

## **Maintain Your Brain**

*Take a multifaceted approach to protect your brain from degenerative diseases like Alzheimer's*

By Lindsay Wilson

A mind is a terrible thing to waste. These words have never rung more true than when it comes to Alzheimer's disease. One of the most debilitating degenerative diseases of our time, Alzheimer's robs a person of his or her mind, destroying brain cells and leading to extreme memory loss and behavior problems. As many as 5.3 million Americans are living with Alzheimer's and it is predicted that healthcare costs for the disease will exceed one trillion dollars by 2050.<sup>i</sup> However, researchers calculate that delaying Alzheimer's disease onset by one or two years could significantly decrease the disease burden by 2050 by 9.5 million or 23 million cases, respectively.<sup>ii</sup> With this sort of information in mind, much research is shifting from finding a cure to prevention and searching for ways to delay onset and slow progression.

Alzheimer's is a neurological disease in which brain nerve cells (neurons) deteriorate and die. Researchers have found two abnormal structures—plaques and tangles—that are the prime suspects in damaging and killing brain cells in Alzheimer's. Plaques build up between nerve cells and contain deposits of a protein called beta amyloid. Tangles are twisted fibers of another protein called tau proteins. The plaques and tangles tend to form in a predictable pattern, beginning in areas important in learning and memory and then spreading to other regions.<sup>iii</sup>

It is believed that long-term oxidative stress and inflammation may be factors in the development of Alzheimer's; therefore, much of the current research is investigating how diet and particular nutrients like antioxidants and essential fatty acids (EFAs) may play a role in protecting the brain from oxidative damage, inflammation, and amyloid plaque.

Lifestyle habits, including diet and exercise, may have a profound affect in protecting the brain from Alzheimer's. A study conducted at the Columbia University Medical Center in NYC and published last summer in the *Journal of the American Medical Association*, found that those subjects who consumed the most foods found in the Mediterranean diet—vegetables, fruit, fish, olive oil, nuts, and legumes—and who were physically active, had a lower risk of developing the disease.<sup>iv</sup>

The Mediterranean diet combines several foods and nutrients that are potentially neuroprotective, including fish, monounsaturated fatty acids, vitamins B12 and folate, and antioxidants (vitamin E, carotenoids, flavonoids).

It is known that certain phytonutrients protect cells (including brain cells) from oxidative damage and inflammation; some of them also seem to protect the brain from the buildup of the amyloid plaques associated with Alzheimer's. Curcumin, epigallocatechin (EGCG), and resveratrol, phytonutrients that are known to have potent antioxidant and anti-inflammatory properties, are a few that have been researched.

## Curcumin

It is well known that curcumin exhibits significant antioxidant and anti-inflammatory properties, and now, a number of in-vitro and animal models of Alzheimer's disease studies have indicated that curcumin has a direct effect in decreasing amyloid plaque buildup, helping to break it apart<sup>v</sup> and possibly preventing it from forming in the first place.<sup>vi vii viii ix</sup> Research published in *Food and Chemical Toxicology* found that curcumin also protected cells from damage from amyloid plaques by decreasing oxidative and DNA damage to the brain cells.<sup>x</sup> Human clinical trials are currently underway, but population studies have shown that populations who consume a large amount of curcumin (in the form of turmeric) have a significantly lower risk of developing Alzheimer's compared to those populations who consume little to no curcumin.<sup>xi xii</sup>

## Green tea

Another phytonutrient showing promise in Alzheimer's research is epigallocatechin (EGCG), found in green tea. A 2005 paper reported that the EGCG in green tea reduced amyloid plaque formation in Alzheimer mice.<sup>xiii</sup> Later, in 2008, the same researchers reported that they gave mice that were engineered to develop Alzheimer's disease green tea extracts in water for six months. Drinking their daily green tea halved the amyloid plaque deposited in the brains of the mice.<sup>xiv</sup> That same year, a team of German researchers found that EGCG appears to change potentially harmful amyloid proteins into proteins that are nontoxic to brain cells.<sup>xv</sup> A 2009 study found that EGCG reduced amyloid-induced memory dysfunction, and actually enhanced memory function, as well as reducing amyloid plaque levels and inhibiting amyloid-induced neuron cell death in the brain.<sup>xvi</sup>

## Resveratrol

Several epidemiological studies indicate that moderate consumption of red wine is associated with a lower incidence of dementia and Alzheimer's disease. Red wine is a source of resveratrol, an antioxidant with potential neuroprotective effects. A number of studies have indicated that like curcumin and EGCG, resveratrol also promotes the break down of amyloid plaque.<sup>xvii xviii xix xx</sup> Additionally, a Chinese study indicated that resveratrol could improve cognitive ability in Alzheimer mice.<sup>xxi</sup>

## Other nutrients

In addition to the protective antioxidant phytonutrients mentioned above, other nutrients are gaining support for use in protecting the brain from Alzheimer's disease. In a small human study of nine Alzheimer's patients, vitamin D, in combination with curcumin, was shown to strongly stimulate the uptake and absorption of amyloid beta by macrophages in a majority of patients. Macrophages act as the immune system's clean-up crew, traveling through the brain and body, mopping up waste products, including amyloid plaque.<sup>xxii</sup>

Another powerful antioxidant, alpha lipoic acid (ALA), has been shown to have a variety of properties that can interfere with the development or progression of Alzheimer's disease, including down regulating the expression of pro-inflammatory proteins and increasing production of acetylcholine, an important neurotransmitter; a deficiency of acetylcholine has been linked to the development of Alzheimer's.<sup>xxiii</sup> Researchers say that "data from cell culture and animal models suggest that ALA could be combined with curcumin, EGCG, and

DHA from fish oil to synergistically decrease oxidative stress, inflammation, amyloid levels and amyloid plaque load associated with Alzheimer's disease.”<sup>xxiv</sup>

Epidemiological studies suggest that increased intake of the omega-3 fatty acids found in fish oil, particularly DHA, is associated with a reduced risk of developing Alzheimer's. It is believed that DHA suppresses neuro-inflammation and oxidative damage that contribute to neuronal dysfunction.<sup>xxv</sup> DHA also appears to slow the development of Alzheimer's by reducing amyloid plaque buildup. A mouse model showed that a DHA-enriched diet significantly reduced overall plaque burden by 40.3 percent. The researchers concluded that “the results suggest that dietary DHA could be protective against beta amyloid production, accumulation, and potential downstream toxicity.”<sup>xxvi</sup> In addition to having its own neuro-protective effects, fish oil has also been shown to enhance bioavailability of other protective phytonutrients, including EGCG and curcumin, while also working synergistically with these antioxidants to inhibit amyloid deposits.<sup>xxvii xxviii</sup>

### **A multifaceted approach**

Alzheimer's is a complex disease, and it is important to note that there is no magic bullet to prevent or cure it. Additionally, researchers have found that the disease is often already far progressed before any noticeable symptoms appear, which makes it difficult to treat. It is also important to note that much of the research has been done in vitro and on animal models, though a few human clinical trials are currently underway. However, we do know that like in most degenerative diseases, chronic inflammation and oxidative damage play a role. We also know that there is a number of phytonutrients and other nutrients that work together to protect the health of the brain by reducing inflammation, oxidative stress, and amyloid plaque buildup. Lifestyle habits, including diet and exercise, also play an important role in the prevention of developing a disease like Alzheimer's. Take a multifaceted approach in maintaining the health of your brain, because remember... a mind is a terrible thing to waste.

*References available on request*