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IRON METALLOBIOLOGY AND BALNEOLOGY, IMPLICATIONS IN TYPE 2 DIABETES

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Abstract

Introduction:

Iron, as a metal ion, plays an important role in biology, is essential to the metabolic function of any cell. The study highlights on aspects of the role of iron in type 2 Diabetes, and one of a "natural treatment methods" with mineral waters.

Objectives:

The main goals of the study are to review, underline and present the molecular mechanism of iron, role and position of the "trace element" through entry into the cell to control iron homeostasis, in patients with type 2 diabetes, require more considerations. According to a complex treatment, it may be demanded demonstrations that mineral waters, beyond antidiabetic drugs, in adequate doses and parameters can contribute to an equilibrium state in metabolism.

Material and methods:

Identify, compare, describe essential processes from articles, professional books, reviews, meta-analysis and describe iron cycle in organism, molecular pathways, association with type 2 diabetes with a balneological approach is a challenging subject.

Results and discussion:

Iron is one of the most widespread elements in the earth's crust, in water could be present in Fe^{2+} (ferrous) or Fe^{3+} (ferric) states. Waters which include especially increased iron, represent the ferrous forms. The dissolved ferrous iron can be oxidized to ferric state by atmospheric oxygen (near the surface of the ground) related to pH and redox-potential conditions.

Iron plays an essential role as a cofactor in various metabolic processes like oxygen or electron transport, DNA synthesis. It is a redox-active transitional metal, disturbances in iron homeostasis are very common, overload status however may contribute to the production of reactive oxygen species. Type 2 diabetes is a systemic disease that can affect any organ in the body. Studies described association between the iron and glucose metabolism, furthermore pancreatic beta cells are sensitive to the oxidative stress. As an essential nutrient, iron can be obtained from dietary sources. A meta-analysis summarize, that hem-iron (found in hemoglobin and myoglobin and is derived only from animal products) was mainly associated with an increase in the risk of type 2 diabetes, and dietary non-hem iron (derivate from both plant and animal products) was not associated with risk of the disease. Mineral waters also are important "metal-vehicles", if concentrations of iron in drinking water are approximately 0.3 mg/l, that would contribute about 0.6 mg to the daily intake. Mentioned by a guideline, in a spring water present a total dissolved mineral content of 500 mg/l, the taste threshold value of iron was observe 0.12 mg/l. In anaerobic groundwater, iron concentrations can be usually 0.5-10 mg/l, but concentration up to 50 mg/l can sometimes be found (an example, Unirea Spring from Vatra Dornei 49.7 mg/l).

Conclusion:

Affected iron metabolism, both deficiency or overload conduct to tissue damage, contribute in diabetes pathogenesis. However, creno-therapy with iron content (pharmacodynamic effect based on Fe^{2+} form) generally combined with carbon dioxide or bicarbonate anion in adequate parameters could be recommend in type 2 diabetes.