

The Players Part I



Healthy
Hormones

Quick Review

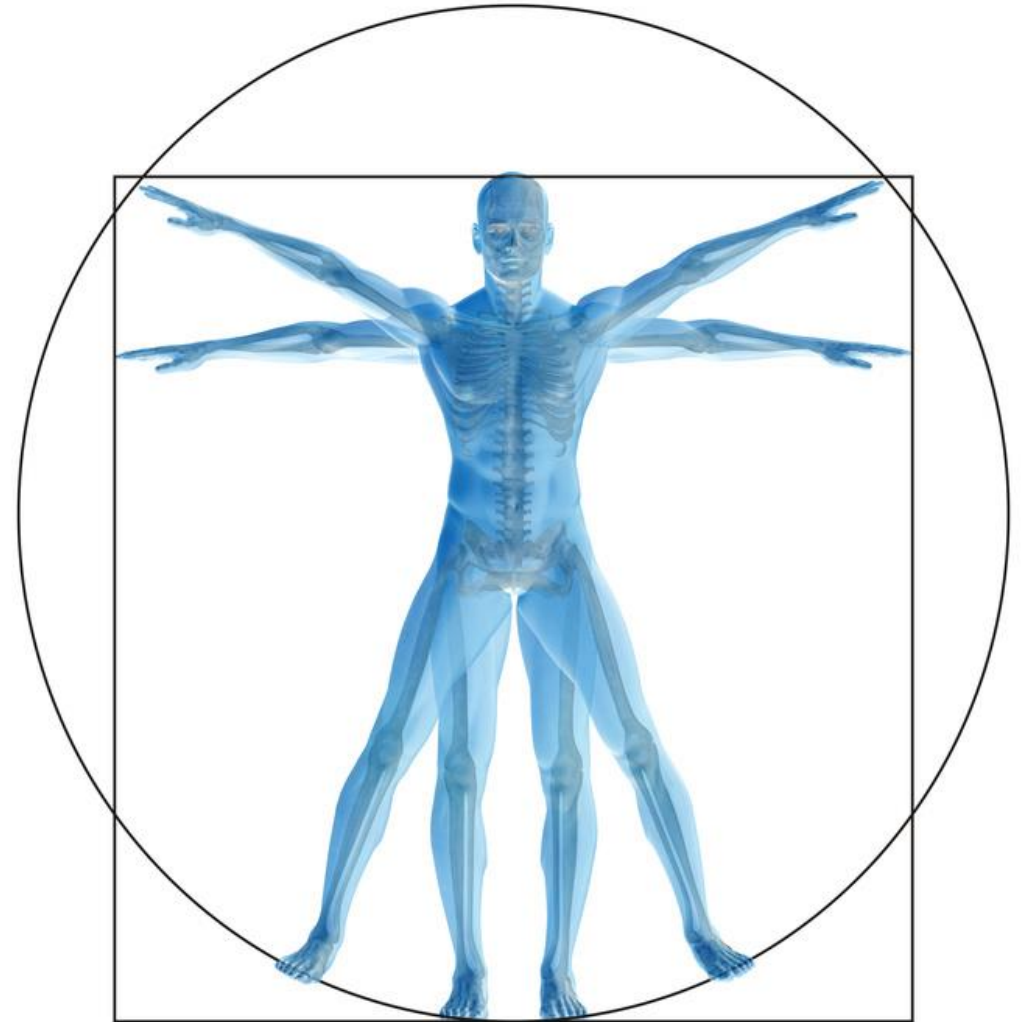
- Understanding some of the key systems and their relationship to hormones is the best place to start
- It will help with some of the hormone interconnections
- Key to understanding protocols
- Your protocols must function like a conductor, conducting an orchestra



By HikingArtist.com

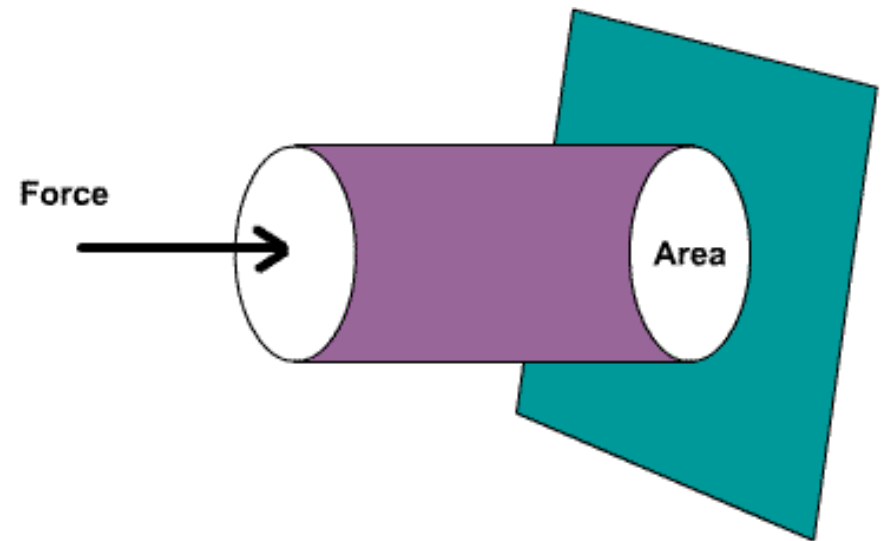
The Players

- Liver
- Thyroid
- Adrenals
- Pancreas
- Reproductive System
- Pituitary
- Gut Bacteria



