ANA2018

143rd ANNUAL MEETING OF THE AMERICAN NEUROLOGICAL ASSOCIATION

ATLANTA, GA • OCTOBER 21–23, 2018

PRE-MEETING SYMPOSIUM: OCTOBER 20, 2018

FINAL PROGRAM

AMERICAN NEUROLOGICAL ASSOCIATION

INNOVATORS IN DISCOVERY, EDUCATION, AND CARE

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Congratulations to UCSF physician/scientist Michael Wilson, MD

Dr. Wilson is the recipient of the 2018 Grass Foundation-ANA Award in Neuroscience. This award recognizes Dr. Wilson's role in advancing the development of metagenomic next-generation sequencing for diagnosis of meningitis and encephalitis.

Hear Dr. Wilson speak at the Derek Denny-Brown Young Neurological Scholar Symposium

Sunday, October 21, 1:15 - 3:15 p.m.

Centennial Room III and IV

nextgendiagnostics.ucsf.edu | 415-502-2632 | NGDx@ucsf.edu

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HYATT REGENCY ATLANTA

265 PEACHTREE STREET, NW ATLANTA, GA 30303

MAIN PHONE: (404) 577-1234
GUEST FAX: (404) 588-4137
CHECK-IN TIME: 3:00 PM
CHECK-OUT TIME: 12:00 PM

M. Elizabeth Ross, MD, PhD
Chair, Scientific Program
Advisory Committee

Dear Colleagues,

It is an honor to welcome you to the 143rd Annual Meeting of the American Neurological Association (ANA). The Board of Directors, Scientific Program Advisory Committee (SPAC), Dr. Allan Levey and the Local Arrangements Subcommittee here in Atlanta, and colleagues throughout our academic neurological community have worked tirelessly to produce an exciting program.

In this landmark year, you'll find outstanding talks and poster presentations that represent the latest advances in translational neuroscience, neurobiology of disease, and academic and global neurology. A recurring theme in this year's symposia is the science behind recent breakthroughs in our understanding and treatment of neurological disorders across a broad etiological spectrum. Subjects include neurovascular contributions to neurodegeneration, the positive and negative roles of inflammation in neurological disease, recent advances in the use of cell-based neurotherapeutics, and new insights into limiting the progression of traumatic brain injury. Each of the plenary sessions is interlaced with poster blitz-talks that highlight the scientific contributions of young investigators, selected from submitted abstracts, while the Derek Denny-Brown Symposium showcases ground-breaking research from the emerging generation of leaders in neurology.

Don't miss the Presidential Symposium that features the latest research into ties between Lewy body dementia and Parkinson's disease. The session will host special guest Susan Schneider Williams, widow of actor Robin Williams, who will provide important insight into the profound toll of this disorder on patients and family.

The Pre-Meeting Symposium on October 20th offers a unique view from academic and industry leaders in the field of gene therapies delivered through viral vectors. As the first AAV gene therapy was FDA approved in 2017, this session illuminates the challenges for pre-clinical model development, first-in-human toxicity studies, target identification and the power of this platform for gene delivery.

This year's meeting is packed with opportunities for professional networking and education through lively poster sessions, breakout Special Interest Group (SIG) Sessions across 19 disciplines, and Interactive Lunch Workshops (ILWs). These are designed to provide the latest emerging information affecting neurological care and education. Additional sessions offer insights from leaders in the field regarding career development issues at all levels of academic neurology, especially those encountered early in the profession.

Finally, the ANA continues its dedication to welcoming our international colleagues, this year from the German Neurological Society. Our intent is to promote and extend collaborations in neurological education and research among academic neurologists across the globe. I join the ANA members of the Board of Directors, SPAC, ILW and Career Development and Awards Committees in inviting you to take advantage of all this vibrant meeting and Association have to offer.

Welcome to Atlanta!
With warmest wishes,

M. Elizabeth Ross, MD, PhD
Chair, Scientific Program Advisory Committee (SPAC)
Nathan Cummings Professor and Head, Laboratory of Neurogenetics and Development
Director, Center for Neurogenetics
Chair, Neuroscience Graduate Program, Weill Cornell Medicine

SCHEDULE AT A GLANCE

FRIDAY, OCTOBER 19, 2018	
4:30 PM-9:00 PM	**ANA-NINDS Career Development Symposium** Invitation Only

SATURDAY, OCTOBER 20, 2018	
7:15 AM-5:00 PM	**ANA-NINDS Career Development Symposium** Invitation Only
3:00 PM-7:00 PM	**Registration**
5:00 PM-6:00 PM	**Pre-Meeting Symposium Reception & Buffet Dinner***
6:00 PM-9:00 PM	**Pre-Meeting Symposium*** Viral Vectors in Neurotherapeutics

SUNDAY, OCTOBER 21, 2018	
6:00 AM-5:45 PM	**Registration**
7:00 AM-9:00 AM	**Breakfast**
7:00 AM-7:30 AM	**Trainee Breakfast with the ANA Board of Directors***
7:30 AM-9:00 AM	**Professional Development Courses** • Students, Residents, Trainees, and Post-Doc Fellows-Career Level • Early to Mid-Career Level • AUPN Chair-Career Level
9:00 AM-9:15 AM	**Break**
9:15 AM-11:15 AM	**Plenary Session** Vascular Contributions to Neurodegeneration
11:15 AM-11:45 AM	**Break**
11:45 AM-1:00 PM	**Lunch** **Interactive Lunch Workshops** **ANA-AUPN Career Fair***
NOON-7:00 PM	**Poster Viewing***
1:15 PM-3:15 PM	**Plenary Session** Derek Denny-Brown Young Neurological Scholar Symposium
3:15 PM-3:30 PM	**Break**

SUNDAY, OCTOBER 21, 2018	
3:30 PM-5:30 PM	**Special Interest Group (SIG) Sessions** 1. Autoimmune Neurology 2. Clinical Logic 3. Dementia and Aging 4. Education (sponsored by AUPN) 5. Epilepsy 6. Global Neurology 7. ANA-AHS Headache (sponsored by the American Headache Society) 8. Neurocritical Care
5:30 PM-7:00 PM	**Exhibits***
5:30 PM-7:00 PM	**Poster Presentations & Reception*** Poster presenters will be in attendance
7:00 PM-9:00 PM	**Satellite Symposium*** Medical Mystery: 53-Year-Old Female with Unexplained Severe Fatigue and Back Pain (Sponsored by Catalyst Pharmaceuticals)
7:15 PM-9:15 PM	**Past Presidents' Dinner*** Invitation Only

MONDAY, OCTOBER 22, 2018	
6:30 AM-5:45 PM	**Registration**
7:00 AM-9:00 AM	**Breakfast**
7:30 AM-9:00 AM	**Professional Development Courses** • Students, Residents, Trainees, and Post-Doc Fellows-Career Level • Early to Mid-Career Level • AUPN Chair-Career Level
9:00 AM-9:15 AM	**Break**

*This session is not available for AMA PRA Category 1 Credit(s)™

Note: The American Board of Psychiatry and Neurology has reviewed the 143rd Annual Meeting of the American Neurological Association and has approved this program as a part of a comprehensive CME program, which is mandated by the ABMS as a necessary component of Maintenance of Certification.

SCHEDULE AT A GLANCE

9:15 AM-11:15 AM	**Presidential Symposium** Lewy Body Dementia: From Symptoms to Synuclein
MONDAY, OCTOBER 22, 2018	
11:15 AM-11:45 AM	**Executive Session of Membership*** All members are encouraged to attend
11:45 AM-1:00 PM	**Lunch** **Interactive Lunch Workshops**
11:45 AM-1:00 PM	**Media Roundtable (media attendees only)***
11:45 AM-1:00 PM	**Additional Lunch Workshops** 1. 18th Annual Women of the ANA Lunch Program* 2. American Board of Psychiatry and Neurology (ABPN) Maintenance of Certification (MOC) Program*
NOON-7:00 PM	**Poster Viewing***
1:00 PM-1:15 PM	**Break**
1:15 PM-3:15 PM	**Plenary Session** Inflammation and Neurological Disease: Friend or Foe?
3:15 PM-3:30 PM	**Break**
3:30 PM-5:30 PM	**Special Interest Group (SIG) Sessions** 1. Behavioral Neurology 2. Cerebrovascular Disease and Interventional Neurology 3. Health Services Research 4. Movement Disorders 5. Multiple Sclerosis 6. Neuromuscular Disease 7. Neuro-oncology 8. Sleep Disorders and Circadian Rhythm 9. Traumatic Brain Injury
5:30 PM-7:00 PM	**Exhibits***

MONDAY, OCTOBER 22, 2018	
5:30 PM-7:00 PM	**Poster Presentations & Reception*** Poster presenters will be in attendance
7:00 PM-7:30 PM	**New Member Meet & Greet*** With ANA Past Presidents and Current Leadership
7:30 PM-9:00 PM	**President's Reception**

TUESDAY, OCTOBER 23, 2018 PLEASE NOTE THE EARLIER START TIME FOR TUESDAY SESSIONS	
6:30 AM-2:15 PM	**Registration**
7:00 AM-8:45 AM	**Breakfast**
7:00 AM-8:30 AM	**Professional Development Courses** • Students, Residents, Trainees, and Post-Doc Fellows-Career Level • Early to Mid-Career Level • AUPN Chair-Career Level
8:30 AM-8:45 AM	**Break**
8:45 AM-10:45 AM	**Plenary Session** Advances in Cell-Based Therapies for Neurological Diseases
10:45 AM-11:00 AM	**Break**
11:00 AM-NOON	**Lunch** **Interactive Lunch Workshops**
NOON-12:15 PM	**Break**
12:15 PM-2:15 PM	**Plenary Session** Toward Disease-Modifying Therapies in Traumatic Brain Injury
2:15 PM	**Meeting Adjourns**

*This session is not available for AMA PRA Category 1 Credit(s)™

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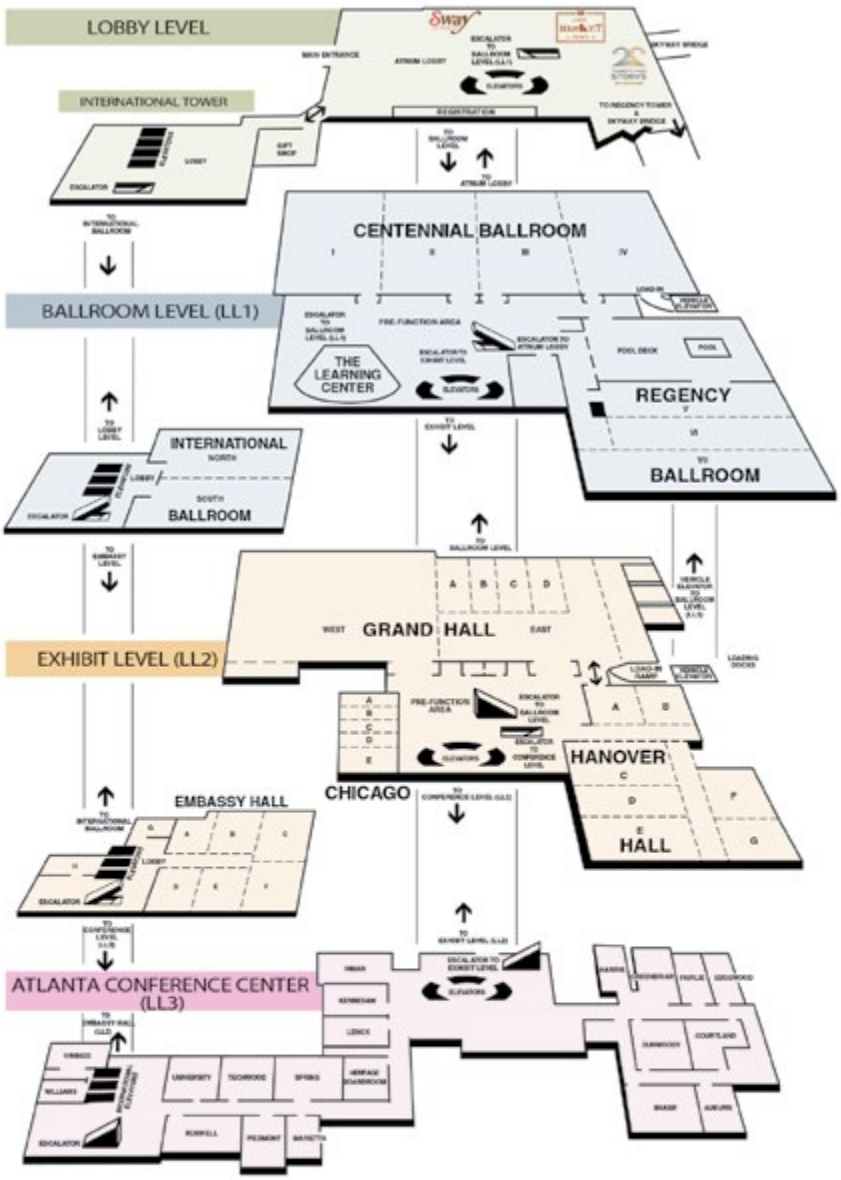

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GENERAL INFORMATION

ON-SITE REGISTRATION HOURS | CENTENNIAL FOYER

SATURDAY, OCTOBER 20	3:00 PM-7:00 PM
SUNDAY, OCTOBER 21	6:00 AM-5:45 PM
MONDAY, OCTOBER 22	6:30 AM-5:45 PM
TUESDAY, OCTOBER 23	6:30 AM-2:15 PM

POSTER HOURS | GRAND HALL WEST

SUNDAY, OCTOBER 21	12:00 PM-7:00 PM
Poster presenters and poster judges will be in attendance from 5:30 PM-7:00 PM	
MONDAY, OCTOBER 22	12:00 PM-7:00 PM
Poster presenters and poster judges will be in attendance from 5:30 PM-7:00 PM	

SPEAKER READY ROOM HOURS | CHICAGO A/B

SATURDAY, OCTOBER 20	3:00 PM-7:00 PM
SUNDAY, OCTOBER 21	6:00 AM-5:45 PM
MONDAY, OCTOBER 22	6:30 AM-5:45 PM
TUESDAY, OCTOBER 23	6:30 AM-2:15 PM

BREAKFAST | TERRACE FOYER

SUNDAY, OCTOBER 21	7:00 AM-9:00 AM
MONDAY, OCTOBER 22	7:00 AM-9:00 AM
TUESDAY, OCTOBER 23	7:00 AM-8:45 AM

LUNCH | TERRACE FOYER

Boxed Lunches will be distributed in the foyer and attendees are encouraged to attend Interactive Lunch Workshop Lunches. Additional seating is available in the Terrace & Regency Foyers if you are not attending an Interactive Lunch Workshop.

SUNDAY, OCTOBER 21	11:45 AM-1:00 PM
MONDAY, OCTOBER 22	11:45 AM-1:00 PM
TUESDAY, OCTOBER 23	11:00 AM-12:00 PM

PRESS ROOM HOURS | AUBURN

SUNDAY, OCTOBER 21	8:30 AM-5:30 PM
MONDAY, OCTOBER 22	8:30 AM-5:30 PM
TUESDAY, OCTOBER 23	8:30 AM-2:00 PM

WIRELESS CONNECTION

All Hyatt Regency Atlanta 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 Wi-Fi on the device. While in the designated ANA meeting rooms at the Hyatt Regency Atlanta, look for the network SSID: Hyatt Meeting Room. When prompted, enter the Passcode: ANA2018 (Please note that the password is case sensitive). Proceed to the internet as normal.

DISCLAIMER

Please note some session titles may have changed since this program was printed or 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: 2018.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.

CONSENT TO USE OF PHOTOGRAPHIC IMAGES

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PHOTOGRAPHY

Photography in the Annual Meeting Poster 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.

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#ANA2018

ANA ANNUAL MEETING MOBILE APP

DOWNLOADING THE APP IS EASY!

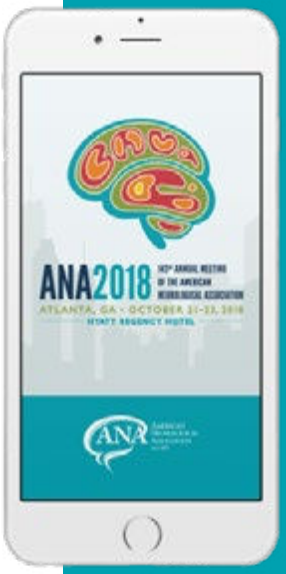
» While on your smartphone or hand-held device, open your app store (Play Store, Google Play), and SEARCH for "ANA Meetings."

» While on your smartphone or handheld device, point your mobile browser to http://app.core-apps.com/ana_annual2018 to be directed to the appropriate download version for your phone.

» While on your desktop or laptop computer, open your browser to this URL http://app.core-apps.com/ana_annual2018 to be directed to the appropriate download version for your phone.

The ANA Annual Meeting mobile application is a native app on both Apple and Android platforms. This design allows a majority of the app features to function without Wi-Fi or connectivity including interactive scheduling, maps, exhibitors, sessions, and speaker information.

The ANA Annual Meeting application is available on all Apple and Android devices and is optimized for the iPhone 7, the iPad and iPad mini, and all other Android devices and tablets. A tablet specific app is supported for iPad along with a universal Android tablet app. The technology also supports an HTML5 app for BlackBerry, Windows, and all other web-based devices for access on personal computers.



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PROGRAM BY DAY

SATURDAY, OCTOBER 20

3:00 PM-7:00 PM
REGISTRATION | CENTENNIAL FOYER

6:00 PM-9:00 PM
PRE-MEETING SYMPOSIUM

VIRAL VECTORS IN NEUROTHERAPEUTICS | CENTENNIAL I

5:00 PM-6:00 PM
BUFFET DINNER | CENTENNIAL FOYER

6:00 PM-9:00 PM
SYMPOSIUM | CENTENNIAL I

CHAIR: *Conrad C. Weihl, MD, PhD, Washington University in St. Louis*

CO-CHAIR: *Pedro Gonzalez-Alegre, MD, PhD, University of Pennsylvania*

Viral vector-based gene delivery approaches for neurological disorders hold great promise. Just last year the first FDA approved AAV therapy moved into the clinic. However, there are many challenges to gene therapy that must be successfully navigated that include first in human toxicity studies, vector development, manufacturing and regulatory compliance. The goal of this symposium will be to demonstrate the basic science of viral vectors, pre-clinical model development, target identification and ultimately therapeutic trials using a powerful platform of gene-based delivery. These speakers will span industry to academics and a range neurologic disorders from the CNS to the peripheral nervous system.

LEARNING OBJECTIVES

1. Understand AAV based gene delivery.
2. Understand the limitations of gene therapy approaches.
3. Appreciate the complexities of bringing novel therapies to the clinic.

6:00 PM-6:10 PM
Introduction
Conrad C. Weihl, MD, PhD, Washington University in St. Louis

6:10 PM-6:40 PM
Challenges and Solutions on the Road to Approval of the First Gene Therapy for a Genetic Disease in the U.S.
Katherine A. High, MD, Sparks Therapeutics

6:40 PM-7:10 PM
PRESENTATION OF THE 2018 F.E. BENNETT MEMORIAL LECTURESHIP AWARD
Emerging Therapies for Neurogenetic Disorders
Beverly L. Davidson, PhD, Children's Hospital of Philadelphia

7:10 PM-7:25 PM
COFFEE AND DESSERT BREAK

7:25 PM-7:55 PM
Delivery of Adeno-Associated Viral Vectors for Neurological Diseases
Krystof S. Bankiewicz, MD, PhD, University of California, San Francisco

7:55 PM-8:25 PM
Systemic AAV.Micro-dystrophin Gene Therapy for Duchenne Muscular Dystrophy
Louise R. Rodino-Klapac, PhD, Sarepta Therapeutics

8:25 PM-8:30 PM
AAV-Mediated Progranulin Delivery to a Mouse Model of Progranulin Deficiency Causes TCell-Mediated Hippocampal Degeneration
Defne A. Amado, MD, PhD, University of Pennsylvania

8:30 PM-8:35 PM
VY-AADC01 in Medically Refractory Parkinson's Disease: Safety and Efficacy of a Phase 1b Dose-ranging Study 12 Months and Beyond
Chadwick W. Christine, MD, PhD, University of California, San Francisco

8:35 PM-9:00 PM
Q&A and Discussion

SUNDAY, OCTOBER 21

5:45 AM-7:30 AM
SATELLITE SYMPOSIUM

EXPLORING THE LATEST EVIDENCE ON NEW AND EMERGING THERAPIES FOR MIGRAINE TREATMENT AND PREVENTION: WHAT ARE THE POTENTIAL IMPLICATIONS ON CLINICAL PRACTICE? | CENTENNIAL II

Migraine, a common neurovascular brain disorder, represents a severe and widespread health problem. In recent years the evidence on the role of calcitonin gene-related peptide (CGRP) in migraine pathophysiology has been consolidated, and new and promising treatments for prevention have been developed. The monoclonal antibody directed against the CGRP receptor, erenumab-aooe, is one example of an agent now approved for migraine prevention in adults. Several antibodies directed against the CGRP ligand (fremanezumab, galcanezumab, and eptinezumab) have shown to be effective in the prevention of episodic and chronic migraine. During this PeerView Live breakfast symposium, experts

in the management of this neurologic disorder will discuss pathways that are common to episodic and chronic migraine, assess current data on approved and emerging anti-CGRP monoclonal antibodies for migraine prevention, and highlight key considerations for using these therapies in clinical practice.

PROVIDERSHIP:
This CME activity is jointly provided by Medical Learning Institute, Inc. and PVI, PeerView Institute for Medical Education.

SUPPORT:
This activity is supported by educational funding provided by Alder BioPharmaceuticals, Amgen, and Teva Pharmaceuticals.

For additional information or to register for the symposium, please visit www.peerview.com/Migraine18.

SPEAKER & MODERATOR
Stewart J. Tepper, MD FAHS, Geisel School of Medicine at Dartmouth

SPEAKER
Lawrence C. Newman, MD, NYU Langone Health and Preston Robert Tisch Center for Men's Health

6:00 AM-5:45 PM
REGISTRATION | CENTENNIAL FOYER

7:00 AM-9:00 AM
BREAKFAST | TERRACE FOYER

7:00 AM-7:30 AM
TRAINEE BREAKFAST WITH THE ANA BOARD OF DIRECTORS* | REGENCY V

(Open to Students, Residents, Trainees, and Post-Doc Fellows)

The ANA Board of Directors is composed of academic neurologists at every level, representing all subspecialties from every region of the country. Join the Board for breakfast and an informal discussion on preparing for, entering, and succeeding in a career in academic neurology. This is a wonderful opportunity to interact with leading academics 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

PROFESSIONAL DEVELOPMENT COURSES

COURSE I: STUDENTS, RESIDENTS, TRAINEES, AND POST-DOC FELLOWS -CAREER LEVEL

Early Careers in Academic Neurology | REGENCY V

CHAIR: *Allison W. Willis, MD, MS, University of Pennsylvania*
CO-CHAIR: *Rebecca Fasano, MD, Emory University*

This course is designed to provide information that will be useful in the first five years after residency. Speakers will talk about different career paths in academic neurology, and the transition from fellow to attending. Previous speakers have included the winners of the ANA Derek Denny-Brown Award, leading clinician- basic scientists, clinician-clinical scientists, and clinician-population scientists.

LEARNING OBJECTIVES
1. To understand the early career path of a clinician educator/ program director.
2. To understand the early career path of a clinician-basic scientist.
3. To understand the early career path of a clinician-clinical scientist.

7:30 AM-7:34 AM
Introduction
Allison W. Willis, MD, MS, University of Pennsylvania

7:34 AM-7:59 AM
Early Career Development for the Clinician-Educator
Rebecca Fasano, MD, Emory University

7:59 AM-8:24 AM
Passion, Partnerships and Creativity
Lesli E. Skolarus, MD, MS, University of Michigan

8: 24 AM-8:49 AM
Early Career Navigation in Academic Neurology
Conrad C. Weihl, MD, PhD, Washington University in St. Louis

8:49 AM-9:00 AM
Q&A and Discussion

COURSE I: EARLY- TO MID-CAREER LEVEL

Is a Master's Degree Necessary? | REGENCY VI

CHAIR: *Amy A. Pruitt, MD, University of Pennsylvania*
CO-CHAIR: *Lauren Sansing, MD, MS, Yale University*

Speakers in this course will present the options and benefits of obtaining a master's degree after the MD. Questions posed include: Does it help you build your Niche in Neurology? What specific skill sets are best served with master's degree programs? How do you get graduate work funded? How do you negotiate time and meld with clinical obligations?

LEARNING OBJECTIVES
1. To understand the range of master's programs that are available and relevant to neurologists.
2. To have direct contact with neurologists who both have earned master's degrees and also are experienced educators in different master's programs.
3. To understand the steps, challenges and rewards of adding master's degree training to one's career development path.

7:30 AM-7:34 AM
Introduction
Amy A. Pruitt, MD, University of Pennsylvania

7:34 AM-7:49 AM
Adding a Master's Degree to Your Training: What is the Evidence?
Laura J. Balcer, MD, MSCE, NYU Langone Medical Center

*This session is not available for AMA PRA Category 1 Credit(s)™

7:49 AM-8:04 AM

Benefits of the MSCI Degree
Andria L. Ford, MD, MSCI, Washington University in St. Louis

8:04 AM-8:19 AM

Do you need a Master's Degree to do "Translational" Research?
Kathryn A. Davis, MD, MSTR, University of Pennsylvania

8:19 AM-9:00 AM

Q&A and Discussion

COURSE I: AUPN CHAIR-CAREER LEVEL

Burnout in Academic Neurology: How Bad is it, and What Can We Do to Prevent It? | REGENCY VII

MODERATOR
Robin Brey, MD, University of Texas at San Antonio

FACULTY
L. John Greenfield, MD, PhD, University of Connecticut School of Medicine
Patrick Reynolds, MD, Wake Forest University

Career dissatisfaction among healthcare providers is reaching epidemic proportions, with more than 50% of practitioners suffering symptoms of burnout. This may be particularly true for academic physicians who face the additional burdens of performing research, writing papers and grants, administrative duties and teaching medical students and residents. Burnout involves loss of the feeling that one's work is important, valued and meaningful. It damages the physician patient relationship, causing depersonalization and loss of the vital connection and the pleasure of patient interactions. Career dissatisfaction may reduce clinical and academic productivity, can lead to depression and induce physicians to leave academics or medicine entirely.

These effects are magnified in the academic setting due to the loss of potential life saving research and the cascading effect of poor satisfaction on the training of medical students and residents. During this sesion Dr. John Greenfield will present results from a survey of clinical faculty at UConn Health and its ramifications for academic departments. Dr. Patrick Reynolds will discuss burnout among Neurology residents and ongoing efforts to understand and mitigate this problem. The focus will be to provide tools for improving career satisfaction among academic neurologists and neurologists in training.

LEARNING OBJECTIVES
1. Describe the effects of burnout on academic clinicians.
2. List factors associate with burnout among academic clinical faculty, and possible remedies.
3. Discuss strategies for detecting, mitigating and preventing burnout in Neurology residents.

7:30 AM-8:00 AM

Candle or Fuse: The Perils of Burnout
L. John Greenfield, MD, PhD, University of Connecticut

8:00 AM-8:30 AM

Patrick Reynolds, MD, Wake Forest University

8:30 AM-9:00 AM

Q&A and Discussion

9:00 AM-9:15 AM

BREAK | CENTENNIAL FOYER

9:15 AM-11:23 AM

PLENARY SESSION

VASCULAR CONTRIBUTIONS TO NEURODEGENERATION | CENTENNIAL III & IV

CHAIR: *Rebecca Gottesman, MD, PhD, Johns Hopkins University*

CO-CHAIR: *Costantino Iadecola, MD, Weill Cornell Medicine*

A growing body of evidence indicates that vascular factors play a role in Alzheimer's disease (AD) and other neurodegenerative disease. Whereas clinical-pathological studies have demonstrated that vascular and neurodegenerative pathology coexist in over 50% of clinically-diagnosed AD, midlife vascular risk factors have emerged as important contributors to AD risk later in life. At the same time, basic science investigations have revealed a deleterious impact of Abeta and tau on neurovascular function and have unveiled previously-unappreciated pathways through which vascular dysfunction promotes neurodegenerative pathology.

These recent developments have rekindled the view that vascular factors are critically important for cognitive health, but their impact on the overall dementia landscape, still dominated by AD pathology, remains unclear. Therefore, a symposium exploring the basic and clinical aspects of the interaction between vascular and neurodegenerative pathology may be of interest to the neurological community at large. To this end, we propose four talks by leaders in the field addressing relevant neurobiological, clinical and imaging aspects of the vascular-neurodegenerative overlap in AD and its potential for prevention and therapy.

LEARNING OBJECTIVES
1. Recognize imaging markers which might identify cases in which there is a vascular contribution to dementing illness.
2. Describe potential mechanisms by which vascular risk factors might impact cognitive status.
3. Identify potential areas for prevention and treatment and estimate their effect on dementia prevalence and trends over the coming decades.

