

EVALUATING HUMAN HEALTH RISK FROM LOW-DOSE AND LONG-TERM EXPOSURE TO POLYCHLORINATED BIPHENYLS

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The objective of this project is to evaluate human health risk of low-dose long-term exposure to a group of persistent organic pollutants such as polychlorinated biphenyls (PCB) and their metabolites (hydroxylated PCB and methylsulfonated PCB), organochlorine pesticides (hexachlorobenzene, DDT and DDE), polychlorinated dioxins and furans. Among the effects of these organochlorinated compounds on human health to be evaluated will be predominantly their possible carcinogenicity, endocrine disrupting, neurotoxic and immunomodulatory effects.

In each of a polluted (as a consequence of PCB manufacture during 1954-85 and heavy environmental pollution due to the negligence of previous regime) and a background area about 1000 sex and age matched adults and 200 children will be examined. In adults, special respect will be paid to the blood levels of organochlorines as analysed by congener specific microcapillary gas chromatography/mass spectrometry, bioassays of dioxin-like (CALUX assay and cytochrome P450 1B1 activity in lymphocytes) and xenoestrogenic activity (ER-CALUX assay) as well as of heavy metals (Cd, Hg, Pb, Mn, Zn, Se). The data obtained by chemical analyses and bioassays will be compared and statistically evaluated to determine the relationship between the dioxin-like compounds produced by the analytical and biological methods.

A number of data on the health, social and occupational history of each subject and of some important data (related to cancer, diabetes, thyroid disorders etc.) on its first and second degree relatives is proposed to be obtained by questionnaires. In addition to the medical and thyroid ultrasound examination, the level of several hormones (thyrotropin, thyroid hormones, testosterone in males), antibodies (anti-thyroperoxidase, anti-TSH receptor, anti-glutamic acid decarboxylase) and biomarkers (thyroglobulin, beta²-microglobulin, alpha-fetoprotein, carcinoembryonic antigen) will be estimated.

Each child will be evaluated by selected computer and non-computer versions of neurobehavioral tests for individual age groups, e.g. sensomotoric functions (eye-hand coordination), attention, vigilance, memory and complex mental processes. The thyroid status will be examined by ultrasound, blood hormone and anti-peroxidase antibody levels, while the hearing status will be examined by the acoustic decay test, tympanometric screening, auditory efferent reflexes, brainstem evoked response audiometry and distortion product oto-acoustic emissions. In addition, blood levels of organochlorines and heavy metals will be measured.

The complex nature of the project previews many modifications of approach not changing the basic conception of the project. Thus, further development

and precision of design will be done during the first months of the project's life. An important task will be the creation of a specific software and respective relational database. The main task will be formulation of hypotheses regarding potential relationships between some measured parameters and some effect endpoints. The wide range of exposure levels in the

area studied gives a real chance to construct dose-effect relationships and relational computer database. The outcomes are expected to be in classical terms of epidemiology of non-infectious diseases, e.g. relative risk, incidence, prevalence etc. The data are to be used for risk assessment and management as well as for regulatory purposes.