use of HGH for this purpose. There is preliminary evidence that injected HGH may be of benefit in some with Crohn’s disease and that it might be helpful in treating dilated cardiomyopathy. There is some fear that high doses of HGH might promote some cancers.

RESEARCH SUMMARY
Recombinant human growth hormone, given parenterally to men aged 61 to 81, reportedly resulted in significant improvements in lean body mass, muscle tone, skin thickness and density of lumbar vertebrae. Significant loss of adipose tissue was also reported. The researchers concluded that “the effects of six months of human growth hormone treatment on lean body mass and adipose tissue were equivalent in magnitude to the changes incurred during 10 to 20 years of aging.”

Subsequent studies also demonstrated some positive effects of HGH replacement therapy on body composition in those over 60. Some serious side effects were also noted, however, including arthralgias of both small and large joints, insulin resistance leading to higher serum fasting glucose levels, fluid retention in the lower extremities, carpal tunnel syndrome, gynecomastia and headaches. Due to the prevalence of some of these side effects, the researchers who conducted the first human trial reduced the dosage of HGH they had been using by half.

In a preliminary study, recombinant human growth hormone, given parenterally for three months to patients with idiopathic dilated cardiomyopathy, was reported to increase myocardial mass and reduce the size of the left ventricular chamber. These changes were associated with improved clinical status.

Recently, in another preliminary study, injected HGH was said to be beneficial in some with Crohn’s disease. Improvement was measured by scores on the Crohn’s Disease Activity Index over a four-month period.

There is no credible evidence that oral HGH has any health benefit.

CONTRAINDICATIONS, PRECAUTIONS, ADVERSE REACTIONS
(For information on the pharmaceutical use of somatropin, see Physicians’ Desk Reference.)

CONTRAINDICATIONS
Supplemental human growth hormone is contraindicated in those with any evidence of active malignancy. It is also contraindicated in those who are hypersensitive to any component of an HGH-containing product.

PRECAUTIONS
Pregnant women and nursing mothers should avoid the use of HGH-containing supplements.
Adolescents should avoid the use of supplemental HGH.

Those with diabetes should avoid the use of supplemental HGH.

Oral forms of HGH are not meant to be used parenterally and should never be used in such a manner.

ADVERSE REACTIONS
None known for HGH-containing supplements.

INTERACTIONS
None known for HGH-containing supplements.

DOSAGE AND ADMINISTRATION
Oral recombinant human growth hormone is available and marketed as a dietary supplement, typically in the form of an oral spray. There are no recommended doses.

LITERATURE

Huperzine A
DESCRIPTION
Huperzine A is a plant alkaloid derived from the Chinese club moss plant, Huperzia serrata, which is a member of the Lycopodium species. Huperzia serrata has been used in Chinese folk medicine for the treatment of fevers and inflammation.

Huperzine A has been found to have acetylcholinesterase activity. Huperzine B, also derived from Huperzia serrata, is a much less potent acetylcholinesterase inhibitor. Natural huperzine A is a chiral molecule also called L-huperzine A or (-)-huperzine A. Synthetic huperzine A is a racemic mixture called (+)-huperzine A. Huperzine A is also known as HUP, hup A and selagine. In Chinese medicine, the extract of Huperzia serrata is known as Chien Tseng Ta and shuangyiping. Huperzine A derivatives are being developed for pharmaceutical application.
ACTIONS AND PHARMACOLOGY

ACTIONS
Huperzine A may have cognition-enhancing activity in some.

MECHANISM OF ACTION
Alzheimer’s disease is a neurodegenerative disorder associated with neuritic plaques that affect the cerebral cortex, amygdala and hippocampus. There is also neurotransmission damage in the brain. One of the major functional deficits in Alzheimer’s disease is a hypofunction of cholinergic neurons. This leads to the cholinergic hypothesis of Alzheimer’s disease and the rationale for strategies to increase acetylcholine in the brains of Alzheimer’s disease patients. Two FDA-approved drugs for the treatment of Alzheimer’s disease, tacrine and donepezil, are acetylcholinesterase inhibitors.

Huperzine A is also an acetylcholinesterase inhibitor and has been found to increase acetylcholine levels in the rat brain following its administration. It also increases norepinephrine and dopamine, but not serotonin levels. The natural L or (-)-huperzine A is approximately three times more potent than the racemic or (+)-huperzine A in vitro.

PHARMACOKINETICS
There are limited pharmacokinetic studies with huperzine A. It appears that huperzine A is rapidly absorbed from the gastrointestinal tract and transported to the liver via the portal circulation. Some first-pass metabolism takes place in the liver, and huperzine A and its metabolites are distributed widely in the body, including to the brain. Following ingestion, the time to reach peak blood level is approximately 80 minutes.

INDICATIONS AND USAGE
Huperzine A has potent pharmacological effects and, particularly since long-term safety has not been determined, it should only be used with medical supervision. It may have some effectiveness in Alzheimer’s disease and age-related memory impairment. It has been used to treat fever and some inflammatory disorders, but there is no credible scientific evidence to support these uses.

RESEARCH SUMMARY
Numerous studies, most of them from China, suggest that huperzine A may be as effective as the drugs tacrine and donepezil in Alzheimer’s disease. This is not so surprising since in vitro and animal model tests have demonstrated that huperzine A effectively inhibits acetylcholinesterase, an enzyme that catalyzes acetylcholine breakdown. Tacrine and donepezil work in the same way to conserve acetylcholine in the brain—the mode by which they presumptively improve memory and cognition in those with Alzheimer’s and age-related cognitive impairment. Huperzine A may prove superior to tacrine (dose-limited due to its hepatotoxicity) if long-range studies, yet to be conducted, demonstrate its safety.

