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Folate Status and Mental Health is There a Link

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Introduction

Folate is an important nutrient for mental health and its deficiency is associated with many mental disorders. Folate is also known as vitamin B9 or folic acid; dietary sources of which include leafy green vegetables and fortified grain products. It is easily inactivated by cooking and food processing. Chronic diseases, diabetes, cancer, smoking, alcohol use, and medications as mood stabilizers, L-dopa, statins, and cancer chemotherapy are considered as examples of factors that might lead to folate deficiency besides insufficiency of its dietary intake. In addition, genetic variations in the methylenetetrahydrofolate reductase (MTHFR) gene may decrease the benefits of oral folate supplementation [1-3].

Folate forms and resources

Folic acid is the form mostly used in supplemention as well as food fortification while methylfolate is the natural version found in foods like beef liver, spinach, asparagus, brussel sprouts, romaine lettuce, avocado, orange juice, and broccoli. Because methylfolate can cross the blood brain barrier, it is the form required by the central nervous system [3].

Physiological roles of folate

Folate is responsible for the early central nervous system development that begins early during embryogenesis; often before women discover that they are pregnant. Accordingly, its supplementation has been recommended for females in their child bearing period to prevent congenital CNS malformations as neural tube defects [2,3].

Also, folate shares in myelin formation, the neuronal protective sheath that accelerates nerve signal conduction. In addition, production of neurotransmitters as serotonin, dopamine, and norepinephrine depends on folate, so does melatonin which is the hormone that regulates sleep [3,4]. On the other hand, folate is a co-factor in nucleic acid synthesis and is essential in maitainance of DNA integrity. By donating its methyl component, it has an epigenetic role; regulating expression of genes by turning them on and off. It also enables formation of brain derived neurotrophic factor crucial for neural plasticity [3,4].

Furthermore, folate is vital for dismembering homocysteine that is an aminoacid produced during protein metabolism. If it accumulates, it damages the vascular endothelium with subsequent vasculitis contributing to increased risk of heart attacks, strokes, anxiety, depression, and other psychiatric disorders [5-7].

Folate DNA repair and the brain

DNA repair is crucial for the brain as neurones do not replicate. Consequently, they tend to accumulate DNA dings over time. The gradual deterioration of DNA integrity and efficiency is the key of CNS pathology. Even in healthy individuals, brain ages and becomes vulnerable to cumulative DNA damage and defective repair as well as delayed cellular housekeeping and mitochondrial dysfunction. Without folate, the brain is unable to send signals for DNA synthesis and repair; accordingly folate deficiency is associated with depressive manifestions and if long standing it can lead to development of dementia [2, 7, 8].

Folate deficiency and depression

It has been claimed that methylfolate supplementation is effective in reducing depressive manifestations in those with either normal or low folate levels as well as improving their cognitive functions. Researchers have observed some potential positive impact of folate with other B vitamins like B6 and B12 on the aging brain. They might not prevent or treat dementia but it is recommended to include them in the human diet because of their neuroprotective characteristics as if they might not be useful in some cases, they are definitely harmless in their supplementary or therapeutic doses [9]. On the other hand, folate deficiency can not only lead to depression but also hinder its recovery as it has been shown in different studies that deficient folate especially if it is due genetic variability in its metabolism, will be associated with antidepressant resistance. Accordingly, it is recommended to use methylfolate as an adjuvant to different medications of major depression to boost their therapeutic efficacy [10-13].

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