

Major Endocrine Organs

Preview from Notesale.co.uk
Page 4 of 50

Pineal gland

Hypothalamus

Pituitary gland

Thyroid gland

Parathyroid glands
(on dorsal aspect
of thyroid gland)

Thymus gland

Adrenal glands

Pancreas

Ovary
(female)

Testis
(male)

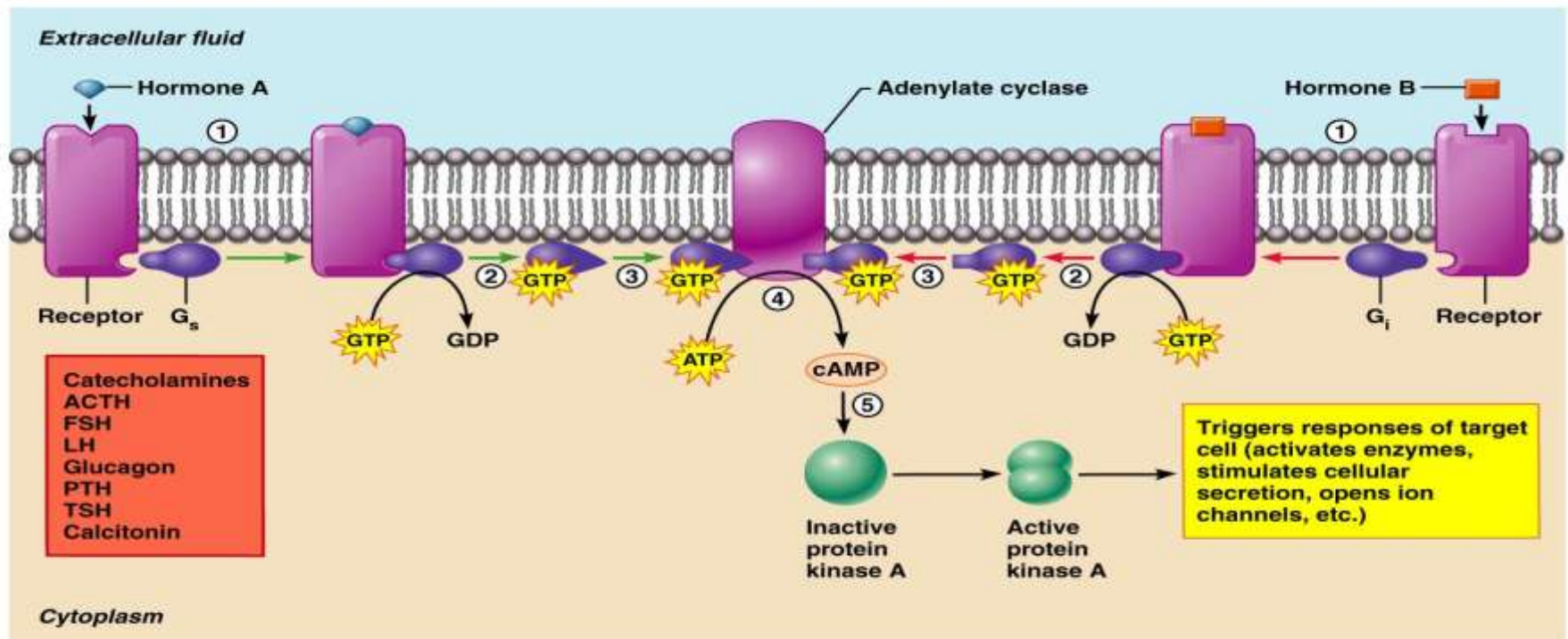
Copyright © 2006 Pearson Education, Inc., publishing as Benjamin Cummings.

-
- 3. Effects in the target cells caused by hormone action
 - a. A change in cell membrane permeability (e.g. insulin causes muscle cells to have a higher permeability for glucose).
 - b. A change in chemical reaction rate (e.g. growth hormone stimulates higher chemical reaction rates in muscle and bone cells).
 - c. Enzyme activation (e.g. epinephrine increases enzyme action in muscle cells).
 - d. Activation of cell secretion (e.g. melanocyte-stimulating hormone activates more melanin secretion from the melanocytes).

