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## Utility of Nutraceutical Products Marketed for Cognitive and Memory Enhancement

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### Abstract

This article identifies a convenience sample of 14 memory-enhancing herbal products that were found to be available commercially, examines their active ingredients, states their claims, and evaluates the available evidence to determine their efficacy. The analyses identified four problematic areas. First, a majority of the products use cognitive terminology, which leads consumers to anticipate an intended cognitive benefit. Second, some ingredients are completely homeopathic and contain components not known outside of the homeopathic field. Third, the evidence of treatment efficacy is often contradictory, because products are recommended for purposes other than cognitive or memory loss. Finally, the manufacturers of the product have usually conducted the research on individual products. Until more research is available, it is suggested that holistic nursing professionals exercise caution in recommending nutraceuticals to their patients/clients for the use of cognitive improvement or memory enhancement.

### Keywords

nutraceutical products; cognitive function; memory enhancement; evidence; treatment efficacy

Growing older is often expected to usher in declines in memory and cognition, and this is borne out from longitudinal studies of cognitive aging (Hultsch, Hertzog, Small, McDonald-Miszczak, & Dixon, 1992; Small, Dixon, Hultsch, & Hertzog, 1999; Zelinski & Stewart, 1998). Poor health, decreased physical activity, high blood pressure, medications, and vitamin deficiencies affect memory negatively, whereas good health, increased physical and mental activity, a higher level of education, and decreased depression all have positive influences on memory. These findings suggest that preventative strategies for sustaining high intellectual performance in later life may be possible (Calvaresi & Bryan, 2001; Rowe & Kahn, 1987, 1997). Some of these strategies adapted by people are the use of nutraceuticals.

Nutraceuticals are commonly defined as any substance that is considered a food, a part of a food, a vitamin, a mineral, or an herb that provides health benefits, including disease prevention and/or treatment, and they were first identified in 1989 (Kalra, 2003). Combining two words, *nutrition* and *pharmaceutical*, created the term *nutraceutical*. They include a new class of product, the dietary supplement, which is considered neither food nor drug and is not subject to the same regulatory hurdles as prescription and over-the-counter medicines. The manufacturers label the individual products as either dietary supplements or herbal products. Products in this category include vitamins, minerals, herbs, amino acids, and other substances that are not intended as a substitute for food (Eisenberg et al., 1998; Elvin-Lewis, 2001). With the increased interest in nutraceuticals, medical and allied health care professionals interested

in holistic practices, including medical and research scientists, are carrying out clinical trials to determine whether these treatments have any merit or produce the stated results (Fontanarosa & Lundberg, 1998; Sand-Jecklin & Badzek, 2003).

When diagnosed with a disease of uncertain outcome, people often turn to unproven treatments (Cohen, Ek, & Pan, 2002; Coleman, Fowler, & Williams, 1995; Dergal et al., 2002; Ernst, 2000, 2002; Houston, Daniel, Johnson, & Poon, 1998; Kessler et al., 2001; Planta, Gundersen, & Pettitt, 2000; Temple & Himmell, 2002; Wyatt, Friedman, Given, Given, & Beckrow, 1999). Linde et al. (1997) meta-analyzed 89 clinical trials of research on homeopathy, which is one of these treatments. However, although they determined that the benefits were not entirely due to the placebo effect, the researchers concluded that there was insufficient evidence to regard homeopathy as effective for any single clinical condition.

The market for nutraceuticals to enhance and maintain memory function is booming. Two national surveys of adults in the United States were reported. In the first study, the researchers found that adults greater than 60 years of age had a higher use of all supplement types than did younger age groups (Radimer et al., 2004). In the other survey, 65% of older adults reported that they used dietary supplements (Ness, Cirillo, Weir, Nisly, & Wallace, 2005). Nutraceutical products not only are unregulated by the Food and Drug Administration (FDA), but their use by individuals is often not reported to nurses and/or physicians. In this article, we identified a convenience sample of memory-enhancing herbal products that were found to be available commercially, examined their active ingredients, stated their claims, and evaluated the available evidence to determine their efficacy. We used six questions to guide our evaluation of the selected products: (a) What is the cost per day of the product? (b) What is the health claim made by the manufacturer? (c) What are the active ingredients? (d) Is there research to support the health claim? (e) Are there any warnings on the package? and (f) Is there a Dietary Supplement Health and Education Act (DSHEA) disclaimer?

