# MORE INFO TO MAINTAIN

# MAXIMUM HEALTH

# WHILE TRAINING

# MORE INFO TO MAINTAIN MAXIMUM HEALTH WHILE TRAINING

## CONTENTS



***This information is a general guide only to assist with maintaining MAXIMUM HEALTH while training***

**It is recommended to consult a Medical Practitioner who is familiar with AAS & PIEDs**


References: Llewellyn, William. Anabolics E-Book Edition

# AAS SOME FREQUENTLY ASKED QUESTIONS

## 1. How much weight can someone expect to gain during the first cycle of steroids?

Provided dosing is sufficient, a steroid user can expect to make the most significant progress during their first cycle. Although this will vary from person to person, it is not uncommon for someone to gain 10 kilograms of weight or more during a 8 to 12 week period of AAS use. Some of this may be water retention, although a solid gain of more than 5 to 8 kilograms of muscle mass is possible.

## 2. Are the gains from steroid use temporary?

Yes, and no. Steroids can help you do two basic things with regard to muscle growth. First, they can allow you to more rapidly reach your genetic limits for muscle growth. Provided you continue to train actively, eat properly, and use an effective PCT program, you should be able to maintain at your genetic limit indefinitely. So in this regard, the early gains do not have to be temporary. Later, steroids can allow you to push well beyond your genetic limits. It is important to emphasize this, as extreme physical development cannot be maintained long-term without the repeat administration of anabolic substances. The body will always revert back towards its normal metabolic limits once AAS are removed. In this context, some of the gains will not be permanent. Steroids do permanently alter the physiology of your muscles by adding more cellular nuclei. With higher nuclei content, each muscle cell can manage its volume more efficiently, which allows more rapid expansion. Even after a long period of complete abstinence from training and AAS, the nuclei remain.

This may provide a "muscle memory" effect, allowing you to reach your genetic limit (perhaps a slightly extended limit) faster than if you had never used AAS in the past. So in this regard, there are lasting benefits beyond the temporary increase in muscle size itself.

### 3. Can steroids make me look like a professional bodybuilder?

If you have the underlying genetics to allow for this extreme muscle growth, this may be possible with a lot of hard work and dedication. If you are like the vast majority of people, however, steroids will not be able to make you look like a professional bodybuilder. Genetics are a big factor in determining the ultimate limits to your physique, even in an enhanced state. Many people use steroids and look very big and impressive because of it, but very few users are able to make it to the stage of a professional bodybuilding show.

### 4. How dangerous is an isolated cycle of steroids?

Anabolic/androgenic steroids are overall considered safe with appropriate monitoring, at least in a short-term sense. Fatal overdose is not reasonably possible, and the negative health changes such as alterations in cholesterol, blood pressure and blood clotting (among other things) are very unlikely to manifest in serious bodily harm after an isolated cycle. There are rare deaths from such things as stroke and liver cancer in short-term users, but such occurrences are statistically extremely rare in light of the millions of people that use these drugs. If you had to comparatively rate the acute risks of AAS use, they would be far less than virtually all illicit narcotics.

## 5. How dangerous is long-term steroid use?

The long-term use of steroids for non-medical reasons maybe an unhealthy practice. It has been difficult, however, to quantify the exact risk. The main issue is the fact that AAS use can promote heart disease, the number one killer of all men-both steroid users & non-users. Heart disease is a slow progressive disease, which may build for decades without symptoms. Steroid use may accelerate the silent process of plaque deposition in the arteries, and also induce other changes in the cardiovascular system that may increase susceptibility to stroke or heart attack. The exact mortality rates of long-term steroid users has not been able to be reliably calculated in comparison to non-steroid users.

***It is especially important to closely monitor cardiovascular disease and other health risk factors with a Medical Practitioner who is familiar with AAS & PIEDs if long-term steroid use is a practice you will follow.***

## 6. Can steroids be used long-term safely?

The non-medical use of AAS by definition cannot be defined as a safe practice. However, it can be argued that anabolic/androgenic steroids can be used with high relative safety, even over a period of many years. The guidelines of steroid harm reduction are important to minimizing the negative health effects of these drugs. Provided an individual follows these guidelines and is careful with drug selection, dosages, and durations of intake, follows a diet low in saturated fats, cholesterol, sugar, and refined carbohydrates, actively trains with both resistance and cardiovascular exercise, it may be difficult in many cases to argue high tangible health risks. It takes a great deal of involvement and planning to use AAS in this manner, which is always advised.

