

FDA & UNIVERSITY OF MARYLAND CERSI

PHARMACOKINETIC EVALUATION IN PREGNANCY VIRTUAL PUBLIC WORKSHOP

Monday, May 16, 2022 & Tuesday, May 17, 2022

Engaging stakeholders in dialogue to assess available science and data gaps to advance the conduct of PK studies in pregnant individuals for CDER-regulated products.

May 16 10:00am – 3:00pm (ET)

Day 1 - Welcome & Introduction



Robert M. Califf, M.D., MACC was confirmed earlier this year as the 25th Commissioner of Food and Drugs. As Commissioner, Dr. Califf oversees the full breadth of the FDA portfolio and execution of the Federal Food, Drug, and Cosmetic Act and other applicable laws. This includes assuring the safety, effectiveness, and security of human and veterinary drugs, vaccines and other biological products for human use, and medical devices; the safety and security of our nation's food supply, cosmetics, dietary supplements, products that give off electronic radiation; and the regulation of tobacco products. Dr. Califf has had a long and distinguished career as a physician, researcher, and leader in the fields of science and medicine. He

is a nationally recognized expert in cardiovascular medicine, health outcomes research, health care quality, and clinical research, and a leader in the growing field of translational research, which is key to ensuring that advances in science translate into medical care. This is Dr. Califf's second stint as Commissioner. He also served in 2016 as the 22nd Commissioner. Before assuming the position at that time, he served as the FDA's Deputy Commissioner for Medical Products and Tobacco. Prior to rejoining the FDA in 2022, Dr. Califf was head of medical strategy and Senior Advisor at Alphabet Inc., contributing to strategy and policy for its health subsidiaries Verily Life Sciences and Google Health. He joined Alphabet in 2019, after serving as a professor of medicine and vice chancellor for clinical and translational research at Duke University. He also served as director of the Duke Translational Medicine Institute and was the founding director of the Duke Clinical Research Institute. Dr. Califf is a graduate of Duke University School of Medicine. He completed a residency in internal medicine at the University of California, San Francisco and a fellowship in cardiology at Duke.

Session 1: Considerations for Conduct of PK Studies in Pregnant Individuals

Speakers



Leyla Sahin, M.D. is an obstetrician-gynecologist who joined the FDA's Division of Pediatrics and Maternal Health (DPMH) in the Office of New Drugs, Center for Drug Evaluation and Research in 2008 following twelve years of clinical practice. She is currently serving as Acting Deputy Director for Safety, Maternal Health, for DPMH, and over the years has led various maternal health related scientific and regulatory/policy initiatives. She was a working group member on the HHS Task Force for Research Specific to Pregnant Women and Lactating Women (PRGLAC). The focus of her work involves advancing FDA's scientific and regulatory policies related to pregnancy and

lactation, through all phases of drug development. Her principal area of interest is promoting the public health of pregnant and breastfeeding individuals through improved data collection.



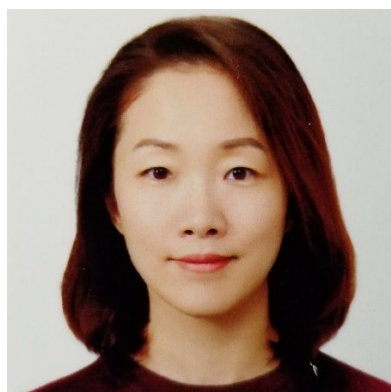
Anne Drapkin Lyerly, M.D., M.A. is Professor of Social Medicine, Research Professor of Obstetrics and Gynecology and core faculty in the Center for Bioethics at the University of North Carolina, Chapel Hill. A board-certified obstetrician/gynecologist and bioethicist, she studies ethically complex issues around gender and reproductive medicine. She co-founded the Second Wave Initiative, an effort to ensure that the health interests of pregnant people are fairly represented in biomedical research and drug and device policies. She is PI on the NIH-funded PHASES Project addressing the ethics of HIV research and pregnancy and the PREPARE Project addressing the ethics of research engaging pregnant adolescents; she was also co-PI on

a Wellcome Trust funded PREVENT project on research, pregnancy and public health emergencies. Dr. Lyerly is an alumna of the Greenwall Foundation's Faculty Scholars Program and Fellowship in Bioethics and Health Policy. She has served on numerous U.S. national committees, including the American College of Obstetricians and Gynecologists Committee on Ethics, which she chaired. She has written dozens of articles and book chapters for academic and public audiences, including publications in journals such as JAMA and The Lancet as well as the New York Times. She is also the author of a book, *A Good Birth*, published by the Penguin Group/USA.



