

Probiotics May Offer Hope for Alzheimer's and Other Neurodegenerative Diseases

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STORY AT-A-GLANCE

- › Probiotics may influence brain function through the gut-brain axis, which may offer supportive benefits for neurodegenerative diseases like Alzheimer's and Parkinson's by improving gut health and reducing inflammation
- › Studies suggest a link between gut health and cognitive function, indicating that an improved gut microbiome enhances mental health and may reduce inflammation associated with neurodegeneration
- › Research suggests probiotics may support gut and brain health in Alzheimer's and Parkinson's, and researchers are studying their potential effects on cognitive function
- › Biologically, the action of probiotics involves several interconnected pathways. By restoring a healthy balance of gut bacteria, probiotics may help reduce the production of harmful substances like lipopolysaccharides (LPS) that have been associated with triggering inflammation in the brain
- › Further studies are needed to confirm the long-term benefits of probiotics in neurodegenerative disease management, emphasizing the importance of continued research in this area

Neurodegenerative diseases (NDs) are disorders characterized by the progressive loss of structure or function of neurons, leading to their eventual death. This decline disrupts essential brain functions, resulting in symptoms that significantly impair daily living and overall quality of life.

Common neurodegenerative diseases include [Alzheimer's disease](#), [Parkinson's disease](#), and amyotrophic lateral sclerosis (ALS).¹ Individuals affected by these conditions often experience memory loss, impaired movement, and difficulties with speech and coordination. As the diseases advance, patients may face severe cognitive and physical challenges, necessitating extensive care and support.

Neurodegenerative diseases now affect millions worldwide, with Alzheimer's alone responsible for approximately 60% to 70% of dementia cases.² On the other hand, the prevalence of Parkinson's disease is expected to double by 2040, underscoring a growing public health concern.³ Additionally, ALS affects about 2 per 100,000 people in Europe and the U.S., with no known cure currently available.⁴

Risk Factors Associated with Neurodegenerative Diseases

Understanding the underlying causes of NDs is complex, as they often involve a combination of factors. For example, genetic mutations can predispose individuals to conditions like Alzheimer's and Parkinson's. According to a review published in the NPJ Parkinson's Disease journal, genetic factors are linked to 56% to 79% of the risk for developing Alzheimer's disease.⁵

- **Environmental toxins** — Exposure to heavy metals and pesticides, may contribute to neuronal damage. According to the aforementioned study:

*"Several studies have suggested that lead (Pb), arsenic (As), and methyl mercury (MeHg) are also neurotoxins and can disrupt brain function, cause cognitive dysfunction, and increase the risk of AD and PD by disrupting mRNA splicing, the ubiquitin-proteasome system, the electron transport chain, and oxidative stress."*⁶

- **Lifestyle factors** — Poor diet, lack of exercise and chronic stress exacerbate NDs by affecting overall brain health and function. The progression from these underlying causes to full-blown NDs involves a cascade of biological events. Neurons, the

brain's communication cells, begin to lose their structure and function due to factors like oxidative stress and inflammation.

This deterioration disrupts the brain's ability to process information, leading to symptoms such as memory loss and impaired motor skills. Over time, the cumulative effect of these disruptions results in the characteristic decline associated with NDs.

- **Diagnosing NDs can be challenging** — Often, symptoms overlap with other conditions, making it difficult to pinpoint the exact disease. For instance, memory loss could be attributed to normal aging, stress, or other medical issues, leading to potential misdiagnosis. Additionally, the lack of definitive biomarkers for many NDs means that diagnosis often relies on clinical assessments and patient history, which can be subjective and vary between practitioners.
- **Limitations in diagnostic tools complicate the process** — Imaging techniques like MRI and CT scans show brain changes, but these are not always specific to NDs. Blood tests and genetic screenings may offer clues but are not conclusive.

As a result, patients may undergo a lengthy diagnostic journey, experiencing uncertainty and anxiety while seeking answers. This underscores the need for more precise and reliable diagnostic methods to improve early detection and treatment outcomes.

Beyond the immediate symptoms, neurodegenerative diseases lead to profound emotional and financial burden for patients and their families. The progressive nature of these disorders often results in loss of independence, increased healthcare costs and emotional stress. Addressing these multifaceted challenges is crucial in improving patient outcomes and enhancing the quality of life for those affected.

