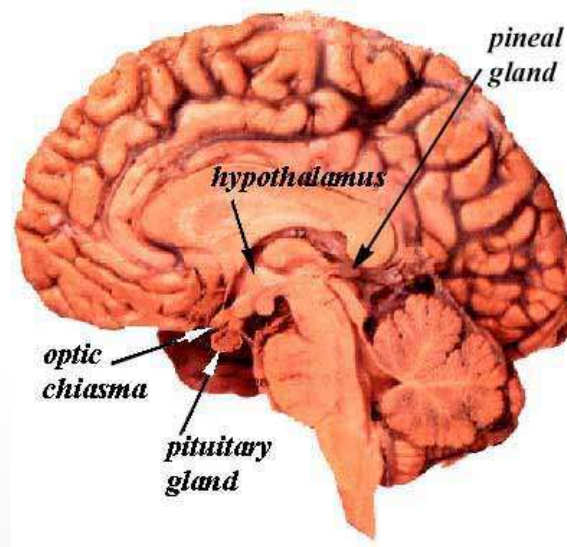


Lecture 8. Role of the hormonal regulation of physical, psychical development and linear body growth. Hormonal role in sexual functions regulation

Hypothalamic-Pituitary-Peripheral Gland Axis

- Hypothalamus – the central organ of the neuroendocrine system
 - Secretions regulate the secretions from the pituitary
 - Located at the base of the brain
 - Two sections: adenohypophysis and neurohypophysis

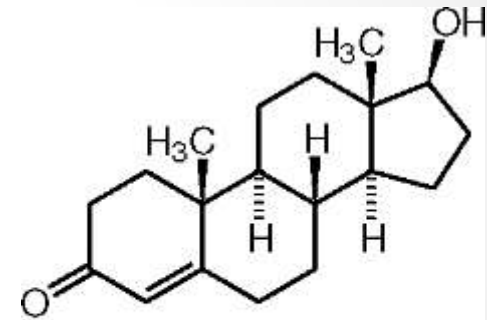


Androgens

- Two types: testicular and adrenal
- Testicular hormones are testosterone and androstenone
- Testosterone is produced in the Leydig cells of the testes.
- Androstenone is a pheromone
 - Known to contribute to the boar taint odor in pork

Androgens

- Androstenone is stored in the salivary gland and accumulates in fat depots
- Growth effects are seen by the influence of testosterone of bone and muscle.
 - This is seen by the increasing deposition of bone salts. Thus, increased bone mass is seen more in males



testosterone

Androgens

- Muscle development is seen through androgen secretions in three ways
 - In utero, declines after birth, and increases at puberty
 - Prenatal androgens affects myogenesis
 - Castrated males have lower circulating GH than intact males
 - Androgens increase both protein synthesis and degradation, yet synthesis is stimulated more

Androgens

- Androgens synthesis induces the development of mature male characteristics such as: larger muscles in the forequarter, neck and crest region.
- Castration diverts energy from growth of muscle development to fat deposition
- Castration helps improve quality by less muscle and more fat development at an earlier age

Estrogen

- General classification for three hormones: Estrone, Estriol, Beta-estradiol
- Responsible for: growth, maturation of repro tract, female behavior, mammary development
- Impact: bone, fat, and muscle tissue growth
- Females have shorter skeletons due to: earlier epiphyseal closure that is a result of chondrocyte proliferation and a function of bone formation

Estrogen

- Facilitates fat deposition
- Anabolic for ruminants
- Effective in castrate males for growth, yet is less effective in non-ruminants
- Have little effect on intact males
- In steers, estrogens increases muscle protein



Progestins

- Classified as steroid hormones
- Progesterone
 - member of the progestin family
 - responsible for maintenance of pregnancy and mammary growth and development
- MGA is a synthetic progestin that is 100X more potent than progesterone
 - Improves feed to gain ratios in heifers and suppresses estrus

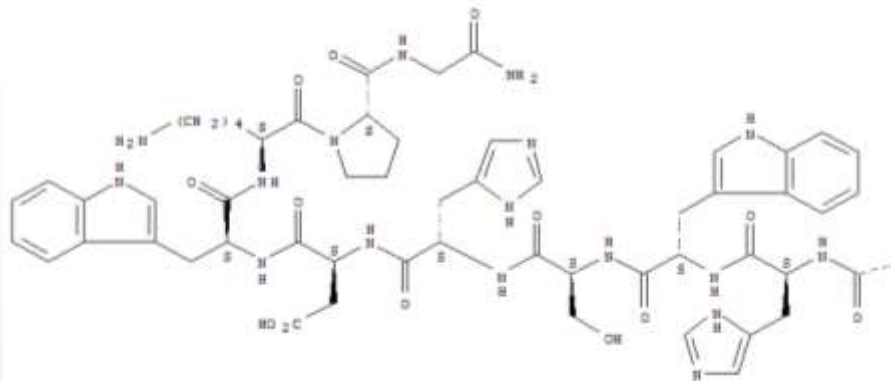


Growth Hormone

- GH or Somatotrophin (ST)
- Produced by the anterior pituitary
- Acts in an endocrine manner
- Liver can synthesize growth factors to help regulate growth, acts as a mediator
- GH also increases lipolysis of fatty acids from adipocytes

Growth Hormone

- GH is a protein hormone
- It is not an orally active hormone and admin. Via injection
- GH has been shown to increase wt. gain, feed conversion while decreasing feed intake
- When nutrients are limited, GH increases lipolysis, and decreases growth because IGF-I becomes uncoupled from GH, therefore IGF-I decreases. These changes cause a transfer of calories from adipose to vital functions



Gigantism at
hyperproduction of STH
in children, nanism at
hypoproduction in
children



Acromegaly at hyperproduction of STH in grown-ups



Acromegaly

Pituitary adenoma
(CT scan or MRI)

High blood -[Growth Hormone]

Hypertrophy of
sweat & sebaceous glands

Galactorrhoea
(prolactin)

Cardiomegaly
Hypertension

Sexual dysfunction

Peripheral
neuropathy

Visual field defects

Prominent supraorbital ridge

Large nose and jaw
Teeth are separated or lacking

Abnormal glucose
tolerance test
Glucosuria/polyuria

Spade-shaped
hands and feet

Arthrosis

Thyroid Hormones

- Play an important part in metabolism, growth, and development
- Increase protein synthesis
- Stimulate lipid metabolism



Thyroid gland hormones' effects

- Increase metabolism by activating enzymes & increasing oxygen consumption
- As the result increase heat production and body temperature
- Morphogenic influence (especially CNS & bone tissue)
- Activate protein synthesis by increasing membrane permeability for amino acids
- Activate lipids breakdown

Thyroid gland hormones' effects

- Increase glucose level in blood plasma by intensifying glucose absorption in the intestines
- Activate gluconeogenesis and glycogenolysis
- Inactivate insulin by activation of liver insulinase
- Increase heart rate and cardiac output by increasing adrenoceptors sensitivity to adrenalin and increasing the number of receptors
- Activate erythropoiesis