*Regular monitoring of blood pressure and blood tests are recommended to minimize long-term health issues and maintain* ***MAXIMUM HEALTH*** *while training.*

## 7. What are the safest steroids for men?

Testosterone, whatever the form, tends to be the safest steroid for men. When the dose remains within the moderately supra-therapeutic range (such as 250-500 mg of an injectable testosterone ester per week), alterations in cardiovascular risks factors are noticed, but not extreme. Some of this has to do with the beneficial cardiovascular effects of estrogen in men. Also considered fairly safe are the common injectable steroids boldenone (equipoise), nandrolone (deca), and methenolone (primobolan). Isolating your use to these drugs is recommended over using the full spectrum of oral and injectable steroids.

## 8. How can I minimize the long-term negative health effects of steroid use?

Regular monitoring of blood pressure and blood tests are recommended to minimize long-term health issues. Including cholesterol levels, glucose, hormone profile, thyroid, liver and kidney function.
***It is recommended to consult a Medical Practitioner who is familiar with AAS & PIEDs.***

## 9. Should I rotate my steroids every few weeks to prevent receptor down regulation?

No, this is not necessary. Anabolic/androgenic steroids all work primarily by attaching to and activating the same receptor. As such, you do not gain anything by switching to a new compound that works via stimulating the same receptor. If tolerance were induced by one AAS compound, it would be extended to all compounds. The plateau effect that is noticed 6-8 weeks into most cycles is however still poorly understood.

***The use of a Body Composition Analyser can assist with monitoring changes in muscle mass, body fat and water retention.***

# TESTOSTERONE ENANTHATE

Testosterone enanthate (Test-E) is considered the best AAS for the first time user for muscle growth.

## Description

Testosterone enanthate is a slow-acting injectable form of the androgen testosterone. Following deep intramuscular injection, the drug is designed to provide a sustained release of testosterone into the bloodstream for approximately 2 to 3 weeks. Testosterone enanthate is highly favored by bodybuilders for its ability to promote strong increases in muscle mass and strength.

## Estrogen Aromatization

Testosterone is readily aromatized in the body to estradiol (estrogen). The aromatase (estrogen synthetase) enzyme is responsible for this metabolism of testosterone. Elevated estrogen levels can cause side effects such as increased water retention, body fat gain, and gynecomastia.
Testosterone is considered a moderately estrogenic steroid.

An **anti-estrogen** such as clomiphene citrate (**Clomid**) or tamoxifen citrate (**Nolvadex**) may be necessary to prevent estrogenic side effects.

Some users prefer to use an **aromatase inhibitor (AI)** like **Arimidex** (anastrozole), which more efficiently controls estrogen by preventing its synthesis. Aromatase inhibitors however may have negative effects on blood lipids (cholesterol).

Estrogenic side effects will occur in a dose-dependent manner, with higher doses (above normal therapeutic levels) of testosterone more likely to require the concurrent use of an anti-estrogen or aromatase inhibitor.

Since water retention and loss of muscle definition are common with higher doses of testosterone, this drug is usually considered a poor choice for dieting or cutting phases of training. Its moderate estrogenicity makes it more ideal for bulking phases, where the added water retention will support raw strength and muscle size, and help foster a stronger anabolic environment.

## Side Effects (Androgenic)

Testosterone is the primary male androgen, responsible for maintaining secondary male sexual characteristics. Elevated levels of testosterone are likely to produce androgenic side effects including oily skin and acne.

## Side Effects (Hepatotoxicity)

Testosterone is not considered to have any long-term significant liver toxicity effects.
Mild elevation of the liver enzymes ALT (Alanine Aminotransferase) and/or AST (Aspartate Aminotransferase) may occur and monitoring of liver function blood tests are recommended during use.

