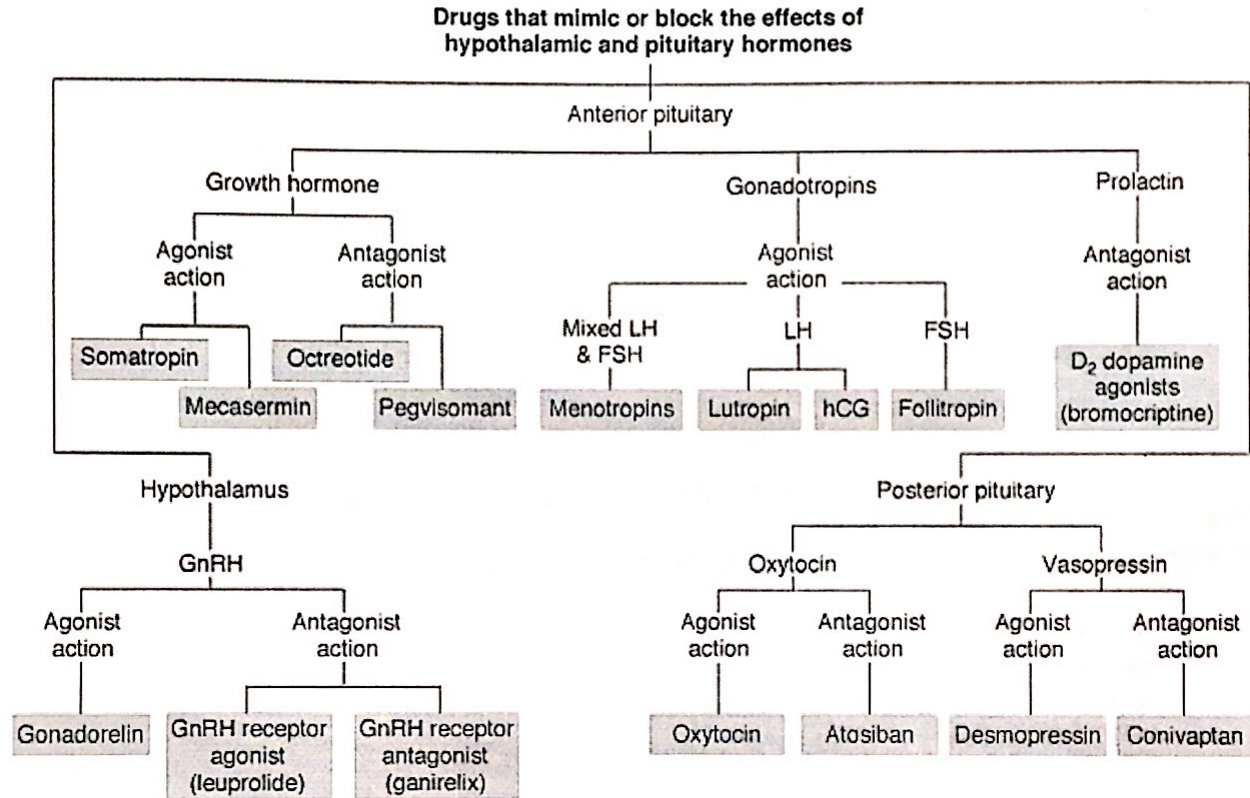


Endocrine Pharmacology

Hypothalamic-pituitary hormones

The hormones produced by the hypothalamus and pituitary gland are key regulators of metabolism, growth, and reproduction.

Preparations of these hormones, including products made by recombinant DNA technology and drugs that mimic or block their effects, are used in the treatment of a variety of endocrine disorders.



Hypothalamic hormones

1. Growth hormone releasing hormone

Growth hormone inhibiting hormone (Somatostatin)

Somatostatin analogue (Octreotide)

- It Inhibits the release of growth hormone in the pituitary

Uses

- Treatment of a variety of hormone-secreting tumors
- Acromegaly (Excessive growth hormone secretion due to pituitary carcinomas)

2. Gonadotropin-releasing hormone (GnRH) (Luteinizing hormone-releasing hormone)

- It is also called **gonadorelin**.
- It stimulates the gonadotrophic cells in the anterior pituitary to produce and release luteinizing hormone (LH) and follicle stimulating hormone (FSH)
- It is used to stimulate gonadal hormone in hypogonadism

GnRH Analogs

They inhibit FSH and LH due to sustained stimulation of the anterior pituitary

- **Leuprolide** : Highly effective at decreasing estrogen levels
- **Nafarelin**
- **Goserelin**

Uses

1. Endometriosis and Uterine fibroids
2. Breast cancer
3. Prostate cancer
4. Central precocious puberty
5. Male and female infertility

Side effects

1. Hot flashes
2. Acne
3. Depression
4. vaginal bleeding
5. Tachycardia

GnRH Antagonist

Ganirelix

It inhibits LH and in high concentration FSH by binding to pituitary GnRH receptors without activation

Uses

- In vitro fertilization, endometriosis and uterine fibroids

3. Corticotropin-releasing hormone

- It is secreted in response to stress. It stimulates corticotropin cells to produce
- adrenocorticotrophic hormone (ACTH) in the pituitary
- It is used for Diagnosis

4. Thyrotropin-releasing hormone

- It stimulates secretion of thyroid stimulating hormone (TSH) from the anterior pituitary
- Protirelin (drug)
- Diagnostic purposes only

5. Prolactin inhibiting hormone (dopamine)

- Dopamine inhibits secretion of prolactin in the pituitary
- **Bromocriptin**
- **Gabergoline**
- They are dopamine agonist, used in the treatment of hyperprolactinemia, which is associated with galactorrhea and hypogonadism.

