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Free Radicals, Nitric Oxide and Peroxynitrite

In the last several years there has been considerable discussion regarding the role that nitric oxide plays in the development neurodegenerative diseases. Nitric oxide is known to play an essential role in the modulation of vascular tone, neurotransmission and the immune system. When microglial cells of the brain (immune cells of the brain) become activated as the result of an infection, they release inflammatory cytokines which promote the release of nitric oxide. Through an elaborate biochemical pathway, nitric oxide combines with free radical oxygen to form peroxynitrite which is highly toxic to the brain and interferes with the production of mitochondrial ATP (energy molecules).

This fancy language can be more easily understood through examining free radical biology. Free radicals, (usually oxygen) are molecular species which increase as the result of inflammation or infection. As the concentration of free radicals in the brain increases, the tissue loses it's integrity and function and essentially becomes toxic and unable to perform natural activities. This is particularly evident when peroxynitrite contributes to the degradation of the blood brain barrier so that selective permeability to nutritive substances becomes impaired. Neural toxicity is exemplified as cognitive impairment, brain fog, mood lability, and sensory impairment.

In order to rectify this situation, strategic use of high dose antioxidants known to affect the brain can be utilized. Nutrients such as vitamin E, vitamin C, lipoic acid, selenium, green tea and various bioflavanoids essentially scavenge the free radicals and neutralize the effects of peroxynitrite on the tissue. Returned function of the tissues seems to occur to some degree in many patients with neurodegenerative disease such as Parkinsons Disease, Alzheimers Disease, ALS and perhaps Autism even when the etiology of toxicity is infectious.

Therapeutically, I work with various biochemical pathways in order to decrease the effects of free radical toxicity on the brain and increase the likelihood of a return in function. This requires calculated and strategic use of various nutrients that work synergistically to improve neuroprotection derived from antioxidants. I have seen many patients whose brain fog and memory impairment have become considerably reduced as the result of an integrated approach to healing.