

Attention Link® (Phosphatidylserine 50%)

By: Hi-Tech Pharmaceuticals



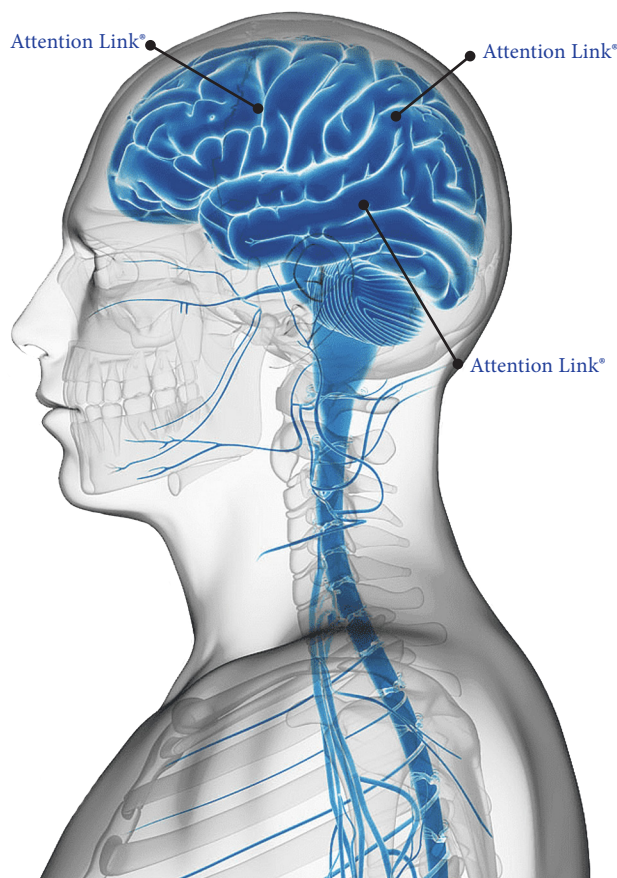
Attention Link® (Phosphatidylserine 50%) or PS is a highly purified product derived from soy and run no risk of contamination with any kind of prion (protein particles associated with brain diseases). Attention Link® is manufactured in a strictly controlled GMP environment and the "Gold Star" of PS products. This beneficial phospholipid is present in all cellular membranes (primarily in their inner layer). More heavily concentrated in the brain and nerves, PS is important to many cellular functions as well as cell structure.

As an example, PS helps modulate the activity of receptors, enzymes, ion channels and signaling molecules. For makers of nutritional products, this translates to improved exercise capacity, increased neurotransmitter release in the brain, reversed age-associated nerve cell dendrite loss and increased brain glucose levels.

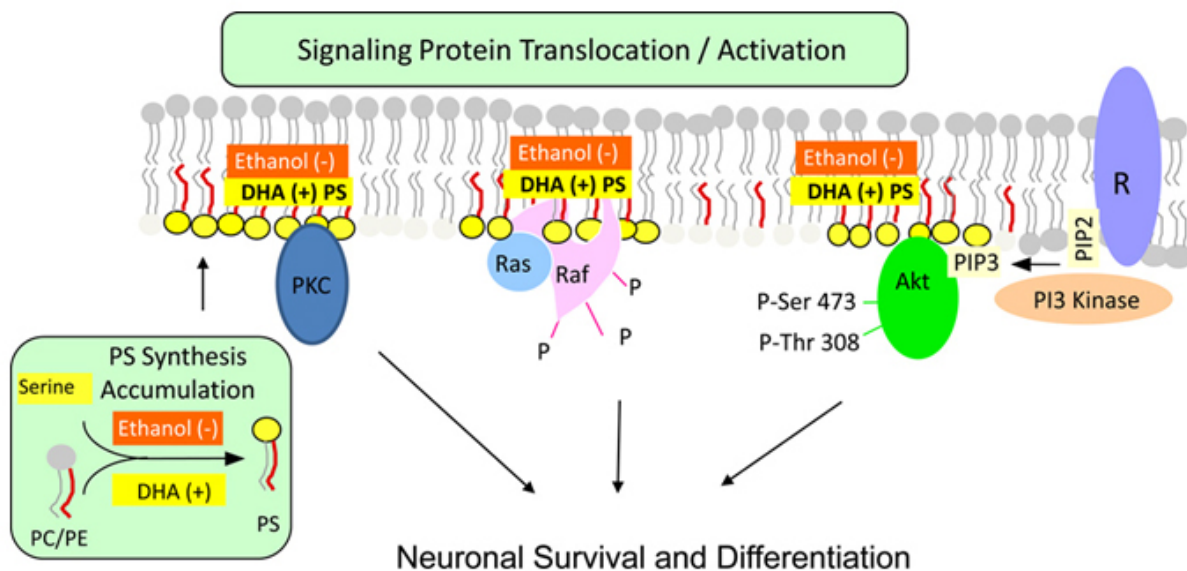
Phosphatidylserine, or PS, is a compound similar to a dietary fat which is highly prevalent in human neural tissue. It can be synthesized as well as consumed through the diet, but further benefits can be gained through supplementation. It is vital for cognitive function. Phosphatidylserine (PS) supplementation in individuals aids in improved memory and cognitive capacity. PS appears to improve symptoms of global and subscale attention problems in children, and an improvement in short-term auditory memory and impulsivity was noted. In otherwise healthy young adults given PS for 2 weeks, a significant improvement in processing speed (20%) and accuracy (13% more correct responses, 39% less wrong responses).

