BIO 282

ENDOCRINE PATHOPHYSIOLOGY

FINAL EXAMINATION

MAY 9, 2001

Instructions:

This examination is composed of True / False and multiple choice questions including 1 matching question. For True / False questions, True=A, and False=B.

The last page of this exam contains a rating scale for the quality and fairness of this exam. Please circle the rating that best represents your opinion of this exam.

Write your name on both the question booklet and the answer sheet. Please use a #2 pencil or a blue or black pen on the answer sheet.

At the end of the test, both the question booklet and answer key should be handed in.

Thank you.
1. **F** Fetal growth is dependent on the production of GH from the fetal pituitary.

2. **T** In an adolescent, the onset of deep sleep triggers a major pulse of GH secretion.

3. **F** Serum calcium is the most important physiologic regulator of PTH secretion.

4. **F** Phosphate has a direct effect on parathyroid hormone secretion

5. **T** Under normal physiologic circumstances, parathyroid hormone activity is inversely related to serum calcium levels.

6. **T** Optimal magnesium stores are necessary for normal parathyroid hormone secretion.

7. **F** Hypocalcemia and hyperphosphatemia are present in renal failure

8. **T** Hypocalcemia and hyperphosphatemia are present in idiopathic hypoparathyroidism

9. **F** Hypocalcemia and hyperphosphatemia are present in pseudohypoparathyroidism

10. **F** Hypocalcemia and hyperphosphatemia are present in osteomalacia

11. **F** Vitamin D is biosynthesized in skin with ultraviolet irradiation

12. **F** Vitamin D is carried in blood by a D binding protein

13. **F** The most active metabolite of Vitamin D is produced in the kidney.

14. **T** 25 hydroxylation of Vitamin D occurs in the renal cortex

15. **T** Primary hyperparathyroidism is characterized by hypophosphatemia

16. **T** PTH actions include a stimulation of 1,25-(OH)2 vitamin D biosynthesis

17. **F** PTH action includes increasing renal cyclic AMP generation

18. **F** PTH actions include an inhibition of calcium reabsorption in distal renal tubule

19. **F** PTH inhibits phosphorus reabsorption in the proximal renal tubule

20. **F** Primary hyperparathyroidism is characterized by hypercalcemia
21. T F Primary hyperparathyroidism is characterized by increases in urinary cyclic AMP.

22. T F Primary hyperparathyroidism is characterized by increased serum 25-OHD levels.

23. T F Primary hyperparathyroidism is characterized by an increase in the serum chloride/phosphate ratio.

24. T F Hypercalcemia is associated with primary hyperparathyroidism.

25. T F Hypercalcemia is associated with excess PTH-RP.

26. T F Hypercalcemia is associated with osteolytic metastases.

27. T F Hypercalcemia is associated with hyperthyroidism.

28. T F Hypercalcemia is associated with secondary hyperparathyroidism.

29. T F Pharmacological intervention can overcome the obstacles of inadequate diet and exercise therapy in patients with diabetes mellitus.

30. T F The progression of retinopathy can be markedly slowed at most stages with improved glycemic control.

31. T F Viruses can cause type 1 diabetes by direct beta cell damage or by molecular mimicry of beta cell antigens.

32. T F Once initiated, beta cell damage by insulitis usually proceeds very rapidly (ie within 2 weeks).

33. T F The only cause of Type 2 diabetes is the development of insulin resistance.

34. T F Elevated triglycerides and low HDL cholesterol is the most common dyslipidemia pattern seen in type 2 diabetes.

35. T F The underlying deficiency in Hyperosmolar Hyperglycemic Non-Ketotic Coma (HHNK) is insulin deficiency.

36. T F The microvascular complications of Type 1 diabetes mellitus and Type 2 diabetes mellitus are pathologically different.

37. T F If the pituitary stalk is severed in a female, the serum prolactin falls.

38. T F Prolactinomas in males are more commonly macroadenomas than in females.

39. T F A serum prolactin which is less than 200ng/ml in a non-pregnant female is never caused by a pituitary tumor.

40. T F Males with prolactinomas often have galactorrhea.
41. T F Growth hormone-releasing hormone (GH-RH) neurons arise in the arcuate nucleus of the hypothalamus and innervate the somatotrope cells in the anterior pituitary.