9:15 AM-9:19 AM

Introduction
Rebecca Gottesman, MD, PhD, Johns Hopkins University

9:19 AM-9:39 AM

Neurovascular Pathways to Cognitive Impairment: From Vascular Dementia to Alzheimer's Disease
Costantino Iadecola, MD, Weill Cornell Medicine

9:39 AM-9:42 AM
Q&A and Discussion

9:42 AM-10:02 AM
Novel Imaging and Endothelial Biomarkers of Small Vessel Cerebrovascular Disease
Charles DeCarli, MD, FAAN, University of Southern California in Davis

10:02 AM-10:05 AM
Q&A and Discussion

10:05 AM-10:25 AM
Genetic, Epigenetic and Omic Clues to the Biology of Vascular Contributions to Dementia
Sudha Seshadri, MD, FANA, FAAN, Glenn Biggs Institute for Alzheimer's and Neurodegenerative Diseases, University of Texas Health Sciences Center

10:25 AM-10:28 AM
Q&A and Discussion

10:28 AM-10:48 AM
Blood-Brain Barrier: Structure, Function and Role in Neurodegenerative Disorders
Berislav V. Zlokovic, MD, PhD, Zilkha Neurogenetic Institute, Keck School of Medicine

10:48 AM-10:51 AM
Q&A and Discussion

10:51 AM-10:56 AM
DATA BLITZ PRESENTATION
Greater Body Mass Index is Associated with Smaller Cortical Thickness in the Alzheimer Disease-Signature Regions: The Northern Manhattan Study
Michelle Caunca, BSc, University of Miami

10:56 AM-10:59 AM
Q&A and Discussion

10:59 AM-11:04 AM
DATA BLITZ PRESENTATION
Cerebrovascular and Alzheimer's Pathology Preferentially Affect White Matter Pathways Within Large Scale Brain Networks Compared to Pathways Between Networks
Christopher Brown, PhD, University of Kentucky

11:04 AM-11:07 AM
Q&A and Discussion

11:07 AM-11:12 AM
DATA BLITZ PRESENTATION
The Role of the Inflammation Module Hub Protein Moesin in AD
Ranjita Betarbet, PhD, Emory University

11:12 AM-11:15 AM
Q&A and Discussion

11:15 AM-11:20 AM
DATA BLITZ PRESENTATION
Exploring the Validity of Disease-Specific Masks as a Novel Non-Invasive Imaging Biomarker for Alzheimer's or Vascular Associated White Matter Hyperintensities
Omar M. Al-Janabi, MD, MS, PhD Candidate, University of Kentucky

11:20 AM-11:23 AM
Q&A and Discussion

11:23 AM-11:45 AM
BREAK | CENTENNIAL FOYER

11:45 AM-1:00 PM
LUNCH | TERRACE FOYER

Boxed Lunches available to be taken into Interactive Lunch Workshops

11:45 AM-1:00 PM
ANA-AUPN CAREER FAIR* HANOVER FG

12:00 PM-7:00 PM
EXHIBITS OPEN* GRAND HALL WEST

Open to All Attendees

12:00 PM-7:00 PM
POSTER VIEWING* GRAND HALL WEST

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

11:45 AM-1:00 PM
INTERACTIVE LUNCH WORKSHOPS

(These workshops are "lunch and learns")

WORKSHOP 1: RECENT ADVANCES IN MOVEMENT DISORDERS | REGENCY VI

CHAIR: *Henry Paulson, MD, PhD, University of Michigan*
CO-CHAIR: *Christine Klein, MD, FANA, FEAN, Deutsche Gesellschaft für Neurologie (The German Society for Neurology)*

This session will provide an update of major advances in the field of movement disorders in the previous two years.

LEARNING OBJECTIVES
1. Identify the major recent advances (2017-18) on clinical care of patients with Parkinson's disease, atypical parkinsonism and Huntington's disease.
2. Describe the major research achievements in the fields of Parkinson's disease, atypical parkinsonism and Huntington's disease.

*This session is not available for AMA PRA Category 1 Credit(s)™

11:45 AM-11:49 AM

Introduction
Henry Paulson, MD, PhD, University of Michigan
Christine Klein, MD, FANA, FEAN, Deutsche Gesellschaft für Neurologie (The German Society for Neurology)

11:49 AM-12:04 PM

Advances in Huntington's Disease
Claudia Testa, MD, PhD, Virginia Commonwealth University

12:04 PM-12:19 PM

Recent Advances in Movement Disorders
Andrew Siderowf, MD, MS, University of Pennsylvania

12:19 PM-12:34 PM

Advances in Atypical Parkinsonism
Horacio Kaufmann, MD, NYU Langone Medical Center

12:34 PM-12:49 PM

Advances on Ataxia
Tetsuo Ashizawa, MD, Houston Methodist Research Institute

12:49 PM-1:00 PM

Q&A and Discussion

WORKSHOP 2: COMPREHENSIVE MANAGEMENT OF LARGE ARTERIAL CEREBRAL INFARCTION (LACI) | CENTENNIAL I

CHAIR: *Camilo R. Gomez, MD, MBA, Loyola University Chicago, Stritch School of Medicine*

CO-CHAIR: *Marc Malkoff, MD, FAAN, FAHA, University of Tennessee*

MODERATOR
Peter Berlit, MD, FAAN, FANA, FAAEM, Deutsche Gesellschaft für Neurologie (The German Society for Neurology)

This session is designed to address the various stages of specialized management of patients with large arterial cerebral infarction (LACI); Patient selection, Pre-operative Care, Neuroendovascular Rescue, and Post-operative care. The objective is to show how these components constitute the links of a chain of survival that translates into the best opportunity for patients with LACI to have optimal clinical outcomes. The symposium will emphasize the seamless integration of these stages into an evidence-based continuum of care.

LEARNING OBJECTIVES

1. Recognize the anatomoclinical profiles of LACI patients ideally suited for urgent endovascular flow restoration.
2. Understand the principles that guide and the techniques available for bridging the therapeutic gap between presentation and procedural success.
3. Comprehend the various technical underpinnings of neuroendovascular rescue procedures.
4. Appreciate how the completion of the endovascular procedure constitutes the starting point of another set of clinical priorities and the need for a shift in the emphasis of the overall care of these patients.

11:45 AM-11:50 AM

Introduction
Camilo R. Gomez, MD, MBA, Loyola University Chicago, Stritch School of Medicine

11:50 AM-12:05 PM

Early Assessment and Patient Selection for Endovascular Treatment
Enrique C. Leira, MD, MS, University of Iowa

12:05 PM-12:20 PM

Critical Management: Emergency Bay to Catheterization Laboratory
Marc Malkoff, MD, FAAN, FAAEM, University of Tennessee

12:20 PM-12:35 PM

Definitive Care: Neuroendovascular Rescue Techniques
Randall C. Edgell, MD, St. Louis University School of Medicine

12:35 PM-12:50 PM

Clinical Priorities and Management Strategies Following Reperfusion
Camilo R. Gomez, MD, MBA, Loyola University Chicago, Stritch School of Medicine

12:50 PM-1:00 PM

Q&A and Discussion

WORKSHOP 3: THE OPIOID CRISIS AND THE EVOLUTION OF PAIN NEUROSCIENCE RESEARCH | REGENCY V

CHAIR: *Thomas P. David, PhD, University of Arizona*

CO-CHAIR: *Natalia Murinova, MD, MHA, University of Washington*

The current epidemic of opioid abuse is a significant public health problem that often stems from the presence and management of pain. During the workshop, attendees will gain a better understanding of the mechanisms that govern pain regulation and identification of novel therapeutic targets which are reasonable steps to approach this problem from a rigorous scientific point of view.

LEARNING OBJECTIVES

1. Discuss how the current epidemic of opioid abuse influences pain neuroscience research.
2. Identify changes in the blood brain barrier induced by pain and potential implications for therapeutic development.
3. Describe the normal function of the endorphin system and how it is altered by chronic pain.
4. Describe the interaction between use of antidepressants and pain management from a scientific perspective.

11:45 AM-11:49 AM

Introduction
Thomas P. David, PhD, University of Arizona

11:49 AM-12:04 PM

The Opioid Crisis and the Evolution of Pain Neuroscience Research
Natalia Murinova, MD, MHA, University of Washington

12:04 PM-12:19 PM

An Update on the Molecular Biology of Opioid Analgesia
Gavril W. Pasternak, MD, PhD, Memorial Sloan Kettering Cancer Center

12:19 PM-12:34 PM

Cannabinoids and Chronic Pain
Todd W. Vanderah, PhD, University of Arizona

12:34 PM-12:49 PM

How Pain Influences the Function of the Blood Brain Barrier
Thomas P. David, PhD, University of Arizona

12:49 PM-1:00 PM

Q&A and Discussion

WORKSHOP 4: MEET THE NINDS* | REGENCY VII

Attendees will have the opportunity to get their questions answered by leadership and senior staff members from the National Institute of Neurological Disorders and Stroke (NINDS).

MODERATOR
Allison W. Willis, MD, MS, University of Pennsylvania

PANELISTS
Craig Blackstone, MD, PhD, Senior Investigator and Cell Biology Section Chief, NINDS

Adam Hartman, MD, Program Director, NINDS

Shantadurga Rajaram, PhD, Scientific Review Officer, NINDS

Nina F. Schor, MD, PhD, Deputy Director, NINDS

Amir Tamiz, PhD, Associate Director, NINDS

1:15 PM-3:15 PM

PLENARY SESSION

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR SYMPOSIUM | CENTENNIAL III & IV

CHAIR: *Allison Brashear, MD, PhD, Wake Forest University*

CO-CHAIR: *Andrew J. Cole, MD, FRCP, Massachusetts General Hospital and Harvard Medical School*

The Derek Denny-Brown Young Neurological Scholar Symposium is an opportunity for young researchers to share groundbreaking research in the field of Neurology. This symposium will feature sessions from the three 2018 Derek Denny-Brown awardees, The Wolfe Neuropathy Research Prize awardee and the Grass Foundation - ANA Award in Neuroscience recipient.

The Derek Denny-Brown Young Neurological Scholar Award recognizes early- to mid-career neurologists and neuroscientists. This award honors those neurologists and neuroscientists in the first 10 years of their career at the assistant/associate faculty (equivalent) level who have made outstanding basic and clinical scientific advances toward the prevention, diagnosis, treatment and cure of neurological diseases. As of 2018, the Membership, Honorary and Awards Committee can designate up to a total of three (3) awards in any of the following three areas: Physician Scientist-Basic, Physician Scientist-Clinical, Neuroscientist-relevant to disease. This year the committee has awarded two (2) Physician Scientist-Basic and one (1) Physician Scientist-Clinical.

The 2018 Grass Foundation-ANA Award in Neuroscience was established in 2007 to recognize outstanding young physician scientists conducting research in basic or clinical neuroscience. The Grass Foundation was established in 1955 by Albert and Ellen Grass to advance research and education in neuroscience, with a special focus on investigators early in their careers.

The Wolfe Neuropathy Research Prize for Investigators Identifying New Causes or Novel Treatments of Axonal Peripheral Neuropathy was established to honor outstanding investigators who identify a new cause or treatment of axonal peripheral neuropathy. Eligible candidates include faculty members at any stage in their career (MD, MD/PhD, or PhD) who identify either a new cause or treatment of axonal peripheral neuropathy. The same researcher can qualify for this award annually if he/she can demonstrate evidence of repeated success in identifying new causes or treatments for axonal peripheral neuropathy.

1:15 PM-1:19 PM

Introduction
Allison Brashear, MD, PhD, Wake Forest University

1:19 PM-1:39 PM

THE DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD-BASIC

How Repeats Break the Rules to Cause Neurodegeneration
Peter K. Todd, MD, PhD, University of Michigan

1:39 PM-1:42 PM

Q&A and Discussion

1:42 PM-2:02 PM

THE DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD-BASIC

Inflammation and Resolution after Intracerebral Hemorrhage-Lessons from Mouse and Man
Lauren Sansing, MD, MS, Yale University

2:02 PM-2:05 PM

Q&A and Discussion

*This session is not available for AMA PRA Category 1 Credit(s)™

2:05 PM-2:25 PM
THE DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD-CLINICAL
Big Screens and Where You Go From There: Towards Translation in the Neurodegenerative Disorders
Alice Chen-Plotkin, MD, University of Pennsylvania

2:25 PM-2:28 PM
Q&A and Discussion

2:28 PM-2:48 PM
WOLFE NEUROPATHY RESEARCH PRIZE
Development of EQ-6 for Neuroprotection Against Chemotherapy-induced Peripheral Neuropathy
Ahmet Hoke, MD, PhD, Johns Hopkins University

2:48 PM-2:51 PM
Q&A and Discussion

2:51 PM-3:11 PM
THE GRASS FOUNDATION - ANA AWARD IN NEUROSCIENCE
Metagenomic Approaches Advance Our Understanding of Infectious Encephalitis
Michael Wilson, MD, University of California, San Francisco

3:11 PM-3:15 PM
Q&A and Discussion

3:15 PM-3:30 PM
COFFEE BREAK | CENTENNIAL FOYER

3:30 PM-5:30 PM
SPECIAL INTEREST GROUP SESSIONS

SESSION 1: AUTOIMMUNE NEUROLOGY | CENTENNIAL I

CHAIR: *Jenny J. Linnoila, MD, PhD, Massachusetts General Hospital*
CO-CHAIR: *Eric Lancaster, MD, PhD, University of Pennsylvania*

Autoimmune Neurology encompasses the diagnosis and treatment of neurological disorders with an autoimmune basis. The last decade has seen a dramatic increase in the discovery of neural-specific autoantibodies and their target antigens. This SIG will explore advances in the field ranging from clinical practice to novel insights and immunologic mechanisms of injury.

LEARNING OBJECTIVES
1. Understand autoimmune disorders targeting the peripheral autonomic nervous system.
2. Recognize the effects of neurotoxicity from novel cancer immunotherapies.
3. Learn the characteristics of a newly reported autoimmune movement disorder.
4. Appreciate the implications of the latest research on autoimmune encephalitis.
5. Learn imaging features of neuroinflammatory disorders of the spinal cord.

3:30 PM-3:32 PM
Introduction
Jenny J. Linnoila, MD, PhD, Massachusetts General Hospital

3:32 PM-3:57 PM
LEADER IN THE FIELD PRESENTATION
Overview of Autoimmune Dysautonomia
Steven A. Vernino, MD, PhD, FAAN, The University of Texas Southwestern Medical Center

3:57 PM-4:02 PM
Q&A and Discussion

4:02 PM-4:10 PM
DATA BLITZ PRESENTATION
Adaptor Protein-3 beta-2 (AP3B2)-IgG: A Biomarker of Autoimmune Gait Disorders
Josephe Archie Honorat, MD, PhD, Mayo Clinic

4:10 PM-4:12 PM
Q&A and Discussion

4:12 PM-4:37 PM
LEADER IN THE FIELD PRESENTATION
Imaging Features of Neuroinflammatory Disorders of the Spinal Cord
Eoin P. Flanagan, MB, BCh, Mayo Clinic

4:37 PM-4:41 PM
Q&A and Discussion

4:41 PM-4:49 PM
DATA BLITZ PRESENTATION
Passive Transfer of Human CASPR2 Antibodies Into Mice Causes Behavioral and Neuropathological Changes
Maria Pia Giannoccaro, MD, University of Oxford

4:49 PM-4:51 PM
Q&A and Discussion

4:51 PM-5:15 PM
LEADER IN THE FIELD PRESENTATION
Neurologic Implications of CAR-T Cell Cancer Immunotherapy
Henrikas Vaitkevicius, MD, Brigham and Women's Hospital and Harvard Medical School

5:15 PM-5:20 PM
Q&A and Discussion

5:20 PM-5:28 PM
DATA BLITZ PRESENTATION
Neurotoxicities Associated with Immune Checkpoint Inhibitor Therapy
Sophie Lan-Linh Duong, Medical Student, Yale University

5:28 PM-5:30 PM
Q&A and Discussion

SESSION 2: CLINICAL LOGIC-CHALLENGING CASES IN NEUROLOGY | CENTENNIAL II

CHAIR: *Steven L. Galetta, MD, NYU Langone Medical Center*

CO-CHAIR: *Raymond S. Price, MD, University of Pennsylvania*

This SIG will be case based emphasizing general neurology, stroke and neuro-ophthalmology. The case studies will be selected from patients seen in consultation. The cases will be presented as unknowns to the audience including their history, examination and the diagnostic testing that was performed. Attendees will be encouraged to participate in the case discussions as they unravel. Lessons learned and the sources of diagnostic and management error will be emphasized.

LEARNING OBJECTIVES

1. Discuss challenging cases in neurology both in terms of diagnosis and management.
2. Learn new concepts of neurologic illness.
3. Discuss advanced testing for complex neurologic cases.

3:30 PM-3:50 PM
LEADER IN THE FIELD PRESENTATION
Challenging Cases in Neuro-ophthalmology
Steven L. Galetta, MD, NYU Langone Medical Center

3:50 PM-4:10 PM
LEADER IN THE FIELD PRESENTATION
Challenging Cases in Stroke
Koto Ishida, MD, NYU Langone Medical Center

4:10 PM-4:30 PM
LEADER IN THE FIELD PRESENTATION
Challenging Cases in Neurology
Raymond S. Price, MD, University of Pennsylvania

4:30 PM-4:50 PM
LEADER IN THE FIELD PRESENTATION
Challenging Cases in Stroke
Koto Ishida, MD, NYU Langone Medical Center

4:50 PM-5:10 PM
LEADER IN THE FIELD PRESENTATION
Challenging Cases in Neurology
Raymond S. Price, MD, University of Pennsylvania

5:10 PM-5:30 PM
LEADER IN THE FIELD PRESENTATION
Challenging Cases in Neuro-ophthalmology
Steven L. Galetta, MD, NYU Langone Medical Center

SESSION 3: DEMENTIA AND AGING | REGENCY V

CHAIR: *Jennifer L. Whitwell, PhD, Mayo Clinic*

CO-CHAIR: *Eric M. McDade, DO, Washington University in St. Louis*

Age related neurodegenerative dementias comprise a wide range of syndromes. However, between different syndromes there are shared pathologies and likely shared mechanisms leading to the development of distinct diseases, yet, within diseases a significant variability in phenotypic expression. The 2018 Dementia and Aging SIG will highlight work exploring common mechanisms leading to the development of proteopathies with aging, the non-random distribution and progression of pathology, and the complex genetic risks that contribute to the development of dementia and the differences in clinical symptoms within specific dementias.

LEARNING OBJECTIVES

1. Understand the role autophagy plays in neurodegenerative disease.
2. Discuss current hypothesized mechanisms that proteins spread through the brain.
3. Understand the complex genetic risks that contribute to the development of Alzheimer's disease.

3:30 PM-3:34 PM
Introduction
Jennifer L. Whitwell, PhD, Mayo Clinic

3:34 PM-3:59 PM
LEADER IN THE FIELD PRESENTATION
Virginia M.-Y. Lee, PhD, University of Pennsylvania

3:59 PM-4:09 PM
DATA BLITZ PRESENTATION
Profiling Alzheimer Disease Stages in Dominantly Inherited Alzheimer Disease Using CSF Tau Phosphorylation Isoforms: Position Matters
Nicolas Barthélemy, PhD, Washington University in St. Louis

4:09 PM-4:34 PM
LEADER IN THE FIELD PRESENTATION
Polygenic Risk in AD
Richard Mayeux, MD, Columbia University

4:34 PM-4:44 PM
DATA BLITZ PRESENTATION
Quantitative Proteomics of the Human Brain Reveals Proteins Associated with Cognitive Resilience
Thomas Wingo, MD, Atlanta VA Medical Center

4:44 PM-5:09 PM
LEADER IN THE FIELD PRESENTATION
The Role of Autophagy in Neurodegeneration
Mathieu Bourdenx, PhD, Albert Einstein College of Medicine

5:09 PM-5:19 PM
DATA BLITZ PRESENTATION
Systemic Inflammation During Midlife and Cognitive Change Over 20 Years: The ARIC Study
Keenan Walker, PhD, Johns Hopkins University

5:19 PM-5:30 PM
Q&A and Discussion

SESSION 4: EDUCATION (SPONSORED BY AUPN) | REGENCY VI

CHAIR: *Charles Curtis Flippen, MD, University of California, Los Angeles*

CO-CHAIR: *Guillermo E. Solorzano, MD, University of Virginia*

Mentorship is an essential part of a successful career, but it is not always available or effectively implemented. Mentorship at all levels of the professional continuum should occur, including medical and graduate students, residents, fellows, and faculty members. The 2018 Education SIG will present an overview of what constitutes effective mentorship, followed by succinct presentations about mentorship at various career levels including residency, junior faculty, and senior leadership. Special consideration will be given to the mentorship of women and minorities, as well as the role of the mentee in this process. A lively discussion is expected to follow these presentations.

LEARNING OBJECTIVES

1. Recognize the current literature regarding mentoring of students, residents and faculty developing within neurology.
2. Identify the needs of mentees across the academic spectrum within neurology.
3. Compare mentoring strategies used at institutions with the goal of developing formalized mentoring programs at their institutions.

3:30 PM-3:34 PM

Introduction
Charles Curtis Flippen, MD, University of California, Los Angeles

3:34 PM-4:09 PM
LEADER IN THE FIELD PRESENTATION

Medical Student Mentoring
Guillermo E. Solorzano, MD, University of Virginia

4:09 PM-4:44 PM
LEADER IN THE FIELD PRESENTATION

Mentoring in Academic Medicine: Residency
Charles Curtis Flippen, MD, University of California, Los Angeles

4:44 PM-5:19 PM
LEADER IN THE FIELD PRESENTATION

Fellowship and Career Mentoring
Charlene E. Gamaldo, MD, FAAN, FAAS, Johns Hopkins University

5:19 PM-5:30 PM

Q&A and Discussion

SESSION 5: EPILEPSY | REGENCY VII

CHAIR: *Anli A. Liu, MD, NYU Langone Medical Center*

CO-CHAIR: *Shennan Aibel Weiss, MD, PhD, Thomas Jefferson University*

Memory dysfunction is the most common cognitive comorbidity in patients with epilepsy, significantly impairing quality of life and contributing to disability. In the last 5 years, there has been increasing insight into the mechanisms of memory function and its failure, and memory remediation efforts have focused on medications and devices. This SIG will feature talks on the role of interictal discharges and high frequency oscillations in memory dysfunction, the use of direct cortical stimulation and pharmacology to enhance memory in patients with epilepsy, and using chronic ambulatory intracranial EEG to study memory physiology

LEARNING OBJECTIVES

1. To characterize how ictal and interictal discharges may impact cognition in patients with epilepsy (PWE).
2. To describe how hippocampal oscillations such as gamma and ripple activity support or disrupt memory processes.
3. To become familiar with techniques which may potentially enhance memory function in PWE, such as interictal spike reduction and closed-loop direct brain stimulation.
4. To understand how focal ablations of mesial temporal structures such as hippocampus and amygdala impair memory in PWE.
5. To become familiar with approaches to investigating the neurobiology of memory impairment, such as intracranial EEG, chronic ambulatory electrocorticography and structural MRI.

3:30 PM-3:34 PM

Introduction
Anli A. Liu, MD, NYU Langone Medical Center

3:34 PM-3:59 PM
LEADER IN THE FIELD PRESENTATION

Impact of Ictal and Interictal Intracranial EEG on Cognition
Kathryn A. Davis, MD, MSTR, University of Pennsylvania

3:59 PM-4:24 PM
LEADER IN THE FIELD PRESENTATION

Does Spike Reduction Lead to Improved Cognitive Performance?
David W. Loring, PhD, Emory University

4:24-4:49 PM
LEADER IN THE FIELD PRESENTATION

Closed-loop Direct Brain Stimulation for Memory Restoration
Youssef Ezzyat, PhD, University of Pennsylvania

4:49 PM-4:59 PM
DATA BLITZ PRESENTATION

Hippocampal Gamma Predicts Associative Memory Performance as Measured by Acute and Chronic Intracranial EEG
Anli A. Liu, MD, NYU Langone Medical Center

4:59 PM-5:09 PM
DATA BLITZ PRESENTATION

Ripples (80-200 Hz) in the Human Mesial Temporal Lobe Exhibit Different Profiles of Phase-amplitude Coupling in Relation to Slow Waves
Shennan Aibel Weiss, MD, PhD, Thomas Jefferson University

5:09 PM-5:19 PM
DATA BLITZ PRESENTATION

Focal Ablations of the Amygdala and Hippocampus Infrequently Results in Verbal Memory Impairment
Daniel Drane. PhD, Emory University

5:19 PM-5:30 PM

Q&A and Discussion

SESSION 6: GLOBAL NEUROLOGY | HANOVER A+B

CHAIR: *Farrah J. Mateen, MD, PhD, FAAN, Massachusetts General Hospital and Harvard Medical School*

CO-CHAIR: *Ana-Claire Meyer, MD, Yale University*

The emerging field of global neurology includes a range of newly discovered and ancient neurological diseases. It also incorporates the complex social, economic, political, and scientific issues that affect the understanding of neurology at the macro-level. Focused on resource-limited groups, both abroad and within the U.S.A., this session will include experts on vulnerable populations research and novel approaches to neurological problems outside of our usual circumstances. The issues inherent to studying, practicing, and mentoring effectively in resource-limited settings will also be highlighted.

LEARNING OBJECTIVES

1. To study the impact of both emerging and common neurological disorders across low-income populations globally.
2. To understand the testing of interventions for brain disorders in especially resource-constrained environments.

3:30 PM-3:35 PM

Introduction

Farrah J. Mateen, MD, PhD, FAAN, Massachusetts General Hospital and Harvard Medical School

3:35 PM-3:55 PM

LEADER IN THE FIELD PRESENTATION

Bridging the Brain Disorders Treatment Gap in Africa

Ed Trevathan, MD, MPH, Vanderbilt University

3:55 PM-4:15 PM

LEADER IN THE FIELD PRESENTATION

Challenges and Opportunities in Managing Cerebrovascular Disease in the Middle East

Ashfaq Shuaib, MD, FRCP, FAAN, FAHA, University of Alberta

4:15 PM-4:35 PM

LEADER IN THE FIELD PRESENTATION

Stroke in Mexicans and Americans-Cross Ethnic Studies

Lewis B. Morgenstern, MD, University of Michigan

4:35 PM-4:45 PM

DATA BLITZ PRESENTATION

Case Series of Ebola Survivors from Liberia with Neurological Sequelae Undergoing In-Depth Neurological Evaluation at the National Institutes of Health

Avindra Nath, MD, National Institute of Neurological Disorders and Stroke (NINDS)

4:45 PM-4:55 PM

DATA BLITZ PRESENTATION

Long-term Decreases in N-acetylaspartate After Perinatal Brain Injury Results From Altered De Novo Synthesis

Joseph Scafidi, DO, MS, Children's National Medical Center, Washington, DC

4:55 PM-5:05 PM

DATA BLITZ PRESENTATION

People with Epilepsy Presenting to a Free Consultation Service in the Republic of Guinea-Conakry

Farrah J. Mateen, MD, PhD, FAAN, Massachusetts General Hospital and Harvard Medical School

5:05 PM-5:30 PM

Q&A and Discussion

SESSION 7: ANA-AHS HEADACHE (SPONSORED BY THE AMERICAN HEADACHE SOCIETY) | HANOVER C

CHAIR: *Andrew C. Charles, MD, University of California, Los Angeles*

CO CHAIR: *Todd J. Schwedt, MD, Mayo Clinic*

Migraine is the most common neurological disease, making an up-to-date understanding of migraine mechanisms and treatments relevant for all neurologists and neuroscientists, regardless of their specialty. This SIG will focus on advances in the understanding of migraine mechanisms that have identified new therapeutic targets. Important data on headache disorders presented at the meeting will be highlighted, and new and emerging therapies for migraine and other headache disorders will be the topic of an interactive discussion.

LEARNING OBJECTIVES

1. Discuss ictal changes in the vasculature during a migraine.
2. Describe the relationship of migraine and arterial function, including endothelial dysfunction, dissection, and atherosclerosis.
3. Describe the relationship of the migraine and venous circulation, including venous thrombosi.

3:30 PM-3:34 PM

Introduction

Andrew C. Charles, MD, University of California, Los Angeles

3:34 PM-3:59 PM

LEADER IN THE FIELD PRESENTATION

Migraine: What Does Imaging Tell Us?

Todd J. Schwedt, MD, Mayo Clinic

3:59 PM-4:24 PM

LEADER IN THE FIELD PRESENTATION

Migraine and The Vasculature

Gretchen E. Tietjen, MD, University of Toledo

4:24 PM-4:49 PM

LEADER IN THE FIELD PRESENTATION

New Therapies Based on Advances in Migraine Science

Andrew C. Charles, MD, University of California, Los Angeles

4:49 PM-4:59 PM

DATA BLITZ PRESENTATION

Hypocalcemia and Vitamin D Deficiency Induced Loss of Function Amongst Migraine Hospitalization

Urvish Patel, MBBS, MPH, Icahn School of Medicine at Mount Sinai

4:59 PM-5:09 PM
DATA BLITZ PRESENTATION
Acceptability and Usage of the PROSe Mobile System Among Pediatric Patients with Chronic Headache: A Pilot Study
Karla Gray-Roncal, MS, Johns Hopkins University

5:09 PM-5:19 PM
DATA BLITZ PRESENTATION
Obesity-related Cortical Thickness Changes in Chronic Migraine
Yohannes Woldeamanuel, MD, Stanford University

5:19 PM-5:30 PM
Q&A and Discussion

SESSION 8: NEUROCRITICAL CARE | HANOVER D+E

CHAIR: *Wendy C. Ziai, MD, Johns Hopkins University*
CO-CHAIR: *Kevin N. Sheth, MD, FAHA, FCCM, FNCS, FAAN, FANA, Yale University*

Consciousness in medicine has gradually entered mainstream neuroscience as novel methods and theoretical advances have opened the field for scientific and clinical progress. Unconsciousness is commonly seen in Neurocritical care settings, although interventions that modify awareness remain elusive. The speakers in this SIG will review neural correlates of consciousness, detection of awareness, prognostication and therapies in patients who remain unresponsive after brain damage.

LEARNING OBJECTIVES
1. Identify new neuroimaging and electroencephalographic methods of quantifying consciousness.
2. Understand how the pathophysiology of functional networks are important for maintaining or recovering consciousness.
3. Gain insight into prognostication of coma after cardiac arrest and other neurological disorders.