6. Prolactin releasing hormone

There is no preparation available for hypoprolactinemic condition

Anterior pituitary hormones

Growth hormone (Somatotropin)

- It is released from the anterior pituitary in response to GHRH and inhibited by GHIH (somatostatin)
- It is synthesised by recombinant human growth hormone

Uses

- Deficiency: In children failure to grow conditions. In adults generalized obesity, reduced muscle mass
- It is widely abused hormone

Side effects

- Intracranial hypertension
- Gynecomastia

Growth hormone receptor antagonist (Pegvisomant)

- It binds to growth hormone receptors in target tissues blocks hepatic production of insulin-like growth hormone factor 1 (IGF-1), responsible for bone growth
- It is used in acromegaly

Side effects

Liver- yellowing of the skin, abdominal pain, dark urine, vomiting

2. Follicle Stimulating Hormone (FSH)

It stimulates gametogenesis and follicular development in women and spermatogenesis in males. It also stimulates androgen conversion into estrogen in females

Uses

- Anovulatory females
- Pituitary and hypothalamic hypogonadism with infertility in both sexes

Side effects

- Abdominal pain, vaginal bleeding, ovarian cysts
- risk of multiple births

Menotropin:

- human Menopausal Gonadotropins (hMG)
- Purified from urine of post-menopausal females
- combination of FSH and LH

Urofollitropin

- Purified FSH, Derived from post-menopausal females

Follitropin Beta

1996, recombinant technology, highly pure

3. Luteinizing Hormone (LH)

- Human chorionic gonadotrophin (HCG)
- Its predominant action is that of LH
- In women, it induces progesterone from the corpus luteum
- In men, it involves in spermatogenesis and in the production of testosterone

Uses

- Diagnosis
- Induce ovulation
- Induce puberty

4. Adrenocorticotropin Hormone (ACTH)

Cosyntropin

- It is the synthetic subunit of human ACTH which
- exhibits the full activity of natural ACTH

Uses

- It is used for diagnostic as a tool for differentiating between primary adrenal insufficiency (Addison disease associated with adrenal atrophy) and secondary adrenal insufficiency (insufficient secretion of ATCH)

5. Thyroid Stimulating Hormone (TSH)

Thyrotropin alpha: It is prepared by recombinant DNA technology

Uses

- It is used for diagnosis

6. Prolactin

- It stimulates and maintains lactation. It also decreases sexual drive and reproduction function. Prolactin is not used as a drug.
- There is no preparation available for hypoprolactinemic condition
- Hyperprolactemia can be inhibited by dopamine agonist

Bromocriptine {Parlodel}

Cabergoline {Dostinex}

- Dopamine agonists
- They decrease prolactin secretion through a dopamine-mimic action

Uses

- Prolactin secreting adenomas
- Acromegaly
- Parkinson's disease
- Restless legs syndrome

Adverse reactions

- Headache, light headedness, fatigue
- Psychotic reactions
- Postural hypotension

Posterior pituitary hormones

1. Oxytocin

- Oxytocin is a nonapeptide synthesized in cell bodies in the paraventricular nuclei of the hypothalamus and transported through the axons of these cells to the posterior pituitary.
- Oxytocin is an effective stimulant of uterine contraction and is used intravenously to induce or reinforce labor.
- It is chemically synthesized. It is only used in obstetrics to stimulate uterine contraction to induce labor or to promote ejection of milk.
- **Atosiban** is an antagonist of the oxytocin receptor that is used in some countries as a tocolytic, a drug used to treat preterm labor.

2. Vasopressin (Anti-Diuretic Hormone) (ADH)

- Vasopressin is synthesized in neuronal cell bodies in the hypothalamus and released from nerve terminals in the posterior pituitary. The chemically synthesized has replaced that extracted from animal.
- It has both antidiuretic and vasopressor effects
- vasopressin acts through **V2 receptors** to increase the insertion of water channels in the apical membranes of collecting duct cells in the kidney and to thereby provide an antidiuretic effect. It is used to increase water reabsorption in the kidney to treat **diabetes insipidus**,
- Vasopressin also **contracts vascular smooth muscle by activating V1 receptors**. Because of this vasoconstrictor effect, vasopressin is sometimes used to treat patients with bleeding from esophageal **varices or colon diverticula**, also to treat bleeding due to esophageal varices.

Several antagonists of vasopressin receptors (eg, conivaptan, tolvaptan) have been developed to offset the fluid retention that results from the excessive production of vasopressin associated with hyponatremia or acute heart failure

Side effects

Water intoxication and hyponatremia

Desmopressin

- Desmopressin, is modified vasopressin, a selective agonist of V2 receptors with minimal activity at V1 receptor, making it free of pressor effects with long duration of action.
- Extrarenal V2-like receptors regulate the release of coagulation factor VIII and von Willebrand factor.
- Is administered orally, nasally, or parenterally in patients with pituitary diabetes insipidus, It is now preferred for nocturnal enuresis effects and in patients with mild hemophilia A or von Willebrand disease.

Thank you