42. T F Oxytocin is synthesized in the magnocellular neurons of the hypothalamus and stored in the posterior lobe of the pituitary.

43. T F The concentration of corticotropin releasing hormone (CRH) in the hypophysial portal venous circulation is higher than in the adrenal artery.

44. T F The administration of hydrocortisone to a normal male subject stimulates the release of ACTH from the anterior pituitary.

45. T F Microadenomas of the pituitary may cause bitemporal hemianopsia.

46. T F Trans-sphenoidal surgery is the treatment of choice for a patient with a microadenoma causing Cushing's Disease.

47. T F Diplopia may result from pituitary tumor invasion of the cavernous sinus.

48. T F Pituitary tumors causing acromegaly are rarely malignant.

49. T F Insulin-like growth factor-1 (IGF-1) in the systemic circulation is derived mainly from the pancreas.

50. T F IGF-1 has a half-life (T1/2) of approximately 20 minutes.

51. T F Fetal growth is dependent on the production of GH from the fetal pituitary.

52. A patient with wide purple striae, an abnormal overnight dexamethasone test, elevated 24-hour urine free cortisol, and a suppressed ACTH level likely has:
- Addison's disease
- small cell lung cancer
- pituitary adenoma
- an adrenal tumor
- ectopic CRH syndrome

Match the items in the left column with the appropriate item in the right column.

53. Gonadotropin Releasing Hormone (GnRH) A
B. Inhibition of prolactin secretion from a prolactinoma.

54. Thyrotropin Releasing Hormone (TRH) B
A. Stimulation of Follicle Stimulating Hormone (FSH) secretion from a normal pituitary.

55. Dopamine C
C. Inhibition of Growth Hormone (GH) secretion from a normal pituitary.

56. Somatostatin D
D. Stimulation of prolactin secretion from a normal pituitary.
57. The most common form of thyrotoxicosis is due to Graves' disease. Which of the following is true concerning Graves' disease?
   A. TSH receptor antibodies are usually present ✓
   B. Exophthalmos may be a prominent feature ✓
   C. Elevated radioactive iodine uptake is present ✓
   D. Both T4 and T3 levels are typically elevated ✓
   E. All of the above

58. Iodine is an essential dietary element which is actively taken up into many tissues within the body. Iodide appears to be concentrated in all of the following fluids EXCEPT:
   A. Breast milk
   B. Saliva
   C. Gastric juice
   D. Urine
   E. Colloid

59. Thyroxine (T4) is converted to Triiodothyronine (T3) through the action of 5'-deiodinase. Which of the following statements in this regard are true?
   A. 5'-deiodinase activity is found primarily in heart & skeletal muscle
   B. Inner ring deiodination results in the highly active reverse T3 molecule (rT3)
   C. Conversion of T4-T3 is upregulated by thyroxine, starvation, and glucocorticoids.
   D. Thyroxine to Triiodothyronine conversion is down-regulated by nonthyroidal illness
   E. Regulation of T4-T3 conversion is primarily a pituitary-dependent process.

60. Thyroid hormones are bound and transported in the circulation. Which of the following statements are true?
   A. Thyroglobulin is the primary thyroid-binding protein in the circulation
   B. Less than 0.5% of the circulating thyroxine is free to diffuse into cells
   C. Thyroxine-binding prealbumin binds an unmeasurable amount of thyroxine in the circulation
   D. Triiodothyronine (T3) is about 50% bound and 50% free in the circulation
   E. Most bound T3 is found on circulating albumin molecules

61. Which of the following is NOT correct?
   A. CRF stimulates the release of ACTH
   B. ACTH stimulates the release of cortisone
   C. Peak ACTH levels normally occur in the late afternoon
   D. Cortisol inhibits the secretion of ACTH
   E. All of these are not correct.