Ahizechukwu Eke, M.D., Ph.D., MPH is an Associate Professor within the Division of Maternal Fetal Medicine, Department of Gynecology and Obstetrics at the Johns Hopkins University School of Medicine. He received his medical degree from the University of Calabar School of Medicine in Nigeria, and completed 2 residencies in Obstetrics & Gynecology at the Nnamdi Azikiwe University College of Medicine, Nigeria (in 2010) and Michigan State University (in 2016) respectively. He continued his training at Harvard University to earn a Master of Public Health (MPH) in Health Policy & Management. Dr. Eke completed a dual Fellowship in Maternal Fetal Medicine and Clinical Pharmacology at the Johns Hopkins University School of Medicine in 2019, and finished a PhD in Clinical

Investigation/Clinical Pharmacology at the Johns Hopkins University School of Public Health in 2021. He is triple-board certified (in Obstetrics & Gynecology, Clinical Pharmacology, and Maternal Fetal Medicine). His research interests include understanding the pharmacokinetics (PK), pharmacodynamics (PD), pharmacoepidemiology, pharmacogenomics, and pharmacomicrobiomics of drug use in pregnant women; understanding methods of drug use in pregnancy through continuous process improvement and performance measures; and ensuring safe and effective use of medications during pregnancy. He has been working with the International Maternal Pediatric Adolescent AIDS Clinical Trials Network (IMPAACT) and the HIV Prevention Trials Network (HPTN) as principal investigator and co-investigator for numerous pharmacokinetic drug studies in pregnant women. Dr. Eke has served the American College of Obstetricians and Gynecologists (ACOG) in numerous leadership positions. He currently serves on the ACOG National Clinical Guidelines Committee, and on several other national and international OBGYN committees, including an Editorial Board member of the New England Journal of Medicine (NEJM) and the Editorial Board of Obstetrics & Gynecology (the Green Journal). Dr. Eke has over several PubMed cited peer-reviewed research publications, and has won several teaching and research awards. Dr. Eke is the current Associate Program Director for Maternal Fetal Medicine at Johns Hopkins.



Su-Young Choi, Pharm.D., Ph.D. is currently a clinical pharmacology team leader for antiviral products, Office of Clinical Pharmacology, Office of Translational Sciences, Center for Drug Evaluation and Research, US Food and Drug Administration. She is primarily responsible for leading scientific and regulatory assessments on clinical pharmacology aspects of antiviral drug development and has been extensively involved in the research and regulation of various antiviral products in specific populations including pregnant individuals. She has presented at various conferences and has numerous publications addressing clinical pharmacology principles for drug development for antiviral products. Dr. Choi obtained her Pharm.D. and

Ph.D., focused on the molecular mechanism of PK changes during pregnancy, at the University of Illinois at Chicago.



Martina Penazzato, M.D., M.Sc., Ph.D. is an infectious disease specialist and over the last 15 years, in addition to providing major contribution to several WHO Guidelines in the areas of HIV, TB and child health, she has provided technical assistance to several countries globally and contributed to shape the paediatric HIV research agenda. In her role as pediatric HIV lead, she is also leading the work of WHO on paediatric treatment and care and contributing to a number of global initiatives to improve access to better medicines for children and investigation of new ARVs for pregnant and lactating women.



Michael J. Fossler, Pharm.D., Ph.D. is Executive Consultant and Vice-President, Strategic Consulting at Cytel. He received the Pharm. D. (1992) and Ph. D. (1995) degrees from the University of Maryland. From 1995 to 2000, Dr. Fossler was employed by the FDA as a clinical pharmacology reviewer in the Division of Metabolic and Endocrine Drug Products. In 1998, he was promoted to Senior Reviewer, and joined the Pharmacometrics group at FDA, where he was responsible for reviewing and performing population PK/PD analyses. He left the Agency in 2000 and joined the Clinical Pharmacokinetics Group at DuPont Pharmaceuticals, where he had major responsibility for PK/PD analyses in

the cardiovascular and anti-inflammatory areas. In November, 2001, he joined GlaxoSmithKline, where he continued to work in the cardiovascular area, and eventually headed a group of nine pharmacometrics scientists. He left GSK in 2015 to join Trevena, Inc., a late-stage small biotech company, where he led clinical pharmacology, clinical development, biostatistics, programming and data management. He assumed his present role at Cytel in April 2022, where he provides strategic consulting services in the areas of clinical pharmacology, and pharmacometrics. Dr. Fossler is a Fellow of the American Foundation for Pharmaceutical Education, a Fellow of the American College of Clinical Pharmacology, a past President of the College and is an Honorary Regent. He holds an adjunct faculty appointment at the University of North Texas where he teaches in the school's Pharmacometrics program and is on the faculty of the University of California's American Course on Drug Development and Regulatory Science.



Mary F. Hebert, Pharm.D., FCCP is a Professor of Pharmacy, Adjunct Professor of OBGYN, Director of the University of Washington Obstetric-Fetal Pharmacology Research Unit, Core Member of the University of Washington, Center for Ecogenetics and Environmental Health and Member of the University of Washington Institute of Translational Health Sciences. She completed her Pharm.D., Residency and Fellowship training at the University of California, San Francisco. Dr. Hebert joined the University of Washington Faculty in 1996 after serving on the Clinical Faculty at the University of California, San Francisco for 6 years. Her primary research focus is on understanding the effects of pregnancy and lactation on drug

disposition and the underlying mechanisms causing the changes.



