

REPORT

Phosphatidylserine (PS)
The Essential Brain Nutrient

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Health headlines have preached about the necessity of calcium for bones, folic acid for the heart, and lutein for the eyes. Likewise, a number of nutrients such as ginkgo, SAMe and choline have been deemed helpful for the brain. One that's absolutely vital, though, is phosphatidylserine (PS). What makes experts so sure that we need phosphatidylserine is that the brain actually produces it. Aging slows the production of phosphatidylserine to sub-optimal levels that preclude us from functioning at full mental capacity. This is where supplementation with phosphatidylserine comes into play. A growing body of scientific findings supports the vital role of phosphatidylserine in improving and reversing the damage that age and/or disease have set in motion.

Phosphatidylserine (PS) is a phospholipid that is found in all cells, but is most highly concentrated in the walls (membranes) of brain cells, making up about 70% of its nerve tissue mass. There it aids in the storage, release and activity of many vital neurotransmitters and their receptors. Phosphatidylserine also aids in cell-to-cell communication.

Phosphatidylserine is involved in the upkeep and restoration of nerve cell membranes. Among its list of functions, phosphatidylserine stimulates the release of dopamine (a mood regulator that also control physical sensations, and movement), increases the production of acetylcholine (necessary for learning and memory), enhances brain glucose metabolism (the fuel used for brain activity), reduces cortisol levels (a stress hormone), and boosts the activity of nerve growth factor (NGF), which oversees the health of cholinergic neurons.

Research has shown that dietary supplementation with phosphatidylserine can slow and even reverse the decline of learning, mood, memory, concentration, word recall related to dementia or age-related cognitive impairment in middle-aged and elderly subjects.[1]

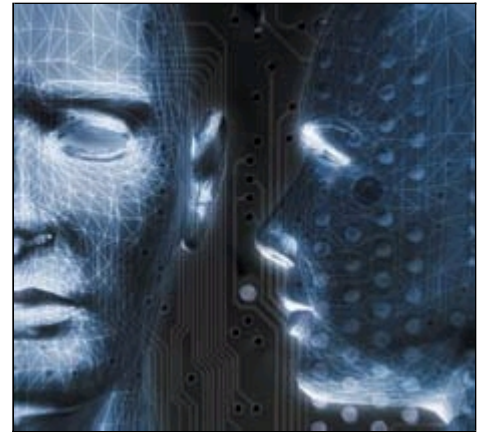
Age-related cognitive decline

Left to its own devices, the brain will succumb to the insults of age, starting by about the fourth or fifth decade of life. Putting your finger on a name, face, car keys, a phone number or a word, can become increasingly challenging and annoying with each passing decade. The net result of mental aging is cognitive decline, including a gradual loss of the ability to learn, reason, concentrate and remember-basically, a decrease in the higher brain functions. But, as scientists are discovering, phosphatidylserine can help prime the brain back to a more youthful level of activity in a number of ways.



In a multicenter Italian study, researchers assessed the effects of phosphatidylserine on senile mental deterioration and compared it to placebo. In the study, 87 test subjects, aged 55 to 80, with moderate cognitive deterioration, received either 300 milligrams of phosphatidylserine or a placebo for a 60-day period. Results from follow-up evaluation done at 60 days and then at 90 days, revealed improvements in the treatment group with regards to cognitive functions such as attention, concentration and short-term memory. Behavioral measurements also showed improvement such as in socialization aspects, daily living, and of being more engaged with one's environment and self-sufficiency.[2]

A Belgian study that examined the effects of phosphatidylserine in 35 hospitalized senile demented patients, aged 65 to 91, with mild to moderate cognitive and memory impairment, suggests an improved quality of life for such patients, as it helped to alter several behaviors. In this study, 17 patients received phosphatidylserine at 300 milligrams per day, while the other 18 were given a placebo, over the course of six



weeks. Using three different evaluation scales, the researchers measured 49 items relevant to daily living, which they subdivided into 10 categories. Items included things such as dressing, feeding, bowel and bladder control, ability to go to the toilet unaided, interpersonal relations, relationship to the environment, behavioral problems and verbal expression. Results indicated an improvement in all 10 parameters.[3]

