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Is the Cause of Alzheimer's Connected to Your Mouth?

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STORY AT-A-GLANCE

- Periodontal disease may be a contributory factor in the development of Alzheimer's disease
- In 2019, researchers identified Porphyromonas gingivalis (P. gingivalis), a pathogen involved in chronic periodontitis, in the brains of patients with Alzheimer's disease
- 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
- In vivo and invitro studies also showed gingipains were neurotoxic and damaging to tau, which is needed for normal neuronal function
- The risk of Alzheimer's disease and mild cognitive impairment in patients with periodontal disease is significantly higher than in those without periodontal disease, underscoring the importance of maintaining good oral health throughout your life

More than 6 million U.S. adults have Alzheimer's disease. This number is expected to increase to nearly 13 million by 2050.[1] Despite its growing prevalence, the causes of this devastating condition continue to be debated. There's a growing consensus, however, that multiple factors play a role, from your gut health[2] to your oral health.

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]."[3]

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. Now, however, it's being recognized that periodontal disease may be a contributory factor in the disease's development.[4]

Gum Disease Pathogen Found in the 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.[5] 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.[6]

Further, in mice, oral infection with P. gingivalis resulted in brain colonization of the pathogen, along with increased production of Aβ1-42, which is found in amyloid plaques. According to David Reynolds, Ph.D., chief scientific officer from Alzheimer's Research UK:[7]

> *"Previously the P. gingivalis bacteria associated with gum disease has been found in the brains of people with Alzheimer's but it remains unclear what role, if any, it plays in the development of the disease. In this well-conducted study, researchers were able to show that when mice were given P. gingivalis, the bacteria was found in the brain alongside higher levels of the hallmark Alzheimer's protein, amyloid."*

In vivo and invitro studies also showed gingipains were neurotoxic and damaging to tau, which is needed for normal neuronal function. When the researchers designed small-molecule inhibitors to target gingipains, bacterial load was reduced, as was neuroinflammation. Production of Aβ1-42 was also blocked.

Together, the data suggest that gingipain inhibitors could target P. gingivalis in the brain and treat neurodegeneration from Alzheimer's disease.[8] P. gingivalis was also detected in the brains of people without Alzheimer's disease, lending support for the theory that's it's involved in development of the condition and not simply a byproduct of it. According to the study:[9]

> *"Our identification of gingipain antigens in the brains of individuals with AD [Alzheimer's disease] and also with AD pathology but no diagnosis of dementia 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."*

Periodontal Disease Linked to Increased Alzheimer's Risk

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.[10] 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.[11]

According to the researchers, "This study provides evidence for an association between periodontal pathogens and AD, which was stronger for older adults."[12] What's more, the risk of cognitive decline in older men increases the more teeth are lost, while periodontal disease and caries, both of which contribute to tooth loss, are also linked to cognitive decline.[13]

How Gum Disease Leads to Alzheimer's

Periodontal disease likely contributes to Alzheimer's by increasing pro-inflammatory mediators, including C-reactive protein (CRP), IL-6, IL-1β, and TNF-α.[14] According to researchers with the University of California School of Dentistry, three primary mechanisms have been identified for how periodontal disease may lead to Alzheimer's:[15]

1. Increased peripheral pro-inflammatory cytokines that systemically affect the brain via neural, humoral and cellular mechanisms
2. Ectopic migration of periodontal bacteria and related molecules directly to the brain via blood and/or cranial nerves
3. Leptomeninges (tissue covering the brain and spinal cord) that may act as a mode of communication between periodontal pathogens and microglia in the brain

In an editorial published in Expert Review of Anti-infective Therapy, it's further explained:[16]

> *"A plethora of studies firmly place P.gingivalis … in the red complex as a risk factor for AD. This is because P.gingivalis is adept at modifying the peripheral and intracerebral immune responses.*
>
> *Furthermore, this bacterium has a range of enzymes including cathepsin B and gingipains that are, respectively, shown to interact with the amyloid precursor protein (APP) and neuronal tau resulting in the formation of amyloid-beta (Aβ) and neurofibrillary tangles (NFTs), which are the cardinal hallmarks of AD.*
>
> *Prospective, retrospective population-based, and nested control studies have shown that the risk of developing the sporadic form of AD doubles when periodontal disease persists for about 10 years."*

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.[17]

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 are improved among those without good oral health compared to those with aggressive periodontal disease[18] — 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.

