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University of Ottawa
ANP1105A: Human Anatomy and Physiology I. Fall 2017

Professors: J. Savory and S. Lemaire

Midterm 2

Monday, November 13th, 2017

Exam time: 1 hour 20 minutes

- 1) *51 multiple choice questions (1 mark/1 correct answer per question), plus 14 marks worth of diagram- labeling and short answer questions.*
- 2) *Please answer the multiple choice questions on the computer sheet that is provided and answer the remaining questions right on the exam.*
- 3) *Please put your name and student number at the top of this page, on the top of page 11 and on the computer sheet. **Hand in everything when you have finished.***
- 4) *Write the following words 'Version ROCK' on the front of your computer sheet!!*
- 5) *Make sure this exam is complete. This exam contains **12 pages and is printed double-sided.** The excuse of missing a page will not be accepted after the examination.*

1. Concerning the negative feedback control mechanism that regulates body temperature, which one of the following statements is INCORRECT?
 - A. High temperature is monitored by peripheral temperature-sensitive receptors that send signals to the hypothalamus.
 - B. The hypothalamus integrates the signals and send effector responses to the sweat glands
 - C. Secretions of the sweat glands are enhanced through the activation of the parasympathetic nervous system
 - D. Temperature returns to normal

2. The sympathetic nervous system causes the following effects, EXCEPT:
 - A. Dilates the pupil of the eye ✓
 - B. Decreases digestion ✓
 - C. Increases the frequency of heart beats (β_1 receptors) ✓
 - D. Stimulates defecation ?
 - E. Relaxes the lungs (β_2 receptors) ?

3. Which of the following statements is TRUE?
 - A. the sympathetic and parasympathetic nervous systems always affect different target organs
 - B. the effects of the sympathetic and parasympathetic nervous systems are normally opposite ✓
 - C. a high sympathetic tone is always balanced by a high parasympathetic tone
 - D. we can voluntarily control the tone of stimulation by the autonomic nervous system
 - E. the sympathetic stimulation of the effector organ is normally mediated by acetylcholine while the parasympathetic stimulation is always mediated by noradrenaline

4. Which of the following statements is FALSE concerning the adrenal medulla:
 - A. The adrenal medulla is considered as a sympathetic ganglion ✓
 - B. The adrenal medulla is stimulated by a preganglionic sympathetic fiber
 - C. The adrenal medulla secretes catecholamines (adrenaline and noradrenaline) ✓
 - D. Both secreted compounds pass into the circulation
 - E. They lower blood pressure, cardiac frequency and contractile activities

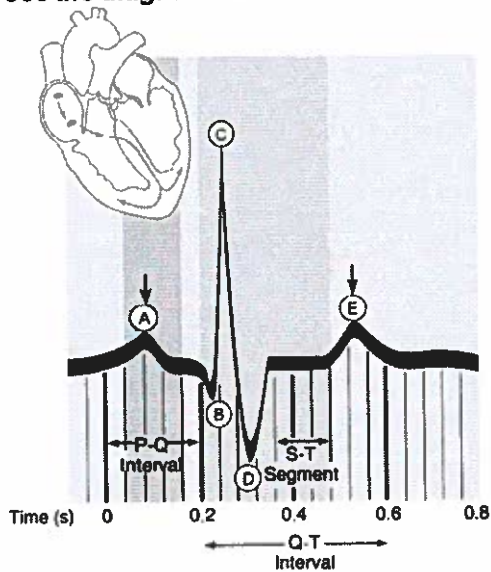
5. The _____ division of the autonomic nervous system has its ganglia near the effector organs.
 - A. thoracic
 - B. somatic
 - C. sympathetic
 - D. parasympathetic
 - E. enteric

6. Acetylcholine is secreted at all of the following sites, EXCEPT:
 - A. Sympathetic postganglionic nerve terminals connected to sweat glands.
 - B. Parasympathetic postganglionic nerve terminals.
 - C. Sympathetic and parasympathetic preganglionic nerve terminals
 - D. Neuromuscular junctions.
 - E. Sympathetic postganglionic nerve terminals connected to the heart

