CHEMI Nutra

WHITE PAPER

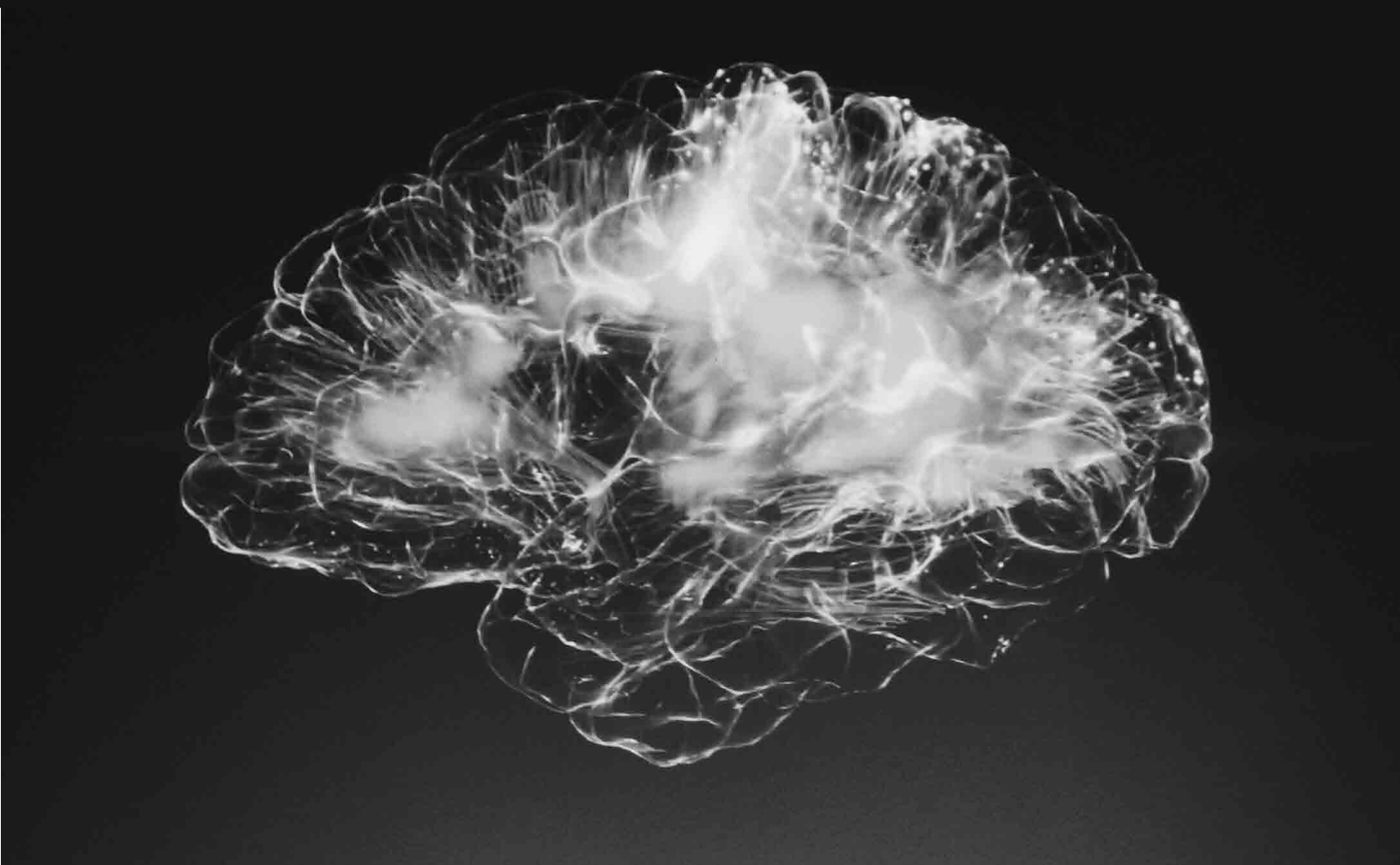
PHOSPHATIDYLSERINE

A Nutraceutical for Mental Performance, Mood and Stress

GENE BRUNO, MS, MHS, RH(AHG)

INTRODUCTION

Given the title of this article, it may be your impression that I am positioning phosphatidylserine (PS) as a “brain nutrient.” If so, you are correct. The fact is that this phospholipid is an integral component in the structure of the brain and spinal cord and is active at cell membranes (including synaptic membranes which transmit information from one neuron to the next). In any case, there is a significant body of research demonstrated the significance of PS supplementation in improving cognitive parameters in such diverse areas as attention-deficit hyperactivity disorder, memory in learning, stress management, age-related memory impairment, Alzheimer’s and other dementias, and depression.