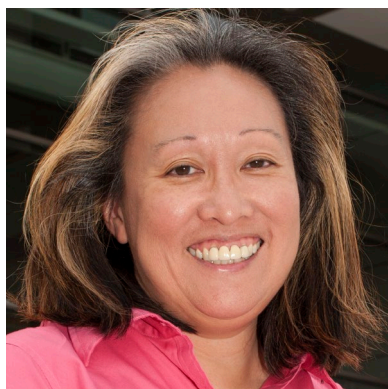
Catherine Stika, M.D. has worked at Northwestern Memorial Hospital for the last 30 years, initially as an academic generalist and then as the first medical director of Obstetric Triage from 2012 to 2020. Following fellowship training in clinical pharmacology, she developed an interest in both contraceptive and obstetrical pharmacology and consulted parttime for GD Searle's Women's Health division. In the late 1990s, she participated in the initial FDA/NIH conferences which helped recognize pregnancy as a special PK population. She has been the obstetrical pharmacologist/co-PI for Northwestern's U54 Obstetrical-Fetal Pharmacology Research Center grant (2015–2021), studying SSRIs,

atypical antipsychotics, and nifedipine in pregnancy.



Adetola Louis-Jacques, M.D. is an Assistant Professor and physician scientist at the University of Florida in Gainesville, Florida. She completed her medical degree in 2010 at the University of Vermont, College of Medicine, Burlington, Vermont and her Obstetrics and Gynecology residency at the Lehigh Valley Health Network, Allentown, Pennsylvania. Her Maternal-Fetal Medicine fellowship was completed at the University of South Florida (USF), Morsani College of Medicine, Tampa, FL. Her interests include lactation, maternal mental health, and maternal health disparities.

Moderators



Lynne Yao, M.D. is the Director, Division of Pediatric and Maternal Health in the Office of New Drugs, Center for Drug Evaluation and Research. Dr. Yao received a B.S. degree in Biology from Yale University, and an M.D. degree from the George Washington University School of Medicine. She is board certified in both Pediatrics and Pediatric Nephrology. Prior to joining FDA, Dr. Yao was the Director of Dialysis and Associate Pediatric Residency Program Director at the Inova Fairfax Hospital for Children in Fairfax, VA. She has been with the FDA since 2008. The Division of Pediatric and Maternal Health oversees quality initiatives which promote and

necessitate the study of drug and biological products in the pediatric population; and improve collection of data to support the safe use of drugs and biological products in pregnant and lactating individuals. She collaborates with numerous stakeholders both inside and outside of FDA to advance development of safe and effective therapies for children, and pregnant and lactating women.



Solange Corriol-Rohou, M.D. is a pulmonologist/immuno-allergist by training and joined AstraZeneca R&D in 2004. She is currently Sr. Global Policy Director, with responsibilities in the Respiratory/Infection and Vaccine/Immune franchise. Over the past 20 years, moving from the French Medicines Agency/EMA and academia to the pharmaceutical industry, she has gained strategic experience in drug development. She is quite active within EFPIA, ICH and IMI, and passionate about paediatric drug development.

Panelists

Yodit Belew, M.D. is the Deputy Director (acting) and Associate Director for Therapeutics in the Division of Antiviral (DAV), Office of Infectious Disease (OID) at the Center for Drug Evaluation and Research (CDER), FDA. She joined the Agency in 2007 as a Medical Officer. Dr Belew has additional regulatory experiences in the Division of Pediatric and Maternal Health and the Office of New Drugs Policy. As an Associate Director, Dr. Belew provides leadership to the scientific and clinical review teams involved in the complex task of regulating and evaluating new drugs and biological products, with focus on pediatrics, maternal health, and rare diseases. She supports regulatory science research activities in the Division of Antiviral and helps build and maintain relationships with stakeholders to advance the mission and goals of the Division. Dr. Belew graduated from Cornell University Medical College. She completed her residency in Pediatrics at Mount Sinai Hospital in New York, and fellowship in Pediatric Infectious Diseases at Children's National Medical Center in Washington, D.C. Dr Belew is board certified in both Pediatrics and Pediatric Infectious Diseases.



Christina Bucci-Rechtweg, M.D. is currently the Global Head for Pediatric and Maternal Health Policy at Novartis Pharmaceuticals Corporation. She graduated with a MD from the University of Rochester School of Medicine & Dentistry and was Residency trained in Pediatrics and Fellowship trained in Pediatric Critical Care Medicine at the State University of New York @ Buffalo. She has over 20 years of pharmaceutical industry experience with roles in Clinical Development & Medical Affairs as well as Regulatory and Development Policy where she was responsible for the oversight and registration of global clinical development programs. In her career she has developed and implemented clinical programs as a Global

Medical Director for pediatric and women's health in phase II and III, including those with pediatric regulatory obligations in the EU and US, and is widely regarded for her negotiating skills in adult and pediatric drug development, as well as health policy and international regulatory consensus building. Christina is actively involved in numerous external organizations advancing the regulatory and development environment for pediatric and maternal health globally, including the U.S. National Advisory Council for Child Health and Human Development, ICH Pediatric Standing Advisory Cmte, ICH E11A Pediatric Extrapolation Expert Working Group, Critical Path Institute's International Neonatal Consortium, EFGCP Children's Medicines Working Party, the IQ Consortia's Pediatric Clinical Pharmacology Leadership

Group, HHS Task Force on Research in Pregnant Women & Lactating Women, as well as numerous professional societies and the trades.



