Precision Genomic Medicine

2018

Iowa Institute of Human Genetics
Bringing Personalized Genomic Medicine to Iowans
Welcome to the 2018 Precision Genomic Medicine Conference

All of us strive to provide the best medical care we can. By adding genetic data to our clinical armamentarium, we can refine our clinical examination, improve the care we deliver to our patients, and provide better and more targeted disease-specific treatment. This one-day conference targets health care professionals and provides an introduction to the integration of genomic data into routine patient management. We focus on the outstanding successes at the University of Iowa that are driving precision medicine, and highlight the benefits and the challenges associated with the routine the implementation of genetic data into standard practice.

The conference is cosponsored by the Iowa Institute of Human Genetics, the UIHC Department of Pathology, the Holden Comprehensive Cancer Center, The Carver College of Medicine, Illumina, and Integrated DNA Technologies.
Enabling Precision Medicine for Iowans

Kevin L Knudtson¹, Diana Kolbe¹, M. Adela Mansilla¹, Carla Nishimura¹, Christie P. Thomas¹, Mark Sorenson¹, Anne E Kwitek¹, Colleen A Campbell¹, Richard JH Smith¹
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Learn more at: https://medicine.uiowa.edu/humangenetics/
Schedule - Revised

8:00-8:30  Check In - Coffee and tea provided

8:30-8:35  Welcome
J. Brooks Jackson, MD, MBA

8:35-8:50  Introduction: Precision Genomic Medicine and Genomic Data
What is Precision Medicine - It’s Promises and Limitations
Richard Smith, MD

8:50-9:30  Curing Heritable Blindness
Ed Stone, MD, PhD

9:30-10:15 Diagnostic Applications in Practice Today - Changing Diagnostic Algorithms
Moderator: Val Sheffield, MD, PhD
  • One Step Comprehensive Testing for Genetic Kidney Disease - Christie Thomas, MD
  • What I have Learned Seeing Cardiovascular Genetic Patients Over Two Decades
    Ferhaan Ahmad, MD, PhD
  • Changing Approaches to Genetic Diagnosis in the Inherited Neuropathies: Our
    Experiences - Mike Shy, MD
  • Genetic Variant Classification: Implementing Disease-Specific Knowledge to
    Empower Clinical Decision-Making - Hela Azaiez, PhD

10:15-10:30 Break

10:30-11:00  Precision Genomic Medicine at UIHC and in the Community
Moderator: Val Sheffield, MD, PhD
  • Medical Genetics and the Application of Precision Genomic Medicine
    John Bernat, MD, PhD
  • How Genetic Counselors Can Assist Integrating Precision Genomic Medicine Into
    Your Practice - Colleen Campbell, PhD, MS, CGC

11:00-11:10 Pharmacogenomics introduction - Anne Kwitek, PhD

11:10-11:55 Keynote speaker: Pharmacogenomics: Precision Medicine and Drug Response
Richard Weinshilboum, MD, Mayo Clinic

12:00-1:00 Lunch
12:15-12:45: The Drug Metabolism Test Report - Colleen Campbell, PhD, MS, CGC

1:00-3:00 Cancer Genomics in Diagnosis and Treatment
Moderator: Aaron Bossler, MD, PhD
  • Current State of Molecular Diagnostics
    Jennifer Laffin, PhD, University of Wisconsin, Madison
  • Patients Enhancing Research Collaborations at Holden Cancer Center
    Kenneth Nepple, MD
  • Non-Small Cell Lung Cancer - A Model for Precision Medicine
    Muhammad Furqan, MD
  • CAR T cells in Oncology: Gene Therapy and Immunotherapy Join Hands for a Leap
    Forward in Precision Medicine - Umar Farooq, MD

3:00-3:15 Break

Continued on next page:
3:15-3:45  Ethics in Personalized Genomic Medicine
Moderator: Aaron Scherer, PhD
Anya Prince, JD

3:45-4:55  The Use of Smart Data in Precision Medicine
Moderator: Aaron Scherer, PhD
Colleen Campbell, PhD, MS, CGC; Mike Brownlee, PharmD; Timothy Gutshall, MD;
Maia Hightower, MD, MBA, MPH

Panel Discussion
Moderator: Colleen Campbell, PhD, MS, CGC
Mike Brownlee, PharmD; Timothy Gutshall, MD; Maia Hightower, MD, MBA, MPH;
Anya Prince, JD

4:55-5:00  Closing remarks
Anne Kwitek, PhD
Guest Speakers:

