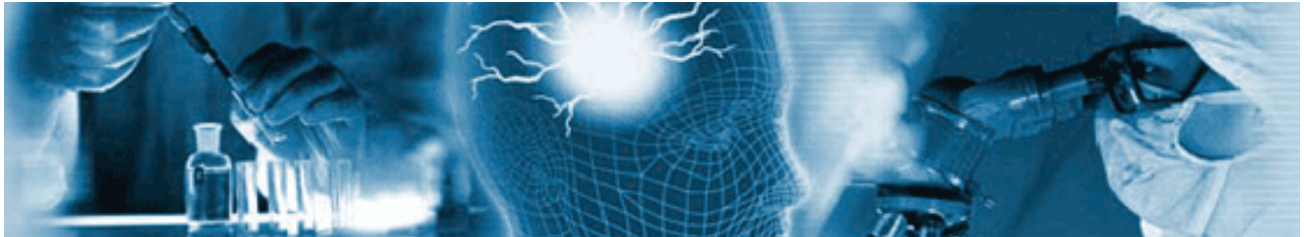


MD+ GHboost Version IV

Growth Hormone Booster



GHboost, a research driven nutritional supplement, is a unique growth hormone stimulating product that increases growth hormone (GH) secretion more effectively than any other GH boosting product on the market.

GHboost also increases serum and tissue levels of the potent anabolic growth factor, insulin-like growth factor I (IGF-I). Growth hormone and IGF-1 act together to increase protein synthesis, decrease muscle breakdown and increase body fat loss.

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While it's mostly known as a hormone that is involved in the growth of children growth hormone is vitally important in adults as well. That's because it plays a central role in body composition, metabolism, protein synthesis and exercise performance.

Growth hormone deficiency at any age, whatever its cause and whether its acute (as in certain instances of short or long-term overtraining) or chronic (due to aging, stress and other factors) can have significant adverse effects on body composition, performance, mood, cognition, cardiovascular function, bone mineral density, health, aging and quality of life.

GHboost stacks a number of different growth hormone releasing compounds that maximize natural GH secretion. Many of these compounds increase GH secretion by different methods (for example the mechanisms by which L-dopa and arginine stimulate

GH secretion are different) and in some cases act synergistically (for example, arginine pyroglutamate and lysine have been shown to work synergistically to release growth hormone), resulting in an increased GH secretion. Stacking a number of these compounds also allows smaller doses to be used with a decrease in any potential side effects.

GHboost effectively suppresses somatostatin the hormone that inhibits GH secretion, while at the same time increasing GH secretion through various direct and indirect pathways including the stimulation of growth hormone releasing hormone (GHRH).

But that's not all as GHboost also increases that anabolic hormones IGF-I and insulin sensitivity, decreases the catabolic hormone cortisol, helps maintain thyroid function and increases nutrient delivery to muscle, all of which are necessary to maximize body composition and exercise performance, as well as maintaining energy levels, health and feelings of well being.

The previous version of GHboost was already the leader in GH boosting products. The new GHboost version IV dramatically improves the anabolic and fat burning effects of GHboost and creates a new paradigm in boosting endogenous GH levels.

What can I expect from the use of GHboost?

GHboost will:

1. Increase GH
2. Increase IGF-I
3. Increase insulin function and sensitivity
4. Increase testosterone secretion and effect
5. Decrease cortisol
6. Optimize thyroid
7. Increase nutrient delivery to muscle

As a result you can expect:

1. Increased muscle mass
2. Decreased body fat
3. Increased energy
4. Increased exercise performance including power and endurance (yes even endurance benefits from increased levels of GH¹)
5. Increased recovery
6. Increased well-being
7. Anti-aging effects

No two people will react to GHboost in exactly the same way. However, in a limited number of follow-ups, everyone using GHboost increased their serum levels of both GH and IGF-I, in some cases dramatically.

In two of the clinical studies both GH and IGF-I levels increased from negligible amount to supraphysiological (above the normal range) levels. In all of the lab tests done on several dozen people so far, the post supplementation GH and IGF-I levels were increased above their levels prior to using GHboost. The lowest increase was 34% for GH levels and 18% for IGF-I. The highest increases were off the chart going from negligible levels to almost 100% above the upper limit of normal values.

As well, GHboost resulted in significant changes in body composition. There was a significant decrease in overall body fat, and particularly so in problem areas such as abdominal fat and areas prone to cellulite, and a maintenance of lean body mass in those losing weight. And in those wishing to maximize body composition and/or athletic performance, there was a shifting of body composition to decreased body fat and increased muscle mass.

Overall, GHboost version IV resulted in an average increase of about 25% over and above the results seen with the previous version of GHboost.

Since GHboost works naturally in the body, the potential for side effects is dramatically reduced when compared to the use of GH injections. That's because the exogenous use of GH (usually by injection) decreases the natural production and make the body dependent on the shots for its GH. When the GH is discontinued it can result in a state of GH deficiency at least until the body revs up its own GH production, something that may take some time.

That doesn't happen when you go off GHboost since it works by increasing natural GH production, and thus puts the body's manufacturing capability in high gear. While GH levels drop when you discontinue its use, they will not drop to below the levels that existed prior to the use of GHboost. In some cases lab results showed that GH levels remained slightly higher after the use of GHboost than they were prior to its use.