Meanwhile, U.S. scientists at the Memory Assessment Clinics in Bethesda, MD, found that, compared to placebo, a 12-week regimen of phosphatidylserine (300 milligrams) improved learning and memory related to daily living, such as the ability to learn and recall names, faces and numbers. The study involved 149 patients, aged 50 to 75, with age-associated memory impairment. The patients were assessed prior to treatment with phosphatidylserine or placebo, then at week 3, 6, 9, 12 and 16 (four weeks after treatment ended). While improvements in three out of five evaluation criteria were noted at three weeks (learning and recalling names and faces, and facial recognition), the benefits seemed to fall off as the study continued. However, a subgroup of 57 test subjects with more severe cognitive impairment and lower daily functioning showed improvement on both computerized and standard neuropsychological performance tests and also on clinical global ratings. Improvements included name-face recall and recognition, remembering telephone numbers, misplaced objects, test paragraphs, as well as increased concentration. These effects seemed to last beyond the study period. In terms of name-face recognition, the authors report that the subgroup improved to a point that their brains returned to a much younger cognitive age, resembling the mind of a 52-year-old rather than someone who is 64.[4]

In a large, multicenter study of geriatric patients (494 patients, aged 65 to 93 years), from 23 geriatric or general medicine units with moderate to severe age-related cognitive decline, those who received phosphatidylserine treatment (300 milligrams per day for six months) showed significantly improved behavior, such as increased motivation, initiative and socialization, compared to the placebo group. Patients were examined just before starting therapy, and three and six months thereafter. The authors suggest that, "These results are clinically important since the patients were representative of the geriatric population commonly met in clinical practice."[5]

Alzheimer's dementia

In Alzheimer's disease, phosphatidylserine has been said to influence changes in the brain that can help alleviate the symptoms of senile dementia related to this disease,[6-7] such as increasing acetylcholine availability[8] and significantly enhancing brain glucose metabolism.[9]

In one study, 40 patients with probable Alzheimer's disease were assigned to four groups: The first group received social support, the second cognitive training only, the third cognitive training with pyritinol, and the fourth cognitive training with phosphatidylserine. The patients followed their respective program for six months, and underwent neuropsychological testing and brain imaging (namely positron emission tomography, or PET) to measure cerebral glucose metabolism, prior to and after treatment ended. Results indicated that the treatment group with cognitive training combined with phosphatidylserine showed a significant enhancement of glucose uptake during the stimulation tasks in various brain regions-meaning that more brain activity was occurring-and an improvement in cognitive functioning, which translated into better test performance, compared to the other groups.[9]

In 51 patients with Alzheimer's disease, a 12-week treatment with 300 milligrams of phosphatidylserine resulted in significant improvement in several cognitive functions for the treated group, compared to placebo. Differences were more dramatic among patients with less severe cognitive impairment, suggesting that phosphatidylserine may be useful in the early stages of Alzheimer's disease.[10]

Meanwhile, another study involving 33 patients with early Alzheimer's dementia demonstrated a small but significant improvement with phosphatidylserine in regards to global enhancement of mental function, as revealed using electroencephalography (EEG) mapping of brain activity.[11]



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Mood and stress

With regards to mood and stress, studies have also shown favorable results with phosphatidylserine supplementation. For example, studies in both men and women, old and young, have found that phosphatidylserine can alleviate depressive and stress-induced symptoms. Researchers at the University of Milan conducted a small study of 10 elderly women with depression, aged 70 to 81 years, treated with phosphatidylserine (300 milligrams per day) for 30 days, following a 15-day course of placebo. Results showed that phosphatidylserine increased brain turnover of noradrenaline, dopamine, acetylcholine and glucose reserves. Using the Hamilton Rating Scale for Depression (HRSD) and clinical observation, the researchers also found that, compared with pre-treatment baseline scores and controls, treatment with phosphatidylserine caused anxiety levels to decrease significantly and interests and socialization to increase, while long-term memory and learning also improved.[12]

In another study conducted at the University of Naples, Italy, researchers showed that high-doses of phosphatidylserine administered over a short period of time could elicit neuroendocrine responses to physical stress in men that suggest a positive effect on mood. The experimentation consisted of nine young, healthy men taking phosphatidylserine (at 800 milligrams per day) for 10 days. Results from blood samples revealed that phosphatidylserine significantly blunted the responses of stress hormones, such as adrenocorticotropin (ACTH) and cortisol, to physical exercise without affecting the rise in plasma growth hormone and prolactin. The authors concluded that "chronic oral administration of phosphatidylserine may counteract stress-induced activation of the hypothalamo-pituitary-adrenal axis in man." Otherwise known as the HPA, this working trio of hypothalamus, pituitary gland and adrenal glands is what's responsible for how we respond to various kinds of stress, be it emotional, mental or physical in nature. With advancing age, however, the HPA suffers decline and dysfunction, which can affect mood.[13]

Evidence has been emerging for several years now, indicating that phosphatidylserine derived from plant sources, such as soybean lecithin, may be equally effective and safer than that derived from animal brain sources.



