

- A. Metabolism
- B. Serves as a reservoir of blood for the left ventricle.
- C. It is a filter to protect the systemic vasculature
- D. Facilitates the exchange of O₂ and CO₂ between air and blood.
- E. All of the above are true.

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Show answer

Correct Answer: E

2. Which of the following is in the correct path of CO₂ from the tissue to the atmosphere?

- A. Reaction with H₂O to make H₂CO₃, dissociation to H⁺ and HCO₃⁻, H⁺ combines with imidazole side chain of hemoglobin, carried back to lungs as HHb⁺ and HCO₃⁻, reverse reaction forms CO₂.
- B. O₂ is metabolized to CO₂, reaction with H₂O to make H₂CO₃, H₂CO₃ combines with imidazole side chain of hemoglobin, H₂CO₃Hb⁺ is carried back to the lungs, reverse reaction forms CO₂.
- C. Reaction with H₂O to make H₂CO₃, dissociation to H⁺ and HCO₃⁻, HCO₃⁻ combines with imidazole side chain of hemoglobin, carried back to the lungs as HCO₃-Hb⁺ and H⁺, reverse reaction forms CO₂.
- D. O₂ is metabolized to CO₂, reaction with H₂O to make H₂CO₃, dissociation to H⁺ and HCO₃⁻, carried back to lungs in this form, reverse reaction forms CO₂.

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Correct Answer: A

Show answer

Correct Answer: D

4. Which of the following is the first branching of the bronchial tree that has gas exchanging capabilities?

- A. Terminal bronchioles.
- B. Respiratory bronchioles.
- C. Alveoli
- D. segmental bronchi
- E. alveolar ducts.

Show answer

Correct Answer: B

5. Which of the following could NOT be part of an acinus?

- A. alveolar sacs
- B. Alveolar ducts
- C. Terminal bronchioles
- D. Respiratory bronchiole

6. If you increased the left atrial pressure from 5 mmHg to 15 mmHg, what effect would that have on pulmonary circulation?

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- A. It would force blood the opposite direction.
- B. It would increase the speed at which blood moves through the pulmonary circulation.
- C. No change.
- D. Blood flow would almost or completely stop.

Show answer

Correct Answer: D

7. Which of the following concerning average lung volumes and capacities of a person at rest is TRUE?

- A. $TLC > VC > TV > FRC$
- B. $TLC > FRC > VC > TV$
- C. $TLC > VC > FRC > TV$
- D. $TLC > FRC > TV > VC$

Show answer

Correct Answer: C

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Correct Answer: E

9. Which of the following spirometry measurements has the greatest sensitivity for detecting early air flow obstruction?

- A. FVC
- B. FEV1
- C. FFE
- D. FEF25-75

Show answer

Correct Answer: D

10. Which of the following does NOT happen during inspiration?

- A. The ribs move upward.
- B. The diaphragm lifts up.
- C. The antero-posterior dimensions of the chest are increased.
- D. The transverse dimensions of the thorax are increased.
- E. The scalene and sternocleidomastoid muscles can be recruited for inspiration.

11. During inspiration, how does alveolar pressure compare to atmospheric pressure?

- A. Alveolar pressure is greater than atmospheric.
- B. Alveolar pressure is less than atmospheric.
- C. Alveolar pressure is the same as atmospheric.
- D. Alveolar pressure is one of the few pressures where the reference pressure is not atmospheric.

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Show answer

Correct Answer: B

12. Which of the following represents the pressure difference that acts to distend the lungs?

- A. Alveolar pressure
- B. Airway opening pressure
- C. Transthoracic pressure
- D. Transpulmonary pressure
- E. Esophageal pressure.

Show answer

Correct Answer: D

13. If a patient had a progressive lung disease that required an ever increasing pressure to

Correct Answer: C

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14. An asthma sufferer finds she has to breathe at twice her normal rate. How does that affect her dynamic compliance?

- A. It stays the same.
- B. It decreases.
- C. It increases.
- D. Static compliance, not dynamic, is the variable affected by asthma.

Show answer

Correct Answer: B

15. According to the Law of Laplace, air should flow from the smaller alveoli to the larger, collapsing them. In the lungs, several factors counter that tendency, and stabilize the alveolar structures. Which of the following is NOT one of them?

- A. Surfactant lowers surface tension to a greater degree when it is on a smaller surface area, allowing the smaller alveoli to stay open.
- B. Mechanical stability is given by surrounding alveoli.
- C. Transpulmonary pressure is lower for smaller alveoli, allowing them to stabilize in comparison to the bigger ones.
- D. Surface tension at the gas-liquid interface increases as alveolar surface area increases.

16. Which of the following is FALSE concerning the production and role of lung surfactant?

- A. It is part of a lipoprotein called dipalmitoyl phosphatidyl-choline.
- B. It is synthesized by alveolar type II cells.
- C. As the alveolar surface area decreases during the compression curve, the surfactant decreases the surface tension at a constant rate.
- D. When surfactant density is decreased during expansion, surface tension initially rises rapidly, then slows down until it reaches the starting point.

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Show answer

Correct Answer: C

17. Which of the following is NOT true concerning respiratory distress syndrome in premature infants?

- A. Their ability to synthesize DPPC is limited.
- B. Higher pressures are required to ventilate the lungs.
- C. Lung compliance is low.
- D. Positive pressure respirators are often used to assist them in breathing.
- E. Alveoli tend to overexpand and sometimes burst at the end of inspiration.

Show answer

Correct Answer: E

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Correct Answer: A

19. If the lung were punctured, which of the following would happen?

- A. The lung would collapse on the side of the puncture.
- B. Both the lung and the chest wall would collapse on the side of the puncture.
- C. The relaxation pressure of the chest wall would increase until it surpassed the atmospheric.
- D. The relaxation pressure of the chest wall would increase, but stop before it reached atmospheric pressure.

Show answer

Correct Answer: A

20. Which of the following is FALSE concerning the airflow in the lungs?

- A. During inspiration and expiration, the flow in the trachea and larger bronchi is turbulent.
- B. Towards the middle of the bronchial tree, the flow is turbulent at the branches and laminar in between.
- C. Near the end of the bronchial tree, the flow is laminar.
- D. The acini have very small radii which significantly increases the total air flow resistance of the bronchial tree.

21. Which of the following is FALSE concerning airway resistance?

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- A. Up to 50% is in the nose.
- B. The maximum resistance in the bronchial tree occurs at the fourth generation.
- C. In the later generations, the radii are smaller, increasing the total resistance at each successive generation.
- D. Airway resistance can be increased by loss of tissue elasticity and contraction of bronchial smooth muscles.

Show answer

Correct Answer: C

22. Which of the following is FALSE concerning the effect of effort on airflow and volume during inspiration and expiration?

- A. During inspiration, greater effort always results in greater flow.
- B. Peak expiratory flow occurs at the beginning of expiration.
- C. At low and moderate lung volumes, the greater the effort above threshold, the greater the airflow in expiration.
- D. Portions of the expiration curve are effort independent.

Show answer

Correct Answer: C

Show answer

Correct Answer: A

24. Which of the following does NOT apply to the alveoli at the base of the lungs?

- A. They are less elastic than the alveoli at the apex.
- B. The pleural pressure is lower.
- C. At FRC they are less inflated than the alveoli at the apex.
- D. They are closed at RV.
- E. They have a greater volume change than alveoli at the apex during inspiration from FRC.

Show answer

Correct Answer: A

25. Which of the following is FALSE concerning the closing volume for the lung?

- A. Comes between Phase 3 and Phase 4 on the single breath N₂ washout curve.
- B. Marks the point where the alveoli at the apex close.
- C. Marks a sudden increase in nitrogen concentration in the expelled breath.
- D. Marks when the overinflated, poorly ventilated alveoli at the apex expel their air with high N₂ concentrations.

26. Which of the following is TRUE if a patient breathes slower than normal with increased tidal volumes? www.FirstRanker.com www.FirstRanker.com

- A. More resistive work is done.
- B. The total work done decreases.
- C. More elastic work is done.
- D. Compliance is decreased.

Show answer

Correct Answer: C

27. Which of the following is INCORRECT concerning the efficiency of breathing and the oxygen consumption of the respiratory muscles?

- A. Efficiency is defined as the ratio of mechanical work done to move air to the amount of metabolic energy used by the respiratory muscles.
- B. The respiratory system uses less than 3% of the body's total oxygen consumption at rest.
- C. Respiratory muscles are more efficient than large muscle groups.
- D. Emphysema increases the oxygen requirement for respiratory muscles.
- E. Hyperventilation can increase the oxygen consumption of respiratory muscles to 30%.

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Correct Answer: C

D. 0.3 L/min

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Show answer

Correct Answer: D

29. In what situation would the gas exchange ratio be decreased compared to the respiratory quotient?

- A. During slowed breathing.
- B. Holding your breath.
- C. During hyperventilation.
- D. Impossible. The two are always equivalent.

Show answer

Correct Answer: C

30. A 140 lb woman would have approximately how much dead space in her lungs?

- A. 140 ml.
- B. 70 ml.
- C. 280 ml.
- D. 35 ml.

31. How do you calculate how much inspired air actually ventilates the alveoli during one minute? www.FirstRanker.com www.FirstRanker.com

- A. Subtract the volume of dead space from the tidal volume.
- B. Subtract both the dead space volume that was already in the lungs plus the dead space of the inspired air that won't reach the alveoli from the tidal volume.
- C. Subtract the volume of dead space from the tidal volume and multiply it by the number of breaths per minute.
- D. It is equal to the tidal volume times the frequency of breathing.

