Practice Midterm #2
Physiology 2130 2019-2020
TA: Greydon Gilmore

1. **The neurotransmitter norepinephrine is released by:**
   A. Postganglionic neurons of the sympathetic nervous system
   B. Preganglionic neurons of the sympathetic nervous system
   C. Postganglionic neurons of the parasympathetic nervous system
   D. Preganglionic neurons of the parasympathetic nervous system

2. **In the muscle cell, calcium is stored at a high concentration in the:**
   A. Rough endoplasmic reticulum
   B. Sarcolemma
   C. Transverse tubules
   D. Sarcoplasmic reticulum

3. **Which of the following is <u>true</u> regarding the events at the neuromuscular junction?**
   A. Voltage-gated K^+ channels open when the motor neuron axon terminal depolarizes
   B. Calcium flows into the end plate when it becomes depolarized
   C. The end plate potential is also known as a muscle cell action potential
   D. Acetylcholine is the only neurotransmitter at the neuromuscular junction

4. **Which of the following myofilament molecules can break down ATP for muscle contraction?**
   A. G-Actin
   B. Myosin
   C. Troponin
   D. Tropomyosin

5. **Preganglionic neurons of the sympathetic nervous system release:**
   A. Norepinephrine
   B. Noradrenaline
   C. Acetylcholine
   D. Dopamine

6. **According to the sliding filament theory, during muscle contraction which of the following changes in length?**
   A. The thin myofilaments
   B. The thick myofilaments
   C. The distance between two Z-lines
   D. The distance between two M-lines

7. **Freshly oxygenated blood is delivered to the _____, and then it passes into the _____ to be pumped to the body tissues (systemic circuit).**
   A. left atrium; left ventricle
   B. right ventricle; right atrium
   C. right atrium; right ventricle
   D. left ventricle; left atrium

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8. **The role of the atrioventricular node (AV node) is to _____.**
    A. initiate a sinus rhythm
    B. initiate ventricular depolarization
    C. conduct impulses to the sinoatrial node (SA node)
    D. slow down impulses so that the atria can contract to fill the adjacent ventricles with blood

9. **What would occur if a contracting muscle became totally depleted of ATP?**
    A. The muscle would exhibit isometric contraction.
    B. The muscle would exhibit isotonic contraction.
    C. The muscle would relax and lengthen because of an inability to sustain actin-myosin cross bridges.
    D. The muscle would remain in a contracted state because of an inability to break actin-myosin cross bridges.

10. **Which of the following statements is FALSE?**
    A. During contraction, actin-myosin cross bridges form.
    B. During contraction, thin filaments slide past thick filaments so that actin and myosin filaments do not overlap.
    C. During contraction, thin filaments slide past thick filaments so that actin and myosin filaments overlap.
    D. During contraction, the distance between Z discs of a sarcomere decreases.

11. **The _____ are inward invaginations of the sarcolemma that run deep into the cell and ensure that every myofibril in the muscle fiber contracts at virtually the same time.**
    A. A bands
    B. thin filaments
    C. T tubules
    D. Z discs

12. **At the arteriolar end of a capillary, _____ pushes fluid into the capillary.**
    A. hydrostatic pressure in the interstitial fluid
    B. osmotic pressure in the interstitial fluid
    C. osmotic pressure in the capillary
    D. hydrostatic pressure in the capillary

13. **Which of the following neurons secrete norepinephrine?**
    A. preganglionic sympathetic
    B. preganglionic parasympathetic
    C. postganglionic sympathetic
    D. somatic motor

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14. **What part of the heart is considered the systemic circuit pump?**
    A. the pericardium
    B. the left ventricle
    C. the right ventricle
    D. the right atrium

15. **From the perspective of blood returning from the systemic circuit, identify the correct sequence of blood flow through the chambers of the heart.**
    A. right ventricle, left ventricle, left atrium, lungs, right atrium
    B. left ventricle, left atrium, lungs, right ventricle, right atrium
    C. lungs, right ventricle, left ventricle, right atrium, left atrium
    D. right atrium, right ventricle, lungs, left atrium, left ventricle

