AGENDA

Genetics in Your Clinic: What You Can and Should Do Now
An ASHG Global Virtual Meeting, March 22, 2016

#GeneticsinClinic

You may log in to the event starting at 8:00 am U.S. Eastern Time (5:00 am U.S. Pacific Time), when the meeting space and virtual Exhibit Hall will open. They will remain open until 5:30 pm ET (2:30 pm PT). Sessions will available for on-demand viewing in the hours following their live broadcast.

9:30-10:00 am U.S. Eastern Time (6:30-7:00 am U.S. Pacific Time)
Greeting/Introduction.

Speaker: Cynthia C. Morton, PhD, chair of the ASHG Virtual Meeting Advisory Committee
William Lambert Richardson Professor of Obstetrics, Gynecology, and Reproductive Biology, Professor of Pathology, Harvard Medical School; Director of Cytogenetics, Brigham and Women's Hospital

Speaker Bio: Cynthia Casson Morton received her Bachelor of Science degree from the College of William and Mary in Virginia and her PhD in Human Genetics from the Medical College of Virginia in Richmond. She is the William Lambert Richardson Professor of Obstetrics, Gynecology and Reproductive Biology and Professor of Pathology at Harvard Medical School, Director of Cytogenetics and Past Director of the Biomedical Research Institute at Brigham and Women's Hospital. She is an Institute Member of the Broad Institute of MIT and Harvard. Dr. Morton is an adjunct faculty member of the University of Manchester, where she holds a position as Chair in Auditory Genetics. Dr. Morton is certified by the American Board of Medical Genetics in PhD Medical Genetics, Clinical Cytogenetics, and Clinical Molecular Genetics.

Her research interests are in molecular cytogenetics, hereditary deafness, genetics of uterine leiomyomata and human developmental disorders. She has published over 275 original articles. Dr. Morton is a past member of the Board of Directors of the American Board of Medical Genetics. She was the Chair of the Molecular Genetic Pathology Policy and Exam Committees of the American Board of Medical Genetics and the American Board of Pathology. She served as Member and Chair of the Board of Scientific Counselors of the National Institute of Deafness and Other Communication Disorders, and as Member and Chair of the Board of Regents of the National Library of Medicine. Dr. Morton is currently a member of the Counsel of Scientific Trustees of the Hearing Health Foundation, and Chair of the Veteran's Administration Genomic Medicine Program Advisory Committee. Dr. Morton is a member of the Board of Directors of the American Society of Human Genetics and served as the 2014 President. She recently completed a six year tenure as Editor of *The American Journal of Human Genetics* and is currently Co-Editor of *Human Genetics*.

10:00-10:45 am U.S. Eastern Time (7:00-7:45 am U.S. Pacific Time)

Speaker: Bruce R. Korf, MD, PhD
Wayne H. and Sara Crews Finley Chair of Medical Genetics; Professor and Chair, Department of Genetics; Director, Heflin Center for Genomic Sciences

From History to Action. *Dr. Korf will describe situations where family history indicates a need for genetic testing. When to order tests and how to interpret results for your patient will be discussed.*

Speaker Bio: Dr. Korf is Wayne H. and Sara Crews Finley Chair in Medical Genetics, Professor and Chair of the Department of Genetics, Director of the Heflin Center for Genomic Sciences at UAB, and Co-Director of the UAB-HudsonAlpha Center for Genomic Medicine. He is a medical geneticist, pediatrician, and child neurologist, certified by the American Board of Medical Genetics (clinical genetics, clinical cytogenetics, clinical molecular genetics), American Board of Pediatrics, and American Board of Psychiatry and Neurology (child neurology). Dr. Korf is past president of the Association of Professors of Human and Medical Genetics, past president of the American College of Medical Genetics and Genomics, and current president of the ACMG Foundation for Genetic and Genomic Medicine. He has served on the Board of Scientific Counselors of the National Cancer Institute and the National Human Genome Research Institute at the NIH. He chairs the Medical Advisory Committee of the Children's Tumor Foundation and serves on the CTF Board of Directors.

