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Short Communication

Biochemical Pathologies of Zinc Deficiency

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Abstract

This article describe role of zinc deficiency in oxidative stress regulation, immune response, proliferating and pathogenesis and pathophysiology of selected diseases such as depression, cardiovascular diseases, diabetes mellitus, alizehmers disease and willson diseases.

Keywords: Zinc Deficiency; Zinc Diseases; Zinc Pathomechanism

Introduction

Zinc is one of the important traced elements in biological function. This metal is indispensable to growth of microorganisms, plant and animals and also involved in homeostasis, immune growth microorganisms and many enzymatic function.

Physiological function of zinc

Zinc is one of the important traced elements in biological function. Zinc performs its biochemical function as a divalent cation. It is redox inert. This metal is indispensable to the growth of microorganisms, plant and animals and also involved in homeostasis, immune response, regulating oxidative stress, apoptosis and aging. It is being important in stablishing DNA.

Zinc absorption and homeostasis has been shown in the figure 1 bellow.

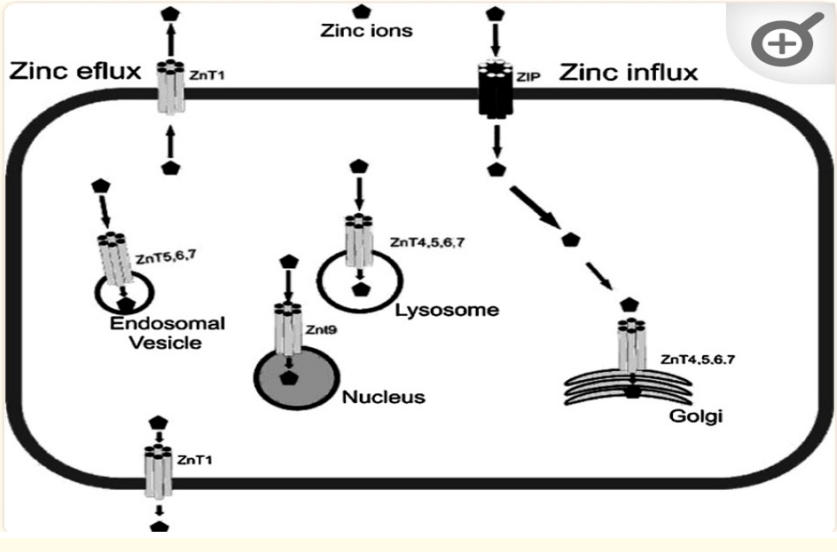

Figure 1

The role of zinc distribution in brain

The brain contains the highest amount of zinc in the body. The highest level of zinc is found in the grey matter of forebrain reaching 60-90 ppm. The white matter contain second highest level of zinc about 26 to 40 ppm [1].

Approximately 80 % of total amount of l brain zinc exists as zinc metal proteins, while the rest mainly exists in presynaptic terminals in form of vesicles and is histochemically reactive as revealed by Timm's [2] sulfide-silver staining method. Modified Timm's staining and staining with a zinc fluorescent quinoline derivative, N-(6-methoxy-8-quinolyl)-para-toluenesulfonamide [3]. (TSQ), confirm a willingly accessible zinc entity in much of the neuropil throughout the [4] telencephalon. "Vivid" zinc staining is in neocortical layers, i.e., I–III and V, the hippocampus (dentate gyrus, CA1-4 radiatum, and oriens and mossy fibers), subiculum, amygdala, thalamus, and striatum, while less staining is found in the cerebellum, brain stem, and spinal cord [5].

Figure 2 shows the possible mechanism of behavioural changes.

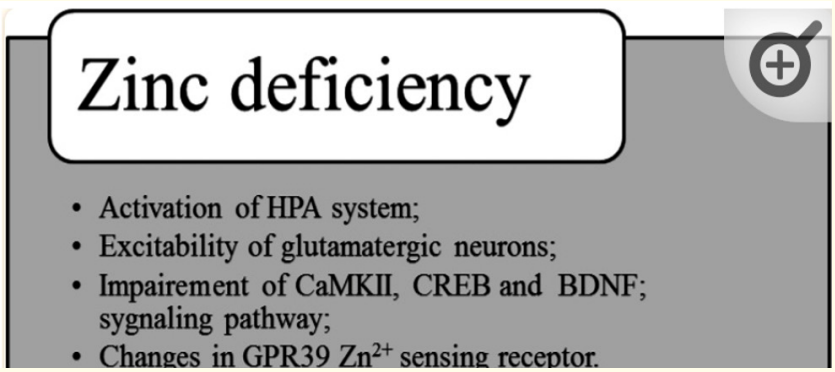

Figure 2

Deficiency of zinc and organ malfunction

Organs that are affected by zinc are central nervous system, Gastrointestinal, immune system, epidermal, reproductive and skeletal system [6].

Zinc deficiency results in the mortality of children due to the zinc malabsorption syndrome Acrodermatitis enteropathica due to infections caused by decreased lymphocyte counts due to atrophy of the thymus size and function [7]. Acrodermatitis enteropathy is a hereditary zinc deficiency disease manifested baldness, ulcerated and hypertrophic skin, muscle wasting, and chronic diarrhea [8]. This condition is a rare inherited autosomal recessive disease caused by decreased intestinal zinc absorption. The gene cause this disorder is SLC39A4. For this disease, the plasma zinc (low level) and alkaline phosphatase levels are characteristically low. A better understanding of the disrupted biology underlying each of the clinical features of acrodermatitis [9] enteropathica primarily includes determining the importance of the optimal medical management of patients with this autosomal recessive inherited disease and other severe zinc deficiency disorders. Zinc deficiency had been described both in animals and humans after a prolonged reduction in intake or [10] excessive uncompensated loss. This metal plays an important role in protecting cells from oxidative stress. Long-term less amount of this trace element makes an organism more susceptible to damage induced by oxidative stress. More specific in zinc deficiency increases the osmotic fragility of erythrocyte membranes and the levels of lipid peroxidation in mitochondrial and microsomal membranes, while the presence of zinc prevents lipid peroxidation.

Hypogonadal dwarf syndrome is connected with zinc deficiency leading to growth retardation, dysosmia, anemia, poor wound diseases. It is also connected with diarrhea.

Discussion

- Mechanism of zinc absorption
- Concentration of zinc in body
- Zinc deficiency

Conclusion

Zinc deficiency diseases and mechanism of absorption of zinc.

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