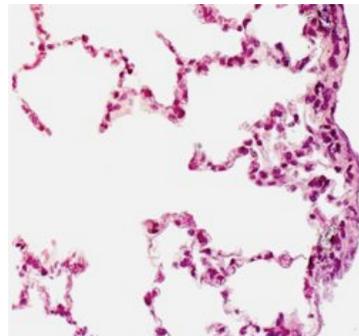


**Respiratory #1 – Histology**

- 1) Which of the following belongs to the respiratory portion of the air passage, not the conduction portion?
  - a) Bronchioles
  - b) Bronchi
  - c) Trachea
  - d) Larynx
  - e) Pharynx
- 2.1) Which of the following respiratory cell types create mucus?
  - a) Brush cells
  - b) Basal cells
  - c) Ciliated cells
  - d) Olfactory cells
  - e) Goblet cells
- 2.2) What type of cells line the vestibular chamber of the nasal cavity?
  - a) Bipolar olfactory neurons
  - b) Pseudostratified columnar
  - c) Ciliated tall columnar
  - d) Stratified squamous
  - e) Small granular cells
- 3) What type of epithelial cell characterizes the larynx and respiratory tract?
  - a) Unciliated pseudostratified squamous
  - b) Ciliated pseudostratified squamous
  - c) Unciliated pseudostratified columnar
  - d) Ciliated pseudostratified columnar
  - e) Brush cells and goblet cells
- 4.1) What type of tracheal cells function as receptor cells as their basal surface is in synaptic contact with afferent nerve endings?
  - a) Ciliated cells
  - b) Mucous cells
  - c) Brush cells
  - d) Small granule cells
  - e) Basal cells
- 4.2) The C-shaped cartilaginous layer is a unique feature of which of the following?
  - a) Bronchioles
  - b) Bronchi
  - c) Trachea
  - d) Larynx
  - e) Pharynx
- 5) Disappearance of what histological layer signifies a change from the bronchi to the bronchioles?
  - a) Mucosa
  - b) Muscularis
  - c) Submucosal
  - d) Cartilage plates
  - e) Adventitia

- 6) Which of the following best describes the epithelial layer of the small bronchioles?
- Simple cuboid epithelium with Clara cells
  - Pseudostratified cuboid epithelium with ciliated cells
  - Simple columnar epithelium with Clara cells
  - Pseudostratified columnar epithelium with ciliated cells
  - Extensive cartilage plates, especially in smokers
- 7) Which of the following statements is true?
- As bronchiole size decreases, Goblet cells increase
  - As bronchiole size decreases, Clara cells decrease
  - Clara cell protein (CC16) prevents luminal adhesion
  - CC16 is most important during inspiration
  - With lung injury, CC16 would increase in bronchoalveolar lavage and decrease in blood serum
- 8) Which of the following respiratory areas is considered transitional between the portions of the air passage?
- Bronchioles
  - Bronchi
  - Trachea
  - Larynx
  - Alveoli
- 9) Which of the following are thin-walled, polyhedral shaped, and are involved directly in gas exchange?
- Bronchioles
  - Bronchi
  - Trachea
  - Larynx
  - Alveoli
- 10) Which of the following is NOT true regarding type II alveolar cells?
- They produce type I pneumocytes
  - They produce type II pneumocytes
  - They produce surfactant
  - They tend to bulge into air spaces like Clara cells
  - They are mostly thin squamous cells
- 11.1) What is the major role of dipalmitoylphosphatidylcholine (DPPC)?
- Increases surface tension
  - Reduces surface tension
  - Dilates bronchioles
  - Constricts bronchioles
  - Secretes mucus
- 11.2) Which of the following is responsible for surfactant homeostasis as well as modulating the immune response to viruses, bacteria, and fungi?
- Surface protein A (SP-A)
  - Surface protein B (SP-B)
  - Surface protein C (SP-C)
  - Surface protein D (SP-D)
  - DPPC

- 12) Which of the following is only present in the thick portion of the air-blood barrier?  
a) Type I epithelial cells  
b) Surfactant layer  
c) Fused basal lamina  
d) Lymph vessels  
e) Capillary endothelial cell
- 13) Which of the following is NOT true regarding alveolar macrophages?  
a) They function in the connective tissue of the septum  
b) They function in the air space of the alveolus  
c) They phagocytize and digest mycobacterium, preventing re-infection  
d) They scavenge particulates such as dust and pollen  
e) They can scavenge red blood cells that enter the alveolus in heart failure
- 14) Which of the following is supplied by the pulmonary circulatory system?  
a) Left lung parenchyma  
b) Right lung parenchyma  
c) Bronchioles  
d) Bronchi  
e) Alveoli
- 15) The lung has dual lymphatic drainage for the parenchyma and the lung surface. Which of the following is NOT the common lymph drainage pattern of the lung?  
a) Right inferior lobe toward the right bronchus  
b) Left inferior lobe toward the left bronchus  
c) Right superior lobe toward the right bronchus  
d) Left superior lobe toward the left bronchus  
e) Left inferior lobe toward the right bronchus
- 16.1) What type of tissue makes up the “Adam’s Apple”?  
a) Compact bone  
b) Hyaline cartilage  
c) Spongy bone  
d) Fibrocartilage  
e) Elastic cartilage
- 16.2) What cell type is most numerous in olfactory mucosa?  
a) Basal cells  
b) Brush cells  
c) Olfactory cells  
d) Sustentacular cells  
e) None of the above
- 16.3) In what structure does gas exchange NOT occur?  
a) Terminal bronchiole  
b) Respiratory bronchiole  
c) Alveolar duct  
d) Alveolar sac  
e) Alveoli
- 16.4) Which of the following is shown here? >>>>>>>  
a) Olfactory mucosa  
b) Respiratory mucosa





exam reveals an enlarged liver and icterus. Testing reveals a deficiency in the serine protease inhibitor (serpin) alpha1-antitrypsin. Which of the following is not being broken down in this patient, leading to their symptoms?

- a) Angiotensin converting enzyme
  - b) DPPC
  - c) Elastase
  - d) CC16
  - e) Surfactant
- 2.1) In most patients with cystic fibrosis, what type of mutation occurs in the gene that encodes for the protein product cystic fibrosis transmembrane regulator (CFTR)?
- a) Nonsense mutation
  - b) Missense mutation
  - c) Silent mutation
  - d) Base-pair repeat sequence
  - e) Triple-base-pair deletion
- 2.2) Which of the following mutant alleles (proteinase inhibitor genotypes) seen in alpha1-antitrypsin deficiency has the least alpha1-antitrypsin activity and thus is the most likely to cause emphysema and GI disease?
- a) SS
  - b) SZ
  - c) ZZ
  - d) MM
  - e) MZ
- 2.3) Alpha1-antitrypsin deficiency usually involves which of the following on chromosome 14?
- a) Nonsense mutation
  - b) Missense mutation
  - c) Silent mutation
  - d) Base-pair repeat sequence
  - e) Triple-base-pair deletion
- 3) Which of the following is used most commonly for the detection of cystic fibrosis in children and the fetus via amniocentesis or chorionic villus sampling (CVS)?
- a) Hybridization
  - b) Northern blotting
  - c) Western blotting
  - d) Southern blotting
  - e) Polymerase chain reaction (PCR)
- 4) Which of the following is NOT a fundamental feature of the oxygen transport and storage systems?
- a) The carrier molecule (Hb) should have a higher oxygen affinity when oxygen is present in the lungs
  - b) The storage molecule (Mb) should have a lower oxygen affinity than Hb at low oxygen tension
  - c) Hb should be able to transport CO<sub>2</sub> back to the lungs for removal
  - d) HB should release oxygen more readily to working muscle than resting muscle
  - e) Hb should have a lower oxygen affinity in the tissues than in the lungs

5.1) The oxygen-holding heme pocket formed by a myoglobin molecule consists of how many alpha-helices?

- a) 3
- b) 4
- c) 6
- d) 8
- e) 9

5.2) The heme pocket formed by methylene bridges in hemoglobin consists of how many co-planar pyrrole rings, making a porphyrin ring (protoporphyrin IX) which includes the proximal histidine (his F8) and distal histidine (his E7)?

- a) 3
- b) 4
- c) 6
- d) 8
- e) 9

6) According to a rectangular hyperbolic saturation curve, in which of the following locations are hemoglobin molecules more likely to be in the T-state, as opposed to the R-state?

- a) Pulmonary vein
- b) Pulmonary artery
- c) Aortic arch
- d) Renal arteries
- e) Arterioles

7.1) A patient presents with difficulty breathing, chest pain, and pallor after working on his water heater. An arterial blood gas (ABG) shows lower oxygen saturation than recorded by the pulse oximeter. The clinician suspects carbon monoxide (CO) poisoning. Which of the following describes the irreversible interaction of CO and hemoglobin?

- a) CO affinity is 2 times greater than oxygen affinity in hemoglobin
- b) CO affinity is 20 times greater than oxygen affinity in hemoglobin
- c) CO affinity is 200 times greater than oxygen affinity in hemoglobin
- d) CO affinity is 2,000 times greater than oxygen affinity in hemoglobin
- e) CO affinity is 20,000 times greater than oxygen affinity in hemoglobin

7.2) Patients with carbon monoxide poisoning will often present with a cherry red skin appearance.

- a) True
- b) False

8) HbF is the principle form of hemoglobin from about 7 months prior to birth to about 1 month after birth, when it goes through what conversion to become HbA?

- a) The 2 alpha subunits are replaced with alpha subunits
- b) The 2 alpha subunits are replaced with beta subunits
- c) The 2 gamma subunits are replaced with alpha subunits
- d) The 2 gamma subunits are replaced with beta subunits
- e) The alpha and gamma subunits bind together with HbA2

9) Most of the CO<sub>2</sub> in blood is carried by hemoglobin in what form, which liberates hydrogen ions and thus acts as a buffer?