Show answer

Correct Answer: C

32. Which of the following is NOT a function of dead space?

- A. Warms expired air to body temperature.
- B. Saturates inspired air with water vapor.
- C. Removes bacteria and other particulate matter.
- D. Conducts the warmed air to the respiratory membranes.

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Correct Answer: A

Show answer

Correct Answer: D

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34. To which of the following is alveolar PCO₂ directly proportional?

- A. Rate of CO₂ production and alveolar ventilation.
- B. Rate of CO₂ production and rate of O₂ consumption.
- C. Alveolar ventilation and rate of O₂ consumption.
- D. Alveolar ventilation, rate of O₂ consumption, and rate of CO₂ production.

Show answer

Correct Answer: B

35. If a patient's blood carries 10 grams of Hb per deciliter, what is the O₂ carrying capacity of his blood?

- A. 18 milliliters per deciliter.
- B. 20 milliliters per deciliter.
- C. 10 milliliters per deciliter.
- D. 13 milliliters per deciliter.

Show answer

- A. O₂ content of blood is the actual amount of O₂ in one deciliter of blood.
B. O₂ saturation of blood is the ratio of O₂ content to its O₂ capacity.
C. The O₂ uptake curve of blood is the functional relationship between O₂ content and PO₂.
D. The O₂ content of blood depends completely on the amount of Hb in the blood.

Show answer

Correct Answer: D

37. Which of the following statements about Hb is FALSE?

- A. A higher P₅₀ than normal means that the O₂ binds less tightly to Hb.
B. An increase in 2,3-DPG shifts the O₂ uptake curve to the left.
C. An increase in PCO₂ causes a right shift of the O₂ uptake curve.
D. An decrease in pH increases P₅₀.
E. An increase in temperature shifts the O₂ uptake curve to the right.

Show answer

Correct Answer: B

38. Which of the following is NOT a form by which CO₂ can be transported in the blood?

- A. As bicarbonate
B. Dissolved in the blood.

39. Which of the following is FALSE concerning CO₂ uptake?

- A. If $PO_2 = PCO_2$, then there will be more total CO₂ in the blood.
- B. Oxygenation moves the CO₂ uptake curve downward.
- C. The CO₂ uptake curve is generated by comparing the total CO₂ per unit volume of blood, and the PCO₂.
- D. Deoxygenated blood carries less CO₂ than oxygenated.

Show answer

Correct Answer: D

40. Which of the following is INCORRECT concerning the O₂ / CO₂ movement and processing through the lungs and tissues?

- A. Binding of O₂ to Hb changes its configuration so that CO₂ and H⁺ ions are more likely to dissociate.
- B. When CO₂ diffused into the alveoli, the PaCO₂ is lowered.
- C. Carbonic acid is an intermediate in the reaction combining H⁺ with HCO₃⁻ to form H₂O and CO₂.
- D. Arterial blood flows to the tissues where H⁺ ions combine with HCO₃⁻ to form H₂O and CO₂.

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- B. Shock or heart failure.
- C. Cyanide poisoning.
- D. Carbon monoxide poisoning.

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Show answer

Correct Answer: B

42. If you blocked the blood supply to an alveolus, which of the following would NOT occur as a result?

- A. The ventilation perfusion ratio would be 0.
- B. The PAO₂ would be greater than normal.
- C. The PACO₂ would be 0.
- D. All of the above are true.

Show answer

Correct Answer: A

43. Which of the following is FALSE concerning the ventilation and perfusion of different regions of the lung?

- A. Alveoli at the top of the lung have a smaller dynamic compliance.
- B. The Hb moving through the base of the lung is less saturated than that at the apex of the

Show answer

Correct Answer: D

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44. Which of the following is FALSE concerning the relationships of the variables in diffusion of O₂ across a membrane?

- A. Doubling the thickness of the membrane would cut the total flow of O₂ in half.
- B. Doubling the area of the membrane would double the total flow of O₂.
- C. If you increased the alveolar concentration of O₂, you would increase the total flow of O₂ across the alveolar membrane.
- D. The lower the diffusion coefficient, the higher the total flow.
- E. Increasing the arterial concentration of O₂ would decrease the total flow of O₂.

Show answer

Correct Answer: D

45. If the blood moved slower than normal through the alveolar capillaries, which of the following would have an increased uptake?

- A. Carbon dioxide.
- B. Carbon monoxide.
- C. Oxygen
- D. None of the above.

46. Which of the following is FALSE concerning diffusion in the lungs?

- A. CO is used to measure diffusing capacity because its uptake is diffusion limited.
- B. Actual diffusion time includes time required for an O₂ molecule to diffuse from the alveolus, through the membrane, the plasma, and into a RBC.
- C. Reaction time is the time it takes the O₂ molecule to react with Hb.
- D. The diffusion time is greater than the reaction time of an O₂ molecule.

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Show answer

Correct Answer: D

47. Which of the following pairs is INCORRECT concerning central nervous systems and a factor they respond to by affecting respiration?

- A. Cerebellum: Mechanoreceptor input
- B. Limbic system: emotional states
- C. Cerebral cortex: voluntary control
- D. Cerebral motor cortex: exercise

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Correct Answer: A

Show answer

Correct Answer: A

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49. Which of the following is the primary regulating variable of the central chemoreceptors?

- A. PaO_2 .
- B. PaCO_2
- C. arterial pH
- D. Input from stretch receptors.

Show answer

Correct Answer: B

50. In which situation would the response to hypoxia be limited?

- A. In a patient with obstructed airways.
- B. When hypoxia is accompanied by hypercapnea.
- C. In the hypoxia induced by high altitude.
- D. During hypoventilation.

Show answer

Correct Answer: C

change in respiration.

B. The body can adjust to chronic hypercapnea by using an active HCO_3^- transport process in the choroid plexus.

C. The carotid and aortic bodies detect increases in PaCO_2 and pH, and decreases in PaO_2 .

D. 75% of ventilatory response is regulated by chemoreceptors in the CSF and 25% by the carotid and aortic bodies.

E. Central chemoreceptors tend to respond slowly over time, while carotid bodies react quickly to immediate needs.

Show answer

Correct Answer: C

52. Which of the following pairs is NOT a pulmonary mechanoreceptor paired to a possible stimulus?

A. Stretch receptor: inflation

B. Irritant receptor: inhaled dust

C. Juxtacapillary receptors: decreases interstitial fluid volume in alveolar walls.

D. Bronchial C receptors: large inflations.

Show answer

Correct Answer: C

Correct Answer: B

2. Choose one correct answer.

- A. The A-band lengthens during relaxation.
- B. The I-band shortens during contraction.
- C. The A-band shortens during contraction
- D. None are correct.

Correct Answer: B

3. Choose one correct answer.

- A. Gap junctions are part of the intercalated disk.
- B. The A-band is composed of actin filaments.
- C. Action potentials cannot propagate into the t-tubules of muscle.
- D. None are correct.

Correct Answer: A

B. Blockade of SR Ca release channels will increase the magnitude of the calcium transient in heart muscle.

C. Epinephrine will decrease the strength of contraction in heart muscle.

D. None are correct.

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Correct Answer: D

5. Choose one correct answer.

A. Cardiac muscle requires beat-to-beat Ca influx to trigger contraction.

B. A DHP blocker will increase the strength of contraction in heart muscle.

C. SR Ca release channels are called DHP receptors.

D. None are correct.

Correct Answer: A

6. Choose one correct answer.

A. Digitalis decreases the strength of contraction of heart muscle.

B. Na-Ca exchange requires ATP directly and normally acts to pump Ca into heart cells.

C. Blockade of SR Ca pumps will increase the rate of relaxation of heart and skeletal muscle.

D. None are correct.

7. Choose one correct answer.

- A. Calcium binds directly to myosin to promote crossbridge formation.
- B. In a resting heart muscle cell, tropomyosin acts to shield the myosin binding sites on actin.
- C. Binding of ATP to actin acts to detach myosin from actin.
- D. None are correct.

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Correct Answer: B

8. Choose one correct answer.

- A. During an isometric contraction the tension goes up and the muscle shortens.
- B. Heart muscle cells can normally develop tetanic contractions.
- C. Skeletal muscle cells are normally held at a muscle length that maximizes their ability to generate force.
- D. None are correct.

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Correct Answer: C

9. Choose one correct answer.

- A. Skeletal muscle fibers that rely mainly on oxidative phosphorylation for ATP production

Correct Answer: C

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10. Choose one correct answer.