What Research Shows About Probiotics and Alzheimer's Disease

A 2023 study published in the journal *Nutrients*⁷ investigated the impact of probiotics on individuals diagnosed with Alzheimer's disease. The research, conducted by Taiwanese researchers, aimed to determine whether different doses of a multi-strain probiotic supplement could influence neurotrophic, inflammatory and oxidative-stress markers, and cognitive function, in patients with Alzheimer's disease.

- **Investigating the effects of probiotics** — The study involved 40 adults diagnosed with Alzheimer's disease, 32 of whom completed the 12-week trial. In this double-blind, active-controlled design, participants were randomized to a lower-dose or a higher-dose multi-strain probiotic supplement — there was no placebo group.

Both groups took a probiotic capsule containing *Bifidobacterium longum* BLI-02, *B. breve* Bv-889, *B. animalis lactis* CP-9, *B. bifidum* VDD088, and *Lactobacillus plantarum* PL-02, differing only in dose. The goal was to assess changes in brain-derived neurotrophic factor (BDNF), inflammatory and oxidative-stress markers, and cognitive function as a result of the higher-dose probiotic intervention.

- **What the study found on cognitive function** — Cognitive test scores (MMSE, ADAS-Cog, ADL, and CDR) did not differ significantly between the higher-dose and lower-dose groups after 12 weeks. Researchers noted a nonsignificant trend toward less cognitive deterioration in the higher-dose group, though this did not reach statistical significance.*
- **Inflammation and antioxidant markers** — The higher-dose group showed a 36% increase in brain-derived neurotrophic factor (BDNF), a reduction in the inflammatory marker IL-1 β , and an increase in the antioxidant enzyme superoxide dismutase (SOD), compared to the lower-dose group.* “Considering these findings, specific probiotics demonstrate robust and effective antioxidant capabilities,” the study authors reported.⁸

Probiotics Reduce Inflammation and Oxidative Stress

The mechanism behind these improvements is believed to involve the gut-brain axis, a communication network between the gastrointestinal tract and the brain.

- **Probiotics balance your gut health** — Probiotics help maintain a healthy balance of gut microbiota, which in turn may influence brain function. By promoting a diverse and balanced microbiome, probiotics may help reduce systemic inflammation and oxidative stress, both of which are implicated in the progression of Alzheimer's disease. For more information on how gut health affects your mental health, read ["Gut Health's Impact on Mental Well-Being."](#)
- **Benefits of SCFAs** — Short-chain fatty acids (SCFAs) are metabolites produced by beneficial bacteria in the gut. SCFAs have been shown to support brain health by providing energy to neurons and reducing inflammation. The increased abundance of Lactobacillus species in the probiotic group likely contributed to higher SCFA levels, fostering an environment conducive to cognitive stability and improvement.
- **Benefits are observed in a short amount of time** — While this trial's cognitive measures did not reach statistical significance over 12 weeks, the BDNF, inflammation and oxidative-stress changes emerged in that same short window — suggesting some biological effects of probiotic supplementation may appear relatively quickly, even though longer or larger trials are needed to determine whether measurable cognitive benefits follow.*

Comparing the higher- and lower-dose groups, the higher dose was associated with measurable improvements in BDNF, inflammatory and oxidative-stress markers, while cognitive test scores were similar between groups. This suggests probiotic dose may influence some physiological markers of brain health, though further research is needed to determine whether this translates into measurable cognitive benefit.

Probiotics' Mechanisms of Action Against Neurodegenerative Disorders

Biologically, the action of probiotics involves several interconnected pathways. By restoring a healthy balance of gut bacteria, probiotics may help reduce the production of harmful substances like lipopolysaccharides (LPS) that trigger inflammation in the brain.⁹

- **Enhancing the integrity of the gut barrier** — They may help prevent the leakage of proinflammatory agents into the bloodstream, which could otherwise reach the brain and exacerbate neuroinflammation.¹⁰
- **Affecting neurotransmitter production** — Probiotics may influence the production of neurotransmitters such as dopamine and **gamma-aminobutyric acid (GABA)**.¹¹ These chemicals are crucial for mood regulation and cognitive function. By increasing the levels of these neurotransmitters, probiotics may contribute to improved mental health and greater cognitive resilience against the degenerative processes of Alzheimer's disease.