The Players

- The liver, the adrenals, the thyroid, the pancreas and the gut are the major players
- The reproductive, the pituitary, the hypothalamus are actually secondary players, at the mercy of the major players
- Digestive and other hormones also secondary
- The major players even exert pressure on each other



The Liver

A gland consisting of a left and right lobe with the gall bladder sitting underneath it

Main functions:

- Filter blood from the digestive tract
- Detoxifies toxin, chemicals and drugs
- Makes bile and controls secretion into intestines
- Regulates the supply and production of glucose and glycogen



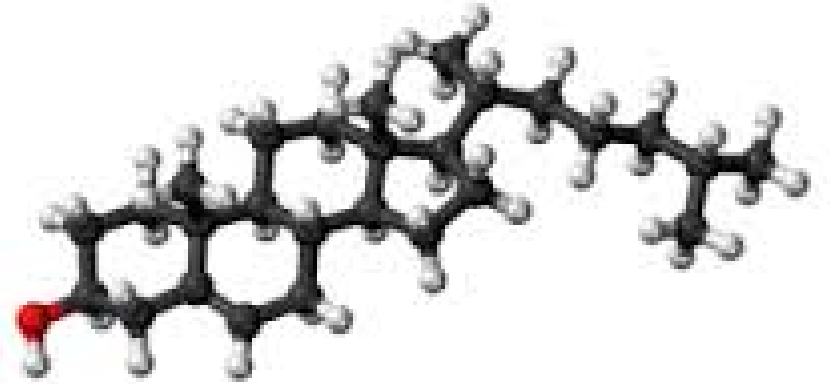
The Liver

- Production and storage of fat
- Manufactures special proteins involved with transporting substances in the blood, blood clotting and other things that help fight infection
- Helps regulate metabolism (converting T4-T3 along with kidneys and muscles)
- Converts nutrients from our diet into substances we need, stores them and supplies the cells when needed



Liver's Hormone Role

- Regulates the balance of sex hormones, thyroid hormones and adrenal hormones - cortisol and cortisone
- Produces and regulates cholesterol needed for to make steroid hormones such as testosterone, estrogen, progesterone and cortisol
- Detoxification of toxins including sex hormones, cortisol and xenoestrogens



FAT-SOLUBLE TOXINS

↓
Phase 1 →
(Cytochrome P450 Enzymes)

Oxidation
Reduction
Hydrolysis
Hydration
Dehalogenation

Nutrients Needed

- Vitamins B2, B3, B6, B12
- Folic Acid
- Glutathione
- Flavonoids

I
N
T
E
R
M
E
D
I
A
R
Y

M
E
T
A
B
O
L
I
S
M

→ **Phase 2** ↗
(Conjugation Pathways)
Sulfation
Glucoronidation
Glutathione Conjugation
Acetylation
Amino Acid Conjugation
Methylation

Nutrients Needed

- | | | |
|---------------|-------------------|--------------|
| • Methionine | • Vitamin B5, B12 | • Glutamine |
| • Cysteine | • Vitamin C | • Folic Acid |
| • Magnesium | • Glycine | • Choline |
| • Glutathione | • Taurine | |

WATER-SOLUBLE WASTE

↓
Eliminated via:

Urine
Bile
Stool

Liver Detoxification

- The key to understanding liver detoxification – a fat soluble toxin must be converted to a water soluble compound in order to be excreted
- This decision to detox the toxin should occur as needed – this means nutrients needed to detox must be there
- Cytochrome P450 enzymes are made a head of time and will be waiting when the toxin arrives in the liver
- The liver likes consistency – CYP 450 enzymes needed for these things you ingest or make daily will be ready (as long as nutrients present)
- Liver also used store nutrients for Phase II



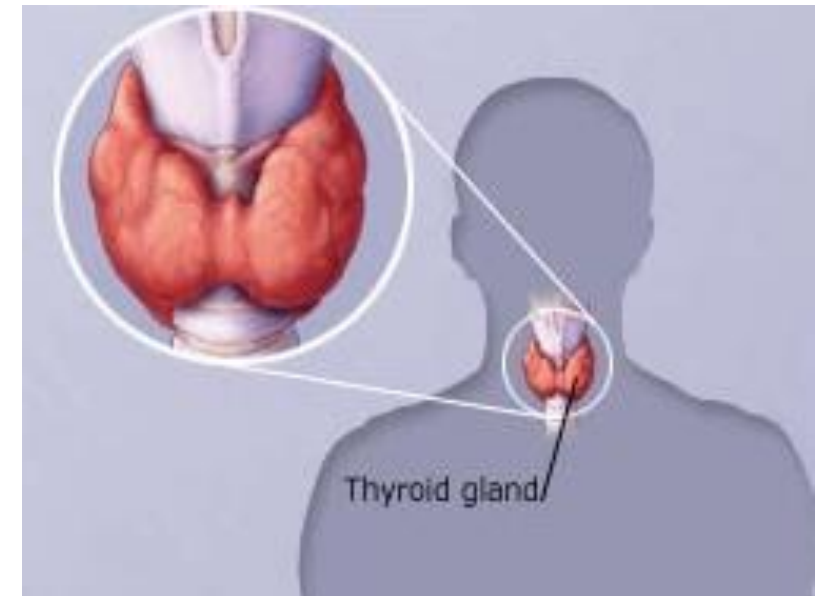
Detoxing

- Remember – all nutrients pass through the liver
- In theory, they may be used for detoxification
- If a person does not consumer enough nutrients, then choices have to be made
- Storing of toxins or excess hormones in fat cells is an option is there is neither enough nutrients nor energy (carbohydrates) for detoxification, they are not removed