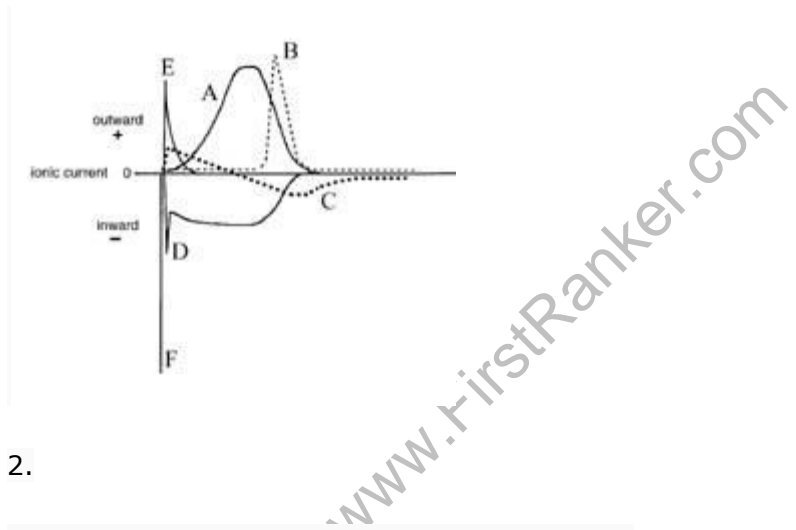
- A. Inositol triphosphate (IP3) inhibits SR Ca release in smooth muscle.
- B. The calcium–calmodulin complex in smooth muscle inhibits myosin-light chain kinase.
- C. Smooth muscle can develop both tonic and phasic contractions.
- D. None are correct

Correct Answer: C

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Show answer

Correct Answer: D



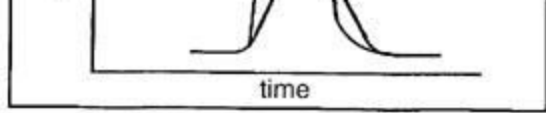
2.

In the image, which curve represents the I_{K1} ?

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

Show answer

Correct Answer: B



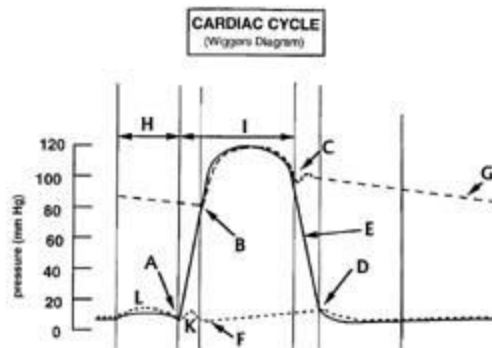
3.

Which of the following would cause the change from curve A to curve B in heart contractility?

- A. Norepinephrine
- B. Acetylcholine
- C. Intracellular acidosis
- D. Ca channel blockers

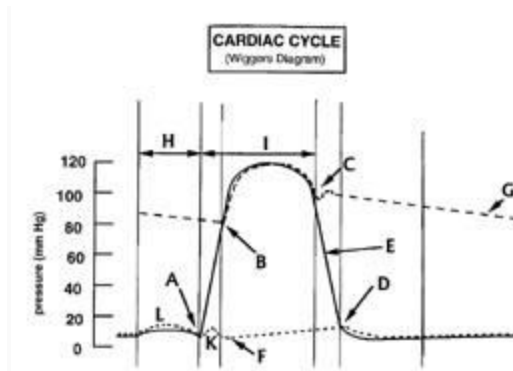
Show answer

Correct Answer: A



Show answer

Correct Answer: D

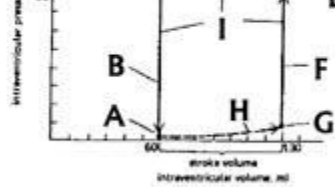


5.

Which letter in the image represents the pressure reaction in the left atrium as the mitral valve bulges during ventricular contraction followed by the stretching of the atrium due to tension of the AV ring?

- A. L
- B. K
- C. F
- D. D

Show answer



6.

Which letter in the image represents the isovolumetric contraction of the left ventricle in the heart?

- A. F
- B. B
- C. H
- D. D

Show answer

Correct Answer: A



7. Which of the following is a CORRECT order of blood flow through the heart?

- 1 - right atrium
- 2 - left atrium
- 3 - right ventricle
- 4 - left ventricle

- A. 5, 1, 9, 3, 10, 6, 7, 2, 8, 4, 11, 12
- B. 5, 1, 8, 3, 10, 7, 6, 2, 9, 4, 11, 12
- C. 5, 1, 8, 3, 10, 6, 7, 2, 9, 4, 11, 12
- D. 5, 1, 8, 3, 11, 6, 7, 2, 9, 4, 10, 12

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Show answer

Correct Answer: C

8.

What type of arrhythmia does this image represent?

- A. First-degree heart block
- B. Third degree heart block (complete AV block)
- C. Premature ventricular contraction
- D. Ventricular fibrillation

Show answer

Correct Answer: C

9. Which of the following is NOT a part of the specialized conduction system of the heart?

- A. Cells of the SA node.

10. Which of the following is INCORRECT concerning cardiac muscle?

- A. Cardiac cells are smaller than skeletal muscle cells.
- B. Electrical communication between cardiac cells is maintained via gap junctions which are specialized portions of the intercalated discs.
- C. Mechanical attachment of cardiac cells is at the intercalated disc.
- D. The spread of excitation through the heart muscle is 3-dimensional.
- E. Transverse tubules are larger in skeletal muscle than in heart muscle allowing more diffusion of Ca^{2+} into the interior of the cell.

Show answer

Correct Answer: E

11. Which of the following is usually the dominant pacemaker and fires the fastest?

- A. SA node.
- B. AV node
- C. His bundle.
- D. Purkinje fibers.

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- B. It decreases heart rate via the SA node.
- C. It decreases conduction velocity via the AV node.
- D. It can be blocked by beta blockers, e.g. propranolol.

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Show answer

Correct Answer: D

13. Which of the following is a TRUE statement concerning pacemaker potential?

- A. Specialized cells depolarize during phase 4, but ventricular and atrial muscle cells do not.
- B. Specialized cells depolarize during phase 3, but ventricular and atrial muscle cells do not.
- C. Specialized cells repolarize during phase 4, but ventricular and atrial muscle cells do not.
- D. Specialized cells repolarize during phase 3, but ventricular and atrial muscle cells do not.
- E. None are correct

Show answer

Correct Answer: A

14. Which of the following is INCORRECT concerning the voltage clamp technique?

- A. The voltage clamp technique is used to record action potentials from heart cells
- B. It is useful to measure effects of antiarrhythmic agents on specific ion channels.
- C. The voltage clamp can be used to set the V_m either for a segment of the cell membrane

15. Which of the following is the property of a cardiac cell to initiate and fire an action potential on its own without external stimulation?

- A. Selectivity
- B. Spontaneity.
- C. Automaticity.
- D. Conductance.

Show answer

Correct Answer: C

16. Which of the following does NOT show rapid initial depolarization at the start of an action potential?

- A. SA node.
- B. Atrial muscle.
- C. Purkinje fibers.
- D. Ventricular muscle.
- E. Bundle of His.

Show answer

Correct Answer: A

- B. It is extruded via an ATP-dependent Na-K pump.
- C. It is extruded via an ATP-dependent Na-Ca pump.
- D. It is extruded via an ATP-independent Na-K pump.
- E. It is extruded via an ATP-independent Na-Ca pump.

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Show answer

Correct Answer: B

18. If sodium channels are open, membrane potential is +110 mV, and the equilibrium potential is +68 mV, how will sodium ions respond?

- A. They will move into the cell.
- B. They will move out of the cell.
- C. They will not move.
- D. The conductance will drop to zero.

Show answer

Correct Answer: B

19. Which of the following is NOT true of an inward ionic current?

- A. It is negative.
- B. It reduces the polarity of the cell.

20. If you reduced the outward current in a heart cell, what would be the result?

- A. Increase the rate of repolarization.
- B. Prolong the action potential.
- C. Increase the rate of depolarization.

Show answer

Correct Answer: B

21. Which of the following is INCORRECT concerning diastolic depolarization at the SA node?

- A. It results from a decrease in I_K .
- B. Results from the activation of I_f carried mainly by Na ions.
- C. Its rate is decreased by sympathetic stimulation.
- D. Activating I_{KAcH} decreases its rate.
- E. Its rate is decreased by decreasing I_{Ca}

Show answer

Correct Answer: C

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Correct Answer: D

23. Which of the following is INCORRECT concerning local circuit flow in the heart?

- A. It flows from regions with high membrane potential to regions with low potential.
- B. The cell with the more negative potential is called the current source, while the one with the more positive potential is called the current sink.
- C. The circuit flows from the current source to the current sink.
- D. The circuit flows from the active cell to the resting cells in its vicinity.

Show answer

Correct Answer: B

24. Which of the following is NOT a factor affecting local circuit current in the heart?

- A. R_i
- B. R_{myo}
- C. R_o
- D. C_m
- E. R_k

25. Which of the following will increase the length constant involved in the local circuit current flow of the heart?

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- A. Increase in membrane resistance.
- B. Increase in extracellular resistance.
- C. Increase in intracellular resistance.
- D. None of the above.

Show answer

Correct Answer: A

26. Which of the following is FALSE concerning the safety factor in the heart?

- A. It is how much the depolarizing local circuit current exceeds what is required to elicit a propagated action potential.
- B. It depends on the characteristics of the current source and current sink.
- C. It is higher in cells activated by I_{Na}
- D. It is higher in cells activated by I_{Ca}

Show answer

Correct Answer: D

Show answer

Correct Answer: D

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28. Which of the following will decrease the V_{max} and sodium current in a myocardial cell?

- A. A premature heart beat.
- B. Late membrane depolarization.
- C. Low extracellular potassium levels.
- D. More than normal activated Na channels.

Show answer

Correct Answer: A

29. Which of the following does NOT contribute to the slow conduction found in the SA and AV nodes?

- A. Low AP height.
- B. Small cell size.
- C. High V_{max} .
- D. Few nexal connection between cells.

