

PREFACE

The book contains the contributions at the NATO Advanced Research Workshop on Environmental Heavy Metal Pollution and Effects on Child Mental Development – Risk Assessment and Prevention Strategies, which took place in Sofia - Katarino, Bulgaria, April 28–May 1, 2010.

A group of specialists of different background participated at the meeting and contributed to the multidisciplinary approach, bringing a wide pallet of opinions and remarks. The spread in specializations of the participants was: air quality, analytical and bioanalytical chemistry, biochemistry, biology and marine ecology, developmental psychology, economics, environmental engineering, environmental medicine, toxicology and risk assessment, and physics.

The goal of the Advanced Research Workshop was to evaluate the existing knowledge on intellectual impairment in children exposed to heavy metals in their living environment. Research needs were identified in order to obtain a clearer picture of the situation in countries and regions in risk, in which the economy is closely related to metallurgy and heavy metals emission and to recommend a strategy for human protection. The importance and need of such evaluation is obvious and timely.

Heavy metals include metals and metalloids with atomic density of 4 g/cm^3 or five times greater than water. They are: arsenic, cadmium, chromium, copper, lead, mercury, silver, zinc, iron, and the platinum group elements, and are of major economic significance. These metals present themselves in various chemical forms and take various routes of exposure; both of these factors can influence the severity of their neurotoxic effects.

Millions of children throughout the world have suffered brain damage as a result of environmental pollution. One of six children is thought to have some kind of developmental disability, but the exact causes are largely unknown. The levels of environmental pollutants, their mixture, their accumulation in humans, and the rising incidence of neurological diseases have been noted recently as a suspicious coincidence. Neurodevelopmental disorders caused by heavy metal exposure are a known contributor to this silent pandemic.

Children exposed to even small amounts of some heavy metals are known to suffer a wide range of neurobehavioral problems, including learning disabilities, memory and attention deficits, impaired problem solving, reduced intelligence test (IQ) performance, increased behavior problems such as aggression, conduct disorder, and criminality, and psychiatric problems such as depression and anxiety. For many pollutants, important questions remain unexplored or have only tentative answers at this time. Of particular importance is the relative importance of prenatal versus postnatal exposure and clarifying the effects of simultaneous or

sequential exposure to multiple pollutants. There are also questions about best methods for measuring mental disabilities, such as using IQ tests versus more specific tests of neuropsychological function.

The main objectives of the Advanced Research Workshop were to: to review the principle sources for single and complex mixtures of heavy metal pollutants in the environment; to identify the suitable methodology for chemical analyses in the environment and in humans; to evaluate the existing methods for measuring mental impairment, including their reliability and validity; to recommend a standard testing protocol to be used in future research; to assess the future role of environmental heavy metal pollution in countries and regions in risk and its effects on children's neurological development; to recommend a prevention strategy for protecting children's health and development.

Lubomir I. Simeonov
Solar-Terrestrial Influences Institute
Bulgarian Academy of Sciences
Sofia, Bulgaria

Mihail V. Kochubovski
Republic Institute for
Health Protection
Skopje, FYR of Macedonia

Biana G. Simeonova
Institute of Electronics
Bulgarian Academy of Sciences
Sofia, Bulgaria

Environmental Heavy Metal Pollution and Effects on
Child Mental Development

Risk Assessment and Prevention Strategies

Simeonov, L.I.; Kochubovski, M.V.; Simeonova, B.G.
(Eds.)

2011, XX, 344 p., Hardcover

ISBN: 978-94-007-0252-3