بسم الله الرحمن الرحيم

Al-Quds University **Endocrinology 0202313**
College of Health Professions **First- hour exam. July 7, 2008**
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I. Multiple Choice: choose the single best answer (50 points, 2.5 each)

1. Communication systems in the body include
    a. The endocrine system.
    b. The nervous system.
    c. The immune system.
    d. Both (a) and (b) above are correct.
    e. All of the above are correct.

2. Chemicals produced by the nervous system and secreted systemically (into the blood) then delivered to target cells are called:
    a. Neurotransmitters.
    b. Neurohormones.
    c. Cytokines.
    d. Are all peptides.
    e. Both (b) and (d) above are correct.

3. Steroid hormones
    a. Are derived from cholesterol.
    b. Have intracellular receptors.
    c. Are synthesized in the rough endoplasmic reticulum.
    d. Both (a) and (b) above are correct.
    e. All of the above are correct.

4. Endocrine diseases due to defects in the immune system include:
    a. Type 1 diabetes mellitus.
    b. Hyperthyroidism.
    c. Addison's disease.
    d. All of the above are correct.
    e. None of the above is correct.

5. The response of a particular target organ to a hormone is influenced by:
    a. Local hormone concentration.
    b. The rate of hormone synthesis, release and transport.
    c. Metabolic modification of the hormone.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

6. The rough endoplasmic reticulum is the site of protein synthesis destined for
    a. Secretion.
    b. Plasma membrane.
    c. Lysosomes.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

7. Heat-shock proteins
    a. Are important for protein folding.
    b. Bind cytosolic steroid hormone receptors.
    c. Bind nuclear thyroid hormone receptors.
    d. Both (a) and (b) above are correct.
    e. All of the above are correct.

8. Hormone responsiveness is influenced by
    a. Free hormone concentration.
    b. Total hormone concentration.
    c. Total number of receptors.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

9. Examples of peptide hormones include
    a. Adrenocorticotropic hormone (ACTH).
    b. Catecholamines.
    c. Gonadotropins (LH and FSH).
    d. Thyroid hormones.
    e. Both (a) and (c) above are correct.

10. Peptide hormones are transported free **except**:
    a. Growth hormone.
    b. ACTH.
    c. Vasopressin and oxytocin.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

11. Signal transduction in cytokine receptors involves
    a. Intrinsic tyrosine kinase activity.
    b. G protein.
    c. Phospholipase C.
    d. Diacylglycerol.
    e. Cytoplasmic tyrosine kinase.

12. Interaction between signaling systems can be
    a. Additive.
    b. Synergistic.
    c. Antagonistic.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

13. Endocrine hypofunction could be due to
    a. Destruction of the gland.
    b. Defects in hormone biosynthesis.
    c. Damage to tissues that convert hormones to active hormones.
    d. Both (a) and (b) above are correct.
    e. All of the above are correct.

14. Negative feedback inhibition is carried out by
    a. A change in the level of free hormones.
    b. A change in the level end-product metabolites like glucose and Ca^{++}.
    c. A change in the level of bound hormones.
    d. Both (a) and (b) above are correct.
    e. All of the above are correct.

15. Effector systems of hormones include
    a. Enzymes.
    b. Ion channels.
    c. Genes.
    d. Both (a) and (b) above are correct.
    e. All of the above are correct.

16. G protein-coupled receptors
    a. Have one transmembrane domain.
    b. Stimulate or inhibit adenylate cyclase.
    c. Stimulate phospholipase C.
    d. Both (b) and (c) above are correct.
    e. All of the above are correct.

17. Cholera toxin causes
    a. ADP ribosylation of the β subunit of the G protein.
    b. Inhibition of the GTPase activity of the α subunit of the G protein.
    c. Activates adenylate cyclase even in the absence of ligand.
    d. Both (b) and (c) above are correct.
    e. All of the above are correct.

