INTERNATIONAL NEUROTOXICOLOGY ASSOCIATION

Development of New Approach Methodologies (NAMs) that fill biological gaps in the current in vitro Developmental Neurotoxicity (DNT) Test Battery

Introduction

Lena Smirnova, *Johns Hopkins University, USA*

Melissa M. Martin, *Environmental Protection Agency, USA*

1) Novel approaches using the multi-electrode array to measure local field potentials and network formation

Melissa M. Martin, *Environmental Protection Agency, USA*

2) Multiplexed Developmental Neurotoxicity Test in Human Brain Organoids

Lena Smirnova, *Johns Hopkins University, USA*

3) Expansion of the current OECD-EFSA developmental neurotoxicity (DNT)-in vitro battery

Ellen Fritsche, *Leibniz Research Institute for Environmental Medicine, Heinrich-Heine-University Düsseldorf, Biological and Medical Research Center (BMFZ), Germany*

4) High-throughput phenotypic profiling (HTPP) of chemical-induced changes in human neural progenitor cell morphology for developmental neurotoxicity (DNT) hazard assessment

Megan Culbreth, *Environmental Protection Agency, Office of Research and Development, Center for Computational Toxicology and Exposure, RTP, USA*

5) Use of signaling endpoints to identify neurofunctional disturbances by neonicotinoid pesticides and their metabolites

Jonathan Blum, *University of Konstanz, Germany*

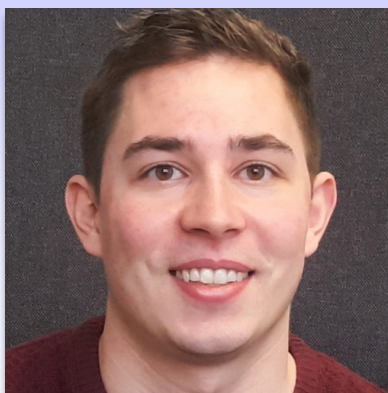**6) Intrinsic network activity in human brain organoids**

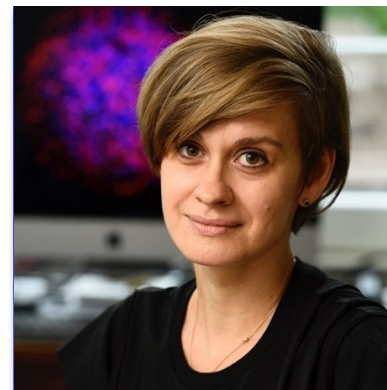Tal Sharf, *Neuroscience Research Institute, University of California Santa Barbara, USA*
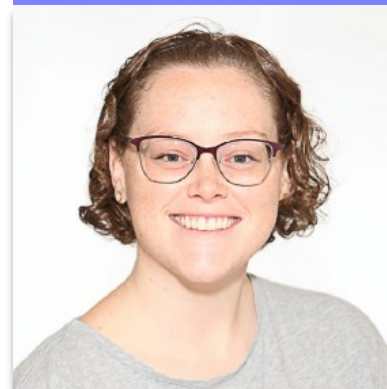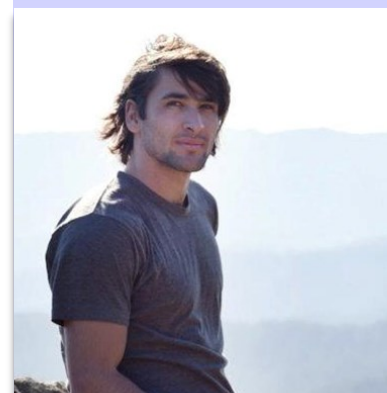
Melissa Martin