7. Which of the following is NOT synthesized in the pituitary gland?
 - A. PRL (prolactin) ✓
 - B. LH (luteinizing hormone)
 - C. TSH (thyroid-stimulating hormone) ✓
 - D. FSH (follicle-stimulating hormone) ✓
 - E. ADH (anti-diuretic hormone, vasopressin) ✓

8. Which of the following organs is considered a neuroendocrine organ?
- A. pituitary
 - B. pancreas
 - C. adrenal cortex
 - D. hypothalamus
9. The parathyroid gland controls blood levels of:
- A. Glucose
 - B. Thyroxine
 - C. Calcium
 - D. Testosterone
 - E. Oxytocin
10. How do protein kinases affect enzymes?
- A. They increase the secretion of enzymes.
 - B. They add a phosphate group (phosphorylation) to enzymes.
 - C. They break down enzymes.
 - D. They decrease the activity of enzymes.
11. The "hormone response element" involved in the effects of steroid hormones is located on the cell _____.
- A. DNA
 - B. enzymes
 - C. RNA
 - D. membrane
12. The thyroid gland secretes:
- A. Glucose
 - B. Thyroxine (T4)
 - C. Calcium
 - D. Testosterone
 - E. Oxytocin
13. The TSH-mediated control of thyroid hormones secretions is a (an) _____ control.
- A. humoral
 - B. neural
 - C. neurotransmitter-mediated
 - D. hormonal
 - E. immune
14. The glucose-mediated control of insulin secretions is a (an) _____ control.
- A. humoral
 - B. neural
 - C. neurotransmitter-mediated
 - D. hormonal
 - E. immune
15. J.A. is admitted to the cardiac unit with a diagnosis of pericarditis. She asks you, the nurse, to explain where the pericardium is. You tell her that the pericardium is:
- A. the outermost muscular layer of the heart
 - B. the innermost lining of the heart
 - C. a double-walled membranous sac that encloses the heart
 - D. the thick muscular layer of the heart that provides pumping action

Use the diagram below to answer the next two questions



16. Point after which pressure begins to rise in the pulmonary trunk.

- A. A
- B. B
- C. C
- D. D
- E. E

17. Point at which the end systolic volume is measured?

- A. A
- B. B
- C. C
- D. D
- E. E

18. The heart contracts twice for every heartbeat. One contraction is the atrial contraction while the other is the ventricular contraction. During ventricular contraction, which two valves of the heart open?

- A. Pulmonary and aortic valves
- B. Aortic and mitral valves
- C. Aortic and tricuspid valves
- D. Pulmonary and tricuspid valves

19. When the cardiac output = 15 L/min and the HR = 100 beats/min, the stroke volume equals.....

- A. ~ 70 ml
- B. 100 ml
- C. 1500 ml
- D. 150 ml

$$15 = 100 \times ?$$

20. Compared to skeletal muscle, cardiac muscle:

- A. has gap junctions that allow it to act as a functional syncytium
- B. lacks striations
- C. has more nuclei per cell
- D. cells are larger than skeletal muscle cells