History of GHboost

I've been involved in the sports and weight loss business for four decades. For most of that time I've helped athletes in all sports, from professional bodybuilders to Olympic 100 meter gold medalists, optimize their body weight for maximum performance. I also had a medical practice for over three decades that included bariatric and geriatric clinics.

As well I've researched and written books and hundreds of magazine articles (in top fitness, sports and bodybuilding magazines) about ways to optimize body composition for over three decades.

During this time I was fully aware of the effects of GH and how it is an important hormone for health, weight loss and for maximizing body composition. Unfortunately I found that the people that needed it most that didn't produce enough physiologically. And even in those that did, optimizing GH secretion and effects is an important part of the body composition solution.

I looked into using exogenous GH but because of side effects, expense and the bother of daily injections this wasn't the solution I was looking for. I was looking for something natural that had minimal side effects, was convenient to use and that worked.

All of my knowledge and research has finally come to fruition in GHboost, a supplement that really works and is safe. In fact, not only safe but a supplement that naturally increased health and well being, provided some anti-aging benefits as well as helping people to reach their performance, weight and body composition goals.

This amazing, patent-pending formula produces an entirely new level of effectiveness when compared to all of the other GH boosting products on the market. In fact, it is the first product ever to look at all aspects of boosting GH levels and contains dozens of ingredients that work synergistically to maximize GH secretion and effects. The ingredients in this evidence-based, research-driven formula have been proven to affect your GH and IGF-I levels and result in significant anabolic and fat burning effects without causing any negative health effects.

GHboost is a product of my four decades of research and involvement in the medical, sports and weight/fat loss fields. It is a true GH boosting breakthrough that is unequalled in its ability to provide significant performance, anabolic and body composition effects.

It's so good that GHboost is **used by hundreds of elite Olympic athletes and top bodybuilders** to optimize body composition and performance. With GHboost they're able to maximize muscle mass while taking body fat levels to the absolute minimum for their needs. They're finding that GHboost is the perfect supplement to complement their diet and training efforts. And with the emphasis on drug testing in many of these sports, GHboost offers the advantages of some of the more potent performance, anabolic and body composition drugs, without any of the side effects.

What's Changed in GHboost version IV?

I first formulate GHboost in 1997 and when it came out it was immediately popular among bodybuilders and other athletes, and those looking to lose weight and maximize body composition. Version IV of GHboost represents the fourth evolution of this supplement. Each formulation is an improvement over the previous one, taking into consideration my experience with the previous version and the most recent research and findings, and applying these to make GHboost even more effective.

I added a number of ingredients as well as fine tuning some of the ingredients in GHboost version III. I tried several dozen variations of ingredients and dosages to

determine the optimum number and dosages of ingredients necessary to dramatically improve on the already spectacular effects of GHboost on GH and IGF-I levels.

I added

1. Pyridoxyl-5-phosphate
2. Alpha GPC
3. L-tyrosine
4. Anterior Pituitary Peptides

I increased the amounts of

1. Velvet bean
2. GABA
3. Acety-L-tyrosine
4. Bovine colostrum
5. Turmeric
6. Resveratrol

All were increased significantly, some more than four fold over the previous formula.

The result of the additions and fine tuning is a much more effective product. The three tablets per dose has gone up to 5 tablets per dose and a bottle of GHboost now contains 150 tablets instead of 90.

Although much more expensive to manufacture I've kept the retail price the same as an incentive to the serious supplement user to use the very best GH booster on the market at a bargain basement price. Just compare the number and dosages of the ingredients in GHboost with any other GH booster on the market and you'll be convinced on just how much of a bargain GHboost really is.

The Problems with Exogenous Growth Hormone

In my view, increasing your own natural endogenous levels of growth hormone is more effective for maximizing body composition than using exogenous GH. There are two main reasons for this view.

First of all the use of recombinant or synthetic GH (the only kind available since 1985 when the possibility of prion infection resulting in Creutzfeldt-Jakob disease,² a variant of mad cow disease, halted the use of GH harvested from the pituitaries of cadavers) only provides limited GH exposure.

That's because human GH represents a family of proteins rather than a single hormone. In fact, the circulation contains over a hundred GH forms.³ And because we have yet to discover enough about the various forms, the net biological activity of this mixture is

difficult to predict since the exogenous recombinant GH represents only 20 percent or so of the mix.

Thus far, most of the research has been largely confined to monomeric 22K, the same GH that is available for exogenous use. However, while it is certainly effective for its original intended purpose, namely growth promotion, it's not known if it's sufficient for optimal growth. It's unlikely that it can fulfill all the functions of the GH family that are naturally present in the body. As well, the use of one GH variant likely decreases the production of the other variants in the body⁴ thus limiting the normal biological activity of GH.

But there's more to GHboost in that it also stimulates insulin release and increases insulin sensitivity by the use of several of the ingredients in GHboost, including arginine, glutamine, taurine, and alpha lipoic acid.

The combination of increased GH, IGF-I and insulin levels results in a synergistic anabolic effect on muscle while at the same time maintaining significant fat burning effects since the action of GH and IGF-I minimize insulin's effects on body fat.

The second reason is that the use of exogenous GH shuts down your own growth hormone production. And that's a bad thing as it takes time for your body to ramp up the GH machinery once you discontinue the GH injections. In some cases the body decreases the natural production of GH permanently, often making it necessary for you to go back on the injections to feel normal.

That doesn't happen with GHboost since it acts by increasing your natural GH secretion. It acts by ramping up your GH producing machinery rather than shutting it down. So if you go off GHboost you're still in business, even if your levels go back to what they were before using GHboost. In other words, unlike the use of exogenous GH, you don't become a "GH Eunuch" when you discontinue taking it.

