



Workshop on Extracellular Vesicles, Exosomes, and Cell-Cell Signaling in Response to Environmental Stress Biosketches

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Biosketches of the Extracellular Vesicles, Exosomes, and Cell-Cell Signaling in Response to Environmental Stress workshop presenters, moderators, and panelists are presented below in the order they appear on the agenda.

Rick Woychik

Rick Woychik, Ph.D., became the director of the National Institute of Environmental Health Sciences (NIEHS), one of the National Institutes of Health (NIH), and the National Toxicology Program (NTP) on June 7, 2020. In these roles, Woychik oversees federal funding for biomedical research to discover how the environment influences human health and disease. As a mammalian geneticist, Woychik has had a number of noteworthy accomplishments. His laboratory was the first to clone and characterize the gene called *agouti*, which provided molecular insights into obesity and the satiety response in the brain. Additionally, his laboratory was the first to identify a gene mutation associated with polycystic kidney disease, which provided insights into this molecular biology of this important human disease. Also, his laboratory was the first to determine that a member of the protocadherin family was associated with the hearing loss in a mouse model that was ultimately paved the way to better understanding the molecular basis of Usher syndrome type 1F in humans. More recently his research program has been focused on investigating the molecular mechanisms associated with how environmental agents influence the epigenetic control of gene expression.

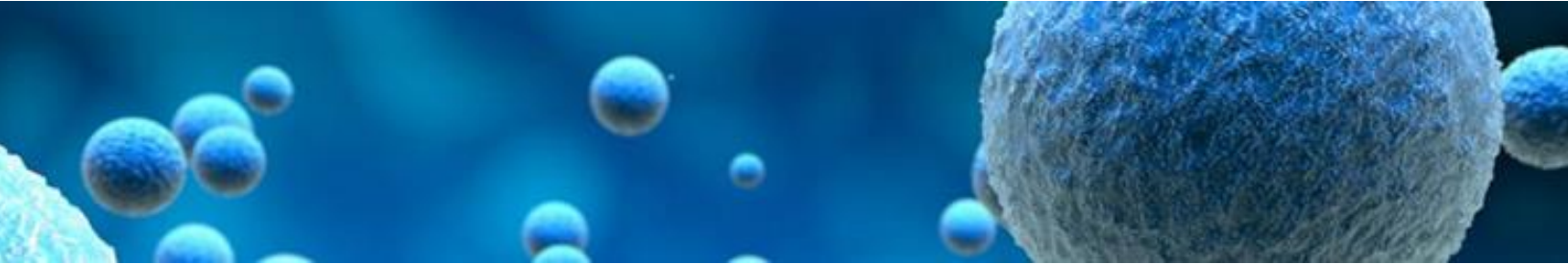
Dan Shaughnessy

Daniel Shaughnessy, Ph.D., joined the Division of Extramural Research and Training in 2006. As a postdoctoral fellow in the Laboratory of Molecular Carcinogenesis at NIEHS, he conducted research on the risks and protective effects of dietary factors on DNA damage in humans. He received a Ph.D. from the University of North Carolina at Chapel Hill in 2002 and an M.S.P.H. degree from UNC in 2000, studying the molecular mechanisms of dietary antimutagens.

Shaughnessy manages a portfolio of grants related to DNA repair and mutagenesis. He also manages grants on the development and validation of biomarkers of response to environmental stress, with a current focus on early biomarkers of mitochondrial dysfunction and altered signaling in response to environmental stress. He is the program contact for the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs at NIEHS.

Stephen Gould

Stephen J. Gould, Ph.D., is a professor of biological chemistry at the Johns Hopkins University School of Medicine. A cell biologist and biochemist, Gould investigates the formation of HIV particles, which develop as the virus escapes from one cell and infects others. His research has led to the identification of new targets for anti-HIV therapy. Gould is co-director of the School of Medicine's Graduate Program in Biological Chemistry. He also leads the metabolism component of its "Genes to Society" Translational Science Intersessions for third-year medical students. Gould earned his doctoral degree in biology at the University of California, San Diego, where he completed a post-doctoral fellowship. He also holds a



bachelor's degree in aquatic biology from the University of California, Santa Barbara. He joined the Johns Hopkins faculty in 1991 as an assistant professor of cell biology. Gould serves as both the president of the American Society of Exosomes and Microvesicles and the editor-in-chief of Exosomes and Microvesicles. He also sits on the editorial board of the Journal of Extracellular Vesicles and serves as an ad hoc reviewer for publications that include the Proceedings of the National Academy of Sciences (United States), Cell, Science and Journal of Cell Biology. He has organized several scientific conferences, delivered scores of invited lectures, published approximately 110 journal articles, and authored and co-authored seven book chapters.

