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STUDENT NUMBER: [redacted]

University of Ottawa
ANP 1105B
Midterm #2

Date: November 13, 2019 Duration: 1 hr 20 min
Instructor: J. Carnegie

INSTRUCTIONS:

1) 55 multiple choice questions (1 mark/1 correct answer per question) plus 10 marks for fill-in-the-blank questions and diagram labeling.

2) Please answer the multiple choice questions on the computer sheet that is provided and answer the remaining questions right on the last page of this exam (both sides of page).

3) Please put your name and student number at the top of this page, on the top of the last page and on the computer sheet. ***Hand in the last page of the exam and your computer sheet*** when you have finished. You may keep the rest of the exam; correct answers for the MCQs will be posted.

4) Make sure this exam is complete. This exam contains **10** pages **and is printed double-sided**. The excuse of missing a page will not be accepted after the examination.

1. **When can erythroblastosis fetalis not possibly happen in the fetus of an Rh-negative mother?**
   A. if the child is type O positive
   B. if the child is Rh+
   C. if the father is Rh+
   D. if the father is Rh-
   E. None of the above; it will always happen in the child of an Rh- mother.

2. **Which of these plasma proteins plays a key role in maintaining the osmotic concentration of the blood?**
   A. albumin
   B. fibrinogen
   C. platelets
   D. hemoglobin
   E. globulins

3. **The circumflex artery and the anterior interventricular artery are branches of the:**
   A. right coronary artery
   B. left coronary artery
   C. marginal artery
   D. coronary sinus
   E. aorta

4. **Blood flows into the coronary arteries from the:**
   A. coronary sinus
   B. superior vena cava
   C. pulmonary trunk
   D. base of the aorta
   E. descending aorta

5. **The left ventricular wall of the heart is thicker than the right ventricular wall in order to:**
   A. accommodate a greater volume of blood
   B. expand the thoracic cage during diastole
   C. pump blood with greater pressure
   D. pump blood through a smaller valve

6. **Select the correct statement(s) about heart valves:**
   A. The bicuspid valve separates the right atrium from the right ventricle.
   B. Stenosis refers to the inability of a valve to close completely when it should.
   C. Semilunar valves control the flow of blood into the heart.
   D. The AV valves are supported by chordae tendineae so that they do not invert up into the atria during ventricular contraction.
   E. All of the above are correct.

7. **The foramen ovale:**
   A. connects the two atria in the fetal heart
   B. is a condition in which the heart valves do not completely close
   C. is a shallow depression in the interventricular septum
   D. is a connection between the pulmonary trunk and the aorta in the fetus

8. **The right ventricle pumps blood to the:**
   A. lungs
   B. left ventricle
   C. left atrium
   D. systemic circuit
   E. right atrium

9. **The P wave of a normal electrocardiogram indicates _____.**
   A. ventricular repolarization
   B. ventricular depolarization
   C. atrial repolarization
   D. atrial depolarization

10. **The dicrotic notch occurs in response to:**
    A. opening of the pulmonary valve
    B. atrial systole
    C. opening of the AV valves
    D. closing of the aortic valve
    E. ventricular systole

11. **Stroke volume is the:**
    A. volume of blood pumped out by the left ventricle per minute
    B. difference between end-diastolic volume and end-systolic volume
    C. difference between the amount of blood pumped at rest and that pumped at maximum output
    D. volume of blood pumped from the left atrium into the left ventricle

12. **When threshold is reached in cardiac pacemaker (autorhythmic) cells, the next event is:**
    A. opening of funny sodium channels
    B. opening of calcium channels
    C. opening of fast sodium channels
    D. opening of potassium channels

13. **The Frank Starling Law of the Heart implies a direct relationship between stroke volume and:**
    A. end-systolic volume
    B. mean arterial pressure
    C. afterload pressure
    D. end-diastolic volume
    E. pulse pressure