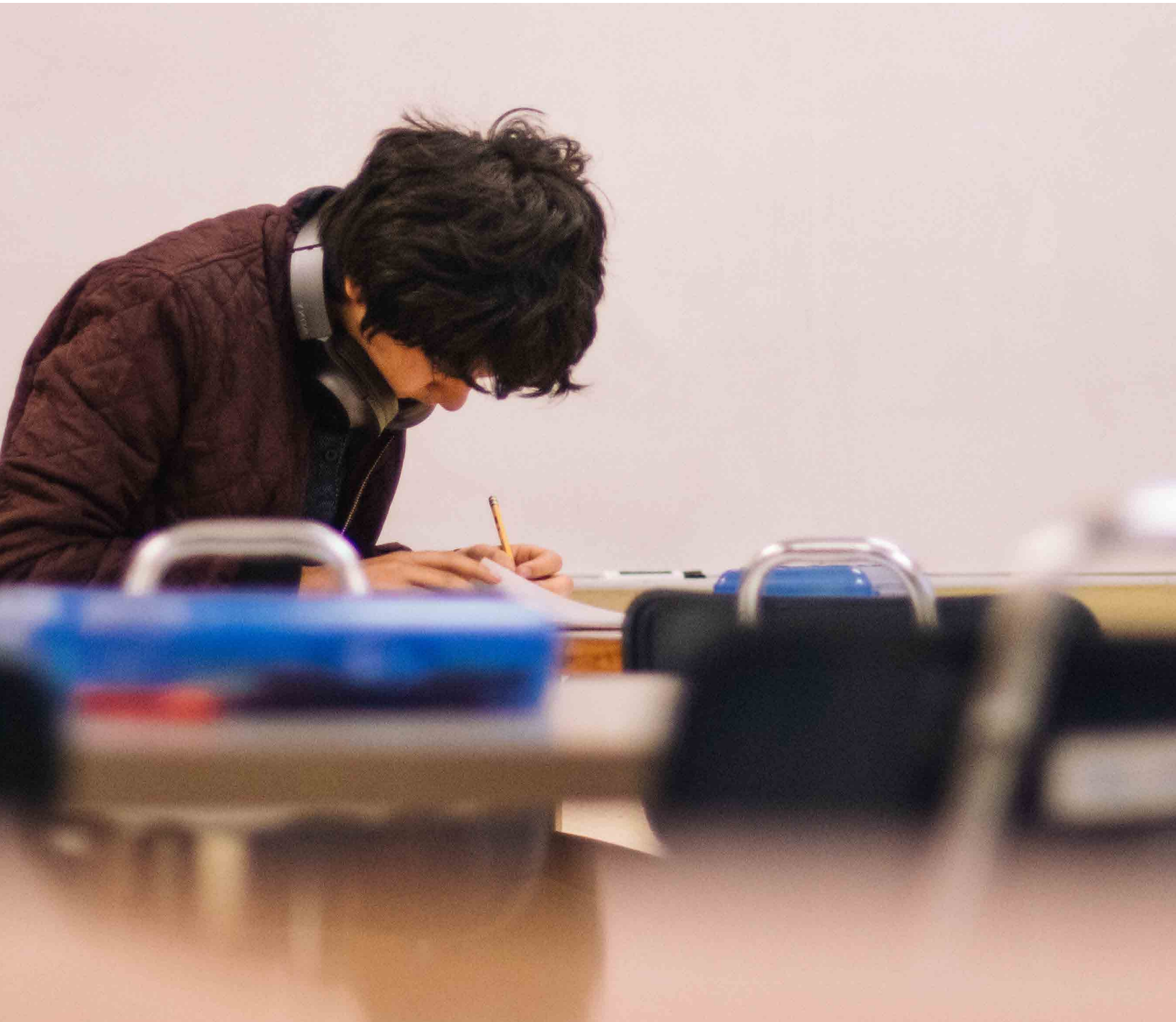


ADHD

Fifteen children (aged 6-12 years) with attention-deficit hyperactivity disorder (ADHD) and who had rarely received medication before, participated in a pilot study where they received 200 mg/day of PS in a capsule. After two months of supplementation with PS, results indicated that ADHD symptoms were significantly improved ($p<0.01$). This included significant improvement in inattention ($p<0.01$) as well as hyperactivity and impulsiveness ($p<0.05$). There was also significant improvement in visual perception ($p<0.001$). Likewise, 36 children with ADHD (aged 4-14 years) who had not previously received any related drug treatment participated in a randomized, double-blind, placebo-controlled trial. They received 200 mg/day phosphatidylserine (PS) (n = 19) or placebo (n = 17). After two months, results showed that PS supplementation resulted in significant improvements in ADHD ($P < 0.01$), AD ($P < 0.01$), HD ($P < 0.01$), short-term auditory memory ($P < 0.05$), and inattention and impulsivity ($P < 0.05$)—whereas there were no significant differences in the placebo group. Furthermore, PS showed no adverse