3:30 PM-3:34 PM
Introduction
Wendy C. Ziai, MD, Johns Hopkins University

3:34 PM-3:59 PM
LEADER IN THE FIELD PRESENTATION
Quantifying Consciousness
Melanie Boly, MD, PhD, University of Wisconsin

3:59 PM-4:24 PM
LEADER IN THE FIELD PRESENTATION
Prognostication in Coma after Cardiac Arrest
David M. Greer, MD, MA, FCCM, FAHA, FNCS, FAAN, FANA, Boston University School of Medicine

4:24 PM-4:59 PM
LEADER IN THE FIELD PRESENTATION
Detecting Covert Consciousness in the Intensive Care Unit
Brian L. Edlow, MD, Harvard Medical School

4:59 PM-5:09 PM
DATA BLITZ PRESENTATION
Characterization of Network Connectivity in EEG Recordings: Applications to Post-cardiac Arrest Coma
Peter Forgacs, MD, Weill Cornell Medicine

5:09 PM-5:19 PM
DATA BLITZ PRESENTATION
Effect of Brain Lateral Displacement on Cerebral Autoregulation in Acutely Comatose Neurocritical Patients
Romergryko Geocadin, MD, Johns Hopkins University

5:19 PM-5:30 PM
Q&A and Discussion

5:30 PM-7:00 PM
POSTER PRESENTATIONS AND RECEPTION*

GRAND HALL WEST

7:00 PM-8:00 PM
JUNIOR MEMBERSHIP HAPPY HOUR | REGENCY V

7:00 PM-9:00 PM
SATELLITE SYMPOSIUM

MEDICAL MYSTERY: 53 YEAR OLD FEMALE WITH UNEXPLAINED SEVERE FATIGUE AND BACK PAIN | CENTENNIAL II

Participants are invited to work with us to uncover the cause of our patient's symptoms in this interactive case study.

MONDAY, OCTOBER 22

SATELLITE SYMPOSIUM

6:00 AM-7:30 AM
hATTR AMYLOIDOSIS: NAVIGATION THROUGH A MYRIAD OF MANIFESTATIONS | CENTENNIAL II

Join us to understand the multisystem manifestations and diagnostic challenges of patients with hereditary transthyretin-mediated (hATTR) amyloidosis.

6:30 AM-5:45 PM
REGISTRATION | CENTENNIAL FOYER

7:00 AM-9:00 AM
BREAKFAST | TERRACE FOYER

* This session is not available for AMA PRA Category 1 Credit(s)™

7:30 AM-9:00 AM

PROFESSIONAL DEVELOPMENT COURSES

COURSE 2: STUDENTS, RESIDENTS, TRAINEES AND POST-DOC FELLOWS -CAREER LEVEL

Landing Your First Faculty Position: A Workshop for New Academic Neurologists | REGENCY V

CHAIR: *Allison W. Willis, MD, MS, University of Pennsylvania*

Two faculty members will speak on the essential skills needed for a successful job seeking experience in Academic Neurology, then faculty and senior ANA members will break into smaller groups with attendees to practice interviewing skills, and to demonstrate and practice "elevator talks". This course is designed to benefit students, residents, and fellows.

LEARNING OBJECTIVES

1. Acquire knowledge of essential skills needed for a successful job seeking experience in Academic Neurology.
2. Develop crucial interviewing skills.
3. Learn how to sell yourself by developing the essential skill: the "elevator talk".

7:30 AM-7:35 AM

Introduction
Allison W. Willis, MD, MS, University of Pennsylvania

7:35 AM-7:50 AM

Articulating a Vision for What You Want in a Faculty Position and Where You Would like Your Job To Take You - It All Starts with an "Elevator Speech"
Allison W. Willis, MD, MS, University of Pennsylvania

7:50 AM-8:15 AM

Attendee activity and Discussion

8:15 AM-8:40 AM

The Other Side of the Table: A Chair's Perspective on Faculty Recruitment
Brett Kissela, MD, MS, University of Cincinnati

8:40 AM-9:00 AM

Q&A and Discussion

COURSE 2: EARLY TO MID-CAREER LEVEL

Building A Career That Involves Industry, Government, and Dean's Office Roles | REGENCY VI

CHAIR: *Amy A. Pruitt, MD, University of Pennsylvania*
CO-CHAIR: *Lauren Sansing, MD, MS, Yale University*

This session will discuss paths toward building a varied program in academic neurology that encompasses two different paths: 1) Interaction and garnering support through multiple government, professional associations and industry sources. These may include not only NIH, but also CDC, Department of Defense, private foundations, state programs and health related industries. Speaker will discuss available options from the point of view of an academic neurologist building bridges to various funding entities and industry as well as the perspective of moving to pharmaceutical or other health related industry to pursue translation of scientific advances from bench to bedside; 2) Interaction with Dean's Office activities combined with academic neurology careers.

LEARNING OBJECTIVES

1. To become familiar with the broader palate of government, private and industry entities engaged in promoting and supporting research.
2. To obtain insight into how connections may be made and the issues—both positive and negative—in working with varied groups having different expectations.
3. To learn more about the benefits and trade-offs of pursuing translational research in an academic vs. industry setting.

7:30 AM-7:35 AM

Introduction
Amy Pruitt, MD, University of Pennsylvania

7:35 AM-8:45 AM

Turning "Tax" into Currency: Combining the Roles of Diversity Officer and Academic Neurologist
Roy H. Hamilton, MD, MS, FAAN, FANA, University of Pennsylvania

8:45 AM-9:00 AM

Q&A and Discussion

COURSE 2: AUPN CHAIR-CAREER LEVEL

Creating a Culture within your Neurology Department | REGENCY VII,

MODERATOR
L. John Greenfield, MD, PhD, University of Connecticut

The job of running an academic department has been compared to herding cats; faculty members have their own individual strengths and weaknesses, goals and needs, and if left alone tend to pursue their own interests with little regard for the overall goals of the department chair or the institution. Departmental goals may include high levels of clinical performance, improved research grant and publication productivity, outstanding educational achievement and improved financial performance. Aligning faculty and department goals to ensure consistently high level of performance across these missions can be challenging, particularly since large institutions may be inflexible and resources limited. How does a department chair create a culture of high performance, career satisfaction and engagement in which faculty members see their contributions to each of these missions as vital and important? How do you maintain this culture despite declining clinical reimbursements, lower grant funding rates, and increased educational expectations? What does it take to create a culture of

excellence? For those new to these concepts or who want to know more, see the recommended reading below which presents a nice synthesis of critical concepts as well as specific strategies for group leaders.

LEARNING OBJECTIVES

1. Discuss strategies for aligning faculty and departmental/ institutional interests.
2. Describe ways to encourage faculty members to view themselves as members of a team rather than individual practitioners or researchers.
3. Discuss approaches to build collegiality, camaraderie and esprit de corps.

7:30 AM-8:00 AM

Creating a Culture within UT Health San Antonio
Robin Brey, MD, University of Texas at San Antonio

8:00 AM-8:30 AM

Building a Culture of Academic Excellence in a Rural Medical Center
Gregory L. Holmes, MD, University of Vermont College of Medicine

8:30 AM-9:00 AM

Q&A and Discussion

9:00 AM-9:15 AM

COFFEE BREAK | TERRACE FOYER

9:15 AM-11:15 AM

PLENARY SESSION

PRESIDENTIAL SYMPOSIUM

Lewy Body Dementia: From Symptoms to Synuclein

CENTENNIAL III & IV

CHAIR: *David M. Holtzman, MD, Washington University in St. Louis*
CO-CHAIR: *William T. Dauer, MD, University of Michigan*

Lewy body dementia (LBD) is the second most common type of degenerative dementia and encompasses dementia with Lewy bodies and Parkinson disease dementia. Principle features of LBD include hallucinations, fluctuations in consciousness, sleep dysfunction and a close association with parkinsonism. The pathological hallmark of LBD is synuclein-containing Lewy bodies in the cerebral cortex that are similar in appearance to those that occur in Parkinson disease (PD). In LBD, Lewy bodies are frequently accompanied by other protein aggregates such as amyloid-Î². Little is understood about the pathogenesis of LBD, including the cause of synuclein accumulation in cerebral cortex, its spread through the brain, how synuclein leads to neuronal dysfunction, and the relationship of LBD to PD. The speakers in this Symposium will present the latest research in these areas, advancement of which is critical to advancing novel therapies for DLB.

LEARNING OBJECTIVES

1. Recognize the cardinal clinical features of LBD, including its varied presentations.
2. Understand the proper use of laboratory and neuroimaging studies in the diagnosis of LBD.
3. Appreciate current scientific knowledge about how synuclein accumulates and disrupts neuronal function.

9:15 AM-9:19 AM

Introduction
David M. Holtzman, MD, Washington University in St. Louis

9:19 AM-9:39 AM

Clinical, Diagnostic, and Prognostic Features of DLB
Bradley F. Boeve, MD, Mayo Clinic

9:39 AM-9:42 AM

Q&A and Discussion

9:42 AM-9:47 AM

DATA BLITZ PRESENTATION

Propagation of Brain Derived Disease Specific Tau Oligomeric Strains via the Eye-Brain Axis
Rakez Kayed, PhD, University of Texas Medical Branch

9:47 AM-9:50 AM

Q&A and Discussion

9:50 AM-10:10 AM

Cell-to-Cell Transmission of Misfolded Alpha-Synuclein as a Disease Mechanism in Lewy Body Dementia and Parkinson Dementia
Virginia M.-Y. Lee, PhD, University of Pennsylvania

10:10 AM-10:13 AM

Q&A and Discussion

10:13 AM-10:18 AM

DATA BLITZ PRESENTATION

The Role of α-Synuclein Strains on Tau Aggregation in Disease Pathology
Urmi Sengupta, MS, University of Texas Medical Branch

10:18 AM-10:21 AM

Q&A and Discussion

10:21 AM-10:41 AM

PRESENTATION OF THE 2018 SORIANO LECTURESHIP AWARD

The Interplay of Mitochondria and Lysosomes in Neurodegeneration
Dimitri Krainc, MD, PhD, Northwestern University Feinberg School of Medicine, 2018 Soriano Lectureship Award Recipient

10:41 AM-10:44 AM

Q&A and Discussion

* This session is not available for AMA PRA Category 1 Credit(s)™

10:44 AM-10:49 AM
DATA BLITZ PRESENTATION
Nicotinic Receptor Dysfunction Underlies Abnormal Responses to Muscarinic Receptor Antagonist Treatment in a Mouse Model of DYT1 Dystonia
Anthony Downs, BS, Emory University

10:49 AM-10:52 AM
Q&A and Discussion

10:52 AM-11:12 AM
The Unchosen Path
Susan Schneider Williams

11:12 AM-11:15 AM
Q&A and Discussion

11:15 AM-11:45 AM
EXECUTIVE SESSION OF MEMBERSHIP* | CENTENNIAL III & IV

All ANA members are encouraged to attend this session this session where new officers and directors will be elected to the ANA Board of Directors.

11:45 AM-1:00 PM
LUNCH | TERRACE FOYER

11:45 AM-1:00 PM
INTERACTIVE LUNCH WORKSHOPS

(These workshops are "Lunch and Learns")

WORKSHOP 1: MEET THE CHAIRS | CENTENNIAL II

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.

FACULTY:
Kenneth L. Tyler, MD, University of Colorado
Barbara G. Vickrey, MD, MPH, Icahn School of Medicine at Mount Sinai
Frances E. Jensen, MD, University of Pennsylvania
David M. Greer, MD, MA, FCCM, FAHA, FNCS, FAAN, FANA, Boston University School of Medicine
S. Thomas Carmichael, MD, PhD, David Geffen School of Medicine at University of California, Los Angeles
David Lee Gordon, MD, University of Oklahoma

WORKSHOP 2: MEET THE EDITORS | CENTENNIAL I

Editors from the named journals will be available to discuss the submission process, publishing, tips, and other key topics of interest.

EDITORS:
Jack Kessler, MD, Editor-in-Chief, ACTN and Boshes Professor and Chairman of Neurology, Northwestern University
S. Andrew Josephson, MD, FAAN, Editor-in-Chief, JAMA Neurology and Professor of Neurology, University of California, San Francisco
Clifford B. Saper, MD, PhD, Editor-in-Chief, Annals of Neurology®, Professor of Neurology and Neuroscience, Harvard Medical School, Chairman, Department of Neurology, Beth Israel Deaconess Medical Center
Bradford B. Worrall, MD, MSc, FAAN, Deputy Editor, Neurology®, Professor of Neurology and Public Health Sciences, University of Virginia

WORKSHOP 3: NEW DEVELOPMENTS IN DYSTONIA | REGENCY V

CHAIR: *William T. Dauer, MD, University of Michigan*
CO-CHAIR: *Stewart Factor, DO, Emory University*

The family of disorders known as the dystonias has seen enormous advances in recent years. These advances include a new definition and classification of all dystonias, new information on the pathogenesis of dystonia, new trends for the use of existing therapies, and an experimental pipeline for development of novel therapeutics. The goal of this session is to review the traditional viewpoints and emerging developments.

LEARNING OBJECTIVES
1. To summarize novel information regarding the genetics and neuroanatomical and neurophysiological bases for various types of dystonia.
2. To describe traditional and emerging trends in botulinum toxin therapy, including new concepts regarding dose and dosing intervals, new toxin preparations, and current understanding of treatment failures.
3. To present the case for the need for novel therapeutics agents, and the different strategies being employed to develop novel therapeutics.

11:45 AM-11:49 AM
Introduction
William T. Dauer, MD, University of Michigan

11:49 AM-12:04 PM
Updates on Clinical Management of Dystonia
Stewart Factor, DO, Emory University

12:04 PM-12:19 PM
Update on Genetics in Dystonia
Christine Klein, MD, FANA, FEAN, Deutsche Gesellschaft für Neurologie (The German Society for Neurology)

12:19 PM-12:34 PM
Dystonia: Molecular and Cellular Mechanisms
William T. Dauer, MD, University of Michigan Medical School

12:34 PM-12:49 PM
Experimental Therapeutics Pipeline
David G. Standaert, MD, PhD, University of Alabama at Birmingham

12:49 PM-1:00 PM
Q&A and Discussion

WORKSHOP 4: TUMOR TREATING FIELDS FOR GLIOBLASTOMA AND OTHER MALIGNANCIES | REGENCY VI

CHAIR: *Eric T. Wong, MD, FANA, Harvard Medical School*
CO-CHAIR: *Roger Stupp, MD, Northwestern University Feinberg School of Medicine*

Tumor Treating Fields are alternating electric fields at 200 kHz currently being utilized to treat glioblastoma. This novel anti-cancer treatment modality has undergone successful clinical trial testing showing comparable efficacy when compared to salvage chemotherapies in patients with recurrent glioblastomas. When tested in the newly diagnosed population, Tumor Treating Fields combined with adjuvant temozolomide was found to be superior to temozolomide alone. The targets of this treatment are proteins and large macromolecules, such as Septin and Tubulin, which both have large dipole moments and are essential for the orderly progression of mitosis in tumor cells. Computer modeling also enables investigators and treating neurologists to estimate the field strength at the site of the glioblastoma. The application of computer technology and our better understanding of the cell biology effects hopefully will improve delivery of this anti-cancer treatment for the glioblastoma patient. This workshop aims to disseminate knowledge on the (i) cell biology effects, (ii) computer modeling work, (iii) past clinical trial results and (iv) other adjuvant treatments that may augment the efficacy of Tumor Treating Fields.

LEARNING OBJECTIVES

1. To discuss the cell biology effects of Tumor Treating Fields.
2. To review the process and utility of electric field modeling in patients.
3. To review up-to-date clinical trial results and other clinical observations.

11:45 AM-11:49 AM

Introduction
Eric T. Wong, MD, FANA, Harvard Medical School

11:49 AM-12:04 PM

Cellular and Immunologic Effects of Tumor Treating Fields Exposure
Kenneth D. Swanson, PhD, Beth Israel Deaconess Medical School

12:04 PM-12:19 PM

Patient-Based Modelling of Tumor Treating Fields: Guiding Principles and New Therapeutic Strategies
Anders Rosendal Korshoej, MD, Aarhus University Hospital

12:19 PM-12:34 PM

Tumor Treating Fields for Glioblastoma, and Beyond: Opportunities and Limitations
Roger Stupp, MD, Northwestern University Feinberg School of Medicine

12:34 PM-12:49 PM

Dexamethasone Interference and Adjuvant Therapies in Combination with Tumor Treating Fields
Eric T. Wong, MD, FANA , Harvard Medical School

12:49 PM-1:00 PM

Q&A and Discussion

WORKSHOP 5: DISTINGUISHING INFLAMMATORY ENCEPHALOPATHIES BEYOND MS | REGENCY VII

CHAIR: *Mark Keegan, MD, FAAN, FANA, Mayo Clinic*
CO-CHAIR: *Emmanuelle Waubant, MD, PhD, FANA, University of California, San Francisco*

There is a new recognition that, to turn a phrase: "all that enhances in the brain is not MS". Clinical, imaging, neuropathology and increasingly, specific laboratory biomarkers are now broadening the diagnostic categories of CNS inflammatory disease. This session will focus on the diagnosis and differential diagnosis of non-MS inflammatory CNS diseases and their treatments and compare and contrast with MS.

LEARNING OBJECTIVES

1. To confidently use clinical, radiological and lab biomarkers in diagnosing specific CNS inflammatory diseases and distinguishing them from MS.
2. To recognize and differentiate CLIPPERS, MOG-associated, and GFAP-associated CNS diseases.

11:45 AM-11:49 AM

Introduction
Mark Keegan, MD, FAAN, FANA, Mayo Clinic

11:49 AM-12:09 PM

Encephalic Presentations of CNS Demyelination in Children
Emmanuelle Waubant, MD, PhD, FANA, University of California, San Francisco

12:09 PM-12:29 PM

Encephalomyelitis with Myelin Oligodendrocyte Glycoprotein (MOG) and Glial Fibrillary Acid Protein (GFAP) Antibodies
Eoin P. Flanagan, MB, BcH, Mayo Clinic

12:29 PM-12:49 PM

Diagnostic Criteria for Chronic Lymphocytic Inflammation with Pontine Perivascular Enhancement Responsive to Steroids (CLIPPERS)
Oliver Tobin, MB, BCh, BAO, PhD, Mayo Clinic

12:49 PM-1:00 PM

Q&A and Discussion

* This session is not available for AMA PRA Category 1 Credit(s)™

ADDITIONAL LUNCH WORKSHOPS

WORKSHOP 1: AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY (ABPN) MAINTENANCE OF CERTIFICATION (MOC) PROGRAM: LIFELONG LEARNING FOR NEUROLOGISTS* | HANOVER AB

FACULTY
Allison Brashear, MD, PhD, Wake Forest University

Dr. Brashear will lead the session by providing background on the ABMS MOC program, recent changes to the MOC program, and perspective on the future of MOC. Dr. Brashear will detail the four-part ABPN MOC Program, giving specific requirements related to self-assessment, CME, and performance in practice components.

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.

WORKSHOP 2: 18TH ANNUAL WOMEN OF THE ANA LUNCH PROGRAM* | CENTENNIAL III & IV

CHAIR: *Eva L. Feldman, MD, PhD, FANA, University of Michigan*
CO-CHAIR: *Lesli E. Skolarus, MD, MS, University of Michigan*

Women face different challenges at different stages in their careers. This year's Women of the ANA will feature 3 short talks. First, a new Assistant Professor, Dr. Mellanie Springer, will discuss her path to securing her first academic faculty position. Associate Professor Dr. Lesli Skolarus will discuss the challenges and opportunities of leading newly formed research teams, and Professor and Chair Dr. Louise McCullough will speak on decision making across the academic spectrum. After these brief talks, the attendees will break up into small groups to discuss their experiences surrounding these three topics with ample time devoted to peer-mentoring and to expanding the discussion to other academic topics of interest to attendees.

LEARNING OBJECTIVES

1. The attendee will be able to list two approaches to successfully lead researchers.
2. The attendee will gain a better understanding of navigating a system for academic advancement.
3. The attendee will be able to list challenges at each instructional level.

12:00 PM-12:05 PM
Introduction
Eva L. Feldman, MD, PhD, University of Michigan

12:05 PM-12:15 PM
Path to Securing Your First Academic Position
Mellanie Springer, MD, MSc, Albert Einstein College of Medicine

12:15 PM-12:25 PM
Challenges and Opportunities of Leading Newly Formed Research Teams
Lesli E. Skolarus, MD, MS, University of Michigan

12:25 PM-12:35 PM
Decision Making Across the Academic Spectrum
Louise McCullough, MD, PhD, University of Texas Houston

12:35 PM-1:00 PM
Panel Discussion with Audience

WORKSHOP 3: MEDIA ROUNDTABLE* | INMAN

ANA will host an interactive panel for members of the press to discuss highlights of the key science being presented at the meeting.

PANELISTS
Ramon R. Diaz-Arrastia, MD, PhD, University of Pennsylvania
Rebecca F. Gottesman, MD, PhD, Johns Hopkins University
David M. Holtzman, MD, Washington University in St. Louis
Justin C. McArthur, MBBS, MPH, FAAN, FANA, Johns Hopkins University
M. Elizabeth Ross, MD, PhD, Weill Cornell Medicine
Conrad C. Weihl, MD, PhD, Washington University in St. Louis

12:00 PM-7:00 PM
POSTER VIEWING GRAND HALL WEST

1:00 PM-1:15 PM
COFFEE BREAK | CENTENNIAL FOYER

1:15 PM-3:15 PM
PLENARY SESSION

INFLAMMATION AND NEUROLOGICAL DISEASE: FRIEND OR FOE | CENTENNIAL III & IV

CHAIR: *Justin C. McArthur, MBBS, MPH, FAAN, FANA, Johns Hopkins University*
CO-CHAIR: *Ellen Mowry, MD, MCR, FAAN, FANA, Johns Hopkins University*

Inflammation within the central nervous system plays a key role in classic neuroimmunological disorders such as multiple sclerosis (MS) but also in diseases traditionally thought of us purely degenerative, such as Alzheimer's Disease. Nonetheless, there is increasing recognition of the fact that some inflammatory processes actually facilitate brain health. An improved understanding of these processes may help facilitate therapeutic strategies that are tailored to influence specific components of inflammation.

* This session is not available for AMA PRA Category 1 Credit(s)™

LEARNING OBJECTIVES

1. The role of immune functioning in neurodegenerative disorders.
2. The relationship between inflammation, demyelination, and remyelination in the CNS.
3. The neurological sequelae that can be induced by immune checkpoint inhibitors.

1:15 PM-1:19 PM

Introduction
Justin C. McArthur, MBBS, MPH, FAAN, FANA, Johns Hopkins University

1:19 PM-1:39 PM

The Immune-brain Interface after Stroke
Katrin I. Andreasson, MD, Stanford University

1:39 PM-1:42 PM

Q&A and Discussion

1:42 PM-2:02 PM

Divergent Functions of Innate and Adaptive Immune Cells in Neurological Diseases
Etty (Tika) N. Benveniste, PhD, University of Alabama at Birmingham

2:02 PM-2:05 PM

Q&A and Discussion

2:05 PM-2:25 PM

NG2 Cells as Mediators of CNS Inflammation and Failed Endogenous Remyelination in Multiple Sclerosis
Peter A. Calabresi, MD, Johns Hopkins University

2:25 PM-2:28 PM

Q&A and Discussion

2:28 PM-2:48 PM

Unintended Consequences of the Therapeutic Promotion of Inflammation: Neurologic Complications of Immune Checkpoint Inhibitors
Michelle L. Mauermann, MD, FAAN, FANA, Mayo Clinic

2:48 PM-2:51 PM

Q&A and Discussion

2:51 PM-2:56 PM
DATA BLITZ PRESENTATION

Clinical Metagenomic Next-Generation Sequencing for Diagnosis of Infectious Meningitis and Encephalitis
Michael Wilson, MD, MAS, University of California, San Francisco

2:56 PM-2:59 PM

Q&A and Discussion

2:59 PM-3:04 PM
DATA BLITZ PRESENTATION

Motor Neuron-derived MicroRNAs Cause Astrocyte Dysfunction in Amyotrophic Lateral Sclerosis
Timothy Miller, MD, PhD, Washington University in St. Louis

3:04 PM-3:07 PM

Q&A and Discussion

3:07 PM-3:12 PM
DATA BLITZ PRESENTATION

Dysregulation of the TGF-beta Pathway in Collagen VI-related Muscular Dystrophy Predisposes Myofibers to Injury and Interferes With Muscle Regeneration
Payam Mohassel, MD, National Institute of Neurological Disorders and Stroke (NINDS)

3:12 PM-3:15 PM

Q&A and Discussion

3:15 PM-3:30 PM
COFFEE BREAK | CENTENNIAL FOYER

3:30 PM-5:30 PM

SPECIAL INTEREST GROUP SESSIONS

SESSION 1: CEREBROVASCULAR DISEASE AND INTERVENTIONAL NEUROLOGY | CENTENNIAL I

CHAIR: *Santiago Ortega-Gutierrez, MD, MSc, University of Iowa*

CO-CHAIR: *Magdy H. Selim, MD, PhD, Beth Israel Deaconess Medical Center and Harvard Medical School*

The Cerebrovascular and Interventional Neurology session will cover new advances in managing acute ischemic and hemorrhagic stroke. Attendees will learn about management of cryptogenic stroke, the changing paradigm in acute ischemic therapy from clock-based to tissue-based selection of appropriate candidates for repercussion therapy, the new imaging methods to identify high-risk unruptured aneurysm and the stroke risk associated with carotid webs.

LEARNING OBJECTIVES

1. To discuss the diagnosis and management of rare causes of stroke.
2. To gain insight into novel imaging methods to identify cerebral aneurysms at high risk for rupturing.
3. To shed more light on the use of advanced neuroimaging to select candidates for thrombectomy.
4. To review the role of carotid webs as a risk factor for ischemic stroke.
5. To highlight the potential utility of machine learning in stroke recovery.

3:30 PM-3:34 PM

Introduction
Santiago Ortega-Gutierrez, MD, MSc, University of Iowa

3:34 PM-3:54 PM
LEADER IN THE FIELD PRESENTATION

Neuroimaging Screening for Patient Selection Prior to Endovascular Therapy
Maarten Lansberg, MD, PhD, Stanford University

3:54 PM-3:59 PM

Q&A and Discussion

3:59 PM-4:19 PM
LEADER IN THE FIELD PRESENTATION
Diagnosis and Management of Rare Causes of Stroke-Including RCVS, ABRA, Moyamoya and Vasculitis
Peter Berlit, MD, FAAN, FANA, FAAEM, Deutsche Gesellschaft für Neurologie (The German Society for Neurology)

4:19 PM-4:24 PM
Q&A and Discussion

4:24 PM-4:44 PM
LEADER IN THE FIELD PRESENTATION
Imaging Methods to Identify High Risk Unruptured Aneurysms
David M. Hasan, MD, University of Iowa

4:44 PM-4:49 PM
Q&A and Discussion

4:49 PM-4:57 PM
DATA BLITZ PRESENTATION
White Matter Hyperintensities in Adults with Cerebral Small Vessel Disease Fall Within the Watershed Region of Healthy Adults
Andria L. Ford, MD, MSCI, Washington University in St. Louis

4:57 PM-5:05 PM
DATA BLITZ PRESENTATION
Carotid Webs and Risk of Stroke
Diego C. Haussen, MD, Emory University

5:05 PM-5:13 PM
DATA BLITZ PRESENTATION
Machine Learning, Kinematics of Reaching and Motor Cortex Dynamics After Stroke
Ahmet Arac, MD, University of California, Los Angeles

5:13 PM-5:30 PM
Q&A and Discussion

SESSION 2: HEALTH SERVICES RESEARCH | CENTENNIAL II

CHAIR: *Brian C. Callaghan, MD, MS, University of Michigan*

CO-CHAIR: *Nabila Dahodwala, MD, MS, University of Pennsylvania*

There is a wide gap between the goals of delivering efficient and effective neurologic care and the reality of daily practice. This SIG will facilitate conversation among researchers, clinician-scientists, policymakers, and students to build research skills and disseminate recent findings related to healthcare use, outcomes, quality, delivery, access, disparities, and economics. Improved knowledge in these areas will help attendees develop strategies to improve care and develop new policy initiatives.

LEARNING OBJECTIVES

1. Describe the health services research methodology for secondary data analysis.
2. Understand the policy implications for neurologic drug pricing.
3. Understand areas for improvement in neuropalliative care.

3:30 PM-3:34 PM
Introduction
Brian C. Callaghan, MD, MS, University of Michigan

3:34 PM-3:54 PM
LEADER IN THE FIELD PRESENTATION
Navigating Patients and Families through the Neuro-ICU
Claire J. Creutzfeldt, MD, University of Washington

3:54 PM-4:04 PM
DATA BLITZ PRESENTATION
Disability in Community-Dwelling Older Adults: Exploring the Role of Stroke and Dementia
Brian Stamm, BS, Northwestern University

4:04 PM- 4:24 PM
LEADER IN THE FIELD PRESENTATION
Drug Prices are Skyrocketing with No End in Sight: Potential Solutions
Nicholas E. Johnson, MD, MS, FAAN, Virginia Commonwealth University

4:24 PM-4:34 PM
DATA BLITZ PRESENTATION
Impatient Neurologic Care of Homeless Individuals
Nicole Rosendale, MD, University of California, San Francisco

4:34 PM-4:54 PM
LEADER IN THE FIELD PRESENTATION
Value of Neurologists in Common Neurologic Diseases
John P. Ney, MD, MPH, Boston University School of Medicine

4:54 PM-5:04 PM
DATA BLITZ PRESENTATION
Measuring the Value of Neurologists in the Care of Epilepsy Patients Using Claims Data
Chloe Hill, MD, University of Pennsylvania

5:04 PM-5:30 PM
Q&A and Discussion

SESSION 3: BEHAVIORAL NEUROLOGY | REGENCY V

CHAIR: *David T. Jones, MD, Mayo Clinic*

CO-CHAIR: *William W. Seeley, MD, University of California, San Francisco*

Intensive clinical, radiographic, and pathologic characterization of patients has always been a cornerstone of the field of Behavioral Neurology. Understanding individual differences, or phenotypic heterogeneity, in these detailed characterizations is fundamental to neurobiology and patient care. This SIG will provide cutting-edge updates on phenotypic heterogeneity from thought leaders across various disciplines important for the practice of Behavioral Neurology.

