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Endocrine System

I. Introduction to the Endocrine System

☞ *Concept:* Hormones are regulatory chemicals secreted by the endocrine glands into the blood, which transports them to their target cells. Feedback mechanisms in the target cells control the secretion (production) of the hormones.

A. Multiple Choice Questions

- ___ 1. Blood transports hormones to specific sites called
(a) primary tissues. (c) secondary tissues.
(b) target cells. (d) receptor sites.
- ___ 2. Which of the following statements concerning hormones is *false*?
(a) Their effects are generally of short duration.
(b) They cause changes in the metabolic activities of specific cells.
(c) They exert their effects relatively slowly.
(d) They are transported only via the blood.
- ___ 3. Which of the following glands does (do) *not* have an endocrine function?
(a) gonads (d) parathyroid glands
(b) adrenal glands (e) pineal gland
(c) parotid glands
- ___ 4. Which of the following is *not* exclusively an endocrine gland?
(a) thyroid (c) pineal gland
(b) pancreas (d) pituitary gland
- ___ 5. Hormones may be
(a) steroids. (c) amines.
(b) proteins. (d) all of the above.
- ___ 6. A steroid is
(a) a lipid synthesized from cholesterol.
(b) composed of amino acids bound together in peptide chains.
(c) composed of amino acids, but without peptide bonds.
(d) composed of nucleic acids, and carbohydrate molecules.

B. True-False Questions

- ___ 1. Endocrine glands secrete biologically active chemicals called hormones into the ducts of organs.
- ___ 2. Estrogen, progesterone, and testosterone are correctly referred to as sex hormones, or steroids.
- ___ 3. In therapeutic treatment of endocrine disorders, all hormones can be administered orally.
- ___ 4. Amines are hormones that always have an amine ($-\text{NH}_2$) group associated with atoms of carbon, hydrogen, and nitrogen.

- _____ 5. In order for protein and amine hormones to have an effect, they must attach to specific receptor sites on the cell membranes of their target cells.
- _____ 6. Most endocrine glands are regulated by positive feedback mechanisms.

II. Pituitary Gland

☞ *Concept:* The neurohypophysis of the pituitary gland releases hormones that are produced by the hypothalamus, whereas the adenohypophysis of the pituitary gland secretes its own hormones in response to regulation from hypothalamic hormones. The secretions of the pituitary gland are thus controlled by the hypothalamus, as well as by negative feedback influences from the target glands.

A. Multiple Choice Questions

- _____ 1. The anterior portion of the pituitary gland is called
(a) the hypophysis. (c) the adenohypophysis.
(b) the neurohypophysis. (d) the pitohypophysis.
- _____ 2. The hormone that triggers the release of TSH from the anterior pituitary is
(a) thyrotropin-releasing hormone.
(b) corticotropin-releasing hormone.
(c) thyroxine-releasing hormone.
(d) thyroid-stimulating releasing hormone.
- _____ 3. In the male, FSH
(a) stimulates the secretion of sex hormone.
(b) stimulates production of sperm cells by the testes.
(c) stimulates the development of secondary sex characteristics.
(d) is not present.
- _____ 4. Releasing and inhibiting hormones that control the anterior pituitary are produced in
(a) the pars intermedia. (c) the hypothalamus.
(b) the thalamus. (d) the infundibulum.
- _____ 5. Which of the following hormones is *not* secreted by the pars distalis?
(a) ADH (c) FSH
(b) prolactin (d) ACTH
- _____ 6. The vascular link between the hypothalamus and the anterior pituitary is called
(a) the arterial circle.
(b) the releasing-inhibitory portal system.
(c) the endocrine-circulatory connection.
(d) the hypothalamo-hypophyseal portal system.

B. True–False Questions

- _____ 1. The entire pituitary gland is surrounded by the dura mater.
- _____ 2. The neuroglia-like cells in the pars nervosa are called pituicites.
- _____ 3. A hypophysectomy is the surgical removal of all or part of the pituitary gland.
- _____ 4. The adenohypophysis secretes hormones that are produced by the hypothalamus.

