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ABSTRACT

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Occupational exposure to low doses of inorganic mercury

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Key Words
Mercury; occupational exposure; early effects; dental amalgam; fish consumption.

The principal aims of the study, financed by the Italian Ministry of University and Scientific and Technological Research, were: to verify if at the current limit values early biological effects due to exposure to mercury can be demonstrated; to identify the levels of internal dose that can cause the early effects; to evaluate the non-occupational factors that can contribute to the levels of internal dose. In particular, the mercury intake derived from dental amalgams and fish consumption was considered. The internal dose was measured with the traditional biological indicators (urinary and blood mercury) and with the speciation of a large percentage of biological samples by ICP-MS. The central nervous system, neurondocrine function, kidney and the immune system were considered as target organs and were examined using previously standardized indicators of effects. Two groups of subjects were included in the study; workers with occupational exposure to inorganic mercury in different industrial settings and control subjects identified from the general population. The first group was characterized by an exposure level to inorganic mercury clearly below the current limit values; whereas the HgU levels of a relevant number of control subjects were similar to those measured in the exposed subjects. The in vitro studies covered several issues: the percutaneous absorption of mercury using skin derived from human post-mortem samples in a standardized model; the release of the metal from dental amalgams in different physiological conditions of the oral cavity; the effects of increasing doses of mercury chloride on tubular renal cells. The project was realized with the cooperation of seven Research Units from six Italian Universities. Researchers belonging to Departments of Occupational Medicine, Industrial Hygiene, General Pathology, Biochemistry, Odontology, and Biostatistics were involved to achieve a multidisciplinary approach. The results of this research project are described in the following papers.