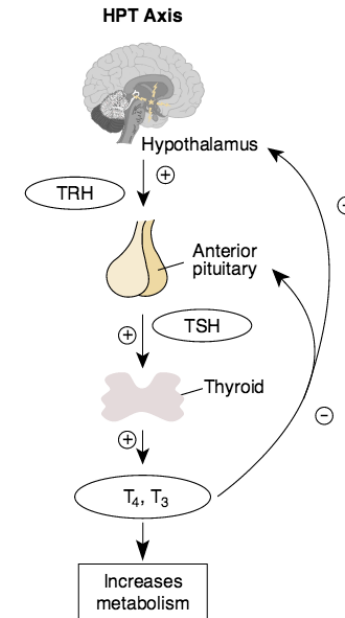
Thyroid

- A butterfly-shaped gland at the base of the neck in front of the throat
- It has two lobes, one on either side of the windpipe, connected by the isthmus
- Makes the hormone Triiodothyronine (T3) – 20%, Thyroxine (T4) 80% and Calcitonin (helps regulate calcium potassium and phosphate levels and by opposing the action of the parathyroid)
- Rest of T4 to T3 conversion done elsewhere



Thyroid

- Hypothalamus releases THR (TSH Releasing Hormone) to tell the pituitary to release TSH which in turn, stimulate the thyroid to produce hormones
- The HPT axis – hypothalamus-pituitary-thyroid
- Once the thyroid has been stimulated, the thyroid has the power to control the production of thyroid hormones
- Negative feedback – thyroid controls production of the thyroid hormones

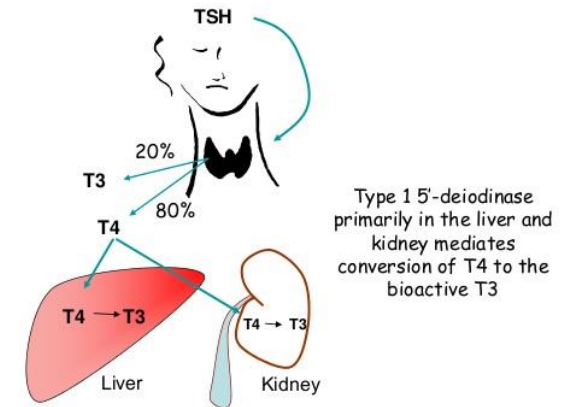


Role Of The Thyroid

T3 affects almost every physiological function in the body

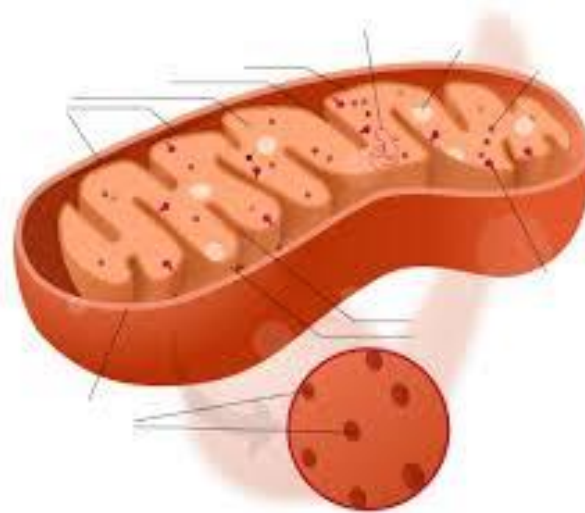
- T3 is four times as powerful as T4
- Every cell in our body relies on thyroid hormones for its metabolism
- The thyroid uptakes iodine into the cells of thyroid and together with tyrosine produces T4 and T3
- Zinc and selenium essential for the uptake of iodine

Conversion of T4 to T3



Functions of the Thyroid

- Increases metabolic rate by increasing the mitochondria activity (for energy production)
- The mitochondria uses oxygen and calories from foods to produce CO₂, water, heat and energy
- Maintain body temperature
- Stimulating protein synthesis