effects and was well-tolerated. Twenty-one ADHD cases (aged 4-19 years) were treated a physician in-office study. Results were that dietary supplementation with PS benefited greater than 90 percent of the cases at intakes of 200-300 mg/day of PS for up to four months. Attention and learning were most consistently improved.

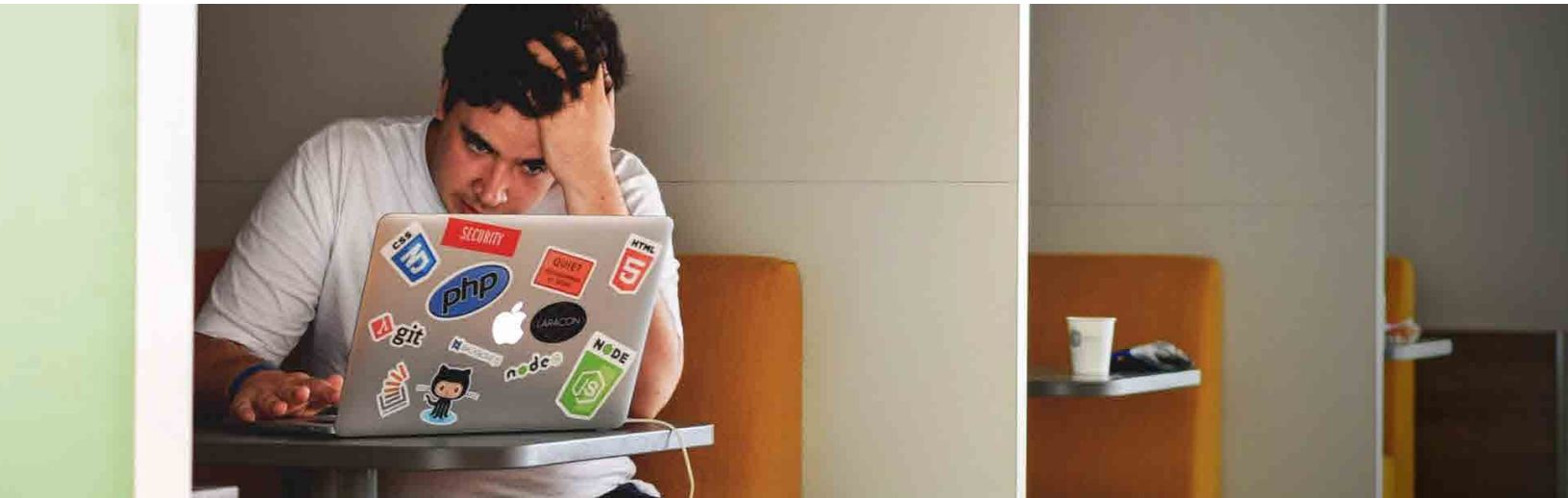
MEMORY IN LEARNING

In addition, PS also has benefits on memory in learning for students without ADHD. This was explored in a randomized, placebo-controlled study in which 120 students (age 17-18 years) received either 100 mg of PS in a glass of milk or a placebo (milk without PS). Memory was assessed by clinical memory scale involving a computerized multimedia method (CM) before and after consumption of milk. After 40 days, results demonstrated that the PS group experienced significant improvement in memory quotation (MQ) and CM compared to the start of the study and compared to the placebo group ($P<0.05$). By contrast, there was no significant change in these parameters in placebo group. The researchers concluded this study indicates that PS treatment improved cognitive performance in students.