Four Ways to Support Your Brain Through Gut Health

Your gut microbiome is closely connected to brain function, and emerging research suggests it may influence cognitive health and play a role in the risk of neurodegenerative conditions. For example, a study published in Scientific Reports showed that **certain bacterial strains in the gut**, such as Collinsella, Lachnospira, and Veillonella, increased the risk of Alzheimer's disease.¹²

However, they also identified strains that provide protective benefits against Alzheimer's disease, such as Eubacterium nodatum and Eisenbergiella. These produce short-chain fatty acids (SCFAs), particularly butyrate, from dietary carbohydrates.

Butyrate nourishes your colonic epithelial cells, reinforcing the intestinal barrier. SCFAs also stimulate mucin production, creating a protective shield against harmful bacteria. Akkermansia muciniphila also produces SCFAs, and research has shown that

Alzheimer's patients tend to have very low levels of this important keystone species.¹³ Here are four strategies that may help support the Akkermansia in your gut to enhance your brain health:

- 1. Increase Akkermansia through targeted diet and supplementation** — Prioritize foods and supplements that promote the growth of Akkermansia. Include well-cooked, prebiotic-rich vegetables and fiber sources that nourish this crucial bacterium.

Look for well-researched Akkermansia-supporting probiotic or postbiotic formulas, which may help support gut barrier integrity and, in turn, healthy inflammation levels. Avoid processed foods and high-fat diets that can hinder Akkermansia growth.

- 2. Enhance beneficial short-chain fatty acids** — Focus on increasing butyrate-producing bacteria alongside Akkermansia which researchers believe may help support healthy amyloid clearance processes in the brain. Incorporate fermented foods and resistant starches that feed these beneficial microbes.

Tailor your carbohydrate intake to support your unique microbiome, aiming for at least 250 grams of targeted carbs daily, and adjust based on your activity level to optimize Akkermansia and short-chain fatty acid production.

- 3. Support your gut-brain connection** — Optimize your gut barrier integrity to prevent inflammatory compounds from reaching your brain. This includes removing inflammatory processed foods and supporting the growth of protective bacteria like Akkermansia, which strengthens your intestinal lining.

Maintain a balanced diet with sufficient carbohydrates tailored to your microbiome, and consider a well-researched Akkermansia-supporting supplement, taken as advised by your healthcare provider, to help sustain your levels.

4. Address systemic inflammation by promoting Akkermansia diversity — Lower inflammation throughout your body by enhancing microbiome diversity, with a specific emphasis on increasing Akkermansia.

Eliminate vegetable oils and other proinflammatory fats that damage gut bacteria, and incorporate foods that reduce inflammatory markers while supporting Akkermansia growth. Regularly monitor biomarkers such as C-reactive protein levels to track your progress in reducing systemic inflammation and maintaining a healthy gut microbiome.

Additional Strategies That May Support Alzheimer's Risk Reduction

Aside from optimizing your gut health and Akkermansia levels, there's a plethora of helpful [Alzheimer's prevention strategies](#), several of which are outlined below:

- **Avoid gluten and casein (primarily wheat and pasteurized dairy, but not dairy fat, such as butter)** — As noted in a 2022 study,¹⁴ your blood-brain barrier is negatively affected by gluten. When bacteria enter your bloodstream, the risk of Alzheimer's disease increases. Other cognitive disorders are linked to a weakened blood-brain barrier as well, such as Parkinson's disease, anxiety and depression.
- **Make sure you're getting enough animal-based omega-3 fats** — Omega-3 fats, namely EPA and DHA, have been studied for a possible role in protecting brain cells and supporting healthy cognitive aging. That said, omega-3s are PUFAs, so don't overdo it.
- **Optimize your vitamin D level with safe sun exposure** — Strong links between low levels of vitamin D in Alzheimer's patients and poor outcomes on cognitive tests have been revealed. In a 2023 observational study,¹⁵ vitamin D supplementation was associated with a 40% lower rate of incident dementia.

The best way to get vitamin D is through sensible sun exposure, aiming for a blood level between 60 and 80 ng/mL. However, you need to purge vegetable oils from your body before going into the sun at solar noon. The LA in your skin oxidizes when exposed to sunlight, causing inflammation and skin damage.

To protect your skin, avoid sun exposure during solar noon for four to six months as you work on removing LA from your body. Stick to sunlight during early morning and late afternoon in the meantime. For additional skin defense, you can take astaxanthin, a low-dose aspirin or molecular hydrogen. Niacinamide cream will also lower your risk of skin damage.