## Side Effects (Cardiovascular)

Testosterone Enanthate can have adverse effects on serum cholesterol. This includes a tendency to reduce HDL (good) cholesterol values and increase LDL (bad) cholesterol values, which may shift the HDL to LDL balance in a direction that favors greater risk of arteriosclerosis (narrowing of arteries).

Test-E may also adversely effect blood pressure and triglycerides which can potentially increase the risk of cardiovascular disease.

The aromatization of testosterone to estradiol also helps to lessen the negative effects of androgens on serum lipids.

With doses of 600 mg or less per week, the impact on lipid profile tends to be noticeable but not dramatic, making an anti-estrogen (for cardioprotective purposes) perhaps unnecessary.

When used in moderate doses, injectable testosterone esters are usually considered to be the safest of all anabolic/androgenic steroids. To help reduce cardiovascular strain it is advised to maintain an active cardiovascular exercise program and minimize the intake of saturated fats, cholesterol, and simple carbohydrates at all times during active AAS administration.

## Side Effects (Testosterone Suppression)

All anabolic/androgenic steroids when taken in doses sufficient to promote muscle gain are expected to suppress the body's natural testosterone production.

Without the intervention of testosterone-stimulating substances (**PCT- Post-Cycle Therapy**), testosterone levels should return to normal within 2-4 months after coming off Test-E.

As with all anabolic/androgenic steroids, it is unlikely that one will retain every kilogram of new bodyweight after a cycle is concluded. This is especially true when withdrawing from a strong (aromatizing) androgen like testosterone, as some of the new weight gain is likely to be in the form of water retention; quickly eliminated after drug discontinuance.

## Administration (Men)

Although active in the body for a longer time, testosterone enanthate is usually injected on a weekly basis for muscle-building purposes. The usual dosage for body-building or performance-enhancing purposes is in the range of **125 mg to 250mg twice per week**, taken in cycles 8 to 12 weeks in length. This level is sufficient for most users to notice exceptional gains in muscle size and strength.

Testosterone is usually incorporated into bulking phases of training. Some do incorporate the drug into cutting cycles as well, but typically in lower doses (125 mg to 250 mg per week) and/or when accompanied by an aromatase inhibitor to keep estrogen levels under control.

Testosterone enanthate is a very effective anabolic drug, and is often used alone with great benefit.
Testosterone is ultimately very versatile, and can be combined with many other anabolic/androgenic steroids to tailor the desired effect.

## Health Monitoring

It is recommended to have regular monitoring of your blood pressure and blood tests during use of Test-E to minimize any potential adverse health effects.

***The use of a Body Composition Analyser can assist with monitoring changes in muscle mass, body fat and water retention.***

*The above side effects are not inclusive and further reading is recommended to understand further possible side effects from AAS use.*

# ESTROGEN AROMATIZATION

**Estrogen levels on cycle – too high or too low**

Testosterone is the primary substrate used in the male body for the synthesis of estrogen (estradiol), the principal female sex hormone. Although the presence of estrogen may seem quite unusual in men, it is structurally very similar to testosterone. With a slight alteration by the enzyme aromatase, estrogen is produced in the male body. Aromatase activity occurs in various regions of the male body, including adipose, liver, gonadal, central nervous system and skeletal muscle tissues. In the context of the average healthy male, the amount of estrogen produced is generally not very significant to one's body disposition, and may even be beneficial in terms of cholesterol values. However, in larger amounts it does have potential to cause many **unwanted effects** including water retention, female breast tissue development (gynecomastia), and body fat accumulation. For these reasons, many focus on minimizing the build-up or activity of estrogen in the body with **aromatase inhibitors** such as Arimidex and Aromasin, or **anti-estrogens** such as Clomid or Nolvadex, particularly at times when gynecomastia is a worry or the athlete is attempting to increase muscle definition.

