

# HUMAN GROWTH HORMONE (hGH)

## What is human growth hormone (hGH)?

hGH is a naturally occurring hormone produced by the pituitary gland and is one of the most important hormones influencing growth and development in humans.

hGH plays a major role in normal growth from birth to adulthood. It stimulates the liver and other tissues to secrete insulin-like growth factor (IGF-1). IGF-1 stimulates production of cartilage cells, resulting in bone growth and also plays a key role in muscle growth.

Low hGH levels in children and teenagers can result in dwarfism. Excessive hGH secretion in children (which is extremely rare and usually resulting from a tumour of the pituitary gland) can result in gigantism. In adults, some conditions (such as tumours) may cause excess secretion of hGH after puberty, and while this has little effect on skeletal growth, it can result in a condition known as acromegaly (abnormal growth of bones of the hands, feet and face).

Medically, hGH has been used to treat deficiency disorders in children and adults. Before 1985, hGH was primarily obtained from the pituitary glands of cadavers. The development of Creutzfeldt-Jakob disease (a degenerative brain disorder) in those who were treated with hGH produced in this way led to the discontinuation of all products derived from the human pituitary gland. This has led to development of artificial (recombinant) hGH (rhGH).

Medical preparations of hGH are usually a sterile white powder that is reconstituted and then injected subcutaneously or intramuscularly.

It is illegal to use hGH without a prescription in all parts of Australia. hGH is banned under the Olympic Movement's *World Anti-Doping Code Prohibited Classes of Substances and Prohibited Methods*.

## What are the perceived benefits?

The reported benefits of hGH include: the reversal of common diseases associated with ageing, improved brain activity and function, strengthening connective tissue which reduces the probability of injury, weight loss without any loss in lean mass, reduction of wrinkles by rejuvenating the skin, increasing energy levels and brightening mood, promotion of muscle growth, improved libido, improved lung function, provides immune system support and thymus function, and the ability to produce more individual muscle cells.

Some individuals use hGH because they perceive that it is as effective as anabolic steroids with fewer side effects, and is difficult to detect in a drug test. It is being used alone and in conjunction with other substances to induce anabolic effects, reduce muscle cell breakdown and reduce body fat. hGH seems to decrease body fat and increase fat-free mass. However, there is less evidence that these effects translate to increased strength, endurance and sporting performance.

## What are the side effects of hGH use?

Although supervised growth hormone therapy in the case of a deficiency syndrome is generally quite safe, with few side effects, the situation regarding illicit hGH enhancement may not be so positive.

One of the most common side effects of hGH misuse is acromegaly. The onset of this disorder begins with an overgrowth of bone and connective tissue that leads to a change in facial appearance, such as a protruding jaw and eyebrow bones. Acromegaly can also lead to abnormal growth of the hands and feet, and a shortened life expectancy.

A summary of other reported side effects of hGH enhancement include:

- o Hypoglycaemia (low blood sugar, risk of diabetic coma)
- o Glucose intolerance/ diabetes mellitus (high blood sugar)
- o Inadequate thyroid function
- o Acromegaly (irreversible)
- o Heart enlargement (may be irreversible)
- o Heart damage
- o High blood pressure
- o Premature ageing and death (especially in the case of acromegaly)
- o Water retention
- o Thickening of the skin
- o Abnormal hair growth (hirsutism)
- o Liver damage
- o Impotence

Many of the effects from long-term administration of this drug are irreversible. Some of the effects can induce life-threatening conditions or shorten life expectancy.

### Risks of counterfeit products

There is an active blackmarket in hGH and in addition to the legitimate hGH preparations for medical use, there are counterfeits which may have few, if any, active ingredients and carry the risk of contamination. Some unsterile and dangerous counterfeits have also been reported.

The most common problem is the unsupervised balancing of blackmarket hGH and insulin. Fast-acting insulin is used to address the side effects of glucose intolerance and IGF-1-induced problems, but carries risks such as severe hypoglycaemic episodes and the risk of diabetic coma.

### Injecting risks

Where needles, vials or other equipment are shared, there may be traces of blood, increasing the risk of transmission of blood-borne viruses (such as hepatitis or HIV).

Where the skin has not been properly cleaned, dirt or bacteria may inadvertently enter the bloodstream, carrying risk of infection, inflammation and damage to blood vessels. Injecting an unsterile substance also carries risks of infection or poisoning. In severe cases, infections from injecting can cause thrombosis, ulcers and gangrene.

Injecting into small muscle groups increases the risks of injecting into veins and nerves.