- a) Bicarbonate

- b) Carbamate
  - c) Carbonic acid
  - d) Water (H<sub>2</sub>O)
  - e) Cyanide
- 10) Which of the following is true regarding the Bohr effect?
- a) Increasing CO<sub>2</sub> in blood raises the hemoglobin affinity for oxygen
  - b) Increasing blood pH raises the myoglobin affinity for oxygen
  - c) Decreasing blood pH raises the myoglobin affinity for oxygen
  - d) Increasing blood pH raises the hemoglobin affinity for oxygen
  - e) Decreasing blood pH raises the hemoglobin affinity for oxygen
- 11) Which of the following is true regarding 2,3-bis-phosphoglycerate (BPG), also known as diphosphoglycerate (DPG)?
- a) Since Hb is a tetramer acting as a dimer, it binds 4 molecules of BPG
  - b) Fetal Hb has a lower affinity for oxygen than HbA
  - c) BPG binds fetal Hb more strongly than HbA
  - d) Without BPG, Hb would pick up very little oxygen in the lungs
  - e) Without BPG, Hb would unload very little oxygen in the tissues
- 12.1) In sickle cell hemoglobin (HbS and HbC), what amino acid replacement occurs at position 6 of the beta-chain, which is not a problem as long as oxygenation is maintained?
- a) Gly to Val
  - b) Val to Phe
  - c) Glu to Gly
  - d) Ser to Asn
  - e) Glu to Val
- 12.2) Approximately 8% of African Americans are carriers for homozygous HbS (sickle cell anemia). What is the incidence in African Americans of this common hemoglobinopathy?
- a) 1 in 50
  - b) 1 in 250
  - c) 1 in 500
  - d) 1 in 1000
  - e) 1 in 2500
- 12.3) Which of the following people, who is heterozygous for HbS (sickle cell trait), may experience symptoms of sickle cell anemia?
- a) A native living in the malaria-ridden Sub-Saharan Africa
  - b) A tourist on a skiing vacation to the Swiss Alps
  - c) A long-distance or marathon runner
  - d) A type I diabetic who forgot to take their insulin
  - e) A sedentary individual with a high cholesterol diet
- 12.4) A patient presents with difficulty breathing and general cyanosis. Previous genetic testing revealed a condition where His F8 was replaced with tyrosine, favoring an Fe(III) state in hemoglobin. Which of the following is most likely?
- a) Heterozygous HbS – Sickle cell trait
  - b) Homozygous HbS – Sickle cell anemia
  - c) Heterozygous HbM – Methemoglobinemia

- d) Homozygous HbC – Crystallization trait
  - e) Heterozygous HbC – Crystallization anemia
- 12.5) Alpha-thalassemias are most commonly caused by \_\_\_\_ and beta-thalassemias are most commonly caused by \_\_\_\_.
- a) Insertions; Deletions
  - b) Deletions; Point mutations
  - c) Point mutations; Repeat sequence mutation
  - d) Repeat sequence mutation; Insertions
  - e) Point mutations; Deletions
- 12.6) A pregnant mother from southeast Asia undergoes genetic testing on her fetus. The results show Hb Barts and massive generalized fluid accumulation. What is the likely prognosis for the newborn?
- a) Asymptomatic
  - b) Mild anemia
  - c) Minor RBC abnormalities
  - d) Moderately severe hemolytic anemia
  - e) Spontaneous abortion or stillbirth
- 12.7) Which of the following leads to HbH disease?
- a) 1 missing alpha-gene
  - b) 2 missing alpha-genes
  - c) 3 missing alpha-genes
  - d) 4 missing alpha-genes
  - e) Hemoglobin Köln
- 12.8) A patient is diagnosed with polycythemia (Hemoglobin Chesapeake). Blood tests reveal a vastly increased concentration of red blood cells. Which of the following is most likely to be seen in this patient?
- a) Increased exercise tolerance
  - b) Below average respiratory rate
  - c) Periods of decreased RBCs
  - d) Hypoxia
  - e) Asymptomatic
- 12.9) Which of the following patients is most likely to have myoglobinuria (dark red urine)?
- a) Myocardial infarction
  - b) Type II diabetic
  - c) Crush injury
  - d) Pneumonia
  - e) Sickle cell anemia
- 12.10) Glycated hemoglobin (HbA1c) can be a useful index for the management of:
- a) Myocardial infarction
  - b) Type II diabetes
  - c) Crush injuries
  - d) Pneumonia
  - e) Sickle cell anemia
  - f) All of the above

**Respiratory #3 – Physiology: Overview**

- 1) Which of the following is NOT a major function of the lung?
  - a) Host defense
  - b) Fluid retention
  - c) Metabolism
  - d) Gas exchange
- 2) A patient presents with a systemic bacterial infection and high fever. Which of the following describes how minute ventilation is most likely affected?
  - a) Increased respiratory frequency
  - b) Increased tidal volume
  - c) Either A or B
  - d) Both A and B
  - e) Neither A nor B
- 3) Which of the following is considered the functional unit of the lung?
  - a) Alveolar sac
  - b) Alveoli
  - c) Hemithorax
  - d) Segmental bronchi
  - e) Visceral & parietal pleura
- 4) What is the perfusion to ventilation (V/Q) ratio for the lung?
  - a) Total alveolar ventilation / Total peripheral resistance
  - b) Total alveolar ventilation \* HR \* SV
  - c) Total alveolar ventilation / (HR \* SV)
  - d) Minute ventilation \* HR \* SV
  - e) Minute ventilation / (HR \* SV)
- 5) Which of the following is NOT true regarding the alveolar-capillary membrane?
  - a) O<sub>2</sub> and CO<sub>2</sub> actively diffuse across the membrane barrier
  - b) The gas exchange barrier is about 1-2 micrometers in thickness
  - c) The membrane contains type 1 alveolar epithelial cells, capillary endothelial cells, and their basement membranes
  - d) Gas exchange occurs through a mesh-like network of capillaries and alveoli
  - e) RBCs pass through the network in less than one second
- 6) Which of the following describes the shape of the carbon dioxide (CO<sub>2</sub>) dissociation curve in blood?
  - a) Sigmoidal
  - b) Exponential
  - c) Elliptical
  - d) Inverse
  - e) Linear
- 7.1) What is the normal range for arterial blood oxygen tension (PaO<sub>2</sub>) when doing an arterial blood gas (ABG)?
  - a) 40-60mmHg
  - b) 60-80mmHg
  - c) 80-100mmHg
  - d) 100-120mmHg
  - e) 120-140mmHg

7.2) What is the normal range for arterial blood carbon dioxide tension (PaCO<sub>2</sub>) when doing an arterial blood gas (ABG)?

- a) 15-25mmHg
- b) 35-45mmHg
- c) 55-65mmHg
- d) 75-85mmHg
- e) 95-105mmHg

7.3) What is the normal range for arterial bicarbonate (HCO<sub>3</sub><sup>-</sup>) when doing an arterial blood gas (ABG)?

- a) 21-28mmol/L
- b) 35-42mmol/L
- c) 49-56mmol/L
- d) 63-71mmol/L
- e) 77-85mmol/L

7.4) Which of the following is described by the equation  $VT * (PACO_2 - PECO_2) / PACO_2$ ? (VT= tidal volume, PACO<sub>2</sub> = alveolar PCO<sub>2</sub>, PECO<sub>2</sub> = expired PCO<sub>2</sub>)

- a) TLC, total lung capacity
- b) VC, vital capacity
- c) RQ, respiratory quotient
- d) VDS, physiologic dead space
- e) RV, residual volume

8) Which of the following is NOT true regarding the mucociliary transport system?

- a) Periciliary fluid is produced by ciliary columnar epithelial cells
- b) Cilia beat and propel mucous towards the mouth
- c) Mucous is composed primarily of glycoproteins
- d) The mucociliary system captures particulates that are eventually swallowed
- e) The mucous layer is produced by Clara cells

9) A defect resulting in poor production of surfactant by type II epithelial cells would most likely lead to which of the following?

- a) Pneumonia
- b) Pleural effusion
- c) Atelectasis
- d) Hypoventilation
- e) Pulmonary edema

10.1) Chemoreceptors at the carotid artery and aortic arch sense \_\_\_\_\_, and chemoreceptors near the ventral lateral surface of the brainstem sense \_\_\_\_\_.

- a) Blood oxygenation; CO<sub>2</sub> surface tension
- b) Blood oxygenation; O<sub>2</sub> surface tension
- c) CO<sub>2</sub> surface tension; Blood oxygenation
- d) O<sub>2</sub> surface tension; Blood oxygenation
- e) O<sub>2</sub> surface tension; CO<sub>2</sub> surface tension

10.2) Stimulation of the peripheral nervous system leads to:

- a) Airway constriction, blood vessel dilation, increased secretions
- b) Airway dilation, blood vessel constriction, increased secretions
- c) Airway constriction, blood vessel dilation, decreased secretions
- d) Airway dilation, blood vessel constriction, decreased secretions

- e) Airway dilation, blood vessel dilation, increased secretions
- 11.1) Which of the following is NOT part of the physiologic unit of the lung?
- a) Alveoli
  - b) Alveolar sac
  - c) Alveolar duct
  - d) Segmental bronchiole
  - e) Respiratory bronchiole
- 11.2) Approximately what percentage of a normal breath does not participate in gas exchange (anatomical dead space)?
- a) 10%
  - b) 20%
  - c) 30%
  - d) 40%
  - e) 50%
- 11.3) The volume of air left in the lungs at the end of passive expiration is known as:
- a) Expiratory Reserve Volume (ERV)
  - b) Residual Volume (RV)
  - c) Tidal Volume (VT)
  - d) Functional Residual Capacity (FRC)
  - e) Total Lung Capacity (TLC)
- 12.1) A respiratory syncytial virus is most likely to cause bronchitis of the small airways in what patient population?
- a) Elderly
  - b) Diabetics
  - c) Alcoholics
  - d) Smokers
  - e) Infants
- 12.2) Asthma is a chronic inflammatory airway disease with reversible bronchospasm that affects:
- a) The upper airway only
  - b) The large airways only
  - c) The small airways only
  - d) A & B
  - e) B & C
- 12.3) A patient presents with severe difficulty breathing due to destroyed alveolar walls, septa, and pulmonary capillary beds. There are large air spaces and decreased surface area for gas exchange. What patient population is most likely to develop this disease?
- a) Caucasians
  - b) Diabetics
  - c) Alcoholics
  - d) Smokers
  - e) Infants
- 13.1) Which of the following is NOT true regarding the lung?
- a) The lung has dual circulation
  - b) The lung can accommodate large volumes of blood at low pressures
  - c) Inspiration results in negative intrathoracic pressure