- ___ 5. The hormones secreted by the anterior pituitary are called trophic hormones.
- ___ 6. Somatotropin is another name for growth hormone.
- ___ 7. The release of oxytocin from the posterior pituitary is controlled by negative feedback mechanisms.
- ___ 8. The pituitary gland is properly referred to as the master gland of the body.

III. Thyroid and Parathyroid Glands

☞ *Concept:* The thyroid gland secretes thyroxine and triiodothyronine, which function in the regulation of energy metabolism. These hormones are critically important for proper growth and development. The thyroid also secretes calcitonin, which may antagonize the action of parathyroid hormone in the regulation of calcium and phosphate balance.

A. Multiple Choice Questions

- ___ 1. Which of the following is (are) *not* associated with the thyroid gland?
 - (a) follicular cells
 - (b) chromaffin cells
 - (c) parafollicular cells
 - (d) an isthmus
- ___ 2. Calcitonin is produced by
 - (a) follicular cells.
 - (b) chromaffin cells.
 - (c) parafollicular cells.
 - (d) principal cells.
- ___ 3. Which pituitary hormone is responsible for the secretion of thyroxine?
 - (a) ACTH
 - (b) TSH
 - (c) FSH
 - (d) ADH
- ___ 4. The function of parathyroid hormone is to
 - (a) increase blood calcium levels.
 - (b) decrease blood calcium levels.
 - (c) increase T4 levels in the blood.
 - (d) decrease T4 levels in the blood.

B. True–False Questions

- ___ 1. The bilobed thyroid gland is the largest of the endocrine glands.
- ___ 2. Thyroid hormones stimulate protein synthesis, promote maturation of the nervous system, and increase the rate of energy utilization by the body.
- ___ 3. The parathyroid glands are embedded in the posterior surfaces of the lateral lobes of the thyroid gland.
- ___ 4. Each of the three hormones secreted by the parathyroid glands plays a role in body growth and metabolism.

IV. Pancreas

☞ *Concept:* The pancreatic islets in the pancreas secrete two hormones, insulin and glucagon, which are critically involved in the regulation of blood sugar levels in the body.

A. Multiple Choice Questions

- _____ 1. The pancreatic cells that secrete insulin are called
(a) alpha cells. (c) islet cells.
(b) beta cells. (d) delta cells.
- _____ 2. The function of glucagon is to
(a) facilitate the entry of glucose into tissue cells.
(b) decrease blood glucose concentrations.
(c) increase blood glucose concentrations.
(d) convert glucose into glycogen.
- _____ 3. Insulin is instrumental in
(a) promoting the movement of glucose through cell membranes.
(b) stimulating the liver to convert glucose into glycogen.
(c) promoting the transport of amino acids into cells.
(d) assisting in the synthesis of proteins and fats.
(e) all of the above.
- _____ 4. Failure of the pancreatic islets to secrete insulin is characteristic of
(a) hyperglycemia. (c) diabetes mellitus.
(b) diabetes insipidus. (d) both a and c.

B. True-False Questions

- _____ 1. Glucagon and insulin are produced in the pancreatic islets and pass into the bloodstream via the pancreatic ducts.
- _____ 2. Hyperglycemia results when beta cells of the pancreas continuously secrete insulin.
- _____ 3. The actions of insulin and glucagon are antagonistic.

V. Adrenal Glands

☞ *Concept:* The adrenal cortex and adrenal medulla are structurally and functionally different. The adrenal medulla secretes catecholamine hormones that complement the action of the sympathetic division of the ANS. The adrenal cortex secretes corticosteroids that function in the regulation of mineral balance, energy balance, and reproductive activity.

