

## BIOLOGICAL ROLE OF d-TRANSITION ELEMENTS OF VIII GROUP

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**Introduction.** The iron group in the periodic table referred to the elements iron, cobalt and nickel, that is the first row of group VIII (or VIIB under the old numbering system.) In modern numbering, the iron group appears as three columns numbered group 8, 9 and 10. These metals, and the platinum group immediately below them, were set aside from the other elements as they show obvious similarities among themselves in their chemistry, but are not obviously related to any of the other groups. All d-microelements has their own optimal concentration in human organism. Any deviation in the direction of the deficit or excess leads to violation of substance exchange.

**Aim.** Review the biological properties of d-elements of VIII group.

### **Biological role of Iron**

Iron is involved in numerous biological processes. Iron-proteins are found in all living organisms: archaeans, bacteria and eukaryotes, including humans. For example, the color of blood is due to the hemoglobin, an iron-containing protein. As illustrated by hemoglobin, iron is often bound to cofactors, e.g. in hemes. The iron-sulfur clusters are pervasive and include nitrogenase, the enzymes responsible for biological nitrogen fixation. Influential theories of evolution have invoked a role for iron sulfides in the iron-sulfur world theory.

Structure of Hemoglobin b, in the protein additional ligand(s) would be attached to Fe. Iron is a necessary trace element found in nearly all living organisms. Iron-containing enzymes and proteins, often containing heme prosthetic groups, participate in many biological oxidations and in transport. Examples of proteins found in higher organisms include hemoglobin, cytochrome (see high-valent iron), and catalase.

### **Biological role of Cobalt**

Cobalt is essential to humans. It is a key constituent of cobalamin, also known as vitamin B12, which is the primary biological reservoir of cobalt. In humans, B12 exists with two types of alkyl ligand: methyl and adenosyl. MeB12 promotes methyl (-CH<sub>3</sub>) group transfers. The adenosyl version of B12 catalyzes rearrangements in which a hydrogen atom is directly transferred between two adjacent atoms with concomitant exchange of the second substituent, X, which may be a carbon atom with substituents, an oxygen atom of an alcohol, or an amine.

### **Biological role of Nickel**

Nickel is a trace element that influences the amount of iron our bodies absorb from foods and may be important in helping to make red blood cells. Also Nickel can have an impact on human health through infectious diseases arising from nickel-dependent bacteria. Nickel released from Siberian Traps volcanic eruptions (site of the modern city of Norilsk) is suspected of having had a significant impact on the role played by Methanosarcina, a genus of euryarchaeote archaea that produced methane during the biggest extinction event on record.

### **Platinum group**

The presence of platinum group elements in the human body are not fully understood and its daily need is unknown. Their presence in human organism have toxic nature.

Organometallic complexes of platinum-group metals, such as alkylplatinum complexes, are employed as catalysts in olefin polymerization, the production of polypropylene and polyethylene, and the oxidation of ethylene to acetaldehyde. Platinum salts are finding increasing use in cancer chemotherapy as drugs marketed under the generic names carboplatin and cisplatin. Ruthenium oxide-coated electrodes are employed in the production of chlorine and sodium chlorate.

### **Main symptoms of deficiency of d – elements.**

Deficiency of platinum metal doesn't affect on metabolism, because of its little concentration in human body. Most pronounced deficiency symptoms refer to the iron. Total body iron averages approximately 3.8 g in men and 2.3 g in women. There are several mechanisms that control human iron metabolism and safeguard against iron deficiency. When loss of iron is not sufficiently compensated by adequate intake of iron from the diet, a state of iron deficiency develops over time. When this state is uncorrected, it leads to iron deficiency anemia: fatigue, dizziness, pallor, hair loss, twitches, irritability, weakness, brittle or grooved nails, Plummer-Vinson syndrome (painful atrophy of the mucous membrane covering the tongue, the pharynx and the esophagus), impaired immune function, pagophagia.

**Conclusions:** Iron group metals have a much greater influence on the metabolic processes in the human body than the platinum group metals. Biomedical research on the concentration of iron metals allow us to establish a diagnosis and choose a treatment strategy.