



# BRAIN LONGEVITY GUIDE



Created May 2025

**“Everybody knows a cancer survivor, but no one knows an Alzheimer’s survivor”.**

An unfortunate belief that has rung true for many decades, until now. Statistically speaking, cognitive decline has, in some way, impacted your life. Through family members, friends, or even those “senior moments” you laughed off as simply getting older.

Alzheimer’s disease is the most common form of dementia, accounting for approximately 60% to 80% of all dementia cases. According to the Alzheimer’s Association, more than 6.9 million Americans aged 65 and older are living with Alzheimer’s as of 2024 with that number being approximately 4.5 million only 20 years ago. According to the projections by The Alzheimer’s Association, this number is projected to nearly double by 2050, reaching around 13 million. It is clearly a growing issue. Women, particularly, are disproportionately affected—making up roughly two-thirds of both people living with Alzheimer’s and those who provide care.

A few additional statistics-between the years 2013 and 2017 researchers found a:

- 143% increase in diagnoses in those between 55-64 years old
- 311% increase in diagnoses for those 45-54
- 373% increase in diagnoses for those 30-44%

From an economic perspective, the cost of Alzheimer’s Disease in the United States has risen to 360 billion per year with the more potentially startling figure of \$339 Billion as the estimated value of unpaid care given, often by family such as a spouse or children. This disease costs more than half of a trillion dollars per year with estimates only climbing. These numbers are staggering, so much so that it is hard to put in perspective.

The real cost is the individual cost. Regardless of the direct financial cost, you begin experiencing frustration of the lack of ability to perform at work or around the home, be present with friends and family in the same way, the potential change in personality or even forgetting small things like where you put the keys or parked car. Real costs can be realized by the statistics from Medicare stating that the “average per-person Medicare spending for seniors with Alzheimer’s is 2.8 times higher than average per-person spending for all other seniors”. With the cost of assisted living with cognitive decline ranging from the Kentucky average of \$5,000 per month to more than double that in other areas we can begin to see the need for early intervention and the reversal of these statistics. It is a somber disease and an expensive disease but with the information below, you can change both.

Before we get to the solutions, it is important to establish what has been and the modern approach to cognitive decline. To date, it has been viewed as a single cause disease that cannot be reversed, simply slowed down. In fact, if you go to the website of the most prescribed medication, a cholinesterase inhibitor under the generic of donepezil, it states, “While [this medication] cannot reverse or stop existing memory and thinking issues that are due to early symptomatic AD, it can help slow the progression of the disease”. Another, that has been more recently approved in 2023 focuses on reducing b-amyloid plaque with the expectation of once again, simply slowing progression. Without delving into the side effects of which are easily found through their websites, it is a mediocre promise with a poor track record when just viewing the statistics. The current viewpoint of dementia as a singular problem has also been met with lackluster results in the form of treatment. The Cleveland Clinic Center for Brain health posted an analysis that found that between 2002 and 2012, 99.6% of Alzheimer’s drugs on trial had failed. The reason? Dementia and more specifically, Alzheimer’s Disease does not have a singular cause, meaning that a singular cure could not be expected to multimodal issue. To add to that, on March 11, 2025 the Pharmaceutical Journal made a publication that two common medications; donanemab (Kisunla; Eli Lilly) and lecanemab (Leqembi; Eisai) have been rejected by the National Institute of Health and Care excellence on the grounds that the results derived from these drugs did not justify the cost. While this is currently in application in Wales and England it should put some questions into our own minds. Drugs, without additional intervention have not and will likely not be the answer. It is not a failure in our ability to make a drug/the right drug, it is a failure in the understanding of the brevity of the disease and what ALL solutions will need to be applied.

A new view on a century-old disease must be applied. That is what we have curated in the following pages to empower you with knowledge and toolkit needed to create your own “Ageless Mind”.



At Chi Rho, we have two foundational systems that guide everything we do and teach, including detoxification. One of these systems is C.A.M.P., which stands for:

## Courage



Achieving outstanding health and healing requires courage because it often means going against the conventional norms. The brain has a specific region known as the nucleus reuniens, which is responsible for courage. When we live courageously, this area strengthens and grows. However, when we live in fear or hesitation, it atrophies.

## Autonomic Nervous System



The autonomic nervous system is the central regulator of all bodily functions. The healthier your ANS, the healthier you will be overall. Strengthening this system is crucial for achieving long-term wellness.

## Mitochondria



Mitochondria are the powerhouses of our cells, and their health dictates our immune function, metabolism, hormones, and neurotransmitters. Interestingly, mitochondria and the autonomic nervous system are interconnected. If you want more energy, the key is to optimize your mitochondria. One of our main goals at Chi Rho is to help people understand how to build and sustain healthier mitochondria.

## Purpose(s)



Each person has a unique purpose they were created to fulfill. Our overall health is intrinsically linked to how we align with and pursue these purposes. Living in accordance with our purpose not only enhances well-being but also fuels vitality and longevity.

At Chi Rho, we also follow the Four-Legged Stool Approach to health.

## The Four-Legged Stool Approach

1. Chiropractic adjustments in rhythm with precise measurements.
  2. A customized body and home care program tailored to individual needs.
  3. Ongoing education that fosters both learning and unlearning for optimal health.
  4. Vitalistic functional medicine testing to uncover root causes and guide personalized care.
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## Contributors to cognitive decline

We will first put these in more broad categories to get a broader view of where your weak points may be. You may already know these but in most cases, the testing described later will help you discover where you may need to focus your efforts.

### 1. Inflammatory:

These infections, or inflammatory messengers because of these infections can travel to the brain through a compromised blood brain barrier thus leading to an immune response. Acute infections are often dealt with quickly and in most cases without great impact. However, the chronic nature of certain infections is most contributory. The brain's immune system produces inflammatory messengers that both alert the body's immune system to fight infection, but as a byproduct, can lead to damage to the structure of neurons. In fact, amyloid beta plays a significant antimicrobial role in fighting these infections in the brain. So, while this protein plaque has been the subject of many medications, we may be focusing on the wrong thing. Blaming the body's healing response rather than the multitude of causes (i.e. Blaming the fire on the fireman). Over time, this protein that is working to protect the brain may build up due to chronic infection thus creating these bundles of proteins that “clog” the passageways of the brain.

1. Infection: Lyme, EBV, HSV, dental infection, gingivitis, gut infection, neural autoimmunity etc.

## 2. Type 1.5:

Elevated blood sugar plays such a significant role in cognitive decline that Alzheimer's disease has been called by many, Type 3 Diabetes. In a study of over 2,000 post-menopausal women, they found that those with a hemoglobin A1c of 7.0% or greater (6.5% being the start of diabetes) had a 4-fold increase in developing cognitive impairment. Considering there are 29.7 million people (about the population of Texas) with diagnosed diabetes in the United States, it starts becoming clearer as to why cognitive decline is on the rise. However, a diabetes diagnosis is not a definitive criterion for an increased risk. According to a 2013 study published in the New England Journal of Medicine, an elevated glucose (not A1c) can increase likelihood of a cognitive decline diagnosis by as much as 18%.