- d) Because of surfactant, the pressure required to keep an alveolus inflated decreases as lung volume increases
- e) The respiratory center of the brain is located in the medulla
- 13.2) A 21-year-old man presented to the student health clinic with a 24-hour history of high fever, chills, cough, and left-sided chest pain. On auscultation, the examiner noted markedly decreased breath sounds with a few abnormal sounds due to opening of airways that closed during the previous exhalation (crackles), posteriorly at the lower edge of the left rib cage. What will a chest x-ray most likely reveal?
- a) Nothing abnormal
  - b) An infiltrate in the right middle lobe
  - c) An infiltrate in the basilar segments of the left lower lobe
  - d) An infiltrate in the superior segment of the left lower lobe
  - e) An infiltrate in the lingual segment of the left upper lobe
- 13.3) A 52-year-old man who has smoked two packs of cigarettes per day for the past 20 years (40 pack years) experiences increased cough productive of copious amounts of yellow-green mucus and increased shortness of breath. Which of the following statements about  $\dot{V}/\dot{Q}$  is most likely true?
- a) There is no effect on ventilation or perfusion
  - b) Both perfusion and ventilation to the lung are decreased equally
  - c) Perfusion to the lung will be increased while ventilation will be normal
  - d) Perfusion to the lung will be affected more than ventilation to the alveoli
  - e) Ventilation to the alveoli will be affected greater than any changes to perfusion
- 13.4) A 30-year-old man presents with infertility due to immotile sperm. This condition affects all ciliated structures within the body. Which of the following statements about this patient is most likely true?
- a) He is at risk for the development of emphysema with destruction of alveoli and septa and the formation of large air spaces
  - b) He is at risk for abnormalities in immune defense in association with changes in mucociliary transport resulting in mucus retention and secondary infection
  - c) He is at no greater risk for lung disease than are other individuals his age
  - d) He is at risk for localized lung disease because of a localized abnormality in the structure of his lung
  - e) None of the above
- 13.5) An infant boy is born prematurely after 27 weeks of gestation, weighing only two pounds. Which of the following is NOT true about this patient?
- a) This infant will have a normal level of oxygen and carbon dioxide
  - b) Surfactant replacement therapy should be administered
  - c) This infant will experience significant atelectasis
  - d) Ventilation in this infant will be decreased
  - e) All of the above

#### **Respiratory #4 – Physiology: Mechanical Properties of the Lung & Chest Wall**

- 1.1) Which of the following is measured via a spirometer with the subject inhaling maximally then forcefully exhaling fully?
- a) TLC, total lung capacity
  - b) VC, vital capacity

- c) VT, tidal volume
  - d) FRC, functional residual capacity
  - e) RV, residual volume
- 1.2) What is the normal (physiologic) RV/TLC ratio?
- a) Less than 50%
  - b) Greater than 50%
  - c) Less than 25%
  - d) Greater than 25%
  - e) Less than 5%
- 1.3) In restrictive disease (e.g. pulmonary fibrosis), \_\_\_\_\_. In obstructive disease (e.g. asthma or COPD), \_\_\_\_\_.
- a) RV is increased; TLC is decreased
  - b) RV is decreased; TLC is increased
  - c) TLC is increased; RV is decreased
  - d) TLC is decreased; RV is increased
- 2.1) Which of the following can NOT be measured by spirometry?
- a) FRC, functional residual capacity
  - b) TV, tidal volume
  - c) RV, residual volume
  - d) ERV, expiratory reserve volume
  - e) IRV, inspiratory reserve volume
- 2.2) Which of the following lung volume and capacity equations is INCORRECT? (IC = inspiratory capacity)
- a)  $TLC = IRV + TV + ERV + RV$
  - b)  $VC = IRV + TV + ERV$
  - c)  $FRC = ERV + RV$
  - d)  $IC = TV + IRV$
  - e)  $IRV = IC + RV$
- 3.1) Which of the following decreases when chest wall muscles are weak and increases with an airway obstruction due to elastic recoil of the lungs?
- a) FRC, functional residual capacity
  - b) TV, tidal volume
  - c) RV, residual volume
  - d) IC, inspiratory capacity
  - e) IRV, inspiratory reserve volume
- 3.2) Emphysema has what affect on the pressure versus vital capacity curve?
- a) Pressure is decreased and vital capacity is decreased
  - b) Pressure is decreased and vital capacity is increased
  - c) Pressure is increased and vital capacity is decreased
  - d) Pressure is increased and vital capacity is increased
- 4) Which of the following is true regarding the RV/TLC ratio?
- a) It is increased in restrictive disease and decreased in obstructive disease
  - b) It is increased in restrictive disease and increased in obstructive disease
  - c) It is decreased in restrictive disease and decreased in obstructive disease
  - d) It is decreased in restrictive disease and increased in obstructive disease

- 5.1) Compliance is greatest (and elastance lowest) at which of the following lung capacities?
- TLC
  - VC
  - IC
  - FRC
- 5.2) Which of the following would result in a non-compliant lung?
- COPD
  - Asthma
  - Emphysema
  - Pulmonary fibrosis
- 6.1) The pressure across the respiratory system is zero during which of the following?
- FRC
  - TLC
  - VC
  - IC
  - All of the above
- 6.2) During quiet breathing, the diaphragm is responsible for what percentage of the pressure gradient?
- 5%
  - 25%
  - 50%
  - 75%
  - 95%
- 6.3) At volumes greater than \_\_\_\_ of TLC, the chest wall is recoiling \_\_\_\_.
- 40%; Inward
  - 40%; Outward
  - 60%; Inward
  - 60%; Outward
- 6.4) On exhalation, the diaphragm moves higher into the chest (elastic recoil), the intrapleural pressure \_\_\_\_, and the alveolar pressure \_\_\_\_.
- Decreases; Decreases
  - Decreases; Increases
  - Increases; Increases
  - Increases; Decreases
- 6.5) Which of the following is NOT true regarding chronic bronchitis?
- RV/TLC increases
  - The chest becomes barrel-shaped
  - The diaphragm becomes more dome-shaped
  - There is impaired movement of the diaphragm
  - The length-force relationship of the diaphragm muscle fibers is sub-optimal
- 7) During thoracic surgery, the chest wall is opened and the patient sustains a pneumothorax. This situation can be life threatening if which of the following occurs in relation to atmospheric (barometric) pressure, PB?
- Lung pressure < PB
  - Lung pressure > PB

- c) Intrapleural pressure < PB
  - d) Intrapleural pressure > PB
  - e) None of the above
- 8.1) What is the major site of airway resistance?
- a) Trachea
  - b) Large bronchi
  - c) Medium bronchi
  - d) Small bronchi
  - e) Alveoli
- 8.2) What is the airway resistance (RAW) for a patient with an average flow during tidal inspiration of 0.25L/sec, alveolar pressure (PA) of 0.4mmHg, and barometric pressure (PB) at the mouth of 0mmHg?
- a)  $0.4 / 0.25 = 1.6$
  - b)  $0.25 / 0.4 = 0.625$
  - c)  $0.4 * 0.25 = 0.1$
  - d)  $0.25 + 0.4 = 0.65$
  - e)  $0.4 - 0.25 = 0.15$
- 9) Turbulent flow detected on auscultation would be most likely in which of the following cases?
- a) Small airways with low flow
  - b) Small airways with high flow
  - c) Large airways with low flow
  - d) Large airways with high flow
- 10) What is the typical value for airway resistance?
- a) 0.15mmHg/L/sec
  - b) 0.6mmHg/L/sec
  - c) 1.3mmHg/L/sec
  - d) 1.6mmHg/L/sec
  - e) 1.99mmHg/L/sec
- 11) Which of the following is NOT true regarding airway resistance (RAW or AWR)?
- a) Lung volume is the most important factor affecting airway resistance
  - b) Patients with status asthmaticus would benefit from oxygen/nitrogen more than oxygen/helium due to decreased airway resistance
  - c) Patients with increased resistance have greater lung volumes
  - d) During a dive, increased gas density would cause increased resistance
  - e) Increasing lung volume increases the caliber of the airways
- 12.1) Which of the following is NOT a major test result from clinical spirometry?
- a) Forced vital capacity (FVC)
  - b) FEV1/FVC ratio
  - c) Residual volume (RV)
  - d) Forced expiratory flow (FEF25-75)
  - e) Forced expiratory volume in 1 second (FEV1)
- 12.2) Which of the following is NOT a major function test result during flow-volume spirometry?
- a) Forced vital capacity (FVC)
  - b) Midmaximal expiratory flow (MMEF)

