

Growth Hormone Releasers

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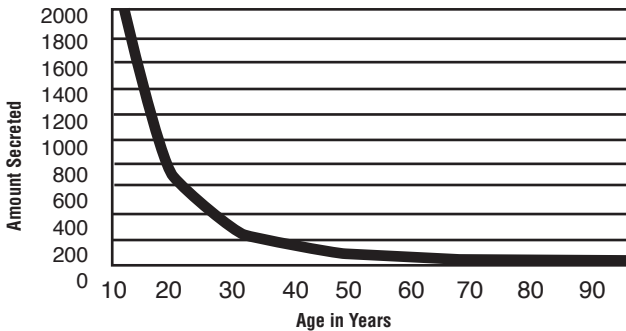
FOREVER YOUNG

Everybody knows that you can't stop the aging process. Even so, you don't need to feel old just because you are advancing in years. Why? Because aging can be slowed down with supplements that encourage the production of Human Growth Hormone (HGH). Yes, it is now possible for you to look and feel younger and healthier than what your age may suggest!

The common symptoms associated with aging—hearing loss, vision problems, impaired memory and the reduction in sexual function— can be delayed, thanks to HGH boosters. These anti-aging boosters increase the levels of growth hormone secretion in your body, thus slowing down the aging process and making you look and feel years younger.

GROWTH HORMONE DEFINED

Growth hormone is produced by the pituitary gland—a garbanzo bean-sized structure at the base of the brain—to fuel childhood growth and help maintain tissues and organs throughout life. It's also responsible for enhancing muscle growth, burning fat and maintaining the immune system. Many scientists have linked the changes seen with aging—the loss of lean body mass, thinning of the skin and an increase in adipose (fat) tissue—to the rapid decline in HGH that begins by the age of 30 (Fig. 1).



The natural slowdown of the body's production of HGH has prompted an interest in the use of synthetic growth hormone to stave off the realities of old age. Synthetic Human Growth Hormone, which must be injected, is available only by prescription. While it has proven effective for people with a true growth hormone deficiency, there's little evidence to suggest that synthetic Human Growth Hormone can help healthy adults regain their youth and vitality.

You can, however, encourage your body to effectively produce higher levels of its own HGH with a variety of natural secretagogues (compounds that trigger the

release of other substances in the body) like those mentioned in this booklet. By boosting your HGH levels in this way, you may experience:

- an increase in muscle mass
- a reduction in body fat
- higher bone density
- healthy tissue repair and the restoration of damaged cells
- enhanced energy and endurance during exercise
- a stronger immune system
- and improved sexual function.

AMAZING AMINO ACIDS

Life extension pioneers Durk Pearson and Sandy Shaw, in their popular book *Life Extension: A Practical Scientific Approach*, were the first to advocate the use of amino acids to boost growth hormone production. Studies done since the publication of this radical theory appear to confirm that taking certain amino acids do indeed stimulate the body's natural ability to manufacture HGH. This may result in a return to the HGH levels of a young adult.

Note that HGH boosters do not contain growth hormones. Instead they help the body increase its secretion of growth hormone, to help slow down the age process. Here are the most important HGH-stimulating amino acids:

L-Arginine

The ability of arginine to raise growth hormone has been verified in numerous studies. But the results of these studies also show that arginine doesn't work the way most people think. For years, sports nutritionists and longevity experts have told their clients to take an arginine supplement before exercising. Yet, researchers now suspect that arginine may only act as a growth hormone secretagogue at night, rather than prior to exercise or during non-exercise daytime conditions. When researchers administered a daily dose of 250 mg. of arginine to a group of healthy young adults for seven days, the rise in HGH that occurred during slow wave sleep was approximately 60 percent higher in the subjects after taking arginine than during the control period.

Another group of researchers achieved promising results when treating 12 adults with one large, 37.5 gram dose of arginine aspartate, administered orally. The treatment caused a small but significant release of serum growth hormone in these subjects.

