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Phosphatidylserine (PS)

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Phosphatidyl Serine (PS)

- A naturally occurring phospholipid and major component of brain cell membranes.
- Helps to keep brain cells functioning properly by optimizing cell-to-cell communication within the brain.
- Numerous clinical studies indicate that PS supports cognitive functions including enhanced concentration and memory.

young children, pregnant women, and nursing mothers.

Q: Should PS be taken in conjunction with specific medications?

A: There are no reported negative nutritional supplement, food, or herb interactions with PS. Additionally there is no indication that PS will act adversely when taken with any medications, however it is recommended that persons who take other prescribed medications consult with their physicians first



Q: What is PS?

A: PS is a naturally occurring phospholipid found in the biological membranes of plants, animals and all other life forms. In humans, it is one of the major constituents of brain cell membranes

Q: How does PS work?

A: PS helps to maintain and improve the integrity of cell membranes in all of our brain cells. In other words, PS helps to keep our brain cells functioning properly, by optimizing cell-to-cell communication signals within the brain. Animal studies have also indicated that PS restores acetylcholine release which is of particular interest because decreased acetylcholine release is directly associated with the plethora of cognitive problems surrounding Alzheimer's disease.

Although there have not been many studies that looked directly at the fate of PS once ingested, a fair amount is understood about how PS makes its way into our brain cells. PS and other phospholipid metabolites get absorbed in the small intestine lining through mucosa cells. There it enters the lymphatic system and makes its way to the brain.

Q: Is PS safe and are there

any side effects?

A: When PS first became of interest for its cognitive benefits, it was derived from brain lipids called cephalins. These cephalins were bovine (cow) cortex-derived substances and are now recognized as unsafe. However modern science is now able to isolate PS from soy lecithin and chicken egg yolks (Over 90% of PS sold today is derived from soy). No major side effects or adverse reactions have been noted with PS supplementation even at very high dosages. Because of the abundance of supportive research on PS and its proven effectiveness in regard to cognitive function, the FDA recently authorized two qualified health claims in respect to PS: It may reduce the risk of dementia and reduce the risk of cognitive dysfunction in the elderly. However as with other specific nutrients, PS should be avoided by very



Q: How long do I have to take PS before I will notice the results?

A: PS is a cell membrane-bound phospholipid. The premise behind PS supplementation is to ingest enough PS on a continual basis so that the levels of PS in our cell membranes are optimized. Once the PS levels in our brains cells are optimized, simple maintenance of those levels is sufficient.

The benefits of PS are not seen acutely but rather result over a time period of 1-3 months and beyond with continued PS dosing. That being said, it would seem the fastest way to achieve the benefits of PS would be to take a significant dose of PS — about 300 mg a day - for several weeks, similar to a "loading phase" that is recommended with Creatine supplementation. After that loading phase, a maintenance dose of 100-200 mg per day could be taken.

Q: In addition to taking PS, what other things should I consider to help maintain proper cognitive function?

A: There are a number of other nutrients that have been clinically

The Registered Dietitian

Phosphatidylserine (PS) Proven to Reduce the Risk of Cognitive Dysfunction and Dementia

PS helps to maintain concentration and overcome mild memory loss associated with aging.

shown to help optimize cognitive function. Some of these "cognitive nutrients" include Alpha-Lipoic Acid which is available as a dietary supplement in the United States but sold as a drug in Germany for the treatment of polyneuropathies. Alpha-GPC, like PS, is a soy derived nutrient that has been shown to significantly increase acetylcholine levels. And as mentioned previously, declining acetylcholine levels are directly related to decreased cognitive performance. Alpha-GPC is also available as a dietary supplement in the United States but sold as a pharmaceutical throughout Europe and Asia. Acetyl L-Carnitine is another nutrient that is very effective at optimizing acetylcholine levels in the brain. Vitamin B12 is also an effective "cognitive nutrient" that has been successful in reversing mild memory impairment and peripheral neuropathy, but the mechanism by which it has done so is not well understood. In addition to the aforementioned dietary supplements, regular exercise may help improve cognitive functions as well. Healthy nutritional habits including a well balanced diet rich in lean protein sources, essential fatty acids, fruits and vegetables are also important. Special attention should be paid to antioxidant-rich foods such as those high in vitamins C and E as they have been shown to benefit cognitive function by scavenging some of the highly detrimental free radicals in our bodies.

Understanding Phosphatidylserine

By Jon Benninger

Consumers may find it difficult to

pronounce the word "phosphatidylserine," but marketers of this dietary-supplement ingredient believe consumers will remember to buy it anyway. In fact, many supplement marketers identify the substance with the letters "PS" to make it more consumer friendly. PS, though not new, may be on the verge of sharp growth. More than 80 local television newscasts nationwide have included stories about PS since June, many as a result of a public relations campaign being mounted by Lucas Meyer Inc., a Decatur, IL., supplier of the ingredient.

The Function of PS

According to *Phosphatidylserine: A Remarkable Brain Cell Nutrient* by Parris Kidd, Ph.D., PS is a naturally occurring phospholipid that is essential to the functioning of all cells in the body, but is most concentrated in the brain. PS, and other phospholipids, are large molecules

that hold together the molecules in the membrane systems of cells. Other phospholipids that function in this way are phosphatidylcholine, ethanolamines and inositols. Each phosphatidyl molecule consists of a head group containing phosphorous and one other chemical subgroup. In the case of PS, this other chemical is serine.

