


quantitatively assess exposure and biological response to classes of insecticides involving multiple routes of exposure (i.e. skin, ingestion, inhalation) that are routinely encountered in the environment. In summary, it is envisioned that once fully validated, these modeling approaches will be very useful for accessing exposure and health risk as a component of a broader biomonitoring or epidemiology assessment strategy for a wide range of potentially exposed individuals. Supported by: CDC/NIOSH 1 R01 OH03629-01A2; EPA-STAR R828608.

 **1337** PESTICIDE NEUROTOXICITY IN ADULTS: IMPLICATIONS FOR PESTICIDE SAFETY TESTING AND PUBLIC HEALTH.

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Pesticide safety evaluations depend on the best available scientific information, including data from animal toxicity and human epidemiological studies. Several recent epidemiological studies indicate that chronic pesticide exposure increases the risk of neurologic symptoms and affective disorders. Animal studies, in contrast, do not investigate comparable outcomes and generally have not demonstrated analogous chronic impairments. There are several factors to consider when evaluating the comparability of epidemiological and animal neurotoxicity studies. Regarding the epidemiological literature, issues include co-exposure to other agents, concurrent, chronic or previous exposures, use of appropriate controls, potential confounding factors, methods of exposure assessment, and subjective or objective evaluation of neurological status. In epidemiological studies, it is difficult to attribute health outcomes to specific exposures, and dose levels are difficult to quantify. Animal experiments must be evaluated regarding factors such as dose level and duration, procedures used to assess neurological or behavioral status, and appropriateness of the animal model to human neurotoxicity. Factors which may explain apparent differences between animal and human studies include: animal neurological status is evaluated with different procedures than those used in humans; animal studies may involve shorter exposure durations and higher dose levels; most animal studies evaluate a single pesticide ingredient whereas humans are typically exposed to many agents in product formulations. Since neither type of study can adequately address all issues, an appropriate blend of scientific information is necessary to evaluate potential human risks of chronic pesticide exposure. [This is an abstract of a proposed presentation and does not reflect EPA policy]

 **1338** CURRENT REGULATORY AND SCIENTIFIC VIEWS REGARDING CHEMICAL HAZARDS TO CHILDREN.

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The evaluation of the health of children, specifically the estimated risk due to environmental chemical exposures, continues to receive increasing regulatory attention. It has resulted in decision-making that has scientific, policy, and public health impacts. At the center of this discussion is whether children are uniquely susceptible and whether current regulatory approaches are protective of children. This workshop will discuss ongoing initiatives by the EPA and CDC aimed at characterizing children's exposures and evaluating biomonitoring data. Other parameters that are influential in predicting susceptibility, namely, pharmacokinetics and pharmacodynamics, will also be addressed. The use of uncertainty factors in setting environmental criteria and estimating safe doses will be discussed and a case study from the VCCEP program will be presented. A view from the medical community, frequently the first responders to questions and concerns over children's health, will be offered. The scientific questions about whether children are significantly more susceptible to toxicants and the current regulatory response to this concern (e.g., FQPA, testing requirements, basic research, cancer risk assessment guidelines) are the focus of this workshop. An anticipated outcome is the identification of those areas of research that will give the toxicology community the opportunity to be a central figure in properly addressing this important public health question.

 **1339** OVERVIEW OF USEPA RESEARCH ACTIVITIES AIMED AT CHARACTERIZING CHILDREN'S EXPOSURES.

E. A. Cohen Hubal. USEPA, Research Triangle Park, NC. Sponsor: D. Juberg.

Given the potential vulnerability of children to the effects of environmental exposures, understanding the relationship between children's health outcomes and environmental exposures is an important research need to reduce uncertainty in risk assessment. Over the past 8 years, significant research activities have been initiated at the USEPA to increase understanding of children's vulnerabilities and to better characterize children's exposures to chemical stressors in the environment. Research efforts include development of models, methods, and data to quantitatively de-

