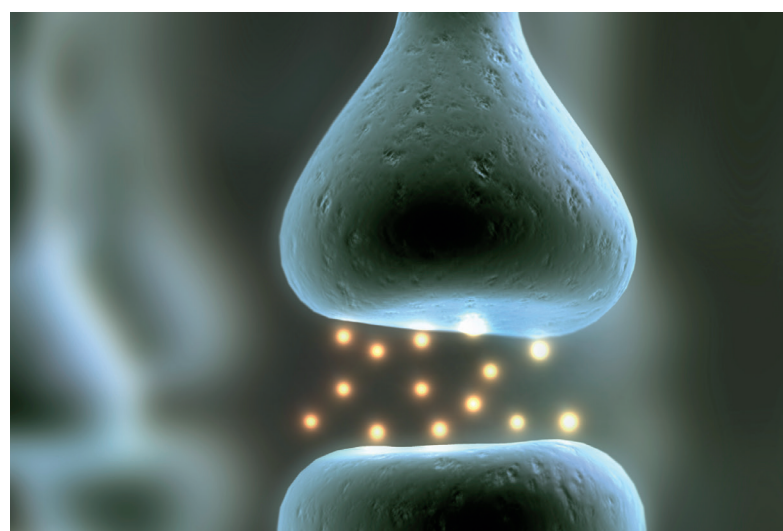


Keep Your Mind in Tune With AstaReal®

Benefits of natural astaxanthin for brain and cognitive health



Natural astaxanthin may improve symptoms of age-related forgetfulness

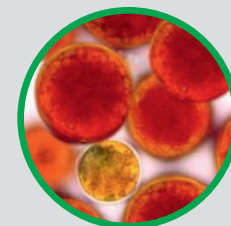
The brain, which has a volume of only 1,130 cm³ and weighs just 1.5 kg on average, contains more than 100 billion neurons, which is more than 14 times the world population. It is interconnected with over 180,000 km of nerve fibers, long enough to encircle the globe four-and-a-half times.

The brain is the primary control center of the body; processing information from the body, operating internal organs, generating thoughts and emotions, storing and allowing for recall of memories and controlling movement. Because the brain has such a vital and complex role in controlling the body's functions, it has an excellent defence system. Firstly, it is well protected by the blood brain barrier, which prevents harmful substances from reaching it. Secondly, the brain has a specialized immune system that monitors the presence of any intruders or the formation of internal injuries.

Nevertheless, the brain remains vulnerable to attack and damage by free radicals, especially in people over the age of 50 in whom the brain's natural antioxidant enzymes progressively lose effectiveness. In fact, excessive and persistent oxidative stress and chronic inflammation in the brain have been linked to the development and progression of neurodegenerative conditions such as Alzheimer's disease and Parkinson's disease and to cerebrovascular diseases, such as ischemic stroke and vascular dementia.

What is Natural Astaxanthin?

It is a naturally occurring carotenoid which is derived from the microalgae *Haematococcus pluvialis*. As well as being the most powerful antioxidant known to science, it also has

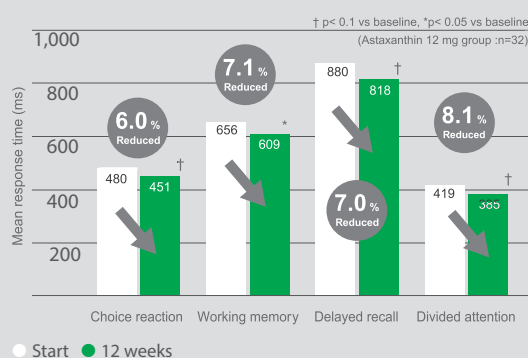


potent anti-inflammatory properties. Natural astaxanthin's distinct advantage in comparison to other antioxidants, is its ability to span the entire lipid bilayer of the cell membrane, thus providing superior protection from the inside out. Natural astaxanthin has been shown to improve brain and cognitive health.

Research & Key Findings

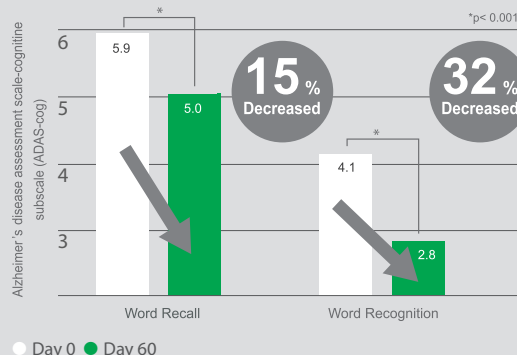
Randomized double-blind, placebo-controlled studies have shown that 3-months supplementation of natural astaxanthin (12 mg/daily) improved memory, mental quickness and multitasking in senior subjects complaining of age-related forgetfulness (2). Clinical studies also suggest that astaxanthin fights vascular dementia by reducing oxidative by-products in red blood cells – a primary factor for the prevention of vascular dementia.