18. Insulin and growth hormone
    a. Bind to growth factor receptors.
    b. Bind to a single-transmembrane domain receptors.
    c. Cause phosphorylation of the receptors.
    d. Both (b) and (c) above are correct.
    e. All of the above are correct.

19. Viagra causes vasodilation of blood vessels by
    a. Inhibiting guanylyl cyclase activity in smooth muscles.
    b. Inhibiting nitric oxide synthase activity in smooth muscles.
    c. Inhibiting phosphodiesterase which is responsible for cGMP degradation in smooth muscles.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

20. The ligand binding domain of steroid hormone receptors is responsible for
    a. Dimerization of the receptors.
    b. DNA binding.
    c. Nuclear translocation.
    d. Both (a) and (c) above are correct.
    e. All of the above are correct.

II. Short-assay questions

1. Describe briefly the different mechanisms by which the cell protects itself from excessive stimulation of hormones that act through G-protein coupled receptors. (12 points)

    a. Desensitization: binding of the hormone to a receptor leads to a loss of the ability of the receptor to subsequently stimulate G protein. This is due to phosphorylation of the cytoplasmic domain of the receptor that prevents the receptor from interacting with G protein.
    b. Down-regulation of receptor levels: binding of a hormone to a receptor induces the internalization of the receptor and degradation in lysosomes thus decreasing the number of the receptors.
    c. Decreasing the synthesis of new receptors by inhibiting the respective gene transcription and or translation.

2. Using the equation for hormone binding to a receptor (18 points)

$$[H] + [R] \underset{k_{-1}}{\overset{k_{+1}}{\rightleftarrows}} [HR]$$

Assume the total number of receptors = R_o and dissociation constant is K_D

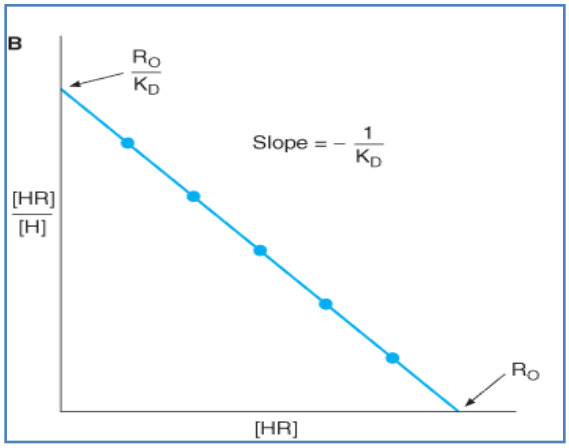
a. Write the linear Scatchard equation for the analysis of hormone-receptor interaction. (4 points)

$$\frac{[HR]}{[H]} = -\left(\frac{[HR]}{K_D}\right) + \frac{R_o}{K_D}$$

b. What information do we get from Scatchard analysis? (6 points)

We get the affinity of the hormone to the receptor and the total number of receptors.

c. Draw the linear graph and indicate on the graph the variables of the X-axis, the Y-axis, the values of the slope, Y-intercept, X-intercept. (8 points)



3. Give one example for each of the following: (20 pionts)
   a. Peptide hormone that activates phospholipase C. Angiotensin II, α-adrenergic agonists.
   b. Steroid hormone that binds nuclear receptors: estrogen
   c. Steroid hormone that binds cytoplasmic receptors: Progesterone, androgens
   d. Neurohormones: epinephrine, norepinephrine, dopamine
   e. Eicosanoids: PGs, prostacyclins, leukotriens, thromboxanes.
   f. Cytokines: IL-2, IL-6
   g. Hormone that binds guanylyl cyclase-linked receptors: ANP
   h. Peptide hypothalamic hormone: CRH, TRH, GnRH
   i. Anterior pituitary hormone: ACTH, LH, FSH, GH, PRL.
   j. Posterior pituitary hormone: oxytocin, vasopressin (ADH)