HYPOTHALAMIC RELEASING/ INHIBITING HORMONES

What are the various hormones of hypothalamus related to processes of reproduction?

- The hormones of the hypothalamus that regulate reproduction are:

1. Gonadotropin releasing hormone (GnRH or LHRH),
2. Adreno corticotrophic Releasing Hormone,
3. Prolactin inhibiting factor.

- The hypothalamus is also the source of oxytocin and vasopressin, which are stored in the neurohypophysis (posterior lobe of the pituitary gland).

GONADOTRPHIN RELEASING HORMONE (GnRH)

How many amino acids does constitute GnRH?

What is Molecular weight of GnRH?

Where is it synthesuzed and stored?

What kind of link does it provides and between what systems?

What kind of signal induce release of GnRH?

- GnRH is a decapeptide.
- MW 1183 daltons.
- It is synthesized and then stored in the medial basal hypothalamus.
- It provides a humoral link between neural and endocrine systems.
- In response to neural signals pulses of GnRH are released into the hypo-physeal portal system for the release of LH and FSH from the anterior pituitary.

ADENOHYPOPHYSEAL HORMONES OR ANTERIOR PITUTITARY HORMONES

How many adenohypophyseal hormones have been there conerned with reproductive processes?

What are their names?

What is LH and FSH chemically and what is PRL chemically?

What is the molecular weight of FSH anf LH?

Which cell types of anterior pituitary produce LH and FSH?

What are the two units from which FSH and LH are constituted?

Which unit is same in both FSH and LH and which unit is different?

Which unit provide specificity to these goNADOTRPHI

- Anterior pituitary gland secretes three gonadotropic hormones.

1. Follicle Stimulating Hormone (FSH),
2. Luteinizing Hormone (LH) and
3. Prolactin (PRL).

- LH and FSH are glyco-proteins with a molecular weight of 32000 daltons.
- Gonadotropes in the anterior pituitary secrete both hormones.
- Each hormone consists of two dis-similar sub units termed the alpha and beta subunits.
- The alpha subunit is common to both FSH and LH within species, whereas the beta subunit is distinct and confers specificity of each gonadotropin.
- The alpha and beta subunits of any of these hormones by themselves have no biological activity.

ADENOHYPOPHYSEAL HORMONES OR ANTERIOR PITUTITARY HORMONES…. Continues

What is prolactin chemicallly?

Which hormones regulates secretion of gonadotrophin?

Which Gonadal peptide regulate FSH secretion?

- Prolactin is not a glycoprotein.
- GnRH and the gonadal steroids regulate secretion of gonadotropins.
- Additionally, gonadal peptides regulate FSH secretion. These either stimulate (activins) or inhibit (inhibins, follistatin) FSH secretion.

FOLLICLE STIMULATING HORMONE (FSH):

What is function of FSH in female?

What is function of FSH in males?

- Follicle stimulating hormone stimulates the growth and maturation of the ovarian follicle or the Graffian follicle. FSH does not cause secretion of estrogen from the ovary by itself, instead, it needs the presence of LH to stimulate estrogen production.
- In the male, FSH acts on the germinal cells in the seminiferous tubules of the testis and is responsible for spermatogenesis up to the secondary spermatocytes stage, later androgens from the testis support the final stages of spermatogenesis.

LUTEINIZING HORMONE (LH)

What is tonic release of LH and FSH?

What is pre-ovulatory release of LH?

What is the function of LH in both male and females?

- Tonic or basal levels of LH act in conjunction with FSH to induce estrogen secretion from the large ovarian follicle.
- The pre-ovulatory surge of LH is responsible for rupture of the follicle wall and ovulation.
- LH stimulates the interstitial cells of both the ovary and testis. In the male, the interstitial cells (Leydig cells) produce androgens after LH stimulation.

PROLACTIN (PRL)

How many Aminio acid does prolactin is composed of?

What is its Molecular Weight?

What kind of relaasing factor of hypothalamus controls secretion from pituitary.

What is the name of regulation molecule for prolactin?

Where from it is secreted and hw it reaches site of action?

- Prolactin is a polypeptide hormone secreted by anterior pituitary.
- Ovine prolactin is a 198 amino acid protein with a molecular weight of 24,000 daltons.
- An inhibiting hormone termed Prolactin inhibiting factor (PIF) regulates secretion of prolactin. PIF is probably the catecholamine, dopamine, an amine of low molecular weight synthesized from L-tyrosine. It is secreted from nerve terminals mostly in the arcuate nucleus located in the median eminence and transported through the hypophyseal portal system to the adeno-hypophysis.

PROLACTIN (PRL)

- Prolactin initiates and maintains lactation.
- It is regarded as a gonadotropic hormone because of its luteotropic properties in rodents (Maintenance of Corpus Luteum).
- However, in domestic animals, LH is the main luteotropic hormone with prolactin being of less importance in the luteotropic complex.
- Prolactin may mediate the seasonal and lactational effects of reproduction in farm animals.

NEUROHYPOPHYSEAL HORMONES:

- The hormones of the posterior pituitary (neuro-hypophysis) differ from the other pituitary hormones in that they do not originate from the pituitary, but are only stored there until needed.
- The two hormones, oxytocin (milk let down hormone) and vasopressin (antidiuretic hormone or ADH) are actually produced in the hypothalamus.
- These hormones are transferred from the hypothalamus to the posterior pituitary not through the vascular system, but along the axons of the nervous system.

OXYTOCIN

- Oxytocin is synthesized in the supra-optic nucleus of the hypothalamus and is transported in small vesicles enclosed by a membrane down the hypothalamic hypophyseal nerve axons. They are stored at the nerve endings next to the capillary beds in the neuro-hypophysis until their release into the circulation.
- Oxytocin is also produced in the corpus luteum.
- Thus oxytocin has two sites of origin, the ovary and hypothalamus.
- Oxytocin also plays an important part in reproductive processes.

Functions of Oxytocin-1

- During the follicular phase of the oestrus cycle and during the late stages of gestation, oxytocin stimulates uterine contractions which facilitate sperm transport to the oviduct at estrus.

Functions of Oxytocin-2

- The stretching of the cervix at parturition caused by the passage of the fetus stimulates a reflex release of oxytocin (Ferguson's reflex).

Functions of Oxytocin-3

- However, the best known action of oxytocin is the reflex release of milk. In the lactating female, visual and tactile stimuli associated with suckling or milking induces the release of oxytocin into the circulation. Oxytocin causes contraction of myoepithelial cells (smooth muscle cells) that surround the alveoli in the mammary gland, resulting in milk let down.

Functions of Oxytocin-4

- Ovarian oxytocin is involved in luteal function. It acts on endometrium to induce prostaglandin F 2 alpha release, which has a luteolytic action (regression of the corpus luteum).