- **Keep your fasting insulin levels below 3** — Insulin resistance is linked to accelerated brain aging, as well as neurodegeneration.¹⁶
- **Eat a nutritious diet, rich in folate** — Vegetables, without question, are your best form of folate. Avoid supplements like folic acid, which is the inferior synthetic version of folate. Research shows that folate is a protective factor against Alzheimer's disease.¹⁷
- **Avoid and eliminate mercury and aluminum from your body** — Dental amalgam fillings, which are 50% mercury by weight, are one of the major sources of heavy metal toxicity. Make sure you use a biological dentist to have your amalgams removed. Sources of aluminum include antiperspirants, nonstick cookware and vaccine adjuvants.
- **Make sure your iron isn't elevated and donate blood if it is** — A study¹⁸ published in Aging Medicine shows that excess iron increases your risk of Alzheimer's disease by initiating the Fenton reaction, leading to increased oxidative stress.
- **Exercise regularly** — Exercise triggers beneficial changes that support cognitive function. Particularly, it's been shown to improve blood flow to the brain, leading to an increase in biomarkers related to improved neuronal plasticity and better cell survival.¹⁹

- **Eat blueberries and other antioxidant-rich foods** — Wild blueberries, which have high anthocyanin and antioxidant content, are known to guard against neurological diseases.
- **Challenge your mind daily** — Mental stimulation, such as learning to play a musical instrument, is associated with a decreased risk of Alzheimer's.²⁰
- **Avoid anticholinergics and statin drugs** — Drugs that block acetylcholine, a nervous system neurotransmitter, have been shown to increase your risk of dementia. These drugs include certain nighttime pain relievers, antihistamines, sleep aids, certain antidepressants, medications to control incontinence, and certain narcotic pain relievers.

Statin drugs are particularly problematic because they suppress the synthesis of cholesterol, deplete your brain of CoQ10 and neurotransmitter precursors, and prevent adequate delivery of essential fatty acids and fat-soluble antioxidants to your brain by inhibiting the production of the indispensable carrier biomolecule known as low-density lipoprotein.

**These findings are from research conducted in clinical settings. Results may not apply to all individuals.*

Talk to your healthcare provider about whether fasting insulin, vitamin D or ferritin/iron testing is appropriate for you. This article is for informational purposes only and does not constitute medical advice. Consult a qualified healthcare provider before making changes to your health regimen.

Frequently Asked Questions (FAQs) About Probiotics and Neurodegenerative Diseases

Q: How do probiotics impact neurodegenerative diseases like Alzheimer's?

A: Probiotics may influence brain function through the gut-brain axis by supporting gut microbiome balance and helping reduce inflammation. Early research is exploring whether beneficial bacteria could help support cognitive health in conditions like Alzheimer's and Parkinson's, though more research is needed to confirm effects on cognitive decline.

Q: What research supports the benefits of probiotics for Alzheimer's patients?

A: A 12-week clinical trial published in *Nutrients* compared higher- and lower-dose multi-strain probiotic supplementation in patients with Alzheimer's disease (there was no placebo group). The higher dose was associated with increased BDNF and antioxidant activity and reduced inflammatory markers, though cognitive test scores did not differ significantly between groups.

Q: What mechanisms make probiotics beneficial for brain health?

A: Probiotics help may help reduce inflammation by lowering harmful substances like lipopolysaccharides (LPS), enhancing gut barrier integrity, and influencing neurotransmitter production (e.g., dopamine and GABA). They also promote the production of short-chain fatty acids (SCFAs), which support brain health.

Q: Can improving gut health help prevent neurodegenerative diseases?

A: Possibly. A diverse gut microbiome, particularly the presence of beneficial bacteria like *Akkermansia muciniphila*, may play a role in supporting healthy inflammation levels and could contribute to long-term brain health, though more research is needed to confirm a protective effect against neurodegeneration. Consuming prebiotic-rich foods, fermented foods, and maintaining a fiber-rich diet can support gut health.

Q: What other lifestyle changes can support brain health and reduce Alzheimer's risk?

A: In addition to probiotics, strategies like avoiding processed foods, eliminating heavy metal exposure (e.g., mercury and aluminum), maintaining optimal vitamin D and omega-3 levels, exercising regularly, and engaging in mental stimulation activities can help prevent cognitive decline and support brain health.

Sources and References

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