

University of Ottawa
ANP 1105B
Midterm #2

Date: November 14, 2017
Instructor: J. Carnegie

Duration: 1 hr 20 min

INSTRUCTIONS:

- 1) 50 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.
- 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. Sympathetic stimulation causes: *SNS*
- ☐ 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
2. Which of the following would be associated with the actions of steroid hormones on cells?
- ☐ A. extracellular receptors with a specificity for a single amino acid sequence on the hormone
 - ☐ B. an enzyme that catalyzes the formation of cyclic AMP
 - ☐ C. second-messenger systems activated by a G protein
 - ☒ D. a hormone-receptor complex that interacts directly with the cell's DNA
3. Which of the following statements is/are TRUE?
- ☐ A. Most body organs are innervated by only the sympathetic division of the nervous system
 - ☒ B. Thermoregulatory responses to increased heat are mediated by the sympathetic nervous system.
 - ☐ C. The adrenal medulla is actually composed of neural tissue.
 - ☐ D. In a negative feedback mechanism, the response of the effector is to enhance the original stimulus.
 - ☒ E. B) and C)
4. 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)
- ADH = post-pit
oxytocin = post-pit*
5. Releasing and inhibiting hormones are produced by the to control the
- ☐ A. hypothalamus // posterior pituitary
 - ☐ B. posterior pituitary // hypothalamus
 - ☐ C. pineal gland // hypothalamus
 - ☒ D. hypothalamus // anterior pituitary
 - ☐ E. anterior pituitary // hypothalamus
6. The chemical classification of hormones does NOT include:
- ☐ A. steroid hormones ✓
 - ☐ B. protein-based hormones ✓
 - ☒ C. glucose-containing hormones
 - ☐ D. amino acid-based hormones ✓
 - ☐ E. cholesterol-derived hormones ✓
7. 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
8. The purpose of positive feedback is to:
- ☒ A. prevent sudden and severe changes in the body
 - ☐ B. regulate a process around a set-point
 - ☒ C. push a process toward the achievement of a goal
 - ☐ D. allow for the maintenance of a steady-state

9. Which of the following is TRUE?

- ~~A.~~ Erythropoiesis can be stimulated by moving from the mountains to sea level.
- ~~B.~~ Erythropoietin is produced in the red bone marrow. *in kidney*
- ~~C.~~ The number of red blood cells tends to be higher in women than in men.
- ~~D.~~ Each hemoglobin molecule consists of a single polypeptide chain that contains 4 heme groups.
- ☒ E. When red blood cells become too old, the heme portion of each hemoglobin molecule is excreted as bile pigments.

10. Sam's blood was determined to be O negative. What does this mean?

- ~~A.~~ There are no antibodies to A, to B, or to Rh antigens in the plasma.
 - ~~B.~~ A and B antigens are present on his red blood cells.
 - ☒ C. His blood lacks Rh factor.
 - ~~D.~~ All of the above are correct.
- NO ANTIGENS*
NO D
Antibodies: A, B

11. 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. *heme*
 - ~~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. *heme*
- 2. Bilirubin*

12. All of the following are properties of erythrocytes EXCEPT:

- A. biconcavity *✓*
 - B. reversible deformability *✓*
 - C. presence of hemoglobin in cytoplasm
 - ☒ D. presence of many mitochondria in cytoplasm
- RBCs*

13. The most abundant plasma protein is:

- A. gamma globulin
 - ~~B.~~ plasminogen
 - ☒ C. albumin
 - ~~D.~~ fibrin
 - ~~E.~~ fibrinogen
- not in BV* *mobile thrombus*

14. 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.

15. Thrombopoietin is a hormone that:

- ~~A.~~ activates thrombin
- ☒ B. stimulates platelet production
- ~~C.~~ blocks the activity of thrombin
- ~~D.~~ dissolves thrombi (plural of thrombus)