14. **Normal resting cardiac output for an average adult male is approximately:**
    A. 70ml/min
    B. 1 litre/min
    C. 2 litres/min
    D. 5 litres/min
    E. 10 litres/min

15. **The cardiac electrical impulse normally begins spontaneously in the SA node because:**
    A. of its superior location in the right atrium
    B. it is the only area of the heart capable of spontaneous depolarization
    C. it has rich sympathetic innervation via the vagus nerve
    D. it depolarizes more rapidly than other autorhythmic cells of the heart
    E. B) and D)

16. **The second heart sound signals the start of which phase of the cardiac cycle?**
    A. isovolumetric relaxation
    B. isovolumetric contraction
    C. ventricular ejection
    D. ventricular filling

17. **Stenosis of the bicuspid valve may initially cause a pressure increase in the:**
    A. venae cavae
    B. left ventricle
    C. pulmonary circulation
    D. coronary circulation

18. **From the coronary sinus, blood normally flows into the:**
    A. aorta
    B. pulmonary trunk
    C. right atrium
    D. left atrium

19. **According to the Frank-Starling Law of the Heart:**
    A. the left ventricle ejects a larger volume of blood with each systole than the right ventricle.
    B. the intrinsic rate of the heart's pacemaker is 100 beats/min.
    C. cardiac output increases with increased heart rate.
    D. stroke volume increases with increased venous return.
    E. both ventricles contract simultaneously.

20. **Which of these correctly states differences between a trained athlete and a sedentary individual at rest?**
    A. The athlete would have a lower heart rate and a larger stroke volume.
    B. The athlete would have a higher heart rate and a larger stroke volume.
    C. The athlete would have a lower heart rate and a smaller stroke volume.
    D. The athlete would have a higher heart rate and a smaller stroke volume.
    E. There would be no differences when the individuals were at rest.

21. **Cardiac muscle cells remain depolarized longer than skeletal muscle fibers because:**
    A. voltage-gated Na+ channels close more quickly to trap Na+ inside longer
    B. Ca++ enters the cardiac muscle cells from the extracellular fluid to continue contributing positive charges after the influx of Na+ ions
    C. voltage-gated K+ channels open at the same time as Na+ channels, allowing more K+ ions to enter the cardiac muscle cells
    D. they are smaller cells, so take longer to repolarize
    E. it takes longer to reach threshold, and the duration of depolarization is directly proportional to the time it takes to reach threshold

22. **Which of the following is TRUE about hormones?**
    A. Steroid hormones are fat soluble and thus easily cross cellular membranes.
    B. All hormones are released from the cells producing them via exocytosis.
    C. Steroid hormones act via G-proteins and a second messenger system.
    D. Protein and peptide hormones directly stimulate gene transcription via binding to DNA associated receptors.

23. **The maintenance of continual partial constriction of the walls of blood vessels (vascular tone) is associated with the:**
    A. sympathetic division of the autonomic nervous system
    B. parasympathetic division of the autonomic nervous system
    C. both the sympathetic and parasympathetic divisions of the autonomic nervous system
    D. neither the sympathetic nor parasympathetic divisions of the autonomic nervous system

24. **Sympathetic stimulation causes:**
    A. decreased blood glucose, increased GI activity, increased heart rate and blood pressure
    B. increased blood glucose, decreased GI activity, increased heart rate and blood pressure
    C. increased blood glucose, increased GI activity, decreased heart rate and blood pressure
    D. decreased blood glucose, increased GI activity, decreased heart rate and blood pressure

25. **Choose the FALSE statement about endocrine regulation:**
    A. Endocrine glands are ductless glands.
    B. Hormones must bind to specific receptors in order to influence target cells.
    C. All hormones regulate cells by binding to cell surface receptors.
    D. The three types of stimuli regulating hormone release are: hormonal, neural, and humoral.
    E. Most hormones are steroid- or amino-acid-based molecules.