In one double-blind, randomized study, huperzine A, in injectable form, was tested against a saline control in 56 patients with multi-infarct dementia or senile dementia and in 104 patients with senile and pre-senile simple memory disorders. Huperzine A produced significant positive effects as measured by the Wechsler Memory Scale. Dizziness was experienced by a few of the huperzine A-treated patients.

In another study, this one multicenter, double-blind, placebo-controlled and randomized, 50 subjects with Alzheimer’s disease were given huperzine A or placebo for eight weeks. Significant improvement was noted in 58 percent of the patients in terms of memory, cognitive and behavioral functions. Research is ongoing.

CONTRAINDICATIONS, PRECAUTIONS, ADVERSE REACTIONS

CONTRAINDICATIONS
Known hypersensitivity to a huperzine A-containing product.

PRECAUTIONS
Huperzine A should be avoided by children, pregnant women and nursing mothers.

Because of possible adverse effects in those with seizure disorders, cardiac arrhythmias and asthma, those with these disorders should avoid huperzine A. Those with irritable bowel disease, inflammatory bowel disease and malabsorption syndromes should avoid huperzine A.

ADVERSE REACTIONS
Adverse effects reported with huperzine A include gastrointestinal effects, such as nausea and diarrhea, sweating, blurred vision, fasciculations and dizziness. Possible adverse effects include vomiting, cramping, bronchospasm, bradycardia, arrhythmias, seizures, urinary incontinence, increased urination and hypersalivation.

INTERACTIONS
DRUGS
Acetylcholinesterase Inhibitors: Use of huperzine A along with the acetylcholinesterase inhibitors donepezil or tacrine may produce additive effects, including additive adverse effects. Other acetylcholinesterase inhibitors include neostigmine, physostigmine and pyridostigmine, and use of these agents along with huperzine A may produce additive effects, including additive adverse effects.

Cholinergic Drugs: Use of huperzine A along with cholinergic drugs, such as bethanechol, may produce additive effects, including additive adverse effects.

NUTRITIONAL SUPPLEMENTS
Use of huperzine A with choline, phosphatidylcholine, CDP-choline and L-alpha-glycerylphosphorylcholine hypothetical.
ly might produce additive effects, including additive adverse effects.

OVERDOSAGE
There are no reports of overdosage with huperzine A.

DOSEAGE AND ADMINISTRATION
There are various forms of huperzine A available, including extracts of Huperzia serrata, natural (-)-huperzine A and synthetic racemic (+)-huperzine A. Natural (-)-huperzine A is approximately three times more potent than the synthetic racemic mixture. The doses of natural (-)-huperzine A used in clinical studies ranged from 60 micrograms to 200 micrograms daily. Huperzine A should only be used with a physician's recommendation and monitoring.

LITERATURE

Hydrolyzed Collagen

DESCRIPTION
Hydrolyzed collagen refers to enzymatically or chemically processed collagen, which is mainly derived from bovine, ox and pig skin and bone. Hydrolyzed collagen consists of water-soluble peptides of various molecular weights. These peptides are rich in the amino acids found in collagen, including glycine, L-proline and L-hydroxyproline. Nutritional supplements containing hydrolyzed collagen are marketed for bone and joint health purposes. Hydrolyzed collagen and gelatin hydrolysates are similar. See Gelatin.

ACTIONS AND PHARMACOLOGY

ACTIONS
Hydrolyzed collagen has putative activity against degenerative joint disease (DJD). It also may have antiulcer activity.

MECHANISM OF ACTION
The mechanism of the putative anti-arthritis activity of hydrolyzed collagen is a matter of speculation. It is claimed that the amino acids of hydrolyzed collagen contribute to the synthesis of new collagen and new cartilage in joints. If this were the case, then hydrolyzed cartilage would be a disease-modifying substance. The amino acids in hydrolyzed collagen may contribute to joint collagen synthesis. However, if they did, it is unlikely that this contribution would be significant. L-hydroxyproline is not a genetic amino acid. It is formed in collagen post-translationally. Therefore, L-hydroxyproline in hydrolyzed collagen would not contribute to collagen synthesis. Further, both glycine and L-proline are synthesized by the body, and it is entirely unclear how any glycine or L-proline in hydrolyzed collagen would make any significant contribution to collagen synthesis in joints. There is speculation that some oligopeptides that may be found in hydrolyzed collagen might have a stimulatory effect on collagen synthesis. There is some preliminary evidence that collagen hydrolysates may stimulate proliferation of chondrocytes, adipocytes and elements of the extracellular matrix.

PHARMACOKINETICS
The digestion, absorption and metabolism of hydrolyzed collagen are typically slower than that of other dietary proteins and peptides. The reason for this is that the peptides formed from collagen contain a high quantity of L-proline and L-hydroxyproline. Proline and L-hydroxyproline form bonds with other amino acids that are significantly more resistant to enzymatic hydrolysis in the small intestine.

INDICATIONS AND USAGE
It is claimed that hydrolyzed collagen is useful in counteracting degenerative joint diseases. There is some preliminary evidence to support this claim. Hydrolyzed collagen may have antiulcer activity.

RESEARCH SUMMARY
Some preliminary research suggests that hydrolyzed collagen may have effects that could be beneficial in some with degenerative joint diseases. A recent 24-week study (prospective, randomized, placebo-controlled, double-blind) on the use of collagen hydrolysates in athletes with activity-related joint pain was found to show significant improvement of joint pain in the athletes treated with the collagen hydrolysates (10 grams/day). A rat study reported that