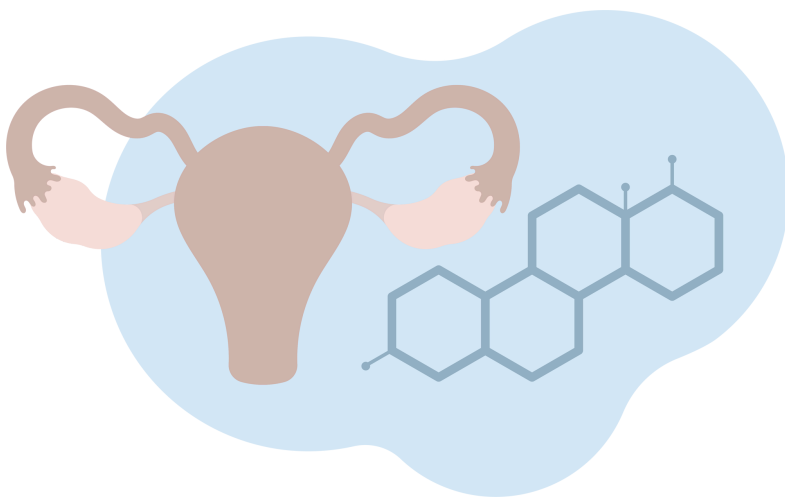


### 3. Atrophic:

Atrophic means that the brain is lacking something that allows it to flourish. Like how a plant needs certain nutrients, light and water or else it will wilt and die. While the scientific community sometimes focuses only on what blocks/inhibits the brain to function, we must also consider the things that activate the brain. As a practitioner, I feel like this is one of the greatest missed opportunities in cognitive decline. The reason is that hormones fall into this category. Without sufficient levels of estradiol, testosterone and progesterone the brain will begin to wither. If we consider that 2/3 of those diagnosed with Alzheimer's Disease, this makes more sense. Following menopause or a hysterectomy, hormones often decrease drastically and often to levels of being unmeasurable on labs. As I like to convey to patients, our goal is not to give you the hormones of a 20-year-old, but there are levels necessary to protect your brain.

- Estrogen: promotes synaptic plasticity, stimulates the growth of new neurons, and enhances blood flow to the brain.
- Progesterone: Supports myelin production and the calming effect of GABA
- Testosterone: Shown to reduce inflammation and oxidative stress while also potentially increasing spatial memory.

We will talk about hormone testing in an upcoming section but, if you do not know your levels, that is critical. In addition to hormones, certain vitamins such as Vitamin D and B12 have been implicated in cognitive decline when not optimized. Lastly, a healthy brain requires ample amounts of Brain Derived Neurotrophic Factor (BDNF) which is often compared to as, miracle grow for the brain. While this is not a supplement or drug, it can be increased by several lifestyle factors (and some supplements).



#### 4. Toxic:

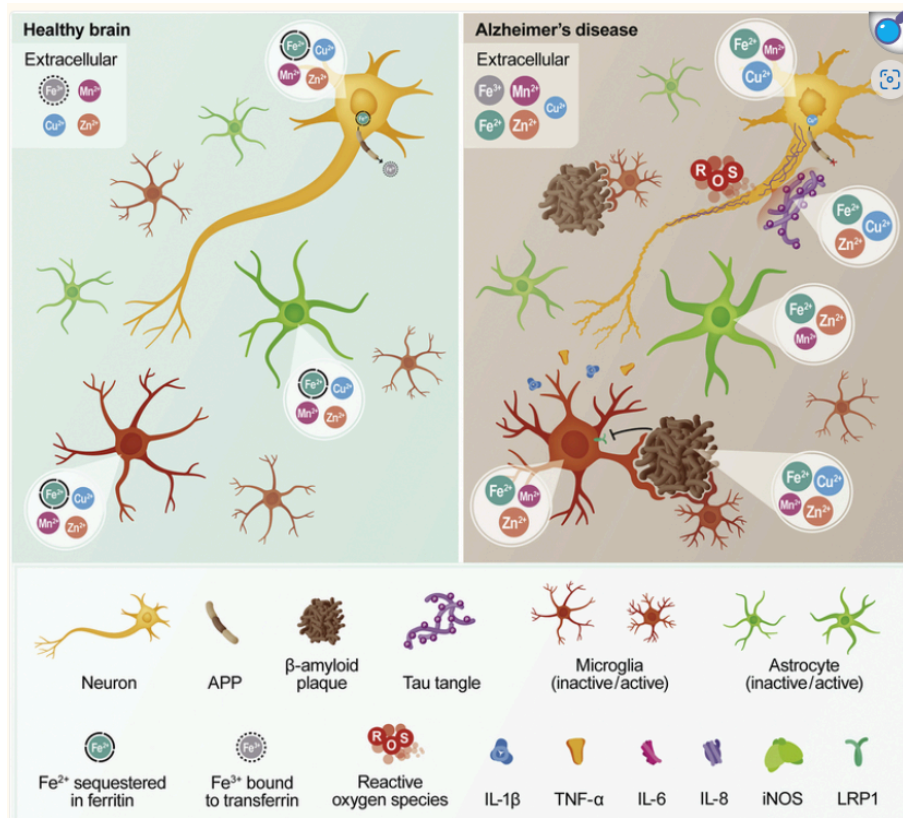
While we just read about the things that help grow the brain, we also must look at a category that breaks down the brain. One of the more significant topics in this regard is toxicities and it is more relevant now than ever. Toxicities lead to oxidative damage which would be comparable to “pollution” in the brain that damages cell membranes, creates protein tangles and ultimately damages the neurons themselves.

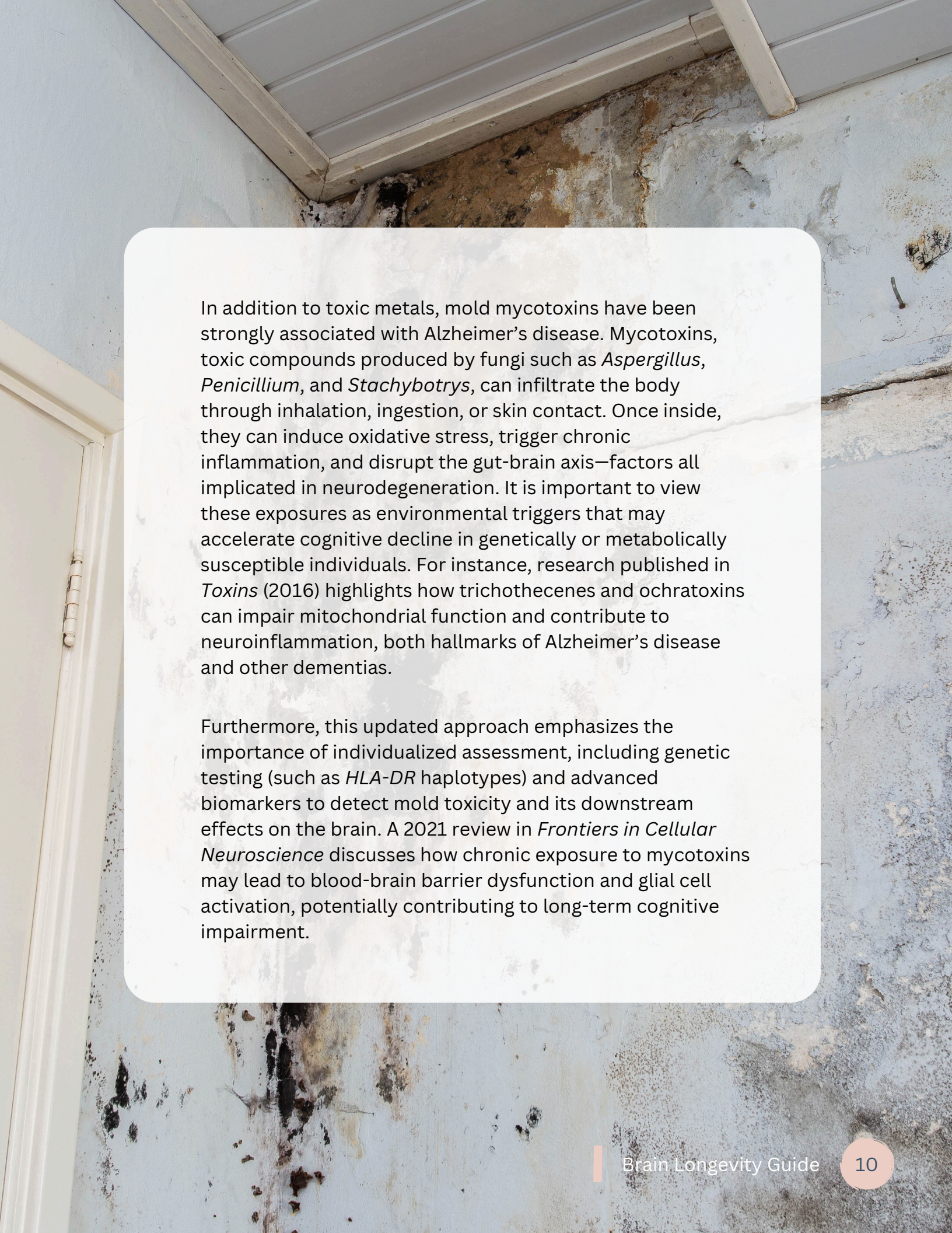
Lead is one of the greatest contributors to cognitive decline from a toxicity perspective. Globally, lead has been associated with 1% of all diseases but for the purpose of this guide, we will focus on the brain. Sources of lead are often from air, soil or foods that have absorbed elevated levels of lead. Once ingested or absorbed, most lead that is not acutely detoxified is stored in bones with some estimates reaching 95% of lead getting absorbed through bone. While this accumulates through early and mid-life, many issues do not begin until bone density begins to deteriorate, freeing up this toxic metal. Comparable to releasing prisoners from the jail cell into the population. The lead that may be causing the neuronal decline may have been building up for several decades prior to symptoms. Lead that is transported into the brain, through the blood brain barrier, creates overexcitation to the point of mitochondrial dysfunction and neuron death. Additionally, lead causes beta amyloid and tau protein to accumulate in the brain.