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Megan Culbreth

Tal Sharf

Dr. Melissa Martin is a post-doctoral researcher in the Center for Computational Toxicology and Exposure at the US Environmental Protection Agency. She received her PhD in Biomedical Sciences from Florida State University in 2019 where her research focused on developmental nicotine exposure and its effects on the brain and behavior. During her time at Florida State, Melissa was awarded a Chateaubriand Fellowship Award sponsored by the French Embassy in the United States. At the EPA, her research focuses on developmental neurotoxicity (DNT) of chemicals using medium to high-throughput tiered assays and computational approaches. During her tenure at the EPA, she has received two Pathfinder Innovation Project awards which aim to develop two new approach methodologies (NAMs) using multi-well microelectrode array (MEA) technologies; one using differentiated human IPSCs and the other using zebrafish as an alternative animal species. Melissa currently serves as the post-doctoral representative for the In Vitro and Alternative Methods Specialty Section (IVAMSS) within the Society of Toxicology and has served as the President for the Biomedical Sciences Government Student Association at Florida State University.
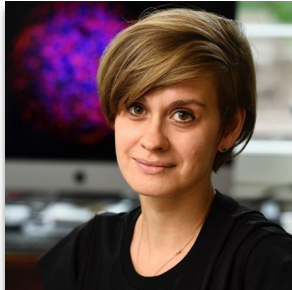

Dr. Smirnova is a researcher at Center of Alternatives to Animal Testing, Johns Hopkins University, where she is leading Education Program and Program on Microphysiological systems and Systems Toxicology. She has joint appointments at Johns Hopkins school of engineering and George Town University. Her research focus on development of new approach methodologies for developmental neurotoxicity testing and understanding gene environmental interactions in autism. She received her PhD from Charite Free University, Berlin and PostDoc training at Federal Institute for Risk Assessment, where she studied the role of microRNA in neural development, stem cell specification and developmental neurotoxicity.

Ellen Fritsche studied medicine and received her doctoral degree in Düsseldorf, Germany. She spent 3 years as a postdoctoral fellow at NIEHS, RTP, NC. Back in Germany she started working on DNT and eventually habilitated for the subject Environmental Toxicology. She has been a group leader at the IUF for many years focussing on the establishment of alternative in vitro methods for neurotoxicity mode-of-action analyses and screening with a focus on DNT. Her assays are part of the current OECD/EFSA DNT in vitro battery.

Megan Culbreth, Ph.D. is a Postdoctoral Research Fellow in the Center for Computational Toxicology and Exposure of the U.S. Environmental Protection Agency. Her research focuses on new approach methods (NAMs) for developmental neurotoxicology hazard assessment. Dr. Culbreth has published 14 peer-reviewed research articles and also serves as a Research Editor for Frontiers in Toxicology – Neurotoxicology.
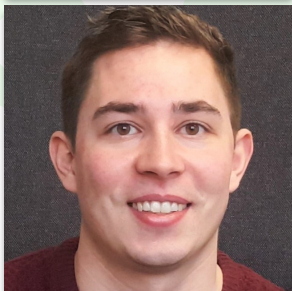
Jonathan Blum is a Ph.D. candidate at the in vitro toxicology and biomedicine chair at the University of Konstanz (GER). He holds an MSc in Disease Biology from the University of Konstanz. The focus of his master thesis was the application of human cell-based test methods to study developmental neurotoxicity (DNT). His Ph.D. work focuses on developing and refining stem cell-based new approach methods (NAM). In cooperation with the EUToxRisk consortium, EFSA, and EPA, he is involved in the implementation of DNT NAMs into screening batteries and in regulatory contexts, e.g., in case studies for integrated approaches to testing and assessment (IATA).

Tal Sharf is a postdoctoral fellow at the UC Santa Barbara Neuroscience Research Institute in the lab of Kenneth S. Kosik, where he has been utilizing interdisciplinary approaches deeply rooted in applied physics, neurobiology, and computation to better understand processes governing human brain function in the context of neurodevelopmental disorders and disease. In 2016, after completing his doctoral work in physics, Tal was awarded the Arnold O. Beckman postdoctoral fellowship award to develop more accurate in vitro models utilizing human iPSC derived neurons. He has authored fourteen scientific articles, ranging from pioneering techniques in human brain organoid neurophysiology to understanding key mechanisms governing the spread of the protein tau in Alzheimer's disease and electron transport 1D quantum systems. Outside of his research and academic pursuits Tal spends most of his time surfing and hiking.