

STUDENT NAME: [REDACTED].....

STUDENT NUMBER: [REDACTED].....

PS: The older quizzes do not have the answers

University of Ottawa

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ANP 1107A

Midterm #2

Date: March 14, 2011
Time: 10:00 h
Duration: 1 hr 20 min

Instructor:
Dr. J. Carnegie
Dr. D. Lohnes

INSTRUCTIONS:

1. 52 multiple choice questions (1 mark/1 correct answer per question) plus 8 marks for T/F questions and diagram labeling.
2. Please use the computer sheet for the multiple choice questions, but answer the remaining questions right on the exam itself.
3. Please put your name and student number at the top of this page and on your computer sheet and hand in everything when you have finished.
4. Make sure this exam is complete. This exam contains 9 pages. The excuse of missing a page will not be accepted after the examination.

1. Cholesterol can be "pulled off" arterial walls by:
 - A. LDLs
 - B. VLDLs
 - C. HDLs
 - D. chylomicrons
 - E. all of the above

2. Which of the hormones listed below causes increased urinary output of Na⁺ and water?
 - A. angiotensin II → potent vasoconstrictor, ↑ Na⁺ reabsorption
 - B. aldosterone → ↑ Na⁺ reabsorption
 - C. antidiuretic hormone (ADH) → ↑ water reabsorption
 - D. atrial natriuretic factor (ANF)

3. B lymphocytes develop immunocompetence in the _____.
 - A. thymus
 - B. spleen
 - C. bone marrow
 - D. lymph nodes

4. Which of the following statements is/are TRUE?
 - A. Tolerance for self-antigens is abnormal.
 - B. The four signs of inflammation are heat, swelling, pus and pain.
 - C. Plasma cells are derived from T-lymphocytes.
 - D. Activation of the complement system leads to formation of the membrane attack complex.
 - E. C) and D)

5. A shortage of cholesterol in the body would interfere with the formation of:
 - A. steroid hormones
 - B. proteins
 - C. nucleic acids
 - D. glycogen
 - E. A) and C)

6. In the absence of the synthesis of new hormone, the thyroid gland typically stores enough thyroglobulin to support thyroid hormone secretion for:
 - A. one day
 - B. several days
 - C. several weeks
 - D. several months
 - E. one year

7. If your urine production were grossly above normal, doing which of the following would cause urine production to decrease and help reduce water loss?
 - A. constrict the glomerular efferent arterioles
 - B. bypass the loop of Henle
 - C. decrease Na⁺ reabsorption in the collecting duct
 - D. constrict the glomerular afferent arterioles
 - E. none of the above

G we want GFR to ↓
 ↓
 By constricting the afferent arterioles, we ↓ the GFR.

8. The glomerulus differs from other capillaries in the body in that it:
 - A. has a basement membrane
 - B. is impermeable to most substances
 - C. is drained by an efferent arteriole
 - D. has a blood pressure much lower than other organ systems
 - E. C) and D)

9. The descending limb of the loop of Henle:
- is not permeable to water
 - is freely permeable to sodium and urea
 - pulls water by osmosis into the lumen of the tubule
 - contains fluid that becomes more concentrated as it moves down into the medulla
 - A) and D)
10. Renin, an enzyme secreted from the juxtaglomerular apparatus, causes the direct:
- activation of angiotensin I
 - activation of angiotensin II
 - activation of aldosterone
 - release of ADH
11. Which of the following is NOT an artery supplying the kidney?
- renal
 - interlobar
 - arcuate
 - segmental
 - hilar
12. Which of the following statements is TRUE?
- Basal metabolic rate is typically measured within 2 hours after eating a meal.
 - Basal metabolic rate is typically higher in females than in males.
 - Under resting conditions, adipose tissue has a higher metabolic rate than skeletal muscle.
 - The satiety centre is located in the hypothalamus.
 - A person taking cortisol on a daily basis is at risk of developing hypoglycemia.
- The satiety centre is in the arcuate nucleus*
13. Innate immune system defenses include _____.
- B cells
 - T cells
 - plasma cells
 - phagocytosis
14. The function of interferon is to:
- break down bacterial cell walls
 - fragment bacterial DNA
 - opsonize microbes
 - prevent viral replication
 - increase capillary permeability
15. What is the consequence to the renal corpuscle of having the diameter of the efferent arteriole smaller than that of the afferent arteriole?
- Blood pressure in the glomerulus is kept low enough to support filtration.
 - Blood pressure in the glomerulus is kept high enough to allow positive net filtration pressure.
 - There is blockage of blood flow to the glomerulus.
 - The endothelial-capsular membrane filters less blood than normal.
 - Capsular hydrostatic pressure increases to levels higher than glomerular blood hydrostatic pressure.
16. Basal metabolic rate:
- is most affected by body surface area
 - increases with age
 - is not different between men and women
 - is the energy used to maintain only the most essential activities
 - A) and D)

