PROGRAM AND ABSTRACTS

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ASSESSMENT OF NEUROBEHAVIORAL EFFECTS IN VULNERABLE POPULATIONS: THE EXAMPLE OF PESTICIDE EXPOSURE IN CHIDLREN

The developing nervous system is vulnerable to chemical exposures. Although the link between high exposures to neurotoxic chemicals and damage to the nervous system is well established, research has also shown a link between low exposures and subclinical deficits. Identifying and characterizing the impact of chemicals on the developing brain allows us to develop programs to prevent exposure. Behavioral performance tests have been used to assess workplace exposure and have become the most efficient methods (in terms of cost and time) to screen for adverse effects of neurotoxic exposures in adult workers. The heightened concern over the potential impact of environmental exposures on neurological functioning in children has led to the development of neurobehavioral test batteries for use with children. Unlike adult neurobehavioral testing, in which a number of tests batteries have been developed, there have been very few attempts to develop specific neurobehavioral batteries for children. Children from all cultures and backgrounds are at risk. However, ethnic minorities and children from low-income families are often at greater risk because of poor nutrition, an impoverished environment, and limited access to medical care. There is a need for reliable, easy-to-administer batteries to assess neurotoxic exposure in children. An example may bring this complex problem into perspective. Children of agricultural workers are considered to have a higher risk of exposure to pesticides compared to the general populations because of the close proximity of their homes to the fields where pesticides are applied and from take-home exposure. The goal was to develop a battery for young children that included measures that had demonstrated sensitivity to organophosphate pesticide exposure and, because of the unknown nature of effects of organophosphate pesticides in children, to assess a wide range of neurobehavioral functions. The battery was assembled by combining computerized tests from the Behavioral Assessment and Research System (BARS), performance tests adapted from the Pediatric Environmental Test Battery (PENTB), and a test of recall and recognition. The current battery has been validated in several cultures and socio-economic status classes, with only minor modifications needed. In order to characterize the impact of neurotoxic exposure on children from diverse populations, the ability to generalize neurobehavioral results by using this type of battery is crucial.

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ASSESSMENT OF NEUROBEHAVIORAL EFFECTS FROM LIFETIME EXPOSURE TO CUMULATIVE NEUROTOXICANTS: THE EXAMPLE OF MANGANESE

Neurobehavioral testing is a useful tool for the assessment of early effects caused by exposure to neurotoxic agents. Computerized systems are particularly suitable for data collection and analysis in large human populations. These systems are typically less specific and not suitable for individual diagnosis of clinical neuropsychological damage. On the other hand, they are sensitive enough to detect the early onset of performance changes in various neuro-behavioral domains exploring cognitive, motor and mood functions. The possibility to quantify the performance in these domains with continuously distributed values allows the evaluation of dose-effect association. When introducing cut-offs points based on the distribution in non exposed referent groups, performance can be dichotomized to yield also dose-response analysis. Since the Nervous System often represents the most sensitive target organ of various chemical substances, dose-effect and dose-response curves based on neurobehavioral testing can be used for risk assessment calculation based on traditional NOAEL/LOAEL approach or on the Benchmark Dose approach. Neurobehavioral testing are also suitable for the evaluation of cumulative effects, caused by prolonged occupational or life-time environmental exposure to neurotoxicants, including metals and PCB. This is particularly useful for a more extended risk assessment, aimed to evaluate the global exposure as determined through various life stages (starting from pre-natal life) and through various exposure sources. The application of risk assessment procedure to cumulative manganese exposure is illustrated as an example of this approach.