Show answer

B. Connexin protein subunits are arranged around a central pore to compose each connexon.

C. Gap junctions are more abundant in the atria and ventricles than they are in the SA and AV nodes.

D. Increases in cytosolic Ca and H will increase gap junction channel conductance.

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Show answer

Correct Answer: D

31. In which of the following do EADs occur more frequently because of their long action potential duration?

A. Atrial fibers.

B. SA node

C. AV node

D. Purkinje fibers.

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Show answer

Correct Answer: D

32. Which of the following is NOT true concerning the differences between skeletal and cardiac muscle?

Correct Answer: B

33. Which of the following is NOT a method of Ca removal following contraction of heart muscle?

- A. Na-Ca exchange transports Ca out of the cell.
- B. ATP-dependent sarcolemmal Ca pumps remove Ca from the cell.
- C. Ca passively diffuses out of the cell.
- D. ATP-dependent SR Ca pumps move Ca from the cytoplasm into the SR.

Show answer

Correct Answer: C

34. Which of the following agents helps to increase the Ca storage capacity of the SR in the heart?

- A. dihydropyridines
- B. ryanodine
- C. calsequestrin.
- D. acetylcholine

Show answer

- B. Increases in end-diastolic volume will generate a larger stroke volume during systole.
- C. The amount and duration of Ca released from the SR can alter contractility.
- D. Positive inotropic agents will increase contractility.

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Show answer

Correct Answer: A

36. Which of the following pairs is INCORRECT?

- A. P wave: atrial depolarization
- B. QRS complex: ventricular depolarization
- C. T wave: ventricular repolarization
- D. QT interval: Measure of duration of atrial action potential

Show answer

Correct Answer: D

37. Which of the following pairs is INCORRECT concerning the Einthoven triangle?

- A. Lead I: RA/LA
- B. Lead II: RA/LL
- C. Lead III: LA/LL
- D. All of the pairs are correct.

38. Which of the following is NOT affected by the preload in the heart muscle?

- A. End systolic volume
- B. End diastolic volume
- C. Stroke Volume
- D. Ejection fraction.
- E. Cardiac output.

Show answer

Correct Answer: A

39. Which of the following is INCORRECT concerning isotonic contraction in the heart?

- A. One occurs during the ejection phase of the cardiac cycle.
- B. Is typically the first step in heart muscle contraction followed by an isometric contraction.
- C. It involves a change in muscle length against a constant load.
- D. An increased afterload will slow the velocity of muscle shortening.

Show answer

Correct Answer: B

Show answer

Correct Answer: D

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41. Which of the following will require the smallest increase in oxygen consumption by the heart?

- A. Generating an increase in left ventricular pressure.
- B. Severe hypertension.
- C. Generating an increase in stroke volume.
- D. Aortic stenosis.

Show answer

Correct Answer: C

42. Which of the following vessels has the largest effect on total peripheral resistance?

- A. Arteries.
- B. Arterioles.
- C. Veins.
- D. Venules.
- E. Capillaries.

Show answer

change?

- A. $\frac{1}{2}$
- B. $\frac{1}{4}$
- C. $\frac{1}{8}$
- D. $\frac{1}{16}$
- E. $\frac{1}{32}$

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Show answer

Correct Answer: D

44. Which of the following is INCORRECT concerning turbulent blood flow?

- A. The resistance to turbulent flow is greater than laminar flow.
- B. Above a critical velocity, blood flow becomes turbulent.
- C. Turbulence can create vibrations that can be detected as murmurs.
- D. Turbulence is found normally in the aorta and in narrowed vessels.
- E. Turbulent flow rate is proportional to the cube root of the driving pressure.

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Correct Answer: E

45. Which of the following blood vessels has the greatest compliance?

Correct Answer: B

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46. Which of the following pairs is INCORRECT?

- A. Nitric oxide (NO): vasodilator
- B. Endothelin: vasoconstrictor
- C. Nitric Oxide (NO): promotes cell growth
- D. Endothelin: potent positive inotropic effect

Show answer

Correct Answer: C

47. Which of the following will NOT increase aortic systolic blood pressure?

- A. Decrease in arterial compliance
- B. Decrease in aortic distensibility.
- C. Increase in stroke volume.
- D. Decrease in ejection velocity.

Show answer

Correct Answer: D

Show answer

Correct Answer: C

49. Which of the following pairs is INCORRECT concerning arteriolar tone?

- A. Myogenic control: vascular smooth muscle responds to changes in pressure.
- B. Metabolic control: accumulation of waste products stimulates vasoconstriction.
- C. Neural control: vasoconstriction activated by sympathetic nerves.
- D. Hormonal control: catecholamines affect the adrenergic receptors of the vascular smooth muscle.

Show answer

Correct Answer: B

50. Which pair is INCORRECT concerning the microcirculation at the capillary level?

- A. Tight junctions: brain
- B. Gaps large enough to exchange plasma proteins: kidneys
- C. Intercellular junctions / pores: exchange of water and lipid-insoluble substances.
- D. Pinocytosis: cytoplasmic vesicles exchanging fluid and solutes.
- E. Intracellular fenestrations: exchange of large molecules.

51. If a patient is suffering from swollen hands, feet, and face, all of the following could be a cause, except? www.FirstRanker.com www.FirstRanker.com

- A. Large decrease in arterial blood pressure.
- B. Lymphatic blockage.
- C. A decrease in plasma proteins.
- D. Increase in capillary permeability to proteins.
- E. Vasodilation.

Show answer

Correct Answer: A

52. Which of the following is NOT a mechanism to promote venous return and reduce blood pooling?

- A. One way venous valves.
- B. Parasympathetic stimulation.
- C. Skeletal muscle pump.
- D. Thoraco-abdominal pump
- E. Pumping of the heart.

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Correct Answer: B

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Correct Answer: A

54. Which of the following would NOT occur following a major blood loss?

- A. Vagal tone to the SA node would be decreased which would then increase the heart rate.
- B. An increase in sympathetic output in arterioles would increase the total peripheral resistance, except in the brain and heart.
- C. Sympathetic output to the atria and ventricles would increase resulting in an increase in stroke volume.
- D. Sympathetic output to the veins would increase, resulting in increased venous pressure, venous return, and cardiac output.
- E. Stroke volume would increase while heart rate decreased. Together this would increase the cardiac output.

Show answer

Correct Answer: E

C. It is smaller than the submucosal ganglia and most prominent in the small and large intestine

D. It is interconnected with the submucosal ganglia.

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E. Contains both excitatory and inhibitory motor nerves to the smooth muscle fibers.

Show answer

Correct Answer: C

Feedback A: This statement is true. Auerbach's plexus and the myenteric plexus are one and the same.

Feedback B: This statement is true. The submucosal plexus contains fewer neurons than the myenteric plexus. The submucosal plexus is most prominent in the small and large intestines. Both plexuses are continuous around the GI tract and along its length. The two plexuses are distinct; however, interconnections bind the network into a functionally unified nervous system.

Feedback C: This statement is false. The submucosal plexus contains fewer neurons than the myenteric plexus. The submucosal plexus is most prominent in the small and large intestines. Both plexuses are continuous around the GI tract and along its length. The two plexuses are distinct; however, interconnections bind the network into a functionally unified nervous system.

Feedback D: This statement is true. Both plexuses are continuous around the GI tract and along its length. The two plexuses are distinct; however, interconnections bind the network into a functionally unified nervous system.

Feedback E: This statement is true. Efferent vagal innervation may excite or inhibit GI effectors. Efferent sympathetic stimulation suppresses motility and secretion, decreases blood flow to intestine and contracts sphincter muscles.

Show answer

Correct Answer: D

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Feedback A: This statement is true. The enteric nervous system has as many neurons as are found in the spinal cord to provide local control of the GI system. Page 10.

Feedback B: This statement is true. Reflex responses are initiated by specific sensory input and always yield the same response. Motor programs activate pattern-generating circuitry that control things such as intestinal motility. Page 10.

Feedback C: This statement is true. The neuron types in the enteric nervous system include sensory neurons (chemoreceptors, mechanoreceptors, thermoreceptors), which report sensory information to the interneurons that coordinate local reflex circuits. Page 10.

Feedback D: This statement is false. In addition to innervating the esophagus, stomach, and pancreas, the vagus nerve also innervates the intestine to the level of the transverse colon. Pelvic nerves provide parasympathetic innervation to the remainder of the colon, the rectum, and anus. Page 11.

3. Which of the following best describes a fast EPSP synaptic event?

- A. The depolarization persists several seconds to minutes after the termination of the presynaptic transmitter release.
- B. Acetylcholine activation of nicotinic cholinergic post-synaptic receptors results in a depolarization lasting less than 50 msec.
- C. requires K⁺ channel closure
- D. requires K⁺ channel opening

Show answer

Correct Answer: B

Feedback C: This statement is false. The fast EPSP doesn't involve K⁺ channels.

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Feedback D: This statement is false. The fast EPSP doesn't involve K⁺ channels.

4. Which of the following statements correctly describes a function of the parasympathetic innervation of the GI tract.
- A. Norepinephrine is the primary excitatory neurotransmitter.
 - B. Excessive parasympathetic activity can lead to a pathological state called paralytic ileas.
 - C. Inhibitory efferent Vagal innervation causes sphincters to contract.
 - D. Afferent sensory input is received in the nucleus of the solitary tract and processed in the dorsal motor nucleus of the medulla oblongata.
 - E. Glucose concentration, pH, osmolality, movement of material past mechanoreceptors, and level of contractile strength or stretch are monitored by efferent parasympathetic fibers.