## Nutraceutical Products

We purchased a representative group of nutraceutical products that claimed to enhance cognitive function and were readily accessible in local pharmacies and food markets. For consideration in the article, the manufacturer had to claim that using the product as directed would enhance some aspect of cognitive function, such as attention, concentration, or memory. Given the difficulty of evaluating the efficacy of the compounds themselves, we chose to examine the herbs and vitamins making up the compounds for which some evaluative research data were available. Some of the products that were purchased had similar names and were derived from a common principal ingredient. In such cases, we chose to examine only one representative product containing the particular substance. For example, if multiple products used a derivative of ginkgo biloba in their title, then we chose the one available product that appeared most representative of the product's active ingredient—in this particular category, Ginkgold. The 14 products chosen for our evaluation were (a) Brain Energy, (b) Brain Gum, (c) Brain Pep, (d) Brain Power, (e) Deep Thought, (f) Focus Factor, (g) Ginkgold, (h) Huperzine RX-Brain, (i) Mind Care, (j) Mental Edge, (k) Mind Balance, (l) Neuro-Logic, (m) Sam-e, and (n) Senior Moment. Brain Gum was not available locally, so it was evaluated based only on information from the Web site (Brain Gum, 2005).

## Ginkgo Biloba

Ginkgo biloba is an herb that has been used for centuries as a memory enhancer. Six of the products that were examined, NeuroLogic, Deep Thought, Brain Pep, Mental Edge, Mind Balance, and Ginkgold, contained ginkgo biloba. All the products, with the exception of Ginkgold, contain other substances. Sales of ginkgo biloba, which is included in many of the formulas in popular herbal products, amount to more than a billion dollars a year in this country.

This product, along with other herbs and combinations of herbs, has been highly touted to enhance memory, although a recent study has produced mixed results on its efficacy (Solomon, Adams, Silver, Zimmer, & DeVeaux, 2002). This 6-week, randomized, double-blind study evaluated 230 men and women older than 60 years. The participants had no cognitive impairment and were in good health. For a period of 26 months, the participants received either ginkgo or a matching placebo. The results indicated that there were no differences between the groups in self-reported memory function or global memory ratings by spouses, friends, and relatives.

Bastianetto and Quirion (2002) found that daily intake of red wine and ginkgo biloba may be beneficial in the stabilization or enhancement of memory functions in the aging brain. These Spanish investigators concluded that age-related mitochondrial oxidative stress might be prevented by the administration of certain antioxidants such as ginkgo biloba. Similarly, Cockle, Kimber, and Hindmarch (2000) assessed the impact of 4 months of supplementation with ginkgo biloba on activities of daily living and various aspects of mood and sleep in a population of older volunteers and found that the group taking ginkgo biloba supplements experienced beneficial effects in these areas. A meta-analysis of randomized clinical trials on the efficacy and safety of ginkgo biloba demonstrated no significant differences in side effects between the ginkgo and a placebo (Birks, Grimley, & Van Dongen, 2002). The reviewers found ginkgo safe and without excessive side effects and suggested that there was promising evidence for cognitive improvement.

