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How Side-Sleeping May Protect Against Alzheimer's

Analysis by Dr. Joseph Mercola Fact Checked | June 23, 2022

STORY AT-A-GLANCE

- The glymphatic system in your brain targets the removal of misfolded proteins that are the hallmark of neurodegenerative diseases such as ALS, Alzheimer's and Parkinson's diseases. The system is functional only while we sleep, and animal models reveal it works best in the side-lying position
- Function declines when you get less sleep. Just one night without sleep increases the accumulation of beta-amyloid in regions of the brain implicated in Alzheimer's disease
- Trans fat foods also increase your risk of dementia significantly as people eating the highest amount in one study had a 74% higher risk of dementia; the largest food contributors were pastries, margarine, candy, croissants and ice cream
- Choices that improve the effectiveness of the glymphatic system are omega-3 fatty acids, longer periods of deep sleep and exercise. You may improve deep sleep through exercise at least three hours before bed, exposure to heat such as in a sauna, cyclical nutritional ketosis, reducing EMF exposure at night, limiting food and eliminating alcohol before bed and sleeping in a cool room

One of the hallmarks of neurodegenerative diseases such as Alzheimer's and amyotrophic lateral sclerosis (ALS) is aggregated and typically misfolded proteins in the brain. A 2022 study[1] published in Translational Neurodegeneration discovered a relationship between the system that clears these misfolded proteins and the progression of ALS, also known as Lou Gehrig's disease.

Other neurodegenerative diseases that may be impacted by the system include Parkinson's disease and Alzheimer's disease.[2] These share many physiological similarities despite looking different clinically and having a different disease progression.

Approximately one-third of the proteins made in the body on any given day are misfolded.[3,4] However, your body has mechanisms to refold those proteins to help prevent disease. In a collaborative editorial, scientists led by the Department of Experimental Neurodegeneration at the University Medical Center Gottingen, Göttingen, Germany, wrote:[5]

> *"Amyloid-beta, Tau, alpha-synuclein, TDP-43, or the prion protein, are just a few examples of proteins that can aggregate and contribute to the pathogenesis of neurodegenerative diseases with diverse clinical manifestations (Alzheimer's disease, frontotemporal lobar degeneration, Pick's disease, Parkinson's disease, Lewy body dementia, multiple system atrophy, amyotrophic lateral sclerosis among the most common)."*

The featured study,[6] published March 15, 2022, looked at the glymphatic system, which is how the brain removes waste products. Removal of these misfolded proteins could help prevent ALS and other neurodegenerative diseases.[7]

Glymphatic System Targets Misfolded Protein

According to a paper published in Neurochemical Research,[8] the recently discovered glymphatic system is a "macroscopic waste clearance system that utilizes a unique system of perivascular channels, formed by astroglial cells, to promote efficient elimination of soluble proteins and metabolites from the central nervous system."

The glymphatic system[9] is how the cerebral spinal fluid clears waste products using glial cells in the perivascular space as a sieve, which is how the system got its name (glial-lymphatic). Researchers have found this system is also important in hemorrhagic

and ischemic neurovascular disorders and other degenerative processes, including traumatic brain injury.

According to the researchers, the glymphatic system uses a network of fluid-filled spaces that are known as Virchow-Robin spaces.[10] The system is not functional while we're awake but begins working during sleep. Not only is it responsible for clearing the brain of toxic waste products but it also distributes compounds to brain cells that are essential for function.

The system declines in function with age, when we may have more sleep disturbances or we get less sleep. Just one night without sleep can raise the beta-amyloid accumulation in regions of the brain that are implicated in Alzheimer's disease.[11] To evaluate the impact that aging and sleep have on the glymphatic system, researchers used genetically modified mice, in which they could turn on and off the TDP-43 protein expression based on what the mice were fed.

This protein accumulates in individuals with neurodegenerative diseases, such as ALS. They used MRI to analyze the brain structures in the mice three weeks after turning on the TDP-43 expression, which showed worse glymphatic clearance than in the control mice.[12]

This demonstrated that the glymphatic system plays a unique and integral part in clearing the brain of toxic waste products that are responsible for the development of neurodegenerative diseases.