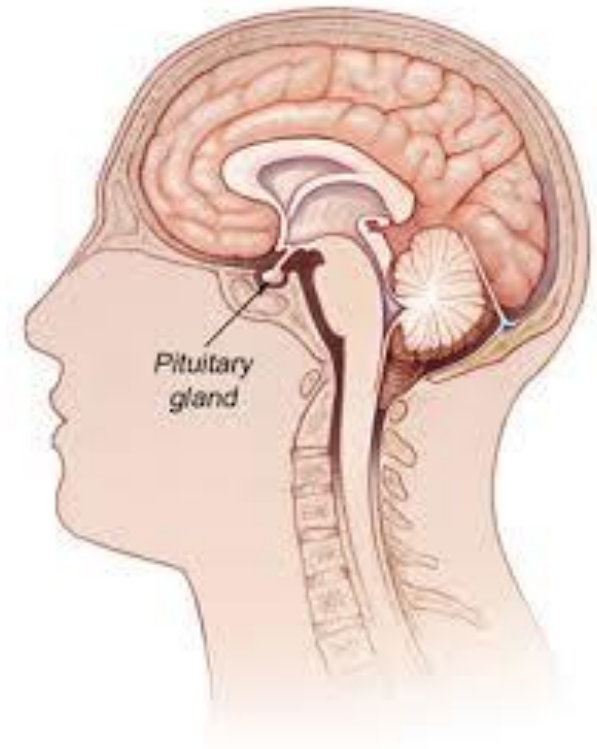
Functions of the Thyroid

- Increases the use of glucose and the breakdown of fats for energy production
- Enhance the conversion of cholesterol into bile acids
- Affect the growth of nerve tissue which in turn can affect mood, memory and cognitive thinking
- Can effect stomach acid production, digestive and intestinal motility and intestinal permeability



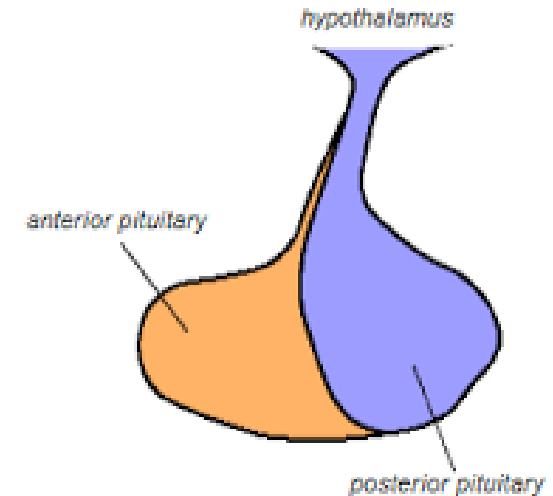
Pituitary

- Known as the “master gland” – it may not be the master we all think it is
- Consist of two parts with different functions:
- Anterior Lobe
- - ACTH (Adrenocorticotrophic hormone) stimulates the adrenal glands to produce hormones



Pituitary Hormones

- GH (Growth hormone) – helps maintain healthy body compositions and growth in children. Help adults with muscle mass, bone health and fat distribution
- FH (Follicle-stimulating hormone) and LH (Luteinizing hormone) helps with normal function of ovaries and testes
- Prolactin stimulates breast milk production

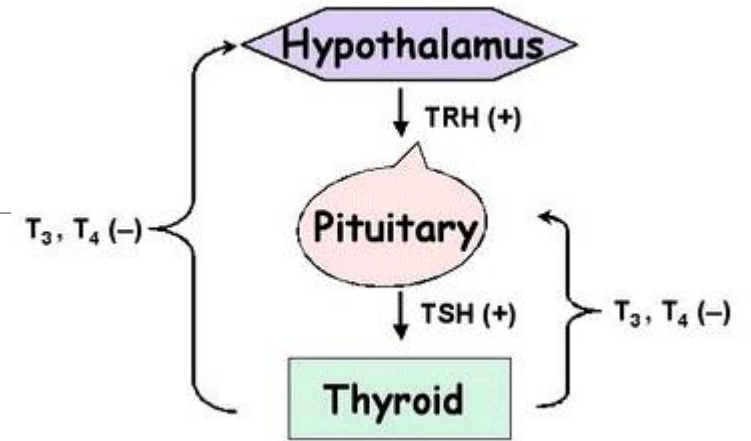


Pituitary Hormones

- TSH (Thyroid-stimulating hormone) stimulates the thyroid gland to produce hormones

Posterior Lobe Function:

- ADH (Anti-diuretic hormone) signals the kidneys to increase water absorption in the blood.
- Oxytocin: Bonding, contracting the uterus during childbirth and stimulating breast milk production.