The bottom line is that the use of GHboost is more natural, more effective, and has considerably fewer (actually nil) side effects compared to the use of injectable GH.

Effects of GH on Body Composition and Athletic Performance

Growth hormone and IGF-I have various anabolic and ergogenic effects including increasing protein synthesis, decreasing protein catabolism, increasing lipolysis and utilization of fatty acids for energy, increasing skeletal muscle blood flow, and increasing non contractile musculoskeletal tissue. The various mechanisms involved are still being worked out and there are several theories as to their modes of action.

For example, a recent paper postulated that the ergogenic effects of GH, and the associated levels of IGF-I are due to their effects on connective tissue.⁵ In this paper the authors state that "a strengthened connective tissue would give a stronger and more

strain-resistant muscle and tendon and this could, in part, fit with the claimed effect of rhGH on athletic performance. Furthermore, an anabolic effect of rhGH in connective tissue could also suggest a potential for rhGH in treatment of muscle and tendon injuries, which are common problems in many sports.”

This is an interesting hypothesis and the authors do make a creditable presentation. However, in light of the many studies showing the anabolic and other metabolic effects of GH and IGF-I I believe there's much more involved. Their views, however, on the therapeutic potential of GH and IGF-I for the prevention and treatment of injuries are more probable.

Adults with growth hormone deficiency (GHD) who receive GH replacement have been reported to significantly increase total lean body mass and muscle mass.⁶⁷⁸⁹ It's also been shown that long term continuous replacement therapy in patients with GHD results in a sustained increase in total body nitrogen¹⁰ and that even low-dose regimens of GH result in improvements in body composition, fatigue, bone mineral density and lipid profiles.¹¹

As well, other studies have shown that the use of GH stimulates amino acid uptake and protein synthesis in skeletal muscle and enhances nitrogen retention.¹²¹³¹⁴

However, until recently, there has only been a few studies documenting the anabolic effects of GH in normal adults,¹⁵ even though increases in growth hormone production are known to have significant effects on carbohydrate, fat, and protein metabolism, have been shown to enhance recovery after exercise and stimulates IGF-I production in muscle.

Several studies have shown that GH and IGF-I have significant anabolic, anti-catabolic, lipolytic, regenerative and other effects that impact on body composition and athletic performance.¹⁶

While there is evidence from animal models that the effects of GH may be mediated through circulating and/or local production of IGF-I, there is additional evidence to suggest that the mechanisms by which IGF-I and GH promote protein anabolism are distinct.

As such, although studies have shown that insulin and IGF-I decrease protein degradation and GH results in enhanced protein synthesis, recent work has shown that under certain circumstances all can both enhance protein synthesis and decrease protein degradation.¹⁷

For example one study looked at the effects of an acute dose of GH on amino acid metabolism in 15 young healthy males while controlling for the effects of other confounding hormones (i.e. via simultaneous infusion of somatostatin and replacement of insulin, glucagon, and GH).¹⁸

This study demonstrated direct effects of GH in terms of increased anabolic effects via inhibition of amino acid oxidation and stimulation of whole body protein synthesis. The

direct effect of GH for this action was supported by the fact that insulin, glucagon, cortisol, IGF-I, catecholamine and glucose concentrations were not different between the control and GH treatment groups.

We know that increases in local IGF-I expression is associated with increased muscle protein and DNA synthesis, and exhibits both GH and insulin like effects.¹⁹ Local production of IGF-I also stimulates satellite cells to multiply and fuse with existing muscle fibers to enlarge muscle mass.²⁰

GH, IGF-I, Insulin and Amino Acids Synergism

It's been known for decades that insulin, growth hormone, glucocorticoids, insulin-like growth factor 1, thyroid hormones, and other hormones regulate body protein metabolism. It's also well known that insulin,²¹ IGF-I,²² and GH²³ each has acute, anabolic actions on skeletal muscle protein while the glucocorticoids (for example cortisol) have a catabolic effect.

Increasing levels of GH, IGF-I and increasing insulin production and sensitivity (by the use of **arginine**,²⁴ **ornithine**,²⁵ **alpha lipoic acid**, **chromium** and **zinc**.²⁶) results in powerful synergistic effects on body composition.²⁷²⁸²⁹³⁰³¹ This is evidenced by the exogenous use of all three by power athletes and bodybuilders. The massive increase in muscle mass, decrease in body fat and increase in strength and performance attests to their effectiveness.

Unfortunately their use results in significant and sometimes debilitating side effects both while taking them and after, including permanent dysfunction in the regulating systems. Reproducing their synergistic effects by increasing endogenous production and effects produces similar results without the side effects.

GHboost not only increases the effectiveness of endogenous GH, IGF-I, insulin and thyroid, but also provides other boosting effects secondary to the interaction of the select amino acids in the formulation.

For example GH levels are increased by specific amino acids and other compounds, and in turn the GH acts synergistically with amino acids, such as **arginine**, **ornithine**, **glutamine**, **GABA**, **lysine**, **glycine**, **tyrosine** and **taurine** to increase IGF-I levels even further than GH acting alone.³² Also IGF-I levels, which are controlled by growth hormone and insulin, rise even higher because of the increase in insulin sensitivity.