Christine Happel

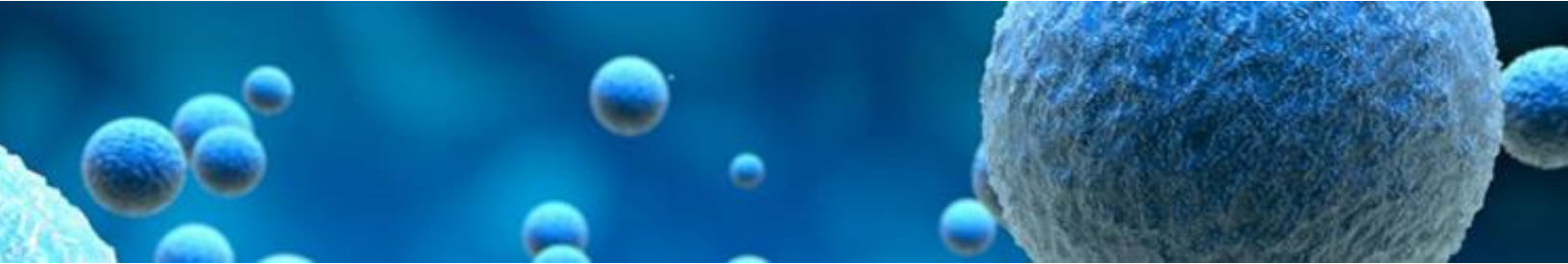
Christine Happel, Ph.D., is a program officer in the Office of Special Initiatives within the National Center for Advances Translational Sciences (NCATS). She manages the NIH Common Fund's Extracellular RNA Communication program as well as the RADx-rad Exosome-based Non-traditional Technologies Towards Multi-Parametric and Integrated Approaches for SARS-CoV-2 program. Key components of these programs include discovering the fundamental biological principles of exRNA; identifying exRNA biomarkers of diseases; demonstrating the clinical utility of exRNAs as therapies; and supporting the development of exRNA resources, tools, and technologies. Prior to joining NCATS in 2019, Happel served as the assistant project director for the NIH AIDS Reagent Program. Happel received her Ph.D. in molecular biology and genetics from Temple University School of Medicine. She completed two postdoctoral fellowships at Johns Hopkins University and the National Cancer Institute (NCI) with a focus on small non-coding RNAs in cancer.

Jennifer Jones

Jennifer Jones, M.D., Ph.D., attended Stanford University. She is a board-certified radiation oncologist specialized training in radiosurgery, with graduate and postdoctoral training in both cancer biology and general immunology. Jones is developing improved methods to characterize, sort, and perform functional studies of nanoparticles, and has established a translational EV analysis pipeline, with instrumentation for preparation, analysis, counting, and cytometric study of extracellular vesicles.

Jonathan Hollander

Jonathan Hollander, Ph.D., is a program director in the Genes, Environment, and Health Branch at the National Institute of Environmental Health Sciences. He received his doctorate from the Behavioral Neuroscience Program (formerly Biological Program) in the Psychology department at the University of North Carolina at Chapel Hill in 2006. Prior to joining the Division of Extramural Research and Training of the NIEHS, he was a Staff Scientist in the Molecular Therapeutics and Neuroscience Departments at The Scripps Research Institute – Florida. His research background includes the use of genetic, behavioral, electrophysiological, and pharmacological methods to study drug addiction and obesity. As part of a joint fellowship with UNC-Chapel Hill, Jonathan also worked in the Neurotoxicology Branch of the U.S. Environmental Protection Agency (EPA) where he studied the neurodevelopmental effects of



polychlorinated biphenyl (PCB) exposure. During his tenure at the EPA, UNC-Chapel Hill, and Scripps Florida he was successful in obtaining NIH fellowship and early career awards and played a key role in developing and implementing new research programs in the aforementioned areas. Jonathan is responsible for basic mechanistic grants in neurodegenerative diseases, psychiatric disorders, and a portion of the neurodevelopmental toxicology portfolio. In addition, he manages grants that focus on applications of brain imaging techniques.

