Alzheimer's Disease Prevention

The risk of being affected by Alzheimer's disease has substantially increased in the last few decades. The number of Alzheimer's cases are projected to continually rise in the future. The increasing risk has sprung some serious concerns in today's population. People are beginning to ask what they can do to protect their mental health and prevent this disease. Others have felt hopeless in the fight against this incurable disease. Recent breakthroughs in neurology have turned things around to support the possibility of prevention. Based on recent studies, prevention of Alzheimer's may be successful through a nutritional diet, regular physical activity, and specific vitamin intake. These prevention methods would target the risk factors that are linked to Alzheimer's disease. In addition, this prevention process would be innovative, safe, cost effective, and socially acceptable. (Swaminathan).

Alzheimer's disease is a degenerative brain disorder that develops in mid to late adulthood. It is the most common form of dementia. Dementia is a chronic or persistent disorder of the mental processes. Alzheimer's causes decline in memory and is progressive and irreversible once it has been developed. Destruction of nerve cells in the cerebral cortex of the brain and loss of brain mass are physical symptoms of this disease. Alzheimer's is responsible for deterioration of cognitive abilities. Patients affected by Alzheimer's experience trouble with remembering newly learned information, judgement, and planning or solving problems during the beginning stages. As the disease progresses, the patient experiences difficulty completing familiar tasks, confusion with time and place, trouble understanding images, and newly developed problems with speaking. This usually causes the patient's mood and personality to change and causes them to withdrawal from social activities. ("What is Alzheimer's?"). Alzheimer's is a destructive disease that can completely change who a person once was.

Scientists continue to look for the direct cause of this disease to change the lives of those affected and their families.

The cause of Alzheimer's has been studied for ages, but a direct source in the brain has not been identified as the main culprit. Scientists have ideas of prime suspects that cause this disease. They have narrowed down their studies to focus on the plaques and tangles located in the brain. Plaques are deposits of a protein fragment called beta-amyloid that build up in the spaces between nerve cells. Tangles are twisted fibers that consist of a different protein that builds up inside of cells. ("What is Alzheimer's?"). Plaques and tangles damage and kill nerve cells. This is important because the destruction of nerve cells is a main cause for memory failure and other symptoms of Alzheimer's disease. Another reason these are the prime suspects for Alzheimer's disease is because they block communication between nerve cells and delay specific processes that are needed for cell function. Scientists have noticed that far more plaques and tangles are developed in those who have Alzheimer's. Other contributing factors that have been noted are oxidative stress, defects in mitochondrial dysfunction, defects in cellular energy production, and chronic inflammatory mechanisms. Prevention methods have focused on these findings in order to lower the beta-amyloid and tau deposits.

Many prevention methods are focused on modifiable risk factors. A study using multiple risk factors including obesity and physical inactivity, showed supportive results. This study collected data from Alzheimer's patients from across the world and in return it was estimated that around half the cases of Alzheimer's disease were linked to risk factors. The largest proportion of those cases was related to physical inactivity. After accounting for over-lap of the risk factors, it was still one-third of the cases that could be attributable to potentially modifiable risk factors. (Norton).

A nutritional diet consisting of specific components is a prevention option due to the relationship between some foods and their effect on cognitive ability or beta-amyloid deposition. This diet consists of a decrease of some harmful products and an increase of other health promoting food products. The Mediterranean diet is most commonly referred to for this prevention process. The Mediterranean diet generally consists of fruits, vegetables, whole grains, beans, nuts, and seeds with a low to moderate intake of fish, poultry, dairy, and red meat. (Swaminathan). Fruits like berries and dark green leafy vegetables have been demonstrated to reduce insulin resistance. Insulin resistance causes cerebral glucose hypo metabolism. Glucose hypo metabolism increases the expression of amyloid precursor protein which in return can cause tangles. (Schelke). High vegetable intake is important to the brain and has been associated with reduced cognitive decline as well. (Barnard). Fruits including grapes, raspberries, and mulberries, have polycylic aromatic compound in their skins. This compound functions as a powerful antioxidant that has been proven to decrease amyloid plaque deposition in animal models of AD. (Swaminathan). In blueberries and the spice curcumin, there is a compound called phenol. This compound has demonstrated behavioral improvement and memory improvement in mouse models of AD. This compound has also been found to reduce amyloid deposits in the brain. (Schelke). The nutritional diet for prevention of Alzheimer's should also include the decrease of saturated fats and trans fats. Saturated fats are found in dairy and meat products and trans fats are found in snack pastries and fried foods. In a recent 4-year study, individuals with a high saturated fat intake had twice the risk of developing Alzheimer's disease. High intake of saturated fat also increases the rate of decline in cognitive abilities with age. Saturated fat and trans fat intake may also contribute to beta-amyloid production or aggregation in the brain tissues. (Barnard). Fish oil is a small contributor to the nutritional diet. It contains

fatty acids that play a major role in cell membrane stability, fluidity, and synaptic connectivity. Based on these attributes, fish oil has been linked to lower the incidence of AD in epidemiologic studies. (Swaminathan).

