Drug Permeability: Best Practices for BCS-based Biowavers

FDA & M-CERSI Virtual Workshop Monday, December 6, 2021

Speaker Biographies

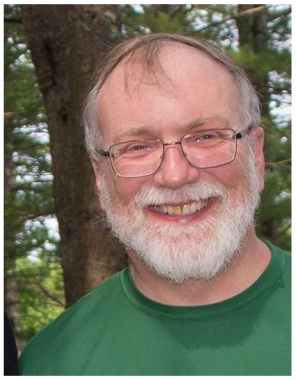
James E. Polli, Ph.D.
Professor and Ralph F. Shangraw/Noxell Endowed Chair in Industrial Pharmacy and Pharmaceutics
University of Maryland School of Pharmacy

James Polli is Professor of Pharmaceutical Sciences and Ralph F. Shangraw/Noxell Endowed Professor in Industrial Pharmacy and Pharmaceutics at University of Maryland. His research interest is oral drug absorption. His two main research interests are 1) maximizing oral bioavailability through formulation and chemical approaches and 2) developing public quality standards for oral dosage forms. He has served as advisor to 21 Ph.D. graduates. He is co-Director of the University of Maryland Center of Excellence in Regulatory Science and Innovation (M-CERSI; www.cersi.umd.edu) and the Center for Research on Complex Generics (CRCG; www.complexgenerics.org), each an FDA-funded collaborative agreement with the Agency. He is Director of the online M.S. in Regulatory Science program (www.pharmacy.umaryland.edu/regulatoryscience).

He is a fellow of the American Association for Pharmaceutical Scientists and until recently served as an editor of its flagship journal Pharmaceutical Research for 12 years. He is a member of the University of Maryland General Clinical Research Center Advisory Committee and the University of Maryland institutional review board (IRB). He is a member of the Scientific Advisory Board of Simulations Plus.

Utpal M. Munshi, Ph.D.
Acting Director
Office of Bioequivalence/Office of Generic Drugs
Center for Drug Evaluation and Research, FDA

Utpal Maushi is the Division Director (Acting) of the Division of Bioequivalence I (DBI) in the Office of Bioequivalence, Office of Generic Drugs, CDER, FDA. He leads a team of scientists responsible for the assessment of the bioequivalence section of Abbreviated New Drug Applications and other stakeholder submissions. During his time in DBI, Dr. Munshi has had a variety of technical and administrative roles and has participated in the drafting of numerous Agency guidances pertaining to bioequivalence. Dr. Munshi received his Ph.D. in Biological Chemistry from the University of Michigan and then undertook post-doctoral training at the National Cancer Institute in Frederick Maryland before joining DBI in 2007.



Jack Cook, Ph.D.
Clinical Pharmacology
Global Products Development, Pfizer, Inc.

Jack Cook is a Vice President in the Clinical Pharmacology Department of the Global Product Development unit at Pfizer, Inc. Dr. Cook holds adjunct faculty positions at the Universities of Michigan and Florida Colleges of Pharmacy. He received B.S. degrees in Applied Mathematics and Pharmacy from Ferris State College, and his Ph.D. in Pharmaceutics from the University of Michigan. He has authored/co-authored over 75 peer-reviewed publications. He served as an industrial representative for the United States Food and Drug Administration's Pharmaceutical Science and Clinical Pharmacology Advisory Committees from 2012 to 2019. He is a fellow of the AAPS. His current interests include improving therapy by optimizing drug delivery and the use of modeling and simulation to make rational decisions in the development of drugs.

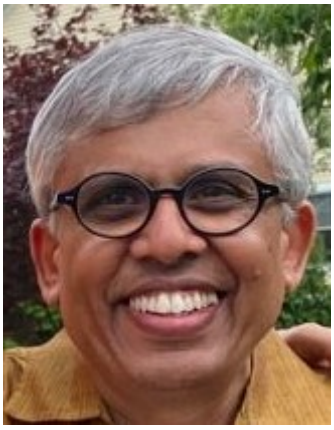
Katja Kristan, Ph.D.
Leading Scientist, In Vitro-In Vivo Correlation Department
Lek Pharmaceuticals d.d.

Katja Kristan has been with Lek Pharmaceuticals since 2006. Katja started her career in Drug Discovery and moved to Development area as an IVIVC scientist, where she is now responsible for biopharmaceutics research as a Leading Scientist. She has extensive and diverse experience in drug permeability, IVIVC/IVIVR, biowaivers and in development of biorelevant dissolution/drug release methods for oral formulations and topical and nasal drug products. She published several articles in peer-reviewed journals from these areas. Moreover, she is a Research Associate at Institute of Biochemistry and Molecular Genetics, Faculty of Medicine, University of Ljubljana, and was (co)supervisor to several M.Sc. students and Ph.D. students.