26. **After surgery, patients are often temporarily unable to urinate and bowel sounds are absent. This is an example of anaesthetic-induced inhibition of:**
    A. the sympathetic division of the autonomic nervous system
    B. the somatic division of the autonomic nervous system
    C. the parasympathetic division of the autonomic nervous system
    D. none of the above

27. **The endocrine control system that directly responds to changing blood levels of ions and nutrients is:**
    A. three-tiered
    B. catabolic inhibitory
    C. concentration-dependent
    D. humoral
    E. hemo-associated

28. **All of the following hormones are secreted by the anterior pituitary gland EXCEPT:**
    A. ACTH (adrenocorticotropic hormone)
    B. TSH (thyroid stimulating hormone)
    C. oxytocin
    D. GH (growth hormone)
    E. C) and D)

29. **Which of the following is NOT involved in the action of water-soluble hormones (hint -> protein, peptide hormones)?**
    A. G-proteins
    B. cell membrane receptors
    C. cyclic AMP
    D. transport into the nucleus
    E. phosphorylation of target enzymes

30. **Regulating hormones from the hypothalamus:**
    A. enter the venous circulation and travel to the heart that then pumps the hormone-containing blood to the pituitary
    B. are delivered directly to the anterior pituitary cells by the hypothalamic neurons
    C. travel by arteries to the pituitary
    D. first enter into the hypophyseal portal system
    E. none of the above

31. **Acetylcholine is neurotransmitter for preganglionic fibers in:**
    A. only the sympathetic division of the autonomic nervous system
    B. only the parasympathetic division of the autonomic nervous system
    C. both the sympathetic and parasympathetic divisions of the autonomic nervous system
    D. neither the sympathetic nor parasympathetic divisions of the autonomic nervous system

32. **Blood vessels are kept in a continual state of partial vasoconstriction by:**
    A. only the sympathetic division of the autonomic nervous system
    B. only the parasympathetic division of the autonomic nervous system
    C. both the sympathetic and parasympathetic divisions of the autonomic nervous system
    D. neither the sympathetic nor parasympathetic divisions of the autonomic nervous system

33. **Homeostasis is the condition in which the body maintains:**
    A. the lowest possible energy usage.
    B. a relatively stable internal environment, within limits.
    C. a static state with no deviation from preset limits.
    D. a dynamic state with an unlimited range.

34. **The main integration center responsible for the homeostatic balance in the body is:**
    A. the hypothalamus
    B. the anterior pituitary
    C. the posterior pituitary
    D. the adrenal medulla

35. **Hormone secretion can be stimulated by:**
    A. another hormone
    B. circulating levels of a substance regulated by that hormone
    C. neural stimulation
    D. all of the above

36. **Which of the following neurons is most likely to be adrenergic (neurotransmitter = norepinephrine)?**
    A. preganglionic sympathetic neurons
    B. preganglionic parasympathetic neurons
    C. postganglionic parasympathetic neurons
    D. postganglionic sympathetic neurons

37. **The hormones insulin and thyroxine arrive at an organ at the same time. Thyroxine causes an effect on the organ but insulin does not. Which of the following is the best explanation?**
    A. Insulin is a lipid-soluble hormone and thyroxine is not.
    B. Thyroxine has a longer half-life than insulin.
    C. Thyroxine is a local hormone and insulin is a circulating hormone.
    D. Thyroxine inhibits the action of insulin.
    E. The organ's cells have receptors for thyroxine but not for insulin.

38. **A major difference between neurotransmitters and hormones is that hormones are secreted:**
   A. directly into their target cell
   B. into the cerebrospinal fluid
   C. into the extracellular fluid
   D. into ducts

39. **Which of these does NOT result from increased activity of the sympathetic nervous system?**
   A. dilation of the pupil
   B. acceleration of heart rate
   C. dilation of blood vessels in penis
   D. piloerection (hairs on surface of skin are erect rather than parallel to the skin surface)
   E. mobilization of fats from adipose tissue

