

# Neuroprotective Effects of Astaxanthin

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Some other nutraceuticals have begun to attain a certain level of fame for having beneficial properties for the brain. But due to Astaxanthin's superior antioxidant and anti-inflammatory properties as well as a recent flurry of research in this area, indications are that it is superior to all other nutraceuticals for brain health. There is substantial evidence that most diseases associated with the brain are the result of oxidation and/or inflammation. Free radicals and singlet oxygen wreak havoc over time in your head, and the consequences, if left unchecked, manifest in such horrible diseases as:

- Alzheimer's disease
- Parkinson's disease
- Huntington's disease
- Amyotrophic lateral sclerosis (Lou Gehrig's disease)
- Senility
- Injuries resulting from trauma
- Inflammatory injuries
- Other forms of age-related dementia

It is essential that people take antioxidants that can cross the blood-brain barrier as they get older to protect the brain and central nervous system. Scientists believe that something may cause people's internal antioxidant defense system to malfunction or wear out as we age. Our bodies may lose the ability to produce high levels of the antioxidants that are normally produced internally such as superoxide dismutase, catalase and glutathione peroxidase. Also, our bodies are now subjected to unprecedented levels of oxidation caused by environmental factors such as pollution, containments, processed food and the high levels of stress in modern life. All of these lead to an assault on our vital organs as we age, particularly our brains and eyes.

Recent research has further validated Astaxanthin's ability to protect our central nervous system. A great deal of this research has been centered on the neuroprotective benefits of Astaxanthin. Two human clinical trials were done in Japan in the last two years in this area. The first study took ten elderly subjects with age-related forgetfulness and administered 12 mg of Astaxanthin each day for 12 weeks. The researchers found efficacy for age-related decline in cognitive and psychomotor function (Satoh, et al, 2009).

The second study was randomized, double-blind and placebo-controlled; a state of the art study in human volunteers. After 12 weeks at either 6 mg or 12 mg daily Astaxanthin dosages, subjects were found to have decreased levels of phospholipid

hydroperoxides (which accumulate in people suffering from dementia), as well as improved erythrocyte antioxidant status. The researchers concluded that Astaxanthin supplementation may contribute to the prevention of dementia in humans as we age (Nakagawa, et al, 2011).

There have been several other studies in the last two years showing evidence that Astaxanthin may be the very best supplement for brain health:

- Human brain cells were subjected to an oxidative stress-induced neuronal cell damage system at Nagoya University in Japan. Significant protection was found in cells pre-treated with Astaxanthin. Additionally, pre-treatment with Astaxanthin inhibited the generation of reactive oxygen species. The authors concluded “The neuroprotective effect of Astaxanthin is suggested to be dependent upon its antioxidant potential and mitochondria protection; therefore, it is strongly suggested that treatment with Astaxanthin may be effective for oxidative stress-associated neurodegeneration and a potential candidate for natural brain food” (Liu, et al, 2009).
- A different set of researchers in the USA at University of Pittsburgh’s medical school also found Astaxanthin to have neuroprotective effects; they too attributed this to its potent antioxidant activity (Lee, et al, 2010)
- Researchers at a biotechnology university in Taiwan concluded that Astaxanthin could be used as a potent neuron protectant and as a therapy for early stages of Alzheimer’s disease (Chang, et al, 2010)
- Astaxanthin can protect against damage from ischemia (Ischemia is the condition where there is a deficient supply of blood to the brain as a result of an obstruction of the arteries which results in stroke, brain cell death and impaired brain function). The researchers attributed Astaxanthin’s benefits to its intense antioxidant activity (Curek, et al, 2010)
- Another study found that pretreatment with Astaxanthin 5 hours and again 1 hour before ischemia provided protection against brain damage (Lu, et al, 2010)
- Astaxanthin was found to be a potent agent against neurodegenerative disorders (Chan, et al, 2010)
- Brain cell death was reduced by Astaxanthin (Wang, et al, 2010)
- Lastly, Astaxanthin displayed an ability to improve the proliferation of neural stem cells (Kim, et al, 2010)

The flurry of research activity in 2009 and 2010 were not the first studies on Astaxanthin’s benefits for the brain; a series of tests on rodents prior to this at the International Research Center for Traditional Medicine in Japan showed Astaxanthin’s potential as a supplement for the brain. In the first experiment, blood pressure was reduced by the introduction of Astaxanthin to hypertensive rats. Blood pressure is a causative factor for many diseases including some associated with the eyes and brain. The researchers went on to examine the effects of Astaxanthin on stroke prone rats. They found that after five weeks of continuous supplementation, the incidence of stroke was delayed in the treated group. Next, they established a possible mechanism for these results in-vitro, which they believed to be nitric oxide suppression.

The same study went on to demonstrate a neuroprotective effect on ischemic mice. In the case of these mice, ischemia was induced by blocking the carotid artery. In humans, this condition can be caused by plaque buildup which can block the flow of blood through the carotid artery in the neck, the primary source of blood to the brain. This build up of plaque can lead to many different types of dementia.

The ischemic mice were fed Astaxanthin only once—just one hour before the ischemia was induced. Remarkable results were seen in the treated group—the mice performed better in a maze designed as a learning performance test. “The present results suggest that Astaxanthin can attenuate the development of hypertension and may help to protect the brain from stroke and ischemic insults...In addition, Astaxanthin showed neuroprotective effects at relatively high doses by preventing the ischemia-induced impairment of spatial memory in mice. This effect is suggested to be due to the significant antioxidant property of Astaxanthin on ischemia-induced free radicals and their consequent pathological cerebral and neural effects. The current result indicates that Astaxanthin may have beneficial effects in improving memory in vascular dementia” (Hussein, et al, 2005). It appears that Astaxanthin actually made these mice with restricted blood flow to their brains smarter by improving their memory.

A similar study had been done previously and was published in “Carotenoid Science.” This study also demonstrated that Astaxanthin could prevent brain damage due to ischemia (Kudo, et al, 2002). A company in Japan did some further work in this area in a rat model. The company fed rats Astaxanthin twice: Twenty four hours before and again one hour before inducing ischemia by occluding the rats’ middle arteries. The blood flow stoppage duration was one hour, at which point blood flow to the brain was permitted to resume. The rats were given one more dose of Astaxanthin after blood flow restarted, and then two hours later the rats were sacrificed and their brains were removed. The brains were compared to rats from a control group fed olive oil, and it was found that the rats fed Astaxanthin had 40% less brain damage than the control group (Oryza, 2006).

To summarize, there is strong evidence that Astaxanthin holds great promise for those wishing to prevent cognitive diseases and maintain general brain health. In particular, daily supplementation with Astaxanthin may have tremendous benefits for those wishing to protect their brains as they age. The implications of the studies cited above are extremely exciting, as our aging population sees growing numbers of Alzheimer’s patients, stroke sufferers and people afflicted by dementia caused by other factors; Astaxanthin could be the magic bullet to prevent many of these maladies.

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