

# ALCOHOLISM, DRUG ADDICTION AND MACRO- AND MICROELEMENTS IN EXPERIMENTAL AND CLINICAL STUDIES

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**ABSTRACT** – Alcoholism and drug addictions are serious social problems. They lead to organism destroying and even to death. Alcohol and drug addictions cause the metabolic changes and disturb homeostasis of macro- and microelements.

In this paper we reviewed alcohol and drug abuse influence on the Mg, Ca, K, Na, and Fe, Zn, Cu, Se, Mn concentrations in experimental and clinical studies.

Most of the clinical investigations showed the decrease of the magnesium concentrations in serum of alcohol abusers in comparison with the healthy control groups. It regarded both of the total and ionized magnesium. The ethanol withdrawal led to the normalisation. Hypomagnesemia was observed in patients with alcoholic pancreatitis and liver cirrhosis. The single dose of ethanol can lead to the decrease of serum magnesium. The experimental studies showed both the alcohol-induced hypomagnesemia and the decrease of magnesium contents in the tissues of kidney and brain.

Alcohol abuse disturbs also the homeostasis of calcium. The degree of hypocalcemia is correlated with the severity of abuse. The single, moderate dose of alcohol consumed by healthy subjects doesn't affect the serum calcium level. However, in patients with alcoholic pancreatitis the serum calcium level was decreased. The positive results obtained in alcoholics treated with calcium supplementation confirm the dependence between the calcium homeostasis and the alcohol abuse.

Alcohol abuse disturbs also sodium and potassium metabolism. The single, acute ethanol poisoning or moderate alcohol consumption didn't effect the levels of these elements, but the chronic alcoholism, leading to the pancreatitis or liver cirrhosis results in the decrease of serum sodium and potassium.

The intake of alcohol exerts also an influence on the microelements concentrations. The studies comprising the subjects without the liver damages showed the rise of serum iron, connected with the increase of serum ferritin and transferrin saturation. The withdrawal of alcohol led to normalization. Non-transferrin-bound iron is especially toxic for the cells because it is capable of initiating the lipid peroxidation. This form of iron was found considerably more often in the case of active abusers, particularly when the abuse led to the liver cirrhosis. The results of the studies indicate univocally, that alcoholism seriously influences the iron metabolism when the consumption of ethanol causes the damage of organs, mainly of the liver. The intoxication of animals with ethanol showed the significant increase of iron level in liver.

The level of serum zinc in the consumers of alcohol is significantly diminished and the degrees of deficiency are correlated with the severity of cirrhosis. It suggests that the zinc deficiency appears in the beginning of the alcohol abuse.

In the studies of the copper level the different results were obtained. Both of increase and decrease were observed. The serum selenium in alcoholic subjects was diminished, what was connected with the decrease of glutathione peroxidase activity.

The studies showed that drug addiction didn't effect the serum level of magnesium. Authors suggest, that it can be caused by the intake of magnesium from the tissues stores.

In the drug addicts the urinary excretion of copper was decreased and the excretion of zinc was increased twice. This fact is of great importance because zinc plays role in immunological system functions. The decrease of serum zinc was observed in drug addicts and the detoxification didn't exert any positive effects.

The studies of the serum copper in drug addicts showed its increase. The same results were obtained for manganese and iron.

These observations univocally showed that both alcoholism and drug addiction causes very severe disturbances of macro- and microelements.

**Key words:** alcoholism, drug abuse, macroelements, microelements.