregulation of downstream insulin signaling molecules in liver, muscle and fat, IR trophic functions are also impaired in ChP.

It is indeed possible that insulin from the periphery and insulin from ChP influence IR activity and its downstream effects in different brain areas. This could also mean that it has effects on different brain cell types related to brain fuel requirements such as fatty acid availability and glucose utilization, inflammation, synaptic outgrowth and maintenance, myelin maintenance, and, not least, vascular health and reactivity of the brain microvasculature. Methods for analyses of the networks impacted by both sources of insulin are now being developed and hopefully will give insights as to the role(s) of insulin in preserving brain function over the lifespan of humans.

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Synuclein Recognizing T Cells Contribute to Parkinson's Disease

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While adult human neurons are not typically antigen-presenting cells, many substantia nigra dopamine neurons express MHC-I (Cebrian et al., 2014). The death of these neurons causes the motor disorders of Parkinson's disease (PD), and in mouse substantia, nigra neurons and the appropriate combination of neuronally presented antigen and T cell causes cell death. In the blood of ~40% of Parkinson's patients and a few age-matched controls, CD4+ and CD8+ T cells are present that respond to two regions in alpha-synuclein (Sulzer et al., 2017), a protein misprocessed in the disorder. One of the antigenic regions is strongly bound to an HLA allele associated with PD. This response likely precedes diagnosis and is high in the first decade and lost at later stages (Lindestam Arlehamn et al., 2020). As degradation of alpha-synuclein and other proteins by lysosomes changes with aging and PD, it is possible that autoimmune response to neoepitopes plays a role in neurodegenerative and other aging-related disorders.

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Meningeal Lymphatics Regulate Microglia in Alzheimer's Disease

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Immune cells and their derived molecules have a major impact on brain function. We have identified several key T cell-derived cytokines that mediate the effect. Despite the robust influence on brain function, T cells are not found within the brain parenchyma, a fact that only adds more mystery into these enigmatic interactions between T cells and the brain. Our results suggest that meningeal space, surrounding the brain, is the site where CNS-associated immune activity takes place. We have discovered a presence of meningeal lymphatic vessels that drain CNS molecules and immune cells to the deep cervical lymph nodes and also regulate perfusion of the brain by CSF (glymphatic flow). This communication between the CNS and meninges is playing a key role in several neurological disorders, including Alzheimer's disease, and, therefore, may serve as a novel therapeutic target that is worth in-depth mechanistic exploration. Understanding trafficking of molecules between CNS compartments is one of the frontiers in neurophysiology and recent advances will be discussed.

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Infiltration of Peripheral Immune Cells in Multiple System Atrophy

Ashley Harms, PhD
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Multiple system atrophy (MSA) is a progressive neurodegenerative disorder characterized by abnormal accumulation of alpha-synuclein (α-syn) in oligodendrocytes accompanied by inflammation, demyelination, and subsequent synapse and neuronal loss. Little is known about the mechanisms of neurodegeneration in MSA. However, recent work has highlighted the important role of the immune system in the pathophysiology of other synuclein-related diseases such as Parkinson's disease. In this study, we investigated postmortem brain tissue from MSA patients and control subjects for evidence of immune activation in the brain. We found a significant increase of HLA-DR+ microglia in the putamen and substantia nigra of MSA patient tissue compared to controls, as well as significant increases in CD3+, CD4+, and CD8+ T cells in these same brain regions. To model MSA in vivo, we utilized a viral vector that selectively overexpresses α-syn in oligodendrocytes (Olig001-SYN) with > 95% tropism in the dorsal striatum of mice, resulting in demyelination and neuroinflammation similar to that observed in human MSA. Oligodendrocyte transduction with this vector resulted in a robust inflammatory response, which included increased MHCII expression on central nervous system (CNS) resident microglia, and infiltration of pro-inflammatory monocytes into the CNS. We also observed robust infiltration of CD4 T cells into the CNS and antigen-experienced CD4 T cells in the draining cervical lymph nodes. Importantly, genetic deletion of TCR-β or CD4 T cells attenuated α-syn-induced inflammation and demyelination in vivo. These results suggest that T cell priming and infiltration into the CNS are key mechanisms of disease pathogenesis in MSA, and therapeutics targeting T cells may be disease-modifying.

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ADVANCING NEUROLOGIC EQUITY: CHALLENGES AND PATHS FORWARD

A Roadmap for Advancing Dementia Equity in Science and Care

Monica Rivera-Mindt, PhD, ABPP
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This presentation will provide an overview of sociocultural and demographic information pertinent to the advancement of equity in dementia research and practice today. Methods for cultivating brain health equity through dementia research will include evidence-based approaches to the development and deployment of culturally-informed dementia research with underrepresented populations. The presentation will describe current demographic trends, sociohistorical considerations, and brain health inequities relevant to dementia research and care. The presentation will also include a discussion of evidence-based approaches for increasing the inclusion and engagement of underrepresented populations in order to increase the external validity of dementia research. Finally, the presenter will discuss the effects of cultural and linguistic diversity on the brain and cognitive test performance, and its import for conducting internally valid dementia research with underrepresented populations.

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Diagnosis and Management Disparities in Multiple Sclerosis

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Descriptive epidemiological efforts have been critical in highlighting that the burden of multiple sclerosis is unequal across diverse demographic groups. Healthcare disparities and inequities and social determinants of health are likely to influence diagnosis and management disparities in MS. While ongoing research is providing new insight into the complex social and health care system factors that shape outcomes in MS, improving healthcare access, increasing awareness, and developing multilevel interventions will be critical to advance health equity.

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LGBTQ Care in Neurology

Nicole Rosendale, MD
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Lesbian, gay, bisexual, transgender and queer (LGBTQ+) individuals experience disparate access to and outcomes in healthcare, including in neurology. In recognition of these persistent disparities, the NIH recognized sexual and gender minority people (an umbrella term that includes LGBTQ+ individuals) as a health disparities population in need of further research in 2016. Despite this recognition, the understanding of LGBTQ+ health issues in neurology is in its infancy. From this session, participants will be able to describe the current state of science in LGBTQ+ neurology, including existing gaps in research. They will be able to identify existing barriers to health equity for LGBTQ+ people and apply a social competence framework, incorporating the concept of minority stress and its downstream effects, toward creating strategies for improving neurologic health and inclusive care for the LGBTQ+ community.

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Social Determinants of Health, the Exposome and Dementia: A Focus on Action

Amy Kind, MD, PhD
University of Wisconsin

Brain health is not distributed equally. Social determinants of health (SDOH) play a key role in brain health disparities and are factors in the exposome—a collection of exposures across the life course that impact health. Exposome factors are incorporated across many mechanistic theories within the field of health disparities research, providing one linkage between adverse social exposures, structural inequities, and biological outcomes. However, the linkage of disparities-aligned exposome metrics to deeply phenotyped biorepositories is not always available. Additionally, the translation of this type of research to real-world change has been difficult to achieve. This presentation will provide a health-disparities-aligned overview of the exposome, offer a brief synopsis of the state of the literature within the dementia field, discuss novel initiatives to link disparities-aligned exposome metrics to widely available biological research resources, and provide a pathway toward actionability, particularly within the policy domain. The use of research-ready multi-domain indices of disadvantage will be discussed as an example of actionable strategy, particularly as applied within the new 2023 US Centers for Medicare and Medicaid Services equity payment models. Finally, the core importance of open data and data democratization will be highlighted.

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