

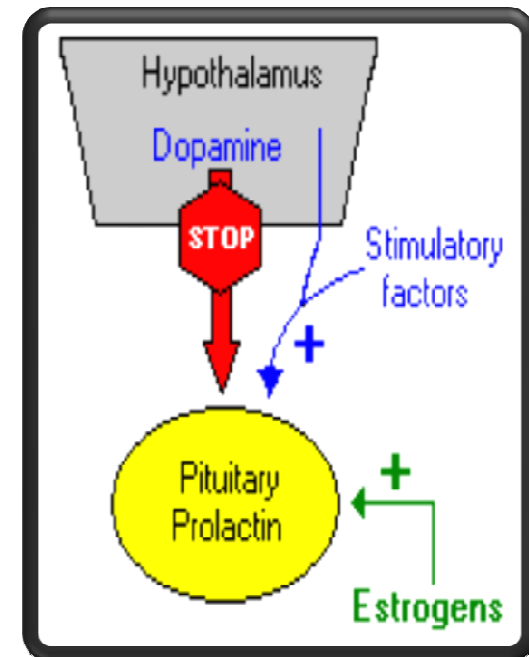
Anterior pituitary (continue)

Lecture 7

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PROLACTIN (PRL)

- Production stimulated by high estrogen levels in pregnancy & by suckling in post-partum period
- Prepares breast for lactation and milk production



Prolactin (PRL)

- **Structure:** It is a single polypeptide chain composed of 199 amino acid residues. It has three disulfide bonds.
- **Secretion:**
Lactotropes of the Anterior Pituitary.
- **Level:**
 - Starts early in the fetal stages.
 - Decline shortly after birth and remain low in males.
 - In female increase with pregnancy reach maximum level at term and remains high during lactation.

Prolactin

- **Functions in relation to reproduction**
 - Breast growth during pregnancy
 - Milk secretory activity after birth
- **Direct effector hormone**
- **Stimulated** by thyrotropin-releasing hormone (TRH)
- **Inhibited** by prolactin release-inhibiting hormone (dopamine)

- **Prolactin imbalance:**

- **Hyperprolactinemia:**

- Causes:**

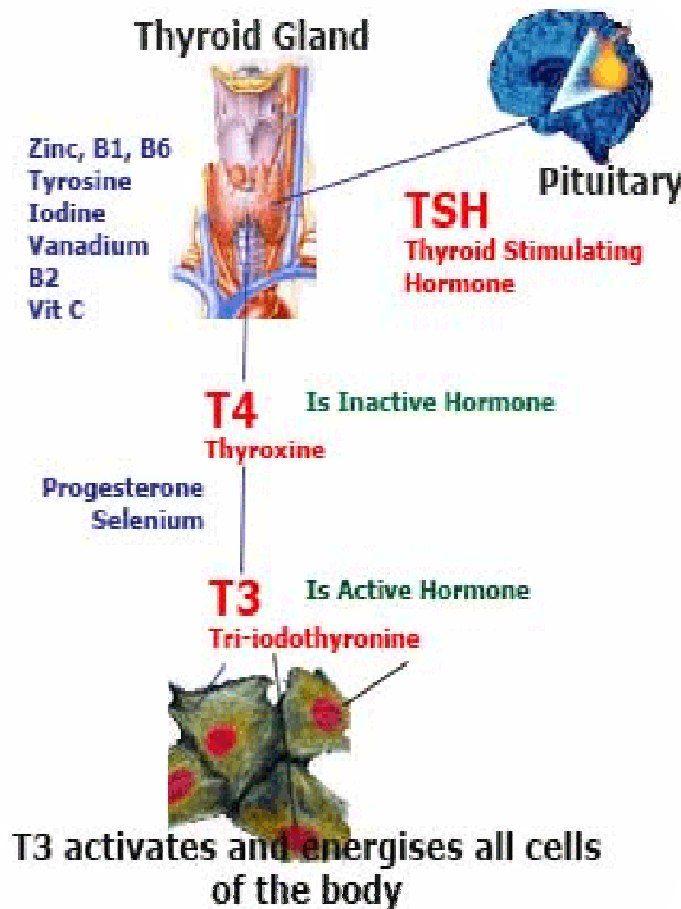
- Tumors in the lactotropes.
 - High level of TRH in hypothyroidism.
 - Hypothalamus or Anterior Pituitary disorders.

- **Symptoms:**

- In females: Galactorrhea, Infertility.
 - In males: Galactorrhea, Infertility.

- Treatment: Dopamine**

THYROID STIMULATING HORMONE



- Target gland is thyroid
- Leads to synthesis of T_3 & T_4
- T_3 & T_4 begins negative feedback inhibition of TRH & TSH production

Gonadotropins

- Include FSH and LH
- They are Glycoproteins
- Required for proper maturation and function of gonads in men and women
- Secretion:
LH and FSH are secreted from the Gonadotropes of the Anterior Pituitary.

Gonadotropic Hormones:

- They were given this name due to their effect on Gonads.
- They includes:
 - 1- Luteinizing Hormone (LH).
 - 2- Follicle-Stimulating Hormone (FSH).

- **Structures:**

These glycoprotein hormones are composed of two subunits α and β .

