

# Brushing, Flossing Could Help Protect Against Dementia

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## STORY AT-A-GLANCE

- › Dental health is associated with hippocampal atrophy – shrinkage of the hippocampus brain region that serves as a marker for Alzheimer’s disease
- › People with mild gum disease and fewer teeth had a faster rate of shrinkage in the left hippocampus; having one less tooth increased brain shrinkage at a rate equivalent to nearly one year of brain aging
- › For those with severe gum disease, having more teeth was linked to a faster rate of brain shrinkage, with one more tooth akin to 1.3 years of brain aging
- › *Porphyromonas gingivalis* (*P. gingivalis*), a pathogen involved in chronic periodontitis, has been identified in the brains of patients with Alzheimer’s disease
- › Even in young, otherwise healthy, adults, episodic memory and learning rate is improved among those without good oral health compared to those with aggressive periodontal disease

Dementia has been added to the long list of health problems potentially associated with poor oral health. The finding, published in *Neurology*,<sup>1</sup> suggests dental health is associated with hippocampal atrophy – shrinkage of the hippocampus brain region that serves as a marker for Alzheimer’s disease.<sup>2</sup>

In short, “Retaining more healthy teeth without periodontal disease may help to protect brain health,” study author Satoshi Yamaguchi, an associate professor at Tohoku University Graduate School of Dentistry in Sendai, Japan, explains.<sup>3</sup>

Since periodontal disease is also linked with systemic inflammation and bacteria in the bloodstream, leading to chronic disease, keeping your teeth, mouth and gums healthy is a key way to boost your overall health, as well.

## **Brain Shrinkage Linked to an Unhealthy Mouth**

Without proper oral hygiene, gingivitis can develop. This is an inflammatory disease caused by an accumulation of plaque, or bacteria, on your teeth that often leads to bleeding gums. If left untreated, it can lead to periodontitis, which is a more serious infection that can lead to teeth loss.

Periodontitis, or gum disease, has been suggested as a potential risk factor for Alzheimer's since at least 2015, when researchers with the University of Bristol noted "periodontal pathogens are possible contributors to neural inflammation and SLOAD [sporadic late onset Alzheimer's disease]."<sup>4</sup>

The Neurology study involved 172 people aged 55 years and over who had no cognitive decline at the start of the study. The participants had dental exams and took memory tests, while brain scans were used to measure hippocampus volume at the start of the study and four years later.

Both gum disease and number of teeth were linked to brain changes. Those with mild gum disease and fewer teeth had a faster rate of shrinkage in the left hippocampus. Among this group, having one less tooth increased brain shrinkage at a rate equivalent to nearly one year of brain aging.<sup>5</sup>

For those with severe gum disease, having more teeth was linked to a faster rate of brain shrinkage, with one more tooth akin to 1.3 years of brain aging.<sup>6</sup> Yamaguchi said in a news release:

*"Tooth loss and gum disease, which is inflammation of the tissue around the teeth that can cause shrinkage of the gums and loosening of the teeth, are very common, so evaluating a potential link with dementia is incredibly important. Our study found that these conditions may play a role in the health of the brain*

*area that controls thinking and memory, giving people another reason to take better care of their teeth.”*

## **Gum Disease Bacteria Travel to Your Brain**

In 2019, researchers with the University of Louisville identified *Porphyromonas gingivalis* (*P. gingivalis*), a pathogen involved in chronic periodontitis, in the brains of patients with Alzheimer’s disease.<sup>7</sup> Gingipains – toxic proteases from *P. gingivalis* – were also found in the brains of Alzheimer’s patients. Levels of gingipains were associated with two markers of the disease, tau protein and another protein called ubiquitin.<sup>8</sup>

Further, in mice, oral infection with *P. gingivalis* resulted in brain colonization of the pathogen, along with increased production of A $\beta$ 1–42, which is found in amyloid plaques.<sup>9</sup> In vivo and invitro studies also showed gingipains were neurotoxic and damaging to tau, which is needed for normal neuronal function.