We must, however, not be led into thinking that estrogen serves no benefit. It is actually a desirable hormone in many regards. Athletes have known for years that estrogenic steroids are the best mass builders, but it is only recently that we are finally coming to understand the underlying mechanisms why. It appears that reasons go beyond the simple size, weight, and strength increases that one would attribute to estrogen-related water retention, with this hormone actually having a direct effect on the process of anabolism. This is manifest through increases in growth hormone secretion, glucose utilization and androgen receptor proliferation.

Regular monitoring of your estrogen levels will assist you in planning your cycle protocol and maximize muscle growth.

## Estrogen and GH/IGF-1

Estrogen may also play an important role in the production of growth hormone and IGF-1.

IGF-1 (insulin-like growth factor) is an anabolic hormone released in the liver and various peripheral tissues via the stimulus of growth hormone (See More Detailed Reading: Human Growth Hormone). IGF-1 is responsible for the anabolic activity of growth hormone such as increased nitrogen retention/protein synthesis and cell hyperplasia (proliferation).

One of the first studies to bring this issue to our attention looked at the effects of the anti-estrogen tamoxifen on IGF-1 levels, demonstrating it to have a suppressive effect. A second, perhaps more noteworthy, study took place in 1993, which looked at the effects of testosterone replacement therapy on GH and IGF-1 levels alone, and compared them to the effects of testosterone combined again with tamoxifen. When tamoxifen was given, GH and IGF-1 levels were notably suppressed, while both values were elevated with the administration of testosterone enanthate alone.

## Estrogen and the Androgen Receptor

It has also been demonstrated that estrogen can increase the concentration of androgen receptors in certain tissues. This was shown in studies with rats, which looked at the effects of estrogen on cellular androgen receptors in animals that underwent orchiectomy (removal of testes, often done to diminish endogenous androgen production). The suggested explanation is that estrogen must either be directly stimulating androgen receptor production, or perhaps diminishing the rate of receptor breakdown.
The fact that estrogen can increase androgen receptor binding in any tissue remains an extremely significant finding.

## Glucose Utilization and Estrogen

Estrogen may play a very important role in the promotion of an anabolic state by affecting glucose utilization in muscle tissue. This occurs via an altering of the level of available glucose 6-phosphate dehydrogenase, an enzyme directly tied to the use of glucose for muscle tissue growth and recuperation. During the period of regeneration after skeletal muscle damage, levels of G6PD are shown to rise dramatically, which is believed to represent a mechanism for the body to enhance recovery when needed. Surprisingly, we find that estrogen is directly tied to the level of G6PD that is to be made available to cells in this recovery window.

The link between estrogen and G6PD was established in a study demonstrating levels of this dehydrogenase enzyme to rise after administration of testosterone propionate. The investigation further showed that the aromatization of testosterone to estradiol was directly responsible for this increase, and not the androgenic action of this steroid.

## Estrogen and Fatigue

"Steroid Fatigue" is a common catch-phrase these days, and refers to another important function of estrogen in both the male and female body, namely its ability to promote wakefulness and a mentally alert state. Given the common availability of potent third-generation aromatase inhibitors, bodybuilders today are (at times) noticing more extreme estrogen suppression than they had in the past. Often associated with this suppression is fatigue. Under such conditions, the athlete, though on a productive cycle of drugs, may not be able to maximize his or her gains due to an inability to train at full vigor. This effect is sometimes also dubbed "steroid lethargy."

The reason is that estrogen plays an important supporting role in the activity of serotonin. Serotonin is one of the body's principal neurotransmitters, vital to mental alertness and the sleep/wake cycle.

Estrogen suppression in menopause has also been associated with fatigue, as has the clinical use of aromatase inhibitors like anastrozole, letrozole and exemestane in some patients. These things may be important to consider when planning your next cycle.

Although not everyone notices this problem when estrogen is low, for those that do, a little testosterone or estrogen can go a long way in correcting this. It is also of note that the use of strictly non-aromatizable steroids sometimes causes this effect as well, likely due to the suppression of natural testosterone production (cutting off the main substrate used by the male body to make estrogen).

## Anti-Estrogens/Aromatase Inhibitors and the Athlete

So what does this all mean to the bodybuilder looking to gain optimal size?