40. **Which sequence of events is correct in response to an injury that has penetrated through the skin and damaged an underlying blood vessel?**
   A. formation of tissue factor, conversion of prothrombin to thrombin, conversion of fibrinogen to fibrin, activation of plasmin
   B. conversion of fibrinogen to fibrin, activation of plasmin, formation of tissue factor, conversion of prothrombin to thrombin
   C. conversion of prothrombin to thrombin, formation of tissue factor, conversion of fibrinogen to fibrin, activation of plasmin
   D. formation of tissue factor, activation of plasmin, conversion of fibrinogen to fibrin, conversion of prothrombin to thrombin

41. **Which of the following is TRUE about erythropoietin?**
   A. It is produced in red bone marrow in response to increased blood oxygen levels.
   B. It induces production of platelets.
   C. It is produced only under conditions of severe blood loss.
   D. Its production increases at higher altitudes.

42. **Which of the following statements is TRUE?**
   A. The resting heart in a healthy person is primarily under the control of the parasympathetic nervous system.
   B. Hemosiderin is an iron transport protein.
   C. The fossa ovalis is a prominent depression seen in the wall of the aorta.
   D. During blood clotting, the role of the thrombopoietin is to block the activity of thrombin.
   E. The intrinsic pathway of blood clot formation relies on the release of tissue factor by damaged tissue cells in order to be activated.

43. **Together, leukocytes and platelets comprise approximately ..... per cent of total blood volume.**
   A. 1
   B. 10
   C. 25
   D. 45
   E. 75

44. **A type of anemia in which hemoglobin molecules assume odd shapes that cause RBCs to become crescent-shaped is:**
   A. iron-deficiency
   B. sickle cell
   C. hemorrhagic
   D. pernicious

45. **The most abundant plasma protein is:**
   A. gamma globulin
   B. plasminogen
   C. albumin
   D. fibrin
   E. fibrinogen

46. 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.

47. 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

48. Which of the following statements regarding blood clotting is TRUE?

A. Thrombin catalyzes the conversion of fibrinogen to fibrin.
B. Fibrinogen catalyzes the conversion of prothrombin to thrombin.
C. The intrinsic pathway of clot coagulation occurs more rapidly than the extrinsic pathway.
D. Plasmin catalyzes the conversion of fibrinogen to fibrin.

49. Which of the following causes ONLY the extrinsic pathway of blood coagulation to be followed?

A. sticking of platelets to roughened blood vessel walls
B. activation of a proenzyme exposed to collagen
C. release of heparin by the liver
D. the conversion of prothrombin to thrombin
E. the release of tissue factor by damaged tissue cells

50. All of the following can be expected with polycythemia EXCEPT:

A. high hematocrit
B. low blood viscosity
C. increased blood volume
D. high blood pressure

51. Which of the following would be most likely to trigger erythropoiesis?

A. elevation of the hematocrit
B. renal hypoxia
C. moving from a high altitude to a low altitude
D. dehydration

52. During blood vessel injury, the role of the von Willebrand factor is:

A. to initiate platelets adhesion to the exposed collagen fibers
B. to release histamine that causes vasoconstriction of the injured vessel
C. to convert plasminogen to plasmin
D. to initiate release of prostacyclin

53. A person with type B blood:

A. has type A antigens
B. will have a transfusion reaction if given type B blood NO
C. has the most common blood type NO
D. has type B antibodies NO
E. will have a transfusion reaction if given type O blood NO

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54. Which of the following is NOT a phase of erythropoiesis?

A. mitosis of reticulocytes
B. production of ribosomes
C. ejection of the nucleus
D. synthesis of hemoglobin molecules
E. all of the above are phases of erythropoiesis

55. What happens to the iron that is released during the breakdown of damaged or worn-out red blood cells?

A. It is used to synthesize proteins.
B. It is transported to the liver where it becomes part of bile.
C. It is converted into urobilin and excreted in urine.
D. It attaches to transferrin and is transported to bone marrow for use in hemoglobin synthesis.
E. It is utilized by intestinal bacteria to convert bilirubin into urobilinogen.