FIFRA SAP Concerning Scientific Issues Associated with Chlorpyrifos PBPK-PD Modeling Linked to CARES, February 15-18, 2011

***Ad Hoc* Panel Member Biosketches**

1) Dr. W. Stephen Brimijoin is a Professor in Pharmacology in the Department of Molecular Pharmacology at the Mayo Clinic. He received his Ph.D. in Pharmacology from Harvard and a B.A. in Experimental Psychology also from Harvard. His research interests are focused on cholinergic neuroscience, especially the biology and toxicology of cholinesterases, novel enzyme inhibitors and reactivators produced with computational chemistry, molecular engineering of cholinesterases for therapeutic use, cellular and system-level toxicology of anticholinesterase insecticides, neurodegeneration induced by immunolesion with cholinesterase antibody and video-based, immunologic and radiometric assays of brain proteins. Dr. Brimijoin has served as an *ad hoc* member of the U.S. EPA FIFRA Scientific Advisory Panel and as a member of the U.S. EPA Human Studies Review Board.

2) Dr. James Bruckner is a Professor in the Department of Pharmaceutical and Biomedical Sciences at the University of Georgia. He earned his Ph.D. in Toxicology from the University of Michigan, a M.S. in Toxicology and B.S. in Pharmacology from the University of Texas. The major focus of his research is on basic toxicology and pharmacokinetic questions that impact assessments of risks of chemicals to human health. A primary interest is interpretation/prediction of the influence of physiological and biochemical changes during maturation on the metabolic activation/inactivation and toxicokinetics of chemicals in rodents and humans. Emphasis in the lab is currently on volatile organic chemicals (VOCs) and pesticides. Work is underway to develop physiologically-based pharmacokinetic models for predicting risks of pyrethroid pesticides to children's health. Grants from the EPA, DOE and CDC support these activities. He is currently a member of two research committees of the National Academies of Science: Committee on Use of Human Subjects in Toxicology Research and Committee on Toxicology. He received an award for outstanding contributions in development of the Acute Exposure Guidelines for Hazardous Substances Program, by former Vice President Al Gore. He has served as an *ad hoc* member of the U.S. EPA FIFRA Scientific Advisory Panel.

3) Dr. Russell Carr is an Associate Professor in the College of Veterinary Medicine at Mississippi State University. He received his B.S. in Biology and Chemistry from Delta State University and his M.S. in Zoology and Ph.D. in Animal Physiology from Mississippi State University. His research interests are in the area of developmental neurotoxicology with emphasis on agricultural pesticides. His current focus is investigating the effects of developmental organophosphorus insecticide exposure on behavior and on gene expression, neurochemistry, and oxidative stress. He utilizes both animal models and in vitro tissue culture in this research. Dr. Carr has served as an ad hoc panel member of the U.S. EPA FIFRA Scientific Advisory Panel.

4) Dr. Jogarao Gobburu is the Director of the Division of Pharmacometrics in the Office of Clinical Pharmacology, U.S. Food and Drug Administration. He received his Ph.D. in Pharmaceutical Sciences from North Dakota State University and recently, his M.B.A. from The Johns Hopkins University-Carey Business School. His expertise is in advanced pharmacokinetic and pharmacodynamics, exposure-response modeling and simulation, and drug development. He is responsible for making complex regulatory and drug development decisions based on the results of quantitative analyses for hundreds of development programs. Dr. Gobburu is involved in the technical design and analysis of early and late clinical trials,

disease-drug-trial modeling, training future leaders in clinical pharmacology and an effective communication and negotiation with scientists with diverse backgrounds. He has authored approximately 50 peer-reviewed publications and book chapters. He often is an invited speaker at national and international professional conferences on topics related to clinical pharmacology, pharmacometrics, pharmaceutical sciences, regulatory perspectives.