Gingipain antigens were detected in the brains of people with Alzheimer’s disease as well as in those with Alzheimer’s pathology who had not yet been diagnosed. This “argues that brain infection with *P. gingivalis* is not a result of poor dental care following the onset of dementia or a consequence of late-stage disease, but is an early event that can explain the pathology found in middle-aged individuals before cognitive decline,” the researchers explained.<sup>10</sup>

It's suggested the bacteria may access the brain from an infected oral cavity via infection of endothelial cells protecting the blood-brain barrier, spreading through cranial nerves or infection of monocytes – white blood cells – that travel to the brain.

“After entering the brain, we suggest that *P. gingivalis* may spread slowly over many years from neuron to neuron along anatomically connected pathways, similar to what has been demonstrated for vascular cell-to-cell transmission of *P. gingivalis*,” the team added.<sup>11</sup>

## **Periodontal Disease Linked to Alzheimer's**

Patients with Alzheimer's disease often have poor oral health, which has commonly been attributed to declining self-care or neglect for oral health by caregivers. Past research has also revealed that periodontal disease may be a contributory factor in the disease's development.<sup>12</sup>

For instance, a systematic review and meta-analysis that included 13 studies showed the risk of Alzheimer's disease and mild cognitive impairment in patients with periodontal disease was significantly higher than in those without periodontal disease.<sup>13</sup> This was especially true in people with severe periodontal disease.

A separate study, published in the Journal of Alzheimer's disease, found that among people aged 65 and older, Alzheimer's disease incidence and mortality were consistently associated with probing pocket depth, a measure of periodontal health, as well as *Prevotella melaninogenica* (*P. melaninogenica*) and *Campylobacter rectus* (*C. rectus*), bacterial markers of periodontitis.<sup>14</sup>

## **New Bacteria Linked to Cavities**

*Streptococcus mutans* (*S. mutans*) bacteria are usually blamed for causing cavities, but another species may also be involved, highlighting how much remains to be learned about the microbes in our mouths and how they influence disease processes. The bacteria, *Selenomonas sputigena* (*S. sputigena*), have previously been linked to gum disease.

Research published in Nature Communications<sup>15</sup> revealed they also partner with *S. mutans*, enhancing their ability to cause cavities.<sup>16</sup> Using plaque samples from 300 children aged 3 to 5 years, the researchers found that *S. sputigena* don't cause cavities on their own.

However, they may become trapped by sticky deposits on the teeth called glucans, which are built by *S. mutans*. According to a University of Pennsylvania School of Dental

Medicine news release:<sup>17</sup>

*“Once trapped, S. sputigena proliferates rapidly, using its own cells to make honeycomb-shaped “superstructures” that encapsulate and protect S. mutans. The result of this unexpected partnership, as the researchers showed using animal models, is a greatly increased and concentrated production of acid, which significantly worsens caries severity.”*

It's possible that using specific enzymes or tooth-brushing methods could better target S. sputigena superstructures to reduce cavity incidence. “This phenomenon in which a bacterium from one type of environment moves into a new environment and interacts with the bacteria living there, building these remarkable superstructures, should be of broad interest to microbiologists,” study author Hyun Koo noted.<sup>18</sup>

## **‘Gum Disease Is Often Silent’**

Among adults aged 30 or over, 46% have signs of gum disease, while 9% of adults have severe gum disease.<sup>19</sup> However, many aren't aware they have it, as gum disease is often a “silent” condition, not showing signs and symptoms until more advanced stages.<sup>20</sup>

In the initial stage of gingivitis, you may notice that your gums bleed when you brush your teeth, floss or eat hard food. Your gums may also be red or swollen. As the disease progresses, your gums may pull away from your teeth, making your teeth appear longer. Your teeth may also become loose, and there may sores in your mouth, bad breath and pus between your gums and teeth.<sup>21</sup>

In addition to cognitive decline, periodontitis has been linked to a number of systemic diseases, including:<sup>22</sup>