This synergistic effect of several ingredients in GHboost results in an increase in IGF-I levels that is out of proportion to the increase in GH levels, and thus provides a more potent anabolic and fat loss stimulus than either one alone.³³³⁴³⁵

As well, increasing levels of GH has been shown to decrease the catabolic effects of cortisol by decreasing its formation from inactive cortisone,³⁶ to decrease myostatin expression and increase testosterone effects in the body.

Myostatin

Myostatin inhibits muscle growth and is a negative regulator of muscle mass. Inhibiting myostatin, either at the genetic level, or by inhibiting its effects in the body, can result in marked increases in muscle hypertrophy.

Information on myostatin was first published in 1997 in a paper describing enhanced muscle hypertrophy in myostatin deficient mice.³⁷ Later that same year myostatin was reported as being responsible for double muscled cattle.³⁸ I reported on the myostatin story featuring these mighty mice and cattle in my Research Update column in September of 1997 in Muscle Media 2000.

Since then research on myostatin has validated its role in regulating muscle mass, regeneration of muscle tissue, and in regulating body fat, with myostatin promoting increased formation of adipose tissue.³⁹ Decreases in myostatin levels and/or effects results in increased skeletal muscle mass and decreased levels of body fat while increases result in decreased muscle and increased body fat.⁴⁰⁴¹⁴²⁴³⁴⁴

As well, some elite bodybuilders have validated the real world results of inhibiting myostatin through various means and have thus achieved massive levels of muscle hypertrophy in part through this inhibition.

Various degrees of natural inhibition of myostatin secondary to gentic polymorphisms likely explains some of the differences naturally seen in muscular hypertrophy and in the ability to attain significant increases in muscle mass.



7 Months

An extreme example of this is seen in a child that was born in Berlin with a loss of function mutation that turns off the myostatin gene.⁴⁵ The base-pair alteration in the gene results in the missplicing of myostatin messenger RNA, thereby reducing the production of mature myostatin protein. At 4.5 years, this boy is reported to have the physique of a mini-bodybuilder with markedly increased muscle mass and reduced levels of body fat.

At 7 months of age muscle hypertrophy was pronounced in all muscles as can be seen by the hypertrophy of the thigh and calf muscles in this picture (from Bouley 2005). The arrowheads i indicate the protruding muscles of the patient's thigh and calf.

In a recent study done on double muscled Belgian blue bulls, muscle biopsies revealed that this deletion in the myostatin gene altered the muscle fiber composition by increasing the fast-twitch glycolytic muscle fiber proportion inducing a higher proportion of fast-twitch glycolytic fibers and, to a lesser extent, a lower proportion of slow-twitch fibers.⁴⁶

An important function of myostatin is inhibition of satellite cells. Thus one would expect that in the absence of myostatin there would be enhanced muscle regeneration. This appears to be true from studies of acute and chronic muscle injury.^{47,48} For example, muscle from myostatin null animals that were acutely injured regenerated large-diameter myofibers earlier than injured controls with normal myostatin.⁴⁹

GH and Myostatin

Recently studies have shown a negative correlation between GH and myostatin. It appears that deficits in GH may result in increased myostatin expression and a disassociation in autocrine IGF-I effects on muscle protein synthesis and that myostatin likely represents a potential key target for GH and IGF-I induced anabolism.⁵⁰

Interestingly enough, decreasing myostatin can also result in an increase in the expression of the androgen receptor. This results in an increased anabolic stimulus due to increased binding of testosterone to the androgen receptor.

GH potentially can have multiple effect son body composition due to:

- its direct action, and actions secondary to
- increases in IGF-I
- decreases in myostatin and subsequently
- increased testosterone activity

GHboost and Testosterone

Besides increasing testosterone activity, GHboost also may increase testosterone secretion. Part of this ability, besides the interaction of various hormones and systems, is the effects of two of the ingredients in GHboost.

These two ingredients may increase testosterone secretion by decreasing estrogen production secondary to the inhibition of aromatase. Inhibiting aromatase decreases systemic estrogen and thus the inhibiting effects that estrogen has on testosterone production. As such, inhibiting aromatase signals the body to produce more testosterone.

Melatonin has been shown to inhibit aromatase activity, decrease the synthesis of gonadal estrogens, downregulate the expression of the estrogen receptor and inhibit the binding of the estradiol-estrogen receptor complex to the estrogen response element in DNA. The overall result is a decrease in estrogen production and effect.⁵¹ And recently **resveratrol** has also been shown to inhibit aromatase activity.⁵²

As well, the effects of GHboost in increasing insulin sensitivity and effects may secondarily increase testosterone levels through one or several mechanisms. For

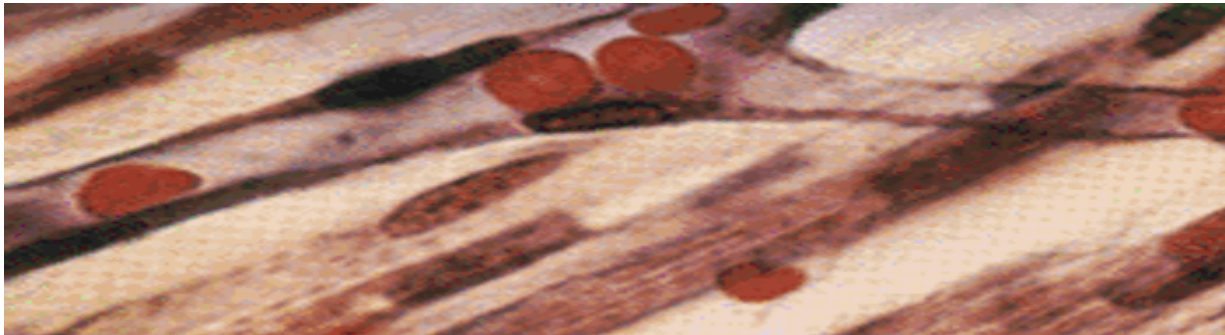
example it may work synergistically with luteinizing hormone (LH), the pituitary hormone that dictates testicular testosterone production. It may do this by stimulating a testes enzyme called 11 beta-hydroxysteroid dehydrogenase which has been shown to relieve steroid-dependent inhibition of Leydig cell function and thus increase testosterone secretion.⁵³