LEARNING OBJECTIVES

1. Identify the spectrum of individual differences in brain networks, molecular pathology, and clinical presentations of neurodegenerative diseases.
2. Understand the importance of individual differences in neurologic factors for understanding normal and dysfunctional cognition and behavior.

3. Gain insight into disease mechanism through novel observations of individual differences in imaging measures of brain function.

3:30 PM-3:33 PM
Introduction
David T. Jones, MD, Mayo Clinic

3:33 PM-3:53 PM
LEADER IN THE FIELD PRESENTATION
The Dominance of Intersubject Variability in Functional Brain Networks
Caterina Gratton, PhD, Northwestern University

3:53 PM-4:00 PM
Q&A and Discussion

4:00 PM-4:10 PM
DATA BLITZ PRESENTATION
Therapeutic Repetitive Bifocal Magnetic Stimulation of Speech Areas in Developmental Stuttering
David Rosenfield, MD, Houston Methodist Neurological Institute

4:10 PM-4:12 PM
Q&A and Discussion

4:12 PM-4:32 PM
LEADER IN THE FIELD PRESENTATION
Decoding Alzheimer's Disease reveals Functional Brain Organization Fundamental to Disease Expression
David T. Jones, MD, Mayo Clinic

4:32 PM-4:39 PM
Q&A and Discussion

4:39 PM-4:49 PM
DATA BLITZ PRESENTATION
Circadian Clock Disruption Differentially Regulates Amyloid-beta and Tau Pathology in Mouse Models of Alzheimer Disease
Erik Musiek, MD, PhD, Washington University in St. Louis

4:49 PM-4:51 PM
Q&A and Discussion

4:51 PM-5:11 PM
LEADER IN THE FIELD PRESENTATION
Clinical Heterogeneity in Behavioral Variant Frontotemporal Dementia
David Perry, MD, University of California, San Francisco

5:11 PM-5:18 PM
Q&A and Discussion

5:18 PM-5:28 PM
DATA BLITZ PRESENTATION
16p11.2 Autism Risk Gene KCTD13 Deletion Reduces Synaptic Transmission via Increased RhoA
Craig Powell, MD, PhD, University of Alabama at Birmingham

5:28 PM-5:30 PM
Q&A and Discussion

SESSION 4: MOVEMENT DISORDERS | REGENCY VI

CHAIR: *Kathleen Poston, MD, MS, Stanford University*
CO-CHAIR: *Alexander Y. Pantelyat, MD, Johns Hopkins University*

Our limited understanding of the pathogenesis of movement disorders hampers the discovery and development of novel therapeutic strategies. In this SIG, leading scientists will present the latest findings on the molecular pathogenesis of Parkinson disease, Huntington disease, Tourette syndrome, and primary dystonia. This SIG will also include a collection of short talks by junior investigators featuring recent, exciting discoveries in Movement Disorders. All speakers will emphasize how these novel findings may translate into new therapeutic approaches for movement disorders.

LEARNING OBJECTIVES
1. Characterize different movement disorders.
2. Describe what is known about the genetics associated with these disorders.
3. Describe what is known about the clinical and research implications of these new genetic discoveries.

3:30 PM-3:34 PM
Introduction
Kathleen Poston, MD, MS, Stanford University

3:34 PM-3:54 PM
LEADER IN THE FIELD PRESENTATION
Genetics of Paroxysmal Movement Disorders: An Update
Christine Klein, MD, FANA, FEAN, Deutsche Gesellschaft für Neurologie (The German Society for Neurology)

3:54 PM-3:59 PM
Q&A and Discussion

3:59 PM-4:09 PM
DATA BLITZ PRESENTATION
A Highly Sensitive and Specific Biochemical Test for the Diagnosis of Parkinson's Disease Based on Detection of Alpha-Synuclein Oligomers in Cerebrospinal Fluid
Mohammad Shahnawaz, PhD, University of Texas at Houston

4:09 PM-4:29 PM
LEADER IN THE FIELD PRESENTATION
An Update on Dystonia Genetics
Buz Jinnah, MD, PhD, Emory University

4:29 PM-4:34 PM
Q&A and Discussion

4:34 PM-4:44 PM
DATA BLITZ PRESENTATION
State-level Prevalence, Utilization and Cost Varies Widely Among Medicare Beneficiaries with Parkinson's Disease
Michelle Fullard, MD, MS, University of Pennsylvania

4:44 PM-5:04 PM
LEADER IN THE FIELD PRESENTATION
Genetics in PD
Roy N. Alcalay, MD, MS, Columbia University

5:04 PM-5:09 PM
Q&A and Discussion

5:09 PM-5:19 PM
DATA BLITZ PRESENTATION
α-synuclein in Brain-derived Blood Exosomes Distinguishes Multiple System Atrophy From Parkinson's Disease
Suman Dutta, PhD, University of California, Los Angeles

5:19 PM-5:30 PM
Q&A and Discussion

SESSION 5: MULTIPLE SCLEROSIS-OBESITY AND METABOLISM IN MULTIPLE SCLEROSIS | REGENCY VII

CHAIR: *Ellen M. Mowry, MD, MCR, FAAN, FANA, Johns Hopkins University*

CO-CHAIR: *Justin C. McArthur, MBBS, MPH, FAAN, FANA, Johns Hopkins University*

There is growing evidence that obesity and related comorbidities play a role in multiple sclerosis (MS) risk and prognosis. This SIG will focus on the epidemiologic evidence supporting the role of obesity (and on relevant underlying biological mechanisms) in MS. Data from randomized controlled trials in MS as well as a discussion regarding the challenges of their conduct and interpretation will be presented.

LEARNING OBJECTIVES

1. Describe the epidemiological evidence supporting the case for the involvement of obesity or related comorbidities in MS risk and prognosis.
2. Describe the biological mechanisms, including metabolism, related to obesity and its comorbidities that may be detrimental to outcomes among people with MS.
3. Describe the results of clinical trials that have focused on improving metabolism through diet, as well as some of the challenges of conducting such studies.

3:30 PM-3:34 PM
Introduction
Ellen M. Mowry, MD, MCR, FAAN, FANA, Johns Hopkins University

3:34 PM-3:54 PM
LEADER IN THE FIELD PRESENTATION
Epidemiology of obesity and Related Comorbidities in MS Risk and Prognosis
Alberto Ascherio, MD, DrPH, Harvard T. H. Chan School of Public Health

3:54 PM-3:59 PM
Q&A and Discussion

3:59 PM-4:06 PM
DATA BLITZ PRESENTATION
Comorbid Disease Drives Short Term Hospitalization Outcomes in Multiple Sclerosis Patients
Adys Mendizabel, MD, MA, University of California, Los Angeles

4:06 PM-4:09 PM
Q&A and Discussion

4:09 PM-4:29 PM
LEADER IN THE FIELD PRESENTATION
Altered Metabolism and MS
Myla Goldman, MD, FANA, University of Virginia

4:29 PM-4:34 PM
Q&A and Discussion

4:34 PM-4:41 PM
DATA BLITZ PRESENTATION
Bile Acid Metabolism is Altered in Multiple Sclerosis
Pavan Bhargava, MD, Johns Hopkins University

4:41 PM-4:44 PM
Q&A and Discussion

4:44 PM-5:04 PM
LEADER IN THE FIELD PRESENTATION
Interventions to Reduce Complications of Obesity and Related Conditions
Vijayshree Yadav, MD, MCR, FAAN, FANA, Oregon Health & Science University

5:04 PM-5:09 PM
Q&A and Discussion

5:09 PM-5:16 PM
DATA BLITZ PRESENTATION
Immunomodulatory Role of Adiponectin in Experimental Models of Multiple Sclerosis
Francesca Cignarella, PhD, University of Pennsylvania

5:16 PM-5:30 PM
Q&A and Discussion

SESSION 6: NEUROMUSCULAR DISEASE | HANOVER AB

CHAIR: *Jayashri Srinivasn, MBBS, PhD, FRCP, Lahey Clinic and Tufts University School of Medicine*

CO-CHAIR: *Margherita Milone, MD, PhD, Mayo Clinic*

The field of neuromuscular medicine has seen remarkable advances in the diagnostic and therapeutic arena. This session will cover the latest in research in key areas of the field including motor neuron disease, neuropathies, neuromuscular junction disorders and myopathies. Emphasis will be placed on the latest cutting edge research developments.

LEARNING OBJECTIVES

1. Identify novel molecular defects leading to muscle weakness in neuromuscular diseases.

2. Understand pathophysiology of inherited and acquired neuromuscular diseases.
3. Gain insight into new therapeutic strategies for treatment of neuromuscular diseases.

3:30 PM-3:34 PM

Introduction
Jayashri Srinivasn, MBBS, PhD, FRCP, Lahey Clinic and Tufts University School of Medicine

3:34 PM-3:54 PM
LEADER IN THE FIELD PRESENTATION

The Unfolding Spectrum of Distal Myopathies
Margherita Milone, MD, PhD, Mayo Clinic

3:54 PM-3:59 PM

Q&A and Discussion

3:59 PM-4:19 PM
LEADER IN THE FIELD PRESENTATION

Breakthroughs in ALS
Merit E. Cudkowicz, MD, MSc, Massachusetts General Hospital and Harvard Medical School

4:19 PM-4:24 PM

Q&A and Discussion

4:24 PM-4:44 PM
LEADER IN THE FIELD PRESENTATION

Advances in the Treatment of Duchenne Muscular Dystrophy
Paula R. Clemens, MD, University of Pittsburgh

4:44 PM-4:49 PM

Q&A and Discussion

4:49 PM-4:59 PM
DATA BLITZ PRESENTATION

Myelin Abnormality in Charcot-Marie-Tooth Type 4J Recapitulates Features of Acquired Demyelination
Jun Li, MD, PhD, Wayne State University

4:59 PM-5:09 PM
DATA BLITZ PRESENTATION

Feasibility and Validation of Modified Oculobulbar Facial Respiratory Score (mOBFRS) in Sporadic Inclusion Body Myositis
Marie Wencel, BS, University of California, Irvine

5:09 PM-5:30 PM

Q&A and Discussion

SESSION 7: NEURO-ONCOLOGY | HANOVER C

CHAIR: *Timothy Gershon, MD, PhD, University of North Carolina at Chapel Hill*

CO-CHAIR: *Santosh Kesari, MD, PhD, Pacific Neuroscience Institute*

Recent discoveries in genomics and stem cell biology have had dramatic effects on brain tumor biology and treatment. Notably, molecular features of brain tumors are now considered during classification. This SIG will review findings demonstrating molecular heterogeneity within brain tumors, the biological mechanisms of tumor development and progression, and new therapies for brain cancer.

LEARNING OBJECTIVES

1. To gain new insight into the heterogeneity within brain tumors.
2. To understand the relationship between tumor heterogeneity and treatment response.
3. To learn about new treatment options for patients with brain tumors.

3:30 PM-3:34 PM

Introduction
Timothy Gershon, MD, PhD, University of North Carolina at Chapel Hill

3:34 PM-3:54 PM
LEADER IN THE FIELD PRESENTATION

Defining Geonomic Geterminants of Glioma Immunotherapy Efficacy
David M. Ashley, PhD, FRACP, MBBS (Hons), Duke University

3:54 PM-3:59 PM

Q&A and Discussion

3:59 PM-4:19 PM
LEADER IN THE FIELD PRESENTATION

Tumor Stem Cell Survival in Sonic Hedgehog Medulloblastoma
Anna M. Kenney, PhD, Emory University

4:19 PM-4:24 PM

Q&A and Discussion

4:24 PM-4:44 PM
LEADER IN THE FIELD PRESENTATION

Heterogeneity of Molecular Mechanisms in Subgroups of Medulloblastomas
Scott L. Pomeroy, MD, PhD, Harvard Medical School and Children's Hospital Boston

4:44 PM-4:49 PM

Q&A and Discussion

4:49 PM-4:59 PM
DATA BLITZ PRESENTATION

Personalized Medicine Diagnosis and Response to Treatment with Braf Mek Inhibition in a Pleomorphic Xanthoastrocytoma Patient
Yolanda Pina, MD, University of South Florida

4:59 PM-5:09 PM
DATA BLITZ PRESENTATION

The Proteasome: Targeting the NF-κB pathway in the Treatment of Glioblastoma Multiforme
Jamal Mohamud, BS, Michigan State University

5:09 PM-5:19 PM
DATA BLITZ PRESENTATION
Understanding The Role of $GABA_A$ Receptors in Medulloblastoma as a Therapeutic Target
Laura Kallay, PhD, Emory University

5:19 PM-5:30 PM
Q&A and Discussion

SESSION 8: SLEEP DISORDERS AND CIRCADIAN RHYTHM | HANOVER D+E

CHAIR: *Miranda M. Lim, MD, PhD, Oregon Health & Science University*

CO-CHAIR: *David M. Raizen, MD, PhD, University of Pennsylvania*

Sleep and circadian biology plays an integral, and often critical, role in the pathogenesis, manifestation, and treatment of neurological disorders. This SIG will feature both junior and senior clinician-scientists at the forefront of sleep and circadian rhythms research. The session will highlight new advances in the field, spanning from basic neurobiology to clinical management of sleep and circadian rhythm disorders.

LEARNING OBJECTIVES
1. Identify new brain circuits involved in the regulation of sleep and wakefulness.
2. Understand how the pathophysiology of these relevant circuits and neurotransmitters may play a role in sleep disorders.
3. Gain insight into novel therapeutic approaches for the treatment of sleep disturbances in neurological disorders.

3:30 PM-3:34 PM
Introduction
Miranda M. Lim, MD, PhD, Oregon Health & Science University

3:34 PM-3:59 PM
LEADER IN THE FIELD PRESENTATION
Slow Wave Sleep Regulation of Amyloid Beta and Alzheimer's Disease
Yo-El S. Ju, MD, MSCI, Washington University in St. Louis

3:59 PM-4:04 PM
Q&A and Discussion

4:04 PM-4:29 PM
LEADER IN THE FIELD PRESENTATION
Pathophysiology, Evaluation, and Treatment of GABA-Related Hypersomnias
Lynn Marie Trotti, MD, MSc, Emory University

4:29 PM-4:34 PM
Q&A and Discussion

4:34 PM-4:59 PM
LEADER IN THE FIELD PRESENTATION
Neural Circuitry of Narcolepsy/Cataplexy and Deep Brain Stimulation as a Potential Treatment
Jon T. Willie, MD, PhD, Emory University

4:59 PM-5:04 PM
Q&A and Discussion

5:04 PM-5:14 PM
DATA BLITZ PRESENTATION
Microbiome-derived Polyphenolic Metabolites Inhibit Nlrp3 Inflammasome-induced Neuroinflammation in a *Bmal1*-model of Circadian Abolishment
Giulio Pasinetti, MD, PhD, Icahn School of Medicine at Mount Sinai

5:14 PM-5:30 PM
Q&A and Discussion

SESSION 9: TRAUMATIC BRAIN INJURY | HANOVER F&G

CHAIR: *Christopher C. Giza, MD, University of California, Los Angeles*

CO-CHAIR: *Dongming Cai, MD, PhD, Icahn School of Medicine at Mount Sinai*

Traumatic brain injury (TBI) is on track to be one of the top three causes of death and disability worldwide in 2020 (not a contest one wants to win). But TBI is actually a series of different pathophysiological disorders, linked by having a biomechanical origin. TBI may strike across all demographics and a broad range of injury severities. This section will cover the broad range of these injuries with perspectives from severe TBI, concussion and mild TBI and basic science pathophysiology. Clinicians and researchers will benefit from a translational perspective on this complex problem.

LEARNING OBJECTIVES
1. To better understand the biomechanics and pathophysiology of TBI.
2. To update development of new evidence-based guidelines for management of mild TBI.
3. To gain insight into novel therapeutic approaches and prevention strategies for TBI.

3:30 PM-3:34 PM
Introduction
Christopher C. Giza, MD, University of California, Los Angeles

3:34 PM-3:59 PM
LEADER IN THE FIELD PRESENTATION
The Emergency Approach to the Concussion Evaluation
David W. Wright, MD, Emory University

3:59 PM-4:04 PM
Q&A and Discussion

*This session is not available for AMA PRA Category 1 Credit(s)™

4:04 PM-4:29 PM
LEADER IN THE FIELD PRESENTATION
Development and Dissemination of CDC's Pediatric Mild TBI Guideline
Matthew J. Breiding, PhD, Centers for Disease Control and Prevention (CDC)

4:29 PM-4:34 PM
Q&A and Discussion

4:34 PM-4:59 PM
LEADER IN THE FIELD PRESENTATION
Using Animals to Inform Clinical TBI Diagnosis
Susan S. Margulies, PhD, Georgia Institute of Technology and Emory University

4:59 PM-5:04 PM
Q&A and Discussion

5:04 PM-5:14 PM
DATA BLITZ PRESENTATION
Head Injury and Long-Term Risk of Cognitive Decline and Dementia: the Atherosclerosis Risk in Communities
Andrea Schneider, MD, PhD, Johns Hopkins University

5:14 PM-5:24 PM
DATA BLITZ PRESENTATION
Diffuse Axonal Injury Presenting as Subcortical Diffusion Restriction: Case Report
Sumanjit Kaur, MD, University of Texas Medical Branch

5:24 PM-5:30 PM
Q&A and Discussion

5:30 PM- 7:00 PM
POSTER PRESENTATIONS AND RECEPTION*
GRAND HALL WEST

7:00 PM-7:30 PM
NEW MEMBER MEET & GREET* | TERRACE FOYER

7:30 PM-9:00 PM
PRESIDENT'S RECEPTION* CENTENNIAL II

TUESDAY, OCTOBER 23

6:30AM-2:15PM
REGISTRATION | CENTENNIAL FOYER

7:00AM-8:45AM
BREAKFAST | TERRACE FOYER

7:00 AM-8:30 AM
PROFESSIONAL DEVELOPMENT COURSES

COURSE 3: STUDENTS, RESIDENTS, TRAINEES AND POST-DOC FELLOWS-CAREER LEVEL

Marketing for Scientists | REGENCY V

CHAIR: *Allison W. Willis, MD, MS, University of Pennsylvania*

This course will discuss techniques for interacting with the press, promoting scientific work in a way that shapes the public debate and increases society's knowledge. Topics covered will include giving compelling presentations, using social media like Facebook and Twitter. This course is designed to benefit students, residents, and fellows.

LEARNING OBJECTIVES
1. Apply concepts learned to start a conversation about their research.
2. Structure their presentations and figures to engage every type of audience.
3. Share their science with colleagues, funding organizations and the public, while avoiding media pitfalls.

7:00 AM-7:35 AM
Introduction
Allison W. Willis, MD, MS, University of Pennsylvania

7:35 AM-7:55 AM
The Media and Medicine (Or Why We Get So Much Wrong)
Dawn Fallik, University of Delaware

7:55 AM-8:15 AM
Defining and Articulating Your Scientific Message: Ideas for the Early Career Scientist
Christopher Anderson, MD, MS, Massachusetts General Hospital and Harvard Medical School

8:15 AM-8:30 AM
Q&A and Discussion

COURSE 3: EARLY TO MID-CAREER LEVEL

CHAIR: *Amy Pruitt, MD, University of Pennsylvania*
CO-CHAIR: *Lauren Sansing, MD, MS, Yale University*

Grant Submissions: The Other Side | REGENCY VI

MODERATOR
Nina Schor, MD, PhD, National Institute of Neurological Disorders and Stroke (NINDS)

FACULTY
Nina Schor, MD, PhD, National Institute of Neurological Disorders and Stroke (NINDS)
Christina M. Marra, MD, University of Washington

This course is intended to demystify what happens to your grant application once submitted. Dr. Schor, will outline the application's path from the center for scientific review (CSR) to study section, how NIH sets priorities for funding streams, what goes into priority scores, and how institutes determine the funding cutoff each cycle and fiscal year. The relationship between NIH and congressional budget and factors that enter into long term planning when the budget is set on a 12 month timeline. Dr. Marra will discuss the steps that go into study section assembly and review, the various types of panels, including standing study sections, special emphasis panels, in person and internet assisted reviews. She will also present the review criteria by which study section members critique an application.

LEARNING OBJECTIVES
1. To better understand the various considerations that go into setting NIH institute goals, programs, and priorities.
2. To hone grant application strategies, e.g. weighing investigator-initiated projects vs. response to a particular grant opportunity announcement.
3. To gain insight into grant writing from the perspective of the study section reviewers: tips for optimizing clarity and communication with scientists who may not be laser focused on your area.

7:00 AM-7:30 AM
The View From the NIH
Nina Schor, MD, PhD, National Institute of Neurological Disorders and Stroke (NINDS)

7:30 AM-8:00 AM
What Happens in a Study Section
Christina M. Marra, MD, University of Washington

8:00 AM-8:30 AM
Q&A and Discussion

COURSE 3: AUPN CHAIR CAREER LEVEL

Faculty Recruitment and Retention: Lessons and Strategies | REGENCY VII

MODERATOR
L. John Greenfield, MD, PhD, University of Connecticut

One of the most important jobs for a department chair is recruiting and retaining high functioning, productive faculty. Every department has its own advantages and challenges in recruiting faculty, and each chair has something different and beneficial to share. Rather than have one or two speakers discuss their strategies, successes and failures that may be unique to the circumstances of their institution, during this session, chairs from a variety of regions and institution styles (e.g. research intensive vs. clinically intensive, small vs. large, urban vs. rural) will speak. Topics for discussion will include:

- Advertising and/or use of headhunters
- Major retention issues and how you resolved them
- How you compete when a candidate has multiple offers
- Differing strategies for recruiting clinician scientists, full-time researchers or full-time clinicians
- How to recruit for diversity
- Salary issues and disparities among subspecialties
- Joint recruitments of married faculty pairs
- Fitting the job to the candidate vs the candidate to the job
- Other related questions

LEARNING OBJECTIVES
1. Describe several strategies for recruiting outstanding research-intensive or clinical-intensive faculty.
2. List successful strategies for retaining faculty who may be considering positions elsewhere.
3. Describe techniques for successful recruitment of diverse candidates, married couples, and those with less common situations or needs.

7:00 AM-7:10 AM
Tips in Recruitment for a Diverse Workforce
Allison Brashear, MD, PhD, Wake Forest University

7:10 AM-7:20 AM
Individualizing Faculty Retention and Recruitment
Frances Jensen, MD, University of Pennsylvania

7:20 AM-7:30 AM
Academic Faculty Recruitment and Retention: Lessons and Strategies from Team Science
Matthew Rizzo, MD, University of Nebraska

7:30 AM-7:40 AM
Academic Recruitment in the 21st Century: A Chair's Perspective
Sanjay Singh, MD, Creighton University School of Medicine

7:40 AM-7:50 AM
Recruiting and retaining physician-scientists
David G. Standaert, MD, PhD, University of Alabama at Birmingham

7:50 AM-8:00 AM
Gretchen E. Tietjen, MD, University of Toledo

8:00 AM-8:30 AM
Q&A and Discussion

8:30 AM-8:45 AM

COFFEE BREAK | TERRACE FOYER

Poster judging results will be displayed on monitors and boards

8:45 AM-10:45 AM

PLENARY SESSION

ADVANCES IN CELL-BASED THERAPIES FOR NEUROLOGICAL DISEASES | CENTENNIAL III & IV

CHAIR: *M. Elizabeth Ross, MD, PhD, Weill Cornell Medicine*

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

Recent proof-of-principle studies of cell-based therapy for CNS disorders are leading to approaches currently in or nearing early phase clinical trials. This Symposium highlights cell-based approaches under investigation for several neurological diseases. It will present both pre-clinical and first-in-human trial data suggesting that engrafted cells may prove therapeutically effective, offering prospects for reaching the clinic in the near foreseeable future. Included will be use of genetically engineered autologous (the patient's own) or heterologous stem cells manipulated through gene delivery or genome editing. Discussion will include the challenges ahead for these approaches and will provide informed projections regarding the realizable applications of these technologies.

LEARNING OBJECTIVES

1. How to differentiate the cell types from stem cells (embryonic or induced progenitor) that would be useful.
2. At what stage of differentiation should cells be transplanted.
3. How to obtain enough of the right type of cells under good manufacturing practices (GMP) conditions.
4. How to deliver them to a large enough region to be therapeutically useful.
5. How to promote survival and integration of the transplanted cells.
6. How to ensure that transplanted cells do not result in tumor formation.

8:45 AM-8:49 AM

Introduction

M. Elizabeth Ross, MD, PhD, Weill Cornell Medicine

8:49 AM-9:09 AM

Stem Cell Therapies for Amyotrophic Lateral Sclerosis

Jonathan D. Glass, MD, Emory University

9:09 AM-9:12 AM

Q&A and Discussion

9:12 AM-9:32 AM

Hematopoietic Stem-Cell Gene Therapy for Cerebral Adrenoleukodystrophy

Florian S. Eichler, MD, Massachusetts General Hospital and Harvard Medical School

9:32 AM-9:35 AM

Q&A and Discussion

9:35 AM-9:55 AM

Developing a Pluripotent Stem Cell-based Cell Therapy for Parkinson's Disease

Claire Henchcliffe, MD, DPhil, FAAN, FANA, Weill Cornell Medicine

9:55 AM-9:58 AM

Q&A and Discussion

9:58 AM-10:18 AM

Toward Cell Based Therapy for Retinal Diseases

Donald J. Zack, MD, PhD, Johns Hopkins University

10:18 AM-10:21 AM

Q&A and Discussion

10:21 AM-10:26 AM

DATA BLITZ PRESENTATION

Image-Guided Delivery, Tracking and Quantification of Stem Cells in the Spinal Cord

Kristina Hallam, BSE, Georgia Institute of Technology

10:26 AM-10:29 AM

Q&A and Discussion

10:29 AM-10:34 AM

DATA BLITZ PRESENTATION

Axonal Sprouting of Thalamocortical Neurons is Essential for Recovery After Thalamic Injury

Asher J. Albertson, MD, PhD, Washington University in St. Louis

10:34 AM-10:37 AM

Q&A and Discussion

10:37 AM-10:42 AM

DATA BLITZ PRESENTATION

SARM1 Dominant-Negative-A New Therapeutic Approach to the Treatment of Axonal Degeneration

Stefanie Geisler, MD, Washington University in St. Louis

10:42 AM-10:45 AM

Q&A and Discussion

10:45 AM-11:00 AM

BREAK

11:00 AM-12:00 PM

LUNCH | TERRACE FOYER

11:00 AM-12:00 PM

INTERACTIVE LUNCH WORKSHOPS

WORKSHOP 1: GENOTYPE-PHENOTYPE RELATIONSHIPS IN NEUROLOGICAL DISEASE | CENTENNIAL I

CHAIR: *Buz Jinnah, MD, PhD, Emory University*

CO-CHAIR: *Allison Brashear, MD, PhD, Wake Forest University*

The basic idea is to call attention to different categories of genotype-phenotype relationships, and their relevance for understanding the biological mechanisms involved, and their implications for the practicing clinician.

LEARNING OBJECTIVES

1. To describe the varied types of genotype-phenotype correlations in movement disorders.
2. To describe the biological mechanisms responsible for genotype-phenotype correlations, and their significance for experimental therapeutics.
3. To outline the clinical relevance of genotype-phenotype relationships for differential diagnosis and diagnostic testing of movement disorders.

11:00 AM-11:04 AM

Introduction
Buz Jinnah, MD, PhD, Emory University

11:04 AM-11:14 AM

One Gene One Phenotype: Introduction to the Basic Idea
Buz Jinnah, MD, PhD, Emory University

11:14 AM-11:24 AM

One Gene Many Phenotypes: Pleiotropy
Allison Brashear, MD, PhD, Wake Forest University

11:24 AM-11:34 AM

One Phenotype Many Genes: Genetic Heterogeneity
Henry Paulson, MD, PhD, University of Michigan

11:34 AM-11:44 AM

The Significance of Genotype-Phenotype Relationships for the Practicing Clinician
Michael Gambello, MD, PhD, Emory University

11:44 AM-12:00 PM

Q&A and Discussion

WORKSHOP 2: LIFESPAN RESEARCH ON AUTISM | CENTENNIAL II

MODERATOR: *Allison W. Willis, MD, MS, University of Pennsylvania*

Autism spectrum disorders are an active focus of investigation from many areas, including genetics, epidemiology, neuroimaging or aging, among others. In this session, speakers will provide an update on recent advances on the molecular bases of autism spectrum disorders and their phenotype and outcomes across the lifespan.

LEARNING OBJECTIVES

1. Genetic contributions to autism spectrum disorders.
2. Profile of early brain development in patients with ASD.
3. Structural and functional brain phenotypes in adults with ASD.
4. The trajectory of neurodevelopment and spectrum of outcomes in patients with ASD.