Show answer

Correct Answer: D

Feedback A: This statement is false. Norepinephrine is the neurotransmitter used by the sympathetic division of the ANS. Efferent sympathetic stimulation suppresses motility and secretion, decreases blood flow to intestine and contracts sphincter muscles. The neurotransmitter released, norepinephrine, binds to pre-synaptic alpha₂ adrenergic receptors to suppress the release of excitatory neurotransmitters. Page 11.

Feedback B: This statement is false. The overall result of sympathetic activations is a state of paralysis of intestinal motility and reduced blood flow. If the condition persists to a pathological state, it is called paralytic ileus. Page 11.

Feedback C: This statement is false. Inhibitory input by the parasympathetic NS relaxes the appropriate sphincter muscles. Page 11.

5. Muscles in the propulsive and receiving segments of the GI tract respond differently to food movement through the gut. Which of the following statements correctly describes activity in the propulsive segment?

- A. The circular and longitudinal muscles are contracted.
- B. The longitudinal muscles are contracted and the circular muscles are relaxed.
- C. Both the longitudinal muscles and circular muscles are relaxed.
- D. The circular muscles are contracted and the longitudinal muscles are relaxed.

Show answer

Correct Answer: D

Feedback A: This statement is false. Peristaltic activity is maintained by the enteric nervous system, which coordinates smooth muscle activity to create receiving and propulsive segments. In the receiving segment, the longitudinal muscles ahead of the intraluminal contents contract and the circular muscles relax causing the lumen to expand and receive the intraluminal contents. Circular smooth muscles in the propulsive segment behind the intraluminal contents contract and the longitudinal muscles relax. Page 13.

Feedback B: This statement is false. Peristaltic activity is maintained by the enteric nervous system, which coordinates smooth muscle activity to create receiving and propulsive segments. In the receiving segment, the longitudinal muscles ahead of the intraluminal contents contract and the circular muscles relax causing the lumen to expand and receive the intraluminal contents. Circular smooth muscles in the propulsive segment behind the intraluminal contents contract and the longitudinal muscles relax. Page 13.

Feedback C: This statement is false. Peristaltic activity is maintained by the enteric nervous system, which coordinates smooth muscle activity to create receiving and propulsive segments. In the receiving segment, the longitudinal muscles ahead of the intraluminal contents contract and the circular muscles relax causing the lumen to expand and receive the intraluminal contents. Circular smooth muscles in the propulsive segment behind the

6. The interstitial cells of Cajal:

- A. fire action potentials to initiate the electrical slow waves propagating along the GI tract.
- B. Are found between the longitudinal and circular smooth muscle layers.
- C. Hormonally regulate peristalsis.

Show answer

Correct Answer: B

Feedback A: The interstitial cells of Cajal, which are found between the longitudinal and circular smooth muscles, are thought to be involved in the generation of slow waves. These electrical slow waves trigger action potentials. The highest frequency of slow waves occurs in the duodenum (12/minute) and decreases distally with the ileum having the lowest frequency. Page 12.

Feedback B: These cells are involved in the generation of slow waves, which trigger action potentials. Each action potential gives rise to a twitch-like contraction; if the frequency of action potentials is sufficient, a tonic-like level of contraction is observed. Elevation of intracellular calcium is required to initiate this contraction. Smooth muscle fibers are coupled via gap junctions allowing low resistance propagation of electrical signals through the fibers.

Feedback C: The interstitial cells of Cajal, which are found between the longitudinal and circular smooth muscles, are thought to be involved in the generation of slow waves. These electrical slow waves trigger action potentials. The highest frequency of slow waves occurs in the duodenum (12/minute) and decreases distally with the ileum having the lowest frequency. Page 12.

7. Circular smooth muscle in the the GI tract:

Correct Answer: A

Feedback A: Circular smooth muscle accounts for the majority of muscle in the stomach and intestine and is the main generator of force for propulsive contractions. There is less longitudinal muscle and it may not be continuous around the entire circumference of the GI tract.

Feedback B: Smooth muscle fibers are coupled via gap junctions allowing low resistance propagation of electrical signals through the fibers.

Feedback C: Circular smooth muscle accounts for the majority of muscle in the stomach and intestine and is the main generator of force for propulsive contractions. There is less longitudinal muscle and it may not be continuous around the entire circumference of the GI tract.

8. Which of the following is characteristic of the segmenting movements in the small intestine?

- A. It decreases particle size, which increases the surface area for digestion.
- B. It brings the products of digestion to the mucosal surface for absorption.
- C. It results in the mixing of the luminal contents in front of the propulsive segments (i.e. in the receiving segments)
- D. All of the above.

Show answer

Correct Answer: D

Feedback A: Correct, but so are some others.

Feedback B: Correct, but so are some others.

Feedback C: Correct, but so are some others.

9. Which of the following sphincters does NOT prevent reflux of material?

- A. Lower esophageal sphincter
- B. Gastroduodenal sphincter.
- C. Ileocolonic sphincter
- D. Internal anal sphincter.

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Show answer

Correct Answer: D

Feedback A: The LES separates esophagus from stomach. Page 14.

Feedback B: This sphincter (also called the pyloric sphincter) regulates chyme entry from the stomach into duodenum. Page 14.

Feedback C: The ileocolonic sphincter keeps bacteria-rich colonic material from refluxing into the small intestine. Page 14.

Feedback D: The internal anal sphincter functions to prevent uncontrolled movement of intraluminal material through the anus. Page 13.

10. Which of the following is NOT involved in swallowing?

- A. Contracture of the upper esophageal sphincter.
- B. Coordination by the swallowing center in the medulla oblongata.
- C. The approximation of the vocal cords to close the glottis.
- D. The raising of the larynx to close its entrance.
- E. The elevation of the soft palate to close the nasopharynx.

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Feedback E: This is involved in swallowing.

11. Which of the following swallowing disorders results from the failure of organized peristaltic behavior, or the simultaneous contraction all along the smooth muscle.

- A. Diffuse spasm.
- B. Dysphasia
- C. Achalasia.
- D. Myelphasia.
- E. Trachiasia.

Show answer

Correct Answer: A

Feedback A: This is the definition of diffuse esophageal spasm. Page 14.

Feedback B: Dysphagia is difficulty in swallowing due to the failure of lower esophageal sphincter relaxation. Page 14.

Feedback C: Achalasia appears to be a disorder of the efferent vagal inhibitory neurons that normally inhibit the LES causing the LES to fail to relax during swallowing. Page 14.

Feedback D: I don't know what this is, but it's not failure of organized peristaltic behavior.

Feedback E: I don't know what this is, but it's not failure of organized peristaltic behavior.

12. Choose the correct listing of the anatomical divisions of the stomach in the direction food normally passes.

Correct Answer: D

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Feedback A: Food goes from LES to Fundus and Cardia to Corpus to Antrum to Pylorus through Pyloric sphincter to Duodenum. Remember FCAP.

Feedback B: Food goes from LES to Fundus and Cardia to Corpus to Antrum to Pylorus through Pyloric sphincter to Duodenum. Remember FCAP.

Feedback C: Food goes from LES to Fundus and Cardia to Corpus to Antrum to Pylorus through Pyloric sphincter to Duodenum. Remember FCAP.

Feedback D: Food goes from LES to Fundus and Cardia to Corpus to Antrum to Pylorus through Pyloric sphincter to Duodenum. Remember FCAP.

Feedback E: Food goes from LES to Fundus and Cardia to Corpus to Antrum to Pylorus through Pyloric sphincter to Duodenum. Remember FCAP.

13. Which of the following is true of smooth muscle in the proximal stomach?

- A. It has no action potentials.
- B. It contracts phasically.
- C. Its main purpose is to grind and mix food prior to propelling it to the gastroduodenal junction.
- D. Receptive relaxation is controlled by decreasing activity of excitatory vagal neurons.

Show answer

Correct Answer: A

Feedback A: The proximal stomach is generally under tonic contraction regulated by slow changes in resting membrane potential-action potentials are not recorded from proximal smooth muscle in the stomach. The proximal region is involved in meal storage. Page 15.

14. Many factors influence the gastric action potential of the stomach. Which of the following is false?
- A. Acetylcholine, gastrin, and cholecystokinin increase amplitude of the plateau phase.
 - B. Gastrin increases AP frequency.
 - C. The initial contraction coincides with the plateau phase while the trailing contraction coincides with the rising phase of the AP.
 - D. Epinephrine and VIP decrease the amplitude of the plateau phase.
 - E. It is a single action potential originating in the orad boundary of the distal stomach.

Show answer

Correct Answer: C

Feedback A: This is true. Ach, gastrin, and CCK all decrease gastric emptying. Page 16.

Feedback B: This is true. Gastrin decreases gastric emptying. Page 16.

Feedback C: This is false. The initial contraction coincides with the rising phase of the AP while the trailing contraction coincides with the plateau phase of the AP. Page 16.

Feedback D: This is true. I don't know why.

Feedback E: This is true. The entire propulsive contractile complex is initiated by a single AP originating in the orad boundary of the stomach. This AP is myogenic and spreads through the electrically coupled smooth muscle at a frequency of 3/min. Page 16.