L-Ornithine

Ornithine is derived from arginine. High doses of supplemental ornithine have successfully raised growth hormone levels in some studies. One trial investigated the effect of 40, 100 and 170 mg. of L-ornithine HCl on 12 bodybuilders. 25 per-

cent of the subjects experienced significant increases in serum growth hormone levels at the two lower doses, while half the subjects showed an increase in HGH at the highest dose. Growth hormone rose, in some cases, up to four times the baseline level.

Unfortunately, the highest dose (170 mg.) used to increase growth hormone also caused diarrhea in the males tested, a side effect not seen in the three females who consumed high ornithine doses. The women also experienced a rise in HGH after each dose.

Arginine and Ornithine

When administered together, arginine and ornithine offer anabolic benefits triggered by the release of HGH. In a double-blind study of 22 adult males participating in a five week progressive strength-training program, half the subjects took a combination of 2 grams of L-arginine and 1 gram of L-ornithine; the other half consumed a placebo. Following a short-term strength program using progressively higher intensities, the men taking the arginine-ornithine combination scored significantly higher in total strength and lean body mass and excreted less urinary hydroxyproline than the subjects taking a placebo. (Hydroxyproline is an amino acid found in collagen. Excretion of hydroxyproline is a marker of the metabolic breakdown of collagen—a process known as catabolism.) In reviewing the study, one group of researchers concluded that arginine and ornithine, taken in prescribed doses, can, in conjunction with a high-intensity strength-training program, increase total strength and lean body mass in a relatively short time.

The researchers suggested that the lower hydroxyproline levels were an indication that arginine and ornithine aided in recovery from chronic stress by alleviating tissue breakdown. The reviewers also suggested that these changes were due to increases in growth hormone release.

The ability of these amino acids to promote the release of HGH is significantly boosted when the supplementation is done along with nutrients like vitamin B6, vitamin C, niacinamide, calcium and other essential minerals like magnesium, potassium and small amounts of zinc.

SECONDARY SECRETAGOGUES

Ornithine-Alpha-Ketoglutarate (OKG)

Ornithine Alpha-Ketoglutarate (OKG) is a salt formed from two ornithine molecules and one alpha-ketoglutarate molecule. OKG is a promising anti-catabolic agent that promotes wound healing and protein synthesis. Researchers have hypothesized that OKG fulfills these functions by encouraging the secretion of insulin and Human Growth Hormone, and by upregulating glutamine and arginine production. When given to trauma patients, OKG significantly increased both insulin-like growth factor (IGF-1) and growth hormone levels.

Although few, if any, oral studies exist on OKGs ability to release growth hormone

in normal subjects, studies do show that in healthy people, OKG does increase tissue levels of glutamine and arginine, which are regulators of protein synthesis. In fact, animal studies show that OKG generates more glutamine in the blood than glutamine itself when given orally. As you'll see later in this section, oral glutamine has also been shown to release growth hormone.

Arginine Pyroglutamate and Lysine

Arginine and lysine may work synergistically to release growth hormone. In a study of 15 healthy male subjects, the consumption of arginine pyroglutamate or lysine as single nutrients did not significantly increase growth hormone compared to baseline. In another study, the oral administration of 1,200 mg. of L-lysine did not raise serum growth hormone levels either.

Studies indicate, however, that these two amino acids can work together to trigger the release of growth hormone. In 15 healthy young men, 1,200 mg. of arginine pyroglutamate combined with L-lysine hydrochloride significantly elevated biologically active growth hormone levels from two to eight times the baseline value. And this increase occurred within just two hours of taking the amino acids.

Another study suggests that arginine and lysine act to increase growth hormone—but only under specific conditions. Sixteen men randomly completed four trials. Trial A consisted of performing of a single set of resistance exercise preceded by a vitamin C placebo. Trial B involved the ingestion of 1,500 mg. of arginine and 1,500 mg. of lysine, followed by the same exercise used in Trial A. In Trial C, subjects took arginine and lysine but didn't do any type of exercise. In Trial D, the subjects were given a placebo and did not engage in any exercise. There was no difference in HGH concentrations between the placebo-supplemented subjects and the amino acid-treated subjects. However, in Trial C, during resting conditions, HGH was significantly elevated 60 minutes after taking the arginine and lysine compared with the placebo trial. The researchers concluded that taking 1,500 mg. of arginine and 1,500 mg. of lysine before resistance exercise did not alter exercise-induced changes in HGH in young men. But, when the same amino acid cocktail is ingested while resting, the production of HGH is greatly increased.