**Jennifer Laffin, PhD**
Dr. Jennifer Laffin graduated from the University of Iowa with her Ph.D. in Genetics. She went on to complete fellowships in Clinical Molecular Genetics and Clinical Cytogenetics at the University of Iowa and the University of Wisconsin – Madison, respectively. Dr. Laffin is currently the Laboratory Medical Director of Exact Sciences Laboratories, LLC; the Director of UW Cytogenetic Services and Associate Professor of Genetics and Metabolism in the Department of Pediatrics at the University of Wisconsin-Madison. The lab is a clinical laboratory that studies a wide range of human genetic and genomic conditions affecting prenatal and postnatal development, and oncology. Research in the lab focuses on genotype-phenotype correlations to better understand the genetic contribution to human conditions and natural history, as well as the development of clinical tools and workflows for precision and personalized medicine.

**Richard Weinshilboum, MD**
Dr. Weinshilboum received B.A. and M.D. degrees from the University of Kansas, followed by residency training in Internal Medicine at the Massachusetts General Hospital in Boston. He was also a Pharmacology Research Associate at the NIH in the laboratory of Nobel Laureate Dr. Julius Axelrod. He is presently Professor of Pharmacology and Medicine and Dasburg Professor of Cancer Genomics Research at Mayo. He also co-directs the Pharmacogenomics Program of the Mayo Center for Individualized Medicine. Dr. Weinshilboum’s research has focused on pharmacogenomics, with over 425 manuscripts on that topic. His major area of research has been the pharmacogenetics of drug metabolism, with a focus on methylation and sulfation. He has also applied genome-wide “omics” to study drug response—especially the drug therapy of depression and breast cancer. Dr. Weinshilboum has been the recipient of many awards including an Established Investigatorship of the American Heart Association, a Burroughs Wellcome Scholar Award in Clinical Pharmacology, the Oscar B. Hunter Award of the American Society for Clinical Pharmacology and Therapeutics, the ASPET Harry Gold Award and the Edvard Poulsson Award from the Norwegian Pharmacology Society. He has also served on the Advisory Councils for two US NIH Institutes, the NIGMS and NHGRI.

**Timothy Gutshall, MD**
Tim Gutshall, M.D. is Vice President of Medical Management & Chief Medical Officer for Wellmark Blue Cross and Blue Shield. He provides clinical and operational oversight of the Appeals, Care Management, Medical Policy and Medical Director teams. Through the Health Networks and Network Engagement teams, he interacts with clinicians to support innovation and management of medical trend. He also works with the Chief Pharmacy Officer to ensure appropriate balance between medical and pharmacy initiatives to deliver exceptional value. Dr. Gutshall received his Medical Degree from the University of Iowa and completed his residency in family medicine at Wake Forest University. After his residency, he spent the next 27 years in family and emergency medicine, then moved on to serve as Chief Medical Officer for Telligen (formerly Iowa Foundation for Medical Care). Dr. Gutshall joined Wellmark in March 2012.
University of Iowa Faculty Speakers

Ferhaan Ahmad, MD, PhD

Dr. Ahmad is an Associate Professor of Internal Medicine, Radiology, and Molecular Physiology and Biophysics at the University of Iowa. He received an MD at McGill University, followed by postgraduate clinical training at McGill, Baylor College of Medicine, and the Brigham and Women’s Hospital leading to board certifications in internal medicine, cardiology, and nuclear cardiology. Following clinical training, he pursued graduate studies in human cardiomyopathy genetics at Baylor College of Medicine, where he earned a PhD. Finally, he completed an HHMI postdoctoral fellowship in mouse genetics at Harvard Medical School, focusing on genetically engineered mouse models of human cardiomyopathies. He commenced an independent career in 2005 as an Assistant Professor at the University of Pittsburgh, where he received prestigious initial funding from a Doris Duke Charitable Foundation (DDCF) Clinical Scientist Development Grant and an American Heart Association (AHA) Scientist Development Grant, followed by funding from the NIH. In 2013, he was recruited to an endowed, tenured position at the University of Iowa as an Associate Professor and Director of the Cardiovascular Genetics Program. The Cardiovascular Genetics Program brings together basic scientists at the Carver College of Medicine and clinicians at the University of Iowa Hospitals and Clinics (UIHC) who are focusing on heritable cardiovascular disorders. He directs a laboratory conducting basic and translational research into the genetic and genomic mechanisms underlying heart failure, including hypertrophic cardiomyopathy, glycogen storage cardiomyopathy, pulmonary hypertension, and diabetic cardiomyopathy. His laboratory uses a wide range of techniques in human, mouse, and pig genetics and genomics, and fosters crosstalk between clinical studies, human molecular genetic studies, animal modeling, basic cellular and molecular studies, and computational systems biology analyses. At the UIHC Cardiovascular Genetics Clinic, an interdisciplinary team evaluates, counsels, and treats patients with inherited cardiovascular disorders and their families.