Katja Berginc, Ph.D.
Senior Scientist, In Vitro-In Vivo Correlation Department
Lek Pharmaceuticals d.d.

Katja Berginc has been with Lek Pharmaceuticals since 2013, where focused on innovating cutting-edge scientifically based approaches and developing bio-predictive tools for poorly soluble compounds within emerging formulations and complex drug products. Her expertise enrolls dissolution, permeability and the interplay between permeability and precipitation.

During 2004 and 2013, Katja Berginc was a member of the Department of Biopharmacy and Pharmacokinetics as Faculty of Pharmacy where she devoted her research to interactions between natural food constituents and drug substances at the level of absorption and metabolism. During this period, she was a mentor to a significant number of students and published numerous scientific papers.



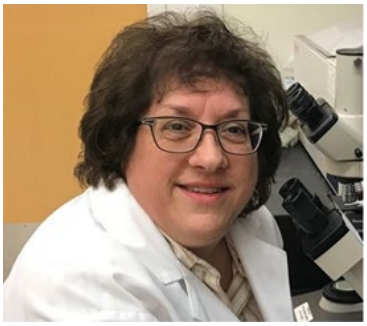
Ravi Shankar, Ph.D.
Senior Research Fellow, Drug Product Design
Pharmaceutical Science, Pfizer

Ravi Shanker is a Senior Research Fellow in Drug Product Design within Pharmaceutical Sciences at Pfizer Worldwide Research and Development in Groton, CT. Ravi has over 32 years of research experience in innovation for several novel drug delivery technologies, advanced mechanistic approaches for discovery support and industry leading experimental as well as computational biopharmaceutics. He has numerous papers and patents to his credit. Ravi has mentored Ph.D. dissertation research and taught graduate level courses as an adjunct faculty

member. He has collaborated globally with industrial entrepreneurs to advance novel methodologies and with academic researchers for enhanced fundamental understanding of drug absorption and drug delivery. He has been an invited speaker at numerous national and international conferences and has been on the editorial board of several journals. Ravi received Bachelor's in Pharmacy degree from Banaras Hindu University in India; Masters and Ph.D. in Pharmaceutical Chemistry from the University of Kansas.

Sid Bhoopathy, Ph.D.
Senior Vice President of Operations
Absorption Systems

Sid Bhoopathy is Senior Vice President of Operations at Absorption Systems, a Pharmaron Company. In this capacity, Dr. Bhoopathy's primary responsibility is to execute the scientific and strategic growth of Pharmaron Lab Services and CGT in the US. He possesses a thorough understanding of the processes that support lead optimization, candidate selection and preclinical drug development. His in-depth appreciation of the nuances of the Biopharmaceutics Classification Systems (BCS) as it relates to biowaivers, drug formulation and drug development in general, have made him a strong advocate for the use and expansion of BCS. In addition, he has led the commercialization of Absorption Systems' portfolio of cell-based transporter assay systems. Prior to joining Absorption Systems, Dr. Bhoopathy received his Bachelor's in Pharmacy from Kakatiya University and a Ph.D. in Pharmaceutics from Virginia Commonwealth University. His current research interests are in the areas of complex drug product development, BCS-based biowaivers and drug transporters



Donna A. Volpe, Ph.D.
Lead Research
Office of Clinical Pharmacology/Division of Applied Regulatory Science
Center for Drug Evaluation and Research, FDA

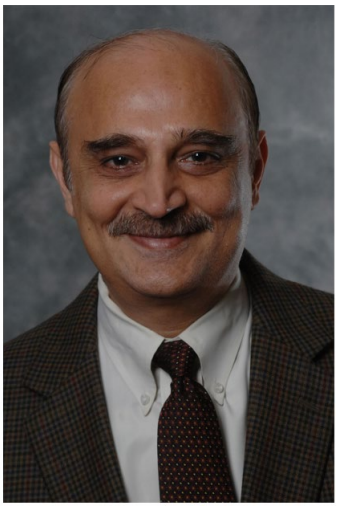
Donna Volpe received a B.A. in Biology from Canisius College in Buffalo, NY and a doctorate (Experimental Hematology) from the University of Buffalo. This was followed by a postdoctoral fellowship at the Hipple Cancer Research Center in Dayton, OH working on an NCI-funded project looking at the bone marrow toxicity of anticancer and antiviral drugs.