- c) Instantaneous flow at 50% vital capacity ( $\dot{V}_{Max50}$ )
  - d) Instantaneous flow at 75% vital capacity ( $\dot{V}_{Max75}$ )
  - e) Peak expiratory flow rate (PEFR)
- 13) In obstructive disease (e.g. emphysema), increased work is due to \_\_\_\_ and breathing is usually \_\_\_\_.
- a) Loss of lung compliance; Slow and deep
  - b) Loss of lung compliance; Rapid and shallow
  - c) Increased airway resistance; Slow and deep
  - d) Increased airway resistance; Rapid and shallow
- 14.1) All of the following decrease in obstructive pulmonary disease. Which of the following also decreases in restrictive pulmonary disease?
- a) Flow-volume curve slope
  - b) FEF<sub>25-75</sub>
  - c) PEFr
  - d) FEV/FVC
  - e) FVC and FEV
- 14.2) Which of the following pulmonary or structural changes is NOT correct?
- a) Movement of the chest wall is restricted in kyphoscoliosis
  - b) A restricted diaphragm in the 3rd-trimester of pregnancy would decrease FRC
  - c) In pulmonary fibrosis, small changes in transpulmonary pressure result in larger than normal changes in lung volume
  - d) RV, FRC, and TLC are increased in patients with chronic bronchitis, and lung compliance is normal
  - e) RV, FRC, and TLC are increased in patients with emphysema, and lung compliance increases
- 15.1) Which of the following is the most important pulmonary function measurement?
- a) TLC, total lung capacity
  - b) VC, vital capacity
  - c) VT, tidal volume
  - d) FRC, functional residual capacity
  - e) RV, residual volume
- 15.2) The major site of airway resistance occurs within the first \_\_\_\_ generations of airway branching.
- a) 2
  - b) 4
  - c) 6
  - d) 8
  - e) 10
- 15.3) In patients with chronic obstructive pulmonary disease (COPD), the equal pressure point can be found closer to the alveolus at any lung volume.
- a) True
  - b) False, it is further from the alveolus
- 15.4) In COPD, there is an increased surface area for gas exchange (DLCO).
- a) True
  - b) False, DLCO is decreased

15.5) A 77-year-old man complains of shortness of breath with activities of daily living. He has smoked one pack of cigarettes per day for the past 55 years (55 pack years). He has a barrel chest and breath sounds are distant, especially over the apices. His FVC, FEV1, and FEV1/FVC are markedly reduced with a significant elevation in the RV/TLC due to a marked increase in RV. His diffusion capacity for carbon monoxide (DLCO) is reduced. What lung disease is most likely?

- a) Asthma
- b) Chronic bronchitis
- c) Emphysema
- d) Pulmonary fibrosis
- e) Respiratory distress syndrome

15.6) A 77-year old man complains of shortness of breath with activities of daily living. He has smoked 55 pack years, has a barrel chest, and distant breath sounds over the apices. His FVC, FEV1, and FEV1/FVC are reduced with elevation in RV/TLC due to a marked increase in RV. His DLCO is reduced. On chest x-ray, what would most likely be found?

- a) A dome-shaped diaphragm with clear lung fields
- b) A dome-shaped diaphragm with increased lung markings
- c) A flattened diaphragm with bullae in the apices and few visible lung markings
- d) A flattened diaphragm with increased lung markings in both fields
- e) Increased lung markings localized to the apices of both lungs

15.7) A 59-year-old man is admitted to the ICU for shortness of breath caused by an exacerbation of emphysema. He previously smoked two packs of cigarettes per day for 40 years (80 pack years). His respiratory rate is 40 breaths/min with accessory muscle use. His physician decides to mechanically ventilate him and temporarily paralyze him with medication. The ventilator is set for 12 breaths/min with tidal volume of 1000mL. The ventilator measures airway pressures at the end of each delivered breath (no airflow), giving an airway pressure of 25cm H<sub>2</sub>O. The ventilator then allows him to passively exhale, and the airway pressure returns to zero (PB). What is the compliance of his respiratory system?

- a) 5mL/cm H<sub>2</sub>O
- b) 100mL/cm H<sub>2</sub>O
- c) 20mL/cm H<sub>2</sub>O
- d) 40mL/cm H<sub>2</sub>O
- e) 55mL/cm H<sub>2</sub>O

15.8) A patient is placed on a ventilator set at 12 breaths/min with a tidal volume of 1000mL. The ventilator measures airway pressures at the end of each delivered breath (no airflow), giving an airway pressure of 25cm H<sub>2</sub>O. The ventilator then allows him to passively exhale, and the airway pressure returns to zero (PB). On further examination, the physician notes that the patient has bilateral wheezes when she listens to his chest. His RAW is measured ((Pao – Palv)/Flow). The peak airway pressure is 35cm H<sub>2</sub>O and the airflow is 1L/sec. The physician occludes the airway at the point of peak airway pressure (end inspiration), and measures 25cm H<sub>2</sub>O. what is the total RAW, including the endotracheal tube?

- a) 2cm H<sub>2</sub>O/L/sec
- b) 5cm H<sub>2</sub>O/L/sec

- c) 8cm H<sub>2</sub>O/L/sec
- d) 10cm H<sub>2</sub>O/L/sec
- e) 20cm H<sub>2</sub>O/L/sec

15.9) A 30-year-old woman, nonsmoker, presents with a 1-week history of an upper respiratory tract (URT) infection and coughing up blood (hemoptysis). She has a history of two previous episodes of pneumonia in the right lung. On physical examination, her pulse is 90/min, respirations are 24/min, and blood pressure is 110/72. On lung auscultation, inspiratory and expiratory wheezes are noted over the right upper lobe. On the chest radiograph, a small patchy infiltrate in the right upper lobe with a suggestion of a mass lesion and volume loss is observed. On bronchoscopy, a nodular tumor mass protruding into the lumen of the right upper lobe bronchus is found. Which of the following is most likely?

- a) Obstructive pulmonary disease associated with a loss of elastic recoil
- b) Obstructive pulmonary disease associated with an increase in airway resistance
- c) Restrictive pulmonary disease associated with interstitial pneumonitis
- d) Restrictive pulmonary disease associated with muscle weakness
- e) Pulmonary vascular disease associated with pulmonary hypertension

15.10) If esophageal pressure changes from -5cm H<sub>2</sub>O to -10cm H<sub>2</sub>O as a patient breathes (change in 1L), what is the compliance?

- a) 0.1L/cm H<sub>2</sub>O
- b) 5L/cm H<sub>2</sub>O
- c) 0.2L/cm H<sub>2</sub>O
- d) 10L/cm H<sub>2</sub>O

15.11) A 16-year-old athlete presents with chest tightness during activity and occasionally at rest. On physical exam, the lungs are clear. A grade 1/6 systolic murmur is noted along the right border of the heart without radiation. During a pulmonary function test, FEF<sub>25-75</sub> is decreased but significantly improves with inhalation of albuterol. Which of the following is most likely?

- a) Obstructive pulmonary disease with reversibility
- b) Irreversible obstructive pulmonary disease
- c) Restrictive pulmonary disease with reversibility
- d) Irreversible restrictive pulmonary disease
- e) Pulmonary vascular disease

15.12) A 18-year-old female with asthma presents with acute asthma exacerbation of moderate severity. Pulmonary function tests at this time might reveal:

- a) Decreased FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC, expiratory flow rates with increased RV
- b) Decreased FVC, FEV<sub>1</sub>, expiratory flow rates with normal RV and FEV<sub>1</sub>/FVC
- c) Normal FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC, expiratory flow rates and RV decreased
- d) Normal pulmonary function
- e) Normal FVC, FEV<sub>1</sub>, expiratory flow rates with increased FEV<sub>1</sub>/FVC and RV

15.13) A 35-year-old man is seen for a physical exam. History is remarkable for a 15-year history of smoking one pack of cigarettes per day (15 pack-years). He denies any respiratory symptoms including cough or increased mucous production. He is physically active and denies physical limitation. Which of the following is most likely true?

- a) A chest radiograph will reveal abnormalities in the lungs
- b) An exercise stress test will demonstrate coronary artery syndrome

- c) The diffusion capacity for carbon monoxide (DLCO) will be abnormal
- d) A sputum culture will demonstrate evidence of infection
- e) Pulmonary function tests will reveal early airway obstruction with decreased expiratory flow rates

**Respiratory #5 – Physiology: Ventilation, Perfusion, & Their Relationship**

- 1) Which of the following describes alveolar ventilation?
  - a) Tidal volume \* Respiratory rate
  - b) Dead space \* Respiratory rate
  - c) (Tidal volume – Dead space) \* Respiratory rate
  - d) (Tidal volume + Dead space) \* Respiratory rate
  - e) Tidal volume – Dead space
- 2) Which of the following describes physiologic dead space?
  - a) Gas in the conducting areas of the respiratory system
  - b) Gas that does not come into contact with alveoli
  - c) Gas that comes into contact with alveoli but cannot cross the barrier
  - d) Gas that comes into contact with alveoli where there is not enough blood flow
  - e) Gas that comes into contact with alveoli where blood flow is very rapid
- 3) Alveolar concentrations of oxygen drop as altitude increases (hypobaric) such that even while breathing 100% oxygen, the partial pressure is so low that one would die of hypoxia at 45,000feet. Conversely, at SCUBA depths below 100feet (hyperbaric) nitrogen partial pressure is so high that one could acquire nitrogen narcosis. What law accounts for these cases?
  - a) Boyle Law
  - b) Henry Law
  - c) Charles Law
  - d) Graham Law
  - e) Dalton Law
- 4.1) What is the partial pressure of atmospheric nitrogen (0.79% N<sub>2</sub>)?
  - a) 760mmHg
  - b) 600mmHg
  - c) 563mmHg
  - d) 160mmHg
  - e) 150mmHg
- 4.2) What is the partial pressure of atmospheric oxygen (0.21% O<sub>2</sub>)?
  - a) 760mmHg
  - b) 600mmHg
  - c) 563mmHg
  - d) 160mmHg
  - e) 150mmHg
- 4.3) As air enters the respiratory conduction system during ventilation, it is warmed to body temperature and humidified. If water vapor pressure at body temperature is 47mmHg, which of the following is true?
  - a) N<sub>2</sub> and O<sub>2</sub> partial pressures will both increase by 47mmHg
  - b) N<sub>2</sub> and O<sub>2</sub> partial pressures will both decrease by 47mmHg
  - c) Overall pressure including N<sub>2</sub> and O<sub>2</sub> partial pressures will increase 47mmHg

