Diet-based Inhibition of Acetylcholinesterase as a Treatment for Myasthenia Gravis and Alzheimer's Disease

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Myasthenia Gravis (MG) is an autoimmune and neurodegenerative disorder characterized by disturbances in nerve-muscle communication caused by auto-immune system complications. Antibodies mistake muscle acetylcholine receptors as foreign invaders and block the binding of acetylcholine (ACh) thereby preventing the signal for muscle activation. Alzheimer's Disease (AD) is characterized by a decreased production of ACh. The enzyme acetylcholinesterase (AChE) normally degrades ACh in order to turn off its signal. Current treatments for MG and AD involve synthetic AChE-inhibitors such as Pyridostigmine. These drugs increase the amount of ACh in the gap by slowing its degradation, effectively increasing the chances of successful nerve-muscle communication. The goal of this research is to find additional AChE-inhibitors in foods that may help to supplement MG and AD treatment. Extracts of various fruits and vegetables were made and tested in a spectrophotometric based AChE-inhibition assay. Concentrations of each extract required for 50% inhibition (IC50 values) and rates of AChE activity were calculated in order to quantitatively compare their AChE-inhibiting properties. Preliminary data analysis suggests that brussel sprouts, broccoli, pear, pomegranate, and bok choy are the most potent natural inhibitors. Further analysis of their methods of inhibition is underway. These findings demonstrate that natural AChE-inhibitors exist in foods and a structured diet could be used to augment MG and AD treatment.

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