15. Emptying gastric contents into the small intestine is strictly controlled. Which of the

Correct Answer: C

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Feedback A: High caloric meals empty more slowly to keep the rate of delivery of caloric input to the small intestine within a narrow range. Page 16.

Feedback B: Liquid meals clear the stomach faster than solid meals with liquid emptying beginning 2-3 min after entry while solids begin to empty at 15-20 min. Page 16.

Feedback C: Your duodenum doesn't want more acid than it can handle.

Feedback D: Both hypertonic and hypotonic solutions empty at slower rates than isotonic solutions. Page 16.

16. How is the MMC controlled?

- A. Ingestion of food ends MMC at all points in the intestine.
- B. IV feeding ends MMC.
- C. Gastrin and CCK terminate MMC in stomach and entire small intestine.
- D. Vagal innervation completely controls MMC.
- E. The MMC increases in speed as it reaches the ileum.

Show answer

Correct Answer: A

Feedback A: The physical presence of food in the upper GI tract is necessary; IV feeding won't terminate the MMC

Feedback B: The physical presence of food in the upper GI tract is necessary; IV feeding won't terminate the MMC (Page 17).

Feedback C: Gastrin and CCK terminate the MMC in the stomach and the upper small

17. What is the difference between normal peristalsis of the SI and giant migrating contractions?

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- A. Normal peristalsis only propagates a short distance.
- B. Because of the distance giant migrating contractions travel, they contribute significantly to mixing chyme.
- C. Normal peristalsis can be initiated by vinegar on the mucosa, parasites, enterotoxins, and ionizing radiation.
- D. Normal peristalsis helps strip lumen clean as it travels.
- E. Normal peristalsis is sometimes associated with abdominal cramping and diarrhea.

Show answer

Correct Answer: A

Feedback A: Giant migrating contractions are strong, long-lasting contractions of circular smooth muscle that propagate for extended distances in small intestine and probably serve to eliminate noxious substances. A giant migrating contraction is much larger than the MMC or segmenting contractions. Page 17.

Feedback B: Giant migrating contractions strip the lumen clean as it travels at a rate of 1 cm/sec. Page 17.

Feedback C: These are all stimuli that will stimulate the brain to transmit a giant migrating contraction, which occurs orthograde when exposed to a noxious substance and retrograde during emesis. Page 17.

Feedback D: This is what a giant migrating contraction does. Normal peristalsis aims to encourage digestion. Page 17.

Feedback E: Giant migrating contractions are associated with these symptoms. Page 17.

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Correct Answer: B

Feedback A: Food remains in the large intestine for days. Page 18.

Feedback B: Dwell time in the small intestine is short (87 min). Page 18.

Feedback C: The transverse colon is involved in the storage and dehydration of feces. It is divided into compartments, called haustra, by ringlike contractions of smooth muscle. In this region, largely stationary movements, called haustration, help in water absorption. Mass movements normally begin in the middle of the transverse colon preceded by relaxation of circular muscles and downstream haustra. Page 18.

Feedback D: Remnants of meals reside in the small intestine for 3-4 days. Page 18.

Feedback E: This is what happens in the ascending colon, not the transverse colon. Page 18.

19. Power propulsion is controlled by many factors in the large intestine. Which of the following is NOT one of them?

- A. Castor oil acts on mucosal receptors to initiate it.
- B. May be triggered by ileal chyme delivery to the ascending colon.
- C. Can be triggered by parasites, enterotoxins, and food antigens.
- D. Normally starts in middle of transverse colon after the relaxation of circular muscles and downstream disappearance of haustral contractions.
- E. The influx of material will stimulate a mass movement 6-7 times daily.

Show answer

Correct Answer: E

Feedback E: This is false. Mass movements do not occur this often.

20. What is Hirshsprung's disease?

- A. A disease developed in adulthood.
- B. Loss of the intrinsic nervous plexus resulting in continuous contraction of circular muscle.
- C. Incompetence of internal or external anal sphincters.
- D. Inappropriate leakage of feces or flatus.
- E. A sensory malfunction where patients can't detect filling of the rectum.

Show answer

Correct Answer: B

Feedback A: It is a disease of infants. Page 11.

Feedback B: In Hirschsprung's disease, the terminal ganglia in the enteric nervous system fail to develop resulting in continuous contraction of circular smooth muscle, which blocks passage of feces. It is present at birth. Page 11.

Feedback C: In Hirschsprung's disease, the terminal ganglia in the enteric nervous system fail to develop resulting in continuous contraction of circular smooth muscle, which blocks passage of feces. It is present at birth. Page 11.

Feedback D: In Hirschsprung's disease, the terminal ganglia in the enteric nervous system fail to develop resulting in continuous contraction of circular smooth muscle, which blocks passage of feces. It is present at birth. Page 11.

Feedback E: In Hirschsprung's disease, the terminal ganglia in the enteric nervous system fail to develop resulting in continuous contraction of circular smooth muscle, which blocks passage of feces. It is present at birth. Page 11.

Show answer

Correct Answer: D

22. If you increase the rate of salivary secretion which of the following changes in ionic composition results?

- A. Sodium concentration increases.
- B. Bicarbonate concentration decreases.
- C. Chloride decreases.
- D. Potassium increases.
- E. Osmolarity decreases.

Show answer

Correct Answer: A

23. Which of the following salivary components continues to be active in the acidic environment of the stomach?

- A. Alpha-amylase
- B. Lingual lipase.

24. Which of the following best describes type of saliva produced when parasympathetic stimulation increases the rate of salivary secretion?

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- A. Copius, protein-poor, electrolyte-rich.
- B. Scant, transient protein-rich (mucin), electrolyte poor.
- C. Scant, protein-poor, electrolyte-poor.
- D. Copius, protein-rich (mucin), electrolyte-rich.

Show answer

Correct Answer: A

25. Which pair is correct concerning secretory glands/cells in the stomach and their products?

- A. Cardiac glands -- hydrochloric acid and intrinsic factor.
- B. Parietal cells -- pepsinogen
- C. Chief cells -- mucus
- D. G cells -- protease
- E. D cells -- somatostatin.

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Correct Answer: E

that pumps out hydrogen in exchange for extracellular potassium.

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Show answer

Correct Answer: C

27. Which of the following does NOT regulate gastric acid secretion?

- A. Vagus nerve stimulation.
- B. Cholecystokinin.
- C. Histamine
- D. Gastrin
- E. Acetylcholine

Show answer

Correct Answer: B

28. Which of the following combinations will result in the most acid secretion through potentiation?

- A. Vagal input, histamine, gastrin
- B. Vagal input, histamine, secretin
- C. Histamine, gastrin, secretin.
- D. Gastrin, vagal input, secretin

29. A condition that results in too much acid in the stomach could be attributed to which of the following?

- A. Lack of taste buds or damage to olfactory nerves.
- B. Defect resulting in release of too much secretin.
- C. Defective G cells.
- D. Defect in D cells in the antrum.
- E. Loss of elasticity of small intestine making distension more difficult.

Show answer

Correct Answer: D

30. If you follow the path that food normally takes through the digestive system, which of the following is in the correct order?

- A. Upper esophageal sphincter, epiglottis, lower esophageal sphincter, pyloric canal, duct of Santorini, duct of Wirsung.
- B. Pharynx, epiglottis, lower esophageal sphincter, pyloric canal, duct of Wirsung, duct of Santorini.
- C. Pharynx, epiglottis, lower esophageal sphincter, pyloric canal, duct of Santorini, duct of Wirsung.
- D. Pharynx, upper esophageal sphincter, pyloric canal, lower esophageal sphincter, duct of Wirsung, duct of Santorini.

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concentrations and their rate of secretion are different. Which of the following is true?

A. A higher rate of pancreatic secretion results in increased bicarbonate and sodium ion.

Plasma has less bicarbonate and more sodium.

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B. A higher rate of pancreatic secretion results in increased bicarbonate and decreased chloride ion. Plasma has less bicarbonate and more chloride.

C. A higher rate of pancreatic secretion increases its osmolarity and pH. Plasma has a lower osmolarity as pancreatic secretions.

D. A higher rate of pancreatic secretion results in increased bicarbonate and potassium ion. Plasma has lower levels of both ions.

Show answer

Correct Answer: B

32. If duodenal mucosal release of CCK was not working properly, which phase of pancreatic secretion would be interfered with?

A. Cephalic phase.

B. Gastric phase.

C. Intestinal phase.

D. Duodenal phase.

Show answer

Correct Answer: C

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Correct Answer: B

34. Which of the following is NOT a component of bile secretions?

- A. Stercobilin.
- B. Bile pigments
- C. Cholesterol
- D. Lecithin
- E. Bilirubin-glucuronide

Show answer

Correct Answer: A

35. Since bile acids are highly lipophilic, they would be rapidly absorbed through the small intestine wall before they could facilitate lipid digestion. Which of the following prevents that from happening?

- A. Addition of hydroxyl and carboxyl acid groups to steroid nucleus of cholesterol.
- B. Bile acids combine with phospholipids to become less easily absorbed.
- C. Bile acids are conjugated to glycine or taurine so they ionize readily.
- D. Cholesterol binds to the bile acids to keep them from being absorbed.

36. If a patient has inadequate bile secretion, which of the following could contribute to the condition? www.FirstRanker.com www.FirstRanker.com

- A. Excessive release of cholecystokinin
- B. Excessive release of motilin
- C. Excessive release of secretin
- D. Excessive steroid hormones.
- E. Excessive parasympathetic stimulation.