Maged Costantine, M.D. is the Frederick P. Zuspan Professor of Obstetrics and Gynecology at the Ohio State University, Columbus, OH. He is also an Attending Physician and Division Director of Maternal Fetal Medicine at the Ohio State University Wexner Medical Center. He completed his residency in OB/GYN at the University of Cincinnati, and fellowship in Maternal Fetal Medicine at the University of Texas Medical Branch, Galveston, TX. He is a Diplomate of the American Board of Obstetrics and Gynecology with subspecialty board certification in Maternal Fetal Medicine. He is a Fellow of the American College of Obstetricians and Gynecologists, a member of the Society for Maternal Fetal Medicine, and elected member for

the American Gynecologic and Obstetrical Society. Dr. Costantine is an active clinical investigator, having published over 150 scholarly articles and book chapters. His primary research interests are hypertensive disorders of pregnancy, perinatal pharmacology, preterm birth, and repurposing medications for the prevention of pregnancy morbidities focusing on the role of statins in prevention of preeclampsia. He is currently the Principal Investigator for OSU's participation in the NICHD Maternal Fetal Medicine Units Network. Additionally, he is the PI or site PI on numerous multicenter federal and industry sponsored trials in pregnancy. At Ohio State, Dr. Costantine oversees the clinical and research operations of the division of Maternal Fetal Medicine. Additionally, he is an associate editor for American Journal of Perinatology, reviewer for national and international societies and institutes, and serves on various NIH Scientific Review Groups.



Melanie Kerr is Nurse Practitioner in GI medical oncology and serving as a patient representative. She has two children. When pregnant with her first child, she developed HELLP syndrome and was induced approximately 7 weeks early. Her son required NICU care for 2 weeks. When she was pregnant with her second son, she was approached about participating in a clinical trial looking at whether the use of pravastatin could prevent preeclampsia/HELLP syndrome. It was a randomized double-blind placebo-controlled study, which required monthly monitoring of blood pressure, weight, and labs. She was blinded to her assignment of placebo versus pravastatin during the study and she did not develop HELLP syndrome. Her second son was born pre-term, she was able to carry him longer and he did not require NICU care.



Aaron C. Pawlyk, Ph.D. joined NICHD as its OPPTB chief in 2019. His long-term research interests and experience include drug discovery and pre-clinical development, pharmacogenomics, and mathematical modeling, especially how these approaches can be applied across multiple therapeutic areas. Prior to joining NICHD, Dr. Pawlyk served at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) as a program director and senior advisor in the Division of Diabetes, Endocrinology, and Metabolic Diseases. At NIDDK, his portfolio included drug discovery, pharmacogenomics, and drug response research. He directed the Type 1

Diabetes-Rapid Access to Interventional Development program, which offered preclinical development contract services to outside researchers. As a program official, he managed cooperative agreement components of the Accelerating Medicines Partnership for Type 2 Diabetes and initiated and directed a trans-NIDDK program on therapeutics translation. He continues to serve as a coordinator of the NIH Common Fund program, Illuminating the Druggable Genome. Dr. Pawlyk received his bachelor's degree from the University of Pennsylvania, where he studied biology and biochemistry. He completed his Ph.D. in biochemistry at Texas A&M University, followed by postdoctoral studies at the University of Pennsylvania. Before joining NIH, he held multiple positions in the pharmaceutical sector.



Raman Venkataramanan, Ph.D., FAAPS, FACCP is currently a Professor of Pharmaceutical sciences and Pathology in the University of Pittsburgh. He is the director of Clinical Pharmacokinetics Laboratory and the Therapeutic Drug Monitoring program at the University of Pittsburgh. Venkataramanan received his B.Pharm degree from the University of Madras, India; Master of Pharmacy degree from the Birla Institute of Technology and Science, India; and doctorate in Pharmaceutical Sciences from the University of British Columbia, Canada. After a postdoctoral fellowship at the University of Washington, he joined the University of Pittsburgh in July 1980. He has been appointed as a Food and Drug Administration special government

employee by Center for Drug Evaluation and Research. Venkataramanan serves as a scientific reviewer for several journals. He is an editorial board member for Therapeutic Drug Monitoring, and four online journals. He is the editor for the American Journal of Analytical Chemistry. He is the recipient of the Distinguished Service Award from AAPS (2021), HiREC Endowed visiting chair at the University of Puerto Rico (Oct 2021), Distinguished Scientists award from American Association of Indian Pharmaceutical Scientists (AAiPS) in 2016, Graduate faculty of the year award from the School of Pharmacy in 2015, 2021, Tyler Prize for Stimulation of Research from the American Pharmacists Association [APhA], in 2011, the Bristol-Meyers Squibb Mentorship in Clinical Pharmacology from the American College of Clinical Pharmacy [ACCP], in 2009; the Provost's Award for Excellence in Graduate Education from the University of Pittsburgh, in 2009; the Innovations in Teaching award the Rho Chi Society at the University of Pittsburgh, in 2009; the Scholarly Contributions award from the Rho Chi Society at the University of Pittsburgh, in 2007, Ranbaxy Research Award in Pharmaceutical Sciences in 1998, and the Distinguished Research scientists award from KDRI in Ahmadabad, India in 1996. The research in his laboratory revolves around "LIFE". One half addresses the first chance in life – Optimizing the use of medications in pregnant women based on pharmacokinetics and pharmacodynamics data; the second half addresses optimization of the use of medications in organ transplant patients—a second chance in life. His current research is funded by NICHD (OPRC-Co-PI), NCI and United Therapeutics. He has presented more than 200 lectures / seminars at national/international meetings and published over 450 scientific articles. He has been an active member in various professional organizations such as American Association of Pharmaceutical Scientists, American Association of Indian Pharmaceutical Scientists, American College of Clinical Pharmacology, American Association of Colleges of Pharmacy, and American Society of Transplantation.