Hela Azaiez, PhD

Hela Azaiez is a Senior Research Scientist at the Molecular Otolaryngology and Renal Research Laboratories (MORL) at the University of Iowa. She received her Master of Science in Biological Engineering and her Ph.D. in Human Molecular Genetics at the University of Sfax in Tunisia conjointly with the University of Iowa. After completing a postdoctoral fellowship at the MORL, Hela was appointed as Assistant Professor at the Pasteur Institute of Tunis in Tunisia where she worked on characterizing the genetic spectrum of orphan diseases in the Tunisian population. She returned to Iowa City in 2012 where she is currently leading the Hearing research and diagnostics teams at MORL. Her interdisciplinary research program is focused on the discovery of novel genes, genetic modifiers and non-coding regulatory elements involved in hereditary deafness as well as the investigation of genetic contributions to age- and noise-induced hearing loss. She is in charge of developing next-generation sequencing pipelines and tools to improve identification, interpretation and clinical correlation of genomic variants. She aims to translate novel knowledge acquired through research into better clinical diagnostics and improved patient care.

John Bernat, MD, PhD

Dr. John Bernat graduated with his M.D., Distinction in Research, and Ph.D. in Human Genetics, from the University of Michigan. After completing residencies in pediatrics and medical genetics; and a fellowship in clinical molecular genetics at the University of Michigan, he relocated to the University of Iowa. Dr. Bernat is currently the Clinical Director of the Regional Genetic Consultation Service for the State of Iowa; Associate Director of Molecular Testing in the Shivanand R. Patil Cytogenetics and Molecular Laboratory; and Clinical Assistant Professor of Pediatrics in the Division of Medical Genetics at the University of Iowa. His research interests include testing new therapeutics for treating lysosomal storage disorders.
Mike Brownlee, PharmD, MS, FASHP
Dr. Mike Brownlee is the Chief Pharmacy Officer and an Associate Hospital Director at the University of Iowa Hospitals and Clinics (UIHC). He also serves as Clinical Associate Professor and Associate Dean for Clinical Education for the University of Iowa College of Pharmacy. As a hospital administrator at UIHC, Dr. Brownlee is responsible for all pharmacy enterprise operations and serves as an executive leader of a number of organizational strategic initiatives. In addition to his on campus responsibilities, he is an active leader in local and national pharmacy organizations. In his academic role, he lectures, precepts students and residents, serves on a number of college executive committees, and is Director of the Health-System Pharmacy Administrative two-year Residency combined with a MPH, MHA, or Masters in Health Informatics from the University of Iowa. Dr. Brownlee graduated with his Doctor of Pharmacy from the University of Iowa and completed his post-graduate residency training in a Health-System Pharmacy Administration program combined with a Masters in Health-System Pharmacy at the University of Kansas.

Colleen Campbell, PhD, MS, CGC
Dr. Colleen Campbell is the Assistant Director of the Iowa Institute of Human Genetics, as well as the University of Iowa Hospitals and Clinics Director of Genetic Counseling Operations, and a Clinical Assistant Professor in Internal Medicine. Her dual research training as a molecular geneticist and clinical training as a board certified genetic counselor is distinct. The focus of her work is to integrate and improve patient access to precision medicine throughout healthcare based on her unique perspective and understanding of the interactions between the lab, providers, patients, legislative, and the health care system. Some of her activities as the Assistant Director of the Iowa Institute of Human Genetics revolve around the development, oversight, and integration of diagnostic genetic tests, such as the clinical exome test and Drug Metabolism Test, into healthcare. Dr. Campbell is the Principal Investigator of the University of Iowa’s Epilepsy Genetics Initiative (EGI), and a co-Investigator on the University of Iowa All of Us Research Program UG4 award for Community Engagement through Public Libraries. As the Iowa Institute of Human Genetics Education Division Director, the education and outreach programs she has developed have proven successful in raising the interest of attendees in human genetics. In addition, her former trainees are now working as genetic counselors, or are enrolled in graduate school.