11:00 AM-11:15 AM

Autism in Adults
Joseph Cubells, MD, PhD, Emory University

11:15 AM-11:30 AM

The Evolving Epidemiology of Autism
Catherine E. Rice, PhD, Emory University

11:30 AM-11:45 AM

Neuroimaging in Autism
Tim Roberts, PhD, Children's Hospital of Philadelphia

11:45 AM-12:00 PM

Q&A and Discussion

WORKSHOP 3: PHARMACEUTICAL COSTS FOR NEUROLOGIC DISORDERS | REGENCY V

CHAIR: *Kevin Kerber, MD, University of Michigan*

CO-CHAIR: *Lindsey DeLott, MD, University of Michigan*

Prescription drug spending in the US far exceeds that in all other countries, with per capita spending of $858 compared to $400 for 19 other industrialized countries. Over the last 5 years a particularly sharp increase in drug spending has occurred. About 1 in 4 people in the US who take prescription drugs report difficulty affording them. Neurologists comprise about 1% of providers in the US and 5% ($5 billion) of total Medicare drug payments-third highest of all specialties. Issues related to drug cost include substantial rise in cost of old medicines (e.g., glatiramer acetate) and extremely high costs for new medicines (e.g., deflazacort, nusinersen). This symposium will present the current status, trends, and emerging issues regarding US drug prices for neurological disorders.

LEARNING OBJECTIVES

1. Describe the landscape of drug prices in neurological disease.
2. Differentiate trends and reasons for drug prices in multiple sclerosis.
3. Describe the Orphan Drug Act, prices, and impact of new orphan drugs.
4. Describe industry approaches to pricing.

11:00 AM-11:04 AM

Introduction
Kevin Kerber, MD, University of Michigan

11:04 AM-11:19 AM

Overview of Prescription Drug Costs and Prices in the US
Brian C. Callaghan, MD, MS, University of Michigan

*This session is not available for AMA PRA Category 1 Credit(s)™

11:19 AM-11:34 AM

The High Cost of Orphan Drugs for Neuromuscular Diseases

Robert C. Griggs, MD, FAAN, FANA, University of Rochester

11:34 AM-11:49 AM

Drug Prices in Multiple Sclerosis

Ruth H. Whitman, MD, FAAN, FANA, Oregon Health & Science University

11:49 AM-12:00 PM

Q&A and Discussion

WORKSHOP 4: UPDATE ON NEURO-INFECTIOUS DISEASES | REGENCY VI

CHAIR: *William Tyor, MD, FAAN, FANA, Emory University*

CO-CHAIR: *Chris Power, MD, University of Alberta*

Four speakers will discuss: 1. Neuro-infectious Disease Pathogen Discovery (diagnosis), 2. Novel Approaches to Therapy of Neuroinfectious Diseases, 3. New Developments with Enteroviruses and Emerging Arboviruses, and 4. Global Infectious Diseases.

LEARNING OBJECTIVES

1. New approaches to the diagnosis of important neuroinfectious diseases.
2. New and potential therapies for neuroinfectious diseases.
3. Current concerns regarding recent enterovirus infections and emerging arboviruses.
4. Epidemiology and diagnosis will be emphasized.
5. Diagnosis and management of neuroinfectious diseases that are important from a global perspective and novel approaches to collaborate internationally.

11:00 AM-11:06 AM

Introduction

William Tyor, MD, FAAN, FANA, Emory University

11:06 AM-11:19 AM

Global Infectious Diseases

Kiran T. Thakur, MD, Columbia University

11:19 AM-11:32 AM

Neuro-infectious Disease Pathogen Discovery

Christopher Power, MD, FRCPC, University of Alberta

11:32 AM-11:45 AM

Novel Approaches to Therapy of Neuroinfectious Diseases

Avindra Nath, MD, National Institute of Neurological Disorders and Stroke (NINDS)

11:45 AM-12:00 PM

Q&A and Discussion

11:00 AM-12:00 PM

ADDITIONAL LUNCH WORKSHOP

AUPN'S NETWORKING LUNCH FOR SMALL ACADEMIC DEPARTMENTS OF NEUROLOGY* | REGENCY VII

MODERATOR: *Gretchen E. Tietjen, MD, University of Toledo*

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 and hosted by Gretchen E. Tietjen, MD, Chair of Neurology at the University of Toledo since 1998, provides an opportunity for chairs of smaller departments to meet, discuss issues and share strategies.

Gretchen E. Tietjen is the Clare Martig Chair and Distinguished Professor of Neurology at the University of Toledo College of Medicine and Life Sciences, and inaugural Director of the Promedica/University of Toledo Neuroscience Center. She received her undergraduate and medical degrees, and completed Neurology residency at the University of Michigan, before doing a two-year clinical and basic research fellowship in cerebrovascular disease, with additional training in headache medicine, at Henry Ford Health System in Detroit. Dr. Tietjen has been at the University of Toledo College of Medicine and Life Sciences (formerly Medical College of Ohio) since 1996 and was the first Chair when the Department of Neurology was established 20 years ago. Under her leadership, the Department has established residency and fellowship programs, directed Primary and Comprehensive Stroke Centers, and developed a robust Neuro-interventional and telemedicine network. She continues to direct the Headache Treatment and Research Program, and her research encompasses epidemiology and mechanisms of the migraine-stroke relationship and includes the effects of childhood maltreatment on vascular biomarkers and early life stress in a basic model.

1:15 PM-2:15 PM

PLENARY SESSION

TOWARD DISEASE-MODIFYING THERAPIES IN TRAUMATIC BRAIN INJURY | CENTENNIAL III & IV

CHAIR: *Steven L. Small, PhD, MD, University of California, Irvine*

CO-CHAIR: *Ramon Diaz-Arrastia, MD, PhD, University of Pennsylvania*

Traumatic brain injury (TBI) is one of the most common human afflictions, yet until recently the acute and chronic consequences of TBI were often ignored and considered beyond the reach of medical science. Over the past few years, in association with growing societal, governmental, and academic recognition of the effects of TBI, particularly in the context of sports-related concussions and military service-related head injuries, there have been remarkable advances

in the clinical and basic neuroscience of TBI. Correspondingly, the field of TBI pathobiology has transformed into one of the most dynamic and fertile areas of neuroscience research. TBI is increasingly recognized not a single disorder, but a set of heterogeneous injuries of differing severity (ranging from minor to severe), with distinct patterns of pathology that evolve across a broad temporal spectrum, from acute insult to latent neurodegeneration. TBI can also lead to diverse types of neurodegeneration, including Chronic Traumatic Encephalopathy (CTE), Alzheimer's disease (AD), and Parkinson's disease (PD). The purpose of this Symposium is to bring together researchers focused on the mechanisms and manifestations of acute and chronic human TBI, ranging from mild to severe, including both preclinical, clinical, and translational work, with the goal of pointing the direction for future clinical trials of disease-modifying therapies.

LEARNING OBJECTIVES

1. Appreciate the complexity of pathologic mechanisms that underlie TBI-related symptoms and disability.
2. Recognize several injury endophenotypes (axonal injury, inflammation, proteinopathy, microvascular injury) that underlie neurological dysfunction after TBI.
3. Understand the value of neuroimaging for identifying injury mechanisms, and how neuroimaging biomarkers can be useful diagnostically and prognostically.
4. Be familiar with the most promising molecular biomarkers of TBI, and how they may be incorporated in future clinical practice.

12:15 PM-12:19 PM

Introduction

Steven L. Small, PhD, MD, University of California, Irvine

12:19 PM-12:39 PM

Traumatic Brain Injury: A Precision Medicine Approach

Geoffrey T. Manley, MD, PhD, University of California, San Francisco

12:39 PM-12:42 PM

Q&A and Discussion

12:42 PM-12:47 PM

DATA BLITZ PRESENTATION

Derivation of a Pilot Decision Aid for Goals-of-care Discussions in Critically-ill Moderate-severe Traumatic Brain Injury Patients and Interim Feasibility Trial Results

Susanne Muehlschlegal, MD, MPH, FNCS, FCCM, University of Massachusetts

12:47 PM-12:50 PM

Q&A and Discussion

12:50 PM-1:10 PM

Pediatric TBI and Concussion: The Most Complex Injury to the Most Complex Organ

Christopher C. Giza, MD, University of California, Los Angeles

1:10 PM-1:13 PM

Q&A and Discussion

1:13 PM-1:18 PM

DATA BLITZ PRESENTATION

Head Injury and Long-Term Risk of Cognitive Decline and Dementia: the Atherosclerosis Risk in Communities (ARIC) Study

Andrea L.C. Schneider, MD, PhD, Johns Hopkins University

1:18 PM-1:21 PM

Q&A and Discussion

1:21 PM-1:41 PM

Concussion, Traumatic Brain Injury, and Chronic Traumatic Encephalopathy: Lessons from the Battlefield, Ball Field, and Lab Bench

Lee E. Goldstein, MD, PhD, Boston University School of Medicine

1:41 PM-1:44 PM

Q&A and Discussion

1:44 PM-1:49 PM

DATA BLITZ PRESENTATION

Characterization, Toxicity and Propagation of TBI Brain-derived Soluble Tau Strains

Alice Bittar, PhD, University of Texas Medical Branch

1:49 PM-1:52 PM

Q&A and Discussion

1:52 PM-2:12 PM

Rehabilitation for Severe TBI: Evidence Based Approaches and Expert Opinion with Insights from Basic Sciences Including an Update on Delayed Neurodegeneration

David L. Brody, MD, PhD, The Uniformed Services University of the Health Sciences

2:12 PM-2:15 PM

Q&A and Discussion

2:15 PM

MEETING ADJOURNS

IN MEMORIAM

Roger C. Duvoisin, MD
Honorary Member — October 5, 2017

Robert J. Gumnit, MD
Senior Member — October 15, 2017

Christian Herrmann Jr., MD
Senior Member — October 23, 2017

Krishnamoorthy Srinivas, DM
Honorary Member — November 1, 2017

William M. Landau, MD
Honorary Member — November 2, 2017

B. Todd Troost, MD
Honorary Member — November 13, 2017

Robert E. Burke, MD
Fellow — January 1, 2018

Sir Roger Bannister, MD
Senior Member — March 3, 2018

Agnes A. Jani-Acsadi, MD
Fellow — May 9, 2018

SPEAKER ABSTRACTS

SATURDAY, OCTOBER 20

PLENARY SESSION

VIRAL VECTORS IN NEUROTHERAPEUTICS

Emerging Therapies for Neurogenetic Disorders

Beverly L. Davidson, PhD, Children's Hospital of Philadelphia
2018 F.E. Bennett Memorial Lectureship Award Recipient

Gene therapies represent an emerging modality for CNS therapies for both recessively and dominantly inherited disorders causing neurodegeneration. The late infantile neuronal lipofuscinoses are an example of a fatal, recessively inherited childhood onset disease due to a deficiency in the lysosomal enzyme tripeptidyl peptidase I (TPP1), a non-membrane bound lysosomal hydrolase. Because these enzymes can be processed through the secretary pathway, genetic correction of a small percentage of cells can provide sufficient protein for enzymatic correction of many cells. We will show the utility of genetically correcting distinct cell types in the brain for disease therapy. Once corrected, these cells serve as enzyme secretion depots, providing widespread correction of neuropathology and clinical symptoms in a small and large animal model ofTPP1 deficiency, with scalability to nonhuman primates.

Huntington's disease (HD) and spinocerebellar ataxia type I (SCA) are among nine dominantly inherited diseases due to polyglutamine repeat expansion in huntingtin or ataxin-1, respectively. Dominantly inherited disorders present the challenge of removing a toxic, gain of function product, in contrast to gene replacement. We exploited the RNA interference machinery and CrispR/Cas9 technologies to reduce expression of huntingtin or ataxin-1 in human cells and in mice models of the human diseases. I will present recent data showing prevention and reversibility of disease readouts in mice, as well as studies in nonhuman primates. Together these preclinical programs exemplify the challenges and progress in the development of gene therapy for inherited brain diseases.

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Delivery of Adeno-Associated Viral Vectors for Neurological Diseases

Krystof S. Bankiewicz, MD, PhD, University of California, San Francisco

Gene transfer technology can correct genetic mutations in the CNS. Neuro gene delivery via direct intrapranchymal injections of adeno-associated viral (AAV) vectors is a locally administered treatment that requires accurate delivery to maximize safety and efficacy. The large volume and convoluted architecture of the human brain is a considerable barrier to translating small animal findings into efficacious clinical procedures. Too little target coverage and the treatment risks being ineffective. Conversely, excessive distribution or off-target gene delivery increases the possibility for unexpected adverse effects. Optimal viral vector delivery into the brain is challenging and brain distribution of viral vectors is uncertain. To address this issue we developed viral vector delivery system that permits direct MRI monitoring of vector distribution within the brain in real-time. This significant advance allows for the first time to adjust parameters of vector infusion while delivering gene therapy, giving surgeon full control over gene transfer technology. This significant MR-guided improvement of anatomical targeting takes full advantage of respective axonal transport that can supply therapeutic gene into well-defined projections regions. For example, thalamic infusion of AAV directs efficient widespread expression of the transgene in the cortex through thalamo-cortical pathways. Moreover, understanding neuropathology involved in disease targeted by gene therapy can help rationalize utilization of anatomical targeting and axonal transport. Examples of this novel gene deliver approach will be presented based on 2 ongoing clinical trials, one in Parkinson's Disease with AAV2-GDNF and other with AAV2-AADC targeting children with AADC deficiency.

Although parenchymal delivery of AAV2 has been utilized in several clinical trials, the potential advantages of intrathecal infusion of AAV have been recognized in particular for pediatric patients, too young to undergo AAV delivery using skull-mounted neuronavigation devices. In a number of studies in nonhuman primates (NHP), bolus injections of AAV vectors have yielded impressive but variable transduction of spinal

cord, cortex and cerebellum. We utilized MR-guided infusions of several AAV serotypes into CSF space of NHP in an attempt to optimize delivery route, volume and infusion rate as well as vector titer. Results will be presented as they relate to upcoming clinical trials in lysosomal storage disorders.

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Challenges and Solutions on the Road To Approval of The First Gene Therapy for A Genetic Disease In The U.S.

Katherine A. High, MD, Sparks Therapeutics

Gene therapies are a novel class of biologics that are being developed for a variety of indications, including for monogenic disorders (1). Gene therapies have the potential to provide treatment options for diseases that have formerly been beyond the reach of more well-established classes of therapeutics. In 2017, the US FDA approved an adeno-associated viral vector (AAV) vector for the treatment of a rare inherited retinal dystrophy (IRD), caused by autosomal mutations in the gene encoding retinal pigment epithelial 65 kilodalton protein (RPE65). This is the first gene therapy for a genetic disease, the first AAV product, and the first pharmacologic product for an IRD, approved in the US. The RPE65 protein is an isomerohydrolase expressed in the retinal pigment epithelial cells that catalyzes the conversion of all trans-retinyl ester to 11-cis retinol, a critical step in the visual cycle. Patients with mutations in RPE65 may present with impaired vision early in life; all patients are affected by the second decade of life, and the disease progresses eventually to blindness in most patients. Studies originally published in 2001 demonstrated in a naturally occurring dog model of the disease that subretinal injection of an AAV vector expressing RPE65 could restore vision in dogs born with this condition (2). Based on these and other pharmacology and toxicology studies, a Phase 1/2 trial of subretinal administration of AAV-RPE65 was begun at the Children's Hospital of Philadelphia in 2007. Challenges in the clinical development program included: an ultra-rare disease population; the dearth of natural history data; and the absence of any pharmacologic treatments for the condition, necessitating the development and validation of endpoints for measuring changes in functional vision (3). The fact that there were no licensed AAV products in the US meant that there were no clear roadmaps for process validation and analytical methods for AAV product manufacturing. This presentation will review the solutions that were crafted to these problems, including the development and characterization of a novel primary endpoint to measure functional vision in patients with IRDs, the clinical trial design of the open-label, randomized, controlled Phase 3 study (4), and the conduct of a multicenter natural history study, to provide context for the Phase 3 trial results. The presentation will emphasize lessons that may be applied to development of gene therapy for other genetic diseases.

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Systemic AAV.Micro-dystrophin Gene Therapy for Duchenne Muscular Dystrophy

Louise R. Rodino-Klapac, PhD, Sarepta Therapeutics

The past decade has been marked by an unprecedented number of gene therapy clinical trials that have shaped the way the muscular dystrophy gene therapy field is moving forward [1-4]. Muscular dystrophies are a large heterogeneous group of primarily genetic disorders discernible by chronic muscle wasting. They are arguably the most challenging diseases to treat using gene therapy as muscle accounts for 40 percent of human body weight. Despite the challenges, incremental successes in clinical trials [1,2] have swung the pendulum in favor of efficacy and the once thought impossible feat of systemic delivery is now a reality. Duchenne Muscular Dystrophy (DMD) is the most common severe form of muscular dystrophy affecting 1:3500-1:5000 male births. Preclinical studies demonstrated robust cardiac and skeletal

muscle expression with a micro-dystrophin that normalized muscle function and histology. A Phase I/II systemic single-dose trial of AAV.micro-dystrophin in DMD boys ages 4-7 has been well tolerated and Week 12 biopsies demonstrated robust micro-dystrophin expression. This study will provide valuable data on efficacy for micro-dystrophin in DMD and this platform gene delivery approach has direct implications for treatment of Limb Girdle Muscular Dystrophies already in development.

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SUNDAY, OCTOBER 21

PLENARY SESSION

VASCULAR CONTRIBUTIONS TO NEURODEGENERATION

Novel Imaging and Endothelial Biomarkers of Small Vessel Cerebrovascular Disease

Charles Decarli, MD, FAAN, University of Southern California in Davis

Cerebrovascular disease, along with neurodegeneration and mixed-pathologies, are predominant contributor of cognitive decline and risk for dementia1. Nonetheless, while major efforts have been deployed to characterize the cascade of cerebral events associated with neurodegeneration, pathophysiological mechanisms associated with vascular disease, and their chronology have received less attention, in part, by a limited availability of imaging biomarkers for small vessel diseases that produce vascular contributions to cognitive impairment and dementia. To support clinical trials that seek to prevent cognitive decline or evaluate treatment for risk factors that promote cerebrovascular disease, robust and sensitive biomarkers are needed. White matter hyperintensities (WMH) are one of the most common biomarkers of brain injury associated with cerebrovascular disease. They are a common finding in elderly individuals, even when they are cognitively normal, are associated with age and vascular risk factors but also with reduced cognitive ability and increased risk for dementia2. Recently, using diffusion tensor imaging (DTI), we have shown that WMH are only the extreme and crude manifestation of a more diffuse, continuous and insidious process of WM degeneration as measured by DTI-derived fractional anisotropy (FA)3. Importantly, these new biomarkers of subtle WM injury also find associations between WM integrity and vascular risk factors, even in the younger adult population, decades before WMH appear or cognition declines. Recently, a method to correct DTI data for extracellular water contamination denoted as "free water" (FW) has been proposed. We applied this method to study of subtle brain injury in association with increased arterial stiffness measured by carotid-femoral pulse wave velocity (CPWV). Using serial mediation analysis, we showed that systolic blood pressure (SPB) was related to CPWV which mediated the impact of SBP on WM FW content. WM FW content further mediated the impact of carotid pulse wave velocity on white matter FA and WMH4.

Work under review by our group also finds that WM FW is significantly associated with a variety of blood based inflammatory and endothelial biomarkers suggesting that WM FW may be a good marker of vascular inflammation as well as subtle brain injury.

The role of MRI biomarkers as measures of vascular brain injury offers the possibility for new understanding of the pathophysiology of this process. In this talk, I will review progress with these methods and propose a new model of vascular brain injury mechanism based on the results.

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Neurovascular pathways to cognitive impairment: from vascular dementia to Alzheimer's disease

Costantino Iadecola, MD, Weill Cornell Medicine

The cognitive dysfunction caused by vascular factors (vascular cognitive impairment and dementia, VCID) and neurodegeneration (Alzheimer's disease, AD) have traditionally been considered mechanistically distinct. However, a growing body of evidence indicates that there might be considerable mechanistic overlap between AD and cognitive impairment on vascular basis (1). Whereas clinical-pathological studies have revealed that vascular and neurodegenerative pathology (plaques and tangles) coexist in over 50% of clinically-diagnosed AD, midlife vascular risk factors have emerged as important contributors to AD risk later in life (1). The brain is uniquely dependent on a well-regulated delivery of oxygen and glucose through the blood supply. If the delivery of cerebral blood flow is not adequate to match the dynamic energetic requirements imposed by neural activity, brain dysfunction and damage ensues (2). Resting cerebral blood flow is reduced in the pre-symptomatic stages of AD and the increases in flow produced by neural activity are attenuated, suggesting a mismatch between blood supply and energy demands (2). Therefore, neurovascular dysfunction is observed not only in VICID, but also in AD, attesting to the significant overlap between these conditions. These findings in patients have been supported by experimental studies demonstrating a previously-unrecognized deleterious impact of AD pathology on neurovascular function (2). Thus Abeta1-40 alters fundamental mechanisms of cerebrovascular regulation such as endothelial function, neurovascular coupling and cerebrovascular autoregulation (2). In addition, major dementia risk factors such as hypertension, ApoE4 genotype, and high salt intake, are also associated with neurovascular dysfunction leading to cognitive impairment (2-4). Innate and adaptive immunity, oxidative stress and endothelial nitric oxide deficiency play a pathogenic role in these alterations, with remarkable cellular specificity. These recent developments have rekindled the view that vascular factors are critically important for cognitive health, and their contribution to the overall dementia landscape, in concert with AD pathology, requires a careful reevaluation in light of novel preventive and therapeutic opportunities that they may afford.

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Blood-Brain Barrier: Structure, Function and Role in Neurodegenerative Disorders

Berislav V. Zlokovic, MD, PhD, Zilkha Neurogenetic Institute, Keck School of Medicine

Blood vessels in the brain are organized with surprising precision, patterned in parallel with the major brain circuits tasked with sensation, memory and motion. This tight interrelationship may reflect key functional roles of vasculature in normal function of neurons in the healthy brain, during aging and in neurodegenerative disorders such as Alzheimer's disease (1,2). I will start with the cellular and molecular composition of the blood-brain barrier (BBB) (1). Next, I will discuss rare human monogenic neurological disorders with the primary genetic defect in non-neuronal cells of the BBB, and genes underlying inheritance or increased susceptibility of familial forms of Alzheimer's disease, amyotrophic lateral sclerosis, Huntington's and Parkinson's disease, with a focus on the link between BBB breakdown and neurodegeneration in humans and animal models (1, 2). Then, I will examine the role of BBB breakdown as an independent early biomarker of cognitive dysfunction unrelated to Alzheimer's amyloid-β and tau biomarkers (3). Finally, I will discuss new models of small vessels disease including pericyte-deficient and pericyte-ablation mice and impact of BBB breakdown and loss of protective function on cognitive function and neuronal health. I will conclude by examining briefly some treatments directed at the BBB that have advanced to Phase 3 and Phase 2 studies in Alzheimer's disease and stroke patients, respectively, based on our preclinical findings.

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What Can We Do Today to Prevent and Treat Dementia

Sudha Seshardi, MD, FANA, FAAN, Glenn Biggs Institute for Alzheimer's and Neurodegenerative Diseases, University of Texas Health Sciences Center

Dementia is a syndrome, with many underlying biological pathways, that are determined and modified by vascular and metabolic factors, lifestyle and environment to result in neurodegenerative, vascular and inflammatory brain injury manifesting as cognitive decline. (1) The exact combination of these factors in each individual varies with their demographics such as age-, sex-, education and race/ethnicity, but most patients with dementia, including persons diagnosed clinically with Alzheimer dementia have, at autopsy, at least some vascular injury. Thus, the concept of vascular contribution to dementia has broadened from assessing 'whether' there is a vascular contribution to 'how' and 'how much'.

Improvements in population burden of vascular risk factors, particularly in midlife, and in stroke prevention and treatments, partially explain declining age-specific incidence of dementia observed among non-Hispanic whites in North America and Europe.(2) Moreover, greater adherence to a heart-healthy lifestyle diminishes risk of dementia.(3) Trials of interventions to optimize vascular health and lifestyle in an effort to prevent cognitive decline are ongoing.

We are rapidly expanding our understanding of the cerebrovascular mechanisms that add to, and synergize with amyloid, tau and other neurodegeneration to result in clinical symptoms. Whether vascular health can promote cognitive resilience is also being studied. Vascular pathologies range from changes in the vessel wall and lumen, reactivity and flow of large arteries, to pathology in the small vessels (arteriolar, capillary and venular), the neurovascular unit, the blood-brain barrier and glymphatic circulation.

Vascular brain injury can be assessed using cardiac, carotid and brain imaging. Structural MRI markers include covert brain infarcts, white matter hyperintensities, cerebral microbleeds, dilated perivascular spaces, cortical microinfarcts, and global and regional patterns of atrophy.(4) Most promising are measures of microstructural white matter injury detected on diffusion tensor imaging sequences that can be processed to assess free water, global, tract and voxel-based fractional anisotropy, mean diffusivity and connectivity. Functional connectivity brain MRI, based on patterns of change in blood flow during rest and with brain activity, imaging the retinal vasculature, measuring blood biomarkers of neuronal, glial, endothelial injury and of immune activation are other promising indices being studied for use in VCI prevention and treatment trials. This is complemented by new methods of assessing metacognition, mood, cognitive and functional performance with special attention to processes used, and variability over time.

Studying the genome, epigenome, transcriptome, metabolome, proteome and microbiome using innovative, integrative computational approaches and in-vitro and in-vivo translation, is uncovering novel biology that could identify 'druggable' molecular targets and permit personalized prevention, diagnosis, prognostication and treatment.

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PLENARY SESSION

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR SYMPOSIUM

How Repeats Break the Rules to Cause Neurodegeneration

Peter K. Todd, MD, PhD, University of Michigan
2018 Derek Denny Brown Basic Awardee

There are over two million microsatellite nucleotide repeats in the human genome. Instability and expansion of these repeats underlies 30 different neurological disorders, with new disease-causing expansions identified each year. How exactly repeats elicit neurological disease and what steps might be taken to mitigate these pathological processes are areas of intense research.

Our group studies a set of Fragile X-associated disorders that result from instability and expansion of a CGG trinucleotide repeat in the 5' untranslated region (UTR) of the fragile X gene, FMR1. Very large (>200 CGG repeats) expansions cause Fragile X Syndrome (FXS), a common form of autism and intellectual disability, by transcriptionally silencing the FMR1 locus and blocking translation of the Fragile X protein, FMRP. In contrast, transcribed CGG repeat expansions result in Fragile X associated Tremor/Ataxia Syndrome (FXTAS), an adult-onset neurodegenerative condition. In FXTAS, the CGG repeats allow for production of toxic proteins in the absence of an AUG start codon through a process known as repeat associated non-AUG (RAN) translation1.

Our group has explored the mechanisms underlying RAN translation at CGG repeats, revealing the following key features: 1) RAN translation occurs in multiple reading frames from both CGG sense strand and CCG antisense strand

mRNAs1. 2) RAN translation is required for CGG repeat associated toxicity in multiple model systems1, 2. 3) CGG RAN translation shares many features with canonical translation, including use of an m7G-cap and ribosomal scanning along the mRNA3. 4) Initiation occurs predominantly at near-cognate (one nucleotide off from AUG) codons 5' to the repeat, with different rates of initiation across repeat reading frames3. 5) RAN translation is selectively and paradoxically enhanced by cellular stress pathways. This requires both eIF2a phosphorylation and non-AUG codon usage for initiation4. 6) CGG Repeats also trigger stress granule formation and suppress global protein synthesis through this same pathway, creating a feed-forward loop that drives toxicity4. 7) Exogenous factors which elicit cellular stress can push on this feed-forward loop towards decompensation and neurodegeneration. 8) Agents which suppress RAN translation block repeat toxicity. Moreover, blocking RAN translation enhances FMRP synthesis even in the setting of very large (>200) CGG repeats. Together, these results support development of therapeutic efforts targeting RAN translation across the spectrum of Fragile X-associated disorders while providing a blueprint for understanding how genetic mutations can lead to diseases with late-life onset.

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Inflammation and Resolution after Intracerebral Hemorrhage-Lessons from Mouse and Man

Lauren Sansing, MD, MS, Yale University
2018 Derek Denny Brown Basic Awardee

The Sansing laboratory has focused on mechanisms of leukocyte recruitment, activation, and resolution after intracerebral hemorrhage (ICH) and how these processes lead to brain injury and recovery. Initial work identified Toll-like receptor 4 activation on the leukocytes within the blood comprising the hemorrhage as a key initiator of the immune response (1). Subsequent work has focused on determining the roles of blood-derived macrophages and microglia. Since the cells are indistinguishable by common cell surface markers and general morphology, the specific roles of each cell type were unknown. We determined that blood-derived CCR2+Ly6Chi macrophages are a major contributor to the early neurological deficit after ICH (2). The cells enter the brain in high numbers, produce TNF once they arrive, and cause functional deficits over the first three days after ICH. Our work identified the importance of blood-derived macrophages in acute pathophysiology after ICH for the first time.

Macrophages provide both proinflammatory and restorative functions in damaged tissue through complex dynamic phenotypic changes. We sought to determine whether blood-derived macrophages contribute to recovery. By profiling the transcriptional dynamics of macrophages in the murine brain, we found robust phenotypic changes in the infiltrating macrophages over time and demonstrated the cells are essential for optimal hematoma clearance and neurological recovery (3). We then identified a novel mechanism by which the engulfment of erythrocytes that exposed phosphatidylserine directly modulated the phenotype of murine and human macrophages. Axl and Mertk deficiency impeded efferocytosis of eryptotic erythrocytes and hematoma clearance, worsened recovery, exacerbated iron deposition, and decreased macrophage alternative activation after ICH. Patients with higher circulating soluble AXL had worse one-year outcomes. Our results identified the efferocytosis of eryptotic erythrocytes through AXL/MERTK as a critical mechanism modulating macrophage phenotype and contributing to recovery in mouse and man.