Aluminum is another toxin that has become endemic in our society which can lead to accelerated brain degeneration. Aluminum can be found in varying concentrations in the air depending on levels of car exhaust fumes, mining and air travel. Additionally, a 2020 study in *JAMA Neurology* found that individuals living in areas with high air pollution levels had significantly more beta-amyloid plaques, a hallmark of Alzheimer's pathology. Additionally, everyday exposures through deodorant or aluminum foil can contribute to overall load. Lastly, aluminum is commonly found in vaccines which brings attention to the childhood schedule and potential risks associated with that. Similar to other toxic metals, aluminum acts as an oxidative stress which depletes the brain's antioxidants thus leading to damaged cell walls and poor nutrient transportation. Additionally, aluminum will get into the mitochondria of the neurons leading to cell death (apoptosis). This mechanism is similar to putting golf balls in your gas tank...metals in the engine of the cells impair function, produce more cellular pollution and eventually die. Aluminum also signals for the brain to send b-amyloid to the area leading to impaired nerve firing as well.

While these are only a couple of the toxic metals associated with cognitive decline, it demonstrates how b-amyloid may be a response to a foreign substance (toxin) entering the brain.





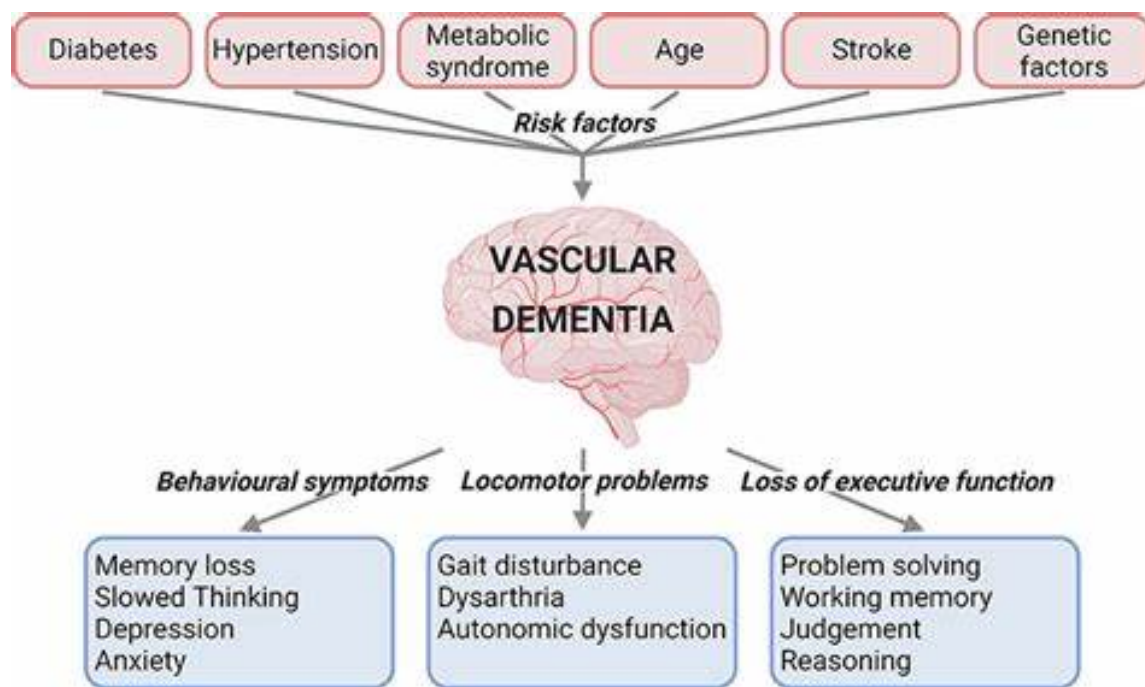
In addition to toxic metals, mold mycotoxins have been strongly associated with Alzheimer’s disease. Mycotoxins, toxic compounds produced by fungi such as *Aspergillus*, *Penicillium*, and *Stachybotrys*, can infiltrate the body through inhalation, ingestion, or skin contact. Once inside, they can induce oxidative stress, trigger chronic inflammation, and disrupt the gut-brain axis—factors all implicated in neurodegeneration. It is important to view these exposures as environmental triggers that may accelerate cognitive decline in genetically or metabolically susceptible individuals. For instance, research published in *Toxins* (2016) highlights how trichothecenes and ochratoxins can impair mitochondrial function and contribute to neuroinflammation, both hallmarks of Alzheimer’s disease and other dementias.

Furthermore, this updated approach emphasizes the importance of individualized assessment, including genetic testing (such as *HLA-DR* haplotypes) and advanced biomarkers to detect mold toxicity and its downstream effects on the brain. A 2021 review in *Frontiers in Cellular Neuroscience* discusses how chronic exposure to mycotoxins may lead to blood-brain barrier dysfunction and glial cell activation, potentially contributing to long-term cognitive impairment.

## 5.: Vascular

Vascular-related Alzheimer's arises from compromised cerebral blood flow, which reduces oxygen and nutrient delivery to the brain, impairing neuronal function and promoting the accumulation of amyloid-beta and tau proteins—hallmarks of Alzheimer's pathology. Chronic conditions like hypertension, atherosclerosis, insulin resistance, and endothelial dysfunction damage the small vessels in the brain, leading to microinfarcts and white matter lesions that are often seen in cognitive imaging studies of Alzheimer's patients. In a paper titled, "The overlap between vascular disease and Alzheimer's disease--lessons from pathology", researchers looked at autopsy studies which indicate that up to 84% of elderly individuals exhibit both AD and CVD pathologies. Common vascular issues include cerebral amyloid angiopathy (CAA) and small vessel disease, which can lead to microinfarcts, white matter lesions, and lacunes. In early stages of AD, these vascular lesions may exacerbate cognitive decline by disrupting blood flow and neuronal function.

While Alzheimer's and true vascular dementia have subtle nuances of difference, I like the image below as it demonstrates the multitude of impacts a vascular issue can have on the functioning brain as well as the complex web of contributing factors. This illustrates the multifactorial nature of the disease and the requirement for a multifactorial approach.



## 6: Traumatic

In a [paper](#) published in the British Medical Journal in 2000, researchers found that any medical history of head injury more than doubled both the risk of developing Alzheimer's Disease and the chances of developing non-Alzheimer's dementia, regardless of age. Evidently, the more serious the head injury, the greater the incidence of Alzheimer's. Those with just moderate head trauma experienced a 2.3 fold increase in risk while those with severe head injury had a risk more than quadruple the control group. Even further, those with the ApoE4 genetic experienced up to a 14 fold risk of developing cognitive dementia.

Another paper published in [JAMA](#) studied deceased football players at autopsy and revealed that 87% of general football players and 99% of previously professional football players had clinical signs of brain degeneration, potentially leading to cognitive decline. Mechanistically, TBI is associated with acute and chronic neuroinflammation, disruption of the blood-brain barrier, accumulation of amyloid- $\beta$  ( $A\beta$ ), and tau protein hyperphosphorylation—hallmarks of AD pathology.