Nutrient and Hormone Delivery to Muscle

On top of the direct anabolic, fat burning, performance and body composition effects, GH, insulin and IGF-I also increase nutrient delivery to skeletal muscle. While exercise is known to dramatically increase muscle blood flow, studies have shown that IGF-I⁵⁴, GH⁵⁵ and an improvement in insulin sensitivity^{56,57} can also increase muscle blood flow.

The improvement in blood flow by the nutrient route (as against the non-nutritive route) can have anabolic and performance enhancing effects by increasing oxygen, hormonal, and nutrient delivery to exercising muscle.⁵⁸

GHboost, besides achieving increased nutrient delivery by increasing GH, insulin and IGF-I levels, also increases tissue levels of nitric oxide, a gas formed from **L-arginine** and oxygen. The combination of **arginine alpha ketoglutarate** and **arginine pyroglutamate** results in a significant increase in NO production, which in turn can further increase oxygen and nutrient delivery to muscle, and athletic performance.^{59,60}



GH and Exercise



Both aerobic and anaerobic exercise have a dramatic effect on serum GH and IGF-I levels, and tissue IGF-I levels.⁶¹

This effect is influenced by several variables, including the type of exercise, training state, body composition, age and gender.

For example, all out rowing performance results in dramatic post exercise increases in GH.⁶² And studies have shown that a single 30-s sprint elicits a marked GH response.⁶³

However, repeated exercise can result in an attenuation of that response. For example, repeated 10-min bout of high-intensity submaximal exercise has been shown to result in a dramatic attenuation of the exercise-induced GH response.⁶⁴

It's also been shown that although a single both of intense exercise results in a marked increase in serum GH, repeated bouts separated by 60 minutes of recovery results in a lower GH response.⁶⁵ A later study found that repeated bouts separated by up to four hours of recovery still resulted in an attenuated GH response whereas there was no adverse effect on serum GH levels in bouts of intense exercise done on consecutive days.⁶⁶

Another study looked at the GH responses to two consecutive 30-min cycling sessions at 80% of individual maximal oxygen consumption ($\dot{V}O_{2\max}$) in amateur competitive cyclists.⁶⁷ Subjects were tested on three occasions with different time intervals between the two bouts: 120 min, 240 min and 360 min.

The GH response to the second bout was significantly lower at the 120 and 240 minute time intervals between bouts but not with the 6 hour interval.

Other studies have shown that even repeated bouts of aerobic (submaximal) exercise resulted in an increase in serum GH that was greater when the recovery period between bouts increased.⁶⁸

The reason for the attenuated serum GH and IGF-I responses (likely also tissue levels of IGF-I) seen in these studies are not known but it could be due to several factors, including autoinhibition at the level of the pituitary secondary to increased levels of GH and/or IGF-I,⁶⁹ to an increase in serum free fatty acid levels⁷⁰ secondary to exercise and GH effects on lipolysis.

GHboost, used prior to repeated bouts, will enhance the GH response to exercise and result in anabolic and ergogenic effects for all athletes because it boosts GH and IGF-I levels, as well as it's boosting endogenous testosterone, enhancing the beneficial effects of insulin and controlling cortisol.

GH and Endurance Athletes



Several recent studies have shown that GH is an effective anabolic and ergogenic aid.

Although many of the studies center around anaerobic training such as resistance training, GH is also effective in increasing aerobic performance in all sports and activities, including ultra-endurance events.

In fact, levels of GH (and cortisol) increase more dramatically in endurance events than with anaerobic events.⁷¹

Aerobic capacity is increased by GH. It's been shown that GH treatment displays multiple actions through several components of the oxygen transport system including increasing red cell mass, blood volume, and cardiac function.⁷²⁷³

Cardiac systolic function, in particular, is well documented to improve with GH treatment of both male and female GH-deficient subjects.⁷⁴

One study looked at the effects of exogenous GH in male endurance athletes. The use of GH resulted in reduced leucine oxidation by more than 50%, which suggests that the metabolic effects of GH include an anabolic effect in skeletal muscle.⁷⁵

Another recent study found that GH use resulted in a lower exercise oxygen consumption without a drop-off in power output.⁷⁶ The authors concluded that the use of GH may improve exercise economy.

As well, GH decreases the perception of fatigue in adults with untreated GHD and therefore may be useful in this regard as well in endurance athletes.

GHboost not only results in an increase in GH and IGF-I levels, but also decreases inappropriate cortisol levels, resulting in significant ergogenic effects for the endurance athlete.

Effect of GH on Core Temperature and Performance

Growth Hormone has other effects that can result in an increase in performance in endurance athletes.

