

Nickel and chromium – necessary elements, but are they always safe?

Nikiel i chrom – pierwiastki niezbędne, ale czy zawsze bezpieczne?

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Microelements are elements that play an important role in the human body. They are structural components of enzymes or involved in enzymatic catalysis.

Chromium and nickel are metals which in low concentrations are essential to human organism, while at higher doses may pose health risk. It has been found that a large amount of organic chromium in form of picolinate can damage the structure of the human DNA. The experiments on laboratory animals have shown that increased nickel content significantly increases the absorption of iron in rats, which may be detrimental to the body.

Nickel relatively recently has been recognized as an essential element for the human body, but neither AI (Adequate Intake), or RDA (Recommended Dietary Allowances) have not been established. It has been assumed that 1 mg per day is a sufficient maximum amount of this element. Nickel taken with food and water is absorbed by the digestive tract at approximately 5% of the total. An excess of this element causes a change in the metabolism of other metals: may reduce level of magnesium, manganese and zinc in certain parenchymal organs.

Trivalent chromium is considered to be necessary for the development of the human body, while the hexavalent is carcinogenic and teratogenic. The demand of adult in Cr^{3+} is $25 \mu\text{g}\cdot\text{day}^{-1}$ for women and $35 \mu\text{g}\cdot\text{day}^{-1}$ for men. Need for this element also increases under stress, trauma and intensive exercise. Lack of chromium in the body causes fatigue, lack of resistance of nervous irritability, anxiety, bouts of nausea, headaches or higher sweet consumption.

The most important connection of chromium in human body is its relationship with nicotinic acid and glutathione known as glucose tolerance factor (GTF) conditioning glucose and lipids metabolism. Deficiencies of GTF in blood can lead to improve glucose and lipids levels and contribute to the formation and development of a number of diseases.

Foods with high nickel content are: cocoa, nuts, almonds, soy, seeds, legumes, grains (wheat, rye, oats, barley, millet, buckwheat), wine, beer, tomatoes, cherries, chocolate, tea, meals fast – food, baking powder, shellfish, some fish (salmon, mackerel, tuna, herring), gelatin, and ready-mix spices (fixes to the dishes). The high nickel content in the diet has been found also in foods subjected to heat treatment using stainless steel vessels.

In turn, meat products and whole grains are considered the best source of dietary chromium.