STRESS MANAGEMENT

Research previously demonstrated that PS (as SerinAid® from Chemi Nutra) was able to blunt the release of cortisol—the "stress hormone"—in response to exercise stress. In some cases, PS supplementation also resulted in improved mood. A subsequent randomized, double-blind, placebo-controlled study examined whether supplementation with 300 mg PS/day or placebo influenced subjective feelings of stress and the change in heart rate when a stressful mental arithmetic task was performed in 48 young adults with neuroticism scores above rather than below the median. After one month, the results were that supplementation with PS was associated with feeling less stressed ($p<0.001$) and having a better mood with regard to feeling clear-headed ($p<0.02$), composed ($p<0.03$) and confident ($p<0.02$). Feelings of being energetic and elated also improved but did not quite reach statistical significance. For the first time, this study reported an improvement in mood following PS supplementation. Stress management is also important in sports. Making quick decisions and reducing the amount of errors at the beginning of a competition are crucial to the success in team sports and individual events. A randomized, double-blind, placebo-controlled, cross-over pilot study was performed to evaluate the effect of 400 mg/day PS supplementation (as SerinAid® from Chemi Nutra) on cognitive function prior to and following an acute bout of resistance training in 18 males aged 18-30. During the first testing session, subjects were familiarized with the serial subtraction test (SST) and performed one repetition maximum (lRM) lifts in the smith machine squat (SQ), leg press (LP), and leg extension (LE). Results were that PS supplementation significantly reduced the time needed for a correct calculation by 19.8 percent compared to placebo ($p = 0.001$), and reduced the total amount of errors by 33 percent compared to placebo. Similarly, a six-week, randomized, double-blind, placebo-controlled pilot study was performed to evaluate the effect of 200 mg/day PS supplementation (as SerinAid® from Chemi Nutra) or placebo on golf performance in 10 healthy young golfers with handicaps of 15-40. Results showed that PS supplementation significantly increased ($p<0.05$) the number of good ball flights (mean: pre-test 8.3±3.5, post-test 10.1±3.0), whereas placebo intake (mean: pretest 7.8±2.4, post-test 7.9±3.6) had no effect. PS supplementation showed a trend towards improving perceived stress levels during teeing-off (mean: pre-test 5.8±2.0, post-test 4.0±2.0, $p=0.07$), whereas stress levels remained unchanged in the placebo group (mean: pre-test: 5.1±2.0, post-test: 5.1±3.1). Likewise, the effects of a multi-ingredient supplement containing 400 mg/d PS (as SerinAid® from Chemi Nutra) and 100 mg/d caffeine following two acute bouts of exercise stress was investigated. Results showed a significant increase in performance of the serial subtraction test, and a significant increase (8.9 percent and 7.1 percent) in the number of correct answers and a significant decrease (8.0 percent and 7.5 percent) in time to answer were seen from pre- to post-workout. PS also significantly attenuated pre- to post-exercise perception of fatigue compared to placebo.



ARMI

One area of cognitive health that is affected by aging is age-related memory impairment (ARMI). ARMI is relatively common and should not be confused with Alzheimer's or other dementia. ARMI is simply mild memory problems associated with normal aging (e.g. "Where did I put my keys?"). Even so, the memory loss and cognitive slowing associated with ARMI can interfere with our daily routines. Supplementation with PS can help. In a double-blind, randomized controlled study, 78 elderly people (aged 50–69 years) with mild cognitive impairment (e.g. memory complaints) were supplemented with PS (100 mg, 300 mg/ day) or placebo for six months to investigate the effects on cognitive functions. In subjects with relatively low scores at the beginning of the study, the memory scores in PS treated groups were significantly increased, while those of placebo group remained unchanged. Furthermore, the memory improvements in PS-treated groups were mostly attributed to an improvement in delayed verbal recall, a memory ability that typically declines in the earliest stage of dementia. Another double-blind, placebo-controlled study with 72 patients (aged 60-80 years) who had some non-dementia related memory difficulties, assessed the influence 300 mg/day PS or placebo on memory and mood. After three months, results showed a large and statistically significant positive influence of treatment on both memory and mood, whereas influence of placebo was small and non-significant. Memorizing information, visual memory, and memorizing numbers were components of memory and cognition that were most improved by PS. Mood was also influenced. Furthermore, winter mood changes ("Winter Blues") did develop in the placebo group but were entirely blocked in those treated with PS. Additional double-blind placebo-controlled studies demonstrated similar beneficial results. In one 12-week study, 50 patients (mean age of 60.5 years) with age-related cognitive decline (aka, ARMI) received 300 mg/day or placebo. Learning and memory were assessed at three, six, nine and 12 weeks using a clinically relevant computerized neuropsychological test battery. Comparisons with PS and placebo are shown below.
In another study with 425 geriatric patients (age between 65 and 93 years) with cognitive impairment, the therapeutic efficacy and the safety of oral treatment with 300 mg/day PS vs. placebo was assessed. After six months, results demonstrated statistically significant improvements with PS compared to placebo were observed for both behavioral and cognitive parameters, and PS was well tolerated.

