

Maintaining Your Brain: A Diet to Prevent Alzheimer's

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ABSTRACT

Alzheimer's disease is a degenerative mental affliction currently affecting an estimated 4.5 million Americans and expected to increase three-fold by 2050. However, a healthy diet with exercise will help reduce the likelihood of developing Alzheimer's disease. Using a literature search, much information has been found about the advantages of antioxidant vitamins C and E as well as unsaturated fats. Not only do foods containing these vitamins and fats protect the brain, but they increase circulatory health. This is also a benefit of exercise. Research has demonstrated a relationship between poor circulation and the risk of dementia. Appropriate diet and exercise may prevent or delay the onset of Alzheimer's disease for up to five years, alleviating treatment costs and improving the quality of life for the elderly.

INTRODUCTION

Alzheimer's disease (AD) is the most common form of dementia, affecting at least 10% of persons over 65 (1). AD is a progressive neurodegenerative disorder (2, 3), gradually restricting cognitive function over a period of up to 20 years (1). Symptoms of the disease include memory loss, paranoia, loss of initiative, inability to learn, and inability to perform familiar tasks. In the most advanced stages of AD, the brain will completely lose function, causing death (1, 2).

There is no cure for AD, and there is no certain cause. However, research has related oxidative stress in cells caused by an imbalance between antioxidants and reactive oxygen species within a cell to the onset of AD (3). Not only does oxidation damage brain cells (3, 4), but oxidized LDL ("bad") cholesterol creates plaque in blood vessels. This reduces blood circulation to the brain, leading to possible brain damage (5). Therefore, I have researched the effects of a diet rich in unsaturated fats and antioxidants, particularly vitamins C and E, with exercise on the risk of AD. My hypothesis is that foods with these components as well as daily activity have will improve cerebral and circulatory health.

METHOD

To complete my research I performed a literature search, which included peer-reviewed journals and an internet source. My internet source is the official website for the Alzheimer's Association, an organization that contributes to Alzheimer's research and care for patients. I checked information used from this site against scholarly journals. Other literature included was *The American Journal of Clinical Nutrition*, *The Journal of Nutrition*, and *Proceedings of the National Academy of Sciences*.