Glycine

Glycine is a nonessential amino acid contained in gelatin protein and it is an important component of collagen. Although much of the early research revolved around glycine's ability to increase strength in athletes, more recent studies have documented that this amino acid can also raise HGH levels in humans. In fact, researchers hypothesize that the reason glycine increases muscle strength may be the result of its growth hormone-boosting capabilities.

One study clearly illustrates glycine's ability to act as an HGH secretagogue. When 19 normal, non-obese subjects took 6.75 grams of glycine, growth hormone

levels increased fourfold for three hours. According to the researchers, glycine is one of the stimulatory agents inducing the pituitary gland to secrete HGH.

In a randomized, double-blind, crossover study, 13 volunteers were given a supplement consisting of glycine and arginine or a placebo over 23 days. Treatment with arginine and glycine increased the subjects mean resistance to fatigue up to 28 percent over the controls during exhaustive high-intensity strength training. The subjects taking glycine and arginine also experienced an overall 10.5 percent gain in total muscle—all thanks to an increase in HGH.

Glutamine

Glutamine is the most abundant amino acid in human muscle and plasma, directly regulating both the production and wearing-down of protein and immune cell activity. When nine healthy subjects consumed 2 grams of oral glutamine 45 minutes after a light breakfast, eight of the nine subjects experienced elevated HGH levels within 90 minutes. These findings show that a surprisingly small amount of supplemental glutamine is capable of elevating plasma growth hormone.

How does it do this? In the small intestine, glutamine is converted into citrulline, which in turn triggers the synthesis of arginine. Moreover, glutamine is converted into glutamate, which can directly enhance growth hormone secretion.

GABA

Gamma-aminobutyric acid (GABA) is the brain's major inhibitory neurotransmitter. Studies show it is also responsible for both the rise of HGH (when at rest) or the inhibition of growth hormone (when exercising). In one study, a single oral dose of 5 grams of gamma aminobutyric acid administered to 19 volunteers significantly elevated plasma growth hormone levels compared to placebo-treated controls.

ADDITIONAL BENEFITS

Each of the amino acids discussed here offers a number of other benefits beyond their potential role in growth hormone release. For example, glutamine shifts the fuel for muscle from glucose to fatty acids and accelerates fat burning. Glutamine is also a precursor for the antioxidant glutathione, which protects the liver. Supplemental glutamine shields the body from stress by deflecting damage from the stress hormone cortisol, and has prevented the muscle wasting associated with cortisol treatments.

Another example is ornithine, which together with arginine, is an important immunity-enhancing nutrient. Ornithine may help reduce the elevated ammonia levels seen after exercise—a benefit that can reduce post-workout fatigue.

Given the number of benefits amino acids produce independent of their ability to stimulate the release of HGH, they can make a beneficial addition to any supplement regimen. But boosting growth hormone levels is still the prime function of amino acids. Here is a brief overview of the HGH-boosting power of each of the key amino acids:

Amino Acids	Study Results
Ornithine	Increased serum growth hormone in body-builders, up to four times the baseline level.
Arginine	250 mg. per day of arginine aspartate given to five healthy subjects for seven days caused a 60 percent rise in GH during slow wave sleep compared to the control period.
Arginine and Ornithine	In a double-blind study, adult males who consumed 2 grams of L-arginine and 1 gram of L-ornithine experienced significantly higher total strength and lean body mass scores and excreted less urinary hydroxyproline than placebo-treated subjects.
Ornithine Alpha-Ketoglutarate (OKG)	In healthy subjects, OKG increased tissue levels of HGH-releasing glutamine.
Arginine and Lysine	1,200 mg. of arginine pyroglutamate combined with lysine hydrochloride significantly elevated biologically active HGH from two to eight times the baseline value in 15 healthy young men.
Arginine and Lysine	1,500 mg arginine and 1,500 mg lysine increased GH in young men only during resting conditions.
Glycine	In normal, non-obese subjects, 6.75 grams of glycine increased growth hormone levels up to 300 to 400 percent that of baseline.
Glycine and L-arginine	Increased the subjects mean resistance to fatigue up to 28 percent over the controls during acute exhaustive high-intensity anaerobic exercise and produced an overall gain in total muscle work of 10.5 percent more than controls.
Gamma Aminobutyric Acid (GABA)	A single oral dose of 5 grams of GABA administered to 19 subjects significantly elevated plasma growth hormone levels compared to placebo-treated controls.
Glutamine	Two grams of oral glutamine resulted in elevated plasma growth hormone in 8 of 9 subjects tested.

