

# The Role of Micronutrients in Cognitive Function

**ALPHA LIPOIC ACID** – This nutrient protects against the neuronal injury that occurs in the presence of toxic proteins found in brain tissue of Alzheimer’s patients. Research clearly indicates that lipoic acid is a potent neuroprotective antioxidant which strengthens memory and stimulates nerve growth.

**B VITAMINS** – Folate, Vitamin B6 and B12 are important in methylation processes. Deficiencies in one of these vitamins can raise homocysteine levels which is linked to increased Alzheimer’s risk. Vitamin B1 protects against mitochondrial dysfunction that causes dementia. B12 improves frontal lobe functions such as language, especially in the elderly.

**CARNITINE** – The amino acid carnitine has potent antioxidant properties. Its role in the transport of fatty acids to the mitochondria explains its beneficial effects on fatigue, which include both physical and mental fatigue. Several trials have demonstrated a consistent improvement in memory, focus and cognition with carnitine supplementation.

**CHOLINE** – Another member of the B-complex, choline is the precursor molecule for the neurotransmitter acetylcholine, which is intimately involved in memory. Choline deficiency can induce mitochondrial dysfunction in the brain that clinically presents as cognitive impairment.

**CHROMIUM** – In a placebo-controlled, double-blind trial, chromium supplementation for twelve weeks enhanced cerebral function in older adults, possibly as a downstream effect of improved glucose disposal in patients with insulin resistance.

**COPPER** – Intracellular copper deficiency increases the formation of amyloid deposits in the brain. Specifically, copper accumulates in amyloid plaques while remaining deficient in neighboring brain cells indicating that copper deficiency is a plausible cause of Alzheimer’s.

**GLUTATHIONE** – This antioxidant is used up faster in brain tissue in the presence of choline deficiency.

**GLUTAMINE and ASPARAGINE** – Both act as neurotransmitters in the brain.

**INOSITOL** – A member of the B-complex of vitamins, inositol regulates cell membrane transport, thus explaining its key interaction with several hormone and regulatory functions. Research suggests it can protect against the formation of abnormally folded toxic proteins seen in Alzheimer’s patients. Inositol treatment also has beneficial effects on depression and anxiety.

**OLEIC ACID** – This fatty acid found primarily in olive oil and is the precursor to oleamide, which interacts with several neurotransmitters and has demonstrated anti-depressant like properties. Oleic acid also facilitates absorption of vitamin A into cells.

**SERINE** – This amino acid is the major component of phosphatidylserine, an integral part of cell membranes in the brain. Phosphatidylserine increases the release of several neurotransmitters, including dopamine, serotonin, acetylcholine and epinephrine, thus improving the rate at which mental processes occur, without the hyperactivity or compulsive behavior that often occurs with drugs that stimulate a single neurotransmitter.

**VITAMIN A** – In the Physician’s Health Study II, vitamin A supplementation (50mg) improved cognition and verbal memory in men. Short term (1 year) effects of cognitive function were not seen, but significant benefit occurred in those on long-term treatment (18 years.)

**VITAMIN C** – Next to adrenal glands, nerve endings contain the highest levels of vitamin C in the body. High intakes of vitamin C are associated with lower risk of Alzheimer’s disease.

**VITAMIN E** – In addition to antioxidative properties, vitamin E reduces death to cells in the hippocampus and protects brain from glutamate toxicity. High dietary intake of vitamin E may lower Alzheimer’s risk.

**ZINC** – Low functional status of zinc is linked to negative alterations of the immune-inflammatory system, which can cause depression, impair learning and memory and a reduce neurogenesis. Zinc also regulates synaptic plasticity.

*Additional nutrients tested by SpectraCell’s Micronutrient Test –*

**BIOTIN, CALCIUM, COENZYME Q10, CYSTEINE, MAGNESIUM, SELENIUM, VITAMINS B2, B3, B5, D, K and SPECTROX™** (a measure of total antioxidant function)



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