Basically I think it calls for a cautious approach to the use of estrogen maintenance drugs if mass is the key objective (things change, of course, if we are talking about cutting).
Obviously, anti-estrogens should be used if there is a clear need for them due to the onset of estrogenic side effects.

Gynecomastia is certainly an unwanted problem for the steroid user, as are noticeable fat mass gains.

But if these problems have not presented themselves, the added estrogen due to a cycle of testosterone might indeed be aiding in the buildup of muscle mass, or keeping you energetic.

An individual confident they will notice, or are not prone to getting, estrogenic side effects, may therefore want to hold off using estrogen maintenance drugs so as to achieve the maximum possible gains in tissue mass.

***The use of a Body Composition Analyser can assist with monitoring changes in muscle mass, body fat and water retention.***

# hCG (human chorionic gonadotropin)

## Description

Human Chorionic Gonadotropin (hCG) is a prescription medication containing chorionic gonadotropin obtained from a natural (human) origin. Chorionic gonadotropin is a polypeptide hormone normally found in the female body during pregnancy.

Although it possesses minor FSH-like (Follicle Stimulating Hormone) activity, the physiological actions of chorionic gonadotropin mainly mimic those of the gonadotropin luteinizing hormone (LH).
As a clinical drug, hCG is used as an external version of LH. Due to the ability of LH to stimulate the Leydig's cells in the testes to manufacture testosterone, hCG is used with men to treat hypogonadotropic hypogonadism, a disorder characterized by low testosterone levels and insufficient LH output.

HCG is used by male athletes for its ability to increase endogenous testosterone production, generally during, or at the conclusion of, a steroid cycle, when natural hormone production has been interrupted.

## Administration (General)

Human Chorionic Gonadotropin is generally given by the subcutaneous (sub-cut) route.
This has been shown to be roughly equivalent therapeutically to IM injections.
Peak concentrations of HCG occur approximately 16 to 20 hours after subcutaneous injection.

## Administration (Men)

Bodybuilders and athletes use hCG either on cycle, in an effort to maintain testicular integrity (size) during steroid administration, or after a cycle, to help restore hormonal balance as quickly as possible.
Both types of use are deemed effective when properly applied.

## HCG Post-Cycle

Human Chorionic gonadotropin is often used with other medications as part of an in-depth Post Cycle Therapy (**PCT**) program focused on restoring natural body testosterone production more rapidly at the end of a steroid cycle. Restoring natural body testosterone production is a special concern at the conclusion of each cycle, a time when subnormal androgen levels (due to steroid induced suppression) could be very costly to the physique.
The main concern is the action of **cortisol**, which in many ways is balanced out by the effect of androgens. Cortisol sends the opposite message to the muscles than testosterone, that is, to break-down protein in the muscle cell. Left unchecked by a low level of testosterone, cortisol can quickly strip much of your new muscle mass away.

## hCG PCT dosage guide:

2000 Units every 2nd day, taken for no longer than 20 days (10 doses).
If used for too long or at too high a dose, the drug may actually function to desensitize the Leydig's cells
(in testes) to luteinizing hormone, further hindering a return of your natural body's testosterone production.

## HCG On-Cycle

Bodybuilders and athletes may also administer Human Chorionic Gonadotropin throughout a steroid cycle, in an effort to avoid testicular atrophy (shrinkage) and the resulting reduced ability to respond to LH stimulus.
In effect, this practice is used to avoid the problem of testicular atrophy, instead of trying to correct it later on when the cycle is over. It is important to remember that the dosage needs to be carefully monitored with this type of use, as high levels of hCG may cause increased testicular aromatase expression (raising estrogen levels) and also desensitize the testes to LH.
As a result, the drug may actually greatly prolong, not improve, the recovery period.

### hCG On-Cycle dosage guide:

250 IU subcutaneously twice a week throughout the length of the steroid cycle. Higher doses may be necessary for some individuals, but at no point should exceed 500 IU per injection.

## Storage

Refrigeration (2° to 8°C) is required after reconstitution. Do not freeze.

## Health Monitoring

It is recommended to have regular monitoring of your blood pressure and blood tests, including testosterone, estrogen and cortisol levels, during use of hCG to minimize any potential adverse health effects.