- ✓ 16. Platelets first stick to the wall of a damaged blood vessel because:
- ☒ A. exposed collagen fibers make a rough surface to which the platelets are attracted
 - ~~B.~~ histamine causes vasoconstriction so that platelets can't fit through the opening
 - C. fibrin threads act like glue to hold them there
 - D. prothrombinase alters the electrical charge of the vessel wall
 - E. the intracellular fluid released by damaged cells in the blood vessel wall has a higher viscosity than plasma
- ✓ 17. The stem cell for all of the formed elements in blood is:
- A. normoblast
 - ~~B.~~ reticulocyte
 - C. erythroblast
 - D. myeloblast
 - ☒ E. hemocytoblast
- ✓ 18. Which of the following statements is FALSE?
- A. Plasma proteins can buffer changes in blood pH.
 - B. Blood is considered a type of connective tissue. ✓
 - C. The only complete cells in blood are leukocytes. ✓
 - D. All lymphocytes are leukocytes but not all leukocytes are lymphocytes.
 - ☒ E. The heme portion of the hemoglobin molecule is capable of binding both O₂ and CO₂.
- ✓ 19. When can erythroblastosis fetalis not possibly happen in the fetus of an Rh-negative mother?
- A. if the child is type O positive Rh +
 - 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.
- Handwritten notes for Q19: Rh- Rh+ Rh-
O_D anti
- ✓ 20. Which of the following cause 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
- ✓ 21. Which of the following is NOT a phase of erythropoiesis? making RBCs
- A. production of ribosomes ✓
 - ☒ B. production of vacuoles
 - C. synthesis of hemoglobin ✓
 - D. ejection of nucleus ✓
- ✓ 22. Which of these statements about plasmin is TRUE?
- A. It is involved in the intrinsic blood clotting system.
 - B. It is involved in the extrinsic blood clotting system.
 - ☒ C. It functions in fibrinolysis.
 - D. It is a procoagulant.
 - E. It promotes the formation of emboli.

23. The formed elements that are fragments of larger cells called megakaryocytes are:

- A. neutrophils
- B. lymphocytes
- C. erythrocytes
- ☒ D. platelets
- E. plasma proteins

committed cell

24. Which of the following statements is TRUE?

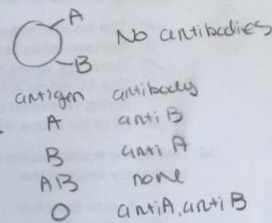
- ☒ A. Reticulocytes are immature RBCs
- ~~B. Platelets have nuclei but do not contain other organelles~~
- ~~C. RBCs occupy about 35% of a total blood volume~~
- ~~D. The number of RBCs is higher in females than in males~~

25. A major plasma protein that maintains the blood osmotic pressure is:

- A. fibrin
- B. fibrinogen
- ☒ C. albumin
- D. globulin
- E. angiotensinogen

26. An individual with type AB blood can donate to (assume donor and all potential recipients to be Rh-negative):

- ☒ A. Only type AB recipients
- B. Only type O recipients
- C. Only type A, type B, or type AB recipients
- D. All blood types because the AB blood type is the universal donor



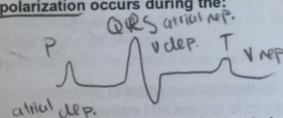
27. Which of the following would not cause an increase in erythropoietin?

- A. anemia ✓
- B. high altitude ✓
- C. hemorrhage
- D. donating blood to a blood bank
- ☒ E. polycythemia

EPO

28. In an ECG tracing, atrial repolarization occurs during the:

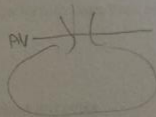
- A. P wave
- ☒ B. QRS complex
- C. T wave
- ~~D. none of the above~~



29. Which of the following statements regarding the cardiac cycle is TRUE?

- ☒ A. The AV valves are open during mid-to-late diastole. Relaxation
- ~~B. The aortic valve is open during isovolumetric contraction.~~
- ~~C. The first heart sound is caused by the closing of the semilunar valves.~~
- ~~D. The diastolic notch is a result of closure of the AV valves.~~
- ~~E. Closure of the AV valves occurs when the ventricles reach end-systolic volume.~~

70%



30. 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 of the aorta

31. 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:

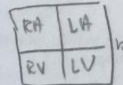
- A. the outermost muscular layer of the heart
- B. the innermost lining of the heart
- ☒ C. a double-walled membranous sac that encloses the heart
- D. the thick muscular layer of the heart that provides pumping action

32. The atrioventricular valves open when:

- A. the chordae tendineae contract
- B. they are stimulated by the AV node
- ☒ C. ventricular pressure falls below atrial pressure
- D. atrial pressure falls below ventricular pressure
- E. the papillary muscles contract

AV open

high → low pressure



33. 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 blow back up into the atria during ventricular contraction.
- ☒ E. All of the above are correct.

Stenosis = narrow?