May 17 10:00am – 2:00pm (ET)

Session 2: Modeling in Pregnancy Pharmacokinetics

Speakers



Elimika Pfuma Fletcher, Pharm.D., Ph.D. is a Policy Lead in the Office of Clinical Pharmacology (OCP) at the US FDA. Her current primary areas of focus are pediatrics and maternal health. She has over 12 years of regulatory experience at the FDA including serving as a Senior Clinical Pharmacology Reviewer supporting Oncology drug products from 2009-2016. She received a Doctor of Pharmacy (PharmD) degree and a PhD in Pharmaceutical Sciences from the University of Houston College of Pharmacy.

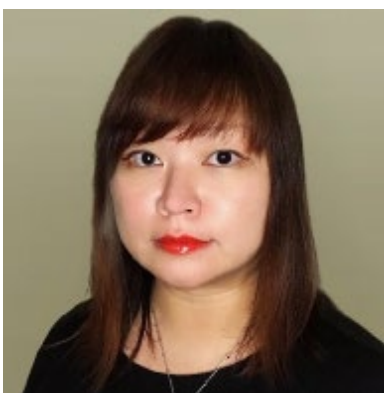


Jeff Barrett, Ph.D. is Senior Vice-President at the Critical Path Institute serving as the Executive Director of the Rare Disease Cures Accelerator, Data Analytics Platform and a critical liaison between C-Path and the pharmaceutical industry, foundations, and other key stakeholders, helping grow C-Path's portfolio in drug development solutions, with a focus, but not limited to model-informed drug development (MIDD) and real-world data (RWD) technologies. Jeff was previously Head of Quantitative Sciences at the Bill & Melinda Gates Medical Research Institute. In this role he was responsible for implementing model-based drug development, employing PK/PD modeling, statistics, and clinical trial simulations to advance the

discovery and development of new medicines and vaccines. Prior to MRI, he was Vice President, of Translational Informatics at Sanofi Pharmaceuticals. Jeff spent 10+ years at the University of Pennsylvania where he was Professor, Pediatrics and Director, Laboratory for Applied PK/PD at the Children's Hospital of Philadelphia. Jeff received his B.S. in Chemical Engineering from Drexel University and Ph.D. in Pharmacokinetics from University of Michigan. He has co-authored over 185 manuscripts, is fellow of ACCP, AAPS, ISOP and the recipient of numerous honors including ACCP awards for Young Investigator (2002) and Mentorship in Clinical Pharmacology (2007) and the AAPS Award in Clinical Pharmacology and Translational Research (2011). Dr. Barrett was awarded for Exceptional Innovation and Advancing the Discipline of Pharmacometrics at the International Society for Pharmacometrics (2013). He is co-Specialty Chief Editor of Frontiers in Obstetric and Pediatric Pharmacology Journal and an active member of the Child Health and Human Development Pediatrics Subcommittee as a study section reviewer. He was a past acting chair of the FDA Advisory Committee for Pharmaceutical Science and Clinical Pharmacology; a voting member of the committee for 8 years.



Susan Cole is an Expert Pharmacokinetics Assessor and Head of the Clinical Pharmacology group in the Innovative Medicine Group at the MHRA, the UK Regulatory Agency. Prior to joining the MHRA in 2012, Sue worked for 26 years at Pfizer in the UK in the field of Drug Metabolism and Pharmacokinetics. While in Industry Sue fulfilled a number of roles including: Head of the preclinical Pharmacokinetics and Modelling group and as a Clinical Pharmacologist. In the past, Sue was a member of the Pharmacokinetics Working Party, the Modelling and Simulation Working Group and the Scientific Advice Working Party at the European Medicines Agency and contributed to the guideline: Reporting of PBPK modelling and simulation. Sue is currently the lead investigator at the MHRA on a project with Bill and Melinda Gates Foundation: Evaluating physiologically-based pharmacokinetic (PBPK) modeling and simulations to inform drug dosing in pregnant women.



S. Y. Amy Cheung, Ph.D. is a Senior Director at Certara, leading a Quantitative Science Group (with scientists from UK, Italy and Nordic regions) in Integrated Drug Development. She is on the leadership team of the Pediatric Integrated Practice Area. She is also a mentor of the Certara-Monash University Fellowship and Pharmacometrics African programme. Dr Cheung obtained her PhD from the University of Manchester. After receiving her PhD, she worked at the Centre for Applied Pharmacokinetic Research (CAPKR) at The University of Manchester. Before joining Certara, she gained over a decade of experience at AstraZeneca (AZ), where she was a Senior Pharmacometrician. She was also a Project Manager and functional representative at the AZ Pediatric Working Group that consisted of 22+ cross-functional pediatric experts. During this time, she was also the company representative on IMI DDMoRe, co-led WPs e.g. PMX-workflow, cardiovascular training. She has been a member of the EFPIA MID3 workgroup since the 2011 EMA M&S workshop, which resulted in several white papers. She has expertise in pediatric/geriatric drug development, oncology, infection, CNS, vaccine, mAb, MIDD, structural identifiability, PBPK, and extrapolation. She is current part of the IQ CPLG pediatric working group and also co-chair of the PBPK pediatric subgroup.