### **Phosphatidylserine and Phosphatidylcholine**

Phosphatidylserine and phosphatidylcholine, both categorized as phospholipids, appear in several of the products: Brain Gum, Deep Thought, Mental Edge, and Senior Moment. The makers of Brain Gum, whose main ingredient is phosphatidylserine, claim that this ingredient is “the most extensively researched brain nutrient, with 16 double blind clinical trials” (Brain Gum, 2005, ¶ 8); however, only eight were briefly summarized on the Web site. These phospholipids can be derived either from plant or bovine sources. Research on the substances has produced mixed findings. In one study, 149 patients who met the criteria for age-associated memory impairment were treated for 12 weeks with a formulation of phosphatidylserine or placebo (Crook et al., 1991). Patients in the treatment group improved on performance tests related to learning and memory and tasks of daily life. However, no positive effects were found in another study of 120 adults with memory complaints (Jorissen et al., 2001). Kidd (1999) reviewed clinical trials of the efficacy of phosphatidylserine, acetyl-L-carnitine, vinpocetine, ginkgo biloba, and bacopa and concluded that phosphatidylserine provides significant improvements in memory, learning, concentration, word recall, and mood in middle-aged and elderly individuals with age-related cognitive decline or dementia. Other investigators also found that the drug had a significant effect, and the intended effect was maintained for 12 weeks. They cautioned, however, that double-blind, controlled verification in a large sample should be done before firm conclusions are reached (Schreiber et al., 2000).

### **Gotu Kola**

Several other ingredients are noteworthy. Gotu kola appears in Brain Pep, Mind Balance, Mental Edge, and Deep Thought. These are nuts chewed in some African countries, usually by men, to act as stimulants. One study encouraged further investigation of the use of the kola nut with cancer patients, because the amines may have antibacterial benefits (Atawodi, Mende, Pfundstein, Preussmann, & Spiegelhalter, 1995). However, another study of kola nuts, available only in French (abstract in English), found that kola extract was not effective against bacteria causing tooth decay and periodontal disease (Kamagate et al., 2002). Kola nut is a caffeine-containing substance and should be used with caution for individuals who are supposed to limit caffeine and other stimulants for health reasons.

## Brain Energy, Brain Power, and Focus Factor

These products include formulations that are homeopathic or herbal, and the active ingredients are unique and not easily identifiable or recognizable. Brain Energy, a homeopathic product, is taken as a spray for the mouth, to be used three times a day. The ingredients have not been systematically evaluated in large, double-blind, and randomly controlled studies. The makers of Brain Energy tout the homeopathic formula as a positive: “Liddell Vital Brain Energy Spray is a ‘two sprays, three times a day’ sublingual treatment that condenses centuries of holistic science to treat the erratic symptoms of the aging mind—safely and naturally” (H&L World Wide Inc., 2005, ¶ 2). Brain Power lists as its main ingredient phenylalanine and therefore also contains a caution for phenylketonurics. Niacin, pantothenic acid, choline, L-glutamine, inositol, and L-tyrosine are listed as the remaining ingredients of Brain Power. Research has indicated that adding these acids to a diet deficient in protein increases learning ability in rats (Yokogoshi & Normura, 1991). Focus Factor, a highly advertised product for memory enhancement, is the most expensive of all the products at \$75. It contains many vitamins and proprietary homeopathic ingredients.

## Huperzine

One of the nutraceuticals, Huperzine RX-Brain, contains only huperzine with no additional ingredients. Huperzine is an alkaloid, which is prepared from the moss, *Huperzia serrata*, and has been used in China for centuries to treat various ailments such as fever and inflammation (Patocka, 1998). Research on this substance comes mainly from China, although studies from the University of Pittsburg (Geib, Tuckmantel, & Kozikowski, 1991) and one from the Walter Reed Army Institute of Research (Ved, Koenig, Dave, & Doctor, 1997) in Washington, D.C., were interesting. These studies indicated that huperzine A could be a potent neuroprotective agent not only where cholinergic neurons are impaired but also under conditions in which the production of glutamate (the most abundant amino acid in the central nervous system) is compromised.

The Chinese research indicates positive findings for the use of huperzine in the treatment of multi-infarct dementia (R. Zhang et al., 1991) and for patients with short-term and long-term memory loss caused by cerebral arteriosclerosis (Zhu, 1991). In addition, Huperzin A capsules were found to enhance the memory and learning performance of adolescent students (Sun, Xu, Pan, Guo, & Cao, 1999). Research on the efficacy of huperzine, including its effects on Alzheimer’s disease, is extensive in China, and the latest research continues to demonstrate the effectiveness and safety of this substance in human participants (Zangara, 2003; Z. Zhang et al., 2002).