Microglia also have complex dynamic responses that differ from blood-derived macrophages. We transcriptionally profiled the microglial phenotype during the acute and resolution phases of ICH in vivo and found elevation of TGF-β1 pathway activation during resolution (4). TGF-β1 treatment modulated inflammatory profiles of microglia in vitro, decreased microglial IL-6 gene expression in vivo and improved functional outcomes. Patients with early increases in plasma TGF-β1 concentrations had better outcomes 90 days after ICH. Our data showed that TGF-β1 modulates microglial-mediated neuroinflammation after ICH and promoted functional recovery, suggesting TGF-β1 may be a therapeutic target for acute brain injury.

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Big Screens and Where You Go From There: Towards Translation in the Neurodegenerative Diseases

Alice Chen-Plotkin, MD, MSc, University of Pennsylvania
2018 Derek Denny Brown Clinical Awardee

The neurodegenerative diseases-Alzheimer's Disease (AD), Parkinson's Disease (PD), frontotemporal dementia (FTD), amyotrophic lateral sclerosis (ALS)-affect >50 million people worldwide, with no treatments to stop or slow progression. Two problems have obstructed our ability to make headway in therapeutic development. First, a significant gap separates what we have learned about these diseases from the genomics revolution and the translation of these discoveries into mechanistic understanding. Second, an additional gap exists between the way that bench-based scientists think about disease pathways and the practical translation of disease pathway recognition into clinical intervention. In this talk, I will discuss the ways our group has worked to fill those gaps. Specifically, in FTD, we identified by genomewide association study (GWAS) a novel genetic risk locus on 7p21 (1); used a combination of computational and bench-based techniques to identify the causal single nucleotide polymorphism (SNP) at this locus (2); showed that common variation at this SNP affects expression of the target gene TMEM106B through differential recruitment of the chromatin architectural protein CTCF (2); characterized TMEM106B as a lysosomal protein (3); and demonstrated that alterations in TMEM106B expression affect lysosomal function (4). We are applying these approaches to the mechanistic elucidation of loci found by GWAS to confer risk for PD now. In PD, we have also worked to fill the bench-to-bedside gap by developing biomarkers with potential for clinical translation. Here we began with unbiased screens of hundreds or thousands of protein candidates in order to find novel biochemical biomarkers that associate with important clinical phenotypes. In this manner, we have demonstrated that plasma apolipoprotein A1 levels associate with dopaminergic system integrity in PD (5, 6); and novel plasma proteins characterize PD patients at baseline and predict future cognitive trajectory. In both lines of work, the starting point has been a "big screen" of patient-derived DNA or biofluids, with downstream follow-up through bench-based manipulative experiment or in additional clinical cohorts.

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Development of EQ-6 for Neuroprotection Against Chemotherapy-induced Peripheral Neuropathy

Ahmet Hoke, MD, PhD, Johns Hopkins University
2018 Wolfe Research Prize Winner

Paclitaxel is among the most commonly used cancer drugs that cause chemotherapy-induced peripheral neuropathy (CIPN), a debilitating and dose limiting side effect in peripheral neurons. Currently no drugs exist to prevent paclitaxel-induced neuropathy. We identified ethoxyquin as a therapeutic candidate to prevent peripheral neuropathy caused by paclitaxel (Zhu, et al., 2016; Zhu, et al., 2013). In order to improve its drug-like properties, we synthesized a novel analogue of ethoxyquin; (6-(2-amino)-ethoxy-2, 2,4-trimethyl-1,dihydroquinoline) and called it EQ-6. After evaluation of its efficacy in vitro, we examined its efficacy in an in vivo model of PTX induced peripheral neuropathy. At doses similar to the parent compound, EQ-6 prevented loss of intra epidermal nerve fibers (primary endpoint), and thermal hypoalgesia and reduction in sensory evoked responses (secondary endpoints). Furthermore, we showed that this neuroprotection is associated with reduction in levels of SF3B2, target of Hsp90 inhibition by EQ-6, in sensory neurons. Additional safety studies in vitro and in vivo were similar to the parent compound and did not show any significant toxicity. EQ-6 is a novel ethoxyquin analogue that is suitable for clinical development to prevent CIPN.

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Metagenomic Approaches Advance Our Understanding of Infectious Encephalitis

Michael Wilson, MD, MAS, University of California, San Francisco, Weill Institute for Neurosciences, 2018 Grass Foundation - ANA Award in Neuroscience Recipient

There is increasing recognition that even severe and seemingly treatment-refractory cases of encephalitis may be treatable, making our inability to identify the etiologic agent in approximately 50% of encephalitis cases unacceptable. Metagenomic next-generation sequencing (mNGS) of cerebrospinal fluid (CSF) is a novel, hypothesis-free and data driven approach to the diagnosis of neurologic infections that interrogates all the nucleic acid present in a human sample rather than querying the sample with a set of probes that are specific for an organism on the treating physician's differential diagnosis. Once the non-human sequences are computationally culled from the larger dataset, these non-human DNA or RNA sequences are searched against giant, publicly available databases to determine the identity of the non-human species present in the tissue sample.

We have demonstrated in case reports and small case series that research-based mNGS of CSF has identified unexpected causes of meningoencephalitis1-4, including novel clinical phenotypes2,3, and has dramatically benefited individual patients1,4. CSF had previously proven difficult to work with for genomic applications, given the picogram quantities of RNA that are frequently isolated. To enrich for the microbial signal in our metagenomic data while still preserving the unbiased nature of the mNGS assay, we developed a new, targeted and highly programmable tool using the CRISPR-Cas9 endonuclease for selectively depleting unwanted host complementary DNA molecules from mNGS libraries5. In addition, the unbiased nature of an mNGS approach makes the assay susceptible to falsely interpreting environmental contaminants as possible pathogens. To combat this problem, we developed a statistical algorithm using a weighted z-score model that leverages our existing metagenomics database of over 600 CSF and brain biopsy specimens to filter out common microbial contaminants that might otherwise be mistaken for pathogens1.

We recently evaluated a first-of-its-kind, clinically validated, CSF mNGS assay for the diagnosis of neurologic infections in over 200 patients with acute meningitis and encephalitis. This assay, which has a sample-to-answer turnaround time of approximately 72 hours, was clinically useful in clarifying diagnosis in patients with acute meningitis and encephalitis and generated more diagnoses than conventional microbiological testing of CSF alone. (Under Review). mNGS has the potential to guide earlier and more targeted treatments for neurologic infections, identify emerging infections and disease phenotypes, and accelerate the workup for non-infectious etiologies.

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MONDAY, OCTOBER 22

PRESIDENTIAL SYMPOSIUM

LEWY BODY DEMENTIA: FROM SYMPTOMS TO SYNUCLEIN

The Interplay of Mitochondria and Lysosomes in Neurodegeneration

Dimitri Kranic, MD, PhD, Northwestern University Feinberg School of Medicine, 2018 Soriano Lectureship Award Recipient

There is an urgent need to identify effective neuroprotective therapies for synucleinopathies such as Parkinson's disease (PD) and Diffuse Lewy Body Dementia (DLB). Recent emergence of genetic forms of PD has facilitated identification of potential targets for therapeutic development. One of the most promising and extensively studied targets has been lysosomal glucocerebrosidase (GCase) in patients with GBA1-linked PD and DLB. These patients exhibit loss of GCase activity in lysosomes which in turn results in downstream neuronal dysfunction. Therefore, chaperoning and/or direct activation of GCase in lysosomes has been postulated as viable therapeutic strategy. Several ongoing therapeutic efforts have focused on chemical chaperones to promote translocation of mutant GCase to the lysosome. We found that wild-type GCase activity is also reduced in sporadic and genetic forms of PD, suggesting that wild-type GCase could serve as promising therapeutic target in synucleinopathies. Therefore, we explored whether activation of wild-type GCase could enhance lysosomal function and rescue downstream pathological phenotypes in dopaminergic neurons from patients with sporadic and familial forms of PD. We identified GCase activator S-181, which was able to increase the activity of wild-type GCase, and partially ameliorated lipid substrate accumulation, lysosomal dysfunction and dopamine oxidation, in both GBA1-linked and non-GBA1-linked PD patient-derived dopaminergic neurons. Our work thus suggests that rescuing GCase activity is sufficient to improve lysosomal function and to reduce accumulation of toxic oxidized dopamine in midbrain neurons. In turn, decreased accumulation of oxidized dopamine resulted in diminished downstream pathogenic effects, including oxidation-mediated modifications of GCase which disrupt its enzymatic activity. We found that this vicious feedback cycle could be interrupted by targeting wild-type GCase with small molecule activators in human DA neurons. Moreover, our in vivo analysis in mice revealed that S-181 could penetrate CNS and enhance wild-type GCase enzyme activity in brain tissue. In sum, these findings point to the relevance of therapeutically targeting GCase across multiple genetic and sporadic synucleinopathies.

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Clinical, Diagnostic and Prognostic Features of DLB

Bradley F. Boeve, MD, Mayo Clinic

Lewy body disease (LBD) is a synucleinopathy which affects central and peripheral (particularly autonomic) nervous system networks, with the clinical features in affected individuals often spanning several domains when fully manifested. Dementia with Lewy bodies (DLB) represents that dementia-predominant phenotype associated with LBD pathology. This presentation will cover five main topics. First, the primary clinical, neuropsychological and neuroimaging features of DLB will be reviewed. The clinical features of DLB are complex and varied within and across individuals. The manifestations span across many domains: cognitive (e.g., forgetfulness, impaired problem-solving and complex decision-making, spatial disorientation),

neuropsychiatric (including visual hallucinations, hallucinations in other sensory spheres, delusions, illusions, apathy, depression, anxiety), motor (parkinsonism), sleep (e.g., REM sleep behavior disorder, hypersomnia), autonomic (e.g., orthostatic hypotension, constipation) and sensory (e.g., anosmia, color vision changes) (1). The neuropsychological profile of impairment can involve all cognitive domains, and particularly executive and/or visuospatial functioning, with memory varying from normal to markedly impaired. The characteristic imaging findings include relatively preserved hippocampal volumes on MRI, occipital +/- parietal hypometabolism and the posterior cingulate island sign on FDG-PET, reduced nigrostriatal uptake on ioflupane SPECT scans, and reduced uptake on cardiac MIBG imaging (1-3). Positive uptake on amyloid PET is also common, and tau PET imaging tends to show occipital-temporal uptake. Second, the recently updated diagnostic criteria for DLB will be reviewed, which emphasizes many of the aforementioned clinical and biomarker features (3). The therapeutic options for the management of problematic DLB features will be reviewed next. Realizing there are no FDA-approved treatments for DLB, there is an array of treatments with varying degrees of evidence to support the role on neurotransmitter modulation in managing symptoms. Fourth, the clinical and imaging features which aid in prognostication will be reviewed. Finally, the vision for the future will be discussed, with an emphasis on a) the National Alzheimer's Project Act-Alzheimer's Disease and Related Disorders national research priorities on the Lewy body dementias (4), b) early detection of prodromal DLB features such as mild cognitive impairment, primary neuropsychiatric presentations, recurrent delirium and REM sleep behavior disorder, c) DLB research networks in the US and abroad, and d) evolving infrastructure to better support DLB clinical trials.

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Cell-to-Cell Transmission of Misfolded Alpha-synuclein as a Mechanism in Lewy Body Dementia/Parkinson Dementia

Virginia M.-Y. Lee, PhD, University of Pennsylvania

The deposition of β-sheet rich amyloid aggregates formed by alpha-synuclein (α-syn) protein, Aβ plaques and tau tangles are prominent features of Lewy body dementia (LBD) and Parkinson's disease dementia (PDD). Furthermore, increasing Aβ, tau and α-syn pathological burden correlating with increased severity of both cognitive and motor symptoms. Recent studies have strongly implicated cell-to-cell transmission of misfolded α-syn through templated recruitment as a common mechanism for the onset and progression of synucleinopathies. However, the role of Aβ plaques and tau tangles in facilitating motor and cognitive phenotypes in LBD and PDD remain poorly understood. To better define the relationship between α-syn burden and Aβ plaque density, we injected α-syn mouse preformed fibrils (α-syn mpffs) into transgenic mice with abundant Aβ plaque pathology (5xFAD mice) and found that the presence of Aβ deposits dramatically accelerated α-syn pathogenesis and spread throughout the brains of 5xFAD mice compared to wild-type (WT) littermates while also enhancing Aβ deposition. Remarkably, hyper-phosphorylated tau (p-tau) was induced in α-syn mpff-injected 5xFAD mice. Finally, α-syn mpff-injected 5xFAD mice showed neuron loss, the onset and severity of which correlated with the progressive decline of cognitive and motor performance. Our findings suggest a "feed-forward" mechanism whereby Aβ plaques enhance endogenous α-syn seeding and spreading over time post-injection with mpffs. Further, the treatment of primary cultured neurons with brain lysates extracted from α-syn mpff-injected 5xFAD mice resulted in significantly greater and more mature α-syn pathology than neurons transduced with lysates from α-syn mpff-injected WT mice or PBS-injected 5xFAD mice. Our data support the idea that Aβ plaques induce a highly potent α-syn strain associated with increased plaque and tau pathology as seen in LBD and PDD.

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PLENARY SESSION

INFLAMMATION AND NEUROLOGICAL DISEASE: FRIEND OR FOE

NG2 Cells as Mediators of CNS Inflammation and Failed Endogenous Remyelination in Multiple Sclerosis

Peter A. Calabresi, MD, Johns Hopkins University

Oligodendrocyte progenitor cells, are abundant in adult central nervous system tissues and differentiate into mature oligodendrocytes during remyelination. In multiple sclerosis, endogenous remyelination is incomplete and oligodendrocyte progenitor cells are either arrested or depleted, but the mechanisms underlying their loss or failure to differentiate remain incompletely elucidated (1, 2). Multiple sclerosis (MS) and the rodent model experimental autoimmune encephalomyelitis (EAE) are characterized by infiltration of activated T cells into the central nervous system (3). In order to investigate the mechanisms by which this neuroinflammatory process leads to oligodendrocyte progenitor cell death (OPC) failure, we utilized PDGFRα-CREER x Rosa26-YFP transgenic reporter animals (4, 5). Results of our studies showed that the OPCs are inhibited by adoptive transfer of infiltrating cytokine producing T effector cells, and CNS interferon gamma changes the profile of these cells by inducing functional expression of the immunoproteasome and upregulation of MHC class I. Oligodendrocyte progenitor cells exposed to interferon gamma are shown to cross present exogenous antigen to cytotoxic CD8 T-cells, which then produce proteases and FasL that results in subsequent caspase 3/7 activation and oligodendrocyte progenitor cell death. This pathway is dependent on the cytosolic processing pathway, and could be inhibited by small molecules targeting MHC class I antigen processing and the immunoproteasome subunits. Further, the immunoproteasome subunit, PSMB8, is shown to be markedly increased on Sox10+ oligodendrocyte lineage cells only in the demyelinated white matter lesions from patients with multiple sclerosis.

These findings support the notion that OPCs have multiple functions beyond differentiation into myelinating cells, and adapt to their microenvironment by responding to local cues. In MS, OPCs may be co-opted by the immune system to perpetuate the autoimmune response, and redirecting aberrant immune activation pathways may be a potential therapeutic goal in order to achieve more efficient remyelination.

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Unintended Consequences of the Therapeutic Promotion of Inflammation: Neurologic Complications of Immune Checkpoint Inhibitors

Michelle Mauermann, MD, FAAN, FANA, Mayo Clinic

Blockade of immune checkpoints is among the most promising approaches in unleashing an anti-tumor immune response. Immune checkpoints are inhibitory molecules that play a key role in dampening T-cell responses, promoting self-tolerance and therefore preventing autoimmunity and tissue damage (1). Cytotoxic T-lymphocyte-associated protein-4 (CTLA-4) is expressed on T-cells and regulates the priming and induction of effector T-cell responses against cancer specific antigens. Programmed cell death 1 (PD-1) is expressed on antigen specific T-cells (cytotoxic T-cells) in peripheral tissues and regulates the inflammatory response in the tissue. Its ligands PD-L1 and PD-L2 are expressed in a wide variety of tissues. Immune checkpoint inhibitors (ICPi) represent a major breakthrough in cancer immunotherapy but its use has also led to the development of immune-related adverse events (irAEs). Rates of moderate-severe irAEs and ICPi related deaths range from 10-42% with anti-CTLA-4 antibody and 10-16% with anti-PD-1 antibodies and 5-20% with anti-PD-L1 antibody (2, 3). Neurological irAEs are less common, occurring in 1.4-3.2% of patients (4-7). These can affect the entire neuroaxis but most commonly cause neuromuscular complications including myasthenia gravis (MG), muscle disorders and Guillain-Barre syndrome. They often occur within the first four cycles of treatment, however can occur at any time. When neurological irAEs occur, the ICPi should be held and corticosteroids initiated. Additional treatment with intravenous immunoglobulin or plasma exchange may be needed in some conditions (8).

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Divergent Functions of Innate and Adaptive Immune Cells in Neurological Diseases

Etty (Tika) N. Benveniste, PhD, University of Alabama at Birmingham

Immune cells, including T-cells and monocytes/macrophages, infiltrate the central nervous system (CNS) during a number of neurologic disease states including Multiple Sclerosis (MS), Parkinson's Disease (PD) and Brain Tumors, specifically Glioblastoma (GBM). These immune cells often exhibit hyper-activation of signaling pathways, including the JAK/STAT pathway, which is the major pathway utilized by many cytokines for signal transduction. We have evaluated the role of the JAK/STAT pathway in pre-clinical models of MS, PD and GBM by using pharmacologic inhibitors as well as conditional deletion to assess the function of this pathway in both detrimental and beneficial responses in the CNS. Deletion of SOCS3, a negative regulator of the JAK/STAT pathway, in myeloid cells, skews both macrophages and neutrophils to a pro-inflammatory phenotype, leading to a pronounced neuroinflammatory response in both MS and PD models (1). These responses are accompanied by polarization of macrophages and neutrophils to a phenotype producing high levels of pro-inflammatory cytokines and reactive oxygen species, which in turn leads to polarization of CD4+ T-cells to pathogenic Th1 and Th17 cells. In contrast, use of JAK inhibitors (Jakinibs) in MS and PD models provides an anti-inflammatory response, with polarization of macrophages to an immunosuppresive phenotype, which dampens Th1 and Th17 cell differentiation (2, 3). In a syngeneic GBM model, deletion of SOCS3 delays intracranial tumor growth and prolongs survival (4). This is the result of increased pro-inflammatory macrophages, decreased immunosuppressive macrophages and decreased CD4+ Tregulatory cells. Thus, in neurodegenerative diseases such as MS and PD, hyper-activation of the JAK/STAT pathway is detrimental due to skewing of macrophages and CD4+ T-cells to a pathogenic phenotype. In GBM, hyper-activation of the JAK/STAT pathway promotes pro-inflammatory macrophages, which have anti-tumorigenic functions and inhibit Tregulatory cells, which promote tumor growth. Thus, both innate and adaptive immune cells have divergent functions in the CNS, depending on the microenvironment (5).

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The Immune-brain Interface after Stroke

Katrin I. Andreasson, MD, Stanford University

Thrombolytic therapy and endovascular removal of thrombi after stroke must be instituted early after the ischemic event. On the other hand, innate and adaptive immune responses are initiated after onset of cerebral ischemia, unfolding over days to weeks after stroke [1-4]. Cerebral ischemia causes release of highly immunogenic cellular components, or danger/damage-associated molecular patterns (DAMPs), from the brain into the systemic circulation. These DAMPs activate and recruit peripheral innate and adaptive immune cells to ischemic brain regions. Experimental manipulations suggest that both toxic and protective inflammatory processes are activated post-stroke with toxic effects including generation of pro-inflammatory cytokines, proteases, and reactive oxygen species (ROS) by inflammatory cells, and protective effects consisting of clearance of injured tissue by myeloid cells and the establishment of a regenerative environment. Identification of molecular and cellular pathways that could either enhance the beneficial effects or dampen the toxic effects of post-stroke inflammation will be critical in developing novel therapies to improve stroke outcome.

In this study, we hypothesized that attenuating the pro-inflammatory component of the post-stroke immune response might reduce stroke severity. Triggering Receptor Expressed in Myeloid Cells 1 (TREM1), an inflammatory type I membrane receptor, is expressed only on myeloid lineage cells and is a potent amplifier of innate immune responses. TREM1 magnifies the pro-inflammatory response by synergizing with classical pattern recognition receptors, such as Toll-like receptors

(TLRs) and Nod-like receptors (NLRs). Since brain ischemia leads to the release of cellular proteins, lipids, and other immunogenic materials from brain, we hypothesized that early post-stroke innate immune responses may be amplified by TREM1. Here we show in a rodent model of transient focal cerebral ischemia that TREM1 is selectively induced in peripheral myeloid cells that traffic to the ischemic brain and that inhibition of TREM1 reduces stroke injury. Unexpectedly, peripheral TREM1 induction occurs not only in spleen but also in intestine, where its expression increased in response to the post-stroke breach in gut permeability driven by increased sympathetic activity. These findings provide evidence that peripheral myeloid cells worsen cerebral injury via TREM1 amplification of immune responses to both sterile brain components and gut microbial pathogens.

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TUESDAY, OCTOBER 23

PLENARY SESSION

ADVANCES IN CELL-BASED THERAPIES FOR NEUROLOGICAL DISEASES

Hematopoietic Stem-Cell Gene Therapy for Cerebral Adrenoleukodystrophy

Florian Eichler, MD, Massachusetts General Hospital and Harvard Medical School

In X-linked adrenoleukodystrophy, mutations in ABCD1 lead to loss of function of the ALD protein. Cerebral adrenoleukodystrophy is characterized by demyelination and neurodegeneration. Disease progression, which leads to loss of neurologic function and death, can be halted only with allogeneic hematopoietic stem-cell transplantation. They enrolled boys with cerebral adrenoleukodystrophy in a single-group, open-label, phase 2-3 safety and efficacy study. Participants were required to have early-stage disease and gadolinium enhancement on magnetic resonance imaging (MRI) at screening. The investigational therapy involved infusion of autologous CD34+ cells transduced with the elivaldogene tavalentivec (Lenti-D) lentiviral vector. Boys with CALD (≤17 years) enrolled in an open-label phase 2/3 study of the safety and efficacy of Lenti-D DP underwent full myeloablation followed by infusion of autologous CD34+ cells transduced with Lenti-D (elivaldogene tavalentivec) lentiviral vector. The primary efficacy endpoint is the proportion of patients who are alive and free of major functional disabilities (MFD) at Month 24. The success criterion for the primary endpoint, defined from an observational study of the natural history of CALD and outcomes from allogeneic transplant, is met for the first 17 patients if the point estimate is ≥76.5% MFD-free survival at Month 24. As of April 2018, 29 patients received Lenti-D DP (median follow-up 34 months, min-max, 0.4-54.0). Of patients with evaluable data at Month 24, 15/17 (88%) remain alive and MFD-free with evidence of disease stabilization. The remaining 12 patients have not yet reached 24 months of follow-up and have had no reported MFDs to date. There was no evidence of replication competent lentivirus or insertional oncogenesis. No graft failure, GvHD, or transplant-related mortality were reported. Most adverse events were consistent with myeloablative conditioning. In conclusion, early results of this study suggest that Lenti-D gene therapy may be a safe and effective alternative to allogeneic stem-cell transplantation in boys with early-stage cerebral adrenoleukodystrophy. Additional follow-up is needed to fully assess the duration of response and long-term safety.

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Developing a Pluripotent Stem Cell-based Cell Therapy for Parkinson's Disease

Claire Henchcliffe, MD, DPhil, FAAN, FANA, Weill Cornell Medicine

Parkinson's disease (PD) affects an estimated 7-10 million subjects worldwide and is a progressive and disabling disease. Cardinal clinical signs, in particular bradykinesia and rigidity, are attributed for the most part to progressive degeneration of dopaminergic input from the substantia nigra to the striatum. This makes cell replacement therapies particularly attractive. Efforts at first generation transplantation treatments have therefore focused on dopamine delivery from several cell sources, including fetal ventral mesencephalic tissue, adrenal medullary cells, and retinal pigment epithelial cells (1). While some results have been encouraging enough to support further efforts [2, 3, 4], these cell sources have all had significant and multiple limitations. A stem cell-based therapy, however, has many advantages: improved homogeneity of cell type; scalability; reproducibility; and access to a standardized cell bank to facilitate rigorous preclinical dosing and safety

studies. A major discovery in 2011 allowed the production of authentic dopamine neurons from human embryonic stem cells (hESCs), that can be derived nearly unlimited numbers and have robust survival and function when engrafted in several animal models of PD [5]. This technology has been refined to produce a clinical grade cell source, that has now undergone extensive testing to optimize storage, dosing considerations, cell stage for transplantation, and to evaluate preclinical safety. We are now on the verge of a first-in-human clinical trial, and considerations in planning, including trial design, cohort, surgical and drug intervention, and outcome measures will be discussed. These key aspects of clinical translation considerations from ours and other groups have been published in 2017 [6].

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Stem Cell Therapies for Amyotrophic Lateral Sclerosis

John D. Glass, MD, Emory University

Amyotrophic Lateral Sclerosis (ALS) is a progressive and incurable neurodegenerative disease where current disease modifying treatments are only minimally effective. The promise of cell based therapies, particularly stem cell therapies, has generated interest from the clinical and research communities, and is seen as a possible "cure-all" by ALS patients and their families (1). The reality is that clinical trials for cell based therapies for ALS are few. Analyses of completed trials show that these treatments are safe, but effectiveness in slowing disease remains to be proven. Stem cell trials for ALS have been completed or are currently underway in North America, Europe and Asia, each with its own cell source and

transplantation method (2-4). Stem cells may be harvested and expanded from fetal CNS tissue and from a variety of adult tissues including blood, bone marrow, fat and umbilical cord. Both allogeneic and isogenic (autologous) transplants have been tested, with the advantage of isogenic cells being that they do not require post-transplant immunosuppression. Delivery is by injection into the spinal cord, brain or spinal fluid. The therapeutic concept underlying cell based therapy is to prolong the survival and function, rather than the replacement of existing motor neurons through trophic or immunological mechanisms, or possibly by the production of new supportive interneurons or astrocytes. There are data demonstrating that intrathecal injection of stem cells can transiently increase growth factor concentrations and anti-inflammatory cytokines in the CSF(4, 5). Stem cells transplanted directly into the spinal cord have been shown to survive and differentiate over long periods of time, providing the possibility of a sustained therapeutic effect (6). Cellular therapy with T-regulatory cells rather than stem cells is another approach that has recently been initiated (7). In summary, cellular therapeutics for ALS is an active area of research and clinical trials. The procedures are safe, but the therapeutic benefit is not yet proven.

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Toward Cell Based Therapy for Retinal Diseases

Donald J. Zack, MD, PhD, Johns Hopkins University

The retinal neurodegenerative diseases are a group of genetically, pathologically, and clinically diverse diseases that all cause retinal cell loss and decreased vision, sometimes resulting in total blindness. In age-related macular degeneration there is damage to and loss of photoreceptor and retinal pigment epithelial (RPE) cells. In the orphan inherited retinal degenerations such as retinitis pigmentosa, primary damage and cell loss is generally restricted to photoreceptor cells. In glaucoma and other forms of optic neuropathy there is damage to and loss of retinal ganglion cells (RGCs). The combination of advances in genome editing and stem cell technology are influencing the retinal degeneration field in multiple ways, providing a ready supply of human retinal neurons for drug discovery efforts (1), allowing the generation of 3-D retinal organoids to model and study retinal development and disease mechanisms (2), and making possible cell-replacement-based studies (3). In terms of exploring the potential use of stem cell-derived retinal cells for cell-based therapies, clinical trials exploring the safety and efficacy of stem cell-derived RPE cells for the treatment of AMD have already begun (4,5). In these trials, there is ongoing debate about the advantages and disadvantages of using ES vs iPS-derived RPE cells. More challenging are ongoing efforts to develop approaches for optic nerve regeneration, which have to deal with additional scientific hurdles such as axonal guidance and formation of appropriate synapses in the brain. In addition to the exciting potential that stem cell biology brings to the retinal disease field, the risks and dangers brought about by unproven and unethical treatments will also be discussed (6).

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PLENARY SESSION

TOWARD DISEASE-MODIFYING THERAPY IN TRAUMATIC BRAIN INJURY

Rehabilitation for Severe TBI: Evidence Based Approaches and Expert Opinion with Insights from Basic Sciences Including an Update on Delayed Neurodegeneration

David L. Brody, MD, PhD, The Uniformed Services University of the Health Sciences, 2018 Raymond D. Adams Lectureship Award Recipient

Rehabilitation after severe TBI starts in the intensive care unit. Seizure prophylaxis, DVT prophylaxis, early mobilization, and prevention if ICU-related infections are central. Treatment of agitation without causing excessive sedation can be performed using propranolol, clonidine and amantadine. Early stimulants (methylphenidate) can improve arousal and are typically safe if seizures are well controlled.

For inpatient rehabilitation, key issues include pain control, agitation, cognitive rehabilitation, gait/balance training, nutrition/hydration, and sleep/wake cycle normalization. Minimizing sedating medications using redirection, structured environment, stimulus control, and light therapy can improve performance in all domains. Again, early use of stimulants can be beneficial (1). In patients with vegetative or minimally conscious state, amantadine treatment may speed recovery (2).

In the outpatient setting, a balance of professional therapies, lifestyle modifications and pharmacological treatments is recommended. Good quality sleep is the 'top of the cascade' facilitating all other areas of recovery (3). Cognitive behavioral therapy, morning bright light therapy, nighttime stimulus control, and melatonin can improve sleep without sedating medications. Spasticity treatment using dantrolene, botulinum toxin, intrathecal baclofen, physical therapy, daily stretching, and careful positioning is recommended to avoid sedation and cognitive impairment. For seizures, lamotrigine and oxcarbazepine are preferred because of their modest side effects and mood stabilizing benefits. Mood disorders are major causes of reduced quality of life after severe TBI. Treatment with cognitive behavioral therapy, exercise, stimulants, and mood stabilizing medications in addition to antidepressants can be helpful. Additional treatments for fatigue, pain, and cognitive dysfunction will be discussed.