62. Which of the following is NOT correct?
   A. The outer zone of the adrenal cortex is the glomerulosa
   B. The rate limiting step in steroid synthesis is the conversion of cholesterol to pregnenolone
   C. Aldosterone is synthesized in the fasciculata zone
   D. Glucocorticoids are synthesized in the fasciculata and reticularis
   E. All of these are not correct.
63. Which of the following INCREASE sex hormone binding globulin (SHBG) levels?
   A. Androgens
   B. Growth hormone
   C. Progestins
   D. Estrogens
   E. Glucocorticoids

64. Which of the following hormones in the circulation of normal women has a significant percentage of its production from peripheral conversion (rather than direct organ secretion)?
   A. Testosterone
   B. Androstenedione
   C. DHEA-S
   D. Progesterone
   E. None of the above

65. Thyroid hormone action is based upon interaction with specific receptors. Which of the following statements in regards to thyroid hormone receptors is true?
   A. Cell surface-bound thyroid hormone receptors are necessary for active transport of thyroid hormone into the cell
   B. Thyroxine binds much more avidly to the thyroid hormone receptor than triiodothyronine (T3) does
   C. Thyroid response elements promote or repress mRNA and protein synthesis
   D. Thyroxine receptors on the mitochondria directly regulate oxidative phosphorylation
   E. Thyroid hormone receptors, once activated by thyroxine, require C-AMP to effect a change in metabolism

66. A woman who has been amenorrheic for 6 weeks seeks your advice in regard to her strongly positive history of thyroid disease. Which of the following would be appropriate parameters to evaluate in this family situation?
   A. Total T4, TSH, urine iodine/creatinine ratio
   B. Free T3, TBG, urine beta-hcg
   C. Free T4, TSH, urine albumin excretion rate determination
   D. FT3, FT4, TSH, TSI, TBII, karyotype
   E. FT4, TSH, urine beta-hcg

67. An elderly man from Cranston reports the presence of a mass growing in the left anterior neck over the past few months. He has had some difficulty swallowing and intermittently becomes hoarse very easily lately. On exam you detect a 4x6 cm rounded mass that moves with swallowing. In order to most directly and appropriately evaluate this man's problem, you would do which of the following?

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<th>Free T4</th>
<th>Free T3</th>
<th>TSH</th>
<th>Anti TPO</th>
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</table>
68. A 14 year old immigrant from Central Africa is seen soon after arrival in Rhode Island for an enlargement of the thyroid. After diagnosing goiter, which of the following would be the most likely cause for this condition.
   A. Apathetic iatrogenic thyrotoxicosis
   B. hcg -producing tumor of the left ovary
   C. Thyroid hormone excess from contaminated meat
   D. Deficiency of dietary iodine
   E. Dietary selenium excess

69. Which of the following statements about adrenal insufficiency is False?
   A. Primary adrenal insufficiency is most often caused by an autoimmune disease.
   B. Hyperkalemia is seen in both primary and secondary adrenal insufficiency.
   C. Hyperpigmentation is seen in primary adrenal insufficiency but not secondary adrenal insufficiency.
   D. Mineralocorticoid replacement is not usually required in the management of secondary insufficiency.
   E. The Cosyntropin(synthetic ACTH) stimulation test may be normal in patients with secondary adrenal insufficiency.

70. Patients with primary hyperaldosteronism may have all of the following except:
   A. elevated renin levels
   B. hypokalemia
   C. hypertension
   D. a genetic disorder that can be treated with glucocorticoids.
   E. a normal adrenal CT

71. Children treated with Prednisone for asthma are at risk for all of the following except:
   A. Cushing's syndrome
   B. Growth retardation
   C. Hypothalamic-pituitary-adrenal axis suppression
   D. Adrenal crisis if Prednisone is stopped abruptly
   E. Primary adrenal insufficiency

72. Which of the following has not been associated with increased risk of type 1 diabetes?
   A. HLA DR-3
   B. Mutation of the tyrosine kinase gene.
   C. HLA DR-4
   D. HLA B-8 and B-15
   E. Certain HLA DQ loci