## Sam-e

S-adenosyl-L-methionine is a naturally occurring molecule that is endogenous in human tissue and fluid in the body. It is important in the synthesis, activation, and/or metabolism of a variety of other endogenous molecules such as hormones, nucleic acids, proteins, phospholipids, neurotransmitters, and some drugs (Friedel, Goa, & Benfield, 1989). The nutraceutical that carries the name Sam-e is a shortening of the technical name and is trademarked under this name. Sam-e is used as a nutritional supplement in the treatment of AIDS-associated myelopathy, Alzheimer’s disease, depression, dementia, fibromyalgia, hepatic cirrhosis, intrahepatic cholestasis of pregnancy, and osteoarthritis. The FDA does not approve it for treatment of any of these conditions. It is available by prescription in Europe but is sold over the counter in the United States and is advertised to improve mood and brain function and to increase longevity. One study indicated that Sam-e was superior to a placebo and was effective as a standard tricyclic antidepressant in the treatment of depression (Fetrow & Avila, 2001). Two case studies of 2 and 5 patients, respectively, found that the product improved measures

of cognitive function and mood after 3 to 5 months of treatment (Bottiglieri, Hyland, & Reynolds, 1994). The rating methods used were not reported.

## Choline

Choline appears throughout the ingredient lists of the nutraceuticals that were examined. Choline is a ubiquitous molecule found throughout almost every tissue in the body and is essential for normal function of all cells. Nearly every cellular membrane has a transport mechanism to meet the intracellular and membrane need for choline. The blood-brain barrier is no exception in that a carrier-mediated transport mechanism is present to deliver choline from plasma to the brain (Allen & Lockman, 2003). It assures the structural integrity and signaling functions of cell membranes, it is the major source of methyl-groups in the diet, and it directly affects nerve signaling, cell signaling, and lipid transport/metabolism. Ninety-five older adults between the ages of 50 and 85 years of age without dementia participated in a randomized clinical trial. The individuals who were given citicoline for 3 months improved their immediate and delayed recall on verbal memory (Spiers, Myers, Hochanadel, Lieberman, & Wurtman, 1996). After 5 weeks of memory training, healthy elders were tested and improved their recall, which was also accompanied by an elevation of creatine and choline signals in their neurometabolites (Valenzuela et al., 2003).

The neurodegenerative process in Alzheimer's disease is characterized by cholinergic dysfunction and deposition of beta-amyloid peptide. A recent study correlated levels of hippocampal choline acetyltransferase activity with the extent of Alzheimer's disease lesions in participants with no cognitive impairment and in those with mild to moderate Alzheimer's disease (Ikonovic et al., 2003). In those individuals with no cognitive impairment, mild cognitive impairment, and mild-moderate Alzheimer's disease, there was a positive correlation between hippocampal choline activity levels and the progression of plaque pathology in the cortex and hippocampus. In Alzheimer's disease, the cholinergic damage (reduced neurotransmission) and cognitive impairment occur long before beta-amyloid plaque formation. Because choline can permeate the blood-brain barrier, elements that enhance memory can be carried directly to the brain.

## Senior Moment

The makers of Senior Moment state on their Web site that "Senior Moment is usually taken daily to support brain function and performance" (Nutramax Laboratories, 2004, ¶ 1). The product contains 50 mg of cerebral phospholipids (Nutramax Laboratories, 2004). In addition to phospholipids, the product contains docosahexaenoic acid (DHA), an essential fatty acid present in brain phospholipids. Rather than identify specific studies of the efficacy of Senior Moment, the Web site references 14 published animal and human studies (reviewed by Nutramax Laboratories, 2004) that focused on phospholipids and fatty acids and their relationship to the aging brain, cognitive dysfunction, and cognitive impairment. The disclaimer states that the FDA has not evaluated these statements. The Federal Trade Commission (2004) published a press release documenting the settlement of an unsubstantiated claim that the product, Senior Moment, could prevent memory loss and restore memory function in adults. The proposed agreement required the company, Nutramax Laboratories, to have competent and reliable scientific evidence for these and similar claims.