HGH-ENHANCING HABITS

Although the amount of growth hormone your body regularly produces declines as you age, there are a few things you can do to trick your pituitary gland into churning out more HGH.

Get some sleep. Even though sleeping in won't necessarily increase the amount of HGH your body secretes, constantly burning your midnight oil could be suppressing how efficiently your body distributes growth hormone during the course of the day. Keeping normal sleeping habits — seven to nine hours per night — may let you tap into a certain percentage of growth hormone that you never get a chance to utilize when sleep-deprived.

Eat Smarter. Focus on eating six smaller meals during your day instead of three or four larger ones. Consuming large meals with a high glycemic index forces the body to release a high amount of insulin into the system to aid with digestion. This reaction not only causes your body to store fat, it may also inhibit the flow of HGH being released throughout your bloodstream. Instead, make a point of consuming low-sugar foods that will prevent the release of insulin.

The crossover between what you need to stay healthy and what you need to release more growth hormone doesn't stop with eating smaller meals and getting enough shut-eye. All of the same factors that need to be in place for a healthy lifestyle still hold true. Exercising right, eating right, sleeping right, and keeping your stress to a minimum will not only keep you healthier, it will foster the type of environment that encourages the pituitary gland to do its job. Deficits in any of these areas will only slow down how well your body functions as a whole which, in turn, slows down the amount of HGH that is being pumped into your system.

Eat before exercise. Eating a meal consisting of high-quality protein and a complex carbohydrate two hours prior to working out and another protein-carbohydrate meal immediately afterward can significantly increase both growth hormone and testosterone within the bloodstream. Yogurt and fruit, low-fat string cheese and a few whole grain crackers or one-half of a turkey sandwich are good options. But don't eat just before exercising. Researchers at UCLA found that subjects who exercised with partially digested food in their stomachs experienced a 54 percent decrease in the production of growth hormone.

Get the most from your workout. Exercising, especially strength training, is one of the best ways to boost your HGH levels—and the more intense your workout, the better. A recent study in the *Journal of Applied Physiology* found that the frequency and amount of growth hormone the body secretes is relative to the intensity of your workout.

Subjects who exercised at a higher intensity experienced greater and more frequent releases of growth hormone after their workouts.

To get the most from your training efforts, you need to be sure that the duration and intensity of your regimen are high enough to elicit a response. Keep your workouts focused on short-burst, high intensity resistance exercises for at least 20 to 30 minutes.

There are certain stretching exercises that may help squeeze out a little extra growth hormone. By utilizing stretches that include several muscle groups that work collectively, the intensity of the workout subsequently increases as well, forcing the pituitary gland to issue more HGH to compensate for the extra effort.

For more on how increasing both HGH and testosterone with exercise, see *Exercises You Can Do Everyday to Reduce Estrogen and Make Your Testosterone Surge* in this series of booklets.

Don't overeat before turning in. Never eat a large meal within two hours of going to sleep. The body releases the greatest amount of HGH during the first two hours of sleep. Having excess insulin within the system after a large meal suppresses this higher output of growth hormone, preventing your body from taking advantages of it as you rest.

Nighttime also seems to be the best time to take additional supplements to increase the flow of growth hormone. For instance, UCLA researchers have found that taking arginine and ornithine together on an empty stomach right before bedtime can boost growth hormone levels significantly.

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As you can see, boosting your natural levels of HGH isn't rocket science. Taking a combination amino acid supplement centered around arginine and ornithine at bedtime and making a few simple lifestyle changes can renew your zest for life and help keep you vibrant and healthy for years to come!

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