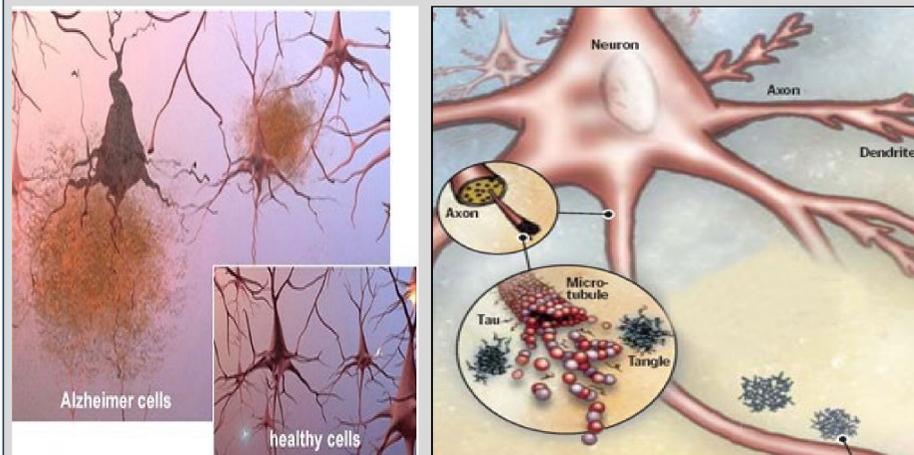


Reducing the Risk of Alzheimer's Through Nutrition

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Alzheimer's Disease (AD)

- Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills and, eventually, the ability to carry out the simplest tasks.
- ~ more than 6 million Americans 65 and older have Alzheimer's with many more under 65 also having the disease.
- Unless the disease can be effectively treated or prevented, it is predicted that the number of people with AD will increase significantly due to increasing age being the most important known risk factor for Alzheimer's disease
- Some of the main features of AD: high levels of amyloid plaques and tau tangles.
- Amyloid plaques damage brain cells and cause the brain lesions characteristic of AD, and tau tangles unravel brain cells' axons.



Effect of Nutrition on AD

- Genes, chronic inflammation, mitochondrial and metabolic dysfunction, impaired insulin signaling, oxidative stress, and metal ion dyshomeostasis synergistically work to promote AD.
- Risk factors for AD that we can change: diet, exercise, and cognitive training.
- Eating a certain diet can possibly affect biological mechanisms that underlie AD.
- Or perhaps diet affects other AD risk factors such as DM, obesity, and heart disease.
- The Mediterranean diet, the MIND diet, and the Ketogenic diet have been studied and show some promising evidence of improving cognitive impairment.

The Mediterranean, MIND, and Keto Diet

Mediterranean Diet:

- Emphasis on fruits, vegetables, whole grains, legumes, fish and other seafood; unsaturated fats; and low amounts of red meat, eggs and sweets.
- Beneficial effects of the Mediterranean diet against the risk of AD and cognitive decline: quality and quantity of food with a consequent reduction in insulin resistance and AD risk.
- The Mediterranean diet reduces AD progression due to the high intake of polyphenols and reduced calorie ingestion.

The MIND Diet:

- MIND diet (Mediterranean-DASH Intervention for Neurodegenerative Delay) incorporates the DASH (Dietary Approach to Stop Hypertension) diet, which has been shown to lower high blood pressure, a risk factor for AD.
- Leafy green vegetables, at least 6 serving/week; other vegetables, at last 1 serving/day; Berries, at least 2 servings/week; whole grains, at least 3 servings/day; fish, 1 serving/week; poultry, 2 servings/week; beans, 3 servings/week; nuts, 5 servings/week; wine 1 glass/day; olive oil.
- Limits servings of red meat, sweets, cheese, butter/margarine, and fast/fried food

The Ketogenic Diet:

- Minimum CHO intake (10% of daily calories), a very high-fat amount (90% of total calories) causing detectable ketone bodies in the urine
- Ketone bodies associated with glucose restriction have a protective affect on hippocampus improving electrical control of neurons, decreased apoptosis, and inflammation.
- The ketogenic diet has clinical limitation due to the side effect of fat intake.

Polyphenols

- Natural compounds synthesized exclusively by plants
- Have been shown to be responsible for the anti-inflammatory and antioxidant properties of potentially functional foods.
- Polyphenolic compounds have a protective effect on tissue metabolism, in particular the brain. '
- Blueberries have the highest contents of polyphenols and have strong antioxidative benefits.

Insulin Signaling and Calorie Restriction (CR) Effect

- CR has a beneficial effect on health by extending lifespan and exerting neuroprotection.
- Abnormal insulin activity (insulin resistance) is harmful to brain health.
- A hypoenergy, low-CHO diet improves plasma glucose level and insulin activity.
- Tau is responsible for insulin resistance in AD.
- Insulin signaling regulates phosphorylation of tau-protein and neuroinflammation

The Gut-Brain Axis

- Various microbial entities coexist in animal and human gastrointestinal tracts and are called gut microbiota (GM).
- Hypothesis: GM can generate a signal that affects brain development, function, and mental health. Also, brain disorders can negatively interfere with GM.
- Diet represents the most important influencer of the GM composition through life.
- Western diet with reduced CHO = reduced production of gut microbiota and SCFAs.
- The combinations of foods and nutrients might work together to produce a greater benefit on cognitive function than individual components – possibly due to the improved micronutrient intake, overall health, and better microbiota composition in those adherent to a healthy diet.

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