- d) Overall pressure including N<sub>2</sub> and O<sub>2</sub> partial pressures will decrease 47mmHg  
e) No change in partial pressures will occur according to the Dalton Law
- 5.1) Due to the diffusibility of carbon dioxide, the alveolar (A) partial pressure (PACO<sub>2</sub>) and the arterial (a) partial pressure (PaCO<sub>2</sub>) are equivalent. In normal individuals, the difference between PAO<sub>2</sub> and PaO<sub>2</sub> (Aa gradient or A-a gradient) is:
- a) Less than 30mmHg
  - b) More than 30mmHg
  - c) Less than 15mmHg
  - d) More than 15mmHg
  - e) Less than 1mmHg
- 5.2) The alveolar air equation is:  $PAO_2 = (PB - PH_2O) * FIO_2 - PACO_2/R$ . FIO<sub>2</sub> is the fraction of inspired air (21% in room air) and R is the respiratory quotient (usually 0.8, or 5 O<sub>2</sub> molecules in and 4 CO<sub>2</sub> molecules out). For clinical purposes, the equation can simplify to  $PAO_2 = FIO_2 * (PB - 47mmHg) - 1.2 * (PaCO_2)$ . If PaCO<sub>2</sub> increases in the blood, which of the following is true?
- a) PAO<sub>2</sub> and PaO<sub>2</sub> will increase
  - b) PAO<sub>2</sub> and PaO<sub>2</sub> will decrease
  - c) PAO<sub>2</sub> will increase and PaO<sub>2</sub> will decrease
  - d) PAO<sub>2</sub> will decrease and PaO<sub>2</sub> will increase
  - e) None of the above
- 5.3) Which of the following causes of hypoxia is characterized by a decreased arterial PO<sub>2</sub> and an increased A-a gradient?
- a) Hypoventilation
  - b) Right-to-left cardiac shunt
  - c) Carbon monoxide poisoning
  - d) Ascent to high altitude
  - e) Anemia
- 5.4) Which person would be expected to have the largest A-a gradient?
- a) Person with pulmonary fibrosis
  - b) Person at 12,000 feet above sea level
  - c) Person with hypoventilation due to morphine overdose
  - d) Person with normal lungs breathing 50% O<sub>2</sub>
  - e) Person with normal lungs breathing 100% O<sub>2</sub>
- 5.5) Given the alveolar gas equation:  $PAO_2 = (PB - 47) * FIO_2 - PACO_2/R$ , with atmospheric pressure of 760mmHg, FIO<sub>2</sub> at room air, and a respiratory quotient of 0.8. What is the approximate PAO<sub>2</sub> for a normal individual with a PaCO<sub>2</sub> of 40mmHg?
- a) 80
  - b) 90
  - c) 100
  - d) 110
  - e) 120
- 5.6) Using the alveolar gas equation, what is the approximate PAO<sub>2</sub> for a patient with PaO<sub>2</sub> of 65mmHg, PaCO<sub>2</sub> of 30mmHg, and pH<sub>a</sub> of 7.57? (Patient also has a significant A-a gradient)
- a) 80
  - b) 90

- c) 100
  - d) 110
  - e) 120
- 6.1) Hypoventilation is defined as PACO<sub>2</sub> \_\_\_\_\_ and hyperventilation is defined as PACO<sub>2</sub> \_\_\_\_\_, with normal PACO<sub>2</sub> around 40mmHg.
- a) Less than 35mmHg; Greater than 45mmHg
  - b) Less than 30mmHg; Greater than 50mmHg
  - c) Greater than 45mmHg; Less than 35mmHg
  - d) Greater than 50mmHg; Less than 30mmHg
  - e) None of the above
- 6.2) Hyperventilation has what affect on cerebral perfusion?
- a) Increased blood flow to the brain
  - b) Decreased blood flow to the brain
- 7) During tidal volume breathing, which of the following areas has the most ventilation (effect greatest at RV and least at TLC)?
- a) Lung apex
  - b) Mid-lung
  - c) Lung base
  - d) Ventilation is equivalent at all areas
- 8) The bronchopulmonary anastomosis adds a small amount of oxygen-poor blood (anatomic shunt) to which of the following oxygen-rich vessels?
- a) Pulmonary artery
  - b) Coronary artery
  - c) Capillary artery
  - d) Bronchial artery
  - e) Pulmonary vein
- 9) What is the driving pressure of the pulmonary circuit if the average pulmonary arterial pressure is 14mmHg, the right ventricular pressure is 25mmHg, the left ventricular pressure is 120mmHg, the right atrial pressure is 3mmHg, and the left atrial pressure is 8mmHg?
- a)  $25\text{mmHg} - 14\text{mmHg} = 11\text{mmHg}$
  - b)  $14\text{mmHg} + 25\text{mmHg} = 39\text{mmHg}$
  - c)  $14\text{mmHg} - 8\text{mmHg} = 6\text{mmHg}$
  - d)  $8\text{mmHg} + 14\text{mmHg} = 22\text{mmHg}$
  - e)  $14\text{mmHg} - 3\text{mmHg} = 11\text{mmHg}$
- 10) Which of the following describes the Starling forces that would lead to pulmonary edema?
- a) High capillary hydrostatic pressure or low interstitial oncotic pressure
  - b) High capillary hydrostatic pressure or high interstitial oncotic pressure
  - c) Low capillary hydrostatic pressure or low interstitial oncotic pressure
  - d) Low capillary hydrostatic pressure or high interstitial oncotic pressure
- 11) What is the major mechanism of pulmonary edema in acute respiratory distress syndrome (ARDS) caused by microvascular injury (neutrophil activation major pathogenesis mechanism)?
- a) Increased permeability
  - b) Decreased permeability

- c) Increased hydrostatic pressure
  - d) Impaired lymphatic outflow
  - e) Increased central venous pressure
- 12) Which of the following describes characteristics of the pulmonary vessels?
- a) Low pressure at rest and low pressure during exercise
  - b) Low pressure at rest and high pressure during exercise
  - c) High pressure at rest and low pressure during exercise
  - d) High pressure at rest and high pressure during exercise
  - e) High resistance and low compliance
- 13) Which of the following describes distention and recruitment of pulmonary vessels with changes in pulmonary blood flow and pulmonary vascular resistance?
- a) Pulmonary capillaries are recruited during low flow and are not distensible
  - b) Pulmonary capillaries are recruited during high flow and are not distensible
  - c) Pulmonary capillaries are recruited during low flow and are highly distensible
  - d) Pulmonary capillaries are recruited during high flow and are highly distensible
- 14) Bronchiectasis (chronic dilatation of one or more bronchi, usually as a result of infection) would most likely lead to:
- a) Decreased bronchial circulation
  - b) Increased bronchial circulation
  - c) Decreased capillary circulation
  - d) Increased capillary circulation
  - e) None of the above
- 15) Total pulmonary vascular resistance is the lowest at which of the following?
- a) Expiratory Reserve Volume (ERV)
  - b) Residual Volume (RV)
  - c) Tidal Volume (VT)
  - d) Functional Residual Capacity (FRC)
  - e) Total Lung Capacity (TLC)
- 16) Which of the following is the most potent constrictor of pulmonary vessel smooth muscle, leading to decrease blood flow in the lungs?
- a) Endothelin
  - b) Leukotrienes
  - c) Angiotensin
  - d) Hypoxia
  - e) Thromboxane A<sub>2</sub>
- 17) Which of the following is NOT true when comparing regional differences in ventilation, perfusion, V/Q ratio, and pH?
- a) The V/Q ratio at the apex is  $> 1$
  - b) The V/Q ratio at the base is  $< 1$
  - c) PCO<sub>2</sub> is lower at the base
  - d) PO<sub>2</sub> is higher at the apex
  - e) pH is lower at the apex
- 18) Perfusion is highest at the lung:
- a) Apex
  - b) Base
  - c) Both

19) Which of the following venous admixtures is responsible for the Aa gradient of <15mmHg in normal individuals?

- a) Ventricular septal defect
- b) Atrial septal defect
- c) Pulmonary vein backflow
- d) Anatomical aortic shunt
- e) Bronchopulmonary anastomosis

*Match the disorder with the sea level partial pressure cutoff:*

20.1) Hypercapnia                      a) 80mmHg

20.2) Hypoxia                              b) 60mmHg

20.3) Hypocapnia                      c) 42mmHg

20.4) Arterial hypoxemia              d) 35mmHg

20.5) Which of the following is the most common cause of hypoxemia?

- a) Anatomical shunt
- b) Physiological shunt
- c) High V/Q mismatch
- d) Low V/Q mismatch
- e) Hypoventilation

21.1) A patient presents with atelectasis, which is the most common cause of a(n) \_\_\_\_\_ shunt because the \_\_\_\_\_.

- a) Anatomical shunt; Perfused area has low ventilation
- b) Anatomical shunt; Perfusion bypasses the lungs
- c) Physiological shunt; Perfused area has low ventilation
- d) Physiological shunt; Perfusion bypasses the lungs

21.2) Giving a patient with cyanotic congenital heart disease (anatomical shunt) 100% oxygen via non-rebreather mask can abolish any hypoxemia.

- a) True
- b) False

22) A low V/Q will have what affect on the Aa gradient?

- a) There will be an increased Aa gradient
- b) There will be a decreased Aa gradient
- c) No change in Aa gradient will occur
- d) The Aa gradient will fluctuate between high and low

23) If ventilation is halved (hypoventilation), arterial CO<sub>2</sub> will double. What affect will this have on the Aa gradient?