These are the broad topics that must be considered and hopefully exemplifies the brevity of contributions to cognitive decline as well as how a single approach (drugs) simply is not the right tool. Now that we have the umbrella of the 6 primary categories we can look more specifically at individual risk factors. In Dr. Dale Bredesen's book, *The End of Alzheimer's*, he describes these as "holes in the roof". When you hit a threshold of "holes in the roof" a hypothetical teeter totter flips into the degenerative state. In most cases, it is not just one or two of these challenging factors, but an accumulation of several challenges.

## Categories and Examples of the 36 “Holes”



### 1. Inflammation

- a. Chronic infections (e.g., herpes simplex virus, Lyme)
- b. Leaky gut and dysbiosis
- c. Elevated C-reactive protein (CRP), interleukins, TNF-alpha

### 2. Insulin resistance / glucose metabolism

- a. High fasting insulin or glucose
- b. Elevated HbA1c
- c. Low ketone production / poor brain fuel flexibility

### 3. Trophic (supportive) factors

- a. Low brain-derived neurotrophic factor (BDNF)
- b. Deficiency in estradiol, testosterone, progesterone, DHEA
- c. Low vitamin D, B12, magnesium, zinc, omega-3 fatty acids

### 4. Toxic exposure

- a. Heavy metals (mercury, lead, arsenic)
- b. Mold/mycotoxins (e.g., ochratoxin A, gliotoxin)
- c. Pesticides, herbicides, air pollutants

### 5. Vascular compromise

- a. Hypertension
- b. Low nitric oxide / poor circulation
- c. Elevated homocysteine, ApoE ε4-related vascular risk

### 6. Synaptic network dysfunction

- a. Lack of mental stimulation
- b. Poor sleep (especially lack of deep sleep)
- c. Excess stress / elevated cortisol

### 7. Detoxification & methylation problems

- a. MTHFR mutations
- b. Glutathione depletion
- c. Impaired bile flow or Phase I/II liver detox

### 8. Gastrointestinal and microbiome issues

- a. Dysbiosis or SIBO
- b. Gut permeability
- c. Poor nutrient absorption

### 9. Genetics & epigenetics

- a. ApoE ε4 status
- b. Other SNPs affecting detox, inflammation, or metabolism
- c. Epigenetic silencing of protective genes (e.g., due to stress or diet)

### 10. Lifestyle imbalances

- a. Sedentary lifestyle
- b. Processed food diet
- c. Poor sleep hygiene
- d. Lack of social connection or purpose

This list allows you to more simply and succinctly begin to think about all the different areas that could lead you to Alzheimer’s Disease, and if you or your loved one already has a diagnosis, it allows you to begin reversing these contributory factors.



# A NEW APPROACH

We have established that the previous model or belief of a one cause, one disease paradigm is flawed. You now see how dozens of potential contributors can come together and lead to the symptomatic cluster known as dementia. We now must use this information to create a road map to prevention and possible reversal of cognitive decline using a framework that has been proven effective.

This approach begins with lifestyle. A healthy brain begins with the hundreds of decisions that you make on a daily basis that can either move you further from disease or closer to it.

## EXERCISE

From a functional medicine perspective, exercise serves as a multifaceted intervention for Alzheimer's disease (AD), addressing underlying biological mechanisms rather than merely alleviating symptoms. Regular physical activity has been shown to enhance mitochondrial function, which is often compromised in neurodegenerative conditions. Exercise promotes mitochondrial biogenesis, dynamics, and mitophagy, thereby improving energy production and reducing oxidative stress in neurons. This mitochondrial optimization supports neuronal health and resilience, aligning with functional medicine's emphasis on cellular and systemic balance .[PubMed](#)

Furthermore, exercise exerts significant anti-inflammatory effects, countering the chronic low-grade inflammation associated with aging and AD, often referred to as "inflammaging." Physical activity has been demonstrated to reduce levels of proinflammatory cytokines such as IL-1 $\beta$  and TNF- $\alpha$ , while increasing anti-inflammatory markers like IL-10. These changes help modulate microglial activation and support a healthier brain environment. This approach aligns with functional medicine's focus on reducing systemic inflammation to promote optimal health .[PMC](#)

Additionally, exercise enhances neuroplasticity by stimulating the production of brain-derived neurotrophic factor (BDNF), a protein crucial for neurogenesis and synaptic plasticity. Increased BDNF levels support the formation of new neural connections and the maintenance of existing ones, which is vital for cognitive function. This neuroplasticity is particularly beneficial in the context of AD, where cognitive decline is a primary concern. Functional medicine practitioners often incorporate exercise into personalized treatment plans to support brain health and cognitive function .

## Where to begin:

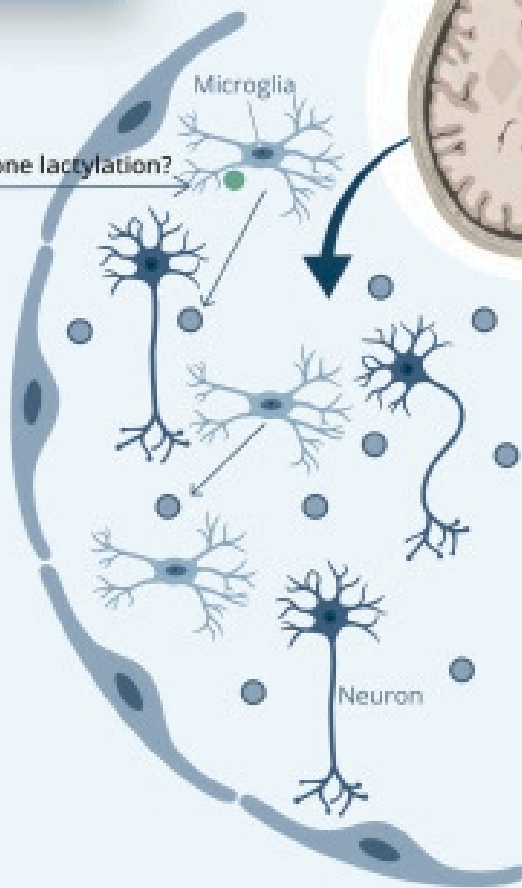
1. Move daily: For adults over 60, aim for 6,000-8,000 steps daily and for those under the age of 60, your target is 10,000 steps daily. What was once an arbitrary number has been examined to have a significant reduction in disease risk. You can read the meta-analysis published in The Lancet [here](#).
2. HIIT: High intensity interval training has separate but additional benefits. A recently published [study](#) found that short burst exercise significantly improves executive functions such as working memory, attention control, and cognitive flexibility, outperforming moderate-intensity continuous training in these areas . These cognitive enhancements are attributed to increased levels of brain-derived neurotrophic factor (BDNF), which supports neuronal survival and synaptic plasticity. To perform this exercise you could do intervals on an exercise bike, rower, treadmill or just using body weight. Work at maximal SAFE effort for 1-4 minutes and then rest for an equal amount of time. Repeat this pattern for a total of 10-20 minutes.
3. Resistance exercise: An area that I have seen as a practitioner that is often overlooked is strength training exercise. This could be weights, machines, resistance bands or body weight but the common goal is an effort to preserve or gain lean muscle mass. The research is growing for this particular form of exercise as it is demonstrating significant benefits in cognitive function, brain structure, and overall health. A comprehensive network [meta-analysis](#) encompassing various exercise modalities revealed that resistance exercise holds the highest probability of being the most effective strategy to slow overall cognitive decline in AD patients,

*In terms of brain structure, a six-month randomized controlled trial involving overweight older adults revealed that resistance training led to a 0.04% increase in hippocampal volume, a critical region for memory and learning. While that may not seem like a lot, the brain is typically shrinking, so any increase is profound. Additionally, functional MRI scans demonstrated enhanced neural activation in memory-related brain regions, including the hippocampus, suggesting that resistance exercise not only preserves but also potentially enhances brain function in older adults.*

