

DUŠKA MEH¹ and ALFRED B. KOBAL²

¹ Institute for Rehabilitation and Department for Physical and Rehabilitation Medicine, Medical Faculty Ljubljana, Linhartova 51, 1000 Ljubljana

² Department of Occupational Medicine, Idrija Mercury Mine, Idrija, Slovenia.

BACKGROUND: Mercury, the only metal in a liquid state at room temperature, has a long and fascinating history of both uses and toxicities. It can be traced back several thousand years but in modern therapeutic medicine, mercury compounds have no place.

The central nervous system is the critical organ for mercury vapour exposure; it can also cause peripheral polyneuropathy (sensorimotor axonopathy), which affects the lower extremities more than the upper ones.

The neurological and neurophysiological evaluations were performed assessing characteristics of peripheral sensorimotor axonal polyneuropathy (Albers et al. 1988, Ellingsen et al. 1993, Letz et al. 2000). Alterations were frequently subclinical. No data are available on small nerve fibre dysfunctions following Hg⁰ exposure.

The electrodiagnostic examinations measure the function of large nerve fibres and do not show the activity of small myelinated and unmyelinated nerve fibres. In human, the preponderance of the small nerve fibres was determined, as the ratio was found to be 3 or 4 to 1.

Objective: The purpose of the investigation was to neurophysiologically assess the small-fibre affection among subjects with recent and past exposure to mercury.

SUBJECTS AND METHOD: The small nerve fibre dysfunctions were observed in 5 ex-mercury miners previously exposed to mercury. Additionally, young woman with actual intoxication was examined.

A complete blood count, serum electrolytes, renal function tests, and urinalysis were performed. All subjects (from 55 to 75 years) were exposed to Hg⁰ from 2 to 32 years, concentrations in the range from 0.05 - 2.0 mg/m³; time since last occupational exposure: 20 to 32 years; ambient exposure: in the last 10 years in the range 10 - 500 ng/m³; urine - Hg: 1-10 µg/L Mercury intoxications: in two not known, in one once and in two twice, Urine-Hg at intoxication owner 100 - 350 µg/L.

Young woman with symptoms and signs of "micromercurialism" was accidentally exposed to Hg⁰. Paraesthesia and pain or impaired sensation occurred to varying severity for all patients. Pain and paraesthesia always occurred in the feet, and also in the hands in some advanced diseases. For the assessment of thermal specific and thermal pain sensibility a Medoc (Medoc Ltd., Ramat Yishai, Israel) and SOMEDIC (Somedic AB, Stockholm, Sweden) ThermoTest apparatus were used.

Temperature sensation was determined as the warm and the cold thresholds, the cold pain and the heat pain thresholds. Always the same sequence of thresholds determination (cold and warm thresholds, cold pain and heat pain thresholds) was used.

RESULTS: In all subjects mercury was found to be neurotoxic. Previous electrophysiological studies have concentrated on groups of workers exposed to mercury but generally free from neuropathic symptoms or on those occasional patients with subacute motor weakness. Sensory nerve conduction has been studied less often and never small nerve fibres were evaluated.

CONCLUSIONS: In ex-mercury miners exposed to Hg⁰, the thermotest was found as very sensitive but unspecific tool; no specific signs and no specific pictures were found. The increased thresholds and no aberrant sensations were established. In advanced disease, the anesthesia and analgesia were frequently determined and aberrant sensations were ordinarily assessed. In acute intoxications sensory dysfunction was concentration dependent. Our group is too small to exactly determine factors that influence sensory system. Peripheral and central nervous processes are important.

KEYWORDS: *Elemental mercury, Small nerve fibre function, Thermotest, Sensory dysfunction*

Corresponding author: duska.meh@mf.uni-lj.si