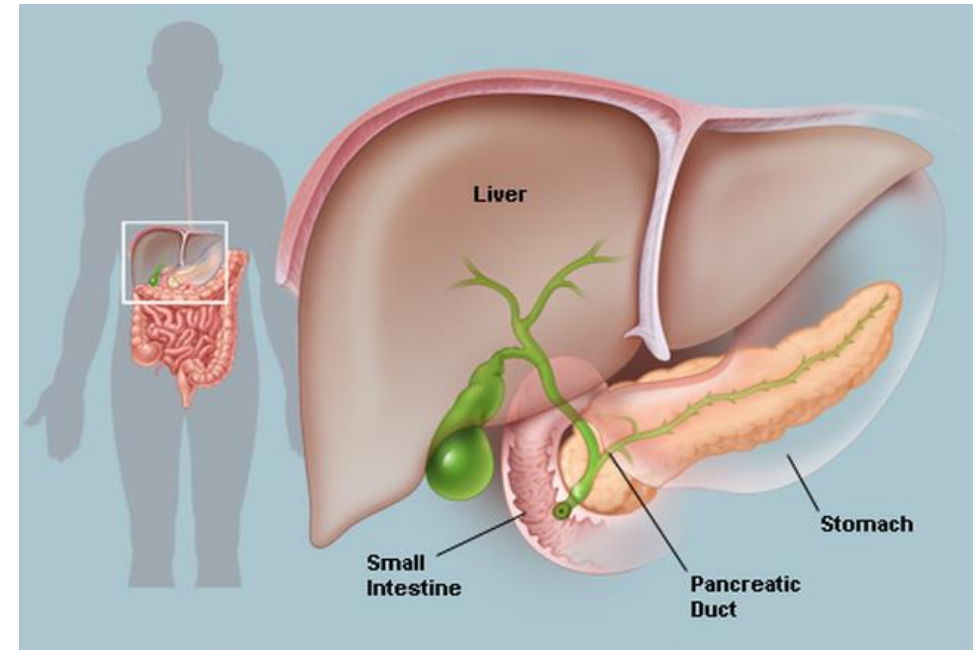
Pituitary Disorders

- Pituitary tumours – in most cases benign
 - Secretory tumours – cause too much secretion of a hormone
 - Non-secretory tumours – do not secrete excess hormones
- Pituitary apoplexy – due to bleeding or trauma – causes the pituitary function to be disrupted, causing a disruption or shortage of many hormones



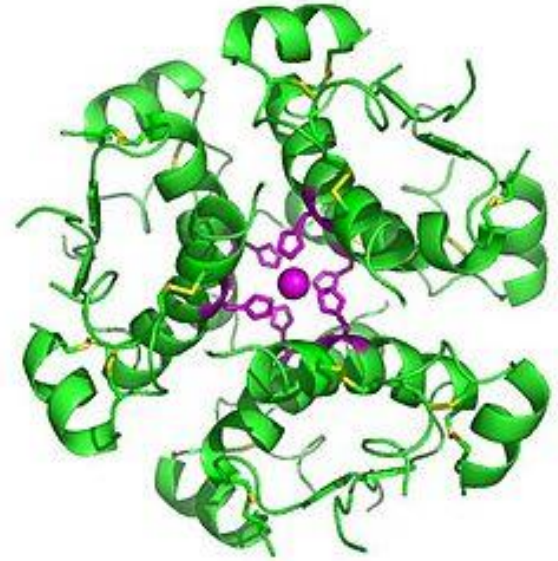
Pancreas

- Has both exocrine and endocrine
- Exocrine function – produces pancreatic enzymes
- Essential for providing nutrients to make hormones – protein, fatty acids (energy to produce them)
- Produces bicarbonate to neutralize stomach acids in the duodenum



Pancreas

- Endocrine – produces three hormones
- Insulin - which helps get glucose into the cells from the blood and lowers it in the blood.
- Glucagon – raises blood sugar when its low by working with the liver to convert glycogen to glucose
- Somatostatin - which helps to control the release of other hormones.

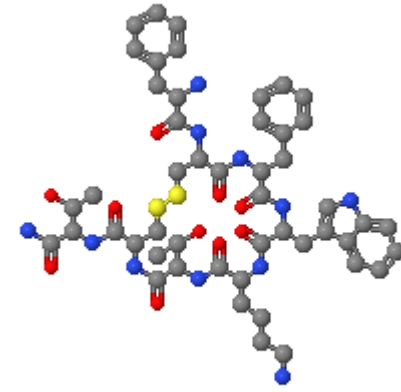


Somatostatin

Somatostatin – made in several areas of the body but primarily the digestive system and the nervous system

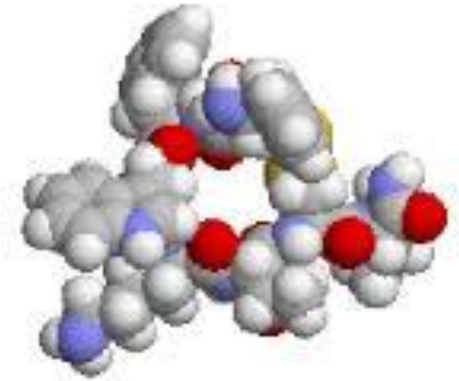
Also known as growth-hormone inhibitory hormone –regulates hormones in a number of areas in body by preventing the production of too many

- Pancreas prevents too much insulin and glucagon
- Regulates hypothalamus signaling and in turn, pituitary function including GH and TSH



Somatostatin

- GI Track - Reduces gastric secretion and the emission of gastrointestinal hormones, such as secretin and gastrin.



Because it balances hormones, issue can cause other hormones problems:

- Low levels can be associated with problems linked to high levels of other hormones like growth hormones (rare)
- High levels can be associated with a somatostatinoma tumour which will produce somatostatin independently causing the suppression of other hormones like insulin