An increase in sweat rate is associated with a greater heat loss from evaporation and a lower core temperature. Investigators have shown that growth hormone stimulates sweat production and heat loss from evaporation during exposure to heat in either the absence or presence of exercise.⁷⁷ Growth hormone deficiency, on the other hand, is associated with reduced sweat secretion and an increase in heat storage.⁷⁸

A recent study of Ironman triathletes found that those with higher GH expression had lower rectal temperatures which in turn correlated with increased performance.⁷⁹

Regenerative and Cognitive Effects of GH and IGF-I

As we've seen the anabolic, anti-catabolic, fat burning effects of GH are well established. However, there is also evidence that the HG/IGF-I axis affect cognition and the biochemistry of the adult brain.

The findings of various studies suggest that both GH and IGF-I have cognitive, neuroprotective and regenerating effects on the central nervous system.⁸⁰ It seems that GH and IGF-I can act directly on their own, and also have shared effects, likely due to cross-talk between the GH and IGF-I transduction pathways.

Effects of GHboost on Aging

As we've seen GH levels decline dramatically from age 20 to age 60. This decline leads to a progressive GH deficiency. Since GH has beneficial effects on muscle mass, bone density and body fat it counters some of the age related changes in body composition.

This reduction in GH contributes to physical and psychological changes seen with aging including decreased skeletal muscle, increased body fat, thinning skin and decreased well being and quality of life.

Studies have shown that restoring GH levels results in improvements in all of these areas as well as boosting the immune system, improving protein, lipid and carbohydrate metabolism, improving recovery, and decreasing inflammation in the body.⁸¹⁸²⁸³⁸⁴

Some of these effects from increasing GH are secondary to increases in IGF-I and may also be secondary to subsequent changes in other hormones and growth factors. For example, as we've seen, GH has a direct effect on decreasing myostatin and an indirect effect of increasing the effects of testosterone in the body.

A recent study found that while exercise has been shown to downregulate myostatin expression in adults, it doesn't do so in the elderly. The authors concluded that this impaired capacity may play a role in limiting hypertrophy in older females.⁸⁵

But there's more to GHboost than just boosting GH. GHboost also contains numerous ingredients that also impact on health, well being and longevity, and have anti-aging effects.

For example GHboost contains resveratrol, a potent anti-oxidant with significant anti-aromatase activity. Researchers in Italy have shown that resveratrol may have significant anti-aging effect and also extend lifespan.⁸⁶

The authors of this study conclude that "conclude that "the observation that its supplementation with food extends vertebrate lifespan and delays motor and cognitive age-related decline could be of high relevance for the prevention of aging-related diseases in the human population."



The formulation includes:

- Several individual amino acids. Many studies have shown that specific amino acids, such as **arginine**, **ornithine**, **lysine**, **L-dopa** and **GABA** (all in Amino) taken orally can act alone and synergistically to increase the release of growth hormone.⁸⁷⁸⁸⁸⁹⁹⁰⁹¹⁹²⁹³

Studies have also shown that the increase in the body's production of growth hormone depends on the specific amino acids used and the ratios of the amino acids.⁹⁴ For example one study found that combining relatively small amounts of **arginine pyroglutamate** with **L-lysine** resulted in a much greater increase in GH secretion than large doses of either one alone.

A recent study found that a combination of **glycine** and **glutamine**, along with **niacin** (all three are in GHboost) enhanced growth hormone secretion in middle aged and elderly men.⁹⁵ Glycine has been shown to increase growth hormone secretion on its own.⁹⁶

GHboost contains an ideal mixture (number and dosage) of the most effective GH boosting amino acids, including **L-dopa**, **arginine pyroglutamate**, **arginine alpha ketoglutarate(AKG)**, **GABA**, **glutamine**, **glycine**, **lysine** and **ornithine**. These amino acids have a stimulatory effect on GH secretion directly, through stimulating GHRH, and by inhibiting somatostatin.

Since several of these amino acids cause the release of growth hormone by different mechanisms,⁹⁷ they are even more effective when taken together. The amino acids can also stimulate other hormones. For example, arginine, like other dibasic amino acids, stimulates pituitary release of growth hormone and pancreatic release of insulin. Various amino acids, for example arginine, also stimulate IGF-I synthesis, both hepatic and local.

- **Bovine colostrums**, which acts as a bioavailable source of IGF-I. It also contains immunoglobulins, including transferring to bolster the immune system and promote GH secretion.
- **Acetyl-L-carnitine**. This compound is part of a new technique to increase nighttime growth hormone release, along with the amino acid **ornithine**.⁹⁸

It's postulated that 500 mg of acetyl-L-carnitine and 25-100 mg of ornithine taken before bed will produce increased nighttime GH release. GHboost contains 500 mg of acetyl-L-carnitine and 200 mg of ornithine. The higher level of ornithine is set for the added synergistic effect that ornithine has with some of the other amino acids, including arginine. There is evidence to show that acetyl-L-carnitine also directly increases IGF-I levels.

A recent study found that acetyl-L-carnitine significantly increased levels of free IGF-1 (the bioactive component of total IGF-1). As well, all the treated patients

reported, an improved sense of well being by the second and third week of acetyl-L-carnitine therapy.⁹⁹

- **L-tyrosine** and **acetyl-L-tyrosine**. L-tyrosine is a conditionally essential amino acid and is a precursor to epinephrine, norepinephrine and dopamine, three important brain neurotransmitters involved in brain function and GH secretion. Tyrosine is also used by the thyroid gland for the production of thyroid hormone, which is important for maximizing metabolism and body composition.