Sequence of steroid hormone action - Summary

- 1. Endocrine glands secrete steroid hormone .
- 2. Steroid hormone diffuses through target cell membrane .
- 3. Hormone combines with a receptor molecule .
- 4. steroid hormone-receptor complex binds to DNA and promotes synthesis of mRNA.
- 5. mRNA enters the cytoplasm and directs protein synthesis .
- 6. Newly synthesized protein produce hormone's specific effects.
- 7. The new protein causes a specific effect to occur within the target cells.

- 4. The product of these reactions is a substance known as the “secondary messenger” (usually cyclic adenosine monophosphate or cAMP), which acts on behalf of the protein hormone, causes a potent effect in the target cell (usually within the cytoplasm).
- 5. Since protein hormones never diffuse to the DNA of target cells, no new proteins or enzymes are made at the end.



-
- **Follicle-stimulating hormone (FSH)** -- stimulates the production of egg cells and sperm in the gonads. [Hypersecretion causes no known effects, while hyposecretion can cause failure of sexual maturation]
 - **Luteinizing hormone (LH)** -- triggers ovulation and stimulates the production of estrogens and progesterone in female, and promotes testosterone production in male. [Disorders are similar to those for FSH].
 - **Prolactin (PRL) or Lactogenic hormone (LTH)** -- stimulates milk production in the mammary glands. [Hypersecretion can disrupt normal menstrual cycles in female and causes impotence in male; and hyposecretion causes poor milk production in female].
 - **Melanocyte-stimulating hormone (MSH)** -- stimulates melanocytes in the epidermis and hair follicles to release melanin pigment. [Hypersecretion causes abnormally dark skin pigment, and hyposecretion causes abnormally light skin pigment].

Thyroid gland

- a) located inferior to the larynx (voice box) and attached to the trachea.
- b) divided into two lateral lobes.
- c) thyroid follicles utilize iodine and synthesize thyroglobulin (TGB) to be stored in the colloids.
- d) upon stimulation of TSH, TGB is converted into two hormones -- **Triiodothyronine (T₃)** and **Thyroxine (T₄)** to promote normal metabolism. [Hyposecretion causes hypothyroidism, similar to cretinism and myxedema, and hypersecretion causes hyperthyroidism that results in a goiter or in Graves' disease].
- e) also secretes **Calcitonin** to lower blood calcium and phosphate levels and regulate digestive hormones. [Both hyposecretion and hypersecretion would affect normal balances of calcium and phosphate].

Adrenal gland

- **B. Adrenal Medulla:** inner portion of the adrenal gland.
- Made of modified nerve tissue that is under direct regulation of sympathetic nerves of the autonomic nervous system.
- Contains glandular cells called chromaffin cells which secrete 2 closely related hormones -- **Epinephrine** (or adrenaline) and **Norepinephrine** (or noradrenaline).
- Effects of these hormones resemble sympathetic stimulation, where body activities such as cardiac actions, blood pressure , and breathing rate are increased , while digestive processes are decreased. [No known effects are due to hyposecretion of these, but hypersecretion can caused hypertension, increased blood glucose level , and high heart rate].

-
- 5. ACTH stimulates release of **Cortisol** by the adrenal cortex .
 - 6. Cortisol increases the conc. of blood amino acids, releases fatty acids, and forms glucose from non-carbohydrate sources.
 - 7. Secretion of **glucagons** from the pancreas and **growth hormone** from the anterior pituitary increase .
 - 8. Glucagons and growth hormone aid mobilization of energy sources and stimulate uptake of amino acids by cells.
 - 9. Secretion of **ADH** from post. Pituitary increases .
 - 10. ADH promotes the retention of H_2O by the kidneys, which increases blood volume.
 - 11. **Renin** increases blood level of angiotnsin II, which acts as a vasoconstrictor and also stimulates **Aldosterone** secretion by the adrenal cortex .Aldosteron increase Na^+ retention by the kidneys .