**Hormones**

Hormones are messengers. They’re made up of differing chemicals and produced by glands in the body, then dumped directly into the blood stream. From there they travel to where they get to work. Different hormones perform different roles. They are secreted in very precise amounts depending on what’s required and when. The natural balance of these hormones is a delicate balancing act. The body strives for a steady state at all times, a process known as homeostasis. The feedback loops which governs hormone production is a finely tuned one.

Here’s a whistle-stop tour of four main players that influence muscle gain and fat loss.

**Testosterone**

All hail the king. Testosterone is described as *the* male sex hormone. The name itself is derived from the Latin *testis* meaningtesticle. Another common term for testosterone is an androgen.

Testosterone imparts two key functions

1. Androgenic. Promoting male sexual characteristics. This effect is most evident in boys going through puberty. It results in the maturation of sexual organs, deepening of the voice, growth of body and facial hair, an interest in sex and a preoccupation with their genitals. Teenagers really are wankers. It’s a scientific fact.
2. Anabolic. Muscle building qualities. The actual reasons for this are not fully understood but there are testosterone receptors on the muscle cells, amongst other sites around the body. Testosterone binds with these like a lock in a key to influence the muscle cell’s DNA. This results in an increased build-up of muscle protein, increasing size and strength.

Another site that testosterone influences are fat cells. Testosterone releases fat to be used as a fuel. There is a direct relationship between low androgen levels and increased fat storage. Testosterone builds muscle and shifts fat. Optimal levels also improve mental health by enhancing mood and cognition.

One other trick of testosterone is its ability to occupy other receptors. It inhibits the action of other hormones that aren’t so helpful. One notable example is cortisol. That’s the equivalent of carrying a skeleton key to get the jump on the rightful occupant.

**Cortisol**

In times of great stress and famine this little chap is a real asset. It is an ace up your sleeve in the game of survival, so credit must be given where it’s due. However, for muscle building cortisol is not very helpful.

Cortisol is a stress hormone, making demands of muscles to release their stored proteins as energy. This process is called catabolism. When the balance is such that testosterone is low and cortisol is high then it produces a catabolic state. Muscle growth and fat loss will simply not happen.

Needless to say, keeping stress levels in check is of vital importance. But not just from psychological reasons. Doing the wrong type of training at the wrong time (usually this is too much, too often) and poor nutrition really gives cortisol the green light.

This spoil the benefits of hormones needed for growth.

**Growth Hormone**

This naturally occurring hormone is produced in large amounts during childhood and rapidly declines as we age. It’s produced in a gland located in the brain. Growth Hormone is anabolic and known to increase both the size of a muscle (hypertrophy) and the number of muscle cells (hyperplasia). It should be noted that GH won’t increase the number of actual muscle fibres. They are determined when we’re still in the womb. The number you have at 24 weeks gestation is all you’ll have. Only the size can increase, not the number. Its anabolic effect is not as great as that of testosterone. But, it also has a potent fat burning property by helping to mobilise a type of fat (triglycerides).

The natural release of GH is pulsatile. It is made in varying stages and amounts throughout the day. These surges occur repeated throughout the day and night with deep sleep being a potent stimulus. So is brief, intense resistance training. Levels peak after 45 minutes then nosedive. The lowered blood sugar and insulin levels following training maintains the elevated GH levels that correct training promotes. Delay eating by 30 minutes post workout to boost the benefits of elevated growth hormone levels.

**Insulin**

Insulin is hormone produced by the pancreas to move and store nutrients from the blood stream. It is mainly released in response to raised levels of glucose (a simple sugar) in the blood stream. A large amount of sugary food or drink will elicit a large insulin response.

It is a very anabolic hormone as it moves sugars, amino acids and fats into the cells of the body. This can be anywhere that they’re required. Or where there’s spare room (like fat tissue). Muscles are an ideal target and have an abundance of insulin receptors. Better still, their sensitivity to insulin increases after training.

Creating a surge of insulin after training is good. That will shuttle nutrients into the muscles and replenish depleted stores. Simple carbohydrates and rapidly digestible protein are perfect to eat during this “anabolic window” when muscles are like sponges.

Creating a diet induced spike in insulin at any other time is bad for both muscle gains and fat loss. Insulin isn’t picky. It’ll attach to receptors anywhere to gain entrance and deposit its load of excess blood sugars. Like a sailor on shore leave. Fat cells are the brothel madams whose doors are never closed for business. As fat deposits increase so does oestrogen.

And when oestrogen goes up a lot, testosterone goes down. Which brings us full circle.

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