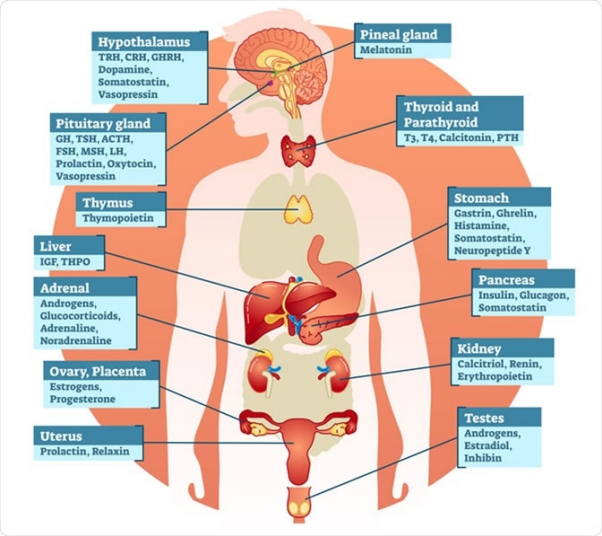
TATU

NUTRITION | MOVEMENT | MIND

Hormones

What are they?



Above some of the main hormones of the endocrine system, this is far from an exhaustive list but it gives an idea and a visual of how these things might work.

Hormones are chemical messengers produced by the endocrine system, the hormones stimulate responses from cells and tissues.

They "lock" into receptors on cell membranes/walls and then elicit a chain of reactions. The ratio of receptor sites to hormones released is key for efficient and appropriate function.

Some foods increase or decrease the number of receptor sites whilst others can up or down regulate the release of the hormone itself, some foods can lock into the receptor sites and elicit a response similar to that which the hormone would normally do.

3 classes of hormones

- Eicosanoids.
- Steroids
- Peptides

Hormones

Eicosanoid

These are made from Arachidonic Acid (AA for short) and this is an **Omega 6 Polyunsaturated Fatty Acid** and they are in the mounting and inhibition of inflammatory cascades, of just inflammation for short. Omega 6' can be broken down into Omega 3 Polyunsaturated Fatty Acids in many animals but not Mammals, including humans. For this reason it is important that we have sufficient Omega 3's in our diets and they are referred to as Essential Fatty Acids. We have Essential Amino Acids too but more on that later. **The reason why Omega 3's are so important is they can inhibit or downregulate inflammation**, the main one is EPA and you'll be hearing plenty about how this can help you in many ways during this course.

The four aspects of inflammation and how hormones have a role in them

- **Redness** - the eicosanoid TXA2 control vasoconstriction short term, this is to stop a poison, such a sting from a bee or scorpion, from spreading quickly through the body. After this the prostaglandin PGE2 is released and this dilates the vessels to allow immune calls, platelets and other substances to access the site of the insult (as it is referred to in this context)
- **Swelling** - another substance then makes the vessels more permeable and let platelets through to the site of insult.
- **Pain** - cytokines, another type of chemical messenger similar to a hormone, are released in response to the prostaglandins and they upregulate pain perception by stimulation of what is called the COX2 pathway, they also stimulate even more prostaglandin release, which perpetuates the cycle.
- **Heat** - heat is also created and this helps to damage the poison, bacteria or virus that might be infecting us.

Most humans have very high omega 6 in their diets and not enough omega 3, it is important to find a happy balance by decreasing the 6's and increasing the 3's. You'll find a food source sheet in the "Supporting Documents Unit" that will be released tomorrow evening.

TATU

NUTRITION | MOVEMENT | MIND

Hormones

In a nutshell

Eicosanoids are hormones associated with inflammation and pain, they are made by Omega 6's and are inhibited or stopped by Omega 3's as well as a few others including quercetin, curcumin, bromelain and resveratrol.

Steroid hormones

These include two main groups, the **sex hormones** and the **corticosteroids**, names such as they are produced in the adrenal cortex. They are fat soluble so they can travel across cell membranes easily but they cannot travel around the blood freely, when in the blood vessels they need to be transported by binding globulins such as sex hormone binding globulin (SHBG).

These are all made from cholesterol and through certain processes each one is made from the previous one and some can be switched back and some can only go forward, a bit like chess pieces in a way.