In the long term, there is an increased risk of dementia following TBI, which shares clinical and pathological characteristics with Alzheimer's disease. There is no effective treatment at present. The main clinical recommendation is cerebrovascular risk factor control. Chronic traumatic encephalopathy has been most commonly reported in patients with multiple concussive TBIs. Tau pathology can also occur after severe TBI (4), though its role in cognitive deterioration later in life remains unknown. Again, there is no effective treatment at present.

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Concussion, Traumatic Brain Injury, and Chronic Traumatic Encephalopathy: Lessons from the Battlefield, Ball Field, and Lab Bench

Lee E. Goldstein, MD, PhD, Boston University

Traumatic brain injury (TBI) is a signature injury of the recent military conflicts in Iraq and Afghanistan and a leading cause of death and disability in civilians. Emerging evidence implicates repetitive head injury as a trigger for later development of chronic traumatic encephalopathy (CTE), a tau protein neurodegenerative disease reported in contact sport athletes with repetitive head injuries and military veterans with exposure to explosive blasts (1-3). The first part of the talk will introduce the distinctive neuropathology of CTE (4,5) and present evidence of the disease in the first controlled case series of brains from blast-exposed military veterans and comparison to brains from young athletes with neuropathologically-confirmed CTE (3). The second part of the presentation will highlight experimental results obtained from new mouse models of blast and impact neurotrauma developed at Boston University (3,6,7). Examination of brains from mice exposed to experimental blast or closed-head impact injury revealed evidence of CTE neuropathology that recapitulates core features of the human disease. Ultrastructural analysis of brains from mice subjected to experimental blast or impact injury revealed profound damage to the cerebral microvasculature that was detectable in vivo by dynamic neuroimaging. Both injury mechanisms also induced axonal pathology that was accompanied by slowed electrical conduction and defective long-term potentiation (LTP) of synaptic transmission. These abnormalities were detected within 24 hours, persisted for months, and correlated with cognitive deficits and behavioral abnormalities. Experimental analyses showed that blast neurotrauma is not mediated by blast wave transit through the brain or hydrodynamic ("waterhammer") effects as previously thought. Rather, blast neurotrauma is induced by inertial forces from blast wind that cause traumatic acceleration of the head ("bobblehead effect") and parenchymal shearing forces in the brain. These

mechanical forces damage fragile blood vessels and nerve fiber tracts in the brain that trigger secondary neuroinflammation and predictable patterns of neuropathology and functional deficits. Recently, we developed a new mouse model of closed-head impact injury that produces head motion kinematically matched to our blast neurotrauma model. Impact-injured mice exhibit acute onset of transient neurological syndrome analogous to concussion in humans. Impact-injured mice also develop progressive CTE neuropathology and functional deficits that mimic human CTE. Experimental, kinematic, and computational analyses revealed many similarities and surprising differences between blast and impact neurotrauma and their aftermath. Our findings provide new insights into brain injury biomechanics, etiology of concussion, and the pathobiology of TBI and CTE. These results also point to translational pathways for development of new diagnostics, therapeutics, and preventive measures for neurotrauma and its aftermath.

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Harnessing Developmental Mechanisms to Promote TBI Recovery

David C. Giza, MD, University of California, Los Angeles

Traumatic brain injury is a leading cause of acquired disability worldwide, particularly in children and youth. Much is known about the acute neurobiology of TBI; however, the pathophysiological mechanisms that underlie recovery and repair are less well understood, and show important age-related distinctions. Some such distinctions in the early post-injury phase include differences in preferred metabolites, shorter duration of metabolic dysfunction, vulnerability of white matter and changes in synaptic function.1 These developmental differences may underlie age-specific mechanisms of recovery, some of which may also be relevant and reactivated following TBI in the mature brain. This talk will focus on acute and chronic mechanisms after TBI and their translational relevance for therapeutic interventions. Metabolic intervention may include early administration of ketones as a fuel for the injured brain, which have been shown to improve outcomes in preclinical models.2 Unmyelinated axons are more vulnerable to TBI than myelinated ones, this has important implications for pediatric TBI. There is growing evidence that a subset of individuals with corpus callosum dysfunction after moderate-severe TBI will show emerging problems with white matter connectivity and resultant greater cognitive impairments (compared to normally developing peers) when followed longitudinally through development.3 Some of this may reflect differences in acute injury but the progressive nature of the network perturbations suggests that other chronic mechanisms-such as neuroinflammation-may also play an important role and may be accessible to treatment. There is also substantial evidence for synaptic dysfunction after TBI, and changes in excitatory and inhibitory balance can affect glutamatergic and gabaergic neurotransmission. This, in turn, can affect learning, memory and experience-dependent developmental plasticity. Preclinical studies have shown that combination therapy using behavioral/environmental and pharmacological treatments concurrently, in the appropriate time frame, may help promote synaptic recovery and optimal long-term behavioral outcomes.4

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ANA 2018 AWARDEES

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.

TUESDAY, OCTOBER 23

David L. Brody, MD, PhD
THE UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

Presentation Title: Rehabilitation for Severe TBI: Evidence Based Approaches and Expert Opinion with Insights from Basic Sciences Including an Update on Delayed Neurodegeneration

This award will be presented at the Toward Disease-Modifying Therapies in Traumatic Brain Injury Symposium.

Dr. David L. Brody was named Director of the Center for Neuroscience and Regenerative Medicine (CNRM), and joined the Uniformed Services University of Health Sciences (USUHS) faculty in August of 2017. His primary appointment is as Professor of Neurology in the F. Edward Hebert School of Medicine. Dr. Brody's research focuses on accelerating implications for better diagnosis, treatment and outcomes of traumatic brain injury (TBI) in civilian and military populations.

Dr. Brody is a board-certified neurologist with both a research and a clinical specialization in TBI and neurodegenerative diseases. Prior to his directorial and faculty position, Dr. Brody was the Norman J. Stupp Professor of Neurology at the Washington University School of Medicine in St. Louis. Dr. Brody was also the Washington University site director for the National Football League Neurological player care program.

He has developed and authenticated advanced imaging techniques to detect injury in the brain's white matter and showed, for the first time, how to predict neurological function by measuring amyloid, an abnormal protein in the brain. He also helped discover that diffusion tensor imaging-- an advanced magnetic resonance imaging technique-- can reveal blast-related damage.

Dr. Brody previously led a team that worked in partnership with DoD researchers at the Landstuhl Regional Medical Center in Germany and at two sites in Afghanistan treating U.S. military personnel who sustained traumatic brain injury. In 2011, he served as a consultant to the medical advisor of the Chairman of the Joint Chiefs of Staff, traveling to Afghanistan at the request of then-JCS Chairman Admiral Michael Mullen with the "Gray Team", a group of civilian and military experts evaluating the status of TBIs in troops in the combat zone.

Dr. Brody's achievements have been recognized with several awards, including a Career Development Award from the National Institute of Neurological Disorders and Stroke (NINDS), a Burroughs Wellcome Career Award in the Biomedical Sciences, and a National Institutes of Health (NIH) R01 award. His clinical monograph entitled Concussion Care Manual: A Practical Guide was published by Oxford University Press in 2014.

Dr. Brody earned a B.A. in Biological Sciences from Stanford University in 1992 and his M.D. and Ph.D. from The Johns Hopkins School of Medicine in 2000. He completed his internship and neurology residency at Washington University.

F.E. BENNETT MEMORIAL LECTURESHIP AWARD

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

SATURDAY, OCTOBER 20

Beverly L. Davidson, PhD
UNIVERSITY OF PENNSYLVANIA

Presentation Title: Emerging Therapies for Neurogenetic Disorders

This award will be presented at the Viral Vectors in Neurotherapeutics Pre-Meeting Symposium.

Beverly L. Davidson, is Director of The Raymond G. Perelman Center for Cellular and Molecular Therapeutics, the Chief Scientific Strategy Officer, and holds the Arthur V. Meigs Chair in Pediatrics at the Children's Hospital of Philadelphia. She is also Professor of Pathology and Laboratory Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania. Dr. Davidson received her B.S. in Biology from the Nebraska Wesleyan University, and her Ph.D. in Biological Chemistry from the University of Michigan.

Professor Davidson's research is focused on inherited genetic diseases that cause central nervous system dysfunction, with a focus on (1) recessive, childhood onset neurodegenerative disease, in particular the lysosomal storage diseases such as the Mucopolysaccharidoses and Batten's disease; and (2) dominant genetic diseases; for example, the CAG repeat disorders (Huntington's disease (HD) and Spinocerebellar ataxia), and (3), understanding how noncoding RNAs participate in neural development and neurodegenerative diseases processes. Her research on childhood onset neurodegenerative diseases is focused on experiments to better understand the biochemistry and cell biology of proteins deficient in these disorders, and to develop gene and small molecule based medicines for therapy. In recent work, she demonstrated that the application of recombinant viral vectors to animal models of storage disease reversed CNS deficits. To approach therapies for dominant disorders her laboratory developed and tested gene silencing and CrispR/Cas9 editing strategies for reducing expression of the disease gene in patient cells and in mice models. The Davidson lab, along with colleagues experienced in gene-based medicine delivery to humans, are advancing these promising preclinical studies to clinical trials in patients.

Recent honors include the 2009 Mathilde Solowey Award (NIH), the 2011 J.J. Armond Lecturer (AANP), the 2011 Presidential Lecture (UIowa), the 2012 Carver College of Medicine Faculty Service Award (UIowa) and the University of Iowa Innovator Award (2012), the 2014 Chair, Electorate Nominating Committee, Medical Sciences Section (AAAS), appointed to the National Advisory Council, NINDS (2014-2018); 2015 appointee to Scientific Advisory Boards of the Huntington Study Group and the Medical Research Advisory Board of the National Ataxia Foundation, and in 2017 she was elected to the American Academy of Arts and Sciences.

Dr. Davidson is a co-founder of Spark Therapeutics, Inc., and Talee Bio Inc., and serves on the Scientific Advisory Boards of Sarepta Therapeutics and Intellia Therapeutics.

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.

MONDAY, OCTOBER 22

Dmitri Krainc, MD, PhD
NORTHWESTERN UNIVERSITY

Presentation Title: The Interplay of Mitochondria and Lysosomes in Neurodegeneration

This award will be presented at the Lewy Body Dementia: From Symptoms to Synuclein Presidential Symposium.

Dr. Krainc is Aaron Montgomery Ward Professor of Neurology, Chairman of Department of Neurology and Director of Center for Neurogenetics at Northwestern University Feinberg School of Medicine. Prior to joining Northwestern, Dr. Krainc spent more than two decades at Harvard serving on the neurology faculty at the Massachusetts General Hospital where he also completed neurology residency and fellowship in movement disorders. Dr. Krainc is studying rare genetic diseases that are clinically and genetically linked to more common neurodegenerative conditions to identify novel therapeutic targets for these disorders.

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN BASIC SCIENCE

A basic and a clinical award is 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 as one who will continue making major contributions to the field of neurology.

SUNDAY, OCTOBER 21

Peter K. Todd, MD, PhD
UNIVERSITY OF MICHIGAN

Presentation Title: How Repeats Break the Rules to Cause Neurodegeneration

Dr. Todd is the Bucky and Patti Harris Professor of Neurology at the University of Michigan and the Ann Arbor VA Medical Center. He graduated from the University of California, San Diego and obtained his medical and doctoral degrees at the University of Wisconsin. He completed his residency in neurology at the Hospital of the University of Pennsylvania, where he did research with J. Paul Taylor, M.D., Ph.D. He moved to Michigan as an AAN clinical research fellow in movement disorders and neurogenetics with Henry L. Paulson, M.D., Ph.D. He joined the faculty at Michigan in 2010.

Lauren Sansing, MD, MS
YALE UNIVERSITY

Presentation Title: Inflammation and Resolution after Intracerebral Hemorrhage- lessons from mouse and man

Dr. Sansing is Associate Professor of Neurology at Yale University and the Academic Chief of Stroke and Vascular Neurology. Her laboratory investigates the role of innate immune responses after intracerebral hemorrhage in experimental murine in vivo and in vitro models, as well as ex vivo models using patient blood and surgical specimens. As a physician-scientist, her goal is to identify the pathological processes that lead to brain injury in our patients, as well as the processes that aid in recovery and repair. With this understanding, we can develop targeted therapeutics to minimize injury after stroke and maximize recovery.

DEREK DENNY-BROWN YOUNG NEUROLOGICAL SCHOLAR AWARD IN CLINICAL SCIENCE

Alice Chen-Plotkin, MD
UNIVERSITY OF PENNSYLVANIA

Presentation Title: Big screens and where you go from there: Towards translation in the neurodegenerative diseases

Alice Chen-Plotkin was a Phi Beta Kappa graduate and English literature major at Harvard University, before beginning her scientific training as a Rhodes Scholar at Oxford University. She subsequently returned to Harvard for medical school and neurology training, moved to the University of Pennsylvania for fellowship training, and joined the faculty at the Perelman School of Medicine at the University of Pennsylvania in 2010. She previously won the 2014 American Academy of Neurology Jon Stolk Award for research in Movement Disorders. She is an immigrant (born in Taiwan), a scientific late bloomer (would-be poet), and a mother of two.

THE GRASS FOUNDATION-ANA AWARD IN NEUROSCIENCE

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

Michael Wilson, MD
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Presentation Title: Metagenomic Approaches Advance Our Understanding of Infectious Encephalitis

Dr. Wilson is an Assistant Professor of Neurology at UCSF and holds the Debbie and Andy Rachleff Distinguished Professorship in Neurology. He obtained his medical degree from UCSF and completed a neurology residency at Massachusetts General and Brigham and Women's Hospitals. He then pursued a clinical and research fellowship in neuro-infectious diseases at MGH and Boston University's National Emerging Infectious Diseases Laboratories before completing a postdoctoral fellowship in metagenomics with Dr. Joseph DeRisi at UCSF. His laboratory develops genomic technologies to identify novel and unusual causes of infectious meningoencephalitis and to identify triggers and autoantigens in neuroinflammatory disease.

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.

Ahmet Hoke, MD, PhD
JOHNS HOPKINS UNIVERSITY

Presentation Title: Development of EQ-6 for Neuroprotection Against Chemotherapy-induced Peripheral Neuropathy

Dr. Ahmet Hoke is Professor of Neurology and Neuroscience and Director of the Daniel B. Drachman Division of Neuromuscular Diseases at Johns Hopkins University School of

Medicine. Dr. Hoke's clinical and research interest focuses on peripheral nerve diseases and nerve regeneration. In 2005, he received the coveted Derek Denny Brown Young Neurological Scholar Award given by the American Neurological Association and was named the Myung Memorial Lecturer at the Korean Neurological Association meeting in 2017. He serves on several editorial boards and is the Editor-in-Chief of Experimental Neurology and Associate Editor for Annals of Clinical and Translational Neurology.

Dr. Hoke's research interest includes studies on biology of peripheral axons and Schwann cells and disorders affecting the peripheral nervous system. He uses in vitro and in vivo models of peripheral neuropathies (chemotherapy induced peripheral neuropathy, HIV-associated sensory neuropathy, and diabetic neuropathy) to study the mechanisms of axonal degeneration and identify therapeutic targets for drug development. In addition, he has a research interest on mechanisms of axonal regeneration focusing on chronic nerve injuries.

TRAVEL AWARDEES

Each year the ANA selects the top abstracts submitted by fellows. Residents. Students, or junior faculty to receive a travel award to attend the Annual Meeting and present their work. For more information please visit the main ANA website.

Poster numbers listed with an **"S"** will be presented **Sunday, October 21**

Poster numbers with an **"M"** will be presented **Monday, October 22**

Ogata Hidenori, MD, PhD, *Kyushu University*
S101 A Combined Immunogenetic and Cerebrospinal Fluid Cytokine Study in Anti-neurofascin155 Antibody-positive Neuropathy

Gregory Day, MD, MSc, *Washington University in St. Louis*
S102 Quantifying Biomarkers of Neuronal Injury, Neuroinflammation and Neurotransmission in Antibody-Mediated Encephalitis

Amanda Piquet, MD, *University of Colorado*
S103 Clinical Features of Glycine Receptor Antibody Syndrome: A Series of Eleven Cases

Lauren Reoma, MD, *National Institute of Neurological Disorders and Stroke (NINDS)*
S104 Reversal of Immune Exhaustion Against HIV in Two Patients Following Anti-PD1 Therapy

Salman Farooq, MBBS, *Aga Khan University*
S124 Frequency and Impact of Cerebral Infarctions in Patients with Tuberculous Meningitis

Kristin Guilliams, MD, MSCI, *Washington University in St. Louis*
S125 Cerebral Oxygen Metabolism within the Watershed Region is Age-dependent Reflecting Peak Metabolic Demand and Increased Stroke Risk in Young Children

Jason Hinman, MD, PhD, *University of California, Los Angeles*
S126 Subcortical Stroke Primes Tau Phosphorylation and Impairs Dendritic Complexity in Cortical Neurons Through Up-regulation of the Microtubule Affinity-regulating Kinase, Mark4

Aaron Matthews, BSN, MSN, *University of Virginia*
S127 iTREAT: Novel Telestroke Application with Rural EMS Providers

Mellanie Springer, MD, MSc, *Albert Einstein College of Medicine*
S128 Racial Disparities in Hospital Arrival After Stroke

Syed Ali Raza, MD, *Louisiana State University Shreveport*
S130 Temporal Profiles of Kv1.3 Channel Expression By Microglia Following Transient Middle Cerebral Artery Occlusion

Thomas Wingo, MD, *Atlanta VA Medical Center*
S151 Quantitative Proteomics of the Human Brain Reveals Proteins Associated with Cognitive Resilience

Michelle Caunca, BSc, *University of Miami Miller School of Medicine*
S153 Greater Body Mass Index is Associated with Smaller Cortical Thickness in the Alzheimer Disease-Signature Regions: The Northern Manhattan Study

Erik Musiek, MD, PhD, *Washington University in St. Louis*
S154 Circadian Clock Disruption Differentially Regulates Amyloid-beta and Tau Pathology in Mouse Models of Alzheimer Disease

Rabab Al-Lahham, PhD, *The University of Texas Medical Branch*
S155 Immunotherapy Targeting Tau Oligomeric Strains in Aged Transgenic Animals of Tauopathy

Lingyan Ping, PhD, *Emory University*
S158 Quantitative Proteomics of CSF and Plasma Reveals Candidate Biomarkers Linked to Immune-related Pathways in Alzheimer's Disease

Measho Abreha, PhD, *Emory University*
S159 Comprehensive Mapping of Alzheimer's Disease Brain Ubiquitin Pattern Revealed Novel Tau Ubiquitylation Sites

Defne Amado, MD, PhD, *University of Pennsylvania*
S161 AAV-Mediated Progranulin Delivery to a Mouse Model of Progranulin Deficiency Causes TCell-Mediated Hippocampal Degeneration

Luis Paixao, MD, MSc, *Massachusetts General Hospital and Harvard Medical School*
S163 EEG-Based Brain Age and Its Relation with Mortality

Barbara Stopschinski, MD, *University of Texas Southwestern Medical Center*
S165 Specific Glycosaminoglycan Chain Length and Sulfation Patterns Are Required for Cell Uptake of Tau vs. α-synuclein and β-amyloid Aggregates

Wyatt Bensken, BS, *National Institute of Neurological Disorders and Stroke (NINDS)*
S176 The Research Enterprise: Understanding Neurologist's Contributions to Science and the Pathway to Becoming a Successful Physician-Scientist

Ushtar Amin, MD, *University of South Florida*
S182 Association Between POSTS and Lambda Waves on EEG

Raquel Valdes Angues, PhD, MScGH, *Oregon Health & Science University*
S192 Real-time Medical Cartography of Nodding Syndrome Built by Village-based Lay Health Reporters

Amir Abdallah, MD, *Mbarara University of Science and Technology*
S194 Validation of the Intracerebral Hemorrhage Score in Uganda: A Prospective Cohort Study

Adys Mendizabal, MD, MA, *Hospital of the University of Pennsylvania*
S203 Comorbid Disease Drives Short Term Hospitalization Outcomes in Multiple Sclerosis Patients

Kelly Harper, BPS, *Vanderbilt University*
S204 Patient Satisfaction with a Teleneurology Service Provided via Tablet Technology

Nicole Rosendale, MD, *University of California, San Francisco*
S205 Inpatient Neurologic Care of Homeless Individuals

Camden MacDowell, MD, *Princeton University*
S208 Towards Adaptive Neural-prosthetics: Using Closed-loop Machine Learning Algorithms and Multi-site Electrical Micro-stimulation to Produce Specific Neural Firing Patterns

Abby Olsen, MD, PhD, *Partners Neurology*
S211 Defining the Contribution of Glia to Alpha-synucleinopathies

Taylor Floyd, BS, *Weill Cornell Medicine*
S213 A Mouse Model of Human Recessive Cerebellar Ataxia: Point Mutation in Small Nuclear RNA, Rnu12

Matthew Barrett, MD, MSc, *University of Virginia*
S214 Cholinergic Nucleus 4 Density and Cognition in Parkinson Disease

Michelle Fullard, MD, MS, *University of Pennsylvania*
S215 State-level Prevalence, Utilization and Cost Varies Widely Among Medicare Beneficiaries with Parkinson's Disease

Taiki Yabumoto, MD, *Osaka University*
S217 Establishment of Slowly Progressive Parkinson's Disease Marmoset Model by á-synuclein Fibril Injection

Mikayla Roof, *Vanderbilt University*
S218 Effects of BDNF rs6265 Genotype and Exercise on Quality of Life in Patients with Parkinson's Disease

Angela Deutschlander, MD, *Mayo Clinic Florida*
S219 Genetic Risk Variants for Parkinson's Disease (PD) and for Cognitive Impairment and Their Influence on Clinical Features in PD

Baijayanta Maiti, MD, PhD, *Washington University in St. Louis*
S221 Cerebellar Resting State Functional Connectivity in Parkinson Disease-The Spotlight Veers to the Vermis

David Coughlin, MD, *University of Pennsylvania*
S222 Regional [18F]-AV1451 Uptake in DLB

Philip Lee, BS, *Medical University of South Carolina*
S226 Executive Function Differences Between Pharmacologic Sub-types of Parkinson's Freezing of Gait

Brian Trummer, MD, PhD, *National Institute of Neurological Disorders and Stroke (NINDS)*
S229 Cross-sectional Validation Study of the Spastic Paraplegia Rating Scale (SPRS) and SF-36 Health Questionnaire in Hereditary Spastic Paraplegia

Pavan Bhargava, MD, *Johns Hopkins University*
S249 Bile Acid Metabolism is Altered in Multiple Sclerosis

Francesca Cignarella, PhD, *Washington University in St Louis*
S250 Immunomodulatory Role of Adiponectin in Experimental Models of Multiple Sclerosis

Karla Gray-Roncal, MS, *Johns Hopkins University*
S251US-based African Americans with Multiple Sclerosis Have Greater Disability and Lower Socio-economic Status Than Caucasian Americans

Yuri Nakamura, MD, PhD, *Kyushu University*
S252 A Comparison of Brain MRI Features Between Asian and Caucasian Patients with Multiple Sclerosis

John Ciotti, MD, *Washington University in St. Louis*
S253 Validation of Algorithm to Retrospectively Capture the Expanded Disability Status Scale in Patients with Multiple Sclerosis

Sudeep Rajpoot, MD, *American University of Antigua*
S261 Hyperammonemia Encephalopathy: A Rare Cause in a Healthy Child

Stefanie Geisler, MD, *Washington University in St. Louis*
S268 SARM1 Dominant-Negative-A New Therapeutic Approach to the Treatment of Axonal Degeneration

Jamal Mohamud, BS, *Michigan State University*
S295 The Proteasome: Targeting the NF-κB pathway in the Treatment of Glioblastoma Multiforme

Dana Almedallah, MBBs, *Imam Abdulrahman Bin Faisal University*
S296 Implementing Apparent Diffusion Coefficient Values to Distinguish Types of Pediatric Brain Tumor: A Possible Approach

Scott DeBoer, MD, PhD, *Johns Hopkins University*
S301 Cerebrolysin After Stroke Leads to Spontaneous Motor Recovery in the Absence of Reduced Stroke Volume in a Mouse Model of Stroke

ANA 2018 AWARDEES

Nigel Pedersen, MD, *Emory University*
S306 The Supramammillary Node of the Ascending Arousal System-Afferent and Efferent Connections

Alice Bittar, PhD, *The University of Texas Medical Branch*
S311 Characterization, Toxicity and Propagation of TBI Brain-derived Soluble Tau Strains

Maria Pia Giannoccaro, MD, *University of Oxford*
M101 Passive Transfer of Human CASPR2 Antibodies Into Mice Causes Behavioral and Neuropathological Changes

Sebastian Lopez-Chiriboga, MD, *Mayo Clinic*
M102 LGI1 and CASPR2 Autoimmunity Phenotype and Outcome in Pediatric Patients

Sophie Duong, *Yale School of Medicine*
M103 Neurotoxicities Associated with Immune Checkpoint Inhibitor Therapy

Sara Dehbashi, MD, *The University of Texas Medical Branch*
M104 Co-occurrence of Multiple Sclerosis and Myasthenia Gravis

Neel Fotedar, MD, *University Hospitals Cleveland Medical Center*
M105 A Novel Autoimmune Encephalitis-Neuromyelitis Optica Spectrum Disorder Overlap Syndrome

Aradhana Sahoo, BS, *Mayo Clinic*
M117 TDP-43 Associated Hippocampal Atrophy Evaluated with FreeSurfer Subfield Analysis

Yukako Kawasaki, MD, *Johns Hopkins University*
M118 Head Circumference and Brain Volume

Alexander Merkler, MD, *Weill Cornell Medicine*
M122 Duration of Heightened Ischemic Stroke Risk After Acute Myocardial Infarction

Amir Shaban, MD, *University of Iowa*
M123 Novel Score to Predict Outcomes in Patients with Cerebral Venous Sinus Thrombosis

Sidhant Varma, MS, *Medical College of Wisconsin*
M124 Identifying Neural Correlates of Speech Articulation Speed in Chronic Stroke Patients

Alison Cloutier, MS, *Massachusetts General Hospital*
M125 Clinical Translation of Early Clinical and Neuroimaging Biomarkers to Predict Stroke Motor Recovery

Vahid Eslami, MD, *University of Texas Health Science Center*
M126 An Overview of the Characteristics of Ischemic Stroke Clinical Trials in The Last Decade

Laura Stein, MD, *Icahn School of Medicine at Mount Sinai*
M127 Readmission to Another Hospital Following Acute Stroke Admission is Associated With Worse Outcomes: Nationally Representative Data

Roland Faigle, MD, PhD, *Johns Hopkins University*
M128 Racial and Ethnic Differences in Dysphagia Severity and Feeding Tube Placement After Intracerebral Hemorrhage

Mohammed Badi, MD, *Mayo Clinic Florida*
M129 Total Cerebral Small Vessel Disease Score and All-cause Mortality in the Mayo Clinic Florida Familial Cerebrovascular Disease Registry

Jacqueline Palmer, DPT, PhD, *Emory University*
M130 Interhemispheric Connectivity Between Lower Limb Motor Regions in Stroke Survivors

Nicolas Barthélemy, PhD, *Washington University in St. Louis*
M150 Profiling Alzheimer Disease Stages in Dominantly Inherited Alzheimer Disease Using CSF Tau Phosphorylation Isoforms: Position Matters

Christopher Brown, PhD, *University of Kentucky*
M152 Cerebrovascular and Alzheimer's Pathology Preferentially Affect White Matter Pathways Within Large Scale Brain Networks Compared to Pathways Between Networks

Chadwick Hales, MD, PhD, *Emory University*
M153 Proteomic Changes in Frontotemporal Lobar Degeneration Due to Microtubule Associated Protein Tau (MAPT) Mutations

Urmi Sengupta, MS, *The University of Texas Medical Branch*
M155 The Role of α-Synuclein Strains on Tau Aggregation in Disease Pathology

Rafi Haque, BSE, *Emory University*
M156 A Passive Assessment of Discrimination Memory During Healthy Aging, Mild Cognitive Impairment, and Alzheimer's Disease

Keenan Walker, PhD, *Johns Hopkins University*
M157 Systemic Inflammation During Midlife and Cognitive Change Over 20 Years: The ARIC Study

Eric Dammer, PhD, *Emory University*
M159 Effects of APOE Genotype on Protein Co-expression in Alzheimer's Disease

Alex Nackenoff, PhD, *Vanderbilt University*
M160 PLD3 Alzheimer's Risk Gene Functional Analysis

Yuka Miyamoto, MD, *Kochi Medical School*
M162 Clinical and Neuropathological Features of Seven Cases of Neuronal Intranuclear Inclusion Disease (NIID)

Carolin Koriath, MD, *University College London*
M163 Predictors for a Dementia Gene Mutation Based on Gene-Panel Next-Generation Sequencing of a Large Dementia Referral Series

Nicholas Seyfried, PhD, *Emory University*
M164 Establishing a Roadmap for Brain-based Protein Biomarkers in Alzheimer's Disease

Ahmed Bahrani, MS, *University of Kentucky*
M165 Semi-Automated Volumetric Quantifying Method of Cerebral Microhemorrhage Using T2*-Weighted MRI Images

Rebecca DiBiase, BA, *Johns Hopkins University*
M166 The Effects of Gravidity and Parity on Risk of Cognitive Impairment and Amyloid Plaque Deposition

Mohammad Tabaeizadeh Fesharaki, MD, *Massachusetts General Hospital*
M180 Levosimendan Exerts Anticonvulsant Properties Against PTZ-induced Seizures in Mice Through Activation of nNOS/NO Pathway: Role for KAPT Channel