17. Which of the following statements is TRUE?

- A. An individual with Grave's disease experiences poor cold tolerance.
- B. Grave's disease is a type of autoimmune disease.
- C. A symptom of hyperthyroidism is lethargy.
- D. Basal metabolic rate is usually higher in females than in males.
- E. Under resting conditions, adipose tissue has a higher metabolic rate than skeletal muscle.

18. are white blood cells that mature (differentiate) into macrophages.

- A. Monocytes
- B. Neutrophils
- C. Eosinophils
- D. Basophils

19. The primary immune response:

- A. occurs more rapidly and is stronger than the secondary response
- B. occurs when memory cells are stimulated
- C. is another name for immunological memory
- D. has a lag period while B cells proliferate and differentiate into plasma cells

20. Fever:

- A. is a high-than-normal body temperature that is always dangerous
- B. decreases the metabolic rate of the body to conserve energy
- C. production is regulated by chemicals that reset the body's thermostat to a higher setting
- D. causes the liver to release large amount of iron, which seem to inhibit bacterial replication

21. Leptin is secreted by:

- A. lymphocytes
- B. adipocytes
- C. goblet cells
- D. fibroblasts

22. All of the following are properties of thyroxine (T₄) EXCEPT:

- A. increases cellular ATP utilization. *Both do.*
- B. is composed of tyrosine subunits. *Both are*
- C. binds more strongly to target organ receptors than T₃.
- D. is the thyroid hormone produced in the greatest amount
- E. none of the above

T₃ binds more strongly to target organ receptors than T₄

23. Which lipoprotein delivers cholesterol for use in cells?

- A. LDLs
- B. VLDLs
- C. HDLs
- D. chylomicrons
- E. all of the above

T₄ is produced in the greater amount but enzymes convert T₄ into T₃

24. A "foreign" molecule that can invoke an immune response is called:

- A. antibody
- B. colony-stimulating factor
- C. antigen
- D. immunoglobulin
- E. plasma factor