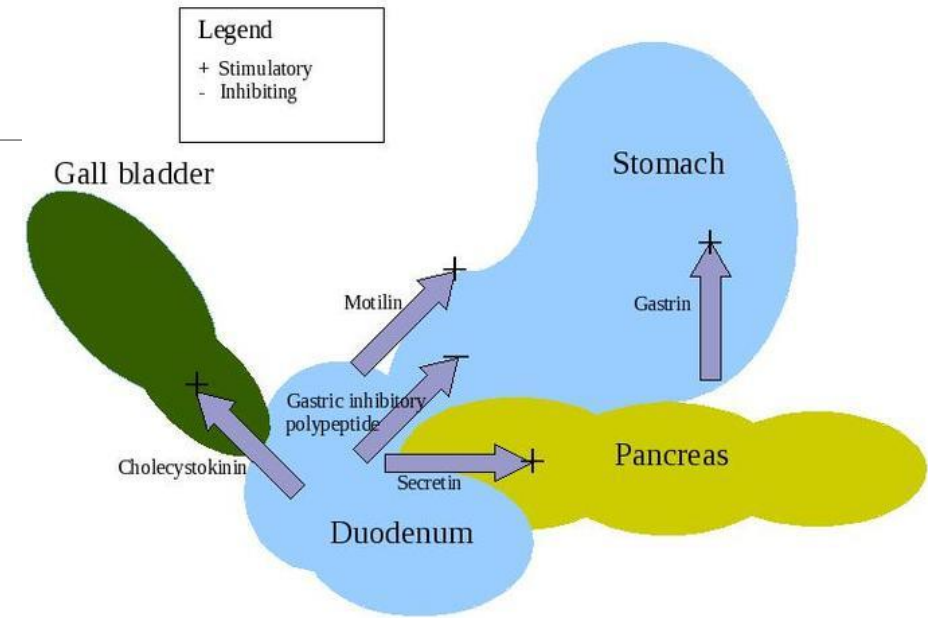
Digestive System

- Both the liver and pancreas are involved in digestion as are the gut bacteria
- Digestion is critical to having healthy hormones as this allows the body to be supplied with the nutrients it needs
- Digestive system has 5 hormones:
- Gastrin which stimulates the gastric glands to secrete pepsinogen and hydrochloric acid in the stomach. It is stimulated by the arrival of food in the stomach.



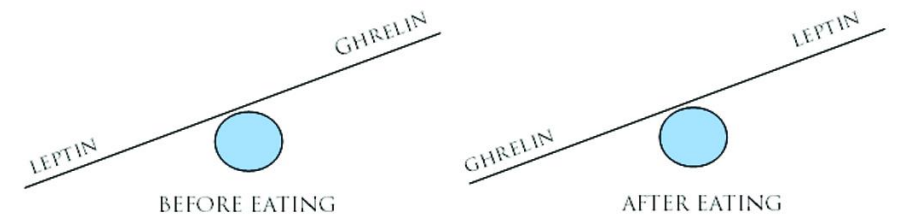
Digestive Hormones

- Secretin the release of sodium bicarbonate in the pancreas and bile in the liver
- Cholecystokinin (CCK) signals the release of digestive enzymes in the pancreas and the release of bile from the gall bladder into the duodenum
- Gastric inhibitory peptide (GIP) decreases stomach churning to slow the emptying of the stomach.



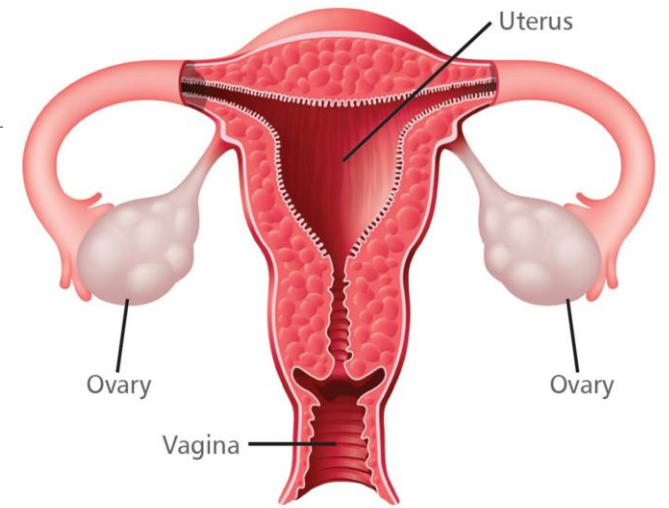
Digestive Hormones

- Motilin is involved with gastrointestinal motility and stimulates the production of pepsin
- Two other important hormones
- Ghrelin: Increase appetites – produced in cells that line the pancreas and stomach
- Leptin: Increases feelings of satiety – produced in fat cells and signals the hypothalamus
- Leptin and ghrelin levels increase in the saliva with chewing



Reproductive Hormones

- Two area of production – adrenals and gonads
- Ovaries: Two functions
 1. Produce eggs to be fertilized
 2. Produce estrogen and progesterone
- FSH stimulates the growth of the ovum inside the follicle of the ovary
- LH helps regulate the menstrual cycle an increase just before ovulation, can help determine a woman's egg supply