## EXERCISE EFFECTS

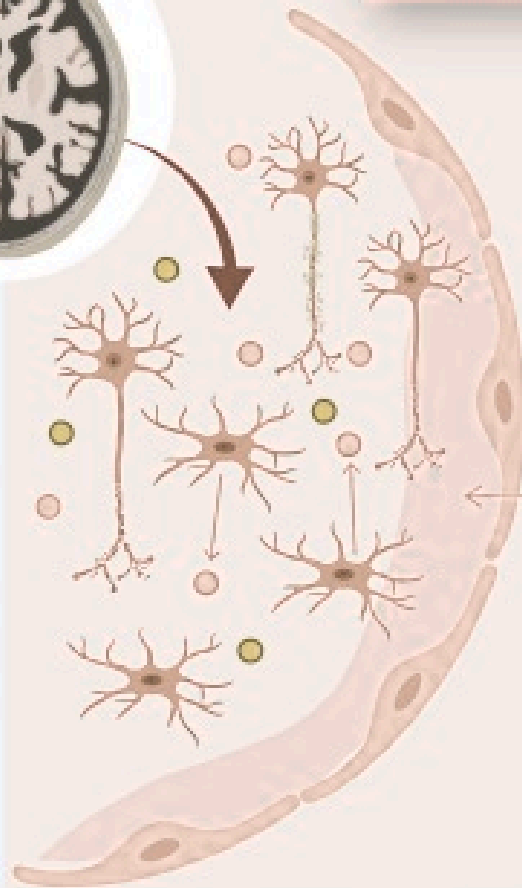
Lactate

Histone lactylation?



## ALZHEIMER'S DISEASE

Amyloid- $\beta$



- ↑M2 microglia polarization
- ↑Healthy neuron
- ↓Neuro-inflammation
- ↓Amyloid- $\beta$



- ↑M1 microglia polarization
- ↑Degenerated neuron
- ↑Neuro-inflammation
- ↑Amyloid- $\beta$



# DIET

The brain needs proper fuel in the same sense an elite athlete focuses on every bite. The brain is one of the most energy demanding, mitochondrially dense organs in the body meaning that if our fuel is even a little suspect, the results will be amplified in the brain. Mitochondria are also very much like the engines in your car. You put in dirty fuel, you get more pollution. On the road that may be black smoke coming out of the exhaust but in your brain, it produces oxidative toxins that lead to protein aggregation as well as cellular aging and death.

The foundation of the diet relates back to the information found in our CAMP Nutrition guide which goes in depth about all the principles and nuances of an optimal diet. In regards to the purpose of this guide, there are a few details that take a great diet and make it customized to the purpose of supporting brain health. The primary being the goal of creating and utilizing ketones and an alternative source of fuel for the brain. A ketone is the usable energy source derived from fats. These ketones are a clean burning fuel that can be used to fuel neurons that may have compromised glucose utilization. Going back to the types of Alzheimer's disease, blood sugar plays a large role in many of those. In a 2019 research article published in **Alzheimer's and Dementia**, the team found that a daily drink containing MCT oil, a ketone precursor, increased brain ketone metabolism by 230%. This alternative fuel source allows neurons to continue to function and heal despite possible insulin resistance. To further bolster the prioritization of a mild ketogenic diet, another recent comprehensive study published in *The Journal of Nutrition, Health & Aging* (2024) analyzed the effects of ketogenic diets (KDs) on cognitive function in Alzheimer's disease (AD) and found that in just 3 months, participants experienced improvements in their MMSE scores (cognitive assessment test).

To achieve mild ketosis through diet, focus on eating fewer carbohydrates and more healthy fats. This means cutting back on sugar, bread, pasta, rice, and starchy vegetables like potatoes, while adding foods like avocados, nuts, olive oil, eggs, cheese, and fatty fish to your meals. Most people aim for about 20–50 grams of carbs per day to gently shift the body into using fat—rather than carbs—for energy. Drinking plenty of water, staying active, and making sure you're getting enough electrolytes (like sodium, potassium, and magnesium) can also help your body adjust to this new fuel source smoothly. Lastly, there are supplements that can be incorporated to make this process easier which we will discuss in a later section.

## TESTING

To assess your personalized risk factors and contributors requires a proper testing protocol curated by our doctors. The goal is to spend time with the doctors to establish a thorough health history to help identify what testing will be most beneficial and revealing. As we have discussed above, some of these risk factors can begin at a very young age meaning that the earlier that you start, the better.

Comprehensive bloodwork is the foundation that I believe everyone should have, beginning as early as possible. It allows a person to have a personal review of the major organ systems, nutrients, immune function, cardiovascular health and more. If we think back to the contributors to Alzheimer's disease, bloodwork can help to identify many of those from one test. While all data is valuable there are a few specialty labs that have been profound in the impact they have had on our patients.

The ATN profile is a lab test that helps doctors understand what's happening in the brain of someone who may be at risk for Alzheimer's disease. "ATN" stands for three biological markers: Amyloid plaques (A), Tau protein (T), and Neurodegeneration (N). These markers can be found in blood or spinal fluid and give clues about changes in the brain long before memory problems become obvious. Amyloid (A) builds up into sticky plaques, tau (T) forms tangles that damage brain cells, and neurodegeneration (N) reflects overall brain cell loss. When these markers are measured together, the ATN profile can help identify whether someone is in the early stages of Alzheimer's—even before symptoms like forgetfulness begin.

Recent research has shown that phosphorylated tau (p-tau)—a specific form of the tau protein—is especially important for early detection. Scientists have found that levels of p-tau in blood and spinal fluid start to rise in people up to twenty years before they are diagnosed with Alzheimer's. This is a major breakthrough because it means we can potentially detect and track the disease much earlier, giving people and doctors more time to plan and explore treatment options. As p-tau testing becomes more accurate and widely available, it's becoming a key part of the ATN system and one of the most promising tools in Alzheimer's research today. A simple blood draw can give you invaluable information.

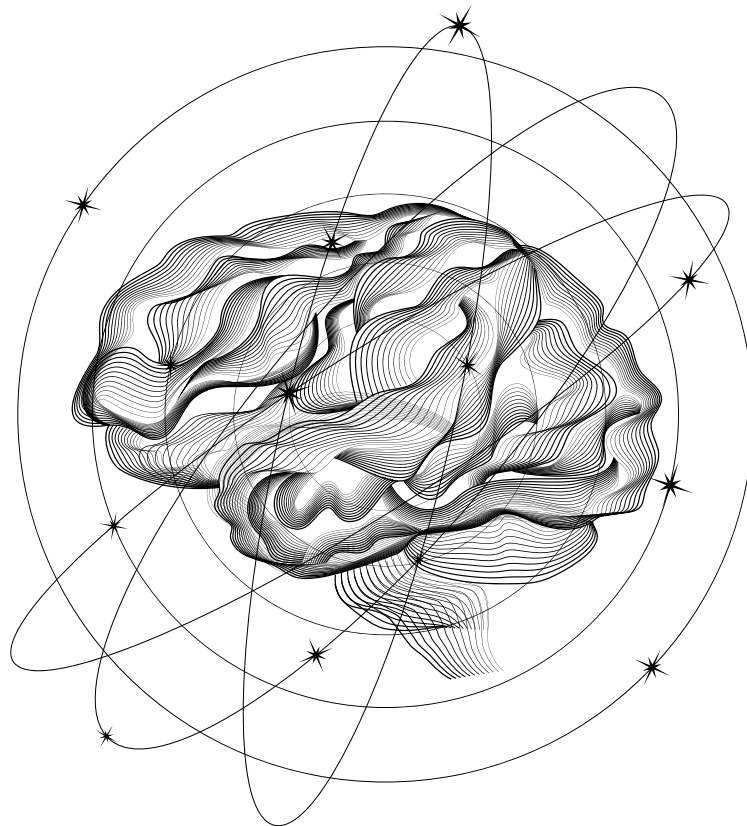
The **ApoE gene** (short for apolipoprotein E) plays a role in how your body processes fats, but it also affects your brain health—especially when it comes to Alzheimer's disease. There are three common versions of this gene: **ApoE2**, **ApoE3**, and **ApoE4**. Everyone gets two copies (one from each parent), and the combination you have can influence your risk. **ApoE3** is the most common and considered “neutral,” while **ApoE2** may actually lower your risk of Alzheimer's. On the other hand, **ApoE4** is linked to a higher chance of developing the disease. Having one copy of ApoE4 increases your risk by about 2 to 3 times, while having two copies (one from each parent) can raise your risk up to 8 to 12 times compared to people without it.