The first report of cognitive improvement in elderly humans with aging associated mental impairment (non-pathological) was 3 months of 300mg soy-based phosphatidylserine, in which scores on the Wechsler Memory test improved with particular improvement in visual memory; this was later replicated with 300mg PS over 12 weeks and two studies have noted that PS supplementation appears to aid in face recognition in elderly persons at this dose.

A body of evidence supports the functional significance of PS in the brain. Underlying mechanisms are still unfolding; however, PS facilitates the activation of signaling proteins and receptors that are critical for neuronal survival, differentiation and synaptic neurotransmission. Despite its constitutive nature, membrane PS is often an indispensable participant in signaling events and/or influences the signaling in a concentration-dependent manner. The PS biosynthesis preferentially utilizes DHA-containing phospholipids as substrates. Although membrane phospholipids are under a tight homeostatic regulation, the PS level



can be altered according to the DHA status, specifically in the brain. Therefore, diet- or ethanol-induced alteration of the brain DHA level and membrane, PS can influence the signaling platform in the membrane and the transmission of the signaling cues. Detailed molecular mechanisms, particularly membrane PS-protein interactions, warrant further investigation in order to obtain more insight of the functional significance of neuronal PS. Such an endeavor is likely to generate new targets for controlling physiologic or pathophysiologic processes affecting brain function. Phosphatidylserine is the major acidic phospholipid class that accounts for 13–15 % of the phospholipids in the human cerebral cortex [1]. In the plasma membrane, PS is localized exclusively in the cytoplasmic leaflet where it forms part of protein docking sites necessary for the activation of several key signaling pathways. These include the Akt, protein kinase C (PKC) and Raf-1 signaling that is known to stimulate neuronal survival, neurite growth and synaptogenesis. Modulation of the PS level in the plasma membrane of neurons has significant impact on these signaling processes. The mechanism of PS-mediated activation of these neuronal signaling pathways is illustrated below.



Health benefits cited in scientific literature include:

- Improved exercise capacity
- Increased neurotransmitter release in the brain
- Reversed age-associated nerve cell dendrite loss
- Increased brain glucose level
- Improved memory
- Shorter reaction time
- Better hand-eye coordination
- Higher stress resistance
- Mood improvement

FDA qualified health claims for phosphatidylserine (PS):

- Consumption of phosphatidylserine may reduce the risk of dementia in the elderly
- Consumption of phosphatidylserine may reduce the risk of cognitive dysfunction in the elderly

1. Effect of Phosphatidylserine on Cerebral Glucose Metabolism in Alzheimer's Disease.
2. Amaducci L. Phosphatidylserine in the treatment of Alzheimer's disease: results of a multicenter study. *Psychopharmacol Bull.* (1988)
3. Engel RR, et al. Double-blind cross-over study of phosphatidylserine vs. placebo in patients with early dementia of the Alzheimer type. *Eur Neuropsychopharmacol.* (1992)
4. Crook T, et al. Effects of phosphatidylserine in Alzheimer's disease. *Psychopharmacol Bull.* (1992)