Dr. Volpe joined the FDA in 1990 as a Senior Staff Fellow to continue studies on bone marrow toxicity with human, canine and murine models. Later she worked on the Caco-2 cell permeability model, BCS classifications and drug stability studies. This was followed by work on drug metabolism and transporter projects. In her current position, she is the Lead Researcher in the drug metabolism, transporter and drug-drug interaction group. Dr. Volpe has been involved in the drafting and revising of FDA's BCS-biowaiver and in vitro drug interaction guidances for industry.

Dr. Volpe has been involved in a number of studies including in vitro drug metabolism, P-gp efflux and permeability assays in Caco-2 cells, binding affinities of opioid drugs and hepatotoxicity. She also provides scientific expertise to reviewers as a member of DARS' multi-disciplinary teams on drug permeability, metabolism and transport.

Haritha Mandula, Ph.D.
Senior Pharmaceutical Quality Assessor
Division of Biopharmaceutics/ Office of New Drug Products
Center for Drug Evaluation and Research, FDA

Haritha Mandula is a Senior Pharmaceutical Quality Assessor (SPQA) in the Division of Biopharmaceutics\Office of New Drug products (ONDP) at OPQ\CDER\FDA). She is involved with the review of the biopharmaceutics aspects of new and generic drug product submissions. Dr. Mandula also serves on several review committees at the FDA including the BCS committee and chairs the in vitro-in vivo correlations (IVIVC) committee. Prior to joining ONDP, Dr. Mandula assessed bioequivalence of generic applications in the Office of Generic Drugs at FDA. Prior to joining FDA, Dr. Mandula was employed as a Pharmacokineticist at Pharmaceutical Product Development (PPD, Richmond) where she was involved with the design and conduct of Phase 1-Phase 3 pharmacokinetic and biopharmaceutics drug development studies. Dr. Mandula graduated with a Ph.D. in Pharmaceutical Sciences from Texas Tech University with an emphasis on transport pharmacokinetics of drugs/molecules across the blood-brain barrier (BBB). Dr. Mandula is well published in the literature related to drug transport across blood-brain barrier, BCS and clinically relevant dissolution testing. Dr. Mandula received several awards at FDA including CDER Regulatory Science Excellence Awards, CDER Special Recognition Awards and FDA Commissioner's Special Citation Awards.



Mehul Mehta, Ph.D., FAAPS
Director, Division of Neuropsychiatric Pharmacology
Center for Drug Evaluation and Research, FDA

Mehul Mehta is the Director, DNP (Division of Neuropsychiatric Pharmacology), OCP (Office of Clinical Pharmacology), in CDER (Center for Drug Evaluation and Research), FDA. His division is responsible for reviewing the clinical pharmacology aspects of the neurological, psychiatric, analgesic, anesthetic and addiction drug products. He has been with the Agency for the last 35 years during which period he has made significant contributions to the approval of hundreds of NDAs. In addition to his review oversight, administrative and management responsibilities, he continues to play a significant role in broad based regulatory needs. For example, he represented the Agency as the FDA Lead Expert on the ICH M9 EWG for BCS-based biowaivers guideline that was finalized in 2021, co-chair of the CDER NTI (Narrow Therapeutic Index) WG, member of the CDER Lifecycle Management Board, founding co-chair and current member of the CDER BCS Committee, co-chair of the FDA-EUFEPS-AAPS sponsored GBHI workshop and member of the FIP BCS SIG. Current research interests include role of biomarkers in establishing efficacy of Alzheimer's disease, therapeutic equivalence of complex modified release products, NTI designation of drug products, pediatric efficacy extrapolation for various indications, possible extension of BCS-based biowaivers, etc. He has authored numerous publications and book chapters, has led WGs for the FDA 'Hepatic Impairment' guidance and SUPAC MR guidance and has been a key member of WGs for several additional guidances.

Jan Welink, Ph.D.
Medicines Evaluation Board
Utrecht, The Netherlands

Jan Welink has worked since 1997 as a (Senior) Clinical Assessor at the Dutch Medicines Evaluation Board (MEB). He was Chair of Pharmacokinetic Working Party of the European Medicines Agency (EMA) until September 2019 and since then an expert member of this group. Specialist areas of interest are bioavailability, bioequivalence and the BCS. He joined the EUFEPS Steering Committee on Bioavailability and Biopharmaceutics in 2012. He is involved in the WHO Prequalification program, an approval procedure for products (mainly generics) within areas such as HIV/AIDS, tuberculosis and malaria. He is participating in the ICH Generics Discussion Group (IGDG) as Regulatory Chair and has been involved in the ICH harmonization process M09 on BCS-based biowaivers as Rapporteur. Currently, Jan is involved in ICH M10 on bioanalytical method validation as Deputy Topic Leader and ICH M13 on Bioequivalence as Regulatory Chair.