16. **Choose the correct sequence of electrical current flow through the heart wall.**
    A. AV node, SA node, Bundle of His, right and left bundle branches, Purkinje Fibers
    B. SA node, AV node, Purkinje Fibers, right and left bundle branches, Bundle of His
    C. SA node, gap junctions, AV node, Bundle of His, right and left bundle branches, Purkinje Fibers
    D. AV node, gap junctions, SA node, Bundle of His, right and left bundle branches, Purkinje Fibers

17. **Why is the adrenal gland unique in its autonomic innervation?**
    A. It is innervated by parasympathetic cholinergic preganglionic neurons
    B. The postganglionic neurons are cholinergic rather than noradrenergic despite being part of the sympathetic nervous system
    C. The post-synaptic response is mediated via muscarinic acetylcholine receptors
    D. It is directly innervated by the spinal cord without passing through ganglia.

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Directions: For each of the questions below, ONE or MORE of the answers given is correct. Answer:

(A) if only 1,2 and 3 are correct
(B) if only 1 and 3 are correct
(C) if only 2 and 4 are correct
(D) if only 4 is correct
(E) if ALL are correct

18. **Under what circumstances would acetylcholine be released in the autonomic nervous system?**
    1) Pre-ganglionic sympathetic innervation of the adrenal medulla
    2) Post-ganglionic sympathetic innervation of blood vessels in skeletal muscle
    3) Post-ganglionic parasympathetic innervation of the heart
    4) Pre-ganglionic sympathetic innervation of the salivary glands

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

19. **Which of the following effects of the autonomic nervous systems are antagonistic?**
    1) Innervation of the digestive tract
    2) Innervation of the adrenal medulla
    3) Innervation of the heart
    4) Innervation of the salivary glands

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

20. **During the actin-myosin-ATP cycle, which of the following molecules is attached to myosin *while* the power stroke is occurring?**
    1) Actin
    2) inorganic phosphate (Pi)
    3) ADP
    4) ATP

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

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21. **Which of the following contributes to the self-excitability (spontaneous generation of the action potentials) of the SA nodal cells?**
    1) leakage of Na^+ into the cells/increased Na^+ permeability
    2) leakage of K^+ into the cells/ increased K^+ permeability
    3) leakage of Ca^{++} into the cells/increased Ca^{++} permeability
    4) a threshold value that is the same as the resting membrane potential

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

22. **Which of the following concerning arterioles is/are correct?**
    1. they have relatively thick walls compared to the other blood vessels
    2. they regulate blood flow by vasoconstricting and vasodilating
    3. they are the site of the largest drop in blood pressure throughout the systemic circulation
    4. when they constrict, they will increase venous return which will increase SV by the Frank-Starling law of the heart

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

23. **After myocardial infarction, Carl's ECG has a normal P-wave but the QRS complex doesn't always come afterwards. Based on this information, which of the following would be true?**
    1. his cardiac output would be lower
    2. his mean arterial pressure would be lower
    3. he has a blockage at the Bundle of His/purkinje fibres
    4. his atria would not be contracting

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

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24. **If a cardiac transplant patient has no autonomic nerves going to their new heart (no direct SNS and PNS innervation), how would they increase cardiac output if they exercised?**
    1) the hormone epinephrine will still be released from the adrenal gland which can increase heart rate and stroke volume
    2) they would still have the muscle and respiratory pump which would both increase venous return to increase stroke volume
    3) they could still vasoconstrict veins in the systemic circulation to increase venous return to increase stroke volume
    4) the maximum heart rate is 100 bpm in a normal non-transplanted heart during exercise any way (which is the normal intrinsic rate of the SA node) so a higher heart rate is not necessary

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

25. **Postganglionic neurons of the parasympathetic nervous system:**
    1) release acetylcholine as a neurotransmitter
    2) innervate blood vessels in skeletal muscles
    3) are usually found near or within the effector organ
    4) are found within the adrenal medulla and release adrenaline

    A. 1,2 and 3 are correct
    B. 1 and 3 are correct
    C. 2 and 4 are correct
    D. Only 4 is correct
    E. ALL are correct

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Answer Key

1. A
2. D
3. D
4. B
5. C
6. C
7. A
8. D
9. D
10. B
11. C
12. A
13. C
14. B
15. D
16. C
17. D
18. E
19. B
20. B
21. B
22. A
23. A
24. A
25. B