Andrea Baccarelli

Andrea Baccarelli, M.D., Ph.D. is the Leon Hess Professor and chair of the Department of Environmental Health Sciences and serves as the director of the NIH/NIEHS P30 Center for Environmental Health in Northern Manhattan, one of 21 such centers across the country. Baccarelli's laboratory investigates molecular mechanisms as pathways linking environmental exposures to human disease. Recent projects have shown that extracellular vesicles (EVs) and EV-encapsulated miRNA in the bloodstream and other human biofluids are modified by air pollution and other environmental exposures. Baccarelli's work has supported international best practices for air quality standards developed by multiple agencies worldwide, and his findings have served as the basis for the Environmental Protection Agency's decision to enforce stricter guidelines for human exposure. Baccarelli was elected to the National Academy of Medicine for his pioneering work showing that environmental exposures adversely affect the human epigenome and has been included in the Web of Science list of highly cited, world's most influential scientists of the past decade.

Anumantha Kanthasamy

Anumantha Kanthasamy, Ph.D., is a neurotoxicologist with significant expertise in studying the role of environmental factors in pathogenesis of Parkinson's disease (PD) and related neurodegenerative disorders. He has recently been recruited by the University of Georgia at Athens as the inaugural John H. "Johnny" Isakson Chair and Georgia Research Alliance Eminent Scholar in Parkinson's Research to lead newly formed neurodegenerative research center. Prior to this appointment, Kanthasamy was Distinguished Professor, Lloyd Endowed Chair as well as founding director of the Iowa Center for Advanced Neurotoxicology (ICAN) centered at Iowa State University over 20 years. He also served as the Department Chair at Iowa State over eight years. Kanthasamy is also a Fellow of both the American Association for the Advancement of Science and the Academy of Toxicological Sciences. His research program focuses on studying the cellular and molecular mechanisms underlying chronic neurodegenerative processes in Parkinsonism by pursuing three major thrust areas: i) Cellular and molecular signaling underlying degenerative mechanisms; ii) Gene-environment interactions in etiopathogenesis, particularly the mechanistic interplay between environmental neurotoxic chemical exposure and genetic susceptibility in PD onset; and iii) Biomarker discovery for early diagnosis and translational strategies targeting novel therapies. Kanthasamy has published over 200 peer-reviewed papers and book chapters and has been continuously supported by NIEHS and NINDS grants for over 20 years. He has mentored over 30 doctoral and 15 master's students.