Shereeni Veerasingham, MBBS, Ph.D.
Assessment Officer, Therapeutics Products Directorate/ Health Products and Food Branch
Health Canada, Government of Canada

Shereeni Veerasingham is a Senior Assessment Officer at the Bureau of Pharmaceutical Sciences, Health Canada where she evaluates biopharmaceutics information provided in support of approval of innovative and generic drug products. Her expertise includes pharmacokinetics, comparative bioavailability and modelling and simulation for biopharmaceutics applications.

She served as Health Canada's Topic Leader on the ICH BCS-based biowaivers (M9) Expert Working Group.

Shereeni obtained her Doctorate degree (Ph.D.) with specialization in Pharmacology from the University of Ottawa, Ontario (2001), and her Degree in Medicine (MBBS) from the University of Ibadan, Nigeria (1990).

John Gordon, Ph.D.
Assessment Officer, Division of Biopharmaceutics/ Health Products and Food Branch
Health Canada, Government of Canada

John Gordon has 18 years of international experience in the areas of bioequivalence and BCS-based biowaivers through his involvement with the World Health Organization (WHO) Prequalification Team – Medicines. He has been directly involved in the development of bioequivalence and BCS-based biowaiver guidelines published by the WHO and served as the WHO representative on the ICH EWG that developed the ICH Guideline M9 'Biopharmaceutics Classification System-Based Biowaivers' (2019).

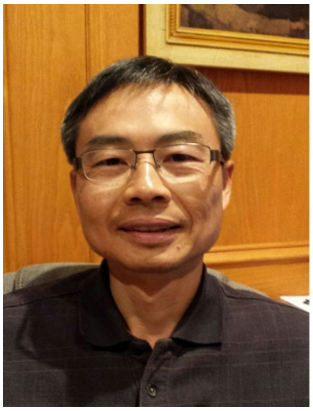
For 24 years, John has been an Assessment Officer in the Division of Biopharmaceutics Evaluation (DBE) in the Bureau of Pharmaceutical Sciences, Health Canada. DBE is responsible for assessing comparative bioavailability studies and biowaivers submitted in support of drug products applications. In addition, he has been involved in the development of many Health Canada policies related to bioequivalence and biowaivers, including the 2014 Health Canada guidance 'Biopharmaceutics Classification System Based Biowaiver'. John is currently the Health Canada Topic Lead on the ICH EWG M13 'Bioequivalence for Immediate-Release Solid Oral Dosage Forms'. John has co-authored many publications on interchangeability, bioequivalence and biowaivers. John has a Ph.D. in Biopharmaceutics/Pharmacokinetics from the University of British Columbia (UBC), an M.Sc. in Pharmaceutics from UBC, and a B.Sc. Hon. in Chemistry from Dalhousie University.

Jennifer Dressman, B. Pharm, Ph.D.
Professor of Technology
Goethe University, Frankfurt Germany

Jennifer Dressman recently retired as Professor of Pharmaceutical Technology at the Goethe University in Frankfurt am Main, Germany. She received her B. Pharm degree in Pharmacy from the Victorian College of Pharmacy, Melbourne in 1976 and her Ph.D. in 1980 from the University of Kansas in the USA under the direction of Prof. Takeru Higuchi. From 1980 to 1983, she held positions as Senior Scientist at Burroughs Wellcome and Interx/Merck before joining the Pharmaceutics Faculty at the University of Michigan as an Assistant Professor. In 1989, she was promoted to Associate Professor, with tenure, at the same university and in 1994 took up her position in Frankfurt. Since 2018, she has been working with the Fraunhofer Institutes in Germany to establish a formulation group within the new Institute of Translation Medicine and Pharmacology.

Prof. Dressman's research interests focus principally on predicting the in vivo performance of drugs and dosage forms after oral administration. She is best known for pioneering the use of biorelevant dissolution testing and her contributions to combining dissolution testing with physiologically based pharmacokinetic modelling in order to achieve quantitative predictions of oral drug absorption.

In recognition of her research excellence, she has been made a Fellow of the AAPS, the CRS, AJPST and the FIP. In 2008, she was awarded the Distinguished Scientist Award of the FIP and in 2017 was named the International Woman Pharmaceutical Scientist of the Year by the APSTJ. Her research papers have been awarded Paper of the Year on four occasions (Ebert Prize 1986, Phoenix Prize 2003, Best Paper Award EJBP 2010 and Most Informative research Paper Simcyp 2017) and she was recently named a career "Highly Cited Researcher" by Elsevier. In 2022, a special issue of the Journal of Pharmaceutical Sciences will be dedicated to her contributions to the Pharmaceutical Sciences; she is the first woman to receive this recognition.