Jashvant (Jash) Unadkat, Ph.D. is a Professor in the Dept. of Pharmaceutics at the School of Pharmacy, University of Washington, Seattle. He received his Bachelors degree in Pharmacy (B.Pharm.) from the University of London (1977), his Ph.D. from the University of Manchester (1982; advisor Prof. Malcolm Rowland) and his postdoctoral training at the University of California at San Francisco (1982-85; advisor Dr. Lewis Sheiner). Dr. Unadkat's research interests are focused on elucidating the mechanisms of transport and metabolism of drugs. In particular his laboratory has been interested in metabolism and transport of drugs during pregnancy, and transport of drugs across the placental, hepatic, intestinal and blood-brain barrier. Dr. Unadkat has published more than 220 peer-reviewed research papers. He is a fellow of AAAS, AAPS, JSSX, and the founding co-chair (1999-2001) of the focus group of AAPS on Drug Transport and Uptake. Dr. Unadkat received the AAPS Research Achievement Award in 2012. Dr. Unadkat

created and leads the UW Research Affiliates Program on Transporters (UWRAPT), a cooperative effort between the UW School of Pharmacy and pharmaceutical companies. He also leads UWPKDAP, a NIDA funded Program Project grant (P01) on drug disposition during pregnancy. Dr. Unadkat has been an Associate Editor for the Journal of Pharmaceutical Sciences, an Editor of AAPS Journal, and a member of the NIH Pharmacology study section (2000-3). Dr. Unadkat has organized or co-organized numerous national and international conferences on the role of transporters and pregnancy in disposition of drugs.

Panelists



Karim Azer, Ph.D. is head of Systems Biology & Discovery at Axcella Therapeutics. He leads the data and discovery sciences organization at Axcella, bringing together innovations in data sciences and discovery sciences to advance novel pipeline opportunities through the application of systems biology, design of novel endogenous metabolic modulator combinations for new indications, and the translation of these combinations into the clinic. Prior to Axcella, Karim led quantitative sciences efforts at the Bill & Melinda Gates Medical Research Institute where His work was focused on leveraging the spectrum of systems biology, including computational biology, QSP and Pharmacometrics modeling approaches,

and data science, to address research and development needs of the institute, in the areas of tuberculosis, malaria, diarrheal and enteric diseases, and maternal neonatal health. Karim received his PhD in Applied Mathematics from the Courant Institute of Mathematical Sciences at NYU, and holds an M.S. in Applied Mathematics from Courant Institute at NYU, and B.S. degrees in Mathematics and Computer Science from Rutgers University. He has worked in the pharmaceutical industry since 1997, employing a wide variety of systems biology approaches to address drug discovery and development questions in R&D. Previously at Sanofi, he formed and headed the quantitative systems pharmacology group, supporting programs across several disease areas, including immunology, rare diseases, cardiovascular and oncology. Moreover, as part of the leadership of the integrated pharmacometrics program, he took part in the development and application of pharmacometric disciplines across the development organization, and building bridges across the multiple quantitative disciplines. He also led the development of technical capabilities in support of model development, calibration, qualification and simulation, in collaboration with academic partners and Institutes. Prior to Sanofi, he was at Merck, where he established a quantitative group spanning a broad range of computational approaches to drug discovery, development and translational medicine, including both mechanistic and empirical models, image and signal processing, data science, and high performance computing. At Merck, He also led pharmacometric and mechanistic modeling efforts in support of early clinical development and translational medicine programs. He has applied systems biology to many discovery and development programs throughout his career in pharma and non-profit and has been involved in respective interactions with regulatory agencies. He has served on a number of professional societies such as American College of Clinical Pharmacology (ACCP), American Society of Mechanical Engineering (ASME), IEEE, Society for Industrial and Applied Mathematics (SIAM), and International Society of Pharmacometrics (ISOP), and continues to be active in the community. He has publications in the areas of drug discovery and development, systems biology and pharmacology, and core data science methodology.



Gilbert Burckart, Pharm.D. is presently Associate Director for Pediatrics, Office of Clinical Pharmacology, U.S. Food and Drug Administration. Dr. Burckart has served on the faculties of four universities (Buffalo, Tennessee, Pittsburgh, Southern California) as a Professor of Pharmacy, Pediatrics and Surgery for 33 years prior to coming to the FDA. He moved to the US FDA in 2008, and his duties include the direction of the Pediatric Clinical Pharmacology program within the Office of Clinical Pharmacology, and participation in the FDA's Pediatric Review Committee. His present educational and research program focuses on pediatric drug development studies.