Acetyl-L-tyrosine is an active metabolite of tyrosine that has some properties outside of L-tyrosine. Both tyrosine and the acetyl metabolite are precursors to the neurotransmitter dopamine, and have been found to increase GH secretion. Both ingredients have also been shown to increase cognitive function.

- **Alpha Glycerylphosphorylcholine (alpha GPC)** is a precursor to acetylcholine. It's been shown that low acetylcholine levels can result in decreased levels of GH secondary to decreased cholinergic tone.¹⁰⁰ Studies have shown that alpha GPC increases GH production secondary to stimulation via GHRH.¹⁰¹

Anterior pituitary peptides are ultra pure proteins and peptides derived from porcine anterior pituitary glands. This mixture, while not containing actual hormones, increases the secretion of GH by the pituitary gland.

- **CDP choline (cytidine 5'-diphosphocholine)** has been shown in several studies to increase serum levels of GH in man.¹⁰²
- **Melatonin**. Several studies have shown that melatonin increases growth hormone secretion through complimentary pathways¹⁰³ for as long as 24 hours. As well it's been shown that melatonin induces normal sleep patterns which in turn are conducive to maximizing night time growth hormone secretion. Melatonin has also been shown to have significant antioxidant effects.
- **Taurine**. Taurine has been shown to increase GHboost in animals.¹⁰⁴ As well it is a potent antioxidant, increases insulin sensitivity, increases cell volume and therefore protein synthesis, and acts as a cytoprotective agent in the central nervous system and muscle.¹⁰⁵¹⁰⁶¹⁰⁷¹⁰⁸¹⁰⁹ Overall, while it isn't used to make up muscle tissue, it has significant anabolic effects.
- **Turmeric**. The active constituent in turmeric, known as curcumin, is a potent antioxidant with anti-inflammatory properties and has a wide range of therapeutic effects.¹¹⁰ Turmeric exhibits marked anti-inflammatory action and has been shown to be as effective as some anti-inflammatory drugs. For example in a double-blinded trial, post surgical patients receiving curcumin experienced reductions in stiffness and joint swelling comparable to the effects of phenylbutazone, a potent anti-inflammatory drug.¹¹¹

Of all the spices and herbal preparations it seems that only the spice turmeric has any anti-inflammatory effects. This was the conclusion of a study of a variety of Ayurvedic and herbal preparations, which was presented recently at the 9th Asia Pacific League of Associations for Rheumatology Congress. In this study, a variety of herbal and Ayurvedic preparations were tested in rats. The rats were fed oral doses of the varied herbal and Ayurvedic recipes. Only turmeric showed anti-inflammatory effects when tested on irritated paws of the rats.

It works by inhibiting cyclooxygenase and lipoxygenase enzymes that catalyze the formation of inflammatory prostaglandins.

Since GH secretion is compromised by acute and chronic inflammation,¹¹²¹¹³ the anti-inflammatory effects of turmeric, along with the other potent antioxidants in GHboost, such as **resveratrol, vitamin C, alpha lipoic acid, taurine, melatonin**, relieves the effects of inflammation on GH secretion and thus results in increased GH levels in the body.

- Other potent antioxidants such as **vitamin C, glutathione** and **resveratrol**. As mentioned above, these antioxidants suppress oxidant and stress damage to the hypothalamic pituitary axis and minimize the adverse effects of inflammation on GH secretion. Again several studies have shown that chronic systemic inflammation, including arthritis, involving cytokines such as interleukin-1 and tumor necrosis factor-alpha may be associated with a decrease in GH and IGF-I, and concomitant muscle wasting.¹¹⁴ In one study the authors surmised that the decrease in body weight gain in arthritic rats may be, at least in part, secondary to the decrease in GH and IGF-I secretion.
- **Alpha Lipoic Acid**. Besides having potent antioxidant properties,¹¹⁵ likely secondary to increasing levels of intra-cellular glutathione, ALA also increases insulin sensitivity. **Alpha lipoic acid (ALA)**, a potent antioxidant¹¹⁶¹¹⁷¹¹⁸ that can recycle other antioxidants such as vitamin C, vitamin E and glutathione.¹¹⁹¹²⁰ ALA was added to GHboost to increase GH secretion and insulin functioning and sensitivity¹²¹¹²² by its actions on the pro-inflammatory cytokines¹²³¹²⁴ and because of its effects on decreasing secondary cortisol elevations.
- **Pyridoxine (vitamin B-6)** and **niacin (vitamin B3)** are water-soluble vitamins that are needed in the body's production of GH. Niacin also directly increases GH secretion. Niacin, along with the amino acid glycine, also have some relaxing effects and thus are useful before bed to help sleep.

GHboost has both **pyridoxine** (in the form of HCL) and **pyridoxal-5-phosphate (P5P)** in it. P5P is the metabolically active form of vitamin B6. Pyridoxine HCL, while as easily absorbed as P5P has to be converted to P5P in the body in order to be used by the enzymes involved in protein metabolism and various hormonal processes. P5P is the preferred form of vitamin B6 as it can be used directly in the body without relying on the liver's conversion of other forms of vitamin B6 into P5P. As well, less is needed to achieve the same cofactor effects.

Pyridoxal-5-Phosphate (P5P) is an active form of vitamin B6 involved in macronutrient metabolism as well as the production of neurotransmitters including dopamine, noradrenaline and serotonin.