Membranes of nerve cells are high in PS, and the cell membrane controls many vital functions, including the following:

- Entry of nutrients and exit of waste products.
- Movement of ions into and out of the cell.
- Passage of molecular messages from outside the cell to its interior.
- Cell movement and shape changes.
- Cell-to-cell communication.

These functions are managed by proteins which depend on the phospholipid membrane matrix for full functional capacity and coordinated activity.

Safety Data

PS occurs naturally in some foods in trace amounts, and studies conducted on PS have indicated the substance is safe. Preclinical toxicological studies on rats

and dogs have shown PS to be safe. For example, in one study, dogs were given 70 grams of PS per day for one year with no apparent histological damage. A double-blind, placebo-controlled, multicenter study conducted on 425 human subjects also found PS to be safe. The researchers reported that "adverse events were very few, and clinically unimportant. These observations are remarkable in the light of the large number of subjects enrolled in this study, who represent a sample of the geriatric population commonly encountered in clinical practice."

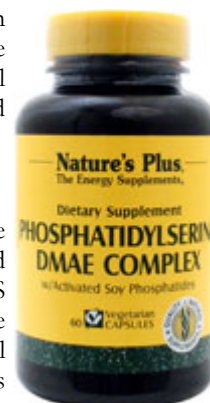
According to Dr. Kidd, ingestion of doses of PS exceeding 200 milligrams per single dose may lead to nausea in rare cases because of its stimulation of dopamine release. Taking PS with meals, which is advised, can minimize this effect. Also, taking PS may delay sleep when taken just before going to bed.

Efficacy Data

PS has been extensively studied in the United States and Europe. A review of the studies related to the efficacy of PS includes the following:

A multicenter study examined 149 human subjects ages 50 to 75. PS was given at 300 milligrams per day (three daily 100-milligram administrations) versus a placebo for 12 weeks. Assessments were made at baseline, week three, week six, week nine, week 12 and week 16 (four weeks after dosing ended). Assessments involved measurements such as learning names and faces (Name-Face Acquisition), recalling names and faces (Name-Face Delayed Recall), facial recognition (Delayed Non-Matching), telephone number recall, misplaced objects recall, paragraph recall (Wechsler Memory Scale-Logical Memory Subtest) and ability to concentrate while reading, conversing and performing tasks.

Compliance by the subjects was good, and PS was well tolerated. At the first post-administration assessment period (three weeks), trends ($p < 0.1$) were noted in three areas: learning names and faces, recalling names and faces, and facial recognition. These trends did not hold up through the entire 12-week trial, however. The researchers examined a cluster of 57 subjects who were relatively



more memory impaired and slightly older (64.3-year-old average age versus 61.6-year-old average age) than the entire test group. This second group exhibited significant improvement in the above three categories at week 12 of the trial. Additionally, these subjects showed significant improvement at week 16 (four weeks after PS administration ended) in facial recognition, telephone number recall, misplaced objects recall, paragraph recall and ability to concentrate.

This second cluster of subjects also demonstrated overall global improvement in cognitive status at week 12. This was assessed with detailed interviews conducted blindly by trained interviewers. Using the parameter of Name-Face Acquisition, researchers calculated PS administration had reduced the cognitive age of cluster two subjects by 12 years.

A U.S.-based, multicenter, double-blind, randomized study was conducted with 51 human subjects ages 55 to 85 (average age 71 years). Subjects received 300 milligrams of PS daily, or a placebo, for 12 weeks. Assessments were made at three, six, nine and 12 weeks. By the *end* of the dosing period (week 12), the subjects treated with PS showed statistically significant improvements ($p < 0.05$) in several areas: memory for names of familiar persons, memory for names of interviewer or clinic staff, recall of the location of frequently misplaced objects, recall of the details of events from the previous day and recall of the details of events from within the past week.

As in the previously mentioned study, researchers identified a cluster of subjects with relatively mild cognitive impairment which derived additional benefits from PS administration. This group showed significant improvement in ability to maintain concentration and in two measures of overall global cognitive status. This cluster improved on five of seven cognitive functions on a psychiatric rating scale, and on four of these five func-



tions, benefits were apparent three weeks after dosing began.

- In 1986, a study of 35 hospitalized subjects ages 65 to 91 with mild to moderate memory and cognitive loss showed improvement on three evaluations (the Crichton Scale, the Peri Scale. and a **psychometric** "circle crossing" test) when administered 300 milligrams of PS per day for six weeks. While trends favoring PS were noted on the Crichton and Circle Crossing tests, the Peri Scale results reached significance ($p < 0.05$). This scale assigns ratings based on 49 items, each weighted differently according to its practical significance for daily living activities.

- In 1987, a study of 87 subjects with moderate cognitive deterioration, ages 55 to 80, found benefits on tests measuring attention, concentration and short-term memory for subjects receiving 100-milligram doses of PS three times daily versus a placebo. The study also linked PS to improvements in activities related to daily life such as self-sufficiency ($p < 0.05$), sleep disturbances ($p < 0.05$) and disadapted behavior ($p < 0.002$).

- In a 1992 double-blind trial, researchers subjected young, healthy men to exercise-induced stress and found pretreatment

The Demographics

The majority of the studies, and benefits, related to PS have involved the elderly. This suggests that PS may have a great potential in the dietary-supplement marketplace. In fact, millions of baby boomers are entering their later years, creating a huge potential market for such a substance. Several companies already have recognized this potential and included PS in their products. As the 50-plus population increases and looks for health options, this list is likely to grow

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