André Dallmann, Ph.D. works as Scientist for Systems Pharmacology in the department of Pharmacometrics/Modeling & Simulation at Bayer, Germany. He earned a master's degree in Pharmaceutical Sciences and completed his PhD in Clinical Pharmacy at the University of Münster, Germany, in 2017. Thereafter, he worked as a postdoctoral researcher at the Pediatric Pharmacology & Pharmacometrics Research Center at the University Children's Hospital Basel in Switzerland. In 2018, he joined Bayer where he develops and applies PBPK tools in the context of clinical drug development. Additionally, he is actively involved in employing perinatal PBPK models to better characterize drug pharmacokinetics in pregnant individuals, the fetus, and neonates. Dr. Dallmann co-authored more than 30 peer-reviewed articles and book chapters on clinical pharmacology and

PBPK modeling, most of them with a focus on pregnancy and lactation.



Manuela Grimstein, Ph.D. is an acting team leader for the Physiologically-based Pharmacokinetic (PBPK) team in the Division of Pharmacometrics in the Office of Clinical Pharmacology, FDA. Prior she worked as a clinical pharmacology reviewer in the Division of Inflammation and Immune Pharmacology. Dr. Grimstein received her Ph.D. degree from the Department of Pharmaceutics, College of Pharmacy, University of Florida, in 2011, and her Bachelor of Pharmacy and Masters of Science degree in Pharmaceutical Sciences from the Federal University of Minas Gerais, Brazil, in 2006. Her research interests include application of physiologically-based pharmacokinetic models to evaluate the effect of

patient intrinsic and extrinsic factors on drug exposure. Specifically, the effect of age, renal function, co-medications, genetic polymorphism, and pregnancy on drug exposure. Her work has been published in highly cited peer-reviewed journals.



Sara K. Quinney, Pharm.D., Ph.D. is an Associate Professor in the Department of Obstetrics and Gynecology and Division of Clinical Pharmacology, Department of Medicine, at Indiana University School of Medicine. Dr. Quinney serves as the Director of the Indiana Clinical and Translational Sciences Institute (CTSI) Disease and Therapeutic Response Modeling program, Assistant Scientific Director of the Clinical Pharmacology Analytical Core Laboratory, and co-Director of Indiana Pregmed. She received her Pharm.D. and Ph.D. in pharmacy practice from Purdue University and completed clinical pharmacology and bioinformatics fellowships at Indiana University. Dr. Quinney utilizes in vitro, preclinical,

clinical, and bioinformatics data to develop quantitative systems pharmacology models to improve understanding of drug disposition and response in special populations, especially pregnant women. She is particularly interested in improving care for women with high-risk pregnancies, including those with opioid use disorder, preterm labor, and preeclampsia. She is the contact PI for the Indiana University-Ohio State University MPRINT Data and Model Knowledge Research Coordination Center (IU-OSU MPRINT DMKRCC) and co-director of the MPRINT DMKRCC Pharmacometrics and Clinical Trial Design Core.

Session 3: Data Interpretation & Translation into Dosing Recommendations in Pregnancy

Speakers



Mathangi Gopalakrishnan, Ph.D. is Assistant Professor at the Center for Translational Medicine, School of Pharmacy, University of Maryland. She obtained her Masters in Pharmacy from Birla Institute of Technology and Science, Pilani, India and her Ph.D in statistics from University of Maryland, Baltimore County. Dr. Gopalakrishnan is a quantitative clinical pharmacologist and statistician by training with more than 10 years' experience using innovative quantitative approaches to better inform decision making in clinical therapeutics and drug development. Dr. Gopalakrishnan is also a co-investigator in multiple grants involved in design and analysis of pharmacokinetic-pharmacodynamic (PD) studies for

nutritional supplements and low calorie artificial sweeteners in pregnant and postpartum women. Some of her other research areas include neonatal opioid withdrawal syndrome, neuro-psychiatry and medical countermeasure development. She has authored more than 40 peer-reviewed publications and was the recipient of American College of Clinical Pharmacy's Best teacher award in 2018.



Brookie Best, PharmD, M.A.S. is a Professor of Clinical Pharmacy and Pediatrics, and is the Associate Dean for Pharmacy Education at the University of California San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences and School of Medicine. She specializes in pharmacokinetics – the processes by which a drug is absorbed, distributed, metabolized and eliminated by the body – and perinatal and pediatric clinical pharmacology research. Her research efforts have focused on studying anti-HIV drugs during pregnancy and childhood.

Panelists



Edmund Capparelli, Pharm.D. is a Professor at the University of California, San Diego (UCSD) in Pediatrics for the School of Medicine and Skaggs School of Pharmacy and Pharmaceutical Sciences. Dr. Capparelli received his Doctorate of Pharmacy from the University of California San Francisco in 1985 followed by fellowship training at Hartford Hospital and the University of California Irvine. In 1992 he helped establish the Pediatric AIDS Clinical Trials Group Pharmacology Lab at UCSD and served as principal investigator for a NIAID supported Pharmacology Laboratory within the Infant Maternal Pediatric and Adolescent AIDS Trials (IMPAACT) Network. He has been the pharmacologist or vice-chair on over 30 IMPAACT studies

including several assessing the impact of pregnancy on antiretroviral pharmacokinetics. He currently serves as leader of the network's pharmacometrics core and is the pharmacokineticist for several IMPAACT, NIAID Vaccine Research Center (VRC) and CAPRISA bNAb trials. His research expertise is in pharmacokinetics (PK) and pharmacodynamic (PD) modeling and application of population models and simulation methods to design and analyze clinical pharmacologic studies using mixed-effect modeling. Dr. Capparelli has served as a member of the FDA Clinical Pharmacology Advisory Committee, WHO Pediatric Antiretroviral Working Group (PAWG) and AIDSinfo Pediatric HIV treatment Guideline Committees. More than 50 of his 290 publications relate to drug disposition during pregnancy.