- **Pregnenolone** - this is the precursor to most of the sex hormones as well as teh corticosteroid hormones (think cortisol)
- **Progesterone** - It is secreted by the corpus luteum, a temporary endocrine gland that the female body produces after ovulation during the second half of the menstrual cycle.
- **Oestrogens** - there are three key forms of oestrogens, just to make it a little bit more confusing and complicated.
    - Oestradiol
    - Oestrone
    - Oestriol
- **Testosterone** - Well known as a male sex hormone but also essential for women's health.
- **DHEA and DHEAs** - DHEA is produced in the adrenal glands and ovaries in women and it is used to produce other hormones, after menopause the adrenals take up the slack.
- **5 Alpha Reductase and Aromatase** - these are not hormones but they are essential to conversation as they convert sex hormones in peripheral tissues. More on this later.

TATU

NUTRITION | MOVEMENT | MIND

Hormones

- **Cortisol -** known as the stress hormone, essential for daily function however we are seeing increasingly unhealthily high amounts and how this damages other hormone functions. We will discuss this hormone throughout the programme.
- **Cortisone -** with anti-inflammatories properties this is often used therapeutically for anti inflammatory injections
- **Aldosterone -** This is a mineralocorticosteroid meaning its function is around mineral conservation, mostly sodium in the kidneys, saliva, tears and colon.

Peptide hormones

This group has a huge number of hormones that control a vast array of bodily functions, they are often not much considered when we say, “Gosh, my hormones are all over the place!” but i wanted to highlight a few in this programme as they help to explain a little about how our bodies function and therefore what we can do to balance them and us. I have underlines the ones we will be looking further into

- **adrenocorticotropic hormone (ACTH)**
    - This hormone is usually thought only as it stimulates cortisol release, however it is key to sex hormone production as it signals for the release of cholesterol to be used to make them.
- **amylin**
- **Angiotensin**
- **atrial natriuretic peptide (ANP)**
- **calcitonin**
- **cholecystokinin (CCK)**
    - This is important as it plays a role in satiety and “feeling full after eating”
- **gastrin**
- **Ghrelin**
    - I always remember this one as it sounds like “Gremlins” and I always think there is a hungry gremlin in our tummies who misbehaves if you don’t feed him. This is the hunger hormone.
- **Glucagon**
    - This hormone acts in opposition to insulin.

TATU

NUTRITION | MOVEMENT | MIND

Hormones

- **growth hormone**
    - GH helps build cells and muscles, vessel and more.
- **follicle-stimulating hormone (FSH)**
- **Insulin**
    - Responsible for clearing excess glucose from the blood and packaging it away into glycogen or fat stores as well as helping muscle protein deposition mainly.
- **Leptin**
    - Released by fat cells when they are full, this hormone helps us know when to eat and when to stop.
- **melanocyte-stimulating hormone (MSH)**
- **Oxytocin**
    - The hormone of both love and suspicion as I like to call it, oxytocin is stimulated by the pressure of the infant's head on the vaginal canal wall and induces and sustains contractions during birth, it also is released during intimate bonding, long hugs and cuddles, eye contact and sex. It is a natural painkiller. It is what makes us, as humans, successful in small cohesive groups and suspicious or wary of others one can imagine how this might have been useful in Paleolithic times.
- **parathyroid hormone (PTH)**
    - We won't be exploring this however it is good to know that it is vitamin D dependent and controls the serum calcium (calcium in the blood) levels by balancing it with the calcium stores in our bones. Damage to these glands can cause cardiovascular damage, osteoporosis and calcification of arteries, muscles or organs. It is suggested that this calcification disease may be behind the stories of Medusa turning people to stone (always good to throw in something random)
- **Prolactin**
    - Important in milk production
- **renin**
- **somatostatin**
- **thyroid-stimulating hormone (TSH)**
    - Stimulates the thyroid to release t3 and t4

TATU

NUTRITION | MOVEMENT | MIND

Hormones

- **thyrotropin-releasing hormone (TRH)**
- **Vasopressin**
    - Responsible for vasoconstriction
- **vasoactive intestinal peptide**

We won't be covering everything in the programme as it becomes quite complicated and overwhelming, rather I will be doing my best to break it down into **sections** covering **a group of related hormones** at a time, followed by the **interplay they have with other groups**, **what happens when they go wrong** and how to help **bring them back into balance.**

Tomorrow I will be going through the Female Menstrual Cycle, the sex hormones, how the affect other hormones and behaviours and what we can start to do to rebalance them. I will do this in a number of clips as I think watching a full hour or more of me talking in one hit might bring you all to tears! Making smaller clips also means you can easily go back and watch the ones you feel most apply to you.

Don't forget to continue with your Habit Creating, be it nutrition, movement or mindfulness.