

SPR 2010
Pre-Conference Workshop #1

1. Title of workshop: Utilization of Innovative Interdisciplinary Tools for Integrated Objective Measurement of Exposure to Physical and Psychosocial Stressors and Drug Use

2. Presenter contact information:

Marcia S. Scott, Ph.D. (Organizer, introduction presenter, and primary contact), National Institute on Alcohol Abuse and Alcoholism, mscott@mail.nih.gov , 301-402-6328 (phone), 301-443-8614 (fax)

Mariana G. Figueiro, Ph.D. (Presenter), Lighting Research Center, Rensselaer Polytechnic Institute, ream@rpi.edu; 518 687-7100 (phone), 518-687-7120 (fax)

Mark S. Rea, Ph.D. (Presenter), Lighting Research Center, Rensselaer Polytechnic Institute, ream@rpi.edu; 518 687-7100 (phone), 518-687-7120 (fax)

Yong Zhu, Ph.D. (Presenter), Yale School of Public Health, Yale University, yong.zhu@yale.edu; 203-785-4844 (phone), 203-737-6023 (fax)

Kenzie L. Preston, PhD (Presenter), National Institute on Drug Abuse, Intramural Research Program Chief, Clinical Pharmacology and Therapeutics Research Branch, KPRESTON@intra.nida.nih.gov, 443-740-2326 (phone), 443-740-2318 (fax)

David H. Epstein, Ph.D. (Presenter), National Institute on Drug Abuse, Intramural Research Program Clinical Pharmacology & Therapeutics Branch, Treatment Section, depstein@intra.nida.nih.gov, (443) 740-2328 (phone), (443) 740-2318 (fax)

3. Purpose of workshop/learning objectives:

The purpose of the proposed workshop is to present theory and methods for collaborative integration of technological, biological and psychosocial research approaches in field research among diverse populations. Such approaches have been undertaken by two projects involved in the Network on Exposures to Psychosocial Stress and Addictive Substances (NEPSAS), a program supported by the National Institute of Health's (NIH) Genes, Environment and Health Initiative (GEI) Exposure Biology (EB) program. The EB component of GEI supports projects utilizing new methods (e.g., ecological momentary assessment/EMA, geospatial positioning/GPS, light sensors) to assess personal exposure to environmental stressors and responses to those stressors via key biological pathways involved in the pathogenesis of common diseases. While the use of retrospective self-report measures continues as a primary method for assessment of health-related behavioral intentions and actions in many studies, these methods yield little data on dynamic changes in exposure and responses over time (temporal resolution) and across locations (spatial context). Ultimately, the successful identification of etiologic processes of complex disorders depends on greater precision in measurement of environmental exposures, that can be combined with related biological mechanisms (including genetic) and physiologic systems to fully evaluate impact on disease risk. While research technologies for discovery of gene identification and functioning continue to rapidly evolve, integrated approaches to etiologic study of disease also require improved precision in objective measurement of interactive psychosocial and behavioral processes.

The NIH GEI seeks to investigate the interactions between genetic and environmental factors that underlie complex human diseases. A critical objective of the GEI Exposure Biology component is to accurately identify, quantify, and verify personal exposure to environmental factors associated with a range of adverse health outcomes. The NEPSAS projects are anticipated to advance the utility of real-time measurement and decrease participant burden through miniaturization, automated assessment, and improved usability of measurement devices. Participants in this workshop will be able to:

- a) Describe the utilization of new technologies to measure the interaction of individual-level exposures to environmental factors, including, neighborhood (geospatial), physical (light) and episodic exposures to social and psychological stress, and illicit drug use (EMA); and
- b) Discuss mechanisms for collaborative research among interdisciplinary investigators to establish integration of technologies to inform etiologic and observational studies relevant to prevention and treatment of drug use and dependence.
 - a. Brief Introduction of NIH GEI EB program (Scott)
 - b. The significance of circadian rhythms and sleep for health and well-being (Figueiro)
 - c. How to measure circadian entrainment in the field (Rea)
 - d. The role of clock genes (Zhu)
 - e. How to measure gene expression (Zhu)
 - f. Protocols for using ecological momentary assessment (EMA) of illicit drug use and stress in methadone-maintained outpatients (Preston)
 - g. Issues in collection, visualization, and analysis of EMA and GPS data (Epstein)

4. Target workshop audience:

Workshop attendees should have a masters-level or higher background in Psychology, Epidemiology, Sociology, or similar health-related field. In addition, participants should have an interest in incorporating technological devices, such as ecological momentary assessment (EMA), global positioning (GPS) or light exposure into their future work. No prior experience with technology or interdisciplinary research is required. This workshop is intended as a basic workshop on fostering interdisciplinary collaboration and incorporating technology and biomarker assessment into current and future research.