As Director of Genetic Counseling Operations she oversees the administration, standardization and continuous improvement of genetic counseling operations across the health system which is becoming a model for academic medical centers nationwide. Recently, Dr. Campbell led the successful legislative effort to license genetic counselors in Iowa, and is involved with the federal effort for Medicare recognition of genetic counselors as independent providers. Dr. Campbell is an active member of the National Society of Genetic Counselors, the Association of Genetic Counseling Program Directors, the American Society of Human Genetics, American College of Medical Genetics, Clinical Pharmacogenetics Implementation Consortium (CPIC), and the Pharmacogenomics Research Network.

Umar Farooq, MD
I am a bone marrow transplant physician with interest in CAR T cell therapy and clinical trials for lymphoma. I joined university of Iowa 4 years ago after bone marrow transplant fellowship and since then I have been working to bring the CAR T cell therapy to our institution. We at University of Iowa participated in the first multi-institutional clinical trial for CD19 CAR T cell therapy for relapsed lymphoma and this has led to FDA approval of this therapy. University of Iowa bone marrow transplant program will be offering FDA approved CAR T cell therapy for both relapsed lymphoma and leukemia before end of May 2018, after we have completed FDA certification requirements. We are now opening clinical trial of CAR T cell therapy versus auto-transplant for relapsed lymphoma.
Muhammad Furqan, MD
Muhammad Furqan is an oncologist and specialized in medical management of thoracic malignancies. He joined University of Iowa Hospitals and Clinic as a faculty in 2014 and leads the thoracic multidisciplinary oncology group at Holden Comprehensive Cancer Center (HCCC). He is member of ALLIANCE and Big Ten Cancer Research Consortium thoracic committees. He is principal investigator for multiple investigator-initiated studies and sub-investigator on several national clinical trials. His interested in immune-escape mechanisms and redox-biology of Cancer. Beside clinical and research activities he is also serving as Medical Director of Out Patient Clinical Services at HCCC.

Anne Kwitek, PhD
Dr. Kwitek is an animal and human geneticist whose research revolves around dissecting the genetic components of complex disease with an emphasis on hypertension, obesity, diabetes, and the metabolic syndrome (MetS). Using genome-wide approaches such as QTL mapping, positional cloning, transcriptomics, and high-throughput sequencing, Dr. Kwitek’s studies have identified loci and genes involved in diabetes and cardiovascular disease in both rat models and human populations. Her current work is focused on combining traditional positional cloning approaches with systems genetics and gene targeting in rats to identify genes and linked pathways involved in the Metabolic Syndrome. Dr. Kwitek has also been involved in the development and implementation of the IIHG’s Drug Metabolism Test (DMT), which identifies gene variants affecting how patients respond to their medications, and provides guidance to providers on drug selection and dosage to minimize the risk of harmful side-effects.

Kenneth Nepple, MD
Dr. Kenneth Nepple is a Clinical Associate Professor in the Department of Urology. He completed medical school and urology residency at the University of Iowa, and then pursued a two-year Society of Urologic Oncology fellowship at Washington University in St. Louis. He returned to Iowa City in 2012. His work has led to supported roles as Medical Director of the Holden Comprehensive Cancer Center Oncology Registry, Associate Chief Medical Information Officer, Physician Value Officer, and institutional principal investigator for ORIEN, the Oncology Research Information Exchange Network. Clinically he performs open, endoscopic, laparoscopic, and robotic surgery with an emphasis on kidney, prostate, and bladder cancers.
**Mike Shy, MD**
My professional interests involve translational research to develop rational therapies for patients with inherited peripheral neuropathies and related neurodegenerative diseases. Because genetic neuropathies have known causes, research can concentrate on specific mechanisms and intracellular pathways by which mutant genes and proteins cause demyelination, axonal degeneration or impaired glial-axonal interactions. Careful evaluation of patients as well as animal or tissue culture models of inherited neuropathies or other genetic neuromuscular diseases are essential for a translational approach; accordingly, my research has involved all of these areas ranging from tissue culture to authentic murine models to material from patients with genetic neuropathies. My translational work has particularly been involved with models of CMT 1B, caused by mutations in the Myelin Protein Zero (MPZ) gene extending back to the 1990s. The combination of molecular biology, clinical expertise and human genomics offer patients the best chance to have rationally based therapies to improve their quality of life. I am the PI of the INC consortium (2U54NS065712) of the Rare Disease Clinical Research Network (RDCRN). Goals of the INC are to develop natural history data, develop outcome measures, train new investigators, identify modifier genes and develop standards of care for CMT. MRI studies are proving to be the most sensitive outcome measures available to detect progression in CMT. It is my hope to continue developing this technology as well as develop additional outcome measures and identify biomarkers to enable quality clinical trials for patients with CMT.