ALZHEIMER'S AND OTHER DEMENTIAS

Unlike ARMI, dementias are much more serious conditions, According to the World Health Organization: "Dementia is a syndrome due to disease of the brain, usually of a chronic or progressive nature, in which there is disturbance of multiple cortical functions, calculation, learning capacity, language and judgment. Impairments of cognitive function are commonly accompanied, and occasionally preceded by deterioration in emotional control, social behavior or motivation." The most common form of dementia, affecting 50-60 percent of geriatric patients who have dementia, is dementia of the Alzheimer's type, popularly known as Alzheimer's disease. In a double-blind, placebo-controlled cross-over trial, 33 patients with early Alzheimer's received 300 mg/day of PS or a placebo. Both treatment phases lasted for eight weeks with an eight-week washout phase in between. The results were that significantly more patients improved with PS than placebo during the phase one of treatment. Also, although EEG mapping initially indicated that patients showed higher power values in frequency bands compared to a younger, healthy control group, supplementation with PS successfully reduced the higher power values shifting EEG power more towards the normal level. In another randomized, double-blind, randomized, controlled study with 42 hospitalized dementia patients, 300 mg/ day of PS was used. The results were improvement and a significant treatment effect in the PS patients. A study was also conducted in 30 elderly out-patients, who were divided into three groups of 10 patients each on the basis of clinical diagnosis: multi-infarctual dementia, senile dementia of Alzheimer type and minor depression. Patients received 400 mg/day of PS for 60 days, and were evaluated by means of clinical follow-up, rating scales for dementia and depression, and blood tests. The results were that PS significantly decreased dementia scores and depression scores. Zinc levels increase, while aluminum levels decreased in Alzheimer's patients. In depressed patients, hormones associated with stress were normalized. It should also be noted that, on Feb. 24, 2003, the U.S. Food and Drug Administration (FDA) authorized two qualified health claims for PS. The first claim, "Phosphatidylserine (PS) may reduce the risk of cognitive dysfunction in the elderly", and the second claim, "Phosphatidylserine (PS) may reduce the risk of dementia in the elderly", also carry the FDA's required disclaimer language.

DEPRESSION

In the previously discussed study, supplementation with PS was found to normalize hormones associated with stress in depressed patients. In another study, the effects of PS on cognitive, affective and behavioral symptoms were examined in a group of 10 elderly women with depressive disorders. Patients were treated with placebo for 15 days, followed by 300 mg/ day PS for 30 days. To monitor changes in depression, memory and general behavior, the Hamilton Rating Scale for Depression, Gottfries-Bråne-Steen Rating Scale, Nurse's Observation Scale for Inpatient Evaluation and Buschke Selective Reminding Test were administered before and after placebo and after PS therapy. The results were that depressive symptoms in patients were marked before treatment, did not change after placebo, but were significantly reduced with PS therapy. In fact, PS significantly improved most psychological parameters studied. Remission of symptoms were clear-cut, both based on clinical observation and analysis of scores. In particular, drive, interests and socialization increased. The patients' general neuropsychological improvement and their better coping with requirements of daily life could be related to reduction of depressive symptoms. Additionally, recall and long-term memory were significantly improved. This correlated with attention and concentration, which can be compromised by depression. PS was found to induce consistent improvement of depressive symptoms, memory and behavior.

SAFETY

The tolerability of PS derived from soy (as SerinAid® from Chemi Nutra) was studied in 120 elderly subjects of both sexes who fulfilled the stringent criteria for age-associated memory impairment; some also fulfilled the criteria for ageassociated cognitive decline. Subjects were allocated at random to one of the three treatment groups: placebo, 300 or 600 mg PS daily. Standard biochemical and hematological safety parameters, blood pressure, heart rate and adverse events were assessed at baseline, after six and 12 weeks of treatment. No significant differences were found in any of the outcome variables between the treatment groups, demonstrating that PS is a safe supplement for older persons if taken up to a dosage of 200 mg three times daily. Conclusion The research on PS has demonstrated that it is capable of promoting improvements in attention-deficit hyperactivity disorder, memory in learning, stress management, age-related memory impairment, Alzheimer's and other dementias, and depression. Many of these studies were conducted using PS derived from soy (as SerinAid® from Chemi Nutra), which has also demonstrated good safety parameters. This phospholipid has benefits for both children and adults, in doses ranging between 100-300 mg/day.