scribe ways that children are exposed to environmental stressors. Current and recently completed studies include large field studies to measure children's exposures to chemicals in their homes and daycare centers as well as targeted studies to better understand the determinants of exposure. CTEPP, a study of 260 preschool-age children, has recently been completed and data are being analyzed to identify important exposure factors and pathways. A longitudinal children's study of 60 infants and toddlers is being implemented over the next couple of years to assess exposures to current-use pesticides, phthalates, and BFRs. As a result of these and other Agency initiatives, important data are being collected and assessment approaches are being developed and used to improve the scientific basis of exposure assessments for children. Despite this significant progress, there are many important gaps associated with how to effectively measure and characterize exposure for health studies and risk assessment. In this presentation, ongoing and recent USEPA initiatives aimed at evaluating children's exposures and health risks will be discussed, including issues associated with characterizing cumulative risks from exposures to multiple environmental stressors. The information and data obtained from these efforts will help identify the most important exposures for children and enable decision to prioritize environmental health related activities. This work has been funded wholly or in part by the USEPA. It has been subjected to Agency review and approved for publication.

 **1340** USING CDC BIOMONITORING DATA FOR ASSESSING CHILDREN'S EXPOSURES TO ENVIRONMENTAL CHEMICALS.

L. L. Needham. NCEH, CDC, Atlanta, GA. Sponsor: P. Williams.

It has been well documented that children on a kilogram basis are more highly exposed to a variety of environmental chemicals than are adults. In addition, because their body functions are still developing, the impact of these exposures may be greater; thus, they are more susceptible to these exposures than are adults. These early life exposures can not only potentially affect the child near the time of the exposure but in some instances can lead to adverse health outcomes later in life. Thus, it is important to monitor exposures occurring especially *in utero*, infant, toddler, and early childhood life stages. CDC has utilized samples collected from its National Health and Nutrition Examination Survey (NHANES) to estimate background levels for 116 chemicals in the U. S. general population, based on race/ethnicity, gender and age. The biggest limitation on the NHANES was age, specifically the younger ages. For most of the analytes, measurements were made in urine samples only in those aged 6 years and older and in serum samples only in those aged 12 years and older. Exceptions to these age ranges were lead, cadmium, mercury, and cotinine measurements. To obtain more data on exposures occurring early in life, our laboratory has collaborated extensively with other groups to determine levels of environmental chemicals in the younger populations and in some instances we relate these levels to adverse health outcomes. Specific examples will include organophosphorus pesticides, phthalates, and perfluorinated chemicals.

 **1341** EVALUATION OF CHILDHOOD EXPOSURES TO INDUSTRIAL CHEMICALS THROUGH VCCEP.

P. R. Williams. ChemRisk, Boulder, CO. Sponsor: D. Paustenbach.

The Voluntary Children's Chemical Evaluation Program (VCCEP) is designed to provide data to enable the public and risk assessors to better understand or evaluate the potential health risks to children associated with certain chemical exposures. Specifically, in response to a request from the USEPA, chemical manufacturers have voluntarily begun to collect and analyze data for 23 different chemicals in the first tier of a pilot of this program. These chemicals were selected for initial evaluation because they have been found to be present as contaminants in either human tissues or fluids (e.g., adipose tissue, blood, breath, breast milk, urine); food and water children may eat and drink; or air children may breathe (including residential or school air). A key question of VCCEP is whether the potential hazards, exposures, and risks to children have been adequately characterized, or whether additional data are needed to evaluate children's unique risks. In this presentation, the tiered testing protocol of VCCEP's pilot program will be discussed, as well as the key findings from the first set of chemicals that have undergone peer consultation. These include: acetone, decabromodiphenylether, methyl ethyl ketone, pentabromodiphenyl ether, octabromodiphenyl ether, and vinylidenechloride. The status of other chemicals currently being evaluated under VCCEP will also be discussed (e.g., benzene, ethylbenzene, xylene, n-dodecane, undecane, decane). Particular focus will be given to the lessons learned and data limitations associated with VCCEP, as well as recommendations for areas of improvement in future evaluations.