8J

25. The fatty tissue surrounding the kidneys is important because it _____.
- A. ensures adequate energy for the adrenal glands to operate efficiently
 - B. stabilizes the position of the kidneys by holding them in their normal position
 - C. is necessary as a barrier between the adrenal glands and kidneys
 - D. produces vitamin D
26. The artery lies on the boundary between the cortex and medulla of the kidney.
- A. lobar
 - B. arcuate
 - C. interlobar
 - D. interlobular
27. The process by which a white blood cell squeezes through the space in a capillary wall is called:
- A. diapedesis
 - B. chemotaxis
 - C. margination
 - D. phagocytosis
28. Which of the following statements is FALSE?
- A. The least numerous of the white blood cells are basophils.
 - B. Basophils increase in number when parasitic invasion occurs.
 - C. Granulocytes called neutrophils are phagocytic and the most numerous of all white blood cells types.
 - D. Leukopenia is an abnormally low number of leukocytes.
 - E. Positive chemotaxis is a feedback system that signals leukocyte migration into damaged/infected areas.
29. Which of the following is TRUE concerning the structure of the male versus female urethra?
- ~~A. The female has a longer urethra.~~ *False.*
 - ~~B. There are no differences in structure; the length of the urethra is always about the same in a given species.~~
 - ~~C. The male urethra is about 20 cm long while the female urethra is 3-4 cm long.~~
 - ~~D. There are two sphincters associated with the male urethra, but just one associated with the female urethra.~~
 - E. ~~C) and D)~~ *Both male and Female have the same # of sphincters.*
30. Most reabsorption of substances from the glomerular filtrate occurs in the:
- A. proximal convoluted tubule
 - B. loop of Henle
 - C. collecting duct
 - D. distal convoluted tubule
 - E. Bowman's capsule
31. Which of the following statements is TRUE?
- ~~A. The transport maximum is the greatest percentage of plasma entering the glomerulus that can become filtrate.~~
 - B. During glomerular filtration, molecule size is the primary determinant of whether or not a molecule will end up in the filtrate.
 - C. If the T_m for an amino acid is 120 mg/min and the concentration of that amino acid in the blood is 200 mg/100mLm then one can expect 80 mg/min if the amino acid to appear in the urine.
 - D. ~~85% of all nephrons are juxtamedullary nephrons.~~ *Correct*
 - E. ~~The most important function of the juxtaglomerular apparatus is to produce chemical that changes the diameter of the loop of Henle.~~

Size only matters in glomerular filtration.
Anything < 5 is filtered. 7J

32. Thyroid hormones regulate all of the following EXCEPT:

- A. ovulation and menstruation
- B. oxygen use
- C. growth and development
- D. basal metabolic rate
- E. body temperature

33. Which of the hormones below is responsible for facultative water reabsorption?

- A. ADH
- B. thyroxine
- C. aldosterone $\rightarrow \uparrow \text{Na}^+ \text{ reab.}$
- D. atrial natriuretic peptide $\downarrow \text{Na}^+ \text{ reab.}$

34. S.A. is dealing with a parasitic worm (tapeworm). You would expect increased numbers of:

- A. basophils
- B. eosinophils
- C. lymphocytes
- D. monocytes
- E. neutrophils

35. An obstruction in the proximal convoluted tubule would decrease glomerular filtration rate because:

- A. blood hydrostatic pressure in the glomerulus decreases when blood can't flow through the tubule
- B. osmotic pressure in Bowman's capsule increases due to leakage of more proteins into the filtrate
- C. hydrostatic pressure in Bowman's capsule increases, which decreases net filtration pressure
- D. hydrostatic pressure in Bowman's capsule decreases, due to leakage of filtrate into the peritubular space
- E. release of renin decreases as fluid flow to the macula densa decreases

36. Which of the following is NOT a function of the inflammatory response?

- A. prevent the spread of the injurious agent to nearby tissue
- B. replace injured tissues with connective tissue
- C. dispose of cellular debris and pathogens
- D. set the stage for repair processes

37. Complement proteins and antibodies coat a microorganism, thereby making it easier for macrophages and neutrophils to recognize and phagocytize the organism. This phenomenon is called:

- A. diapedesis
- B. agglutination
- C. opsonization
- D. chemotaxis

38. In the kidney, blood enters the interlobar vein from the:

- A. arcuate veins
- B. renal arteries
- C. efferent arterioles
- D. segmental veins
- E. renal veins

39. Which of the following statements is TRUE?

- A. The satiety centre is located in the cerebral cortex. \rightarrow hypothalamus
- B. The hunger centre is stimulated when blood glucose is low.
- C. The hunger centre is activated by distension of the GI tract.
- D. The appetite centre is located in the hypothalamus. \rightarrow
- E. Appetite is defined as a physiological need to eat. \rightarrow false, hunger

The satiety centre \rightarrow Hypothalamus

Appetite centre \rightarrow PONS

40. Select the correct statement about the nephrons.

- A. The parietal layer of the glomerular capsule is simple squamous epithelium.
- B. The glomerulus is correctly described as the proximal end of the proximal convoluted tubule. *False*
- C. Podocytes are the branching epithelial cells that line the tubules of the nephron. *False*
- D. Filtration slits are the pores that give fenestrated capillaries their name. *not associated w/ fenestrations of Blood capillaries.*

41. The following are known for a patient of Dr. Yendik. Plasma concentration of glucose = 500 mg/100 ml and Tm glucose is 375 mg/min. Assume a normal GFR. What concentration of glucose would appear in the urine (mg/min)?