It's important to know that having the ApoE4 gene doesn't mean you will definitely get Alzheimer's—it just means your **risk is higher**, especially as you age. Many people with ApoE4 never develop the disease, and some without it do. Your lifestyle—like diet, exercise, and sleep—still plays a huge role. According to a major study in *JAMA Neurology*, researchers found that individuals with two copies of ApoE4 had an over 90% chance of developing amyloid plaques (one of the hallmarks of Alzheimer's) by age 85, compared to just 10–20% of those without the gene (Belloy et al., 2019). So while genes are part of the picture, they're not the whole story—your daily choices still matter a lot.

## CNSVS









The CNS Vital Signs test is a computerized neurocognitive testing combination that is supported by many top universities as a means of assessing actual cognitive function. This low cost and highly researched testing battery allows you to establish a baseline in addition to assess the success of a treatment protocol. This can be re-tested throughout the course of care to ensure that your care is fully optimized.

Patient Profile:	Percentile Range				> 74	25 - 74	9 - 24	2 - 8	< 2
	Standard Score Range				> 109	90 - 109	80 - 89	70 - 79	< 70
Domain Scores	Subject Score	Standard Score	Percentile	VI**	Above	Average	Low Average	Low	Very Low
Neurocognition Index (NCI)	NA	96	40	Yes		x			
Composite Memory	90	80	9	Yes			x		
Verbal Memory	50	89	23	Yes			x		
Visual Memory	40	79	8	Yes				x	
Processing Speed	67	102	55	Yes		x			
Executive Function	56	108	70	Yes		x			
Psychomotor Speed	189	103	58	Yes		x			
Reaction Time*	551	108	70	Yes		x			
Complex Attention*	11	86	18	Yes			x		
Cognitive Flexibility	51	102	55	Yes		x			
Total Test Time (min: secs)	54:53				Total time taken to complete the tests shown.				



## Toxicity Panel

We discussed earlier the impact of toxicities on the brain leading to death of brain cells (apoptosis) as well as acting as a trigger for beta-amyloid and tau. These toxins are often woven into our daily environment and unless a conscious effort is made to avoid these, they build up until disease manifests. Due to the aggregating nature of many of these toxicities, we must be mindful of exposures throughout our entire life as well as any potential offenders passed on by a parent. Below you will see the results of a toxicity test that exemplifies the cumulative effects of not just one culprit, but many working against the brain. Testing like this can help stimulate thought on potential sources as well as create a target for treatment. Do you know what you have been exposed to throughout your life?

High (>95th percentile)						
TEST NAME	CURRENT RESULT	PREVIOUS RESULT	Mycotoxins		REFERENCE	
			CURRENT RESULT	PREVIOUS RESULT		
 Aflatoxin B1 (AFB1)	14.96		0	3.9	6.93	≤6.93 ng/g
 Aflatoxin G2	12.47		0	6.08	10.8	≤10.8 ng/g
 Aflatoxin M1	7.92		0	3.6	6.4	≤6.4 ng/g
 Fumonisin B1	8.85		0	3.45	6.13	≤6.13 ng/g
 Thallium*	0.87		0	0.24	0.43	≤0.43 ug/g
 Uranium*	0.68		0	0.02	0.04	≤0.04 ug/g
 Bisphenol A (BPA)*	12.48		0	2.12	5.09	≤5.09 ug/g
 Dimethylthiophosphate (DMTP)*	48.98		0	5.91	33.7	≤33.7 ug/g

\* Indicates NHANES population data reference ranges.

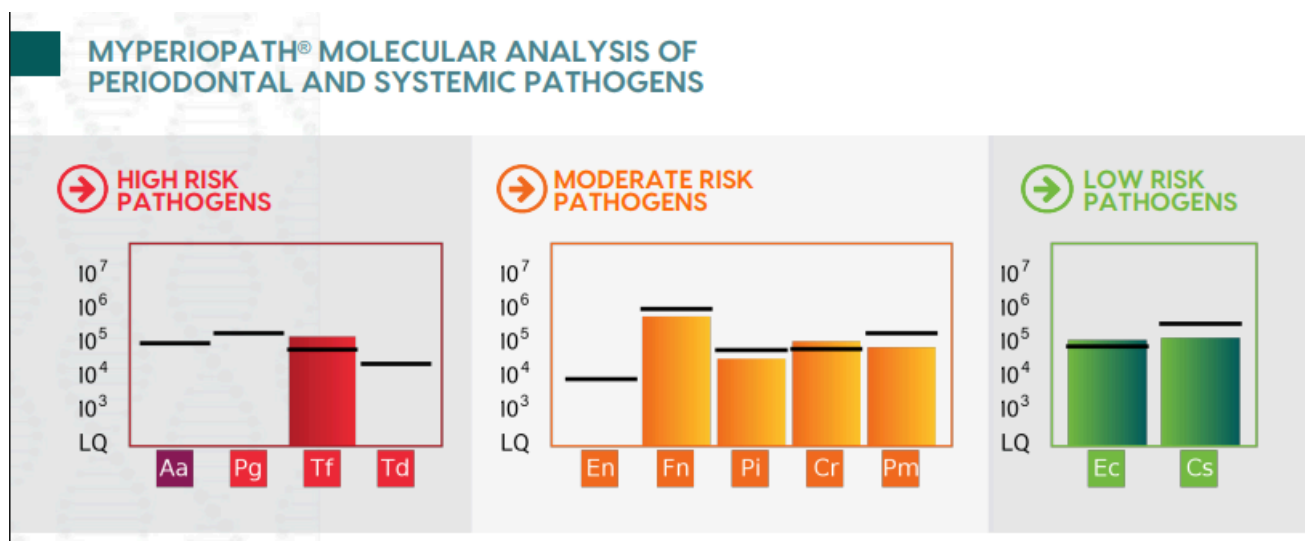
## Gut Zoomer

It is widely accepted the important of gut health on many aspects of our health and a factor in numerous disease. Cognitive diseases are not met with exception. An appropriately named paper titled, “The gut microbiome and Alzheimer’s disease: Complex and bidirectional interactions” published in Neuroscience Biobehavioral review has found just that. An excerpt from this review states, “Emerging data from animal and clinical studies support an important role for gut dysbiosis in mediating neuroinflammation, central and peripheral immune dysregulation, abnormal brain protein aggregation, and impaired intestinal and brain barrier permeability, leading to neuronal loss and cognitive impairment. Gut dysbiosis has also been shown to directly influence various mechanisms involved in neuronal growth and repair, synaptic plasticity, and memory and learning functions”. Essentially, gut dysfunction leads to amyloid and tau clumps, increased inflammation, a breaking down of the barrier system that is supposed to protect the brain, blocks the nutrients to heal the brain and confuses the immune system so it can not clean or protect the brain. Simply put, an unhealthy gut WILL lead to an unhealthy brain, the only unknown, is to what severity. The image below is just one portion of the Gut Zoomer stool test that indicates an elevated gluten reaction, poor detoxification and “leaky gut” which now allows the intestinal inflammation and toxins into the bloodstream to potentially travel to the brain.

Other Markers				
MARKER	RESULT			COMMENT
	CURRENT	REF RANGE	PREV	
slgA	607.1 mcg/g	426.0~1450.0		
β-glucuronidase	485 U/mL	≤2300		
Fecal Occult Blood	5.8 mcg/g	≤10.0		
pH	6.2	6.1~7.8		
Fecal Zonulin	328.0 ng/mL	25.1~160.8		Elevation indicative of intestinal permeability. Addressing gut dysbiosis and low diversity if any. Checking for food sensitivities at peptide and protein level recommended.
Fecal Anti Gliadin	233.5 U/L	≤148.0		Fecal Anti Gliadin is a less sensitive marker of wheat sensitivity in comparison to serum antibodies to peptide fragments of wheat. Individuals may consider running a Wheat Zoomer and/or following a gluten free diet.

