

Questions – GI

- (1) Discuss how a bolus of food is transported safely and efficiency from the mouth to the stomach. In your discussion address the role of swallowing and peristalsis in ensuring the safe and efficient arrival of food to the stomach. Additionally, address the mechanisms responsible for initiating these forms of motility. Lastly, address those secretions that might contribute to ensuring the safe and efficient movement of food to the stomach.
- (2) Discuss those secretions that contribute to the digestion of food as it travels from the mouth to the stomach. In addressing the secretions consider the stimuli responsible for activating the secretions. Similarly, consider the glands or cells responsible for the secretions. Lastly, consider the timing of the secretions relative to the point at which food entered the mouth.
- (3) Describe what is occurring when an individuals complains of heart burn. Describe 3 potential treatments that might alleviate symptoms of heart burn.
- (4) Discuss the digestion of a portion of meat (assume the meat is comprised solely of complex proteins) as it travels from the mouth to the anus.

During your discussion:

- i) compare and contrast the various forms of motility that exist at each level of the GI tract and the role each form of motility has in the digestion of the meat. Additionally, consider the timing of each form of motility.
- ii) address the secretions responsible for the digestion of the meat. Remember to address the target organs and cells which secrete the enzymes that contribute to the digestion of meat. In addition, discuss the stimuli responsible for the secretions as well as the timing of the secretions.
- (iii) address the location where most of the simplified amino acids will be absorbed.

Questions - Respiratory

- (1) The respiratory rhythm can be recorded from what component of the nervous system?
- (2) Under resting conditions is breathing typically controlled voluntarily?
- (3) What groups are comprised of neurons that discharge during inspiration?
- (4) Once the respiratory rhythm is generated where does it travel?
- (5) What is the name of the motoneurons that are located in C3-C5 of the spinal cord?
- (6) What is the name of the motoneurons located in the thoracic regions of the spinal cord?
- (7) What nerves innervate the diaphragm and external intercostal muscles?
- (8) What are the names of the accessory muscles of inspiration?
- (9) Is expiration normally an active or passive process?
- (10) Name two expiratory muscles?
- (11) How many generations of branching points are there in the tracheobronchial tree?
- (12) How many generations of branching points comprise the conducting zone of the tracheobronchial tree?
- (13) Does any gas exchange occur in the conducting zone? What is the name given to the volume of air found in the conducting zone?
- (14) What is the name of the vessel that carries deoxygenated blood from the heart to the lung?
- (15) How does the pulmonary artery differ from systemic arteries?
- (16) What is the function of type 2 alveolar cells?
- (17) What is the resting position of the lung and chest wall at the end of a normal expiration (name the lung volume)?
- (18) What are the resting positions of the lung and chest wall when they are uncoupled?
- (19) What is the transpulmonary pressure when the lung and chest wall are at their resting position?
- (20) What is the intrapleural pressure when the lung and chest wall are uncoupled?
- (21) What is normal lung compliance in a healthy adult?
- (22) How does surfactant promote alveolar stability and ultimately ensure normal lung compliance?
- (23) How is lung compliance altered in the absence of surfactant?
- (24) Name the volume of air in the lung after a maximal inspiration? What impact does this volume of air have on airway resistance?
- (25) What are the two branches of the autonomic nervous system?
- (26) Once activated what branch of the autonomic nervous system causes airway diameter to decrease?
- (27) Name one pharmacological treatment for chronic obstructive pulmonary disease?
- (28) Describe the three patterns of airflow that may be found in the tracheobronchial tree? What pattern typically leads to an increase in airway resistance?
- (29) What is a typical value for tidal volume under resting conditions?
- (30) How does one determine the volume of air inspired in one minute?
- (31) What volumes comprise physiological deadspace? How does physiological deadspace differ between a healthy individual and an individual with chronic obstructive pulmonary disease?
- (32) A patient comes into the pulmonary function laboratory complaining of shortness of breath. You have the patient perform a forced vital capacity maneuver and find that the vital capacity is 40 % of predicted and the volume expired within the 1 s of the maneuver is 50 % of the predicted value. What is your preliminary diagnosis?
- (33) You subsequently treat the patient with a β agonist and wait 20 minutes and repeat the forced vital capacity maneuver. There is no change in the % predicted forced vital capacity and volume expired within the first second after treatment. Can any change be made to your diagnosis?

- (34) What is the normal partial pressure of oxygen in arterial blood at sea level? Will this value increase, decrease or stay the same if hiking at high altitude? Why?
- (35) How is oxygen transported from the lungs to the tissue?
- (35) Draw the oxyhemoglobin dissociation curve. What factors cause the oxyhemoglobin dissociation curve to shift to the right?
- (36) How is carbon dioxide transported from the tissue bed to the lungs?
- (37) Where are the peripheral chemoreceptors located?
- (38) What stimuli increase the activity of the peripheral chemoreceptors?
- (39) How does an increase in peripheral chemoreceptor activity ultimately result in an increase in ventilation?
- (40) Where are the central chemoreceptors located?
- (41) What stimuli increase the activity of the central chemoreceptors?
- (42) What is the normal value for arterial pH?
- (43) How might the respiratory system compensate for metabolic acidosis?
- (44) What mechanism(s) would be responsible for this alteration in respiratory drive?
- (45) High altitude is characterized by decreases in the partial pressure of oxygen. In order to compensate for this reduction in oxygen levels ventilation increases. Discuss the mechanism(s) responsible for the increase in ventilation.
- (46) In addition to causing ventilation to increase, hiking at high altitude leads to a rightward shift in the oxyhemoglobin dissociation curve. Discuss the potential stimuli that cause this rightward shift and the potential advantages and disadvantages of a rightward shift in the oxyhemoglobin dissociation curve at high altitude.
- (47) Breathholding under resting conditions is a process by which an individual voluntarily decides to hold their breath. However the length of time that an individual is capable of holding their breath is dependent primarily on involuntary mechanisms. Describe how these involuntary mechanisms override the voluntary effort to breathhold. In answering this question consider the changes in blood gas values that occur in response to breathholding. Then consider how these changes might affect the receptors that were presented to you in lecture. Lastly consider how changes in the activity of these receptors might cause you to stop your breathhold and begin breathing.
- (48) Would breath hold time increase, decrease or remain constant if an individual was to (a) hyperventilate prior to holding their breath and (b) inspire to total lung capacity before breathholding.
- (49) Name the locations of the irritant receptors in the tracheobronchial tree and the types of responses induced by the activation of these receptors.
- (50) Describe how activation of these receptors might exacerbate an asthmatic attack. What is one potential treatment for someone experiencing an asthmatic episode?