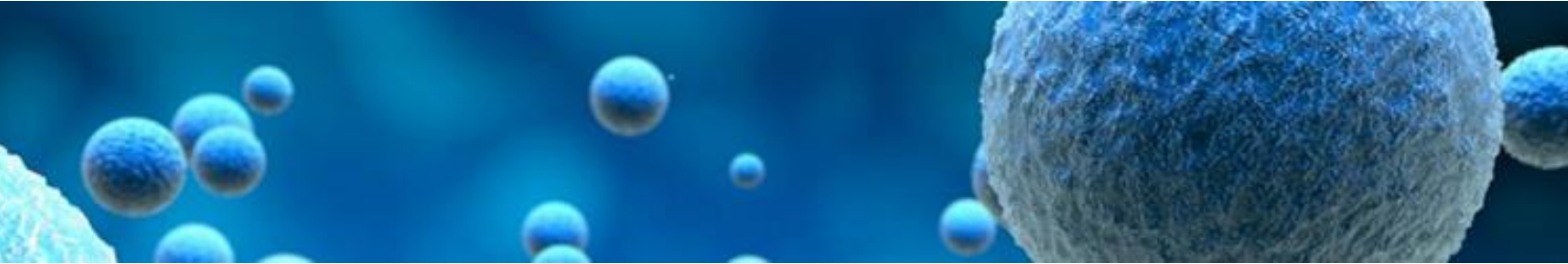


Diane B. Re

Diane B. Re, Ph.D., is an assistant professor in the Department of Environmental Health Sciences at Columbia University. She is also a member to the NIEHS Center for Environmental Health of Northern Manhattan and the Columbia Motor Neuron Center. Diane received her Ph.D. in Neuroscience from the University of Aix-Marseille in the south of France. She completed her post-doctoral training at the Center for Motor Neuron Biology and Disease at Columbia University, focusing on the adult-onset paralytic disorder Amyotrophic Lateral Sclerosis (ALS). Notably, her post-doctoral work pioneered the notion that in ALS motor neurons are degenerating due to the development of a hostile astroglial environment. Now, Diane's research effort is focusing on unraveling the contribution of environmental neurotoxic exposures and gene-environment interactions to the development of ALS and Parkinson's disease (PD). Her current NIH and CDC funded research work concentrates on two aspects: 1) developing new *in vitro* and animal models of gene-metal/pesticide interaction in ALS and PD; 2) isolating, characterizing, and validating novel neuronal and astroglial extracellular vesicle biomarkers of environmental exposure and disease progression in ALS.

Irfan Rahman

Irfan Rahman, Ph.D., is a Dean's Professor of Environmental Medicine, Medicine (Pulmonary), Public Health Sciences and General Dentistry at the University of Rochester Medical Center (School of Medicine and Dentistry), and Director of Flavoring Inhalation Toxicology Center. Rahman's research interests include oxidative stress, inflammation, molecular clock, mitochondrial dysfunction, epigenetics, and cellular senescence by tobacco smoke/tobacco products (cigarette smoke, e-cigarettes, waterpipe/hookah, and cigars) in lung (Chronic Obstructive Pulmonary Disease) and idiopathic pulmonary fibrosis. Rahman is an author of over three hundred (300) publications in peer-reviewed journals and invited to write chapters in textbooks and editorials in journals. He has been serving as a member of several panels of National Institutes of Health (NIH) study sections (SIEE, chartered member), a chartered member of USA Veterans Administration panel on Pulmonary study section, and chair of California Cardiopulmonary tobacco research program. Rahman is an Associate Editor (Nature Scientific Reports, International Journal of COPD, Journal of Inflammation, and Experimental Lung Research), past Associate Editor of European Respiratory Journal, and currently a member of the editorial boards of several international journals, such as Am. J. of Respiratory Cell & Molecular Biology, Therapeutic Advances in Respiratory Disease, Current Respiratory Medicine Reviews, Respiratory Research, Antioxidants Redox Signaling, and Frontiers in Respiratory Pharmacology. He is the author and editor of the book "Inflammation, Advancing Age and Nutrition", Elsevier publisher (2013). He was recognized as Highly Cited Researchers in 2014, 2015, and 2016 by Thomson Reuters with an h-index of 100. He is a member of American Thoracic Society (ATS), American Physiological Society, and Society of Toxicology (SOT), and serving as the President for Inhalation Respiratory Specialty Section of the SOT, and Chair of Lung Aging Interest Group of the ATS. Rahman won numerous awards, such as an outstanding Senior Investigator Award by the Oxygen Society of California, USA in 2006 and Senior Toxicologist Award by the SOT in 2017. Rahman will present current findings on EVs/exosomes from human, mouse, and cells



by vaping chemicals and their specific miRNA effects on cellular homeostasis (particularly mitochondrial dysfunction/mitophagy). In addition, the implications of circulating exosomes including lung BALF from patients with environmental induced lung diseases, such as COPD and IPF.