## Holistic Nursing Implications

Individuals that are diagnosed with a disease with a poor prognosis or an uncertain outcome often turn to obscure and unproven methods of treatment. As people age and begin to sense a decrease in personal control and also become aware of memory decline, the resulting anxiety can produce even more memory loss. If a person is perceived to have a better memory than his



or her age would indicate, he or she is judged in a more favorable light than if his or her memory ability falls behind the age expectation, thereby adding to stress. Manufacturers are rushing to develop nutraceutical products to enhance memory or restore failing memory. These products are unregulated by the FDA.

When older adults regularly use herbal products, they often do not report it to their nurses and/or physicians. Nurses' educations often focus on mainstream rather than alternative treatments (Sand-Jecklin & Badzek, 2003). As a result, their knowledge of these products may lag behind that of the consumers they treat, particularly with geriatric patients. Consumers trust nurses and often seek out the advice of holistic nurses because they (the consumer) generally do not have the time or expertise to critically evaluate the ingredients of nutraceuticals or the scientific validity of studies supporting manufacturers' claims. If the claims for a product are exaggerated, consumers may not know that lack of FDA regulation enables these claims to be made.

## Future Research Implications

Combinations of multivitamins, minerals, and acids are prominent in the formulation of nutraceuticals. Several products list numerous combinations of these substances along with herbal ingredients (found in Brain Power, Focus Factor, and Mind Care). However, after careful examination of 14 of these products, four problematic areas were identified. First, many of the products use cognitive terminology in their names, such as *brain*, *mind*, and *neuro*, which leads consumers to anticipate an intended cognitive benefit. Second, some ingredients are completely homeopathic and contain components not known outside of the homeopathic field. The homeopathic formulas are advertised as an advantage in several products even though many are available only in other countries and share few active ingredients. Third, the evidence of treatment efficacy is often contradictory (e.g., with ginkgo biloba). The research often has investigated uses of the substances for purposes other than cognitive or memory loss. Another concern is that the manufacturers of the product have usually conducted the research on individual products. Problems with the studies that could affect the outcomes should be carefully evaluated. Finally, the studies were sometimes poorly constructed, using a small sample and combinations of substances, thus making the evaluation of one particular component difficult if not impossible.

The National Institute of Health has established a Department of Complementary and Alternative Medicine to award grants for further study of these substances. Some scientists have argued that the randomized clinical trial, often considered the gold standard for research, is inappropriate for homeopathic treatments; to truly study homeopathic methods, they suggest a new research approach should be developed (Mathie, 2003; Oberbaum, Vithoulkas, & Van Haselen, 2003). As studies of nutraceuticals join the trials of the National Institute of Health, more accurate evaluations could be expected, and these products could be compared with other, less drug-centered treatments for cognitive decline, such as tai chi, yoga, and aerobic exercise, and with cognitive interventions, such as social and intellectual stimulation. The results of both cross-sectional and longitudinal studies suggest that cognitive stimulation may be more effective than chemical agents in maintaining cognitive function (Ernst, 2002; Mathie, 2003; McDougall, 2002; Mundt, Kaplan, & Greist, 2001; Salthouse, Berish, & Miles, 2002; Wilson et al., 2002).

## Conclusion

In this article, we identified a convenience sample of memory-enhancing herbal products that were found to be available commercially, examined their active ingredients, stated their claims, and evaluated the available evidence to determine their efficacy. Holistic nurses will find that

the homeopathic substances in the products we examined are problematic and difficult to evaluate, in part because homeopathy coins names not used in other therapies. Also, some herbs are so obscure that no data were available. However, gerontologists and clinicians need to be knowledgeable about these substances, know how they are marketed, and understand something about the public's attitudes toward them. We strongly recommend that more research be conducted, because the field of nutraceuticals is expanding rapidly and we need to know more about their qualities and inform clients with authority about their potential benefits and risks.

