

## The Neuroprotective Effect of Astaxanthin

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Certain nutraceuticals have attained a level of fame for having beneficial properties for the brain. Due to astaxanthin's superior antioxidant and anti-inflammatory properties, indications are that it could prove to be 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 in your head. The consequences, if left unchecked, manifest in such horrible diseases as Alzheimer's, Parkinson's disease, Huntington's and Lou Gehrig's disease, as well as senility, traumatic or inflammatory injuries, and other forms of age-related dementia.

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

Many antioxidants, and even carotenoids that are closely related to natural astaxanthin cannot cross the blood-brain barrier. Mark Tso, PhD, was the first person to show that astaxanthin could cross the blood-brain barrier. He took laboratory rats and tested their eyes for astaxanthin. As expected, he did not find any present. Then he fed the rats astaxanthin and retested, this time finding astaxanthin present in the retina. His tests showed that astaxanthin could not only cross the blood-brain barrier, but also then reach the retina and the macula.

Dr. Tso went on to demonstrate that astaxanthin has [many protective properties](#) once it reaches the brain and eyes.<sup>5</sup> Among the many benefits that Dr. Tso found include astaxanthin's ability to protect the eye from light-induced damage, photoreceptor-cell damage, ganglion-cell damage, neuronal damage and inflammatory damage.

A [series of tests](#) on rodents, conducted at the International Research Center for Traditional Medicine in Japan, show astaxanthin's great potential.<sup>1</sup> 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. Researchers examined 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 in ischemic mice. Ischemia is characterized by a deficient supply of blood to the brain as a result of an obstruction of the arteries. In 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 can lead to many different maladies including stroke and different types of dementia.

The mice were fed astaxanthin only once, just one hour before the ischemia was induced. Remarkable results were seen in the treated group. According to the study authors, "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."

It appears that astaxanthin actually made the ischemic mice smarter by improving their memory. The implications of this study are extremely exciting, as our aging population includes growing numbers of Alzheimer's patients, stroke sufferers and people afflicted by dementia caused by other factors. Further research in humans must be done to fully understand the potential benefit, but these pre-clinical experiments indicate that astaxanthin may help neurology patients live better lives.

A similar study, conducted previously, also demonstrated that astaxanthin could prevent brain damage due to ischemia.<sup>2</sup> A company in Japan did some further work in this area in a rat model. The rats were fed astaxanthin twice, 24 hours and one hour before inducing ischemia. Blood flow was stopped for one hour. The rats were then given one more dose of astaxanthin and sacrificed two hours later, and their brains were removed. The brains were compared to rats from a control group fed olive oil; it was found that the rats fed astaxanthin had 40 percent less brain damage than the control group.<sup>4</sup>

The most recent study on astaxanthin's neuroprotective abilities was done at Nagoya University in Japan. Human brain cells were subjected to an oxidative stress-induced neuronal cell damage system. **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."<sup>3</sup>

In short, 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.

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## What Is Astaxanthin?

Astaxanthin (pronounced *as-tuh-zan'-thin*) is a carotenoid phytochemical and is classified as a xanthophyll, meaning "yellow leaves." As is the case with many carotenoids, it is a colorful, lipid-soluble pigment. Astaxanthin is produced by microalgae (currently the primary source of astaxanthin), as well as yeast, salmon, trout, krill, shrimp, crayfish, crustaceans, and the feathers of some birds.

## References

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