21. If a patient has stenosis of the tricuspid valve, you would expect to see reduced rate of blood flow:
- A. from the left ventricle into the aorta
 - B. from the left atrium into the left ventricle
 - C. from the inferior vena cava into the right atrium
 - D. from the right atrium into the right ventricle
 - E. from the right ventricle into the pulmonary artery
22. Which vessel of the heart receives blood during ventricular diastole?
- A. superior and inferior venae cava
 - B. pulmonary trunk
 - ~~C. aorta~~
 - D. pulmonary veins
 - ~~E. right atrium~~
23. The function of the chordae tendinae is to:
- ~~A. pull the walls of the ventricles inward during contraction~~
 - B. open the semilunar valves
 - C. open the AV valves
 - D. prevent eversion of the AV valves during ventricular systole
 - E. hold the heart in place within the mediastinum
24. If the atria were unable to contract (SA node nonfunctional), approximately what percentage of ventricular filling would still be able to occur?
- A. 15%
 - B. 25%
 - C. 40%
 - D. 60%
 - E. 80%
25. Which of the following lists the elements of the heart's conduction system in the correct order?
- A. SA node, AV bundle, bundle branches, AV node, Purkinje fibers
 - B. AV node, AV bundle, SA node, bundle branches, Purkinje fibers
 - C. Purkinje fibers, AV bundle, bundle branches, AV node, SA node
 - D. SA node, AV node, AV bundle, bundle branches, Purkinje fibers
 - E. None of the above
26. During the isovolumetric contraction, the atrioventricular valves are, the aortic and pulmonary valves are..... and aortic pressure is.....
- ~~A. open, open, increasing~~
 - ~~B. open, closed, decreasing~~
 - ~~C. closed, open, decreasing~~
 - D. closed, closed, decreasing
 - E. closed, closed, increasing
27. If acetylcholine is applied to the SA node, but cardiac output is to remain constant, which of the following would **have** to happen?
- ↑ HR
- ~~A. stroke volume must increase~~
 - B. venous return must decrease
 - C. the force of contraction must decrease
 - ~~D. the rate of conduction of impulses through the AV bundle must increase~~
 - ~~E. none of the above~~

28. When threshold is reached in cardiac pacemaker (autorhythmic) cells, the next event is:

- A. opening of fast sodium channels
- B. opening of slow calcium channels
- ~~C. opening of slow sodium channels~~
- ~~D. opening of fast calcium channels~~
- E. opening of fast potassium channels

29. Cardiac muscle fibers remain depolarized longer than skeletal muscle fibers because:

- ~~A. voltage-gated sodium channels close more quickly to trap sodium inside longer~~
- B. calcium enters the cytosol from the extracellular fluid to contribute more positive charge slightly after sodium has entered
- ~~C. voltage-gated potassium channels open at the same time as sodium channels, allowing more positively charged potassium to enter~~
- D. it takes longer to reach threshold, and the duration of depolarization is directly proportional to the time it takes to reach threshold
- E. the intercalated discs are very thick relative to the rest of the sarcolemma and it takes longer for potassium to exit the cell to cause repolarization

30. In which situation would stroke volume be greatest?

- A. when venous return is increased
- B. when venous return is decreased
- ~~C. when the force of contraction is decreased~~
- ~~D. when the difference between the end diastolic volume and the end systolic volume is small~~
- ~~E. when calcium channel blockers are present~~

$$SV = EDV - ESV$$
$$100 - 99 = 1$$
$$100 - 69 = 31$$

31. The afterload imposed on a ventricle refers to

- A. its end-systolic volume, the blood left after contraction is complete.
- ~~B. the amount of blood added to a ventricle by atrial systole.~~
- ~~C. the total resistance opposing the ejection of blood.~~
- ~~D. the ejection fraction, or percentage of EDV ejected by ventricular systole.~~

32. Cardiac output is usually increased by all of the following EXCEPT:

- ~~A. an increased heart rate~~
- ~~B. an increased stroke volume~~
- C. an increased vascular resistance
- ~~D. exercise~~
- ~~E. increased metabolic activity~~

33. What would be the effect of cutting the vagus nerve to the heart?

- ~~A. Cardiac output would increase due to increase heart rate~~
- B. The strength of contraction would be decreased
- ~~C. Cardiac output would decrease due to an increased heart rate~~
- ~~D. Cardiac output would increase due to increase venous return~~
- ~~E. The heart would stop since the vagus nerve triggers the heart to contract~~