- a) There will be an increased Aa gradient
- b) There will be a decreased Aa gradient
- c) No change in Aa gradient will occur
- d) The Aa gradient will fluctuate between high and low

24.1) A 38-year-old mountain climber has the following blood gas values at sea level (760mmHg): PaO<sub>2</sub> = 96mmHg, PaCO = 40mmHg, pH = 7.40, and FIO<sub>2</sub> = 0.21. He climbs to the top of Pikes Peak, with barometric pressure of 445mmHg. What is his PaO<sub>2</sub> at the top of his climb?

- a) 24mmHg
- b) 34mmHg
- c) 44mmHg

- d) 54mmHg  
e) 64mmHg
- 24.2) An 80-year-old man is admitted to the hospital in acute respiratory distress resulting from emphysema complicated by pneumonia. He is conscious but confused, disoriented, and slow to respond to questions. He uses accessory muscles to breathe, and there is decreased chest expansion and motion of the diaphragm. His blood pressure is low at 90/65, and he has poor capillary refill. The patient is started on oxygen therapy with a 24% Venturi mask. An arterial blood gas analysis reveals the following values: pH = 7.33, PaO<sub>2</sub> = 48mmHg, PaCO<sub>2</sub> = 67mmHg, and HCO<sub>3</sub><sup>-</sup> = 34mEq/L. Which of the following is the least likely explanation for his hypoxemia?
- a) Ventilation-perfusion mismatch  
b) Right-to-left intrapulmonary shunt  
c) Diffusion barrier to gas transfer  
d) Low cardiac output  
e) Bronchial obstruction
- 24.3) To further evaluate the cause of hypoxemia in the 80-year-old patient above, the physician decides to calculate the alveolar to arterial O<sub>2</sub> gradient. Which of the following statements about gas gradients in the lung is FALSE?
- a) The alveolar to arterial CO<sub>2</sub> gradient in the lung is usually 0  
b) The alveolar to arterial O<sub>2</sub> gradient in the lung is normally less than 15mmHg  
c) The alveolar to arterial O<sub>2</sub> gradient will help the physician determine whether the hypoxemia is due to hypoventilation or ventilation-perfusion mismatch  
d) The alveolar to arterial CO<sub>2</sub> gradient is usually greater than 50mmHg  
e) The physician needs to know the barometric pressure to calculate the alveolar O<sub>2</sub> concentration
- 24.4) What is the PAO<sub>2</sub> – PaO<sub>2</sub> (Aa gradient) in the above 80-year-old patient given 760mmHg at sea level and R = 0.8?
- a) 21mmHg  
b) 30mmHg  
c) 35mmHg  
d) 39mmHg  
e) 44mmHg
- 24.5) A 21-year-old man has abrupt onset of muscle weakness. He is unable to walk and is having difficulty swallowing. On physical examination, general muscle weakness is noted. His pulse is 90/min, respirations are 18/min, and blood pressure is 118/60. An arterial blood gas analysis on room air reveals the following values: pH = 7.30, PaCO<sub>2</sub> = 54mmHg, and PaO<sub>2</sub> = 70mmHg. What is the Aa gradient given 760mmHg at sea level and R = 0.8?
- a) 6mmHg  
b) 12mmHg  
c) 16mmHg  
d) 20mmHg  
e) 26mmHg
- 24.6) What is the most likely cause of the above 21-year-old patient's hypoxemia?
- a) Ventilation-perfusion mismatch  
b) Anatomic shunt

- c) Physiologic shunt
- d) Alveolar-capillary block
- e) Hypoventilation

**Respiratory #6 – Physiology: Oxygen & Carbon Dioxide Transportation**

- 1) Which of the following is NOT a feature of the respiratory system aiding in gas diffusion?
- a) Large surface areas
  - b) Short gas travel distances
  - c) Lack of partial pressure gradient differences
  - d) Gases with advantageous diffusion properties
- 2.1) Which of the following describes that the rate of effusion of a gas is inversely proportional to the square root of the mass of its particles?  $\text{Rate1/Rate2} = \sqrt{M2/M1}$
- a) Boyle Law
  - b) Henry Law
  - c) Charles Law
  - d) Graham Law
  - e) Dalton Law
- 2.2) If the molecular mass of a gas (Gas1) is four times the molecular mass of another (Gas2), how will the diffusion rate compare (Gas1 rate)?
- a) Gas1 will diffuse at 4 times the rate of Gas2
  - b) Gas1 will diffuse at 2 times the rate of Gas2
  - c) Gas1 will diffuse at the same rate of Gas2
  - d) Gas1 will diffuse at 1/2 the rate of Gas2
  - e) Gas1 will diffuse at 1/4 the rate of Gas2
- 3) According to the Fick Law, the diffusion of gas ( $V_{\text{dotGas}}$ ) across the alveolus would be inversely proportional to which of the following?
- a) Tissue thickness
  - b) Extra-alveolar pressure
  - c) Inter-alveolar pressure
  - d) Gas diffusion constant
  - e) Surface area
- 4) DLCO is the classic measurement of the diffusion capacity of the alveolar-capillary membrane. A patient with pulmonary interstitial fibrosis inhales a single breath of 0.3% CO<sub>2</sub> from residual volume to total capacity, holds their breath for 10 seconds, and then exhales. Average alveolar pressure of CO<sub>2</sub> is measured at 0.1mmHg and 0.25mL of CO<sub>2</sub> has been taken up. What is the diffusion capacity for CO<sub>2</sub> in this patient? ( $\text{DLCO} = V_{\text{dotCO}} / \text{PACO}_2$ )
- a) 10mL/min/mmHg
  - b) 15mL/min/mmHg
  - c) 20mL/min/mmHg
  - d) 25mL/min/mmHg
  - e) 30mL/min/mmHg
- 5) Which of the following is generally considered diffusion-limited (versus perfusion-limited) and has a very low partial pressure in blood due to hemoglobin affinity?
- a) O<sub>2</sub>

- b) CO
  - c) CO<sub>2</sub>
  - d) N<sub>2</sub>O
- 6) Which of the following is true regarding hemoglobin?
- a) It decreases blood oxygen carrying capacity by about 65 times
  - b) Affinity for oxygen decrease with binding of an oxygen molecule
  - c) In adults it is compose of two alpha chains and two gamma chains
  - d) It cannot carry carbon monoxide at normal temperatures
  - e) It carries about 5-10% of carbon dioxide in the blood
- 7) How many structural subunits does myoglobin have?
- a) 1
  - b) 2
  - c) 3
  - d) 4
  - e) 8
- 8) A SCUBA diver who normally uses compressed atmospheric air is going to dive using NOAA Nitrox I (EAN/32, ONM32, Nitrox68), which contains 32% oxygen. If oxygen toxicity can occur relatively rapidly at PO<sub>2</sub> of 1.4atm, what is the deepest this diver should go (Maximum Operating Depth)?
- a) 72 feet (3.125 atm)
  - b) 96 feet (3.8 atm)
  - c) 114 feet (4.375 atm)
  - d) 136 feet (5 atm)
  - e) 142 feet (5.2 atm)
- 9) Under resting conditions, hemoglobin leaves the lungs at 75% O<sub>2</sub> saturation. How much of this 75% is used by the tissues at resting conditions?
- a) 5%
  - b) 15%
  - c) 25%
  - d) 35%
  - e) 45%
- 10) Each hemoglobin molecule can bind four O<sub>2</sub> atoms, thus each gram of hemoglobin can bind \_\_\_\_\_ of O<sub>2</sub>.
- a) 1.22mL
  - b) 1.34mL
  - c) 1.48mL
  - d) 1.66mL
  - e) 2mL
- 11) Which of the following would cause a leftward shift in the oxyhemoglobin dissociation curve, thus reducing the P<sub>50</sub> pressure?
- a) High CO<sub>2</sub>
  - b) Increased H<sup>+</sup> ions
  - c) Decreased pH
  - d) Hyperventilation
  - e) Decreased hemoglobin concentration
  - f) High temperature

- 12) A patient presents with hemoglobin saturation of 90%. If there is a drop in PO<sub>2</sub> over a wide range of partial pressures (100mmHg to 60mmHg), what will be the expected hemoglobin saturation?
- a) 90%
  - b) 80%
  - c) 70%
  - d) 60%
  - e) 50%
- 13) At what PO<sub>2</sub> level does the oxyhemoglobin equilibrium curve begin to flatten out?
- a) 10mmHg
  - b) 28mmHg
  - c) 40mmHg
  - d) 60mmHg
  - e) 100mmHg
- 14) A rightward shift of the oxyhemoglobin equilibrium curve would have what affect?
- a) Decreased hemoglobin binding to O<sub>2</sub> and decreased P<sub>50</sub>
  - b) Decreased hemoglobin binding to O<sub>2</sub> and increased P<sub>50</sub>
  - c) Increased hemoglobin binding to O<sub>2</sub> and decreased P<sub>50</sub>
  - d) Increased hemoglobin binding to O<sub>2</sub> and increased P<sub>50</sub>
  - e) It would not change the P<sub>50</sub>
- 15) Which of the following describes the Bohr effect?
- a) The effect of CO on the affinity of hemoglobin for O<sub>2</sub>
  - b) The effect of H<sup>+</sup> ions on the affinity of hemoglobin for O<sub>2</sub>
  - c) The effect of CO<sub>2</sub> on the affinity of hemoglobin for O<sub>2</sub>
  - d) The effect of temperature on the affinity of hemoglobin for O<sub>2</sub>
  - e) The effect resulting in decreased uptake of O<sub>2</sub> in the lungs and decreased delivery to tissues
- 16) Which of the following is NOT true regarding the oxyhemoglobin dissociation curve?
- a) Alkalosis causes a leftward shift
  - b) Increased PCO<sub>2</sub> causes a rightward shift
  - c) Increased temperature causes a rightward shift
  - d) Increased 2,3-DPG causes a rightward shift
  - e) Fetal hemoglobin causes a leftward shift
- 17) The affinity for hemoglobin is 200 times greater for CO and 200,000 times greater for NO when compared to oxygen. What major affect does carbon monoxide poisoning have on the oxyhemoglobin dissociation curve?
- a) Increases O<sub>2</sub> content of blood by 50%
  - b) Decreases O<sub>2</sub> content of blood by 50%
  - c) Increases CO<sub>2</sub> content of blood by 50%
  - d) Decreases CO<sub>2</sub> content of blood by 50%
  - e) Increases circulating hemoglobin by 50%
- 18.1) Which of the following would NOT cause hypoxia?
- a) Sodium azide or cyanide poisoning
  - b) Arterial-venous shunt or vascular disease
  - c) Metabolic disease with a decreased PCO<sub>2</sub>
  - d) Pulmonary disease with a decreased V/Q ratio