His major research interests are molecular diagnosis of genetic disorders and the natural history, genetics, and treatment of neurofibromatosis. He serves as principal investigator of the Department of Defense funded Neurofibromatosis Clinical Trials Consortium. He is co-author of *Human Genetics and Genomics* (medical student textbook, now in 4th edition), *Medical Genetics at a Glance* (medical student textbook, now in 3rd edition), Emery and Rimoin's *Principles and Practice of Medical Genetics* (now in 6th edition), and *Current Protocols in Human Genetics*.

Abstract: Family history can be viewed as the first stop in the assessment of genetic risks for any individual. For many genetic disorders, there will be no obvious signs of symptoms until significant medical problems surface, so family history may be the only way to identify individuals at risk. This in turn can lead to a program of surveillance and management to mitigate the effects of the condition. Although the gold standard is a three-generation pedigree, many patients will not have all of the relevant information at their fingertips at the time of a clinic visit, and eliciting a full pedigree can be time-consuming; nevertheless, a set of pointed questions can identify risk for some of the more common conditions for which genetic testing is available. These include disorders that lead to an increased risk of cancer, sudden death due to cardiac dysfunction, hyperlipidemia, adverse drug reactions, and others. Recognition of the major patterns of genetic transmission, i.e., dominant and recessive, autosomal and sex-linked, can reveal individuals and family members at risk who may benefit from genetic testing. Genetic testing itself is a process, beginning with recognizing the most appropriate test, explaining the risks, benefits, and limitations of testing to the patient, selecting an appropriate laboratory, and organizing testing with the laboratory. In some cases, this may be done by a non-genetic specialist, whereas in others the complexity of ordering and interpreting tests warrants involvement of a genetics specialist. In either case, the clinician needs to be prepared to help interpret the results in light of the family history and clinical presentation and to support the patient in future management and decision-making. Genetic test results may also have implications for other family members, which also need to be factored into pre- and post-test counseling.

10:45-11:15 am U.S. Eastern Time (7:45-8:15 am U.S. Pacific Time): BREAK

11:15 am-12:00 pm U.S. Eastern Time (8:15-9:00 am U.S. Pacific Time)

Speakers: Katherine A. Rauen, MD, MS, PhD
Professor, Department of Pediatrics; and Chief, Division of Genomic Medicine, University of California, Davis

Robert Nussbaum, MD
Clinical Professor, UCSF School of Medicine; and Chief Medical Officer, Invitae Corp.

The Top Ten Laboratory Tests*. Two speakers will count down "Top Ten" lists of genetic tests, one for pediatric and one for adult cases. The tests, when to use them, and what the results mean will be discussed. These lists cover the vast majority of tests being used in clinical practice right now.*

Speaker Bio: Katherine (Kate) Rauen, MD, PhD, is a Professor in the Department of Pediatrics, Division of Genomic Medicine at UC Davis, where she currently serves as the Chief of Genomic Medicine. She received a MS in Human Physiology and a PhD in Genetics from UC Davis doing research on gene dosage compensation and genetic evolution. She obtained her MD at UC Irvine, where she also did research in cancer genetics. Dr. Rauen did her residency training in Pediatrics and fellowship in Medical Genetics at UC San Francisco.

Dr. Rauen is internationally known for her pioneering work in the application of array CGH in clinical genetics and as a leader and major contributor to the understanding of the "RASopathies", the Ras/MAPK pathway genetics syndromes. Her research program involves the clinical and basic science study of cancer syndromes with effort to identify underlying genetic abnormalities affecting common developmental and cancer pathways. Dr. Rauen led the research team, including the CFC International Family Support Group that discovered the genetic cause of cardio-facio-cutaneous syndrome.
Dr. Rauen is committed to academic medicine, medical education, and advancing best practices for patients with RASopathies. She has successfully obtained both intramural and extramural funding for her research activities, and currently holds a 5-year NIH grant studying skeletal myogenesis in Costello syndrome and CFC. She is the innovator of the world-renowned NF/Ras Pathway Clinic which she initiated in 2007 and this clinic has now been emulated around the globe. She serves on the medical advisory board of CFC International and is a Co-Director for the Costello Syndrome Family Network.