Reproductive Hormones

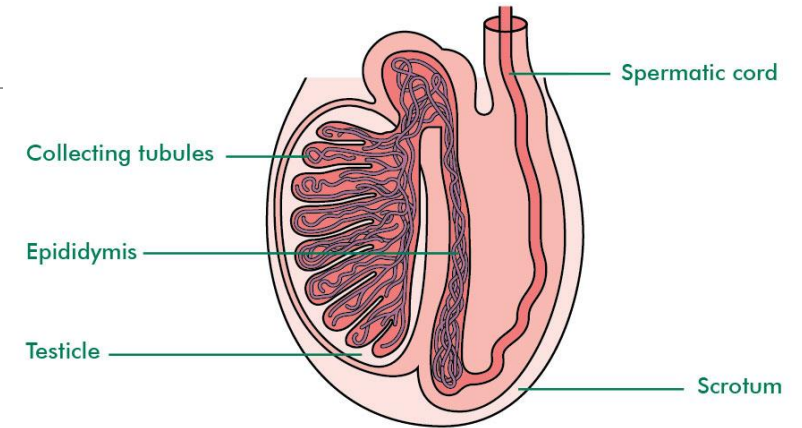
- Testes: Two Functions

1. Produce Testosterone

2. Produce sperm

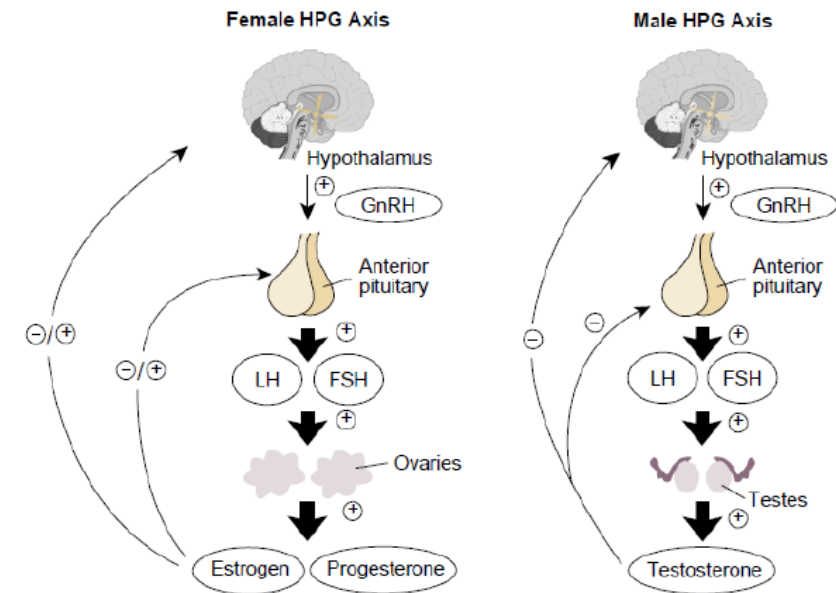
- FSH stimulates the production of sperm

- LH stimulates testosterone production and can be used to check a man's sperm count



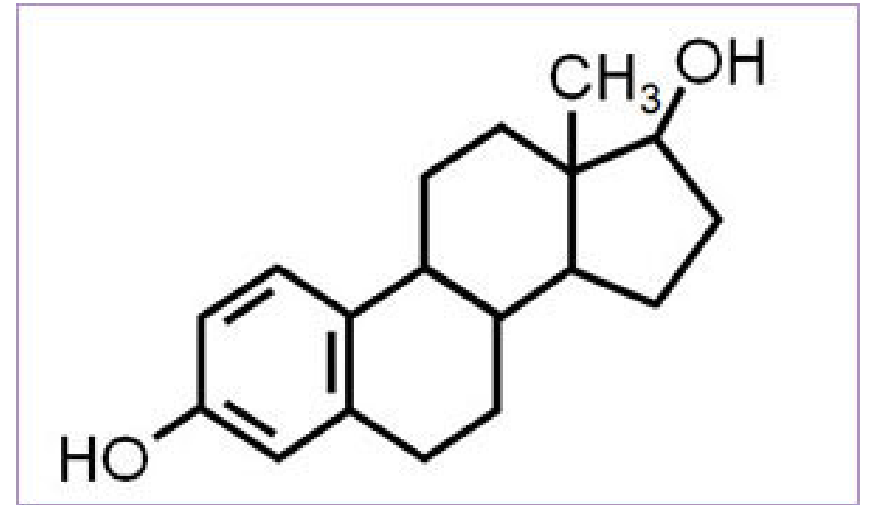
HPG Axis

- Hypothalamus produces gonadotropin-releasing hormone (GnRH) which signals the pituitary to release LH and FSH which stimulates the production of hormones in the ovaries and testes
- Estrogen provides a negative feedback to the hypothalamus to signal the pituitary to stop the production of LH and FSH
- HPG Axis is involved in all phases of the female menstrual cycle
- Also involved in regulating testosterone levels in men and sperm production



Function of Estrogen

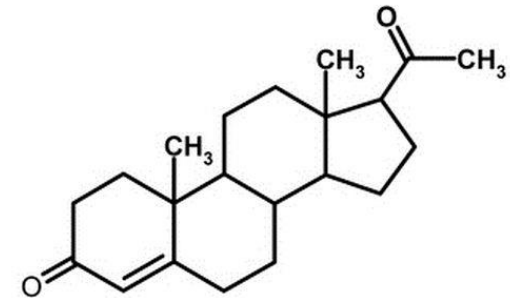
- Women: Responsible for the development of female characteristics, as well as bone health, keeping cholesterol in check, aids brain function, mood and protects heart, skin and other tissues in the body. Also needed for healthy gut lining
- Men: Helps with the maturation of sperm and a healthy libido, aids bone health by maintaining mineral mass and may protect against heart failure in the right levels



Function of Progesterone

Women: Preparing the woman's body for pregnancy, prevents miscarriage, help regulate periods, helps bone health, enhances libido and prevents weight gain, aids thyroid function, maintains blood sugar, helps counter excess estrogen effects including offering some protection from hormone-based cancers.