***It is recommended to consult with a Medical Practitioner who is familiar with AAS & PIEDs.***

# Arimidex (anastrozole)

## Description

Anastrozole is an oral **aromatase inhibitor (AI).** It acts by blocking the enzyme aromatase, subsequently blocking the production of estrogen in the body. This is also the fundamental use of tamoxifen citrate (Nolvadex), except Nolvadex blocks the action of estrogen at the receptor, not its actual endogenous production.
For the steroid-using male athlete, anastrozole is applied to minimize the side effects associated with elevated estrogen levels secondary to anabolic/androgenic steroid use. In comparison with traditional methods such as Nolvadex and Proviron, anastrozole is significantly more effective at controlling estrogen.

## Side Effects

Side effects associated with the use of an aromatase inhibitor may include hot flushes, joint pain, weakness, fatigue, mood changes, depression, high blood pressure, swelling of the arms/legs, headache, nausea and vomiting. When taken by men to reduce estrogenicity during prolonged periods of steroid treatment, aromatase inhibitors may increase cardiovascular disease (CVD) risk by retarding some beneficial properties of estrogen on cholesterol values.

Studies have demonstrated that when an aromatizable steroid such as testosterone enanthate is taken in conjunction with an aromatase inhibitor, suppression of HDL (good) cholesterol levels become significantly more pronounced. Since the estrogen receptor agonist/antagonist Nolvadex generally does not display the same anti-estrogenic (negative) effect on cholesterol values, it is often favored over aromatase inhibitors for estrogen maintenance by male bodybuilders and athletes concerned with long-term cardiovascular health.

## Administration

When used to reduce the estrogenic side effects of anabolic/androgenic steroid use, male athletes and bodybuilders will commonly take a half of a tablet (.5 mg) every other day (EOD).
When used with readily aromatizing androgens such as testosterone, gynecomastia and water retention are often effectively blocked. Additionally, the use of anastrozole may decrease fat mass, which can also be tied to estrogen levels. The result can be a harder and much more defined appearance to the muscles and physique, which makes this agent of interest for dieting/cutting purposes as well.

Food does not appear to affect the absorption of anastrozole, so the drug may be taken with or between meals.

### Health Monitoring

It is recommended to have regular blood pressure and blood tests, including cholesterol levels and estrogen levels, to assist you with maintaining an appropriate estrogen level.

***It is recommended to consult with a Medical Practitioner who is familiar with AAS & PIEDs.***

# Nolvadex (tamoxifen citrate)

## Description

**Tamoxifen** citrate is a **Selective Estrogen-Receptor Modulator (SERM).**
In breast tissue tamoxifen is a strong anti-estrogen. In male bodybuilders and athletes, tamoxifen is commonly used to counter the side effects caused by elevated estrogens subsequent to the use of certain AASs. Gynecomastia is the unsightly development of female breast tissue in men. This can be first noticed by the appearance of swelling or a small lump under the nipple. If left to progress, this can develop into a large hard-tissue gynecomastia that may be an irreversible without surgery. Elevated estrogen can also lead to an increase in the level of water retained in the body, resulting in a notable loss of definition as the muscles begin to look smooth (even bloated) due to the retention of subcutaneous fluid. Fat storage may also be increased as estrogen levels rise in men.

Tamoxifen citrate also possesses the ability to increase production of **FSH** (follicle stimulating hormone) and **LH** (luteinizing hormone). This is accomplished by blocking negative feedback inhibition caused by estrogen at the hypothalamus, which (via the actions of GnRH) then stimulates the desired release of FSH & LH. This is very similar to the function of **Clomid**. Since a higher release of LH can stimulate the Leydig's cells in the testes to produce more testosterone, tamoxifen citrate can have a positive impact on one's serum testosterone level. This "testosterone stimulating" effect is an added benefit when preparing to conclude a steroid cycle.

Since anabolic/androgenic steroids tend to suppress natural body testosterone production, tamoxifen citrate can help restore a balance in hormone levels. It is most commonly used as part of a comprehensive post cycle recovery program.