Dr. Rauen was recently awarded the Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers.

Speaker Bio: Dr. Robert L. Nussbaum, a board certified internist and medical geneticist, specializes in the care of adults with hereditary disorders. He was previously chief of Genomic Medicine at UCSF Medical Center and co-director of the Program in Cardiovascular Genetics at the UCSF Heart and Vascular Center, which cares for patients with inherited disorders of heart muscle, heart rhythm and large arteries, such as the aorta.

Dr. Nussbaum is a physician and clinical geneticist with an intense interest in molecular genetics testing and its role in the provision of medical care and disease prevention. He carried out research for over 35 years in the area of cell biology of phosphoinositides and neurodegenerative disease due to abnormalities in alpha-synuclein.

Abstract: Genetic testing has been an important component of medical care for decades but the breadth and impact of testing has been steadily increasing as medical knowledge increases, appreciation of clinical utility expands, and the cost of DNA sequencing falls. In this session, two geneticists, Dr. Katherine Rauen, who specializes in pediatric genetics, and Dr. Robert Nussbaum, who specializes in adult genetic disorders, will present their "Top Ten" scenarios for which genetic testing is indicated. Conditions were chosen based on their frequency and the likelihood that they would be seen by general pediatricians and internists, including developmental delay, autism, hereditary breast and ovarian cancer, hereditary colon cancer, and others. The session will cover a broad

spectrum of genetic testing, emphasizing appropriate testing for different indications and highlighting the strengths and weaknesses of different testing modalities.

12:00-12:30 pm U.S. Eastern Time (9:00-9:30 am U.S. Pacific Time): BREAK

12:30-2:00 pm U.S. Eastern Time (9:30-11:00 am U.S. Pacific Time)

Speakers: Fuki Marie Hisama, MD, FACMG, FAAN,
Professor, Department of Medicine, and Director, Genetic Medicine Clinic, University of Washington

Eric Konnick, MD, MS
Acting Assistant Professor, Department of Laboratory Medicine, University of Washington

Laura M. Amendola, MS, CGC
Licensed Genetic Counselor, Division of Medical Genetics, University of Washington Medical Center

Tales from the Clinic. *A panel consisting of a physician, a genetic counselor, and a doctoral clinical researcher will discuss questions and observations about clinical situations (as many as time allows) obtained from virtual meeting attendees. Questions can also be asked and answered in real time, and panel members will be available after the session in the Networking Lounge.*

Speaker Bio: Dr. Hisama is Professor of Medicine (Medical Genetics) and Adjunct Professor of Neurology, Director of the University of Washington Genetic Medicine Clinic, and Program Director of the Genetics Residency Program. She was trained as both a neurologist and a clinical geneticist, and is board certified in both specialties. She was Chief Resident of Neurology at Yale New Haven Hospital, and has received a Lucille P. Markey Physician Scientist Fellowship, a John A. Hartford Foundation Award in Aging, and was named a Paul Beeson Physician Faculty Scholar.

She is an elected Fellow of the American Academy of Neurology, a Fellow of the American College of Medical Genetics, and a member of the American Society of Human Genetics. She was elected to the Board of Directors of the American Board of Medical Genetics and Genomics starting in 2016.

Her current research interests include the genetics of Werner syndrome and atypical progeroid (premature aging) syndromes, pediatric and adult neurogenetics, genetics of autism and genetics of polyposis/colon cancer. Her clinical interests and experience are broad and encompass cancer genetics, neurogenetics, adult cardiovascular genetics, and genetics of autism. She has been recognized as a "Top Doctor" by her peers in Seattle Magazine and Seattle Metropolitan Magazine.

Speaker Bio: Eric Quentin Konnick, MD, MS, earned his BS in Biology at the University of Utah, and was a research and development scientist at Associated Regional and University Pathologists (ARUP) laboratories for 7 years prior to enrolling in medical school. During this time he developed numerous tests for the molecular and serologic Hepatitis/Retrovirus laboratories, designed and implemented multiple informatics applications, and earned his master's degree in Laboratory Medicine and Biomedical Science.