Figure 1. 12 mg of astaxanthin supplementation improves cognitive function²



Healthy participants (n=96, aged 55.7±3.7) complaining of aged-related forgetfulness were randomly allocated into 3 groups and given 0, 6 and 12 mg of astaxanthin daily for 12 weeks. The cognitive functions were measured by CogHealth battery in response times on a computer. (2)

Figure 2. Astaxanthin supplementation improves ADAS-cog subscale in MCI patients¹

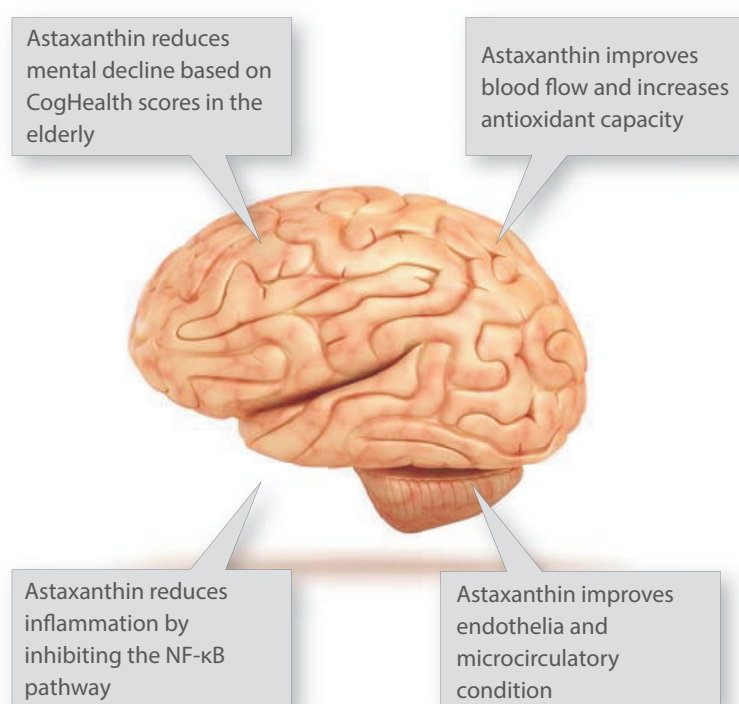


Patients diagnosed with MCI: mild cognitive impairment under non-pharmacological therapy (n=98, aged ≥50) received 4 mg of astaxanthin daily in combination with Bacopa monnieri and other antioxidants for 60 days. A higher score indicates greater dysfunction. (1)



Natural astaxanthin can cross the blood-brain barrier, providing ultimate protection for the brain

The health of the brain plays a critical role in almost everything required of the human body. For these reasons, neurologists and experts have started to pay close attention to the preventive and therapeutic effects of micronutrients on brain health. A number of clinical and experimental studies suggest that natural astaxanthin supplementation may play a role in sustaining and supporting brain and cognitive health.



Benefits of Natural Astaxanthin for Brain Health:

- 1 Improves age-related forgetfulness, multitasking and alertness
- 2 Decreases oxidation of red blood cells, which is linked to the prevention of dementia
- 3 Enhances capillary blood flow and blood antioxidant quality
- 4 Modulates blood pressure, thus lowering stroke risk and improving vascular endothelial health

AstaReal® – The Most Studied Brand

There are over 400 peer-reviewed studies on astaxanthin and AstaReal® has been featured in the vast majority of these studies. The clinical database for AstaReal® contains over 50 human studies including 23 double-blind, placebo-controlled trials with more than 1,400 participants undergoing treatments lasting from 2 weeks to 6 months.

Superior Product Range

AstaReal AB offers a range of bulk products to fit different formats, allowing for the development of innovative products that add astaxanthin's unsurpassed antioxidant power.

In addition, AstaReal AB has developed a range of finished formulations containing AstaReal® natural astaxanthin, each expertly developed to support a number of health areas.



References & Selected Natural Astaxanthin Publications

1. Zanotta *et al.*, Cognitive effects of a dietary supplement made from extract of *Bacopa monnieri*, astaxanthin, phosphatidylserine, and vitamin E in subjects with mild cognitive impairment: a noncomparative, exploratory clinical study. *NeuroPsychiatric Dis. And Treatment* 2014; 10; 225-230.
2. Katagiri *et al.*, Effects of astaxanthin-rich *Haematococcus pluvialis* extract on cognitive function: a randomised, double-blind, placebo-controlled study. *J Clin Biochem Nutr.* 2012;51(2):102-7.
3. Nakagawa *et al.*, Antioxidant effect of astaxanthin on phospholipid peroxidation in human erythrocytes. *British J. of Nutr* 2011; 105: 1563-1571.
4. Wang *et al.*, Astaxanthin upregulates heme oxygenase-1 expression through ERK1/2 pathway and its protective effect against beta-amyloid-induced cytotoxicity in SH-SY5Y cells. *Brain Research* 1360 2010; 159-167.
5. Chang *et al.*, Astaxanthin secured apoptotic death of PC12 cells induced by b-amyloid peptide 25-35: its molecular action targets. *J Med Food* 13 (3) 2010, 548-556.