Louise Laurent

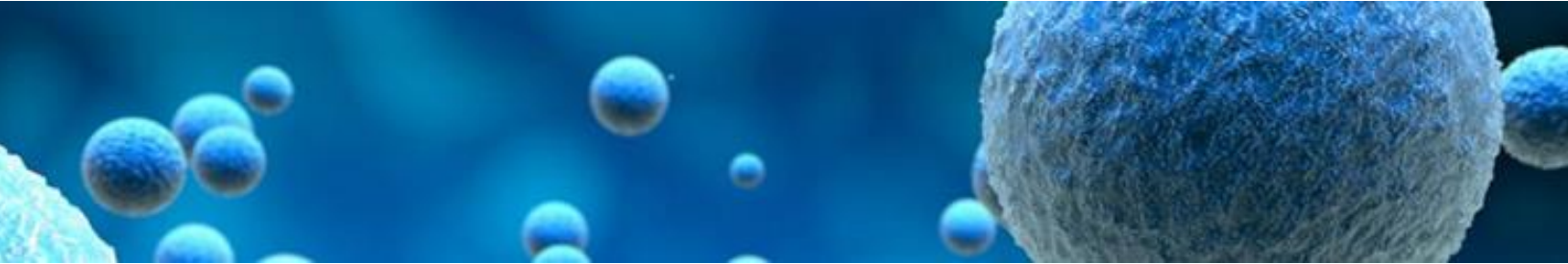
Louise Laurent, M.D., Ph.D., is a professor and the Vice-Chair for Translational Research in the Department of Obstetrics, Gynecology, and Reproductive Sciences at the University of California, San Diego. She received her residency training in Obstetrics and Gynecology and her clinical fellowship training in Maternal Fetal Medicine at UC San Diego. Her research focuses on applying genomic and epigenomic methods to understanding the molecular regulation of placental trophoblast differentiation and function, identifying the molecular basis of placental dysfunction in human pregnancy, and discovering clinical biomarkers, including proteomic, metabolomic, and extracellular RNA biomarkers, for prediction and diagnosis of pregnancy complications.

Kim McAllister

Kimberly McAllister, Ph.D., is presently a program administrator in the extramural division of NIEHS in the Genes and Environment Health Branch. She manages a portfolio of grants in genetic epidemiology and gene-environment interaction studies, human genetics, G x E statistical and bioinformatics methods, basic genetics, DNA repair, animal models of human disease, and comparative biology and population-based model approaches. She represents NIEHS on multiple trans-NIH committees relating to genetics and genomics and is the NIEHS GWAS program administrator. Kim is also involved in the TARGET II consortium and co-leads NIEHS involvement in the Human Heredity and Health (H3Africa) consortium, a large Common Fund program exploring genetic and environmental risk factors for complex human diseases on the African continent.

Fred Tyson

Fred Tyson, Ph.D., is a program director in the Genes, Environment and Health Branch of the Division of Extramural Research and Training (DERT) at the National Institute of Environmental Sciences. He received his Ph.D. in cell biology and developmental genetics from Rutgers University. Postdoctoral training in molecular genetics was obtained at Sloan-Kettering followed by additional training in molecular oncology at Duke University. Tyson served as a Senior Staff Fellow at NIEHS in the Laboratory of Molecular Toxicology and as a Senior Scientist at the Saccamanno Cancer Research Institute in Grand Junction, CO. As an NIEHS program officer, Tyson has developed a research portfolio that employs multi-disciplinary approaches to address environmental health science issues. He has supported diverse research programs in environmental justice, health disparities, genomics, epigenomics, epitranscriptomics and marine toxicology. His current portfolio responsibilities include oversight of grants and programs addressing lung cancer, electronic nicotine delivery systems, oceans and human health as well as programs that address how environmental exposures may perturb epigenomic and epitranscriptomic processes. He has worked with trans-NIH programs as well as leading components of



Common Fund supported initiatives as well as working across agencies such as the NSF, FDA, CDC and NOAA to advance environmental health science research priorities.