Lifestyle Choices Improve Glymphatic Clearance

In an article in The Conversation,[13] David Wright, one of the researchers in the featured study, proposed that sleep position affects glymphatic clearance, which past research has shown is most efficient in a side sleeping position,[14] when compared to sleeping on your back or prone. Although the mechanism for this action is not understood, he proposes it may relate to compression, gravity and tissue stretching.[15]

On the other hand, Dr. Peter Martone, a Boston-based chiropractor and physiologist, offers some important reasons for sleeping on your back. In a previous article, I interviewed him[16] and he shared some incredibly important techniques that can help you achieve proper cervical posture while sleeping, as well as other strategies to help prevent degenerative disc disease.

The Rationale for Sleeping on Your Back

"Use it or lose it" is one of the adages that apply to your physical body, both muscles and bones. If you don't use a joint for a long time, degeneration sets in. As noted by Martone, "your body adapts to the consistent stresses placed on it over a long period of time."

Martone believes it is critically important to sleep on your back in a neutral sleeping position to help avoid shoulder and hip problems. You know you're in the correct position when your eyes are looking straight up toward the ceiling and your chin is pointed up to the ceiling as well. He says:

> *"You give me a side sleep, I'm going to give you a shoulder problem … a hip problem, because you're starting twisted, and I don't care how much support you have, I don't care how much your hips fall into the bed."*

In other words, it's important to consider all your health issues before deciding that side sleeping is best for you.

Lifestyle Choices to Improve Glymphatic Function

There are other lifestyle choices you can make that help improve the efficiency and effectiveness of glymphatic function. Past research[17] has demonstrated that omega-3 fatty acids play a unique role in preventing or slowing neurodegenerative diseases by reducing inflammation, improving cell membrane fluidity and intracellular signaling.

Researchers have now discovered[18] that omega-3 fatty acids also have a positive effect on the glymphatic system by promoting interstitial beta-amyloid clearance from the

brain and resisting injury. Wright also suggests other lifestyle choices that have an impact on the glymphatic system.[19]

He notes animal studies[20] have demonstrated that short and long-term consumption of small amounts of alcohol could improve function, while moderate or high doses have the opposite effect.

A second animal study[21] evaluated the effect of voluntary exercise on the glymphatic system in rodents. They noted that age is often characterized by chronic inflammation, which ultimately can lead to dysfunction and dementia and that past research has indicated that physical exercise has a positive effect on cognition and memory in individuals who are aging.

They sought to evaluate how exercise could affect the glymphatic clearance and blood-brain barrier permeability in aged mice. Using imaging studies, they found that voluntary exercise on a wheel improved cognition and accelerated glymphatic clearance efficiency but did not affect the blood-brain barrier permeability.[22]

Sleep Therapies Can Increase Non-REM Sleep

Sleep is separated into two large stages, REM sleep and non-REM sleep.[23] REM sleep is the stage that most people associate with dreaming. There are three stages to non-REM sleep. The first two are light sleep, while the third stage is deep sleep.

Wright notes that during the third stage of non-REM sleep is when the glymphatic system is most active.[24] According to the American Sleep Association,[25] factors that can increase the amount of time you're in slow wave deep sleep include intense exercise and heat exposure, such as in a sauna or hot tub.

They also suggest that a cyclical low-carbohydrate diet can increase the percentage of slow-wave sleep, which they propose may be linked to fat metabolism. Dr. Dale Bredesen is a professor of molecular and medical pharmacology at the University of California, Los Angeles School of Medicine and author of “The End of Alzheimer’s: The First Program to Prevent and Reverse Cognitive Decline.”