5) Dr. Panos Georgopoulos is a Professor of Environmental and Occupational Medicine at the University of Medicine and Dentistry of New Jersey – Robert Wood Johnson Medical School. He is also a member of the Graduate Faculties of Chemical and Biochemical Engineering, Biomedical Engineering, and of Environmental Sciences at Rutgers University, and a member of the Environmental and Occupational Health Sciences Institute (EOHSI), which is a joint institute of UMDNJ-RWJMS and Rutgers. Dr. Georgopoulos received his M.S. and Ph.D. Degrees in Chemical Engineering from the California Institute of Technology (Caltech) and his Dipl. Ing. Degree from the National Technical University of Athens. At EOHSI he established and directs the Computational Chemodynamics Laboratory (CCL), a research facility for informatics and modeling of complex environmental and biological systems. Furthermore, he directs the State-funded Ozone Research Center and co-directs the Center for Exposure and Risk Modeling (CERM) at EOHSI. He is Co-Director of the Environmental Bioinformatics and Computational Toxicology Center (ebCTC), a research consortium of UMDNJ-RWJMS, Princeton University, Rutgers University and USFDA's Center for Toxicoinformatics. He is also Co-Director of the Bioinformatics, Biostatistics and Computational Toxicology Core for the NIEHS Center for Environmental Exposures and Disease (CEED) at EOHSI. His research interests involve the development and application of novel mathematical and computational methods for diagnostic and mechanistic studies of multipathway physicochemical processes taking place in interacting environmental and biological systems. The aim of this research is to improve the understanding and quantification of human exposure and biological mechanism-based dosimetry and risk for environmental toxics; this is being accomplished through the ongoing development of a consistent mechanistic multiscale modular computational framework for source-to-dose-to-effect modeling of toxicant dynamics.

6) Dr. Sami Haddad is an Associate Professor at the Department of Environmental and Occupational Health, University of Montreal. He received his Ph.D. in Public Health from the University of Montréal. His research focuses primarily on the development and use of physiologically based pharmacokinetic (PBPK) models in toxicological risk analysis of environmental pollutants, in *in vitro* extrapolations and in mixture risk assessment. He also is active in the development of PBPK modeling approaches to consider human growth and variability. Dr. Haddad has published several peer-reviewed articles and chapters in scientific journals and books. He has received awards and honors, including the best publication award by the Board of Publications of the Society of Toxicology for his work on mixture modeling and risk assessment (2003). Prior to his current position with University of Montreal, he was an associate professor in the Department of Biological Sciences at University of Québec at Montréal (2004-2010), a research associate at the INRS-Institut Armand Frappier (2002-2004), and a specialist in biomathematical modeling at Roche Pharmaceuticals in Basel Switzerland (2000-2002).

7) Dr. Teresa Leavens is a Research Assistant Professor in the Department of Pathobiology and Population Health at North Carolina State University. She received her B.S. in Chemical Engineering from North Carolina State University in 1990 followed by a Ph. D. in Toxicology from the University of North Carolina at Chapel Hill in 1996. The focus of Dr. Leavens' research is the pharmacokinetics of environmental contaminants and drugs with a primary focus on kinetic modeling, particularly physiologically based pharmacokinetic modeling. She has

been involved with and published articles on both experimental and computational research in animals and humans for a wide range of compounds, including persistent environmental compounds, water contaminants, air contaminants, metals, nanoparticles, and veterinary drugs used in food-production animals. She has taught courses on pharmacokinetics and modeling and has provided technical expertise as a reviewer for the ATSDR Toxicological Profile for Styrene, as a member of an ILSI working group on establishing physiological parameters for early life stages, as an *ad hoc* member of the U.S. EPA FIFRA Scientific Advisory Panel, and as a technical consultant for EPA on a PBPK model for methanol to be used for establishing reference doses and concentrations. Dr. Leavens is active in both the national and local chapters the Society of Toxicology national, and has served as the Councilor in the Risk Assessment Specialty Section and is currently the newsletter editor for the local chapter.

8) Dr. Chensheng (Alex) Lu is the Mark and Catherine Winkler Assistant Professor for Environmental Exposure Biology at the Harvard School of Public Health Department of Environmental Health. Dr. Lu has a Ph.D. in Environmental Health from the University of Washington (Seattle, WA). His primary research interest is to use variety of biomarkers for assessing human exposures to environmental chemicals. One of Dr. Lu's ongoing research projects is to integrate biomarkers of exposure, physiologically based pharmacokinetic model and cumulative risk assessment tools for quantifying children's longitudinal exposure to pesticides *via* dietary intakes and its risks by comparing to benchmark doses used by regulatory agencies. He is also interested in developing the adduct-base biomarker to assess the health effects from exposures to organophospate pesticides. His Lab is developing several analytical methods/biosensors using GC/MS and LC/MS/MS to quantify exposures *via* the analysis of specimen samples in supporting our research program. The current method developments include pesticide residues in food samples, pyrethroids in saliva, pesticide metabolites in urine, and bisphenol-A and phthalate monoesters in urine. Dr. Lu collaborates extensively with scientists/researchers in academia as well as in federal research labs, such as the National Center for Environmental Health, Pesticide Laboratory at the Center for Disease Control and Prevention, Food and Drug Administration regional labs, the National Institute for Environmental Health Science. He has served as an *ad hoc* member of the U.S. EPA FIFRA Scientific Advisory Panel. He also serves as the associate editor for *Environmental Health Perspectives* (EHP).