An earlier study by the same research team, which examined physical stress response more specifically, illustrated that phosphatidylserine could offset the body's response to physical stress as shown by a marked decrease in stress hormones. The study involved eight healthy men being subjected to a series of three experiments with a bicycle ergometer. Ten minutes before starting the exercise, each subject received 50 or 75 milligrams of intravenously administered PS or a placebo. Blood samples were taken before and after the exercise for plasma epinephrine, norepinephrine, dopamine, adrenocorticotropin, cortisol, growth hormone, prolactin and glucose levels. Blood pressure and heart rate were also recorded. Physical stress increased plasma epinephrine, norepinephrine, adrenocorticotropin, cortisol, growth hormone and prolactin, but not dopamine or glucose. Results showed that phosphatidylserine administration prior to exertion decreased the physical stress response, as indicated by a significant decrease in cortisol and adrenocorticotropin, which secretes cortisol.[14]

At the University of Wales, psychology experts decided to extend such findings on cortisol response and mood by measuring self-reported feelings of stress and the change in heart rate in regards to phosphatidylserine supplementation. A group of young, healthy adults who had higher than average neuroticism scores were required to take 300 milligrams of phosphatidylserine each day for a month, then they were asked to perform a stressful mental arithmetic task. Despite the frustrating task, they reported feeling less stressed and having a better mood.[15]

Cows vs. soybean debate

One issue of debate among researchers is whether phosphatidylserine from soybean lecithin can match the abilities of bovine cortex derived phosphatidylserine, since many of the earlier, telling studies have involved the use of the latter. Bovine source phosphatidylserine, however, is not available in North America, given a concern about risk of infectious agents entering the product when extracted from cows' brains. But evidence has been emerging for several years now, indicating that phosphatidylserine derived from plant sources, such as soybean lecithin, may be equally effective and safer than that derived from animal brain sources.

In 1990, a two-month treatment study using plant-derived soybean phosphatidylserine showed positive effects on daily functioning, emotional state and self-reported general condition of Alzheimer's disease patients.[16]

A team of Tokyo scientists compared both the composition and pharmacological properties of phosphatidylserine prepared from soybean lecithin with those of bovine cortex source phosphatidylserine to improve cognitive disorders of senile dementia patients. They found a difference in their fatty acid composition. The plant derived phosphatidylserine was rich in linoleic and palmitic acids, whereas the animal source phosphatidylserine was mainly comprised of stearic and oleic acids. Despite their different makeup, both forms of phosphatidylserine, orally administered at a dose of 300 milligrams per day, were able to significantly increase brain glucose concentrations in mice, and restore memory function experimentally impeded by pharmacologically-induced amnesia in rats.[17]



In another study, Israeli researchers found that treating 15 healthy elderly volunteers with age related memory impairment with 300 milligrams per day plant-source derived phosphatidylserine for 12 weeks improved memory. The authors conclude that, if born out by large, controlled trials, "this may be a viable approach to the treatment of age-related cognitive decline, without exposing the patients to possible hazards involved in the treatment with bovine derivative of PS." [18]

A more recent Japanese study looked at how phosphatidylserine from soybean lecithin might improve memory impairment in aged rats. These researchers found that phosphatidylserine significantly improved performance in a water maze escape test compared to control aged rats, much like bovine brain cortex derived phosphatidylserine. Additionally, it also increased acetylcholine release and synaptic activity (which helps to build communication links between working brain cells).[19]

Safe and sound findings

The fact that there have been no reported toxicity issues or adverse effects with phosphatidylserine supplementation speaks to its high safety profile. A follow-up survey of Alzheimer's patients in a two-month treatment study found that phosphatidylserine is very tolerable for patients, since nearly half of the participants of the treatment group decided to continue treatment at their own expense, in contrast to none in the placebo group.[16] Likewise, in a large, multicenter study of nearly 500 geriatric patients over a six-month period, the administration of phosphatidylserine together with other drugs that they were taking failed to show any pharmacological interactions, as no clinical signs and symptoms were evident.[5] The only contraindications with other drugs to date are blood thinners, such as Coumadin and heparin-phosphatidylserine may enhance their effects.[20] This means if you are taking Coumadin and phosphatidylserine, your doctor may be able to lower the dose of Coumadin if your coagulation blood tests (Prothrombin and INR) indicate that phosphatidylserine is helping Coumadin work better.

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Given the emergence of the safer soybean lecithin-derived phosphatidylserine and the evidence building to support its role in brain health, we can consider this phospholipid a dutiful soldier in the battle against age-related cognitive decline. Moreover, a younger population may take advantage of phosphatidylserine's ability to fight stress, improve mood and sharpen mental faculties, while resting assured that this vital brain nutrient also plays a hand in preventing the damage done by passing years.

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