What Else Contributes to Alzheimer's?

With a complex condition like Alzheimer's, oral health is only one contributing factor. Gut health is another. A team of Swiss and Italian researchers found a connection between imbalanced gut microbiota and the development of amyloid plaques in the brain.[19]

The researchers used PET imaging to measure amyloid deposition in their brains, then measured markers of inflammation and proteins produced by intestinal bacteria, such as lipopolysaccharides (LPSs) and short-chain fatty acids (SCFAs), in their blood.

The study revealed that high blood levels of LPSs and SCFAs acetate and valerate were associated with large amyloid deposits in the brain. Other SCFAs, namely butyrate, appeared to have a protective effect; high levels of butyrate were associated with less amyloid.

"Our results are indisputable: certain bacterial products of the intestinal microbiota are correlated with the quantity of amyloid plaques in the brain," explains Moira Marizzoni, a study author with the Fatebenefratelli Center in Brescia, Italy.[20] It's not surprising, then, that probiotics have been shown to be protective.

A 2016 study of 60 Alzheimer's patients found those who drank milk containing probiotics experienced significant improvements in cognitive function.[21] Probiotics, by the way, are also useful for managing periodontal disease.[22]

Electromagnetic exposures from wireless technologies are another crucial component that need to be addressed. This type of radiation activates the voltage-gated calcium channels (VGCCs) in your cells, and the greatest density of VGCCs are in your brain, the pacemaker of your heart and male testes.

A 2022 study that summarized 18 different findings found they "collectively provide powerful evidence for EMF causation of AD." Further, "The author is concerned that smarter, more highly pulsed 'smart' wireless communication may cause widespread very, very early onset AD in human populations."[23]

It is my belief that excessive microwave exposure and mitochondrial dysfunction are among the most significant factors contributing to Alzheimer's, along with exposure to the herbicide glyphosate, which also has negative neurological effects.[24]

Tips for Alzheimer's Prevention

Overall, nourishing your brain health is best done with a comprehensively healthy lifestyle, including healthy diet. Not only does what you eat affect your oral and gut health, but it also impacts cholesterol, and cholesterol also plays an important role in the formation of memories and is vital for healthy neurological function.

As noted by senior research scientist Stephanie Seneff, Ph.D., insufficient fat and cholesterol in your brain play a crucial role in the Alzheimer's disease process, detailed in her 2009 paper "APOE-4: The Clue to Why Low Fat Diet and Statins May Cause Alzheimer's."[25]

Time-restricted eating is another important strategy, as is reducing your intake of polyunsaturated fatty acids, also called PUFAs, found in vegetable oils, edible oils, seed oils, trans fat and plant oils. For a more targeted approach, natural options are available.

Animal and laboratory studies demonstrate that the spice saffron is neuroprotective, for instance. Data also show it's as effective as the drug memantine to treat moderate to severe Alzheimer's disease.[26] One of the most comprehensive assessments of Alzheimer's risk is Dr. Dale Bredesen's ReCODE protocol, which evaluates 150 factors,

including biochemistry, genetics and historical imaging, known to contribute to Alzheimer's disease.

In his book, "The End of Alzheimer's: The First Program to Prevent and Reverse Cognitive Decline,"[27] which describes the complete protocol, you will also find a list of suggested screening tests and the recommended ranges for each test, along with some of Bredesen's treatment suggestions. By leveraging 36 healthy lifestyle parameters, Bredesen was able to reverse Alzheimer's in 9 out of 10 patients.

This included the use of exercise, ketogenic diet, optimizing vitamin D and other hormones, increasing sleep, meditation, detoxification and eliminating gluten and processed food. For more details, you can download Bredesen's full-text case paper online, which details the full program.[28]

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