Show answer

Correct Answer: D

37. Components of the intestinal mucosa combine to increase the surface area to 600 times that of a cylinder. Which component makes the greatest contribution to increasing the surface area?

- A. The folds
- B. The villi
- C. The microvilli
- D. The cilia

Show answer

Correct Answer: C

Show answer

Correct Answer: A

39. Which of the following is NOT a polysaccharide?

- A. Dextrin
- B. Glycogen
- C. Sorbitol
- D. Amylose
- E. Amylopectin.

Show answer

Correct Answer: C

40. Choose the FALSE statement regarding dietary fiber?

- A. Examples are cellulose, hemicellulose, pectin, and gums.
- B. Insoluble in water, poorly digested, excreted in feces.
- C. Pectin is readily absorbed.
- D. Binds to bile acids and promotes their excretion.
- E. Reduces colon transit time and may reduce the production of carcinogenic secondary bile acids.

41. A deficiency of colipase would result in which of the following?
- A. Lipase would not be able to bind to the oil-water interface of the lipid.
 - B. An inability to digest phospholipids.
 - C. An inability to digest cholesterol.
 - D. An inability to digest lipids in the stomach.

Show answer

Correct Answer: A

42. Which of the following pass through the thoracic duct before passing through the liver?
- A. Lecithin.
 - B. Micelles
 - C. VLDLs
 - D. Chylomicrons.
 - E. Small and medium chain fatty acids.

Show answer

Correct Answer: D

Feedback D: Correct. Because chylomicrons are too large to enter the capillaries, they are transferred to lymph vessels and are added to the bloodstream via the thoracic duct.

Feedback E: Incorrect. Directly absorbed into the blood stream.

D. Cholecystokinin deficiency.

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Correct Answer: C

44. Of the following water soluble vitamins, which one CANNOT be absorbed by passive diffusion if the concentration is high enough?

- A. Vitamin B1
- B. Niacin.
- C. Vitamin B12
- D. Biotin.

Show answer

Correct Answer: C

45. Defective parietal cells would result in malabsorption of which vitamin?

- A. Vitamin B1
- B. Vitamin B2
- C. Niacin
- D. Vitamin B12
- E. Folic acid.

46. Which of the following is absorbed primarily by passive diffusion powered by a concentration gradient?

- A. Sodium
- B. Potassium
- C. Calcium
- D. Zinc
- E. Iron.

Show answer

Correct Answer: B

47. Of the approximately 9 liters of water that go through the GI tract daily, how much makes it out in the feces?

- A. 100 ml
- B. 1000 ml
- C. 2000 ml
- D. 1500 ml
- E. 500 ml

Show answer

Correct Answer: A

D. The person must have excessive sensitivity to PTH, since normal levels are stimulating excessive calcium mobilization from bone.

C. The PTH should be low if the parathyroid were functioning normally, thus the problem does lie in the parathyroid gland.

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D. You cannot be sure what is going on; you need to perform a parathyroid scan.

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Correct Answer: C

2. A mother comes to see you because two of her seven children are morbidly obese. She and her husband think they may have some relatives in common, and both parents are dark-haired. She brings one of her children with her. The boy is 13 years old, and weighs 230 lb; his BMI is 52. At birth, he was found to have adrenal insufficiency and has been treated with appropriate doses of glucocorticoids. On exam he is an obese, but otherwise normal red-haired kid. What would be the best treatment, assuming that the phenotype is due to a single genetic lesion, and that the treatment options listed were available?

A. Leptin injections.

B. A melanocortin 4 receptor (one of the MSH receptors) agonist.

C. An NPY antagonist.

D. Four weeks in a summer camp for obese kids.

E. Thyroid hormone replacement.

Show answer

Correct Answer: B

- C. The tyrosine kinase activity of the glucagon receptor will be turned on.
D. Lipolysis will be suppressed.
E. Nothing, because you have to give some form of glucose along with the glucagon in order for it to work.
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Show answer

Correct Answer: A

4. Which of the following statements is true regarding thyroid hormone receptors (TRs):
- A. The three beta isoforms of the thyroid hormone receptor (TR-b1, b2, b3) are the products of three distinct genes
B. The predominant TR isoform in the liver is TR-a1
C. TR-b2 is the major mediator of the negative regulation of the TSH and TRH genes in the pituitary and paraventricular hypothalamus respectively.
D. Uncoupling protein-1 (UCP-1) is an important thyroid hormone target in white adipose tissue that is involved in thyroid hormone induced thermogenesis
E. Increased cholesterol levels that occur in hypothyroidism are the result of upregulation of LDL receptor expression in hepatocytes.

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Correct Answer: C

E. Iodine that is released from proteolytic cleavage of thyroglobulin can be recycled from mono and diiodotyrosines by the action of type I deiodinase enzyme residing in thyroid follicular cells.

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Show answer

Correct Answer: E

6. A 51-year old woman seeks attention because she has not had a menstrual period for 4 months. She is not pregnant, and her follicle stimulating hormone level returns at 112 uIU/dL (normal \leq 14). She is menopausal and is deficient in estrogen and:

- A. Activin
- B. Inhibin
- C. GnRH
- D. Corticosterone

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Correct Answer: B

7. In parathyroid cells, calcium regulates expression and release of parathyroid hormone (PTH) by binding to:

- A. A nuclear receptor in the supergene family that includes steroid hormone receptors, the

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Correct Answer: B

8. A 52-year-old male presents for treatment of his hyperlipidemia. Diet efforts have had little effect on his lipid profile. RISKS: no known coronary artery disease, non-smoker and no family history of early coronary artery disease. Blood pressure 150/94, Lab data shows: total cholesterol 250 mg/dl, TG 250 mg/dl, HDL 34 mg/dl, LDL 166 mg/dl, fasting glucose 135 and 128 mg/dl on two occasions. According to ATP III guidelines:

- A. By ATP III guidelines this patient has two risk factors for coronary artery disease.
- B. By ATP III guidelines this patient should be treated with medication to achieve an LDL level of less than 160 mg/dL.
- C. By ATP III guidelines this patient should be treated with medication to achieve an LDL level of less than 130 mg/dL.
- D. By ATP III guidelines this patient should be treated with medication to achieve an LDL level of less than 100 mg/dL.
- E. The high TG levels pose the greatest cardiac risk for this patient.

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Correct Answer: D

9. On physical examination a patient is noted to have tendon xanthomata. Which statement

Show answer

Correct Answer: C

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10. A deficiency of ACTH secretion would greatly diminish

- A. The synthesis of aldosterone
- B. The synthesis of testosterone in a man
- C. The secretion of cortisol
- D. The secretion of estradiol
- E. All of the above

Show answer

Correct Answer: C

11. Cortisol synthesis would be diminished by

- A. A defect in 11-hydroxysteroid dehydrogenase
- B. A defect in 21-hydroxylase
- C. A defect in 18-hydroxylation
- D. A defect in 5-alpha-reductase
- E. A defect in aromatase

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Correct Answer: B

- C. If membrane potential moves in the positive direction it is called depolarization.
D. If you put both the measuring electrode (eg, microelectrode) and reference inside of a cell, you will measure a negative voltage.

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Show answer

Correct Answer: C

2. Choose one correct answer.

- A. Phase 0 of a cardiac action potential is the rapid repolarization phase of the action potential.
B. Phase 1 of a cardiac action potential is the upstroke of a cardiac action potential.
C. During phase 4 of a cardiac action corresponds to the plateau phase of the action potential.
D. None are correct.

Show answer

Correct Answer: D

3. Choose one correct answer.

- A. If efflux of an ion exceeds influx, the ion will accumulate in the cell.
B. The flux of an ion across a cell membrane is equal to the product of membrane

4. If the resting membrane potential is -100mV and the sodium equilibrium potential is $+40\text{mV}$ then what is the value of the electrochemical gradient (ie, total driving force) acting on sodium ions? Choose one correct answer.

- A. $+60\text{ mV}$
- B. -60 mV
- C. -140 mV
- D. None are correct.

Show answer

Correct Answer: C

5. Choose one correct answer.

- A. The lipid bilayer portion of the cell membrane acts like a resistor.
- B. If the membrane conductance to an ion is very high and the total electrochemical gradient is zero there will be no net movement of the ion through the membrane.
- C. If the concentration gradient of an ion across the membrane is inwardly directed and the electrical gradient is equal and opposite, there will be net movement of the ion into the cell.
- D. None are correct.

Show answer

become more negative.

B. Cardioplegia solutions contain a low concentration of potassium.

C. The upstroke of the nerve action potential is generated by Na⁺ influx via the Na-K pump.

D. Action potentials repolarize because the net ionic current is outward.

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Correct Answer: D

7. Choose one correct answer.

A. A reduction in sodium current will increase action potential conduction velocity in nerve.

B. An increase in cell diameter will increase action potential conduction velocity in nerve.

C. An increase in membrane capacitance will increase conduction velocity in heart cells.

D. None are correct.

Show answer

Correct Answer: B

8. Choose one correct answer.

A. Skeletal muscle cells are electrically connected via gap junctions.

B. Local circuit currents are not required for action potential propagation.

C. An increase in action potential amplitude will decrease conduction velocity.

9. Choose one correct answer.

- A. The refractory period of nerve, heart and skeletal muscle is due to inactivation of sodium channels.
- B. The space constant is an index of how far local circuit currents can spread in nerve, heart and skeletal muscle.
- C. Closure of gap junctions will increase conduction velocity in heart.
- D. None are correct.