Churl-Su Kwon, MD, MPH, *Icahn School of Medicine at Mount Sinai*
M182 Readmission After an Epilepsy Surgical Intervention-a Nationwide Cohort Analysis

Vaibhav Goswami, MD, *New York Medical College*
M183 Na Channel Agents are Not Interchangeable: Precision Epilepsy Therapy Using Quinidine vs. Phenytoin in KCNT1 Associated Migrating Partial Seizures of Infancy

Scott Woolf, DO, *Westchester Medical Center*
M184 Occipital Seizures Related to Non-ketotic Hyperglycemia (NKH)

Bridgette Jeanne Billioux, MD, *National Institute of Neurological Disorders and Stroke (NINDS)*
M191 Case Series of Ebola Survivors from Liberia with Neurological Sequelae Undergoing In-Depth Neurological Evaluation at the National Institutes of Health

Furqan Waseem, MD, *SUNY Upstate Medical University*
M195 Post-Malaria Neurological Syndrome

Altaf Saadi, MD, *University of California, Los Angeles*
M204 Mistrust of Researchers, Not Physicians, Predicts Stroke Knowledge: Analysis of a Randomized Behavioral Intervention Trial Among Black, Latino, Korea and Chinese Americans

Sneha Mantri, MD, MS, *University of Pennsylvania*
M205 Ethnic and Geographic Disparities and Frank Prescribing Errors in Parkinson Disease

Jordan Clay, MD, *University of Kentucky*
M206 Alert Protocol Reduces Time to Administration of Second-line Antiseizure Medications for Status Epilepticus

Mohammad Shahnawaz, PhD, *University of Texas Medical School at Houston*
M213 A Highly Sensitive and Specific Biochemical Test for the Diagnosis of Parkinson's Disease Based on Detection of Alpha-Synuclein Oligomers in Cerebrospinal Fluid

Sinem Balta Beylergil, MD, *Case Western Reserve University*
M215 Predicting Prevalence and Irregularity of Dystonic Tremor Using Machine Learning

Suman Dutta, PhD, *University of California, Los Angeles*
M216 α-synuclein in Brain-derived Blood Exosomes Distinguishes Multiple System Atrophy From Parkinson's Disease

K. Cannard, *Vanderbilt University*
M218 Feasibility of Recruitment in Clinical Trials Investigating Deep Brain Stimulation as a Treatment in Early-Stage Parkinson's Disease

Krisna Maddy, BA, *University of Pennsylvania*
M219 Alzheimer's Disease Genetic Risk Variants Predict Cognitive Decline in Parkinson's Disease

Richa Tripathi, MD, *Emory University*
M221 Deep Brain Stimulation in Parkinson: Use of Kinematics to Study Impact of DBS on Gait

Albert Davis, MD, PhD, *Washington University in St. Louis*
M222 Regulation of alpha-synuclein Pathology by Apolipoprotein E

Mallory Hacker, PhD, *Vanderbilt University*
M225 Asymmetric Effects of Bilateral Deep Brain Stimulation on Underlying Motor Symptoms in Early Stage Parkinson's Disease

Tuhin Virmani, MD, PhD, *University of Arkansas*
M226 Differential Gait Progression in Idiopathic Parkinson's Disease with and without Freezing of Gait

Allison Bay, MPH, *Emory School of Medicine/Atlanta VA Hospital*
M227 The Association Between Parkinson's Disease Symptom Side-of-Onset, Performance on the Unified Parkinson's Disease Rating Scale Part IV: Motor Complications, and Environmental Exposures

Tritia Yamasaki, MD, PhD, *University of Kentucky*
M229 Distinct Biochemical and Morphological Characteristics of Proteopathic alpha-Synuclein Derived from Parkinson's Disease and Multiple System Atrophy Brain are Maintained on in vitro Passage

Ryan Schubert, MD, *University of California, San Francisco*
M251 Using Comprehensive Phage Display Coupled With Next-generation Sequencing to Define the Evolution of Autoantibodies and Viral Antibodies in the Two Years After a First Demyelinating Event

Bailey Loving, BS, *University of Colorado, Denver*
M252 The Role of Microglial Lipoprotein Lipase in Remyelination

Xiaoming Jia, MD, MEng, *University of California, San Francisco*
M253 Interrogation of Exonic Variants in Secondary Progressive Multiple Sclerosis Uncovers Mutations in Genes for Hereditary Spastic Paraplegias

Yi Li, *Weill Cornell Medicine-Qatar*
M254 Corneal Confocal Microscopy: An Ophthalmologic Endpoint for Inflammatory Cells in Patients with Multiple Sclerosis

Peter Forgacs, MD, *Weill Cornell Medicine*
M261 Characterization of Network Connectivity in EEG Recordings: Applications to Post-cardiac Arrest Coma

Payam Mohassel, MD, *National Institutes of Health (NIH), National Institute of Neurological Disorders and Stroke (NINDS)*
M268 Dysregulation of the TGF-beta Pathway in Collagen VI-related Muscular Dystrophy Predisposes Myofibers to Injury and Interferes With Muscle Regeneration

Jeffrey Ehmsen, MD, PhD, MPH, *Johns Hopkins University*
M269 Searching for Targets to Modify the Trajectory of Neurogenic Skeletal Muscle Atrophy

Brett Morrison, MD, PhD, *Johns Hopkins University*
M271 Focal Reduction of Monocarboxylate Transporter 1 (MCT1) in Macrophages Delays Peripheral Nerve Regeneration

Gary Zirpoli, PhD, *Massachusetts General Hospital and Harvard Medical School*
M273 Anthropometric, Lifestyle and Hormonal Risk Factors for Peripheral Neuropathy in the Nurses' Health Study-II

Marie Wencel, BS, *University of California, Irvine*
M274 Feasibility and Validation of Modified Oculobulbar Facial Respiratory Score (mOBFRS) in Sporadic Inclusion Body Myositis

Yolanda Pina, MD, *University of South Florida*
M295 Personalized Medicine Diagnosis and Response to Treatment with Braf Mek Inhibition in a Pleomorphic Xanthoastrocytoma Patient

Havva Keskin, PhD, *Emory University*
M296 Understanding The Role of GabaA Receptors in Medulloblastoma as a Therapeutic Target

Milan Chheda, MD, *Washington University in St. Louis*
M298 Developing Zika Virus as a New Treatment for Glioblastoma

Asher Albertson, MD, PhD, *Washington University in St. Louis*
M302 Axonal Sprouting of Thalamocortical Neurons is Essential for Recovery After Thalamic Injury

Jon Willie, MD, PhD, *Emory University*
M305 Direct Electrical Stimulation of the Lateral Hypothalamic Area Consolidates Wake and Ameliorates Cataplexy in a Mouse Model of Narcolepsy Type 1

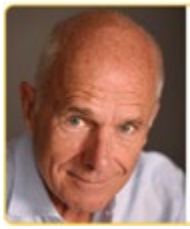
Jagan Pillai, MBBS, PhD, *Cleveland Clinic*
M306 Alteration of Unique Neuroinflammatory Mediators Relative to Sleep Dysfunction in Alzheimer's Disease with Mild Cognitive Impairment

Emily Hokett, BA, *Georgia Institute of Technology*
M307 Age-Related Changes in Sleep Quality, Associative Memory, and Oscillatory Power

Andrea Schneider, MD, PhD, *Johns Hopkins University*
M311 Head Injury and Long-Term Risk of Cognitive Decline and Dementia: the Atherosclerosis Risk in Communities (ARIC) Study

ACADEMIC NEUROLOGY REPRESENTATIVES FROM GERMANY

We are pleased to have two representatives from the German Society of Neurology participating in sessions of the ANA 2018 Annual Meeting



Peter Berlit, MD, FAAN, FANA, FAAEM

Peter Berlit, MD is the secretary general of the German Society of Neurology in Berlin, Germany. He made his medical degree (MD) at the University of Marburg, Germany in 1976, followed by a neurology residency at the university hospital in Heidelberg (FMH 1992). In 1985 venia docendi (associate professor) in Neurology, University of Heidelberg, and from 1985 to 1992 Professor and Vice-Chair, Neurology Dept., University Hospital, Mannheim. In 1990, visiting professorship at the Department of Rheumatology, University of California, San Diego, USA. From 1992 through 2017 Professor of Neurology and Chair, Neurology Department, Alfried Krupp Hospital, Essen Germany. Since 2018 secretary general of the German Society of Neurology, Berlin.

Expertise in general neurology, neuroimmunology, stroke, and peripheral nerve diseases.

Memberships European Academy of Neurology, American Academy of Neurology, American Neurological Association, American Association of Electrodiagnostic Medicine

Publications: more than 300 articles and several teaching books (selection):

Memorix spezial-Neurologie. VCH Weinheim 1990, 1991, 1994, 2006, 2009, 2014

Klinische Neurologie. VCH Weinheim 1992; McGraw Hill Milano 1994

Vasculitis, Rheumatic Disease and the Nervous System. Springer Berlin 1993

Basiswissen Neurologie. Springer Berlin 1994, 1996, 1998, 2001, 2007, 2009, 2013

Klinische Neurologie. Lehrbuch für Fachärzte. Springer Berlin 1999, 2006, 2011, 2018

Neurologie und Innere Medizin interdisziplinär. Thieme Stuttgart 2004, 2010

Professor Berlit will be moderating the Interactive Lunch Workshop on Comprehensive Management of Large Arterial Cerebral Infarction (LACI) on "Diagnosis and Management of Rare Causes of Stroke" scheduled on Sunday, October 21

from 11:45 AM-1:00 PM. He will also be presenting in the Special Interest Group session on Cerebrovascular Disease and Interventional Neurology on "Diagnosis and Management of Rare Causes of Stroke-Including RCVS, ABRA, Moyamoya and Vasculitis" scheduled on Monday, October 22 from 3:30 PM-5:30 PM.

Christine Klein, MD, FANA, FEAN

Dr. Christine Klein is a Professor of Neurology and Neurogenetics. She studied medicine in Hamburg, Heidelberg, Luebeck (1988-1994), and London (with Dr. N.P. Quinn in 1994/1995). She moved to Boston from 1997-1999 for a fellowship in Molecular Neurogenetics under the mentorship of Dr. X.O. Breakefield. Dr. Klein completed her neurology training at Luebeck University with Dr. D. Koempf in 2004, followed by a series of summer sabbaticals in movement disorders with Dr. A.E. Lang in Toronto, Canada in 2004-2015. She was appointed Lichtenberg Professor at the Department of Neurology of Luebeck University in 2005, where her research has focused on the clinical and molecular genetics of movement disorders and its functional consequences. In 2009, Dr. Klein has been awarded a Schilling Section of Clinical and Molecular Neurogenetics at the University of Luebeck and has become Director of the newly founded Institute of Neurogenetics in 2013.

Dr. Klein has published over 400 scientific papers and is the 2008 recipient of the Derek Denny-Brown Award of the American Neurological Association. She is an Associate Editor of 'Annals of Neurology' and of 'Movement Disorders' and a member of the editorial board of 'Neurology'. She is head of the Neurogenetics Working Group of the German Neurological Society and has been a member of the standing committee of the Neuroscience Study Section of the German Research Foundation and of the Wellcome Trust's Molecular Neurobiology Expert Review Group, as well as chair of the Congress Scientific Program Committee of the 2016/2017 Annual Congresses of the International Parkinson and Movement Disorder Society, and President-Elect of the German Neurological Society.

Dr. Klein is a Co-Chair in the Interactive Lunch Workshop on Movement Disorders scheduled on Sunday, October 21, 2018 from 11:45 AM-1:00 PM. She is presenting in the Interactive Lunch Workshop on New Developments In Dystonia on "Update on Genetics in Dystonia" on Monday, October 22, 2018 at 11:45 AM-1:00 PM. Dr. Klein is presenting in the Special Interest Group on Movement Disorder on "Genetics of Paroxysmal Movement Disorders: An Update" on Monday, October 22, 2018 at 3:30 PM-5:30 PM.

ANA 2018 ABSTRACT REVIEWERS

We want to thank the experts who reviewed the 429 abstracts submitted in 18 categories for selection for inclusion in this year's Poster presentations. They performed an outstanding service for ANA. Based on these ratings and comments, authors of 58 impressive studies were selected to give short oral presentations of their abstracts named, "Data Blitz Presentations", during both plenary and special interest group sessions.

David Alexander, MD, *University of California, Los Angeles*

Beau Ances, MD, PhD, *Washington University in St. Louis*

Rahila Ansari, MD, MS, *Case Western Reserve University*

Aaron Berkowitz, MD, PhD, *Brigham and Women's Hospital and Harvard Medical School*

Kerstin Bettermann, MD, PhD, *Pennsylvania State College of Medicine*

Pavan Bhargava, MD, *Johns Hopkins University*

Gretchen Birbeck, MD, MPH, DTMH, FAAN, *University of Rochester*

Craig Blackstone, MD, PhD, *National Institute of Neurological Disorders and Stroke (NINDS)*

Chantale Branson, MD, *Morehouse School of Medicine*

Robert Brown, MD, MPH, *Mayo Clinic*

Dongming Cai, MD, PhD, *Icahn School of Medicine at Mount Sinai*

S. Thomas Carmichael, MD, PhD, *University of California, Los Angeles David Geffen School of Medicine*

Sherita Chapman Smith, MD, *Virginia Commonwealth University*

Stacey Clardy, MD, PhD, *University of Utah*

Salvador Cruz-Flores, MD, MPH, *Texas Tech University Health Sciences Center*

William T. Dauer, MD, *University of Michigan*

Adam de Havenon, MD, *University of Utah*

Monica Dhakar, MD, *Emory University*

Exuperio Diez-Tejedor, MD, PhD, FAHA, FESO, *La Paz University Hospital, Autonoma University of Madrid, Madrid, Spain*

Xiang Fang, MD, PhD, *University of Texas Medical Branch*

Denson Fujikawa, MD, *University of California, Los Angeles*

Christian Gericke, MD, *University of Queensland*

Barbara Giesser, MD, *University of California, Los Angeles*

Elias Giraldo, MD, MS, *University of Central Florida*

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to learn about GOCOVRI and Adamas, and meet our team!

GOCOVRI™ (amantadine) extended release capsules is the first and only medicine approved by the FDA for the treatment of dyskinesia in patients with Parkinson's disease receiving levodopa-based therapy, with or without concomitant dopaminergic medications.

IMPORTANT SAFETY INFORMATION

CONTRAINDICATIONS

GOCOVRI is contraindicated in patients with creatinine clearance below 15 mL/min/1.73 m^2.

WARNINGS AND PRECAUTIONS

Falling Asleep During Activities of Daily Living and Somnolence: Patients treated with Parkinson's disease medications have reported falling asleep during activities of daily living. If a patient develops daytime sleepiness during activities that require full attention (e.g., driving a motor vehicle, conversations, eating), GOCOVRI should ordinarily be discontinued or the patient should be advised to avoid potentially dangerous activities.

Suicidality and Depression: Monitor patients for depression, including suicidal ideation or behavior. Prescribers should consider whether the benefits outweigh the risks of treatment with GOCOVRI in patients with a history of suicidality or depression.

Hallucinations/Psychotic Behavior: Patients with a major psychotic disorder should ordinarily not be treated with GOCOVRI because of the risk of exacerbating psychosis. Observe patients for the occurrence of hallucinations throughout treatment, especially at initiation and after dose increases.

Dizziness and Orthostatic Hypotension: Monitor patients for dizziness and orthostatic hypotension, especially after starting GOCOVRI or increasing the dose.

Withdrawal-Emergent Hyperpyrexia and Confusion: Rapid dose reduction or abrupt discontinuation of GOCOVRI, may cause an increase in the symptoms of Parkinson's disease or cause delirium, agitation, delusions, hallucinations, paranoid reaction, stupor, anxiety, depression, or slurred speech. Avoid sudden discontinuation of GOCOVRI.

Impulse Control/Compulsive Behaviors: Patients may experience urges (e.g. gambling, sexual, money spending, binge eating) and the inability to control them. It is important for prescribers to ask patients or their caregivers about the development of new or increased urges. Consider dose reduction or stopping medications.

ADVERSE REACTIONS

The most common adverse reactions (>10%) were hallucination, dizziness, dry mouth, peripheral edema, constipation, fall, and orthostatic hypotension.

DRUG INTERACTIONS

Other Anticholinergic Drugs: The dose of GOCOVRI should be reduced if atropine-like effects are observed.

Drugs Affecting Urinary pH: The pH of the urine has been reported to influence the excretion rate of amantadine. Monitor for efficacy or adverse reactions under conditions that alter the urine pH.

Alcohol: Concomitant use with alcohol is not recommended, as it may increase the potential for CNS effects such as dizziness, confusion, lightheadedness, and orthostatic hypotension.

Please see Brief Summary of full Prescribing Information on the accompanying page.

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(amantadine) extended release capsules

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GOCOVRI™ (amantadine) extended release capsules
Brief Summary of full Prescribing Information. See full Prescribing Information.
Rx Only.

INDICATIONS AND USAGE: GOCOVRI is indicated for the treatment of dyskinesia in patients with Parkinson's disease receiving levodopa-based therapy, with or without concomitant dopaminergic medications.

CONTRAINDICATIONS: Contraindicated in patients with creatinine clearance below 15 mL/min/1.73 m^2.

WARNINGS AND PRECAUTIONS:
Falling Asleep During Activities of Daily Living and Somnolence: Patients treated with Parkinson's disease medications have reported falling asleep while engaged in activities of daily living, including the operation of motor vehicles, which sometimes has resulted in accidents. Patients may not perceive warning signs, such as excessive drowsiness, or they may report feeling alert immediately prior to the event. In controlled clinical trials, somnolence and fatigue were reported in 4% vs. 1% of patients treated with GOCOVRI or placebo, respectively. Before initiating treatment with GOCOVRI, advise patients of the potential to develop drowsiness and specifically ask about factors that may increase the risk for somnolence with GOCOVRI, such as concomitant sedating medications or the presence of a sleep disorder. If a patient develops daytime sleepiness or episodes of falling asleep during activities that require full attention (e.g., driving a motor vehicle, conversations, eating), GOCOVRI should ordinarily be discontinued. If a decision is made to continue GOCOVRI, patients should be advised not to drive and to avoid other potentially dangerous activities. There is insufficient information to establish that dose reduction will eliminate episodes of falling asleep while engaged in activities of daily living or daytime somnolence.
Suicidality and Depression: In controlled clinical trials, suicidal ideation or suicide attempt was reported in 2% vs. 0%; depression or depressed mood 6% vs. 1%; confusional state 3% vs. 2%; apathy 2% vs. 0%, in patients treated with GOCOVRI or placebo, respectively. Monitor patients for depression, including suicidal ideation or behavior. Prescribers should consider whether the benefits outweigh the risks of treatment with GOCOVRI in patients with a history of suicidality or depression.
Hallucinations/Psychotic Behavior: Patients with a major psychotic disorder should ordinarily not be treated with GOCOVRI because of the risk of exacerbating psychosis. In controlled trials, the incidence of patients who experienced visual hallucination, auditory hallucination, delusions, illusions, or paranoia was 25% vs 3%; hallucinations caused discontinuation of treatment in 8% vs.0%; in patients treated with GOCOVRI or placebo, respectively. Observe patients for the occurrence of hallucinations throughout treatment, especially at initiation and after dose increases.
Dizziness and Orthostatic Hypotension: In controlled clinical trials, 29% vs. 2% experienced dizziness, syncope, orthostatic hypotension, presyncope, postural dizziness or hypotension; and 3% vs. 0% discontinued study treatment because of dizziness, postural dizziness, or syncope; in patients receiving GOCOVRI or placebo, respectively. Monitor patients for dizziness and orthostatic hypotension, especially after starting GOCOVRI or increasing the dose. Concomitant use of alcohol with GOCOVRI is not recommended.
Withdrawal-Emergent Hyperpyrexia and Confusion: A symptom complex resembling neuroleptic malignant syndrome (characterized by elevated temperature, muscular rigidity, altered consciousness, and autonomic instability), with no other obvious etiology, has been reported in association with rapid dose reduction, withdrawal of, or changes in drugs that increase central dopaminergic tone. Abrupt discontinuation of GOCOVRI may cause an increase in the symptoms of Parkinson's disease or cause delirium, agitation, delusions, hallucinations, paranoid reaction, stupor, anxiety, depression, or slurred speech. If possible, avoid sudden discontinuation of GOCOVRI.
Impulse Control/Compulsive Behaviors: Patients can experience intense urges to gamble, increased sexual urges, intense urges to spend money, binge eating, and/or other intense urges, and the inability to control these urges while taking one or more of the medications, including GOCOVRI, that increase central dopaminergic tone. In some cases, these urges were reported to have stopped when the dose was reduced or the medication was discontinued. Because patients may not recognize these behaviors as abnormal, it is important for prescribers to specifically ask patients or their caregivers about the development of such urges, and to consider dose reduction or stopping GOCOVRI treatment.

ADVERSE REACTIONS:
Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.
GOCOVRI was evaluated in two double-blind, placebo-controlled efficacy trials of similar design and population: Study 1 (123 patients) and Study 2 (75 patients). The study population was approximately 56% male and 94% white, with a mean age of 65 years (age range from 34 years to 82 years). The mean duration of levodopa-induced dyskinesia was 4 years (range 0.1 to 14 years). Active treatment started at 137 mg once daily for one week, followed by a dose increase to 274 mg once daily. The treatment duration was 25 weeks for Study 1 and 13 weeks for Study 2. Study 1 was stopped prematurely unrelated to safety, with 39/100 patients (safety population) treated with GOCOVRI for 24 weeks.
The most common adverse reactions reported in >10% of GOCOVRI-treated patients and more frequently than on placebo were: hallucination, dizziness, dry mouth, peripheral edema, constipation, falls, and orthostatic hypotension.
The overall rate of discontinuation because of adverse reactions was 20% vs. 8% for patients treated with GOCOVRI or placebo, respectively. Adverse reactions that led to treatment discontinuation in at least 2% of patients were hallucination (8% GOCOVRI vs. 0% placebo), dry mouth (3% GOCOVRI vs. 0% placebo), peripheral edema (3% GOCOVRI vs. 0% placebo), blurred vision (GOCOVRI 3% vs.0% placebo), postural dizziness and syncope (GOCOVRI 2% vs. 0% placebo), abnormal dreams (GOCOVRI 2% vs. 1% placebo), dysphagia (GOCOVRI 2% vs. 0% placebo), and gait disturbance (GOCOVRI 2% vs. 0% placebo).
Pooled Analysis of Adverse Reactions Reported for ≥ 3% of Patients Treated with GOCOVRI 274 mg (N=100) or placebo (N=98), respectively:
Psychiatric disorders: visual and/or auditory hallucination (21%, 3%); anxiety and/or generalized anxiety (7%, 3%); insomnia (7%, 2%); depression/depressed mood (6%, 1%); abnormal dreams (4%, 2%); confusional state (3%, 2%) **Nervous system disorders:** dizziness (16%, 1%); headache (6%, 4%); dystonia (3%, 1%) **Gastrointestinal disorders:** dry mouth (16%, 1%); constipation (13%, 3%); nausea (8%, 3%); vomiting (3%, 0%) **General disorders and administration site conditions:** peripheral edema (16%, 1%); gait disturbance (3%, 0%) **Injury, poisoning and procedural complications:** fall (13%, 7%); contusion (6%, 1%) **Infection and infestations:** urinary tract infection (10%, 5%) **Skin and subcutaneous tissue disorders:** livedo reticularis (6%, 0%); pigmentation disorder (3%, 0%) **Metabolism and nutrition disorders:** decreased appetite (6%, 1%) **Vascular disorders:** orthostatic hypotension, including postural dizziness, syncope, presyncope, and hypotension (13%, 1%) **Eye disorders:** blurred vision (4%, 1%); cataract (3%, 1%); dry eye (3%, 0%) **Musculoskeletal and connective tissue disorders:** joint swelling (3%, 0%), muscle spasm (3%, 0%) **Reproductive system and breast disorders:** benign prostatic hyperplasia—all male (6%, 2%) **Respiratory, thoracic and mediastinal disorders:** cough (3%, 0%)
Other clinically relevant adverse reactions observed at <3% included somnolence, fatigue, suicide ideation or attempt, apathy, delusions, illusions, and paranoia.
Difference in the Frequency of Adverse Reactions by Gender in Patients Treated with GOCOVRI
Adverse reactions reported more frequently in women (n=46) vs. men (n=54), were: dry mouth (22% vs.11%), nausea (13% vs. 4%), livedo reticularis (13% vs. 0%), abnormal dreams (9% vs. 0%) and cataracts (7% vs. 0%), respectively.
Men vs. women reported the following adverse reactions more frequently: dizziness (20% vs. 11%), peripheral edema (19% vs. 11%), anxiety (11% vs. 2%), orthostatic hypotension in (7% vs. 2%) and gait disturbance (6% vs. 0%), respectively.
Difference in the Frequency of Adverse Reactions by Age in Patients Treated with GOCOVRI
Hallucinations (visual or auditory) were reported in 31% of patients age 65 years and over (n=52), vs.10 % in patients below the age of 65 years (n=48). Falls were reported in 17% of patients age 65 and over, vs. 8% of patients below age 65. Orthostatic hypotension was reported in 8% of patients age 65 and over, compared to 2% of patients below age 65.

DRUG INTERACTIONS:
Other Anticholinergic Drugs: Products with anticholinergic properties may potentiate the anticholinergic-like side effects of amantadine. The dose of anticholinergic drugs or of GOCOVRI should be reduced if atropine-like effects appear when these drugs are used concurrently.
Drugs Affecting Urinary pH: The pH of the urine has been reported to influence the excretion rate of amantadine. Urine pH is altered by diet, drugs (e.g., carbonic anhydrase inhibitors, sodium bicarbonate), and clinical state of the patient (e.g., renal tubular acidosis or severe infections of the urinary tract). Since the excretion rate of amantadine increases rapidly when the urine is acidic, the administration of urine acidifying drugs may increase the elimination of the drug from the body. Alterations of urine pH towards the alkaline condition may lead to an accumulation of the drug with a possible increase in adverse reactions. Monitor for efficacy or adverse reactions under conditions that alter the urine pH to more acidic or alkaline, respectively.
Live Attenuated Influenza Vaccines: Due to its antiviral properties, amantadine may interfere with the efficacy of live attenuated influenza vaccines. Therefore, live vaccines are not recommended during treatment with GOCOVRI. Inactivated influenza vaccines may be used, as appropriate.
Alcohol: Concomitant use with alcohol is not recommended, as it may increase the potential for CNS effects such as dizziness, confusion, lightheadedness, and orthostatic hypotension, and may result in dose-dumping.

USE IN SPECIFIC POPULATIONS:
Pregnancy: There are no adequate data on the developmental risk associated with use of amantadine in pregnant women. Based on animal data, may cause fetal harm.
Lactation: Amantadine is excreted into human milk, but amounts have not been quantified. There is no information on the risk to a breastfed infant. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for GOCOVRI and any potential adverse effects on the breastfed infant from GOCOVRI or from the underlying maternal condition.
Pediatric Use: Safety and effectiveness of GOCOVRI in pediatric patients have not been established.
Geriatric Use: In Phase 3 clinical trials, the mean age of patients at study entry was 65 years. Of the total number of patients in clinical studies of GOCOVRI, 46% were less than 65 years of age, 39% were 65-74 years of age, and 15% were 75 years of age or older. Hallucinations and falls occurred more frequently in patients 65 years of age or older, compared to those less than 65 years of age. No dose adjustment is recommended on the basis of age. GOCOVRI is known to be substantially excreted by the kidney, and the risk of adverse reactions may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function.
Renal Impairment: GOCOVRI is contraindicated for use in patients with end-stage renal disease (creatinine clearance values lower than 15 mL/min/1.73 m^2). A 50% dose reduction of GOCOVRI dosage to a starting daily dose of 68.5 mg daily for a week, followed by a daily maintenance dose of 137 mg is recommended in patients with moderate renal impairment (creatinine clearance between 30 and 59 mL/min/1.73 m^2). For patients with severe renal impairment (creatinine clearance between 15 and 29 mL/min/m^2), a daily dose of 68.5 mg is recommended.
Overdosage: Deaths have been reported from overdose with amantadine immediate-release. The lowest reported acute lethal dose was 1 gram of amantadine hydrochloride (equivalent to 0.8 g amantadine). Acute toxicity may be attributable to the anticholinergic effects of amantadine. Drug overdose has resulted in cardiac, respiratory, renal, or central nervous system toxicity. Pulmonary edema and respiratory distress (including adult respiratory distress syndrome, ARDS) have been reported with amantadine; renal dysfunction, including increased BUN and decreased creatinine clearance, can occur. Central nervous system effects that have been reported with overdose include agitation, aggressive behavior, hypertonia, hyperkinesia, ataxia, tremor, disorientation, depersonalization, fear, delirium, psychotic reactions, lethargy, and coma. Seizures may be exacerbated in patients with prior history of seizure disorders. Hyperthermia has occurred with amantadine overdose. For acute overdosing, general supportive measures should be employed along with immediate gastric decontamination if appropriate. Give intravenous fluids if necessary. The excretion rate of amantadine increases with acidification of urine, which may increase the elimination of the drug. Monitor patients for arrhythmias and hypotension. Electrocardiographic monitoring may be needed after ingestion because arrhythmias have been reported after overdose, including arrhythmias with fatal outcomes. Adrenergic agents, such as isoproterenol, in patients with an amantadine overdose has been reported to induce arrhythmias. Monitor blood electrolytes, urine pH, and urinary output. Although amantadine is not efficiently removed by hemodialysis, this procedure may be useful in the treatment of amantadine toxicity in patients with renal failure.

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