

Concentrations of lead in blood - Diagnostic tests and clinical significance

Basics of biochemical toxicology

The determination of blood lead concentrations is used to assess lead exposure of the body. It is indicated in

- those with exposure to lead (traditional "lead occupations": people working along roads, in waste incineration plants, in paint and printing industries, etc.)
- Patients with clinical symptoms that suggest acute or chronic lead poisoning.

Orally ingested lead is absorbed poorly (approximately only 8 %). The aerosols of lead salts and lead oxide on the other hand are absorbed well through the lungs; the absorption rate is between 50-80 %, depending on particle size and solubility.

Approx. 95 % of circulating lead are bound to red blood cells in the blood. Most of the lead dissolved in plasma spreads to the bones, where it is deposited in an inert form as tertiary lead phosphate (lead deposit). Influences that lead to increased bone loss (such as physical stress, acidosis, catabolic steroids, infectious diseases), also accelerate the metabolism of lead.

Clinical symptoms of lead poisoning

Lead has three places of attack in the body:

- smooth muscles,
- motor system
- red blood cells.

Lead poisoning is typically a **chronic disease**. The onset is gradually, with uncharacteristic symptoms (headache, irrita-

bility, fatigue, loss of appetite). The blockage of several enzymes of the porphyrin/heme synthesis leads to anaemia, with its typical marked anaemic pallor. Other symptoms are severe colicky abdominal pain, with constipation that can last up to ten days; also neurological disorders, particularly in the form of radial nerve paresis, as well as mental changes, and occasionally kidney injury.

Acute **lead poisoning** is rare and is accompanied by signs of acute haemolysis. Moreover, the clinical materials symptoms related to the gastrointestinal tract, central nervous system (from insomnia, dizziness, muscle tremors and muscle twitches to epileptic seizures) and the kidneys are more violent than in chronic lead poisoning.

Material

2 ml EDTA-blood

Other diagnostic tests

A blood count must be carried out in each case of suspected chronic blood poisoning. The 24-hour urine collection should include the determination of δ -aminolevulinic acid and porphobilinogen, while the EDTA blood sample should be analysed for red blood cell porphyrins.

Literature

- Labor und Diagnose. L. Thomas, 8th Edition, 2012
- Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz 2003; 46:1112-1113.
- List of MAK and BAT Values; German Research Foundation, 2003.
- Praktische Hämatologie. M. Begemann, 11th edition, 1999.

Do you have questions? Our serviceteam will be happy to support you: +49 (0)30 770 01-220.