He completed his MD at the University of Utah and is currently a senior AP/CP resident at the University of Washington, where he is also a Molecular Genetic Pathology fellow.

Speaker Bio: Laura Amendola is a genetic counselor in the University of Washington Medical Center, Genetic Medicine Clinic, and is the manager of the NHGRI-funded UW New Exome Technology (NEXT) in medicine study.

Ms. Amendola provides genetic counseling to patients referred to the Genetic Medicine Clinic for indications including inherited cancer syndromes and neurogenetic conditions.

The NEXT Medicine study is exploring the incorporation of whole exome sequencing technology into clinical care for patients being evaluated for hereditary colorectal cancer and/or polyps. Ms. Amendola consents and returns results to NEXT Medicine study participants and has a central role in the interpretation of variants identified by exome sequencing.

Ms. Amendola graduated from Queen's University, in Ontario, Canada, in 2006 with a BS in biology and psychology and received her MS in genetic counseling from the University of Texas Graduate School of Biomedical Sciences in 2009. She was board-certified by the American Board of Genetic Counseling in 2010. Before joining the UWMC Genetic Medicine Clinic, Ms. Amendola worked as a clinical genetic counselor for two years in adult, pediatric, and prenatal genetics in central Texas.

Abstract: Medical genetics is a specialty of medicine that encompasses patients at all ages (prenatal, pediatric, adult), as well as all organ systems. As the genetic causes of more diseases have been discovered, medical genetics has grown beyond the traditional settings of prenatal and pediatric care, and now plays an important role in neurology, oncology, cardiology, preventive care, and precision medicine. Medical genetics providers include: physicians who are board-certified in clinical genetics, genetic counselors, who are master's level professionals, and clinical laboratory directors, who may hold either an MD or a PhD. This session will feature a panel consisting of a three experienced genetics professionals from the University of Washington in Seattle (UW). The Genetic Medicine Clinic at UW was founded in 1959, and one of the oldest, largest, and most diverse genetics clinics for adults in the country. The Clinic serves >2,300 patients per year, including >1,000 cancer genetic patients, and >500 neurogenetic patients.

Dr. Hisama, Ms. Amendola, and Dr. Konnick will present some of their memorable or challenging cases, highlight the "team approach" and contributions of each of their specialties to patient care, and answer questions about cases submitted from the virtual meeting attendees in real time. This session is designed for health care providers to become familiar with situations when a patient can benefit from genetic consultation, and the different roles of board-certified genetics professionals.

2:00-2:30 pm U.S. Eastern Time (11:00-11:30 am U.S. Pacific Time): BREAK

2:30-3:15 pm U.S. Eastern Time (11:30 am-12:30 pm U.S. Pacific Time)

Speakers: English: Heidi Rehm, PhD, FACMG
Associate Professor in Pathology, Harvard Medical School; Director, Laboratory for Molecular Medicine, Partners Healthcare Personalized Medicine

Español: Carlos A. Bacino, MD
Chief, Genetics Service, Texas Children's Hospital; and Medical Director, Cytogenetics Laboratory, Baylor

Co-Language Session

Your New Best Friend: Building a Relationship with the Genetics Laboratory. *Dr. Rehm will discuss ordering tests and interacting with laboratory specialists in the most effective way.*

Tu Nuevo Mejor Amigo: Tu Relación con el Laboratorio de Genética. *El exponente hablará sobre cómo ordenar pruebas genéticas e interactuar con especialistas del laboratorio de la manera más eficaz.*