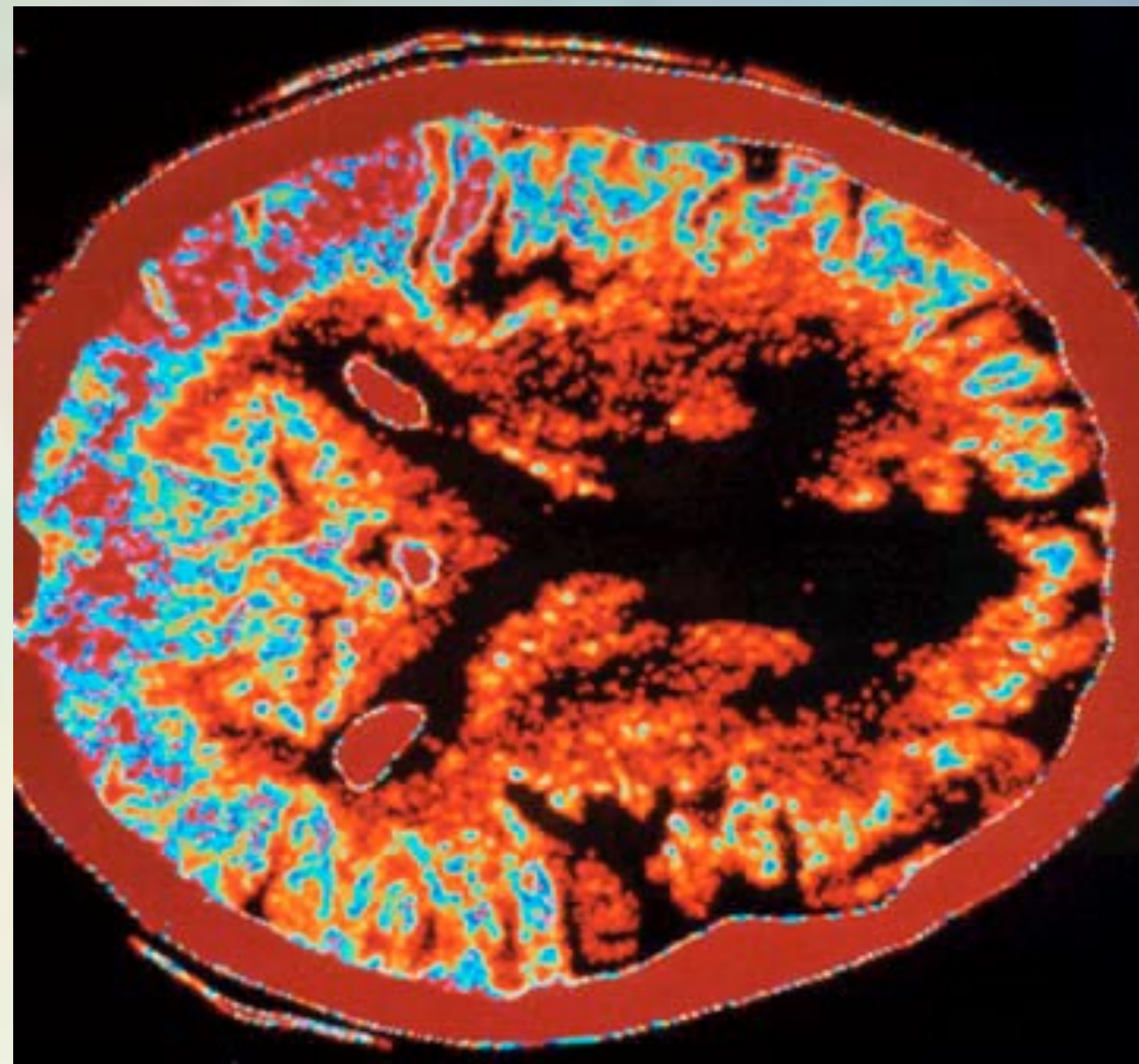


Figure 2. Brain affected by stroke. The darkened areas indicate reduced brain activity. (12)

Figure 1. Daily amounts recommended by Surgeon General (13): sources, and effects of unsaturated fats, vitamin C and vitamin E.

Substance	Recommended Daily Amount	Sources	Effect on body
Polyunsaturated fats	Unsaturated fats should not exceed 30% intake (67g for 2000 Calorie diet).	Fish oil, safflower oil, sunflower oil, corn oil	Protect membranes of brain cells
Monounsaturated fats	Unsaturated fats should not exceed 30% intake (67g for 2000 Calorie diet).	Fish oil, canola oil, olive oil, peanut oil, palm oil	Reduce size of LDL ("bad") cholesterol, reducing risk of stroke.
Vitamin E	Uncertain. While the current RDA is 15-25 mg, some studies have shown that up to 2000 mg has no adverse effect on health.	Almonds, pecans, walnuts, olive oil, canola oil, spinach, collard greens	Prevents oxidation of fats in cell membranes; works with vitamin C to eliminate oxidized LDL ("bad") cholesterol.
Vitamin C	200-300 mg	Citrus fruits, papaya, tomatoes, broccoli, brussels sprouts, strawberries, spinach	Works with vitamin E to eliminate oxidized LDL ("bad") cholesterol; increases cerebral blood flow, helping repair brain after stroke.

