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THE INFLUENCE OF NUTRITION ON THE COGNITIVE FUNCTIONS IN CHILDREN

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Nutrition affects many facets of life - a healthy diet gives energy to support active life, protects from infection. Healthy foods also benefit mind, nourishing cells within brain that allow for cognitive functioning - recalling information, learning and perceiving the world around us. Getting enough nutrients in diet supports cognitive functioning, while nutrient deficiencies or a poor diet decrease cognition.

Since rapid brain growth occurs during the first 2 years of life, this period of life may be particularly sensitive to diet deficiency. Brain development continues throughout childhood. Adolescence is also a significant and sensitive developmental period including structural reorganization, brain and cognitive maturation.

Essential fatty acids play a central functional role in brain tissue. They are the basic components of neuronal membranes modulating fluidity and volume and thereby influencing receptor and enzyme activities in addition to affecting ion channels.

Several B-vitamins, including vitamins B-3, B-6 and B-12, help the body to convert tryptophan into neurotransmitters. Vitamin B-12 also keeps the brain cells coated with myelin, a fatty substance that helps the nerves to communicate effectively.

Zinc is a cofactor for more than 200 enzymes that regulate diverse metabolic activities in the body including protein, DNA and RNA synthesis. In addition, zinc plays a role in neurogenesis, maturation, and migration of neurons and in synapse formation. Zinc is also found in high concentrations in synaptic vesicles of hippocampal neurons, which are centrally involved in learning and memory.

Iron is involved with different enzyme systems in the brain, including the cytochrome *C* oxidase enzyme system in energy production, tyrosine hydroxylase for dopamine receptor synthesis, delta-9- desaturase for myelination, and fatty acid synthesis, and ribonucleotide reductase for brain growth regulation.

In many countries iodine deficiency in the soils has led to food fortification, most commonly the use of iodized salt. The relationship between iodine and cognitive development is extensively researched. It is well known today that severe iodine deficiency during pregnancy may cause “cretinism” in children.

The role of nutrition in brain development is complex. The effects of most nutrient shortages depend on their extent and duration, and in many cases, the brain’s need for a particular nutrient changes throughout its development. Early shortages can reduce cell production; later shortages can affect cell size and complexity. Nutrient deficit also affects the complex chemical processes of the brain and can lead to less efficient communication between brain cells.

Understanding the molecular basis of the effects of food on cognition will help determine the best diet in order to increase the resistance of neurons to stroke and promote mental fitness.