73. Which of the following does not play a role in the pathogenesis of most type 2 diabetes?
   A. Beta cell disfunction
   B. Obesity
   C. Severe deficiency of insulin receptors
   D. Cellular resistance to insulin
   E. All play a role
74. Which one of the following complications is the most common cause of morbidity and mortality in type 2 diabetes.
   A. Diabetic retinopathy
   B. Coronary artery disease
   C. Lower extremity amputation
   D. Diabetic nephropathy
   E. Diabetic neuropathy

75. Which of the following clinical research methods is most useful in assessing insulin resistance?
   A. CT scan of the abdomen
   B. Insulin clamp
   C. Monofilament test
   D. Serum amylin levels
   E. Hb AC measurement

76. True Mononeuropathies, such as a third (cranial) nerve palsy, are usually self-limited.

77. Oxidized LDL does not interact with which one of the following?
   A. Scavenger-Receptor A (SR-A)
   B. LDL receptor
   C. Scavenger-Receptor B-1 (SR-B1)
   D. Lipoprotein Lipase
   E. Hepatic Lipase

78. Which of the following is not associated with an increase lipoprotein lipase activity (LPL)?
   A. Starvation
   B. Insulin
   C. Exercise
   D. Carbohydrate ingestion
   E. All are associated with increasing LPL

79. Which of the following lipoproteins has the greatest ratio of protein to lipid?
   A. Chylomicron
   B. LDL
   C. VLDL
   D. HDL
   E. IDL

80. Which of the following medications/drugs is not associated with gynecomastia?
   A. Spironolactone
   B. Tetrahydro-cannabinol
   C. Ketoconazole
   D. Dihydrotestosterone
   E. Finasteride
81. You work for an HMO as an endocrinologist and your first patient of the day, a 35 y/o
teacher, is referred to you for recent onset of impotence. Your initial evaluation does not include
which of the following?
   A. Testosterone
   B. Examination of the Testes
   C. FSH & LSH
   D. Detailed medication history

82. Male pseudohermaphroditism can result from any of the following Except:
   A. 5-alpha-reductase deficiency
   B. Testicular feminization
   C. Errors in testosterone biosynthesis
   D. Leydig cell aplasia
   E. Congenital adrenal hyperplasia

83. Which of the following is not a hormonal effect stimulated by the actions of androgens?
   A. Temporal balding
   B. Sebum production
   C. Breast budding
   D. Epiphysial closure
   E. Erythropoiesis

84. If during an evaluation for amenorrhea, an abnormal prolactin elevation is detected,
the next step is to:
   A. Administer progesterone
   B. Check TSH
   C. Image the sella turcica
   D. Perform a visual field study
   E. Administer a dopamine agonist

85. Which of the following is the key hormone in the luteal phase?
   A. Estrogen
   B. Progesterone
   C. T4
   D. Prolactin
   E. T3

86. Which of the following will a progesterone challenge test not provide?
   A. Assessment of endogenous estrogen production
   B. Assessment of endogenous progesterone production
   C. Assessment of endogenous ovarian function
   D. Assessment of whether the outflow tract is patent
   E. None of the above are assessed
87. In the evaluation of amenorrhea, if administering estrogen and progesterone (diagnosis step two) does not cause withdrawal bleeding, a defect likely exists in:
   A. patency of outflow track
   B. endogenous progesterone production
   C. endogenous thyroid production
   D. endogenous prolactin production
   E. responsiveness to dopamine agonist

88. Which of the following factors may contribute to the development of microvascular disease?
   A. Hyperglycemia
   B. Hypertension
   C. Smoking
   D. All of the above
   E. None of the above

89. The microvascular complications of Type 1 diabetes mellitus in the DCCT study were influenced by glycemic control:
   A. not at all
   B. somewhat, once a threshold value was reached
   C. somewhat at all levels of glycemic control
   D. conclusively, once a threshold value was reached
   E. conclusively at all levels of glycemic control

90. "Tight" glycemic control is important in gestational diabetes for:
   A. Prevention of cardiac and neural tube defects
   B. Prevention of maternal microvascular complications
   C. Fully developed fetal surfactant production and lung maturation
   D. All of the above
   E. None of the above