Kit Parker

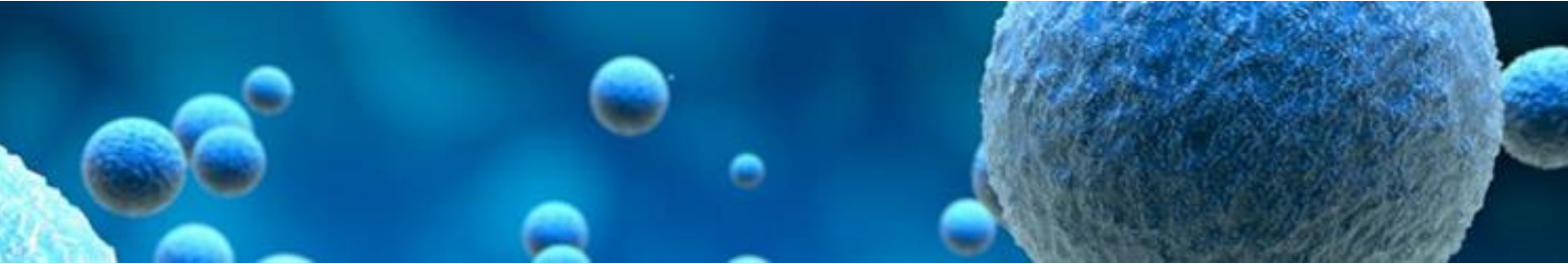
Kit Parker, Ph.D., is the Tarr Family Professor of Bioengineering and Applied Physics at the Harvard John A. Paulson School of Engineering and Applied Sciences, an associate faculty member at the Wyss Institute for Biologically-Inspired Engineering at Harvard Medical School, and the co-director of the Center for Advancing Therapeutic Discovery at Boston Children's Hospital. Kit serves as the director of the Disease Biophysics Group (DBG), an interdisciplinary team of biologists, physicists, engineers, material scientists and artists actively researching the structure/function relationship in cardiac, neural, and vascular smooth muscle tissue engineering, with projects ranging from creating organs-on-chips to developing nanofabrics for applications in tissue regeneration. Kit received his M.S. and Ph.D. from Vanderbilt University, studying mechanical engineering and biological and applied physics. He completed postdoctoral fellowships at Johns Hopkins University's Department of Biomedical Engineering Medical Biotechnology Center and the University of Maryland Biotechnology Institute where he studied cardiac electrophysiology, cell mechanotransduction, and microfabrication, and at the Boston Children's Hospital, where he also studied cell motility and angiogenesis.

Ramkumar Menon

Ramkumar Menon, Ph.D., is a professor and director of the Division of Basic and Translational Research in the department of Obstetrics and Gynecology and Cell Biology at The University of Texas Medical Branch at Galveston. Menon has worked as research director at The Perinatal Research Center, Nashville and has served as the executive director of Preterm Birth International Collaborative (PREBIC). His career as a reproductive biologist and Immunologist spans over 3 decades and has extensive experience in studying mechanisms and pathways leading to adverse pregnancy outcomes (APOs) specifically spontaneous preterm birth (PTB). He has developed multiple in vitro and in vivo models to study PTB, primarily using human placental membranes as a model tissue. Using this tissue, his research has generated knowledge to learn about "fetus as a patient." This knowledge has helped to address how fetus response, immunologic, mechanistic, endocrine, paracrine, and autocrine ways, to various risk exposures during pregnancy that can lead to APOs.

Gordana Vunjak-Novakovic

Gordana Vunjak-Novakovic, Ph.D., is University Professor, the highest academic rank at Columbia University and the first ever engineer at Columbia to receive this distinction. The focus of her lab is on engineering functional human tissues for use in regenerative medicine and patient-specific "organs-on-a-chip" for studies of human pathophysiology. She is well published and highly cited (430 journal articles, h=131), and has had over 150 trainees. Her lab has launched four biotech companies. She is serving on the council of the NIBIB, the HHMI Scientific Review Board, and on numerous editorial and scientific advisory boards. She was inducted into the Women in Technology International Hall of Fame,



received the Clemson Award of the Biomaterials Society, Pritzker Award of the Biomedical Engineering Society, Shu Chien Award of the AIChE, Pierre Galletti award of the AIMBE, and was elected Fellow of several professional societies. She was decorated by the Order of Karadjordje Star - Serbia's highest honor, and elected to the Academia Europaea, Serbian Academy of Arts and Sciences, the National Academy of Engineering, National Academy of Medicine, National Academy of Inventors, the American Academy of Arts and Sciences and the International Academy for Medical and Biological Engineering.