Diabetes

Heart disease

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Respiratory disease

Adverse pregnancy outcomes

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## Protecting Oral Health Early on Is Best

Since deposits of amyloid beta in the brain may start one to two decades before cognitive decline and diagnosis of Alzheimer's disease, and periodontal disease may also be persistent for about 10 years to initiate Alzheimer's, positive oral health early on may help prevent the disease.<sup>23</sup>

This is important not just for older adults, but also middle-aged and younger adults, who may be able to protect their brain health by maintaining good oral health. Even in young, otherwise healthy, adults, episodic memory and learning rate is improved among those without good oral health compared to those with aggressive periodontal disease<sup>24</sup> — suggesting damage to brain health may start early on.

Proper oral hygiene, including regular brushing, flossing and tongue scraping, and getting regular cleanings with a mercury-free biological dentist, will go a long way toward keeping your teeth and gums healthy. A lifestyle that includes a diet based on fresh, whole foods is also essential to a naturally clean mouth and good oral health.

## Oil Pulling Works Wonders for Healthy Teeth and Gums

For extra care, try oil pulling using coconut oil. I've previously detailed how simple it is to [incorporate oil pulling into your dental hygiene routine](#). Coconut oil is antibacterial and antiviral, and oil pulling has been found to reduce gingivitis and plaque, significantly lowering plaque index scores compared to a control group, while also reducing bacterial colony counts in saliva.<sup>25</sup>

Notably, researchers also found that coconut oil pulling worked as well as chemical (chlorhexidine) mouthwash for plaque score, gingival index score and bleeding-on-probing.<sup>26</sup> The oil may also be effective against gingivitis. In a pilot study of 20 people with plaque-induced gingivitis, coconut oil was used as a mouthwash daily for 30 days.

A control group carried out normal daily oral health procedures but without coconut oil. Both plaque and bleeding decreased in the groups, but the coconut oil group had a more significant decline, showing promise for reducing plaque formation and gingivitis.<sup>27</sup>

To try it, take a small amount of the oil and swish it around your mouth, “pulling” it between your teeth and ensuring it moves around your entire mouth. After about 20 minutes, spit the oil out into the garbage. You can use oil pulling daily along with regular brushing and flossing.

## **More Ways to Protect Your Brain Health**

Beyond oral health, nourishing brain health is best done with a comprehensively healthy lifestyle, including healthy diet, which will also work to reduce your risk of gum disease. Your risk of cavities increases the more sugar you eat, for instance. One study found that, in order to minimize your risk of cavities, processed sugars should make up no more than 3% of your total energy intake (with 5% noted as a “pragmatic” or more realistic goal).<sup>28</sup>

Mineral deficiencies, like magnesium, can weaken bones and teeth,<sup>29</sup> while B vitamins are also important. Research published in PLOS One compared brain atrophy in participants taking folic acid (0.8 milligrams (mg) per day), vitamin B12 (0.5 mg per day) and vitamin B6 (20 mg per day) for 24 months with that in patients taking a placebo.<sup>30</sup>

Those taking B vitamins had a lower rate of brain atrophy per year — 0.76% — than those not taking them, who had an atrophy rate of 1.08%. According to the researchers, “The accelerated rate of brain atrophy in elderly with mild cognitive impairment can be slowed by treatment with homocysteine-lowering B vitamins.”<sup>31</sup>

Vitamin B3 is found in grass fed beef, mushrooms and avocados,<sup>32</sup> while vitamin B6 is plentiful in grass fed beef, potatoes, bananas and avocados.<sup>33</sup> You can find folate, or vitamin B9, spinach, broccoli, avocado and asparagus.<sup>34</sup>

Vitamin B12-rich foods include grass fed beef liver, wild rainbow trout and wild sockeye salmon. Other important strategies to boost your brain health include exercise,

ketogenic diet, time-restricted eating, optimizing vitamin D and other hormones, increasing sleep, meditation and detoxification and eliminating processed food.

## Sources and References

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