Speaker Bio (English): Heidi L. Rehm, PhD, FACMG, is a board-certified clinical molecular geneticist and genomic medicine researcher. She is the Chief Laboratory Director at the Partners Laboratory for Molecular Medicine (LMM), the Clinical Director of the Broad Institute Clinical Research Sequencing Platform (CSRP), and Associate Professor of Pathology at Brigham & Women's Hospital and Harvard Medical School. Both of her clinical labs focus on the rapid translation of new genetic discoveries into clinical tests and bringing novel technologies and software systems into molecular diagnostics to support the integration of genetics into clinical use. The LMM has been a leader in translational medicine, launching the first clinical tests for cardiomyopathy and lung cancer treatment. The LMM and the Broad CRSP lab offer genomic sequencing services for both clinical diagnostics and to support several genomic medicine research projects, including the MedSeq and BabySeq projects and the eMERGE program. Dr. Rehm is also involved in defining standards for the use of next generation sequencing in clinical diagnostics and the interpretation of sequence variants through her committee roles at the American College of Medical Genetics. She is also one of several principal investigators of a major NIH-funded effort called ClinGen (Clinical Genome Resource) to support broad sharing of genotype and phenotype data and clinical annotations of genes and variants. Working closely with the Global Alliance for Genomics and Health, she is co-leading the Matchmaker Exchange project to aid in solving rare diseases and co-chairs a subcommittee of the BRCA Challenge to support the international sharing of knowledge on BRCA variation. Dr. Rehm also co-leads a new Center for Mendelian Genomics and conducts research in hearing loss, Usher syndrome, cardiomyopathy, healthcare IT, and genomic medicine.

Abstract (English): This session will give examples of the types of genetic tests that are most often ordered and what those tests are generally able to tell the physician and patient. The speakers will walk through the typical processes from sample collection to receipt of a report as well as typical follow-up of results. The types of specimens and information typically needed to order a genetic test will be described. The methods used in the laboratory to perform the genetic tests will be explained as well as the types of results that are found. Example genetic test reports and common vocabulary used will be shown and explained including variant interpretation terms such as VUS, pathogenic, and benign. Examples of how the genetic test report may be used to guide care will be provided. The limitations of testing will be explained including current limitations in the interpretation of genetic results. Approaches that physicians, patients and laboratories can take to improve test results and interpretations will also be presented with examples of how these approaches help individual patients.

Speaker Bio (Español): Carlos A. Bacino, MD, is primarily dedicated to clinical activities in the Department of Molecular and Human Genetics. In the area of clinical genetics, he is involved in the diagnosis and management of patients with birth defects and a variety of genetic disorders and participate in the Skeletal Dysplasia Clinic. He is directly involved in the supervision and training of medical students, residents, and fellows. As the Medical Director of the Kleberg Cytogenetics Laboratory, he has a particular interest in structural chromosomes abnormalities and genomic disorders (contiguous gene deletion/duplication syndromes), as well as the mechanism of origin of these chromosome anomalies.

In collaboration with Dr. Arthur Beaudet and Dr. Lisa Noll, Dr. Bacino is conducting a natural history study for children with Angelman syndrome supported by the Rare Disease Center Research Network (NIH). A group of Angelman syndrome patients are being brought to the Clinical Research Center at Texas Children's Hospital for developmental, clinical and EEG evaluations on a yearly basis. This allows the group to understand progression, complications, and co-morbidities. They have recently concluded two different studies using betaine, creatine, and folic acid/metafolin to promote methylation and revert silencing of the paternal allele. This trial attempted to ameliorate the symptoms of Angelman syndrome by altering patterns of imprinting.

Abstract (Español): Esta sesión le brindara ejemplos de estudios genéticos que son frecuentemente solicitados y que información pueden brindar al medico y al paciente.

Los conferencistas explicaran el proceso de los estudios desde la toma de la muestra hasta el informe final, así como el seguimiento clínico. Los tipos de muestras y la información necesaria para ordenar un estudio genético serán también descriptos. Los métodos usados en el laboratorio para realizar los estudios genéticos serán explicados así como el tipo de resultados obtenidos. Ejemplos de informes de estudios genéticos y el vocabulario normalmente utilizado en esos informes será discutido, incluyendo términos como VUS (del ingles: variantes de significado incierto), variantes patogénicas, y variantes benignas. Ejemplos de cómo el informe genético será utilizado para ayudar al cuidado medico serán discutidos. Las limitaciones de los estudios serán discutidas, así como las limitaciones en la interpretación de los resultados. Los enfoques que los médicos, pacientes y laboratorios pueden adoptar para mejorar los estudios de laboratorio y su interpretación serán presentados con ejemplos prácticos de cómo estos abordajes pueden ayudar a cada uno de los pacientes.