34. During the transmission of action potentials through the conducting system of the heart, there is a temporary delay at the:

- A. bundle branches
- B. Purkinje fibers
- ☒ C. AV node
- D. SA node
- E. coronary sinus

$$CO = HR \times SV$$
$$= \frac{\text{beats}}{\text{min}} \times \frac{\text{mL}}{\text{beats}}$$

35. Stroke volume is the:

- ☒ A. amount of blood pumped by the heart 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. amount of blood pumped from the atria into the ventricles
- E. (a) and (b)

36. A sudden release of epinephrine from the adrenal medulla causes:

- ☒ A. increased heart rate
- B. increased stroke volume
- C. vasoconstriction of blood vessels serving the gastrointestinal tract
- ☒ D. all of the above

PNS

37. If the connections between the vagus nerve and the heart are severed, the

- ☒ A. heart will beat more slowly
- ☒ B. heart will stop beating
- ☒ C. cardiac output will decrease
- ☒ D. the nodal fibers will depolarize more slowly
- ☒ E. none of the above

38. 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

39. Within a physiologic range, an increase in left ventricular end diastolic volume (preload) leads to:

- ☒ A. an increase in cardiac output and an increased force of contraction
- ☒ B. a decrease in cardiac output and a decreased force of contraction
- ☒ C. an increase in cardiac output and a decreased force of contraction
- ☒ D. a decrease in cardiac output and an increased force of contraction

$$CO = SV \times HR$$

$$SV = ESD - EED$$

$$EDV - ESV$$

40. Choose the FALSE statement about the circumflex artery: away from

- ☒ A. It is a branch of the left coronary artery.
- ☒ B. It provides the major blood supply to the right ventricle.
- ☒ C. It lies in a groove between the left atrium and left ventricle.
- ☒ D. Damage to this vessel would leave the left atrium with virtually no blood supply.

41. From the right ventricle, blood flows into the:

- ☒ A. aorta
- ☒ B. pulmonary veins towards
- ☒ C. superior vena cava
- ☒ D. pulmonary trunk

RA LA
RV LV

42. During the contraction of heart muscle (contractile) cells:

- ☒ A. the action potential is initiated by calcium influx through the voltage-gated slow calcium channels.
- ☒ B. the action potential is initiated by sodium influx through the fast voltage-gated sodium channels.
- ☒ C. the plateau is maintained by the potassium influx.
- ☒ D. the repolarization is due mainly to the closure of sodium and calcium channels.

43. The force of cardiac muscle contraction is influenced primarily by the:

- ☒ A. intracellular calcium ion availability
- ☒ B. afterload pressure needed to achieve
- ☒ C. the parasympathetic nervous system
- ☒ D. the size of the heart

44. The function of the gap junction in cardiac muscle is to:

- ☒ A. separate sarcomeres from each other
- ☒ B. generate the appropriate neurotransmitters to regulate heart rate
- ☒ C. prevent adjacent cells from separating during contraction
- ☒ D. allow ions to pass from cell to cell, transmitting current across the entire heart

$$1L = 1000mL \quad 5000 = HR \times SV$$

$$5000 = 50 \frac{beats}{min} \times SV$$

45. A softball player is found to have a resting cardiac output of 5.0 litres per minute and a heart rate of 50 beats per minute. What is her stroke volume?

- A. 10 mL
- B. 100 mL
- C. 1000 mL
- D. 250 mL
- E. The information given is insufficient to calculate stroke volume.

$$CO = 5.0L = 5000 mL$$

$$HR = \frac{50 \text{ beats}}{min}$$

46. Which of the following is TRUE about hormones?

- A. The posterior pituitary is a place of storage but not production of hormones.
- B. The cells of the anterior pituitary produce releasing hormones (factors).
- C. The release of hormones is always regulated via a negative feedback mechanism.
- D. Steroid hormones are derivatives of the lipid arachidonic acid.

$$\frac{5000 mL}{50 \frac{beats}{min}} = \frac{5000 mL}{beats} \times \frac{min}{50}$$

47. Homeostasis is:

- A. the continual production of energy by cells
- B. the combination of growth, self-repair and energy release by body tissues
- C. the amplification of deviation from the normal range of a cellular response
- D. the maintenance of a relatively constant internal environment within the body

48. 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

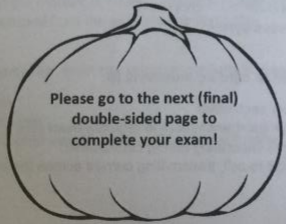
49. A good example of a positive feedback mechanism would be:

- A. body temperature regulation (+ you!)
- B. regulation of blood glucose levels
- C. regulation of uterine contractions by oxytocin during labour
- D. regulation of blood calcium levels

Somatic

50. Which of the following applies to the statement that there is a single, thick, heavily myelinated axon from the spinal cord to skeletal muscle?

- A. sympathetic division of the autonomic nervous system ANS
- B. parasympathetic division of the autonomic nervous system ANS
- C. both sympathetic and parasympathetic divisions of the autonomic nervous system ANS
- D. neither the sympathetic nor the parasympathetic divisions of the autonomic nervous system



$$SV =$$

$$CO = \frac{beats}{min} \times \frac{mL}{beats}$$

$$\frac{mL}{min} = \frac{beats}{min}$$