- **Zinc.** Especially where a deficiency may be present, supplemental zinc has resulted in an increase the secretion of growth hormone and IGF-I.¹²⁵
- **Niacin** has been shown to increase GH secretion and to act synergistically with other GH releasing ingredients.

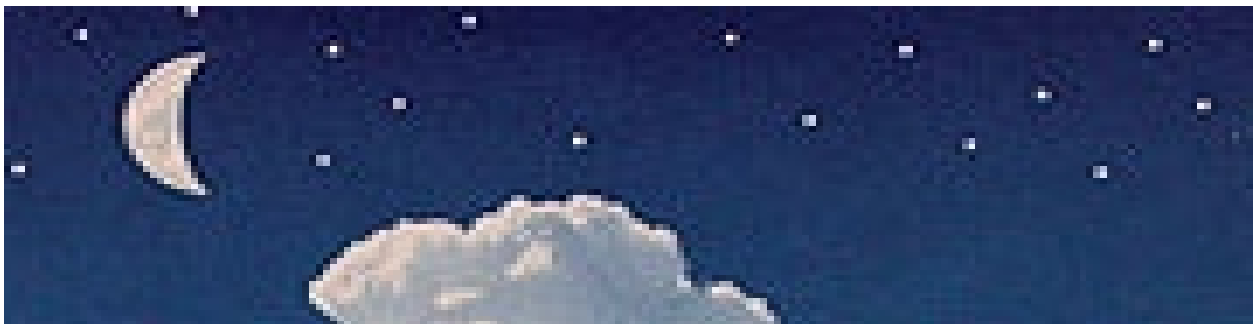
How to Use GHboost

Since up to 90 percent of growth hormone is released two hours or so after falling asleep, GHboost is best used before bed as it results in an increase in the GH nighttime peak as well as increased GH levels throughout the day. The nighttime peak of GH also acutely stimulates IGF-I levels for several hours giving elevated levels over a 24 hour period.

GHboost can also be used before exercising to maximize the anabolic and fat burning effects of exercise. As well, GHboost works synergistically with other MD+ nutritional supplements.

For example [NitAbol](#), the nighttime anabolic, fat burning combo combines [TestoBoost](#) with GHboost and [Myosin Protein](#). NitAbol is perfect for those that want to lose weight, but would prefer to maintain the muscle they have and strictly lose bodyfat.

GHboost works synergistically with [LipoFlush](#) and with [Amino](#) to decrease body fat and maximize muscle mass and performance. This combination is used by competitive bodybuilders and fitness competitors, as well as elite level Olympic athletes to hone their bodies and performance.

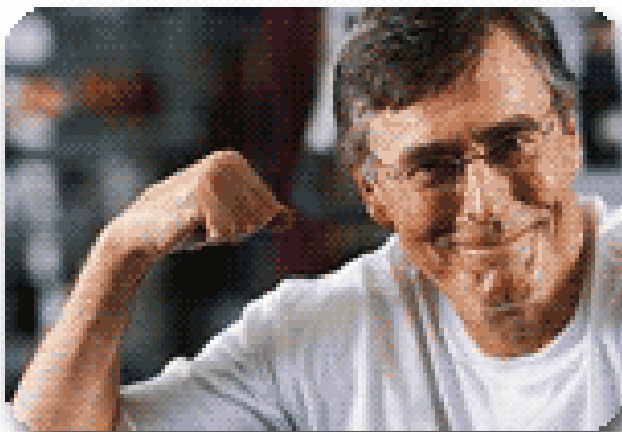


Nutrition Panel GHboost version IV

Supplement Facts: Serving Size: 5 Tablets Servings Per Container: 30					
	Amount Per Serving	% Daily Value		Amount Per Serving	% Daily Value
Vitamin C (as Ascorbic Acid)	500 mg	833%	Bovine Colostrum	1000 mg	*
Vitamin B6 (as Pyridoxine HCL and Pyridoxal-5 Phosphate)	10 mg	500%	Immunoglobulins	250 mg	*
Niacin	15 mg	75%	Velvet Bean Extract (Mucuna pruriens) (seed)	400 mg	*
Zinc (as Zinc Citrate)	10 mg	67%	L-Dopa	60 mg	*
Chromium (Amino Acid Chelate)	25 mcg	21%	Turmeric Extract (Curcuma Longa) (root)	200 mg	*
Copper (as Copper Gluconate)	200 mcg	10%	Polygonum Cuspidatum Extract (root) (Protykin®)	430 mcg	*
Acetyl-L-Carnitine	500 mg	*	Resveratrol	215 mcg	
Acetyl-L-Tyrosine	200 mg	*	GHBoost Proprietary Complex	1700 mg	
GABA (Gamma-Amino-Butyric-Acid)	500 mg	*	Alpha-Glycerolphosphorylcholine (Alpha GPC), Alpha Lipoic Acid (ALA),		
L-Arginine Pyroglutamate	500 mg	*	Anterior Pituitary Peptides, Calcium Phosphate, CDP Choline, Glutathione (Reduced),		
L-Arginine Alpha Ketoglutarate	500 mg	*	L-Glutamine, L-Glycine, L-Tyrosine, Melatonin, Taurine,		
L-Ornithine HCL (hydrochloride)	300 mg	*			
L-Lysine	200 mg	*			

Other Ingredients: Cellulose, Stearic Acid, Modified Cellulose Gum, Hydroxypropylmethyl Cellulose, Magnesium Stearate, Silicon Dioxide.

***Daily Value not established**



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