Yu Chung Tsang, B.Sc. Phm, Ph.D.
Chief Scientific Officer/Biopharmaceutics & Biostatistics
Global Regulatory Affairs, Apotex Inc.

Yu Chung Tsang is currently working at Apotex Inc. as Chief Scientific Officer, Biopharmaceutics and Biostatistics. He obtained his Bachelor's degree (1984) in Pharmacy and Ph.D. degree in the area of Pharmacokinetics in 1990 from the University of Toronto. He has been with Apotex since then. His main responsibilities are to provide pharmacokinetic and statistical advices in preparing protocol and study reports for pharmacokinetic/pharmacodynamic and clinical studies of complex drug and biosimilar products, and in the design of bioequivalence/clinical endpoint studies and the analysis of data for the development of traditional drug products in the Apotex group of companies. To date, he has been involved with the design and data analysis of over a thousand bioequivalence/clinical studies for the registration of complex drug and biosimilar products and over 300 traditional drugs in Canada, US, EU and many other international marketplaces. Dr. Tsang is currently the Chair of the Bioequivalence Committee in the Canadian Generic Pharmaceutical Association, and the Past Chair of the Generic Pharmaceuticals Focus Group of the American Association of Pharmaceutical Scientists. Aside from his industrial experience, he also holds an appointment (status only) at the Leslie Dan Faculty of Pharmacy, University of Toronto.

Pablo Gonzalez, Ph.D.
Gerente General
Innovation and Biopharmaceutical Evaluation Center

Dr. Pablo Gonzalez is a biopharmaceutical expert with more than 10 years of experience in bioequivalence and biowaivers, designing in vivo studies to evaluate therapeutic equivalence; analyzing pharmacokinetic and statistical data; developing and validating bioanalytical methods based on mass spectrometry; establishing and implementing quality systems for bioequivalence centers and bio-exemptions; developing and validating permeability methodologies to study the effect of excipients on drug absorption; forming advanced human capital in the academic, industrial and government sectors, in regulatory sciences related to the development of generic products, design of pharmaceutical forms based on biopharmaceutical principles and in vitro-in vivo correlations.

Dr. González is a Pharmacist from Pontificia Universidad Católica de Chile (PUC, 2002) and Ph.D. from University of Maryland. From 2009 to 2019, Dr. González taught Pharmaceutical Technology at PUC. Currently he is founder and CEO at Innovation and Biopharmaceutical Evaluation Center (IBE Center), only center authorized in LATAM to conduct cell-based permeability assays for biowaivers.

Susana Almeida, Ph.D.
Clinical Development and Safety Director
Medicines for Europe, Brussels, Belgium

Dr. Susana Almeida is Clinical Development and Safety Director at Medicines for Europe (formerly EGA). Before joining Medicines for Europe, Susana was the Chair of the Association's Bioequivalence Working Group for almost 15 years. She has worked in clinical trials and pharmacovigilance in Europe and in North America, and her experience includes the pharmaceutical industry and clinical research organizations. She has overseen the conduction of dozens of clinical trials carried out in Europe, North and South America and Asia.

At Medicines for Europe, Susana is responsible for the coordination of multiple working groups, working on different aspects involving policy and regulatory science; Susana coordinates activities related to clinical development, pharmacovigilance/drug safety and medical devices (EU Medical Device Regulation article 117).

She has represented the International Generic and Biosimilar Medicines Association (IGBA) in multiple Expert Working Groups at the International Council for Harmonisation (ICH):

M13, Generic Discussion Group and M9. She is also involved in the Therapeutics Pillar of the Access to COVID-19 Tools (ACT) Accelerator partnership, launched by WHO and partners.

She holds a Ph.D. in Clinical Pharmacology from the Faculty of Medicine, Universidad Autònoma de Barcelona (UAB), Spain and has authored several scientific papers.

Paul Seo, Ph.D.
Director, Division of Biopharmaceutics Office of New Drug Products
Food and Drug Administration

He received his B.S. in Biochemistry from the University of Maryland at College Park in 1999. Shortly thereafter, he received his Ph.D. in Pharmaceutical Sciences in 2004, from the University of Maryland, Baltimore, focusing in the area of biopharmaceutics. Paul has worked for the FDA for over 17 years and has gained experience in the Office of Generic Drugs, Office of Pharmaceutical Science and Office of New Drug Quality Assessment. He currently oversees the direction and review processes of the Division of Biopharmaceutics in the Office of New Drug Products, as they pertain to NDA and ANDA related biopharmaceutics issues.