91. "Tight" glycemic control is thought to reduce the incidence of:
   A. microvascular complication in patients with Type 1 diabetes
   B. microvascular complication in patients with Type 2 diabetes
   C. macrovascular complication in patients with Type 1 diabetes
   D. macrovascular complication in patients with Type 2 diabetes
   E. all of the above

92. Co-morbidities in patients with diabetes mellitus that substantially increase the risk of macrovascular disease include:
   A. thyroid disease
   B. hyperlipidemia
   C. hypertension
   D. B & C
   E. All of the above
93. The thyroid gland is an end organ which traps iodine, incorporates iodine into thyroid hormones and releases these hormones into circulation. Processes which directly effect the thyroid glandular tissue and result in an inability to produce thyroid hormone result in which form of hypothyroidism.

A. Tissue Specific hypothyroidism
B. Hypothalamic (tertiary) hypothyroidism
C. Primary Hypothyroidism
D. Hashimoto’s Thyroiditis
E. (Pituitary) Secondary Hypothyroidism

94. Iodine content in the diet directly effects thyroid function. Excessive iodine intake may be expected to have which of the following effects?

A. Formation of malignant nodules
B. Decrease in radioactive uptake values
C. Increased sex hormone binding globulin secretion
D. No effect on thyroid hormone release
E. Down regulation of Type 2 5’ deiodinases

95. Thyroid hormone secretion is regulated by the action of TSH(thyrotrpin), which acts by stimulating cell surface receptors. Which of the following is most clearly associated with TSH-like effect?

A. Hashimoto’s Thyroiditis
B. Thyroid cancer
C. Wolff-Chaikoff effect
D. Graves’ Disease
E. Waterhouse-Freidricksen Syndrome

96. Which of the following results in an increase in TSH secretion?

A. High levels of thyroxine
B. Low levels of thyroxine
C. Supraphysiologic levels of somastatatin
D. Interrupted flow of TRH (Thyrotropin Releasing hormone)
E. Prednisone

97. A patient with palpitations, diaphoresis, weight loss, and hyperdefecation asks you to look at his sore right breast. After determining that unilateral gynecomastia is present you order appropriate tests to accurately diagnosis his condition. Which combination below is most consistent with this patients presentation:

<table>
<thead>
<tr>
<th></th>
<th>FT4 (0.8-2.0)</th>
<th>FT3 (200-400)</th>
<th>TSH 0.4-4.0</th>
<th>ANTI-TPO.AB</th>
<th>RAIU 10-30%</th>
<th>Urine l/cr ug/gr cr</th>
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<td>45</td>
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98. Pathophysiologic changes in many organ systems occur when thyroid hormones levels deviate from the normal range. Which of the following represent recognized effects?
A. Excess thyroid hormone results in diminished skin turnover and dry scaly skin.
B. Hypothyroidism results in enhanced sensitivity to CO2 and reflex hyperventilation.
C. Thyrotoxicosis is associated with diminished catecholamine action, resultant A-V nodal blockage and bradycardia with hypotension.
D. A lack of thyroid hormone is a cause for enhanced gastrointestinal motility resulting in malabsorption and fat soluble vitamin deficiencies.
E. Thyroid hormone alters free water clearance in the kidney. Hypothyroidism may therefore result in a modest degree of hyponatremia.

99. Which of the following antigens is not felt to play a role in autoimmune beta cell damage?
A. GAD
B. Nuclear antigens
C. Cows milk protein
D. Proinsulin
E. Thyroglobulin

100. The determination of TSH (Thyrotropin) levels in the assessment of thyroid function has become a key element in screening for and classification of dysfunctional thyroid states. Which of the following is true?
A. A normal to elevated TSH value does not exclude a thyrotoxic state.
B. The combination of an elevated TSH and decreased free T4 is most consistent with a diagnosis of hypothyroidism.
C. Most thyroid nodules are associated with abnormal TSH and FT3 levels
D. Staining a thyroid biopsy specimen for the presence of TSH is a reliable indicator to rule out malignancy.
E. Elevated TSH and Free T3 levels are characteristic of Hashimoto's thyroiditis.