A. Multiple Choice Questions


- _____ 1. Which of the following is *not* a zone of the adrenal cortex?
(a) zona reticularis (c) zona glomerulosa
(b) zona chromaffinalis (d) zona fasciculata
- _____ 2. Aldosterone is
(a) a glucocorticoid. (c) a steroid.
(b) a mineralocorticoid. (d) an androgen.

- _____ 3. The function of the mineralocorticoids of the adrenal cortex is to regulate
- (a) Ca^{++} and Na^+ balance. (c) Na^+ and K^+ balance.
 (b) Na^+ and Cl^- balance. (d) H^+ and OH^- balance.
- _____ 4. The effects of hormones released from the adrenal medulla include
- (a) an increase in cardiac output.
 (b) an elevated metabolic rate.
 (c) dilated coronary blood vessels
 (d) all of the above.
- _____ 5. The autonomic “fight-or-flight” response in humans is due to the activation of
- (a) the adrenal cortex. (c) the pituitary gland.
 (b) the adrenal medulla. (d) both b and c.

B. True–False Questions

- _____ 1. Attached to the superior border of the kidney, the adrenal gland is considered a mixed gland because it secretes hormones and aids in the production of urine.
- _____ 2. The adrenal cortex and the adrenal medulla are structurally and functionally different.
- _____ 3. The adrenal gland has three separate suprarenal arteries that supply blood to each adrenal gland.
- _____ 4. Aldosterone is produced in the zona reticularis.
- _____ 5. Adrenaline, epinephrine, and norepinephrine are synonyms for the hormone secreted by the adrenal medulla.
- _____ 6. Female sex hormones are collectively referred to as androgens.

VI. Gonads and Other Endocrine Glands

 *Concept:* The gonads produce sex hormones that control the development and function of the male and female reproductive systems. Additionally, many other organs secrete hormones that help regulate digestion, metabolism, growth, and immunity.

A. Multiple Choice Questions

- _____ 1. Which of the following structures does (do) *not* secrete estrogen?
- (a) placenta (d) ovarian (graafian) follicles
 (b) uterus (e) corpus luteum
 (c) testes
- _____ 2. Estrogen is responsible for each of the following *except*
- (a) development and function of the secondary sex organs.
 (b) preventing abortion of the fetus.
 (c) menstrual changes of the uterus.
 (d) regulation of the sexual drive.
- _____ 3. The principal hormone secreted by the pineal gland is
- (a) melatonin. (c) trypsin.
 (b) prolactin. (d) oxytocin.

- _____ 4. The thymus serves as the site of the production of
(a) monocytes. (c) granulosa cells.
(b) erythrocytes. (d) T cells.
- _____ 5. The placenta is responsible for each of the following *except*
(a) nutrient exchange between the fetus and the mother.
(b) secretion of estrogen and progesterone.
(c) secretion of steroid hormones.
(d) secretion of human chorionic gonadotropin (hCG).
(e) secretion of somatomammotropin.

B. True–False Questions

- _____ 1. The thymus shrinks after puberty.
- _____ 2. The small intestine does not produce any significant hormones.

VII. Developmental Exposition of the Endocrine System

A. Multiple Choice Questions

- _____ 1. The anterior portion of the pituitary gland is called
(a) the hypophysis. (c) the adenohypophysis.
(b) the neurohypophysis. (d) the pitohypophysis.
- _____ 2. The embryonic pars intermedia is located in
(a) the hypophysis. (c) the adenohypophysis.
(b) the neurohypophysis. (d) the pitohypophysis.
- _____ 3. The thyroid gland is derived from
(a) mesoderm. (c) ectoderm.
(b) endoderm. (d) thyroderm.
- _____ 4. The pancreas begins development during the fifth week as
(a) a solid pancreatic bud of endoderm.
(b) many small pancreatic buds of endoderm.
(c) dorsal and ventral pancreatic buds of endoderm.
(d) a triangular pancreatic bud of mesoderm.
- _____ 5. The adrenal cortex is derived from
(a) mesoderm. (c) neuroectoderm.
(b) endoderm. (d) epidermal ectoderm.
- _____ 6. The formation of the adrenal gland is complete
(a) prior to birth. (c) at the end of the first year of age.
(b) at the time of birth. (d) at the end of the third year of age.