The intake of specific vitamins has also been a common factor in the possible prevention of Alzheimer's disease. Most of these specific vitamins are found in the natural foods included in the Mediterranean diet. Antioxidants including Vitamin E and Vitamin C function to reduce oxidized membrane lipids, prevent carbonylation of protein, limit nucleic acid damage and influence stress kinase. (Swaminathan). Vitamin E is an antioxidant that has been associated with the reduction of Alzheimer's disease based on the Chicago Health and Aging Project. (Barnard). Vitamin E can been found in wheat germ, sunflower, safflower oils, leafy green vegetables, and asparagus. As an antioxidant, Vitamin E could target oxidative stress pathways or mitochondrial cofactors and reduce amyloid plaque deposition. Vitamin E should be taken with Vitamin C to maximize the dosage. Vitamin C can be found in citrus fruits, berries, and vegetables. Vitamin C intake has been tested and in 3 out of the 4 studies there has been an increased cognitive performance. (Swaminathan).

In addition to Vitamin E and Vitamin C, B Vitamins and folate are associated with the decreased risk of AD. They act as cofactors for methylation of homocysteine. Homocysteine levels are associated with higher risk of cognitive impairment in some studies and therefore these vitamins reverse that effect. (Barnard). The complex B vitamins, B12 and B6, have been associated with neuronal health and the lack of them has been directly linked to specific neurological disorders. (Swaminathan). Folate can be found in green vegetables, citrus fruits, and cantaloupe. B vitamins can be found in green vegetables, beans, whole grains, nuts, bananas, and sweet potatoes. (Barnard). A combination of Vitamin C, Vitamin E, folate, and Vitamin B6 and

B12, can all be found in the Mediterranean diet and are an essential part to this prevention process.

In the possible prevention of Alzheimer's, physical activity should be added to a nutritional diet. The physical activity should include moderate intensity exercise around three to four times a week. Moderate intensity exercise can range from walking to swimming to biking. Multiple studies have linked regular exercise to reduced insulin resistance and hippocampal atrophy. The hippocampus is a region of the brain that controls emotion and memory. This is the first region to suffer damage from Alzheimer's disease. (Shelke). In another study consisting of three hundred and seventeen enrollees in the Wisconsin Registry for Alzheimer's prevention project, there were results supporting physical activity. The enrollees were split up into physically active and physically inactive. The results showed that the active individuals had less hippocampal degeneration, slower accumulation of amyloid, and attenuated glucose hypo metabolism. These physically active individuals had symptoms that would slow or eliminate the causes of Alzheimer's disease. (Okonkwo).

With results showing that modifiable risk factors could be responsible for up to half of the cases of Alzheimer's, and evidence linking nutritional changes to the destruction of tangles and plaques, it can be inferred that a nutritional diet, physical activity, and vitamin intake are reasonable prevention methods. These prevention methods have been supported by several scientific sources based on their separate individual studies. Prevention methods will become more reliable once there is a sustained international commitment for the prevention of Alzheimer's. As research continues, more practical applications for prevention methods will be invented and these prevention methods can be individualized for each patient. As of right now, all the studies have been conducted on large groups and can't be broken down to specific cases

of the disease. As research continues to advance, the definitive prevention for Alzheimer's will be closer within reach. With the information and available resources today, even a small reduction in multiple risk factors including physical inactivity, a poor diet, and lack of vitamins, could substantially decrease overall risk of Alzheimer's disease. (Solomon).

Works Cited

Barnard, Neal., et al. "Dietary and lifestyle guidelines for the prevention of Alzheimer's disease." *Science Direct*. Sept. 2014.

Norton, Sam., et al. "Potential for primary prevention of Alzheimer's disease: an analysis of population-based data." *The Lancet Neurology*. Aug. 2014.

Okonknwo, Ozioma., et al. "Physical Activity Modified Alzheimer Biomarkers in Preclinical Ad: Evidence from the Wisconsin Registry for Alzheimer's Prevention." *Science Direct*. Sept. 2014.

Schelke, Matthew., et al. "Nutritional interventions for Alzheimer's prevention: a clinical precision medicine approach." *Annals of New York Academy of Sciences*, Mar. 2016.

Solomon, A., et al. "Advances in the prevention of Alzheimer's disease and dementia." *Journal of Internal Medicine*. 2014.

Swaminathan, Arun. "Nutrition and prevention of Alzheimer's dementia." *Frontiers in Aging Neuroscience*. 2014.

"What is Alzheimer's?" *Alzheimer's Association*. 2016.