Aleks Milosavljevic

Aleks Milosavljevic, Ph.D., develops bioinformatics methods and advanced data platforms while contributing to the fields of genomics, clinical genomics, epigenomics and extracellular RNA communication. Using advanced web technologies, his lab provides data platforms and supports data coordination and analysis needs for NIH Common Fund projects and for the NIH-NHGRI Clinical Genome Resource (ClinGen). As part of the NIH Roadmap Epigenomics project, the lab established an ontogenetic tree of cellular differentiation, including global maps of cell-type specific regulatory elements and regulatory modules of coordinated activity and their likely activators and repressors. By analyzing allele-specific epigenome maps, the lab discovered nearly universal stochastic behavior of transcription factors, as evidenced by their methylation "footprints" at regulatory sites. The results provide a unifying model that links sequence-dependent allelic imbalances of the epigenome, stochastic switching at gene regulatory loci and disease-associated genetic variation. Milosavljevic's lab leads the development of the FDA-recognized ClinGen database to inform clinical interpretation of genetic variation, and the lab currently serves as the Data Coordination Center for the NIH Extracellular RNA Communications project, which produced the ExRNA Atlas and developed the first comprehensive map of extracellular RNA in human biofluids. Developments in his work have been published in recently in *Science*, *Genome Medicine*, and the *American Journal of Human Genetics*.

Alex Merrick

B. Alex Merrick, Ph.D., is acting chief of the Mechanistic Toxicology Branch in the Division of the National Toxicology Program at the National Institute of Environmental Health Sciences. He is a molecular toxicologist with interests in exome sequencing, transcriptomics and liquid biopsy/ccfDNA research. The branch he manages conducts high throughput screening and imaging after chemical toxicant exposure and develops novel in vitro bioassay systems. Alex received his pharmacy degree at the University of New Mexico, Albuquerque, New Mexico and his M.S. and Ph.D. from the University of Nebraska Medical Center at Omaha Nebraska. He conducted postdoctoral work at Oak Ridge National Laboratory, Biology Division in chemical carcinogenesis of polyaromatic hydrocarbons. He served at the USEPA, Health Effects Research Laboratory in Cincinnati Ohio before joining the NIEHS.

Ken Ramos

Kenneth S. Ramos, M.D., Ph.D., is an accomplished physician-scientist with designations in the National Academy of Medicine and National Academy of Sciences. He is a transformational leader recognized



throughout the world for his scientific contributions in the areas of genomics, precision medicine and toxicology. With formal training in pharmaceutical sciences, chemistry, biochemistry, pharmacology, and medicine, Ramos is helping to steer the changing landscape of medicine, biotechnology and healthcare. In this context, he leads several translational, clinical research, and educational programs that integrate diverse approaches to elucidate genomic mechanisms of disease and to develop novel therapies for several oncologic, pulmonary, and vascular diseases.

Anne Marie Jukic

Anne Marie Jukic, Ph.D., leads the Fertility and Reproductive Health Group in the Epidemiology Branch at NIEHS. Her research group investigates environmental influences on menstrual cycles, conception, and early pregnancy. A primary focus of the FRHG is the role of vitamin D in female reproductive function and this group has published some of the initial studies linking low levels of vitamin D to prolonged menstrual cycles, delayed ovulation, and lower probability of conception. Other areas of research include air pollution, phthalates, phenols, and microRNA in early pregnancy. Jukic received a B.S. from the University of Notre Dame, an M.S.P.H. from Emory University, and a Ph.D. in epidemiology from the University of North Carolina at Chapel Hill. She completed a postdoctoral fellowship at NIEHS and was an assistant professor at the Yale School of Public Health before joining NIEHS as a principal investigator.

Matt Roth

Matthew Roth, Ph.D., is currently associate professor and co-director of the Bioinformatics Research Laboratory in the Department of Molecular & Human Genetics at Baylor College of Medicine in Houston, Texas. He has participated in the NIH Common Fund Extracellular RNA Communication Consortium since 2013 as a member of the Data Management and Resource Repository and participates in several consortium technology and data working groups. Matt holds a B.S. in chemistry from Southern Illinois University at Carbondale and obtained his Ph.D. from the University of Illinois at Urbana-Champaign, where he studied the molecular mechanisms of T cell receptor gene rearrangement. Following his graduate studies, he completed an American Cancer Society postdoctoral fellowship at Northwestern University where he examined transcriptional regulation in T cells, brain, and embryonic development using transgenic and knockout mouse models.