- A. 0
- B. 25
- C. 125
- D. 250
- E. 500

$$\left[\frac{GFR}{100} \times 125 \right] - T_m$$

$$500 \times 1.25 = 625$$

$$625 - 375 = 250$$

42. Podocytes are cells specialized for filtration that are found in the:

- A. walls of the vasa recta
- B. ascending limb of the loop of Henle
- C. urinary bladder
- D. visceral layer of Bowman's capsule
- E. collecting duct

43. As systemic blood pressure falls, the afferent arterioles of the kidneys *dilate* preventing a reduction in blood flow to the glomerulus.

- A. dilate
- B. constrict
- C. neither; the efferent arteriole is the arteriole that autoregulates to keep the GFR constant

44. All of the following statements concerning thyroid hormones are correct EXCEPT:

- A. their synthesis requires iodide trapping by the thyroid follicular cells
- B. the thyroid gland stores several months worth of thyroid hormones as colloid
- C. elevated levels of thyroxine inhibit the release of TSH
- D. high blood levels of T3 and T4 stimulate the release of TRH *Falseeee*
- E. their secretion is stimulated by TSH from the anterior pituitary

45. If the glomerular blood pressure is 52 mm Hg, the capsular hydrostatic pressure is 11 mm Hg, and the blood colloid osmotic pressure is 21 mm Hg, what is the net filtration pressure?

- A. 20 mm Hg
- B. 42 mm Hg
- C. 62 mm Hg
- D. 84 mm Hg
- E. none of the above

46. The function of the macula densa cells is to:

- A. prevent water reabsorption in the ascending limb of the loop of Henle
- B. prevent over-distension of the urinary bladder
- C. add bicarbonate ions to the tubular fluid in the proximal convoluted tubule
- D. monitor the NaCl concentration in the tubular fluid
- E. produce the carrier molecules used to actively transport ions into the peritubular space

Monitor filtrate osmolarity. (low)

*Release
ATP which*

→ ↑ GFR

*6 ✓
2 x*

47. Loss of heat via molecule-molecule contact is termed:
- A. radiation
 - B. convection
 - C. conduction
 - D. evaporation
48. When urine leaves the major calices, what structure does it enter next?
- A. urinary papillae
 - B. minor calices
 - C. renal pelvis
 - D. ureter
 - E. renal pyramids
49. Which of the choices below is NOT a major route of heat exchange?
- A. radiation
 - B. conduction/convection
 - C. evaporation
 - D. shivering
50. Which of the following is the primary transport form for cholesterol from the peripheral tissues to the liver for conversion to bile?
- A. chylomicron
 - B. VLDL
 - C. LDL
 - D. HDL
 - E. bound to cholesterol-binding protein
51. Which of the following structures is most likely to be found in the renal medulla?
- A. loop of Henle
 - B. renal corpuscle
 - C. distal convoluted tubule
 - D. Bowman's capsule
 - E. glomerulus
52. In initiating the release of stored thyroxine, which of these events occurs first?
- A. production of thyroglobulin
 - B. discharge of thyroglobulin into the follicles
 - C. attachment of iodine to tyrosine subunits in thyroglobulin
 - D. lysosomal activity to cleave hormone from thyroglobulin

Indicate which of the following statements is TRUE (T) or FALSE (F)

53. True Our genes determine what foreign substances our immune system will be able to recognize and resist.
54. False Glomerular filtration is an ATP-driven process.
55. ~~False~~ The entire responsibility for urine formation lies with the nephron. ← True
56. True The kidneys are retroperitoneal in location.

Label each arrow (4 total)