RESULTS

There are many ways to combat oxidative stress in the body. Unsaturated fats have been shown in several studies to protect the brain and heart from oxidative stress. Whalley et al. (5) discovered that persons aged 64 years who took fish oil supplements, containing n-3 polyunsaturated fats, scored higher on IQ tests than those who did not. Consumption of these fatty acids may protect cell membranes, keeping them functional. Moreno et al. (6, 7) conducted research determining the effects of saturated fats on LDL cholesterol compared to monounsaturated fats and carbohydrates. They determined that saturated fats increase LDL size and quantity in the bloodstream. While carbohydrates are more effective in reducing LDL size (7), monounsaturated fat lowers the prevalence of LDL without drastically affecting the amount of HDL ("good") cholesterol in the bloodstream (6,7).

The antioxidant qualities of Vitamin E prove to be very useful in AD prevention. Absorbed into fat, vitamin E scavenges free radicals in cell membranes (3). This is particularly important to the brain cells, which are more sensitive to oxidation due to their high polyunsaturated fatty acid content (4). The Alzheimer's Disease Cooperative Study tested 2000 IU vitamin E against placebo in patients with moderate AD, finding that vitamin E delayed the onset of severe dementia (3). Ortega et al. (4) tested persons aged 65-91 with the Pfeiffer's Mental Status Questionnaire, finding that subjects with a low vitamin E intake made more errors. Vitamin E also prevents LDL oxidation, preventing plaque from forming in brain capillaries (8).

Vitamin C serves a two-fold purpose: it reduces oxidized LDL, and it helps prevent oxidative damage to brain cells after stroke. A stroke is temporary blood loss to the brain, often caused by plaque in the brain's capillaries. After a stroke, restoration of blood flow increases cell production of reactive oxidative species, leading to cell damage. First, vitamin C works with vitamin E to destroy oxidized LDL so that it cannot form plaque (8). According to Willett (11), one should consume 200-300 mg of vitamin C per day to achieve antioxidant effects. Also, after a stroke, oxidized vitamin C, or dehydroascorbic acid (DHA), improves cerebral blood flow and works as an antioxidant against the increased oxidation in the brain. Administered 15 minutes after a stroke, DHA reduces brain infarction by a factor of 6 compared to no treatment (9).

A study completed by Friedland et al (10) associates reduced physical activity in midlife with a higher risk of AD. The same study also recommends diversity in activities, both physical and intellectual. Exercise increases circulatory health, preventing stroke and brain atrophy that could lead to AD. While the Surgeon General recommends thirty minutes of moderate exercise per day, Willett (11) claims that this is the minimum amount necessary to achieve health benefits. Also, the intensity of exercise must be enough to speed up one's heart rate and breathing.

DISCUSSION

Getting healthy amounts of vitamin E, vitamin C, unsaturated fats, and exercise can prevent or delay the onset of AD. Several studies have proven the cerebral and circulatory benefits of these components in the body. Eating a diet rich in fruits and vegetables and consuming healthy fats found in fish, plant oils, and nuts will help keep the brain healthier longer. It is also recommended to limit consumption of animal fats, which contain saturated fat. Butter and red meats contribute to LDL cholesterol production, and should be avoided.

The prevention or the delay of AD gives the elderly more lucid years in which they can function normally and maintain independence. The success of antioxidants and unsaturated fats in supporting brain cell function greatly contributes to an aged person's quality of life. This diet may also prevent the need for institutionalization or to hire a caregiver, which limits the patient's independence. Also, the cost of care can be staggering, further burdening the patient. A diet of antioxidants and healthy fats may alleviate these burdens, giving the aged individual time to enjoy friends, family, and a normal life.

This study examined a few components of a total diet. It does not take into account carbohydrates, minerals, or possible benefits of other antioxidants in reducing the risk of AD.

It is important to note that several genetic factors affect the success of such a diet. Genetic factors may limit one's ability to absorb vitamin E (3), or change the effect of unsaturated fats on LDL oxidation (6, 7). Also, some may be genetically prone to AD more so than other healthy individuals, to the point that dietary change is moot. Diets have individual success and it is necessary to consult a doctor before committing to one.

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