The α -subunit is similar in both hormones .

The β -subunit is specific for each hormone. In LH it contains one N-linked oligosaccharide chain, while in FSH it contain two N-linked oligosaccharide chains.

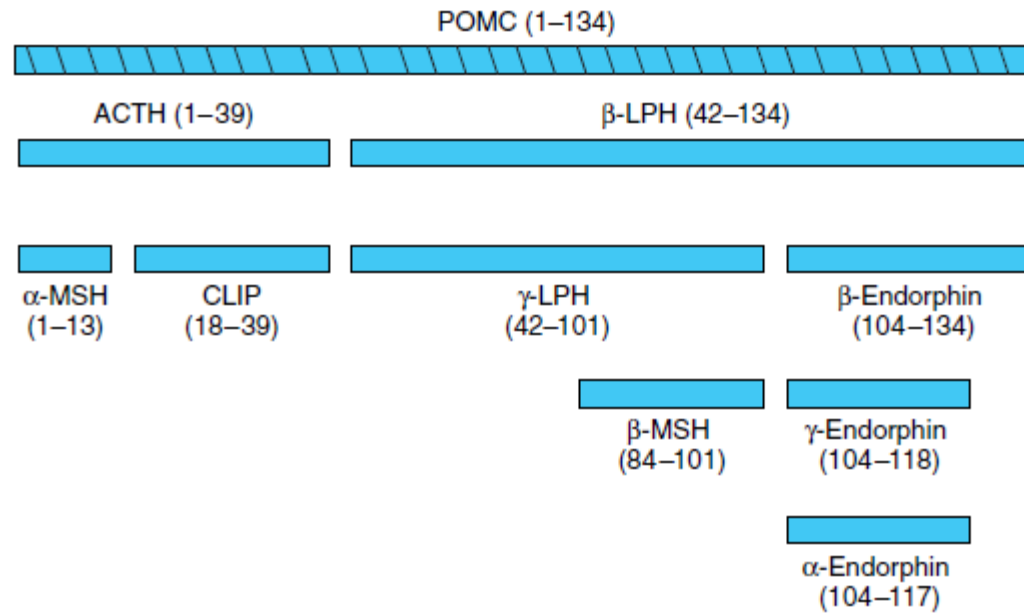
- Regulation:
 - **Stimulation**: Gonadotropin-Releasing Hormone from the hypothalamus (Gn RH).
 - **Inhibition**: Feed back mechanism by sex hormones.
- Physiological effects:
 - **In Males:**
 - **LH**: stimulates cell in the testis to secrete testosterone.
 - **FSH**: Enhance normal sperm production by testis.
 - **In Females:**
 - **LH**: Induce Ovulation and stimulate Progesterone production.
 - **FSH**: Enhance production of Estrogen and development of follicles.

Complex Processing Generates the Pro-opiomelanocortin (POMC) Peptide Family

- The POMC family consists of peptides that act as hormones (ACTH, LPH, MSH) and others that may serve as neurotransmitters . (endorphins)

POMC is synthesized as a precursor molecule of 285 amino acids.

The POMC gene is expressed in the anterior and intermediate lobes of the pituitary



Products of pro-opiomelanocortin (POMC) cleavage.
(MSH, melanocyte-stimulating hormone; CLIP, corticotropin-like intermediate lobe peptide; LPH, lipotropin.)

- There are basic peptide groups:
- (1) ACTH, which can give rise to α -MSH and corticotropin-like intermediate lobe peptide (CLIP);
- (2) β -lipotropin (β -LPH), which can yield γ -LPH, β -MSH, and β -endorphin (and thus α - and γ -endorphins);

Endorphins play role in endogenous control of pain
(they have higher analgesic potencies 9 18-30 times
than morphine)

- The diversity of these products is due to the many dibasic amino acid clusters that are potential cleavage sites for trypsin-like enzymes

Adrenocorticotrophic Hormone

- **Structure:** (ACTH)
 - Peptide hormone composed of 39 amino acid residues.
- **Function:**
- Target cell= adrenal cortex
- Promote growth of adrenal cortical tissue otherwise atrophy of the gland takes place.
- Stimulate the production of adrenal steroids
- **Control:**
 - Feed-back inhibition by corticosteroids.
 - Diurnal variation
 - Highest levels between 6-8 am
 - Lowest levels between 6-11 pm

Anterior Pituitary Hormones

Hormone	Target Gland	Classification	Feedback Hormone	Function
Luteinizing hormone (LH)	Gonad	Tropic	Sex hormones	Directs testosterone production
Follicle stimulating hormone (FSH)	Gonad	Tropic	Sex hormones	development of follicles , estrogen secretion
Thyroid stimulating hormone (TSH)	Thyroid	Tropic	Thyroid hormones (T4/T3)	Directs thyroid hormone production
Adrenocorticotropic hormone (ACTH)	Adrenal	Tropic	Cortisol	Growth of adrenal cortex, secretion of adrenal steroids
Growth hormone (GH)	Multiple(liver, bones, muscles, adipose tissue)	Direct effector	Insulin-like growth factor	Growth, metabolism
Prolactin	Breast	Direct effector	Dopamine	Milk secretion, breast development(lactation)