There is disagreement among cognitive aging researchers on whether older adults should use these products. In a systematic review conducted by Manders et al. (2004), the researchers suggested that nutritional supplements might improve the cognitive function of older adults and do no harm. Of the 21 studies reviewed, Manders et al. found that 9 studies had no effects and that 12 studies had positive effects. Until more research is available, we recommend that holistic nursing professionals exercise caution in recommending nutraceutical products to their patients/clients for the use of cognitive or memory enhancement, particularly because those formulations known to contain products such as caffeine (e.g., kola nut) may compromise health.

Older adults might be attracted to these self-care products because they do not require a physician's order to purchase and they appear to be safe. An individual can purchase these products in their local grocery store or from a neighborhood pharmacy. In addition, the price of the products has great variability. For a month's supply, the cost of the herbal products ranged from \$9 for Brain Power to \$75 for Focus Factor.

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## Biographies

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Nutraceutical Products That Claim to Enhance Cognitive Function and/or Memory Performance

TABLE 1

Product	Distributor or Manufacturer	Package Cost	Pills/ Package	Cost/Day Based on Dosage Recommendations	Dosage Form	DSHEA94 Disclaimer	Health Claim	Ingredient(s)
Brain Energy	Liddell Laboratories, Moraga, CA	\$24.99	1.0 fl oz	\$0.83	Under-tongue spray	No	"To treat the erratic symptoms of the aging mind —safely and naturally."	Acidum phosphoricum 200C, amino acids 3X, anacardium orientale 30C, baryta carbonica30C, calcaria fluorica 30C, cerebrum 6X, crataegus oxyacantha 1X Phosphatidylserine
Brain Gum	Degussa BioActives Manufacturing LLC, Germantown, WI	\$59.99	144	\$1.87	Gum to chew	Yes	"Chewed as a dietary supplement, it helps reverse age-related memory loss."	
Brain PEP	1141 McCormick Drive	\$8.99	30	\$0.60	Capsule	Yes	"This very distinct blend of specialized herbs works together to help maximize your intellectual potential."	Kola nut, ginkgo biloba, gotu kola, Siberian ginseng, schizandra, ginger, L-glutamine
Brain Power	Country Life, Hauppauge, NY	\$8.79	30	\$0.29	Large tablet	No	No claim made	Niacin 250 mg, vitamin B-6, pantothenic acid25 mg, calcium 30 mg, choline bitartrate500 mg, L-glutamine 350 mg, inositol 250 mg, L-phenylalanine 250 mg, L-tyrosine 50 mg Inositol 15 mg, choline 75 mg, phosphatidylcholine 200 mg, lec-PS phosphatidylserine 5 mg, DMAE 100 mg, L-glutamine 250 mg, pyroglutamic acid 200 mg, L-tyrosine 150 mg, acetyl-L-carnitine20 mg, gotu kola 50 mg, betaine HCl 15 mg, Siberian ginseng 40 mg, ginkgo biloba 10 mg, Fo-Ti 5 mg, RoseOX rosemary leaf extract 10 mg, pycnogenol 1 mg, ActiSorb base 10 mg, Vitamins A, C, D, E, thiamin, riboflavin, niacin, B6, folate, B12, biotin, pantothenic
Deep Thought	Nutraceutical Corp for Makers of KAL, Inc., Park City, UT	\$17.99	60	\$0.60	Tablet	No	No claim made	
Focus Factor	Vital Basics	\$74.95	30	\$9.96-\$19.92	Tablet	Yes	"...support normal brain function. It is not intended	