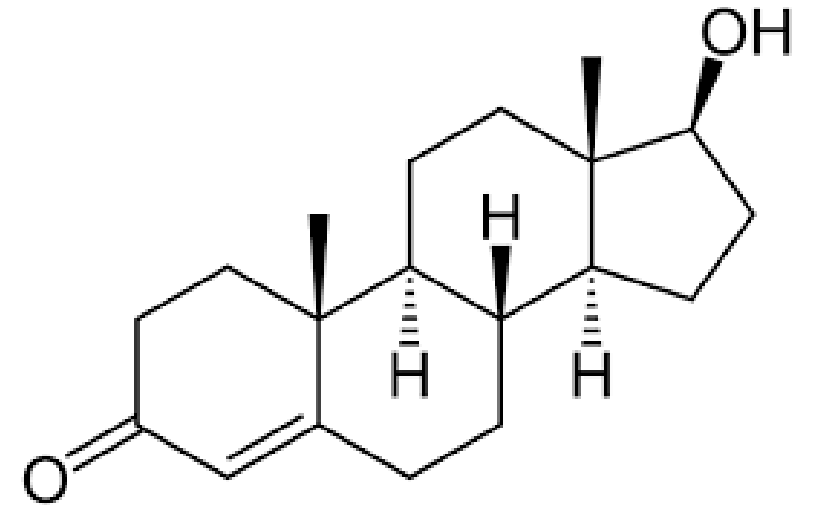
Men: Helps bone health and maintaining muscle mass, regulate brain activity, help protect against the effects of excess estrogen such as male breasts and decreased libido. Men with low Pg have a greater risk for prostate issues and arthritis and may help prevent cancer by countering estrogen and preventing DHT



Function of Testosterone

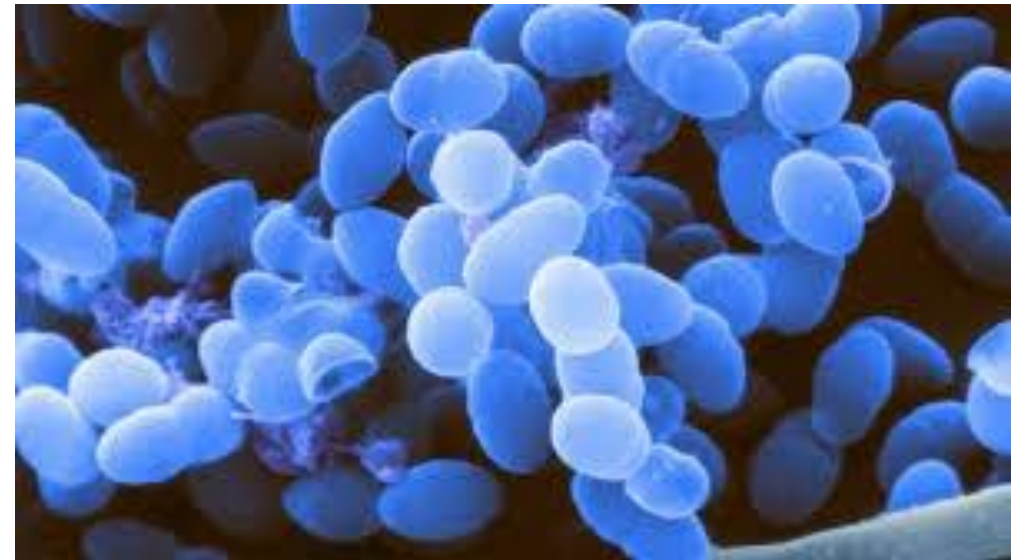
Women: Helps with muscle mass, promoting energy and a sense of well-being, increases libido and sex drive and can help with the maintenance of bone mass

Men: Responsible for the development of males sex hormones, helps men get taller and grow body hair, increases their muscles mass and bone density and is essential for healthy sperm count and sex drive



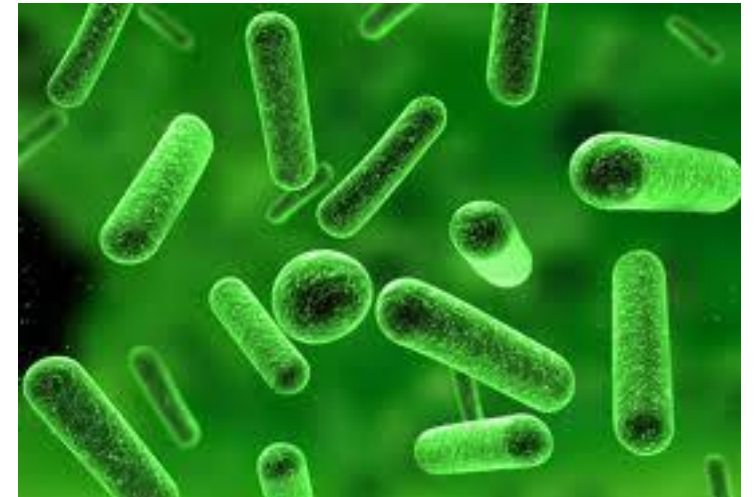
The Role of the Gut

- Every area previously discussed is affected by good gut bacteria
- Regulates blood sugar and insulin response
- Controls cortisol and stress response
- Supports liver function
- Support thyroid function



Role of The Gut

- Aids estrogen metabolism and helps estrogen/progesterone balance
- Helps maintain testosterone levels
- Communicates with the brain via the vagus nerve and the hypothalamus, pituitary, adrenals, thyroid and gonads
- New relationships are being discovered in current research – what is known is that poor gut health will affect all hormone relationships



The Players

- There are already many players that are making hormone health complicate
- In part two we discuss the biggest player of them all