## Oral DNA/infection panel

A study by Beydoun et al. (2020), published in the *Journal of Alzheimer's Disease*, explored whether signs of gum disease and certain bacteria linked to periodontitis are connected to a higher risk of developing Alzheimer's disease or other types of dementia. Using long-term health data from over 6,000 adults in the U.S., the researchers followed participants for up to 26 years. They found that in adults aged 65 and older, deeper gum pockets and higher immune responses (IgG antibodies) to specific bacteria like *Porphyromonas gingivalis* and *Campylobacter rectus* were linked to a greater risk of Alzheimer's. In fact, people with higher antibody levels to a group of these bacteria were up to 46% more likely to die from Alzheimer's-related causes. These findings suggest that gum disease, and especially the bacteria involved, may play a role in brain health and the development of dementia, highlighting the importance of oral health in older adults.



While these are featured tests that are commonly utilized for the detection of triggering factors of cognitive decline, there are many more. It is all about discovering each individual's personal risk factors. Like finding all the pieces of a puzzle. Other tests to consider and be aware of include:

- [MARCON's Nasal Infection](#)
- [Lyme and chronic infections](#)
- [Lyme Autoimmunity](#)
- [Neural Autoimmunity](#)
- [Food Sensitivity](#)
- [Organic Acid Testing](#)
- [DUTCH Hormone Testing](#)
- [Comprehensive Bloodwork](#)

# SUPPLEMENTATION

Your supplementation protocol should be personalized to address your personal risk factors. The benefit of lab testing is to discover these and allows you to create a sufficient yet powerful list of supplements. We will look at a few that have robust research that should be considered in your cognitive health arsenal.

## Foundational

The following four supplements are must haves to not only prevent cognitive decline but also for general health to protect you against general disease and optimize health and vitality. This is a great place to start if you have not been on a regular supplement routine or have not completed testing yet.

## Vitamin D

A study published in *The American Journal of Clinical Nutrition* on April 22, 2022, suggests that low vitamin D levels may increase the risk of developing dementia and stroke. The research analyzed data from over 294,000 individuals, primarily women over 60, in the United Kingdom. Participants with vitamin D deficiency (levels below 25 nanomoles per liter) had a 54% higher chance of developing dementia over the following 11 years compared to those with normal levels (at least 50 nmol/L). However, the study's observational nature means it cannot confirm that vitamin D deficiency directly causes dementia or stroke. The findings highlight the importance of maintaining adequate vitamin D levels for overall brain health. A 2022 study in *Neurology* showed that low serum vitamin D is associated with a 54% increased risk of dementia. -The American Journal of Clinical Nutrition

Two great options include **Pure D3/K2** drops for an easy liquid option or **ADEK Synergy** for a complete fat soluble vitamin in a small capsule form.



## Omega 3 fatty acids

Omega-3 fatty acids—especially the types called DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid)—are essential fats found in fish like salmon, mackerel, and sardines, and they play a major role in keeping our brains healthy. These fats help build and repair brain cells and reduce inflammation, which is important because chronic inflammation is linked to memory loss and other signs of cognitive decline. Studies show that people who regularly consume more omega-3s tend to have better memory, focus, and mental sharpness as they age. Even in middle age, higher omega-3 levels are associated with a larger hippocampus—the brain area responsible for memory.

Research also suggests omega-3s may help delay or slow the progression of Alzheimer’s disease. A large review published in *Frontiers in Aging Neuroscience* (2020) found that omega-3 supplementation improved cognitive function in people with mild cognitive impairment (MCI), a common early stage of Alzheimer’s. Another study from the *Journal of Alzheimer’s Disease* showed that individuals with higher DHA levels had a 49% reduced risk of developing Alzheimer’s compared to those with low levels. While omega-3s aren’t a cure, getting enough—whether from fish or high-quality supplements—can be a simple, powerful way to support brain health as we age.

There are several great options to achieve optimal optimal omega 3 status. This can also be tested in bloodwork to establish individual dosage.

A few options are: **Tripure Omega**, **DHA Supreme** and **Ultra Omega Liquid**.



## Magnesium

Magnesium is a vital mineral that plays a key role in keeping your brain and nervous system working properly. It helps regulate nerve signals, supports healthy brain cell communication, and even protects against overexcitation of neurons—which can lead to damage over time. As we age, many people don't get enough magnesium from their diets, and research suggests this deficiency may be linked to memory problems and a greater risk of cognitive decline. Magnesium-rich foods like leafy greens, nuts, seeds, whole grains, and beans can help keep your brain functioning at its best.

Several studies have shown a promising connection between magnesium and brain health. A 2022 study published in *European Journal of Nutrition* found that higher magnesium intake was associated with better brain volumes and fewer age-related changes in brain structure, especially in women. Another study in *Neuron* showed that increasing magnesium levels in the brain improved learning abilities, working memory, and short- and long-term memory in animals. While more human trials are needed, these findings suggest that getting enough magnesium may be a simple, natural way to help protect your brain from decline and potentially lower your risk of developing Alzheimer's disease.

Great options would be **Daily Mag Neuro** and **Brain Mag**.



## B Vitamins

B vitamins—especially B6, B9 (folate), and B12—are crucial for maintaining a healthy brain, particularly as we age. These vitamins help reduce levels of homocysteine, an amino acid that, when elevated, has been linked to brain shrinkage and a greater risk of cognitive decline and Alzheimer’s disease. B vitamins also play key roles in producing neurotransmitters, the brain’s chemical messengers, which are essential for mood, memory, and clear thinking. Without enough B vitamins, the brain can struggle to perform these basic functions efficiently.

Research supports their role in slowing cognitive decline. A study published in *Proceedings of the National Academy of Sciences* (2010) found that high doses of B6, B9, and B12 significantly slowed brain atrophy in older adults with mild cognitive impairment—a condition that often leads to Alzheimer’s. Participants who had high homocysteine levels saw the most benefit, suggesting B vitamins may be especially helpful for those at greater risk. Check out **B Synergy** which includes several b vitamins in the PROPER methylated form.



## LEVEL 2 SUPPLEMENTS

At this point you have incorporated the first four foundational supplements into your routine and you're looking to level up. These next three supplements are just as important as the first 3 and are encouraged regardless of lab testing.

### Creatine

A personal favorite that has been a staple in my own supplement routine for over 15 years for the initial purpose of sports performance and now the cognitive benefits. The brain, like muscles, needs a lot of energy to function properly—and creatine helps supply that energy. In times of stress, aging, or disease, the brain's energy production can slow down, which may lead to problems with memory, focus, and thinking clearly. Supplementing with creatine may support brain energy metabolism, reduce mental fatigue, and help maintain cognitive function, especially in older adults or those at risk of cognitive decline.

Research on creatine and brain health is growing. A 2022 review published in *Nutrients* found that creatine supplementation improved short-term memory and reasoning in older adults, particularly when their diets were low in creatine (such as in vegetarians). Other studies suggest creatine may help protect brain cells from damage and support mitochondrial function, which is crucial in diseases like Alzheimer's. While it's not a treatment for Alzheimer's, creatine shows promise as a low-risk supplement to support brain energy, especially when combined with a healthy lifestyle.

Shop for creatine [here](#).



## Melatonin

Melatonin is a natural hormone your body makes to help regulate sleep, but it also plays an important role in brain health. As we age, melatonin levels naturally decline, and this drop is linked to sleep disturbances that are common in older adults and people with Alzheimer’s disease. Poor sleep can accelerate memory loss and worsen brain inflammation. Melatonin doesn’t just help you fall asleep—it also acts as a powerful antioxidant that protects brain cells from damage, which is especially valuable in preventing or slowing cognitive decline.

