SBPD EXAM

February 1, 1999

Time: three hours

1. PRINT your name on the answer sheet. **LAST NAME GOES FIRST!!!**

   For example:

   Chase, Herbert

2. PRINT your Social Security number below your name.

3. Bubble in **BOTH** your social security number and **YOUR NAME**
   **IF YOU DO NOT, WE WILL NOT GRADE YOUR EXAM!**

4. Questions During the Exam: we do not answer any questions during the exam. If a particular problem is unclear or ambiguous please do the following: Answer the question as best you can. At the **end of the exam** tell the proctor the number of the question.

5. All of your answers should be entered in the appropriate spaces with a No.2 pencil as you go along.

6. At the end of the exam, promptly hand in your answer sheet.

7. You may keep a copy of the exam.
1. The hypothalamus secretes peptide hormones that are stored in the posterior pituitary. What are they?

A. Oxytocin and Angiotensin  
B. Angiotensin and Vasopressin  
C. Angiotensin and EDRF  
D. Vasopressin and Oxytocin

2. Releasing factors synthesized in the hypothalamus reach the anterior pituitary via:

A. Venous capillaries  
B. Arterial capillaries  
C. Gap junctions  
D. None of the above

3. Most hypothalamic releasing factors are

A. Proteins  
B. Peptides  
C. Carbohydrates  
D. None of the above

4. Secretion of hormones from the anterior pituitary is often episodic (peaks and valleys) rather than constant. Which of the following are episodic?

A. GH, TSH and LH  
B. TSH, LH, and ACTH  
C. ACTH, GH and LH  
D. All pituitary hormone are released in an episodic manner to some extent

5. Which of the following pituitary hormones would be least likely to be released during stress?

A. ACTH  
B. TSH  
C. GH  
D. FSH
6. After removal of the adrenal gland, the level of ACTH should:
   
   A. Decrease, because of a fall in CRF
   B. Increase, because of an increase in CRF
   C. Increase, because of an increase in cortisol
   D. Decrease, because of a decrease in cortisol

7. A patient with a very high insulin level is found to have very little C peptide. One explanation is that
   
   A. The patient has a tumor secreting insulin
   B. The patient is receiving injections of purified insulin
   C. The patient has a tumor secreting insulin and glucagon
   D. None of the above is a reasonable explanation

8. Calcium-channel blockers might have which effect on insulin release by the pancreas?
   
   A. Inhibit insulin release
   B. Stimulate insulin release
   C. Have no effect on insulin release

9. The autonomic nervous system influences pancreatic hormone release in the following manner:
   
   A. Parasympathetic stimulates insulin release, sympathetic stimulates glucagon release
   B. Parasympathetic inhibits insulin release, sympathetic stimulates glucagon release
   C. Parasympathetic stimulates insulin release, sympathetic inhibits glucagon release
   D. Parasympathetic inhibits insulin release, sympathetic inhibits glucagon release

10. Which of the following processes is *stimulated* by a decline in insulin levels?
    
    A. fatty acid biosynthesis
    B. triglyceride hydrolysis
    C. protein synthesis
11. Six hours after a meal an individual has a Plasma$_{\text{glucose}}$ value of 100 mg/dl. What is the principal source of the glucose?

A. ketone bodies derived from fatty acid oxidation  
B. glycogen breakdown in liver  
C. amino acids from muscle protein  
D. glycogen breakdown in muscle

12. Which of the following would be a potent stimulus for the release of glucagon:

A. Infusion of cortisol  
B. Infusion of insulin  
C. Infusion of growth hormone

13. The zonation within the adrenal cortex reflects differential functional roles of each cell type. Which statement best characterizes this phenomenon.

A. Only the cells of the glomerulosa layer secrete a steroid hormone. 
B. The zona glomerulosa (outermost zone) and zona fasciculata (middle zone) make mineralocorticoid and glucocorticoid steroid hormones, respectively. 
C. The zona reticularis makes the peptide hormone, corticotropin releasing factor that stimulates ACTH secretion.

14. Removal of the adrenal glands, resulting in the complete absence of adrenal steroid hormones, is far more serious than removal of the pituitary with complete absence of ACTH because

A. Aldosterone synthesis is not controlled by ACTH  
B. Cortisol synthesis is not controlled by ACTH  
C. Catecholamine release is not controlled by ACTH

15. Local production of cortisol has which of the following effects on catecholamine synthesis in the adrenal medulla:

A. Increase  
B. Decrease  
C. No change
16. Which of the following are not C\textsubscript{21} steroid hormones?

   A. Mineralocorticoids and estrogens
   B. Estrogens and androgens
   C. Androgens and glucocorticoids
   D. Progesterone and androgens

17. Inhibition of HMG-CoA reductase with Lovastatin would lead to:

   A. An increase in mevalonate
   B. A decrease in mevalonate
   C. No change in mevalonate

18. Cells synthesizing steroid hormones would likely have an accelerated level of

   A. NADPH synthesis
   B. NADH synthesis
   C. FAD synthesis
   D. None of the above

19. An animal is treated for 3 weeks with a compound. Compared with a saline injected control, these animals showed increased glycogen content in the liver and an enlarged adrenal cortex. Which compound could have been used?