B. True–False Questions

- _____ 1. The infundibulum of the pituitary gland arises from the diencephalon of the brain.
- _____ 2. The thyroglossal duct of the thyroid gland persists throughout the life of an individual.

- ___ 3. The pancreas develops from the developing gut and maintains connections with the stomach.
- ___ 4. The neuroectodermal cells that form the adrenal medulla are derived from neural crest cells.

VIII. Clinical Considerations

A. Multiple Choice Questions

- ___ 1. Diabetes insipidus is caused by a deficient in
(a) ADH secretion. (c) glucagon secretion.
(b) insulin secretion. (d) ACTH secretion.
- ___ 2. An endemic goiter is caused by
(a) decreased amounts of TSH released by the pituitary gland.
(b) inadequate dietary intake of iodine.
(c) increased thyroxine secretion.
(d) all of the above.
- ___ 3. Hypersecretion of corticosteroids results in
(a) gigantism. (c) adrenogenital syndrome.
(b) Cushing's syndrome. (d) Simmond's disease.

B. True-False Questions

- ___ 1. Total pituitary impairment is referred to as hypopituitarism.
- ___ 2. Hypersecretion of growth hormone in an adult causes acromegaly.
- ___ 3. The infantile form of hypothyroidism is known as cretinism.

IX. Chapter Review

A. Completion Questions

1. Endocrine glands secrete biologically active chemicals called _____ into the blood or surrounding interstitial fluid.
2. Secreted hormones are transported by the blood to specific sites called _____, where they perform precise functions.
3. Another name for the pituitary gland is the _____.
4. The pancreas and gonads are classified as _____ glands because they have both exocrine and endocrine functions.
5. Hormones are broadly classified as steroids, proteins, and _____.
6. The hormonal balance between the rate of secretion and the rate of usage is principally maintained by _____ feedback mechanisms.

7. Neurosecretory cells in the hypothalamus secrete _____ - _____ molecules that influence specific target cells in the pituitary gland.
8. The embryonic germ layers _____, _____, and _____ all contribute to the development of the endocrine system.
9. The mesodermal ridge that joins the adrenal cortex is in the same region in which the _____ develop.
10. The posterior lobe of the pituitary is called the _____.
11. FSH and LH are released by the anterior pituitary when stimulated by _____ from the hypothalamus.
12. The adrenal glands are also called the _____ glands.
13. Parathyroid hormone (PTH) is synthesized by the _____ cells.
14. The endocrine portion of the pancreas consists of scattered clusters of cells called the pancreatic _____.
15. The epiphysis cerebri is also known as the _____ gland.
16. The vascular link between the hypothalamus and the anterior pituitary is called the _____ portal system.
17. _____, secreted by the pineal gland, affects the secretion of gonadotrophic hormones.

B. Matching Questions

Match the pituitary hormone with its action.

- | | |
|---|---|
| ___ 1. prolactin | (a) stimulates the adrenal cortex |
| ___ 2. growth hormone (GH) | (b) stimulates the thyroid gland |
| ___ 3. oxytocin | (c) stimulates sperm production |
| ___ 4. adrenocorticotropic hormone (ACTH) | (d) initiates milk production |
| ___ 5. thyroid-stimulating hormone (TSH) | (e) promotes growth in all body organs |
| ___ 6. luteinizing hormone (LH) | (f) assists uterine contractions during labor |
| ___ 7. antidiuretic hormone (ADH) | (g) stimulates ovulation |
| ___ 8. follicle-stimulating hormone (FSH) | (h) causes retention of water |
| ___ 9. melanocyte-stimulating hormone (MSH) | (i) stimulates pigmentation |