34. The left coronary artery give rise to
- A. The circumflex and marginal arteries
 - B. The great and small cardiac veins
 - C. The circumflex and anterior interventricular arteries
 - D. The right coronary artery
35. Which of the following would provide no benefit to a person suffering any one of the various types of anemia?
- A. supplemental oxygen delivered by mask
 - B. blood transfusion
 - C. supplemental bilirubin injection
 - ~~D. treatment with synthetic erythropoietin~~
36. Which is the correct sequence for the following events?
- (1) fibrinogen → fibrin (2) activation of plasmin (3) formation of prothrombin activator (4) prothrombin → thrombin**
- A. 3, 4, 1, 2
 - B. 1, 2, 3, 4
 - ~~C. 4, 3, 1, 2~~
 - D. 3, 2, 1, 4
37. Select the true statement?
- A. Reticulocytes are immature RBCs
 - B. Platelets have nuclei but do not contain other organelles
 - C. RBCs occupy about 35% of a total blood volume
 - D. The number of RBCs is higher in females than in males
 - E. None of the statements are true
38. The slowest and therefore the rate limiting step in the clotting process is _____.
- A. formation of prothrombin activator
 - B. production of fibrin strands
 - C. binding fibrin strands
 - D. release of PF3
39. What happens to the iron (Fe^{3+}) that is released during the breakdown of damaged red blood cells?
- A. It is used to synthesize proteins.
 - B. It is transported to the liver where it becomes a part of bile.
 - C. It is converted to urobilin and excreted in urine
 - ~~D. It attaches to transferrin and is transported to bone marrow for use in hemoglobin synthesis~~
40. Each hemoglobin molecule consists of:
- ~~A. a single polypeptide chain plus 4 heme groups~~
 - B. 4 polypeptide chains plus a single central heme group
 - C. 4 polypeptide chains, each of which has a central heme group
 - D. a single polypeptide chain with a central heme group
 - E. none of the above

41. The most abundant plasma protein is:
- A. gamma globulin
 - B. plasminogen
 - C. albumin
 - D. fibrin
 - E. fibrinogen
42. Loss of fibrinogen within the plasma would most likely cause which of the following?
- A. anemia
 - B. pallor (pale skin)
 - C. thrombocytopenia
 - D. loss of blood clotting
43. With a patient that has been given an injection of erythropoietin (EPO) you would expect to see _____.
- A. decreased white blood cell count
 - B. increased white blood cell count
 - C. decreased hematocrit
 - D. increased hematocrit
44. A mismatch of blood types during a transfusion is dangerous because _____.
- ~~A. antibodies in the donor's plasma will attack and kill the recipient's healthy blood cells~~
 - ~~B. clotting factors in the donor's blood will cause unwanted clots known as thrombus~~
 - C. preformed antibodies in the recipient's blood will bind and agglutinate (clump) the donated cells
 - ~~D. white blood cells from the donor's blood cause inflammation~~
 - ~~E. preformed antibodies in the donor's blood will bind and agglutinate (clump) the donated cells~~
45. Which of the choices below is the parent cell for all formed elements of blood?
- A. megakaryocyte
 - B. normoblast
 - C. hemocytoblast
 - D. polymorphonuclear cell
46. Which of the following might trigger erythropoiesis?
- A. hypoxia (decrease oxygen) of EPO-producing cells
 - ~~B. decreased tissue demand for oxygen~~
 - ~~C. an increased number of RBCs~~
 - ~~D. moving to a lower altitude~~
 - E. All of the above would trigger erythropoiesis
47. Fred's blood was determined to be AB positive. What does this mean?
- A. There are no antibodies to A, to B, or to Rh antigens in the plasma.
 - ~~B. Antibodies to A and B are present in the red cells.~~
 - ~~C. His blood lacks Rh factor.~~
 - D. He can only receive blood from a donor who is AB positive.
48. All of the following conditions would impair coagulation except _____.
- A. vascular spasm
 - B. vitamin K deficiency
 - C. severe hypocalcemia
 - D. liver disease

49. What is the difference between a thrombus and an embolus?

- A. An embolus is a thrombus that has become mobile.
- ~~B. A thrombus occurs in the bloodstream whereas an embolus occurs outside the bloodstream.~~
- ~~C. An embolus occurs in arteries and a thrombus occurs in veins.~~
- ~~D. A thrombus is a blood clot and an embolus is a parasitic worm.~~

50. The most common type of hemophilia is caused by deficiency in

- A. Prothrombin activator
- B. Factor VIII
- C. Factor IX
- D. Factor XI

51. Together, erythrocytes, leukocytes and platelets comprise approximately..... percent of total blood volume.

- A. 1
- B. 55
- C. 25
- D. 45
- E. 75

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Answer the remaining questions right on the exam**