   A. Insulin
   B. ACTH
   C. GH
   D. Cortisol

20. In a patient with primary adrenal insufficiency (Addison's disease), which of the following would be expected:

   A. a “moon” face
   B. hyperglycemia
   C. decreased serum K\textsuperscript{+}
   D. hyperpigmentation of the skin
21. A patient has a tumor of the adrenal gland producing very high levels of cortisol. What would happen to the levels of cortisol after the infusion of dexamethasone, a very powerful glucocorticoid?

A. Cortisol levels will increase
B. Cortisol levels will not change
C. Cortisol levels will decline

22. Thyroid parafollicular cells differ from thyroid follicular cells in which one of the following characteristics?

A. They are present within the basal lamina of the follicles
B. They are part of the lining epithelium that encloses the follicular lumen
C. They are derived from the neural crest

23. The eventual secretion of thyroxine by the follicular cells of the thyroid requires which one of the following steps?

A. The action of an iodine dehalogenase in removing iodine from thyronine molecules
B. The enzymatic breakdown of iodinated thyroglobulin
C. The iodination of thyroglobulin in the Golgi complex

24. The thyroid gland differs from other endocrine glands in which one of the following?

A. It is under direct hypothalamic control
B. It has an extremely large reservoir of the hormone it synthesizes stored in an extracellular space
C. It releases its hormones into a portal circulation
D. None of the above

25. In the blood, thyroid hormones are, in general, are

A. Almost completely free
B. Almost completely bound
C. Equally free and bound
26. Thyroid hormones act

A. Via G proteins
B. Via tyrosine kinases
C. Via interaction with the genome
D. None of the above

27. One of the mechanisms by which thyroid hormone is thought to increase oxygen consumption is

A. By increasing the number of Na\(^+\)-K\(^+\)-ATPase pumps
B. Activating the parasympathetic nervous system
C. Decreasing the rate of synthesis of thermogenin

28. Each of the following stimulates growth hormone release except

A. stress
B. exercise
C. carbohydrate meal

29. One of the important mediators of growth hormone's action is

A. IGF-4
B. IL-2
C. IGF-I
D. TGF-β1

30. Growth hormone is

A. Anabolic
B. Catabolic
C. Neither
31. *Leptin*, has which of the following effects

A. Inhibits appetite  
B. Stimulates appetite  
C. Has no effect on appetite

32. *Hormone-sensitive lipase* can be activated by

A. Insulin  
B. Epinephrine  
C. Cortisol  
D. None of the above

33. *Thermogenin* acts by

A. Uncoupling oxidative phosphorylation  
B. Increasing the passive Na⁺ leak resulting in an increased turnover of the Na⁺/K⁺-ATPase  
C. Increasing the passive Ca²⁺ leak resulting in an increased turnover of the Ca²⁺-ATPase  
D. None of the above

34. Which of the following enzymes is *not* regulated by phosphorylation-dephosphorylation?

A. Alanine aminotransferase  
B. Pyruvate carboxylase  
C. Glycogen synthase

35. Which of the following mediates the effect of insulin on glycolysis?

A. Fructose 1,6-bisphosphate  
B. Fructose 2,6-bisphosphate  
C. Glucose 6-phosphate  
D. Glucose 1-phosphate
36. When amino acids are utilized for fuel in the muscles the amino group must be dealt with. The amino group leaves the muscle and goes to the liver as:

A. Pyruvate
B. Glutamate
C. Alanine
D. Ornithine

37. Which of the following is an essential amino acid?

A. Tyrosine
B. Phenylalanine
C. Arginine

38. Urea contains two nitrogen atoms. They are derived from:

A. Aspartate and NH₃
B. Alanine and glutamate
C. α-ketoglutarate and NH₃
D. α-ketoglutarate and glutamate

39. Elevated levels of homocysteine is associated with heart disease. Which of the following might be helpful in lowering homocysteine levels?

A. Folic acid
B. Pyridoxine
C. Vitamin D
D. None of the above

40. Protein synthesis is stimulated (or degradation inhibited) by which of the following?

A. Growth hormone, and cortisol
B. Cortisol and androgens
C. Androgens and growth hormone
D. All of the three hormones stimulate protein synthesis
41. *Negative* nitrogen balance means that:

A. The patient is taking in more protein than he or she needs
B. The patient is taking in less protein than she needs
C. The patient is taking in an amount of protein that is roughly equal to the amount needed

42. Which of the following is the *least useful* marker of the state of protein metabolism in the body?

A. Body weight
B. 24 hour excretion of creatinine
C. Serum albumin

43. The synthesis of which of the following would be inhibited by a deficiency of *folic acid*?

A. Uracil
B. Thymidine
C. Adenosine
D. None of the above

44. For those of you who have gout (elevated levels of uric acid), you might want to take an inhibitor of

A. Adenosine deaminase
B. Ribonucleotide reductase
C. Xanthine oxidase
D. None of the above

45. Pyrimidine synthesis begins with the synthesis of:

A. Orotic acid
B. Inosinate
C. CMP
D. None of the above