In the liver Tamoxifen tends to increase HDL (good) cholesterol synthesis and reduce LDL (bad) cholesterol. However the effect it would have on cholesterol values can vary and cannot be relied upon to eliminate cardiovascular disease risk from AAS use.

## Side Effects

Side effects may include hot flushes, upset stomach, headache, light-headedness and skin rash.
Also changes in liver enzyme levels, and increased triglyceride levels may occur.

## Administration

A daily dosage of 10-20 mg is usually taken while on an AAS cycle. As part of a post-cycle hormone recovery program usually 20mg once or twice a day is recommended.

It is important to note that anti-estrogen use may slightly reduce gains made during a steroid cycle, as many AASs seem to exhibit their most powerful anabolic effects when accompanied by a sufficient level of estrogen (See: Estrogen Aromatization). Therefore, it is usually advised to identify a specific need for tamoxifen before committing to its use during a cycle. Many people, in fact, may find the use of an anti-estrogen unnecessary. Others, however, find they are troubled by water retention and gynecomastia even with milder (less estrogenic) drugs like Deca-Durabolin and Equipoise. The estrogenic response to steroid use is very individual, and may be influenced by factors such as age and body fat percentage.

## Health Monitoring

It is recommended to have regular blood pressure and blood tests, including cholesterol levels and estrogen levels, to assist you with maintaining an appropriate estrogen level.

***It is recommended to consult with a Medical Practitioner who is familiar with AAS & PIEDs.***

# HUMAN GROWTH HORMONE (HGH)

## Description

Human growth hormone (HGH) is an important mediator of the human growth process. This hormone is produced by the anterior pituitary gland, and exists at especially high levels during childhood. Its growth-promoting effects are broad, and can be separated into three distinct areas: bone, skeletal muscle, and internal organs. It also supports protein, carbohydrate, lipid, and mineral metabolism, and can stimulate the growth of connective tissues. Although vital to early development, human growth hormone is produced throughout adulthood. Its levels and biological role decline with age, but continue to support metabolism, muscle tissue growth/maintenance, and the management (reduction) of adipose tissue throughout life. Somatropin specifically describes pharmaceutical human growth hormone that was synthesized with the use of recombinant DNA technology. Somatropin (rhGH) is biologically equivalent to human growth hormone (hGH) of pituitary origin.

In a medical setting, somatropin is used to help treat a variety of health conditions. It is most notably prescribed in cases of childhood growth disorders that are characterized by insufficient growth hormone production.

Somatropin is also sometimes prescribed to healthy men and women who are aging. Growth hormone levels tend to decline as we get older, and many physicians believe that its supplementation to more youthful levels can help slow some of the damage of aging. Given its beneficial metabolic effects on muscle mass, strength, energy, cell regeneration, and fat loss, there are many supporters of this use, even if hGH may not specifically retard the aging process. Note that in order to prescribe hGH for adult hormone deficiency in Australia, the patient must have a diagnosed pituitary disease or history of childhood GH deficiency.

Somatropin may be given by either subcutaneous or intramuscular injection. Although drug absorption is acceptable by both methods of use, daily subcutaneous administration is generally regarded as the preferred method of using somatropin.

A specific analysis of somatropin activity shows a hormone with a diverse set of effects.
It is anabolic to skeletal muscle, shown to increase both the size and number of cells (processes referred to as hypertrophy and hyperplasia, respectively). The hormone also seems to have growth-promoting effects on all organs of the body excluding the eyes and brain.

Somatropin has a diabetogenic effect on carbohydrate metabolism, which means that it causes blood sugar levels to rise (a process normally associated with diabetes). Excessive administration of somatropin over time may induce a state of type-2 diabetes. This hormone also supports triglyceride hydrolysis in adipose tissue, and may reduce body fat stores. Coinciding with this tends to be a reduction in serum cholesterol. The drug also tends to reduce levels of potassium, phosphorous, and sodium, and may cause a decrease in levels of the thyroid hormone triiodothyronine (T3). The latter effect marks a reduction in thyroid-supported metabolism, and can interfere with the effectiveness of extended therapy with somatropin.