5. Materials to be provided to attendees:

Copies of all PowerPoint slides will be distributed to participants, including a bibliography of key references and useful study materials.

6. CV's of all presenters and a brief explanation of how the presenters are qualified to conduct the workshop:

Dr. Marcia S. Scott is program director in the Division of Epidemiology and Prevention Research at the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Dr. Scott provides oversight for a diverse portfolio of epidemiological and prevention research grants focusing on family, peer and worksite-based social norms, and environmental and genetic risk factors for alcohol use disorders in multi-ethnic populations spanning across underage drinkers to older adults. She also is chair of the NIAAA Genes and Environment Interdisciplinary Research Team. Currently, Dr. Scott serves as an NIH project scientist for a GEI-supported cooperative agreement project focusing on development of wearable sensors to conduct non-invasive, real-time, and continuous psychophysiological measures of stress-related exposures and responses and biochemical assessment of alcohol exposure from human interstitial fluid. She received her Ph.D. in Health Education from the University of Maryland. Dr. Scott has served in other federal and corporate research settings as a research evaluation specialist and project director managing research contracts on the implementation and impacts of community-based social service programs, and evaluations of substance abuse, violence, conflict resolution and HIV/AIDS education and prevention programs, as well as other projects assessing cultural sensitivity needs and youth development outcomes for work-based learning and workforce preparation. The programs focused on services provided for the frail elderly, high-risk youth, pregnant, postpartum, and homeless women and their children; and multicultural community planning groups that served an advisory role to local and state health departments. Prior to her experiences in public health research, Dr. Scott served for many years as a registered clinical laboratory scientist conducting clinical assays in hospitals as well as commercial and research laboratories.

Dr. Mariana Figueiro is an assistant professor at Rensselaer Polytechnic Institute and a program director at Rensselaer's Lighting Research Center. She holds a BS in architecture and urbanism, a Master of Science in Lighting and Ph.D. in Multidisciplinary Science from Rensselaer. She teaches Light and Health

and Human Factors in Lighting in the MS in Lighting Program at the LRC and has given more than 100 presentations and invited lectures in these topics. She has written numerous scientific articles for archival journals and trade publications and worked as an assistant editor on the 9th edition of the IESNA *Lighting Handbook*. She chaired the IESNA Light and Human Health Committee from July 07 to July 09. She received the 2006 James D Watson Young Investigator Award and the 2007 Office of Naval Research Young Investigator Award.

Dr. Mark Rea is the chief administrator of the LRC and is a Professor of Architecture and Cognitive Sciences. He conducts research in many areas including circadian photobiology, mesopic vision, psychological responses to light, and visual performance. He teaches courses in leadership and in visual processes. He received his PhD in biophysics from Ohio State University in 1978. Before coming to Rensselaer he was a senior research officer and the manager of the Indoor Environment Program of the Building Performance Section at the National Research Council of Canada. Dr. Rea holds the first patent on an imaging photometer was the developer of visual performance model, RVP (Relative Visual Performance), co-developer of a model of mesopic vision and co-developer of the first spectral sensitivity functions for the human circadian system. He is also active in development of controls technologies including photosensors, occupancy sensors, and manual controls. He is author of the more than two hundred scientific and technical articles related to vision, circadian rhythms, photometry, lighting engineering and human factors. He served as Editor-in-chief of the 8th and 9th editions of the Illuminating Engineering Society of North America *Lighting Handbook*. His current teaching responsibilities includes a course on leadership and he supervises graduate students at Masters and PhD levels. Dr. Rea is a Fellow of Illuminating Engineer Society of North America and of the Society of Light and Lighting (UK). He received the highest technical award from Illuminating Engineering Society of North America, the IES Medal and the highest faculty award at Rensselaer Polytechnic Institute, the William H. Wiley Distinguished Faculty Award.