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**Anya Prince, JD**
Anya Prince is an Associate Professor at the University of Iowa College of Law. Professor Prince's teaching and research interests explore the ethical, legal, and social implications of genomic testing, with particular focus on genetic discrimination and privacy rights, the intersection of clinical and research ethics, and insurance coverage of genetic technologies and interventions. Professor Prince is a former Visiting Assistant Professor of Law at Indiana University's Robert H. McKinney School of Law, where she taught New Genetics: Ethical, Legal and Policy Issues and Employment Law. She has published a variety of articles in legal, bioethics, and medical journals, including the American Journal of Bioethics, Journal of Law, Medicine, and Ethics, and Genetics in Medicine, and she has presented and been an invited speaker at conferences across the country. She was recently awarded a Pathway to Independence Award (K99/R00) from the National Human Genome Research Institute to examine the use of genetic information by life, long-term care, and disability insurers. Before joining the legal academy, Professor Prince served as a Post-doctoral Research Fellow at the UNC Center for Genomics and Society (CGS) in the Department of Social Medicine at UNC-Chapel Hill School of Medicine as well as an intern on the UNC Hospital Ethics Committee. In 2015, she received the UNC’s Postdoctoral Award for Research Excellence and received additional funding from the Skadden Foundation for her work on the hospital ethics committee. In addition to her research role, Professor Prince has also worked as a Skadden Fellow and Staff Attorney at the Cancer Legal Resource Center in Los Angeles, California. Professor Prince is a graduate of University of California, Los Angeles (cum laude, B.A.) and Georgetown University (M.P.P. and J.D.)
Richard Smith, MD
Dr. Richard Smith is the Sterba Hearing Research Professor and Founding Director of the Iowa Institute of Human Genetics (IIHG) and the Molecular Otolaryngology and Renal Research Laboratories (MORL) at the University of Iowa. He earned his medical degree at Baylor College of Medicine in Houston, TX, where he also completed a residency, following which he did a fellowship in Pediatric Otolaryngology at the Hospital for Sick Children, London, UK, and a postdoc in Molecular Genetics at the MRC Institute for Hearing Research in Nottingham, UK. He is internationally recognized for his work in human genetics, with an emphasis on hereditary hearing loss and ultra-rare complement mediated renal diseases. In recognition of his accomplishments in these areas, he has received many honors and has been elected to membership in the National Academy of Medicine and the Association of American Physicians.

Edwin Stone, MD, PhD
Edwin M. Stone is the Director of the University of Iowa Institute for Vision Research (www.ivr.uiowa.edu). He is best known for his work in defining the genetic basis of blinding eye diseases: ranging from two of the most common causes of blindness, macular degeneration and glaucoma to much rarer conditions like retinitis pigmentosa and Leber congenital amaurosis. Dr. Stone has been very active in removing the technical, legal and financial barriers between genetic discoveries and the patients who could benefit from them. He founded the Carver Nonprofit Genetic Testing Laboratory at the University of Iowa that provides low cost genetic tests to patients in every state of the U.S. and more than 60 other countries. His current interest is in developing affordable gene- and stem-cell-based treatments for all molecular forms of inherited retinal disease. Dr. Stone received his M.D. and Ph.D. from the Baylor College of Medicine and his training in ophthalmology and vitreoretinal surgery at the University of Iowa where he joined the faculty in 1990. He holds the Seamans-Hauser Chair of Molecular Ophthalmology in the University of Iowa Carver College of Medicine.

Christie Thomas, MD
Dr. Christie Thomas is currently a Professor of Internal Medicine, Pediatrics and the program in Molecular Medicine and the Medical Director of the Kidney Transplant Program at the University of Iowa Hospitals and Clinics. Dr. Thomas has been very active with the Clinical Diagnostic Division of the Iowa Institute of Human Genetics, helping to develop the largest renal disease panel in the United States, KidneySeq™. Dr. Thomas directs the Renal Genetics Clinic where adults and children with a variety of inherited kidney diseases are seen for evaluation, counseling and genetic screening. Dr. Thomas received his MBBS from Christian Medical College, Vellore, India, and completed residencies in internal medicine, nephrology and transplantation at the District General Hospital, Sunderland UK, the Royal Hallamshire and Northern General Hospitals, University of Sheffield, UK and Case Western Reserve University, Cleveland, Ohio.
CONVERTING COMPLEX DATA INTO BIOLOGICAL INSIGHT.

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TOMORROW'S GENOMIC TECHNOLOGY TODAY.