Product	Distributor or Manufacturer	Package Cost	Pills/ Package	Cost/Day Based on Dosage Recommendations	Dosage Form	DSHEA94 Disclaimer	Health Claim	Ingredient(s)
Ginkgold	Germantown, WI53022	\$16.99	50	\$0.68	Tablet			acid, calcium, iron, iodine, magnesium, zinc, selenium, copper, manganese, chromium, molybdenum, potassium; other ingredients: diemethylaminoethanol (as diemethylaminoethanol bitartrate), L-glutamine, Bacopin (bacopa monnieri leaf extract), L-pyroglutamic acid, phosphatidylserine, docosahexaenoic acidconcentrate (15% docosahexaenoic acidfrom fish body oil), choline (as choline bitartrate), inositol, N-acetyltyrosine, bilberry fruit standardized extract (25% anthocyanosides), gamma-aminobutyric acid, grape skin extract and Activin, (grape seed extract), vinpocetine, Trace-Lyte electrolyte concentrate, huperzine A (wholeplant extract of huperzia serrata), boron (asboron citrate), vanadium (as vanadyle sulfate), diacalcium phosphate, microcrystalline cellulose, croscarmellose sodium, stearic acid, silica, magnesium stearate, and pharmaceutical glaze
						Yes	"For improved mental sharpness."	Ginkgo biloba 60 mg
Huperzine Rx- Brain	Natural Organics Laboratories, Inc., Amityville, NY	\$10.89	30	\$0.36	Tablet	Yes	"Designed for any individual concerned with promoting optimal brain function."	Huperzine A 50 mg

Product	Distributor or Manufacturer	Package Cost	Pills/ Package	Cost/Day Based on Dosage Recommendations	Dosage Form	DSHEA94 Disclaimer	Health Claim	Ingredient(s)
Mental Edge	Source Naturals, Scotts Valley, CA	\$11.79	60	\$0.79	Tablet	No	"To help you meet the demands of a challenging world."	Multivitamin plus L-glutamine 500 mg, L-pyroglutamic acid 500 mg, phosphatidylcholine 350 mg, L-tyrosine 275 mg, Siberian ginseng 225 mg, diemethylaminoethanol bitartrate 160 mg, gotu kola 150 mg, L-phenylalanine 125 mg, choline 100 mg, taurine 100 mg, ginger root 80 mg, schizandra fruit 80 mg, cayenne fruit 60 mg, inositol 30 mg, ginkgo biloba 20 mg
Mind Balance	United States	\$18.99	60	\$0.63	Capsule	No	"Enhances normal healthy brain function."	Thiamine 15 mg, riboflavin 17 mg, folate 400 mcg, vitamin B12 60 mcg, pantothenic acid 100 mg, St. John's wort 300 mg, kava kava 50 mg, wild yams 50 mg, gotu kola 50 mg, L-tyrosine 50 mg, L-phenylalanine 50 mg, ginkgo biloba 20 mg, Iron 1.2 mg, long list of herbs 2.03 mg
Mind Care	Himalaya Drug Co, distribution offices in Houston, TX	\$15.99	60	\$0.80	Tablet	Yes	"Helps enhance learning, memory, and academic performance through improved concentration and increased attention span."	
Neuro-Logic	Wakunaga of America, Mission Viejo, CA	\$28.59	120	\$0.95	Capsule	Yes	"Improves memory and mental acuity."	Folate 200 mcg, vitamin B12 100 mcg, aged garlic extract powder 400 mg, lecithin 200 mg, ginkgo biloba extract 60 mg, phosphatidylserine 50 mg, acetyl-L-carnitine 25 mg
Sam-e Elemental200	Jarrow Formulas, Los Angeles, CA	\$15.49	20	\$0.77	Tablet	Yes	"Has been clinically proven to benefit brain	S-adenosyl methionine 200 mg



Product	Distributor or Manufacturer	Package Cost	Pills/ Package	Cost/Day Based on Dosage Recommendations	Dosage Form	DSHEA94 Disclaimer	Health Claim	Ingredient(s)
Senior Moment	Nutramax Labs, Edgewood, MD	\$22.99	30	\$0.77	Capsule	Yes	and joint function." "Supports brain function and performance."	Cerebral phospholipids 50 mg, docosahexaenoic acid 40 mg

NOTE: DSHEA94 = Dietary Supplement Health and Education Act of 1994.