- e) Anemia or CO poisoning
- 18.2) A patient presents with pulmonary disease leading to hypoxia. Which of the following would NOT be low?
- a) Amount of O<sub>2</sub> delivered
  - b) Amount of O<sub>2</sub> used
  - c) PaO<sub>2</sub> (arterial oxygen pressure)
  - d) CaO<sub>2</sub> (arterial oxygen content)
- 19) Normal production of CO<sub>2</sub> is about 200mL/min. Which of the following describes the normal respiratory exchange quotient, which is similar to the respiratory quotient at the tissue to blood compartment?
- a) 100mL/min O<sub>2</sub> in for 80mL/min CO<sub>2</sub> out
  - b) 80mL/min O<sub>2</sub> in for 100mL/min CO<sub>2</sub> out
  - c) 200mL/min O<sub>2</sub> in for 160mL/min CO<sub>2</sub> out
  - d) 160mL/min O<sub>2</sub> in for 200mL/min CO<sub>2</sub> out
  - e) O<sub>2</sub> and CO<sub>2</sub> are equally exchanged
- 20) Carbon monoxide is carried in the blood via bicarbonate, carbamino complex, or is dissolved. Approximately what percentage of CO is carried via HCO<sub>3</sub><sup>-</sup> (bicarbonate)?
- a) 98%
  - b) 63%
  - c) 44%
  - d) 21%
  - e) 5%
- 21) The carbonic anhydrase reaction generates HCO<sub>3</sub><sup>-</sup> in response to CO<sub>2</sub> levels. Where does this reaction take place?
- a) Muscle cell mitochondria
  - b) Alveolar membrane
  - c) Alveolar cell cytoplasm
  - d) Brain cell nucleus
  - e) Red blood cells
- 22) The chloride shift helps maintain electrostatic homeostasis with respect to the carbonic anhydrase reaction by exchanging chloride ions for:
- a) CO<sub>2</sub>
  - b) H<sub>2</sub>O
  - c) H<sub>2</sub>CO<sub>3</sub>
  - d) H<sup>+</sup>
  - e) HCO<sub>3</sub><sup>-</sup>
- 23.1) Along with vomiting and high doses of steroids, which of the following could cause respiratory alkalosis?
- a) Narcotic overdose
  - b) Renal failure
  - c) Anxiety attack
  - d) Untreated type I diabetes
  - e) Sleep
- 23.2) The Henderson-Hasselbalch equation illustrates the influence of HCO<sub>3</sub><sup>-</sup> and H<sub>2</sub>CO<sub>3</sub> on blood pH. Under normal conditions, pK = 6.1, HCO<sub>3</sub><sup>-</sup> = 24mEq/L, and H<sub>2</sub>CO<sub>3</sub> = 1.2mEq/L. What is the pH according to the Henderson-Hasselbalch equation?

- a) 7.1
  - b) 7.2
  - c) 7.3
  - d) 7.4
  - e) 7.5
- 24) Which of the following describes the carboxyhemoglobin dissociation curve?
- a) S-shaped and directly related to PCO<sub>2</sub>
  - b) S-shaped and inversely related to PCO<sub>2</sub>
  - c) Linear and directly related to PCO<sub>2</sub>
  - d) Linear and inversely related to PCO<sub>2</sub>
  - e) None of the above
- 25) Which of the following describes the Haldane effect?
- a) The effect of oxyhemoglobin saturation on CO<sub>2</sub> content and PCO<sub>2</sub>
  - b) The effect of carboxyhemoglobin saturation on CO<sub>2</sub> content and PCO<sub>2</sub>
  - c) The effect of oxyhemoglobin saturation on O<sub>2</sub> content and PO<sub>2</sub>
  - d) The effect of carboxyhemoglobin saturation on O<sub>2</sub> content and PO<sub>2</sub>
  - e) The effect resulting in a rightward shift of the CO<sub>2</sub> dissociation curve in venous blood when compared to arterial blood
- 26.1) On a cold winter morning, your neighbor and her son come over to pick up your children for a ride to school. No one answers the door, and all she hears is the old noisy furnace running. She becomes worried and enters your house to find no one is awake except your teenage son, who is barely conscious, confused, and disoriented. She tries to wake you and your spouse with no success, and she notices that you are breathing rapidly. She calls 911 and opens all the windows. Later, on inspection, it was revealed that the furnace was faulty and carbon monoxide was being emitted. How does carbon monoxide affect the interactions of O<sub>2</sub> to Hb?
- a) Prevents binding, increases affinity, inhibits release, shifts dissociation curve to the left
  - b) Prevents binding, increases affinity, inhibits release, shifts dissociation curve to the right
  - c) Prevents binding, decreases affinity, enhances release, shifts dissociation curve to the left
  - d) Enhances binding, decreases affinity, enhances release, shifts dissociation curve to the right
  - e) Enhances binding, increases affinity, inhibits release, shifts dissociation curve to the left
- 26.2) In a patient with carbon monoxide poisoning, what would you predict would happen to blood pressure, heart rate, and respiratory rate?
- a) Decreased blood pressure, increased heart rate, increased respiratory rate
  - b) Increased blood pressure, increased heart rate, increased respiratory rate
  - c) Decreased blood pressure, decreased heart rate, increased respiratory rate
  - d) Decreased blood pressure, decreased heart rate, decreased respiratory rate
  - e) Increased blood pressure, increased heart rate, decreased respiratory rate
- 26.3) A 10-month-old African-American infant is brought into the Emergency Department with a history of crankiness, crying a lot, and at times shortness of breath. The parents state that she has not been eating well and seems to have lost energy. This

pattern of behavior has been getting worse during the last few weeks, and they think she has developed a fever again. About 6 weeks ago, the infant had a severe cold and fever. On your examination, she appears somewhat pale, especially in the palms and lips. Her fingers and toes are swollen (hand-foot syndrome) and she seems to be sensitive to touch in these areas. At first the parents thought she may have a cold or the flu, so they did not bring her to the hospital sooner and just treated her at home. There are many considerations for a diagnosis, but on questioning the parents, you find out that one of the parents has sickle cell trait. The other parent has not been tested. You do genetic testing on the parent for the sickle cell trait and on the child for homozygous HgbS. What types of hemoglobin would you expect to find in the patient's blood?

- a) HgbF only
  - b) HgbF and HgbA
  - c) HgbA only
  - d) HgbF and HgbS
  - e) HgbS only
- 26.4) What is the underlying cause of the above 10-month-old patient's recurrent infections?
- a) Immunosuppression due to liver disease
  - b) Immunosuppression due to spleen damage
  - c) Immunosuppression due to lack of thymus development
  - d) Immunosuppression due to kidney disease
  - e) Undernourishment

### **Respiratory #7 – Physiology: Control of Respiration**

- 1) Which of the following is NOT true regarding carbon dioxide in the control of respiration?
- a) The slope of the relationship between minute ventilation and CO<sub>2</sub> is a test of CO<sub>2</sub> sensitivity
  - b) The ventilator response is attenuated by hypoxia
  - c) The affects of CO<sub>2</sub> are greater when awake due to increased activity in the reticular formation
  - d) Narcotics shift the CO<sub>2</sub> ventilation curve to the right and reduce its slope
  - e) In metabolic acidosis, sensitivity to CO<sub>2</sub> is increased
- 2.1) How will breathing be affected with a lesion (transaction) in the pons at the level of the pontine respiratory group (apneustic center)?
- a) Breathing is unaffected
  - b) Breathing ceases
  - c) Occasional agonal gasps
  - d) Prolonged inspiration interrupted by occasional expiration
  - e) Prolonged expiration interrupted by occasional inspiration
- 2.2) How will breathing be affected with a lesion (transaction) above the reticular formation (floor of fourth ventricle) in the medulla?
- a) Breathing is unaffected
  - b) Breathing ceases
  - c) Occasional agonal gasps
  - d) Prolonged inspiration interrupted by occasional expiration