3:15-3:45 pm U.S. Eastern Time (12:15-12:45 pm U.S. Pacific Time): BREAK

3:45-4:30 pm U.S. Eastern Time (12:45-1:30 pm U.S. Pacific Time)

Speakers: Jean F. Jenkins, PhD, RN, FAAN
Clinical Advisor, NHGRI Division of Policy, Communications, and Education

Bob Wildin, MD
Chief, Genetic Healthcare Branch, NHGRI

Turnkey Resources: The Genetics Tool Kit. *The speakers will familiarize participants with the best genetic testing resources available to the practicing physician. These tools will be of interest to any health care professional and have been vetted by scientific and medical experts at ASHG. These will be available in the "Tool Kit" site in the virtual meeting lobby.*

Speaker Bio: Jean F. Jenkins is a clinical advisor for the Division of Communication, Policy, and Education at the National Human Genome Research Institute (NHGRI), NIH. Previously, she worked at the NIH Clinical Center Nursing Department, the National Cancer Institute, and the Genomic Healthcare Branch, NHGRI.

Dr. Jenkins received her BSN from the University of Maryland, an MSN at the Catholic University of America, and her PhD from the George Mason University, Virginia, in 1999, completing Innovation of Diffusion Research on Genetics Education for Nurses. It was during a clinical internship as part of her doctoral studies that she recognized the importance of advances in genetics research for all healthcare providers. Dr. Jenkins has been motivated and committed to preparing others to become aware of, plan for and integrate genetic concepts into clinical practice. In 2005, she received the Michael J. Scotti Jr. Award for National Coalition for Health Professional Education in Genetics (NCHPEG) efforts as the content and instruction co-chair when she coordinated the development and consensus of the NCHPEG competencies. Building on these efforts, Dr. Jenkins co-coordinated the development of the Essential Nursing Competencies and Curricula Guidelines for Genetics and Genomics, which led to the development of an interdisciplinary education resource repository (http://www.g-2-c-2.org/) and a web-based case-scenarios resource (http://www.g-3-c.com/).

Speaker Bio: Bob Wildin received his Bachelor's degree from the Massachusetts Institute of Technology in Life Sciences. He graduated medical school at the University of California, San Francisco. He then completed a Pediatrics Residency and a Medical Genetics Fellowship at the University of Washington Hospitals and Clinics.
Initially entering genetics research as an undergraduate, Bob rode the wave of the human genetics revolution for decades, in multiple capacities. An ABMG-certified Clinical Geneticist, he practiced General Clinical Genetics in academic and non-academic settings, including in rural healthcare systems. He served as medical faculty at three academic centers, performing grant funded research on rare genetic disorders (Nephrogenic Diabetes Insipidus, IPEX, etc.), caring for patients, and teaching. In addition, he acted as director of Graduate Education and as Co-Medical Director of a Molecular Diagnostic Laboratory in a Genetics Department, before striking out as an independent contractor, genetics service provider, and supporter of the family chocolate business.

Dr. Wildin also has a strong affinity for information technology. His interests and experience with software and database development center on tools to enhance the efficiency and effectiveness of researchers and genetics practitioners in the clinic, and on improving the value of clinically related data resources through enhanced search workflows and display formats.

Near the end of 2014, the opportunity to draw on his diverse experiences to nurture the historic integration of genomic medicine into general medical practice led him to his current position as Chief of the Genomic Healthcare Branch, Division of Policy, Communications, and Education, at the National Human Genome Research Institute (NHGRI).

Abstract: Genomic Medicine is an incredibly fast moving field awash in information. Successful practice requires ongoing access to authoritative and regularly-updated, yet focused resources for both providers and patients. Many resources are available on the web. This session highlights and demonstrates several key resources from this meeting's resource toolkit that are particularly valuable sources of information and education needed for competent (and confident) patient-provider interactions involving genes and genomes.