He has identified several molecular mechanisms at work in Alzheimer's, and created a novel program called ReCODE to treat and reverse it.[26] Included in the protocol is cyclical nutritional ketosis,[27] which he achieves using intermittent fasting. This promotes autophagy and helps clear dying cells. Thus, a cyclical ketogenic diet plays a neuroprotective role by promoting deep sleep to increase glymphatic clearance and autophagy to promote programmed cell death.

Trans Fat Increases Your Risk of Dementia

Researchers have also found a strong link between trans fat consumption and the incidence of dementia, including Alzheimer's disease. One study[28] published in October 2019 in the journal Neurology included 1,628 Japanese seniors age 60 and older. At the outset of the study, none of the participants had dementia.

They were followed for 10 years and serum levels of elaidic acid, which is a biomarker of industrial trans fat, were measured using gas chromatography-mass spectrometry. The researchers found that higher serum levels were associated with a greater risk of all-cause dementia and Alzheimer's disease.

The association remained significant after adjustments for confounding factors and the increase in risk was not slight. CNN[29] reported that people in the highest quartile were 74% more likely to develop dementia. Those in the second-highest quartile had a 52% higher risk. Although the risk was high for dementia and Alzheimer's disease, there was no association found with vascular dementia.[30]

The biggest contributors to elaidic acid levels were pastries, followed by margarine, candy, caramel, croissants, nondairy creamer, ice cream and rice cakes.[31] Dr. Richard Isaacson, a neurologist and director of the Alzheimer's Prevention Clinic at Weill Cornell Medicine in New York, who was not involved in the study, commented on the findings to CNN:[32]

> *"The study used blood marker levels of trans fats, rather than more traditionally used dietary questionnaires, which increases the scientific validity of the*

results. This study is important as it builds upon prior evidence that dietary intake of trans fats can increase risk of Alzheimer's dementia."

This was not the first study to demonstrate a clear link between consuming trans fat and dementia. For example, in 2012,[33] Dr. Gene Bowman, assistant professor of neurology at Oregon Health and Science University, reported[34] a strong correlation between trans fat and cognitive performance. Participants who had high levels of serum trans fat performed significantly worse in cognitive testing and had reduced brain volume.

Another study[35] in 2015 found trans fat was linked to memory impairment in people under age 45. For every gram of trans fat consumed each day, there was a 0.76-word reduction in word recall. In the highest trans-fat group, participants could recall on average 11 fewer words than those with the lowest trans fat intake who could recall an average of 86 words.

Biohacks Help Improve Deep Sleep

Ben Greenfield is one of the top biohackers in the U.S. During our interview in 2018,[36] Greenfield discussed several biohacks you can use to improve your deep sleep. When I first began tracking sleep, I was shocked to realize how little deep sleep I was getting.

In fact, there were times I was getting no deep sleep at all. Greenfield notes a requirement for deep sleep is a lower core body temperature. Unfortunately, people commonly sabotage their deep sleep by preventing their core body temperature from lowering, these include:[37]

- Eating a high number of calories late at night
- Drinking alcohol before bed
- Sleeping with too many blankets
- Keeping your bedroom too warm
- Exercising with high intensity too close to bedtime (within three hours of bedtime)

Other biohacks that can help improve your deep sleep include taking supplemental:[38]

- Gamma-aminobutyric acid (GABA) ideally liposomal, or precursors to GABA, such as passionflower extract
- Melatonin in small doses (0.3 to 0.5 milligrams)
- Cannabidiol (CBD) oil
- Pulsed electromagnetic field (PMF) in the range of 3 to 8 hertz can also be helpful and provides effects like those of an earthing or grounding mat

Reducing or eliminating electromagnetic fields from your home is another biohack Greenfield uses.[39] He was an early adopter of the strategy and hardwired his home. At the time of the interview, he was living in the wilderness and was fairly well shielded from EMF in the environment.

Eliminating EMF during sleep hours is particularly important as this is when the brain detoxifies. Most of the time, the only way to do this is by turning off the electricity in your bedroom at the circuit breaker. If you're living in a city where building codes require electrical wires to be in a conduit, the best you can do is to unplug the electrical equipment in your bedroom.

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