9) Dr. David MacIntosh, Sc.D., C.I.H. is a Principal Scientist with EH&E and Associate Director of the Advanced Analytics and Building Science Division. He also leads the Exposure Assessment practice. He received his Ph.D. in Environmental Health/Exposure Assessment from the Harvard School of Public Health in 1995. He also holds a M.S. in Environmental Science and a B.S. in Decision Sciences. Dr. MacIntosh has 20 years experience as an active member of the environmental health profession. His work focuses on exposure reconstruction, measurements, mathematical modeling, health impact assessments, risk communication and sustainability. He is the author of numerous publications in the area of exposure assessment, risk analysis, and environmental management. Dr. MacIntosh is a frequent technical advisor to the World Health Organization on topics that include chemical safety and risk assessment. Prior to joining EH&E, Dr. MacIntosh was a tenured faculty member in the Department of Environmental Health Science at the University of Georgia where he conducted research and taught courses in waste management, air quality, and environmental chemistry. He remains active in teaching and holds an appointment as an Adjunct Associate Professor at the Harvard School of Public Health where he teaches graduate courses in exposure assessment and gives lectures on mathematical modeling, study design, data analysis, and biomarkers of exposure. Dr. MacIntosh also teaches courses in environmental management and sustainability as an

Instructor at the Harvard Extension School and an Adjunct Associate Professor at Brandeis University. He has also served previously on the U.S. EPA FIFRA Scientific Advisory Panel

10) Dr. Nu-may Ruby Reed is a toxicologist formerly with the California Environmental Protection Agency's (Cal/EPA) Department of Pesticide Regulation (DPR). For many years, Dr. Reed was the lead scientist on risk assessment issues in the Health Assessment Section of the Medical Toxicology Branch. Her work focused on evaluating health risks and developing risk assessment guidelines for pesticides. She served on Cal/EPA and DPR working groups that initiated research, and revised risk assessment guidelines and policies, and represented her department in task forces on community concerns and emergency response, risk management guidance, and public education. Dr. Reed has served as an *ad hoc* member of the U.S. EPA FIFRA SAP and as a member to committees of the National Academies' National Research Council.

11) Dr. P. Barry Ryan is Professor of Exposure Science and Environmental Chemistry in the Department of Environmental and Occupational Health, Rollins School of Public Health and holds a joint appointment in the Department of Chemistry at Emory University. He received a B.S. in Chemistry from the University of Massachusetts, an M.S. in Physical Chemistry from the University of Chicago, and a Ph.D. in Computational Chemistry from Wesleyan University. He has been active in the exposure assessment field for over 25 years. His current research includes cross-sectional and longitudinal studies of community-based exposure to multiple pollutants in multiple media, assessing the effectiveness of biological markers of exposure to organophosphate and pyrethroid pesticides, studying the impact of airport emissions of various airborne compounds on the surrounding community and a retrospective study of exposure to perfluorooctanoic acid in a large area surrounding a manufacturing facility using this compound. Recently, he began work assessing exposure to pesticides experienced by individuals in a community in Northern Thailand. Dr. Ryan has published in excess of 90 peer-reviewed manuscripts and book chapters and has made over 170 presentations of his work to the scientific community. He is a member of the Executive Committee of the Emory/Battelle/ Morehouse consortium for the National Children's Study. Dr. Ryan is a past member of the Federal Advisory Committee for the National Children's Study being undertaken by the National Institutes of Health. He has also served on several National Academy of Science panels. He has served as a member of two U.S. EPA Federal Advisory Committees, the U.S. EPA: Board of Scientific Counselors and *ad hoc* member of the U.S. EPA FIFRA Scientific Advisory Panel.

12) Dr. Michael Sohn is Staff Scientist and Group Leader of the Airflow and Pollutant Transport Group in the Indoor Environment Department at Lawrence Berkeley National Laboratory. Dr. Sohn received a PhD in Civil and Environmental Engineering, MS degree in Engineering and Public Policy from Carnegie Mellon University, and an MS degree in Mechanical Engineering from UCLA. He has been at Lawrence Berkeley Lab since 1998. He conducts research in mathematical modeling of environmental systems and quality, human exposure assessment, uncertainty analysis, and value-of-information decision analysis. Relevant to this panel, he has led research on developing PBPK models and statistical algorithms for back-estimating population-scale exposures. He also has important experience with developing and applying empirical Bayesian statistical techniques. Dr. Sohn has served as an ad hoc member of theU.S. EPA FIFRA Scientific Advisory Panel.