Research supports melatonin’s potential role in Alzheimer’s prevention and treatment. A study published in *Current Neuropharmacology* (2010) found that melatonin supplementation helped reduce the buildup of beta-amyloid plaques—one of the key markers of Alzheimer’s—in animal models. Other human studies have shown that melatonin may improve sleep quality and slow down the progression of cognitive decline in patients with mild cognitive impairment (MCI). While it’s not a cure, melatonin may support brain health by improving sleep and protecting against oxidative stress—both of which are crucial in preserving memory and cognitive function as we age. This research is only the tip of the iceberg, melatonin is profound for your health.

Shop for [Melatonin SRT](#), [Melatonin Ultra](#), and [Melatonin Max](#).



## MCT Oil

MCT oil, short for medium-chain triglyceride oil, is a type of fat that the body quickly converts into ketones—an alternative energy source for the brain. This is especially important for people with cognitive decline or Alzheimer’s disease, where the brain has a harder time using glucose (its main fuel). By providing a clean, efficient energy source in the form of ketones, MCT oil may help support clearer thinking, better memory, and improved mental energy. It’s often derived from coconut or palm oil and can be easily added to smoothies, coffee, or meals.

Research has shown that MCT oil may benefit people with mild cognitive impairment (MCI) and early Alzheimer’s. A 2019 study which we have referenced earlier and published in the journal *Alzheimer’s & Dementia* found that a daily drink containing MCTs improved memory and overall brain function in older adults with MCI. The participants’ improvements were linked to higher levels of ketones in their blood, showing that the brain was getting an energy boost from the MCTs.



### **BHB Supreme:**

Exogenous ketones are supplements that provide your body with ketones—energy-rich molecules usually produced during fasting or a low-carb, ketogenic diet. These ketones, especially beta-hydroxybutyrate (BHB), can serve as an alternative fuel for the brain, which is important because people with Alzheimer’s disease often struggle to use glucose efficiently. By supplying the brain with a direct, efficient energy source, exogenous ketones may help improve mental clarity, focus, and memory, even in those experiencing early cognitive decline.

Research supports this potential. A 2020 study published in *Frontiers in Aging Neuroscience* found that older adults with mild cognitive impairment (MCI) who took exogenous ketone supplements showed improved working memory and processing speed compared to a placebo group. The benefits were linked to increased blood ketone levels and better brain energy metabolism. Other studies have suggested that ketone therapy could help slow brain aging and protect neurons from damage.

My personal favorite is the **BHB Supreme** as it also contains which amino acids which works synergistically to support metabolic health and brain function.



## Choline

Choline is an essential nutrient that plays a big role in keeping your brain healthy. It's a key building block for acetylcholine, a neurotransmitter that helps with memory, mood, and muscle control. Without enough choline, the brain can't send messages as efficiently, which can affect how well you think and remember. Choline also helps maintain the structure of brain cells and reduces inflammation—two important factors in long-term brain health. Foods like eggs, liver, and salmon are rich in choline, but many people, especially older adults, don't get enough through their diets.

Research has linked higher choline intake to better cognitive performance and a lower risk of Alzheimer's disease. A study published in *The American Journal of Clinical Nutrition* (2011) found that adults with higher choline levels performed better on memory and verbal learning tests. More recently, a 2019 study from Arizona State University showed that lifelong choline supplementation in mice significantly reduced the buildup of amyloid plaques and improved memory in a model of Alzheimer's disease. While human studies are still ongoing, the research suggests that choline is a simple but powerful nutrient that supports brain function and may help slow cognitive decline when included as part of a healthy lifestyle. It can be tough to get enough choline through diet so it can be helpful to add a supplement like **PC Max**. It is best blended into a hot beverage or smoothie.



## **Brain Recharge**

This unique supplement can be used situation and has a trio of powerful brain supporting nutrients.

Ginkgo biloba, a plant extract used for centuries in traditional medicine, has been studied for its potential benefits in treating Alzheimer's disease and improving cognitive function. Some research suggests that ginkgo may help enhance memory, concentration, and overall brain function by increasing blood flow to the brain and acting as an antioxidant, which can protect brain cells from damage. Several studies, including a review published in *Cochrane Database of Systematic Reviews* (2015), have shown that ginkgo can have a small but positive effect on cognitive symptoms in people with Alzheimer's, improving memory and reducing behavioral issues.

Huperzine A, a compound extracted from the Chinese club moss plant, has shown potential in supporting brain function, especially in terms of memory and cognitive performance. It works by inhibiting the enzyme that breaks down acetylcholine, a neurotransmitter crucial for memory and learning. By increasing acetylcholine levels, huperzine A may help improve focus, recall, and mental clarity. Research suggests that it could be particularly beneficial for people with Alzheimer's disease or age-related cognitive decline, as it may enhance memory and slow the progression of cognitive impairment.

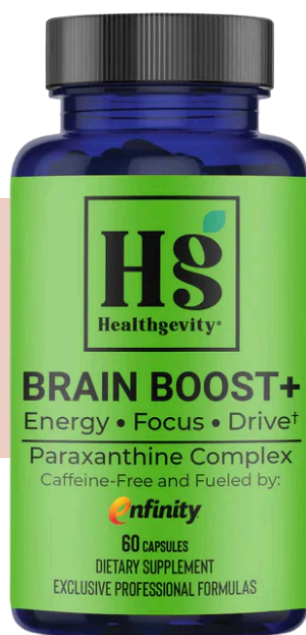
Vinpocetine, a compound derived from the periwinkle plant, is known for its potential to improve brain function by enhancing blood flow to the brain. By increasing circulation, it helps deliver more oxygen and nutrients to brain cells, which can boost cognitive performance, focus, and memory. Vinpocetine also has antioxidant properties that protect brain cells from oxidative stress and inflammation, which are linked to age-related cognitive decline. Some studies suggest that vinpocetine may help improve mental clarity and support brain health, making it a promising supplement for enhancing cognitive function, especially in older adults.



## Brain Boost

A truly unique supplement that I can make a profound impact regardless of what state your brain is in. While it has several ingredients the two that pack the most punch are lions mane and Paraxanthine which is a metabolite of caffeine, has been shown to offer several brain-boosting benefits. It works by stimulating the central nervous system, improving alertness, focus, and cognitive performance without the jitteriness or crash often associated with caffeine. Paraxanthine has been found to enhance memory, attention, and mental clarity by increasing dopamine and norepinephrine levels in the brain. Research also suggests that it may improve mood and reduce mental fatigue, making it a promising compound for enhancing overall brain function, especially for tasks requiring sustained attention and concentration.

Lion's mane, a medicinal mushroom, has gained attention for its potential to support brain health and combat cognitive decline, including Alzheimer's disease. It contains compounds that stimulate the production of BDNF (brain-derived neurotrophic factor), a protein that supports the growth, maintenance, and survival of brain cells. Higher levels of BDNF are linked to improved memory, learning, and overall cognitive function. Research suggests that lion's mane may help protect against neurodegeneration, reduce inflammation, and even stimulate the regeneration of nerve cells, potentially slowing the progression of Alzheimer's disease and enhancing cognitive function in older adults.





## CONCLUSION

In conclusion, a functional medicine approach offers a hopeful pathway for preventing and even potentially reversing Alzheimer's disease. By addressing the root causes—such as inflammation, nutrient deficiencies, hormonal imbalances, and lifestyle factors—we can empower individuals to take control of their brain health and improve their quality of life. This personalized, holistic strategy provides new avenues for treatment, beyond the limitations of conventional medicine, and brings hope to those affected by this devastating condition. If we embrace these scientifically supported methods, we can begin to transform the way we approach Alzheimer's, giving both patients and caregivers renewed hope for the future. Now is the time to take action—through dietary changes, lifestyle improvements, and targeted interventions—we can make a meaningful difference in the fight against Alzheimer's disease.

If you're looking for personalized guidance, we would love to support you on your healthy journey. At Chi Rho, we offer comprehensive testing and tailored protocols to help you achieve optimal health.

**[Click here](#)** to learn more about becoming a Chi Rho client and taking the next steps toward a healthy brain and life.