Dr. Yong Zhu is an associate professor at the School of Public Health at Yale University. He holds a masters and Ph.D. from Rice University. Dr. Zhu's research interests are oriented towards the use of the molecular epidemiological approach in the study of genetic susceptibility biomarkers and their interactions with environmental exposures in human disease development. Dr. Zhu has been developing and validating novel phenotypic and genotypic assays and biomarkers for several cancer types, including non-Hodgkin's lymphoma, breast, bladder, lung and prostate cancer. By utilizing various techniques in genetics, epigenetics, cytogenetics, cell biology, and computational biology, Dr. Zhu's studies have identified biomarkers that can characterize inherited predisposition and cellular response to environmental factors. Current research focuses on studying the role of two classes of transcriptional regulators, circadian genes and microRNAs, in tumorigenesis.

Dr. Kenzie L. Preston is Chief of the Clinical Pharmacology and Therapeutics Research Branch in the Intramural Research Program (IRP) at the National Institute on Drug Abuse (NIDA). Dr. Preston directs research in the outpatient substance abuse treatment research program of the IRP. Her major research interests are the development and testing of substance abuse treatment, human behavioral pharmacology of drugs of abuse, and methods of monitoring cocaine and heroin use. Dr. Preston has pioneered the use of Ecological Momentary Assessment (EMA), a methodology in which individuals report on their mood and behavior in real time in their daily lives, to study the role of individual and environmental factors in relapse to drug use in substance abusers. Most recently she has begun to incorporate real-time location data to investigate neighborhood-level risk factors and exposure to psychosocial stress and drug cues. Dr. Preston received her Ph.D. in Pharmacology from the University of Chicago and completed a post-doctoral fellowship in human behavioral pharmacology at the Johns Hopkins School of Medicine. She has presented her research at numerous national and international meetings, conferences and workshops and has published more than 160 scientific articles. Dr. Preston has served on the editorial advisory boards of the *Journal of Pharmacology and Experimental Therapeutics*, *Behavioural Pharmacology*, *Drug and Alcohol Dependence*, and *Psychopharmacology*. She is a member of the College on Problems of Drug Dependence (CPDD) and the American Society for Clinical Pharmacology Therapeutics (ASCPT), having served on the Board of Directors and numerous committees of both organizations.

Dr. David H. Epstein is an Associate Scientist in the Treatment Section at the Intramural Research Program at NIDA in Baltimore, Maryland. He received his doctorate in experimental psychology at Rutgers in 1998. With Dr. Kenzie Preston, he currently designs and supervises clinical trials of treatments for addiction, along with laboratory and natural-history studies of drug craving and use.

7. Outline of workshop, including (a) roles of presenters if more than one is listed, and (b) which aspects of instruction are hands-on

A day-to-day cycle, known as circadian rhythms, is perhaps the most important of biological systems that functionally vary with time. Circadian disruption can lead to a wide variety of health related problems, including cardiovascular disease, obesity, and breast cancer. Being able to measure and control the input and output of stimuli affecting the circadian system is implicitly important for disease prevention, but has not been systematically considered in prevention research. The light-dark pattern incident on the retina entrains and orchestrates the timing of these circadian rhythms found throughout the body. In fact, the expression of certain clock genes, responsible for the generation and regulation of circadian rhythms, is directly influenced by the lighted environment. Disruption of a regular 24-hour pattern of light and dark, such as occurs with transoceanic flight or rotating shift work, will upset the natural circadian rhythm. Other environmental stimuli (e.g., food) can also entrain one or more subsystems (e.g., liver). These extra-photic stimuli can also disrupt the natural 24-hour circadian rhythm unless they too recur in a regular, 24-hour pattern. Two techniques will be discussed together with very recent results using these field deployable devices and measuring techniques: 1) light and circadian rhythms - measures the primary stimulus for circadian entrainment, namely the light-dark patterns experienced by individuals; and 2) drug use patterns in an inner city measures the temporal and spatial patterns of a possible non-photic entraining stimulus, namely illicit drug use.

This one-day workshop will cover the following topics:

- a. Brief Introduction of NIH GEI EB program (Scott)
- b. The significance of circadian rhythms and sleep for health and well-being (Figueiro)
- c. How to measure circadian entrainment in the field (Rea)
- d. The role of clock genes (Zhu)
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