Steve Caritis, M.D. is currently a Professor of Obstetrics, Gynecology and Reproductive Sciences at the University of Pittsburgh School of Medicine, Magee Womens Hospital. He received his medical degree from from West Virginia Medical School, completed a residency in obstetrics and gynecology at University of Pittsburgh and a fellowship in maternal-fetal medicine at Columbia Presbyterian Medical Center. Dr. Caritis is the PI on five consecutive five-year MFMU Networks and the PI for three consecutive five-year OPRU Network grants. He has directed the Maternal-Fetal Medicine fellowship for 25 years and was the co-PI on a T-32 training grant in Obstetrical Pharmacology. As the PI of the Obstetric and Pharmacology

Research Collaborative, he participated in numerous studies assessing the pharmacokinetic and pharmacodynamic properties of several medications including buprenorphine. He is currently NIH funded to study the impact of opioids on the fetal brain using MRI and neurodevelopmental assessment tools. Dr.

Caritis has vast experience with interventional and pharmacologic treatments in pregnancy and have interacted with industry to study drugs unique to pregnant women.



Ashley Strougo, Ph.D. is currently the Program Lead for the Childhood Cancer Flagship, a commitment from Corporate Social Responsibility at Sanofi. Previously, she was the Head of the Modeling and Simulation Group in Germany where she also fulfilled the roles of Translation Medicine Lead and Modeling and Simulation Lead for late phase projects. Ashley is a member of Sanofi's Pediatric Network, Sanofi's representative and former chair of the Pediatric Working Group at IQ Consortium and, co-founder and member of a DE&I group at Sanofi Frankfurt. Prior to joining Sanofi in 2015, Ashley worked as a quantitative clinical pharmacologist with focus in pediatric drug development for 8 years at Astellas Pharma and 2 years at LAP&P Consultants in the Netherlands. Over her career, she has collaborated to the development of over ten drugs for pediatric use. Ashley graduated as a pharmacist at the Federal University of Rio de Janeiro, Brazil in 2001 and obtained her master and PhD degree after various research projects involving the use of PK-PD modelling in the field of pharmacology, clinical pharmacology and pediatrics at Leiden University, The Netherlands. Ashley is the co-author of key scientific publications in this field.



Kellie Schoolar Reynolds, Pharm.D. is Director of the Division of Infectious Disease Pharmacology in the Office of Clinical Pharmacology, CDER, FDA. She received her B.S. in Biochemistry from Virginia Tech, Pharm.D. from Virginia Commonwealth University, and completed a fellowship in Clinical Pharmacokinetics and Drug Development at University of North Carolina. Her work involves application of clinical pharmacology to development of antiviral and anti-infective drugs and drugs developed under the animal rule. Her interests include dose selection for sub-populations, drug interactions, risk/benefit assessment, and communication. Her work at FDA began in 1994 during a pivotal phase of HIV drug development, allowing her to experience the essential contribution of clinical pharmacology to development of drugs for a life threatening disease. Dr. Reynolds has presented on the study and interpretation of drug interactions and has published peer-reviewed articles that address drug interactions. She is a member of the Drug Interaction Working Group and Drug Interaction Labeling Working Group at FDA and is the FDA topic lead for the International Council for Harmonization Drug Interaction Working Group. Dr. Reynolds is a past president of the American Society for Clinical Pharmacology and Therapeutics and was an associate editor for Clinical Pharmacology and Therapeutics.

Kimberly Struble, Pharm.D. is currently a Senior Clinical Analyst Team Leader in the Division of Antivirals in the Office of Infectious Diseases, CDER, FDA. She received her B.S. in Pharmacy from the University of Connecticut and a Pharm.D. from the University of Arkansas for Medical Sciences. She provides expertise in all phases of antiviral clinical drug development and leads a team responsible for the development of new products for the treatment and prevention of HIV infection, hepatitis B and C, influenza, various herpes infections, and other emerging viral infections such as Ebola and COVID-19. She started at FDA in 1993 and worked as a project manager and clinical reviewer until 2002 then went to Tibotec-Virco as the Director of US Regulatory Affairs. She returned to FDA in 2003 as a clinical reviewer then became a team leader in 2006. She is a member of the Department of Health and Human Services

HIV Treatment Guidelines Panel and she serves on various HIV-related committees including the Long-Acting/Extended Release Antiretroviral Drugs (LEAP) and the Forum for Collaborative Research. She is also the FDA representative to CDC for occupational and nonoccupational post-exposure prophylaxis public health service working groups. She has over 30 publications and 50 presentations relating to HIV, HCV and COVID-19 drug development and FDA regulations.

Additional information

This workshop is open to the public; however, registration is required at:
<https://bioeumd.wufoo.com/forms/modi0au1wjs8as/>.

More information about this event can be found at: <https://go.usa.gov/xu2MX>