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Correct Answer: A

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C. a main morphological difference between the metanephros (permanent kidney) and the mesonephros, is the development of the loop of Henle
D. A and C are correct
E. all are correct

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Show answer

Correct Answer: E

2. The main barrier precluding the free passage of albumin across the glomerular capillary walls is formed by:

- A. the fenestrated glomerular endothelium
- B. anionic proteoglycan clusters within the glomerular basement membrane
- C. the filtration slits in between visceral epithelial cells (podocytes)
- D. none are correct
- E. all are correct

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Correct Answer: B

3. Concerning the measurement of renal plasma flow (RPF) and glomerular filtration rate (GFR):

- A. inulin is a good GFR marker because it is freely filtered in the glomeruli and it is not

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Correct Answer: E

4. Concerning the functional histology of the kidney:

- A. the superficial nephrons have short loops of Henle; thus, they have a low capacity to reabsorb salt (salt losing nephrons)
- B. the deep nephrons have long loops of Henle; thus they have a high capacity to reabsorb salt and water
- C. in dehydration, the blood flow to deep nephrons tends to increase
- D. A and C are correct
- E. all are correct

Show answer

Correct Answer: E

5. The following factor(s) tend(s) to INCREASE the rate of glomerular filtration (GFR):

- A. decreased albumin concentration in plasma
- B. vasodilation of the afferent (pre-glomerular) arteriole
- C. vasoconstriction of the efferent (post-glomerular) arteriole
- D. A and C are correct
- E. all are correct

6. The following factor(s) tend(s) to INCREASE the rate of glomerular filtration (GFR):

- A. sympathetic stimulation (norepinephrine) of the afferent arteriole
- B. obstruction of the renal tubules, ureter or urethra
- C. vasodilation of the efferent arteriole
- D. none are correct
- E. all are correct

Show answer

Correct Answer: D

7. Concerning the function of the glomerular mesangial cells:

- A. mesangial cells can contract and cause some decrease in total glomerular filtration area
- B. mesangial cells play a major role in systemic angiotensin II production
- C. mesangial cells are phagocytic and play a role in the clearing of proteins and immune-deposits entrapped in the mesangium
- D. A and C are correct
- E. all are correct

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Correct Answer: D

- D. A and C are correct
- E. all are correct

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Show answer

Correct Answer: D

9. Concerning metabolic energy (at production) for renal transport:

- A. the main substrate for proximal tubule is glucose
- B. the cortical PO₂ is about 10 mmHg
- C. the papillary tissues normally generate ATP via oxidative metabolism
- D. A and C are correct
- E. all are correct

Show answer

Correct Answer: B

10. Concerning water reabsorption by the proximal tubule:

- A. main driving forces for water reabsorption in the proximal tubule are solute uptake and oncotic pressure in peritubular capillaries
- B. a significant amount of water uptake in the proximal tubule is dependent on sodium uptake by the Na/H antiports present in their luminal membrane

11. Concerning the THICK loop of Henle:

- A. the thick segment of the loop has a very powerful Na/K/2Cl pump that moves salt from the tubular lumen into the peritubular space
- B. water and urea move freely across the epithelium of the thick ascending segment of the loop
- C. following the administration of furosemide (lasix) large volumes of diluted urine are produced
- D. A and C are correct
- E. all are correct

Show answer

Correct Answer: D

12. Concerning urinary concentration:

- A. the thick loop of Henle generates most of the osmotic gradient needed for reabsorption of water in the collecting duct
- B. the tubular urine that reaches the collecting duct is generally hypotonic with respect to plasma
- C. in the absence of ADH, urine is not concentrated along the length of the collecting duct
- D. A and C are correct
- E. all are correct

13. Concerning the transport of urea in the different segments of the nephron:

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- A. main tubular urea source is the plasma via the glomerular ultrafiltrate
- B. the urea concentration in the lumen of the cortical collecting ducts increases as water is reabsorbed
- C. the thin loop of Henle and the medullary collecting duct are permeable to urea
- D. A and C are correct
- E. all are correct

Show answer

Correct Answer: E

14. Concerning the macula densa:

- A. the macula densa senses the total amount of sodium chloride (sodium chloride concentration times volume) of tubular urine being delivered by the loop of Henle into the distal convoluted tubule
- B. if the delivery of sodium chloride is lower than normal the macula densa signals the afferent arteriole (pre-glomerular) to release renin
- C. renin release causes intravascular angiotensin formation and indirectly aldosterone release
- D. A and C are correct
- E. all are correct

Show answer

Correct Answer: E

enzyme present at the luminal surface of endothelial cells

B. aldosterone, but not AII, stimulate thirst and salt appetite

C. angiotensin II induces marked increases in sodium reabsorption by the loop of Henle and the collecting duct

D. A and C are correct

E. all are correct

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Show answer

Correct Answer: A

16. Within an hour following intravenous angiotensin II infusion, the following is(are) clinically evident:

A. increased sodium uptake in the proximal tubular epithelium

B. systemic vasoconstriction

C. increased plasma aldosterone

D. A and C are correct

E. all are correct

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Correct Answer: E

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Correct Answer: C

18. Concerning arterial blood pressure regulation:

- A. prostaglandins and dopamine and bradykinin are vasodilators
- B. ADH, angiotensin II and epinephrine are vasoconstrictors
- C. the vasodilator/vasoconstrictor ratio that regulates total peripheral resistance plus cardiac stroke volume and heart rate are determinants of blood pressure
- D. all are correct
- E. none are correct

Show answer

Correct Answer: E

19. Concerning cell volume regulation:

- A. the Na/H and Cl/HCO₃ antiports are involved in hypertonic cell volume regulation
- B. rapid efflux of cytoplasmic water is followed by volume regulatory KCL efflux
- C. KCL efflux is involved in hypotonic cell volume regulation
- D. A and C are correct
- E. all are correct

20. Intravenous administration of 1.5 liters of isotonic Ringer's solution to a healthy adult could cause:

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- A. increased cardiac output and renal blood flow
- B. increased GFR
- C. increased atrial natriuretic peptide and decreased renin in plasma
- D. A and C are correct
- E. all are correct

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Correct Answer: E

21. Renin

- A. Increased H₂O reabsorption
- B. Decreased sodium reabsorption
- C. AII formation
- D. Increased sodium reabsorption
- E. Decreased phosphate reabsorption

Show answer

Correct Answer: C

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Correct Answer: B

23. ADH

- A. Increased H₂O reabsorption
- B. Decreased sodium reabsorption
- C. AII formation
- D. Increased sodium reabsorption
- E. Decreased phosphate reabsorption

Show answer

Correct Answer: A

24. AII

- A. Increased H₂O reabsorption
- B. Decreased sodium reabsorption
- C. AII formation
- D. Increased sodium reabsorption
- E. Decreased phosphate reabsorption

25. PTH

- A. Increased H₂O reabsorption
- B. Decreased sodium reabsorption
- C. AII formation
- D. Increased sodium reabsorption
- E. Decreased phosphate reabsorption

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Show answer

Correct Answer: E

26. Which one of the following is correct about nonvolatile acids.

- A. they are not essential to eliminate from the body
- B. we generate much greater amounts of nonvolatile than volatile acids
- C. they are fully buffered by bone
- D. they are products of intermediary metabolism and protein degradation
- E. they are eliminated by the lungs

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Correct Answer: D

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Correct Answer: C

28. If the pH is 7.60 (H^+ concentration = 25 nEq/L) and the pCO_2 is 40 mmHg, what is the HCO_3^- concentration (in mEq/liter).

- A. 10
- B. 20
- C. 30
- D. 40

Show answer

Correct Answer: D

29. A patient takes a drug overdose and becomes comatose. His blood pCO_2 was 40 mmHg ten minutes ago, but you discover it is now 80 mmHg. Which one of the following statements about this patient is correct.

- A. the pH of his CSF is likely to fall more slowly than the pH of his blood
- B. the pH of his blood is likely to fall more slowly than the pH of his CSF
- C. the pH of the blood and CSF will not change because he will rapidly eliminate bicarbonate in the urine in response to the rise in pCO_2
- D. the pH of the blood and CSF will change to a similar degree in this time period

30. Which one of the following statements is true about the proximal tubule.

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- A. the Na^+/K^+ ATPase drives sodium into the cell from the urine side of the tubule
- B. Na^+/H^+ exchange is largely the mechanism by which hydrogen ion secretion occurs
- C. bicarbonate reabsorption is independent of carbonic anhydrase activity
- D. the pH in the lumen of the proximal tubule can reach as low as about 5.0

Show answer

Correct Answer: B

31. A patient ingests antifreeze and needs to eliminate the ingested acid. Renal elimination of the protons in this excess acid is primarily accomplished by which of the following mechanisms.

- A. increased urinary ammonium excretion
- B. increased urinary excretion of phosphates
- C. hyperventilation
- D. increased urinary free hydrogen ion concentration
- E. increased urinary sulfate excretion

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Correct Answer: A

Show answer

Correct Answer: A

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33. Which one of the following statements is correct with regard to net collecting duct hydrogen ion secretion.

- A. it is decreased by increased renal production of ammonia
- B. it is increased by increased reabsorption of sodium through the apical sodium channel
- C. it is not affected by the presence or absence of titratable acids
- D. aldosterone does not modify collecting duct hydrogen ion secretion

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Correct Answer: B

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