Growth hormone has both direct and indirect effects. On the direct side, the hGH protein attaches to receptors in muscle, bone, and adipose tissues, sending messages to support anabolism and lipolysis (fat loss). Growth hormone also directly increases glucose synthesis (gluconeogenesis) in the liver, and induces insulin resistance by blocking its activity in target cells. The indirect effects of growth hormone are largely mediated by IGF-1 (insulin-like growth factor), which is produced in the liver and virtually all other tissues in response to growth hormone. IGF-1 is also anabolic to both muscle and bone, augmenting growth hormone's activity.

Somatropin is considered to provide anabolic and performance-enhancing benefits in the realm of bodybuilding and athletics. Most experienced individuals now tend to agree that it is the fat-loss-promoting properties of somatropin that are most obvious. The drug can support muscle growth, strength gains, and increased athletic performance, but its effects are generally milder than those of anabolic/androgenic steroids. For a highly advanced athlete or bodybuilder, however, somatropin can help push body and performance further than might have been possible with steroids alone.

## Side Effects (General)

The **most common adverse reactions** to somatropin therapy are joint pain, headache, flu-like symptoms, peripheral edema (water retention), and back pain.

**Less common adverse reactions** include inflammation of mucous membranes in the nose (rhinitis), dizziness, upper respiratory infection, bronchitis, tingling or numbness on the skin, reduced sensitivity to touch, general edema, nausea, sore bones, carpal tunnel syndrome, chest pain, depression, gynecomastia, hypothyroidism, and insomnia.

## Side Effects (Impaired glucose tolerance)

Somatropin may reduce sensitivity to insulin and raise blood sugar levels. This may occur in individuals without preexisting diabetes or impaired glucose tolerance.

## Side Effects (Injection site)

The subcutaneous administration of somatropin may cause redness, itching, or lumps at the site of injection. It may also cause a localized decrease of adipose tissue, which may be compounded by the repeated administration at the same site of injection.

## Administration

Somatropin is designed for subcutaneous or intramuscular administration. One milligram of somatropin is equivalent to approximately 3 International Units (3 IU). When used to treat adult onset growth hormone deficiency, the drug dosage is commonly roughly 1 IU to 3 IU per day for a person of approximately 80-100 kgs. A long-term maintenance dosage is established after reviewing the patient's IGF-1 levels and clinical response over time. When used for physique- or performance-enhancing purposes, somatropin is usually administered at a dosage between 1 IU and 6 IU per day (2-4 IU being most common). The drug is commonly cycled in a similar manner to anabolic/androgenic steroids, with the length of intake generally being between 12 weeks and 24 weeks. The anabolic effects of this drug are less apparent than its lipolytic (fat loss) properties, and generally take longer periods of time and higher doses to manifest themselves.

Other drugs are commonly used in conjunction with somatropin in order to elicit a stronger response. Thyroid drugs (usually T3) are particularly common given the known effects of somatropin on thyroid levels, and may significantly enhance fat loss during therapy. Insulin is also commonly used with somatropin. Aside from countering some of the effects somatropin has on glucose tolerance, insulin can increase receptor sensitivity to IGF-1, and reduce levels of IGF binding protein-1, allowing for more IGF-1 activity (growth hormone itself also lowers IGF binding protein levels). Anabolic/androgenic steroids are also commonly taken with somatropin, in an effort to maximize potential muscle-building effects. Anabolic steroids may also further increase free IGF-1 levels via a lowering of IGF binding proteins. Note that the stacking of somatropin with thyroid drugs and/or insulin is usually approached with great care and caution, given that these are particularly strong medications with potentially serious or life threatening acute side effects.

## Health Monitoring

To ensure optimum health during use of HGH it is recommended to have regular blood tests that includes IGF-1 levels, glucose, thyroid, cholesterol, liver and kidney function.

**It is recommended to consult with a Medical Practitioner who is familiar with AAS & PIEDs.**

***The use of a Body Composition Analyser can assist with monitoring changes in muscle mass, body fat and water retention.***