Methanol poisoning

Methanol (also *wood alcohol* , *methanol* , *methyl alcohol*) is a toxic liquid with the chemical formula CH 3 OH. It can be a part of solvents, fuels and naturally also occurs in very small quantities in spirits intended for consumption. The main sign of severe methanol poisoning is metabolic acidosis and blindness.

Mechanism of toxicity

Methanol itself shows low toxicity, but produces toxic metabolites. Methanol is metabolized by alcohol dehydrogenase in the liver to **formaldehyde** and subsequently to **formic acid** by aldehyde dehydrogenase . It is only slowly metabolized to CO 2 and H 2 O. The biological half-life is 8–28 hours.

Formic acid accumulates in the body and there is a direct correlation between its concentration and toxicity, also directly or indirectly causing metabolic acidosis . Formic acid further inhibits cytochrome oxidase, a major cause of ocular toxicity, and the accompanying acidosis facilitates the diffusion of formic acid into cells. It accumulates mainly in the retina , optic nerve and basal ganglia .

Symptoms of poisoning

The minimum toxic dose of methanol is about **0.1 ml/kg** . The lethal dose then ranges around 1 ml/kg, although as little as 30 ml can be fatal . Symptoms similar to drunkenness appear shortly after methanol ingestion. Specific symptoms of methanol poisoning appear most often after 12-24 hours, with ethanol consumption even later.

Light poisoning

Light intoxication with methanol is manifested by weakness, headache, confusion. Color vision disturbances, blurred vision or photophobia may occur. Uncompensated metabolic acidosis occurs, mortality increases with the severity and duration of acidosis . In the laboratory, we find a drop in pH, hyperventilation, an increase in the osmolal and anion gap. Nonspecific gastrointestinal symptoms of poisoning are also common - nausea, vomiting, abdominal pain or diarrhea.

Severe poisoning

Severe poisoning may include more serious symptoms, such as impaired consciousness, visual disturbances up to blindness, metabolic disruption up to multi-organ failure, renal and hepatic insufficiency and circulatory failure.

Treatment

- **Ethanol** – has a greater affinity for enzymes than methanol, it competes with it, therefore it slows down the formation of toxic metabolites. The distillate or a 10% solution in 5% glucose is usually administered intravenously. The concentration of ethanol in the blood should be maintained around 1 ‰ until the time when methanol in the blood is undetectable.
- **Fomepizole** – a specific inhibitor of alcohol dehydrogenase.
- **Folic acid** – participates in the oxidation of formic acid to carbon dioxide and water.
- **Hemodialysis** – removes methanol and its metabolites and also corrects metabolic disorders (ion breakdown, correction of acid-base balance).

Investigation

Laboratory examination will help confirm methanol poisoning and determine the severity of the patient's condition.

The detection of methanol in the patient's blood or in the material with which the affected person was intoxicated and **the determination of its concentration** is carried out by gas chromatography .

In order to control the treatment, the level of methanol in the blood, parameters of acid-base balance, osmolal and anion gap, concentration of ions in the blood, renal function, liver enzymes, glycemia, formic acid level, etc. are monitored in particular.

Links

Related Articles

- Methanol
- Alcohol intoxication
- Fomepizole

References

1. 1. VALE, Allister. Methanol. *Medicine* [online] . 2007, vol. 35, no. 12, pp. 633–634, also available from < https://secure.jbs.elsevierhealth.com/action/getSharedSiteSession?redirect=http%3A%2F%2Fwww.medicinejournal.co.uk%2Farticle%2FS1357-3039% 2807%2900324-6%2Fabstract&rc=0&code=mpmed-site >.

External links

- [http://www.tis-cz.cz/index.php/informace-pro-odborniky/methylalkohol TIS: EXPERT RECOMMENDATION FOR INTOXICATION -

METANOL (METHANOL, METYLALKOHOL, DŘEVNÝ LÍH, CH3OH)]

- Jaroslav Petr, On methanol poisoning and the "new antidote" , Objective Source of E-Learning, 15/09/2012
- Matěj Smlsal, Pavel Ševčík: You see a snowstorm and you can't breathe, the doctor describes methanol poisoning, IHNED.CZ, 18/09/2012, 15:03

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- Biochemistry
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