- e) Prolonged expiration interrupted by occasional inspiration
- 2.3) Which of the following describes the control of rhythmic breathing?
- a) Tonic inspiration with intermittent phasic expiration
  - b) Tonic expiration with intermittent phasic inspiration
  - c) Phasic inspiration matched with phasic expiration
- 2.4) Which of the following contains the inspiratory (drive external intercostals) and expiratory (drive internal intercostals and abdominal muscles) neurons?
- a) Nucleus tractus solitarius in medulla (dorsal respiratory group, DRG)
  - b) Nucleus retrofacialis in medulla (ventral respiratory group, VRG)
  - c) Nucleus retroambigous in medulla (ventral respiratory group, VRG)
  - d) Nucleus ambiguus in medulla (ventral respiratory group, VRG)
  - e) Apneustic center in pons
- 2.5) Which of the following is the only location in the VRG containing cells that inhibit inspiratory cells in the DRG?
- a) Nucleus retrofacialis in medulla (ventral respiratory group, VRG)
  - b) Nucleus retroambigous in medulla (ventral respiratory group, VRG)
  - c) Nucleus ambiguus in medulla (ventral respiratory group, VRG)
- 2.6) Which of the following locations acts as the principal initiator of the phrenic nerves?
- a) Central chemoreceptors in the ventrolateral medulla
  - b) Nucleus ambiguus in medulla (ventral respiratory group, VRG)
  - c) Nucleus retroambigous in medulla (ventral respiratory group, VRG)
  - d) Nucleus retrofacialis in medulla (ventral respiratory group, VRG)
  - e) Nucleus tractus solitarius in medulla (dorsal respiratory group, DRG)
- 3.1) Plasma pH is normally about 7.40 (7.35-7.45). What is the normal pH in cerebrospinal fluid (CSF)?
- a) 7.25
  - b) 7.33
  - c) 7.40
  - d) 7.47
  - e) 7.55
- 3.2) Which of the following is NOT true regarding central and peripheral chemoreceptors and their affect on respiration?
- a) Peripheral chemoreceptors respond to changes in PO<sub>2</sub>
  - b) Central chemoreceptors respond to changes in pH
  - c) Arterial PCO<sub>2</sub> regulation takes hours while CSF regulation takes minutes
  - d) Increased arterial PCO<sub>2</sub> would lead to increased CSF pH
  - e) Chemoreceptor discharge markedly increases when PO<sub>2</sub> < 60mmHg with these chemoreceptors accounting for about 40% of the total ventilator response to changes in PCO<sub>2</sub>
- 3.3) A patient with sepsis and a high fever is on a ventilator in the intensive care unit (ICU). If their CO<sub>2</sub> production doubles, how will breathing be affected?
- a) Respiratory rate will double
  - b) Respiratory rate will halve
  - c) Minute ventilation will double
  - d) Minute ventilation will halve
  - e) Breathing will not change

- 3.4) Which of the following patients would experience worsening of their hypoxia if given high dose oxygen over an extended period of time?
- a) Asthma
  - b) Chronic bronchitis
  - c) Emphysema
  - d) Pulmonary fibrosis
  - e) Chronic obstructive pulmonary disease
- 4.1) Which of the following brings foreign materials from the nasopharynx to the pharynx where it can be swallowed or expectorated?
- a) Hering-Breuer reflex
  - b) Diving reflex
  - c) Sniff reflex
  - d) Sneeze reflex
  - e) Gag reflex
- 4.2) Which of the following describes the mammalian diving reflex?
- a) Cold water stimulation on the face results in nasal inhalation
  - b) Cold water stimulation on the face results in oral inhalation
  - c) Cold water stimulation on the face results in closure of the glottis
  - d) Cold water stimulation on the face results in closure of the larynx
  - e) Cold water stimulation on the face results in apnea and bradycardia
- 4.3) Which of the following prevents over-inflation of the lungs (>1L in adults) and is important in newborns?
- a) Hering-Breuer reflex
  - b) Gasp reflex
  - c) Sniff reflex
  - d) Valsalva reflex
  - e) Diving reflex
- 4.4) Rapidly adapting pulmonary stretch fibers are stimulated by all of the following EXCEPT:
- a) Cigarette smoke
  - b) Dust
  - c) Lung inflation
  - d) Phlegm
  - e) Noxious gases
- 4.5) Slowly adapting pulmonary stretch fibers are useful in patients with COPD or airway obstruction because they:
- a) Allow for a longer inspiratory phase
  - b) Allow for a longer expiratory phase
  - c) Cause a shorter inspiratory phase
  - d) Cause a shorter expiratory phase
  - e) Increase the anterior-posterior chest wall dimension
- 4.6) Which of the following would NOT likely stimulate unmyelinated C-ending juxtacapillary (J) receptors?
- a) Barotrauma
  - b) Pulmonary emboli
  - c) Pneumonia

- d) Asbestos
  - e) Pulmonary edema
- 5.1) At the onset of exercise, ventilation is closely matched to:
- a) O<sub>2</sub> consumption
  - b) CO<sub>2</sub> production
  - c) Lactic acid production
  - d) Unknown
  - e) A & B
- 5.2) During strenuous exercise, PCO<sub>2</sub> levels fall, PO<sub>2</sub> levels increase, and lactic acid production increase. What causes the increase in ventilation?
- a) O<sub>2</sub> consumption
  - b) CO<sub>2</sub> production
  - c) Lactic acid production
  - d) Unknown
  - e) A & B
- 5.3) Which of the following is NOT true regarding respiration and high altitude?
- a) Respiratory rate increases due to peripheral chemoreceptor stimulation
  - b) Concentrations of 2,3-DPG in RBCs increases
  - c) NaHCO<sub>3</sub> excretion in the kidneys raises pH toward normal
  - d) Those with acute altitude intolerance should receive oxygen and descend to alleviate symptoms
  - e) Those with chronic altitude sickness can ascend to slightly greater heights with each occurrence
- 6.1) What is the most common cause of obstructive sleep apnea?
- a) Pulmonary hypertension
  - b) Polycythemia
  - c) Obesity
  - d) Diabetes
  - e) Cor pulmonale
- 6.2) Which of the following is seen in central sleep apnea but not obstructive sleep apnea?
- a) Blood gas changes
  - b) No respiratory effort
  - c) Sleep deprivation
  - d) Can cause right sided heart failure
  - e) Can cause polycythemia
- 6.3) Cheyne-Stokes breathing is characterized by oscillations between apnea and hyperpnea. Which of the following would NOT lead to Cheyne-Stokes breathing?
- a) Sleep at high altitude
  - b) Traumatic brain injury
  - c) Diabetic ketoacidosis
  - d) Morphine administration
  - e) Carbon monoxide poisoning
- 6.4) Which of the following respiratory patterns is seen in cardiac arrest and may persist for several minutes after cessation of a heartbeat?
- a) Cheyne-Stokes respiration

- b) Biot respiration
  - c) Kussmaul respiration
  - d) Ataxic respiration
  - e) Agonal respiration
- 7.1) A 20-year-old college student hit a tree while riding his all-terrain vehicle. He was not wearing a helmet. He is initially apneic at the site, but with resuscitation begins to breathe at a rate of 25/min with paradoxical breathing (outward movement of his abdominal muscles with inspiration). An x-ray examination reveals a fractured cervical vertebra with a spinal transection at C2. Which of the following structures of respiration was affected by this injury?
- a) Pons
  - b) Medulla
  - c) DRG
  - d) VRG
  - e) Phrenic nerve
- 7.2) What are the physiological effects in the above 20-year-old patient's injury on respiration?
- a) Reduced vital capacity, mild hypercapnia and hypoxemia, reduced maximal inspiratory pressure
  - b) Normal vital capacity, mild hypercapnia and hypoxemia, normal maximal inspiratory pressure
  - c) Reduced vital capacity, normal PCO<sub>2</sub> and PO<sub>2</sub>, normal maximal inspiratory pressure
  - d) Periods of apnea during sleep
  - e) Apneustic breathing
- 7.3) An obese 45-year-old physician complains of daytime sleepiness, fatigue, and morning headaches. His wife reports snoring with multiple episodes of abrupt arousal each night. She will not allow him to drive long distances because he frequently falls asleep at the wheel. He was recently hospitalized for a deep vein thrombosis and was found at the time to have evidence of right-sided heart failure. An arterial blood gas analysis on room air revealed a PAO<sub>2</sub> of 59mmHg, a PACO<sub>2</sub> of 65mmHg, pH of 7.37, and oxygen saturation of 89% while awake. His hemoglobin concentration was 16.3g/dL. If a polysomnogram (sleep study) were performed, what would it most likely reveal?
- a) Brief, infrequent episodes of no airflow at the nose or mouth with no attempt to breathe and no change in arterial O<sub>2</sub>
  - b) Brief, infrequent episodes of no airflow at the nose or mouth with vigorous attempts to breathe, hypoxemia, and hypercapnia
  - c) Prolonged, multiple episodes of no airflow at the nose or mouth with no attempt to breathe, hypoxemia, and worsening hypercapnia
  - d) Prolonged, multiple episodes of no airflow at the nose or mouth with vigorous attempts to breathe, worsening hypoxemia, and worsening hypercapnia
  - e) Prolonged, multiple episodes of no airflow at the nose or mouth with vigorous attempts to breathe, but no change in arterial O<sub>2</sub> or CO<sub>2</sub>
- 7.4) A 26-year-old woman with cystic fibrosis and severe obstructive pulmonary disease is admitted to the hospital with increasing dyspnea, cyanosis, and increasing productive cough. Her chest radiograph displays severe hyperinflation with flattened diaphragms and

increased markings consistent with airway inflammation and bronchiectasis (dilation of airways resulting from chronic infection). On physical examination, her respiratory rate is 24/min and her breath sounds are diminished with copious crackles at the bases.

Treatment begins with supplemental O<sub>2</sub> therapy by nasal cannula, and a series of arterial blood gas samples are obtained. Which of the following is true?

- a) The most appropriate supplemental O<sub>2</sub> flow for this patient is 2 L O<sub>2</sub>
- b) The higher arterial PO<sub>2</sub> in this patient while she is receiving supplemental O<sub>2</sub> blunts her respiratory response to CO<sub>2</sub>
- c) On room air, this patient demonstrates a hypoxemia-induced increase in ventilation
- d) During sleep, this patient is at risk for worsening hypercapnia.
- e) On room air, this patient demonstrates a chronic respiratory acidosis

### **Respiratory #8 – Physiology: Non-Respiratory Functions of the Lung**

1.1) Which of the following occurs with the autosomal recessive disorder of cystic fibrosis?

- a) Increased Na<sup>+</sup> secretions
- b) Decreased Na<sup>+</sup> secretions
- c) Increased Cl<sup>-</sup> secretions
- d) Decreased Cl<sup>-</sup> secretions
- e) Increased Ca<sup>++</sup> secretions

1.2) The color of sputum correlates more closely with the amount of time it has been in the lower respiratory tract (LRT) than with the type of infection.

- a) True
- b) False

1.3) Which of the following describes the clearance of particles below the terminal bronchioles?

- a) Cilia beat upward in the viscous gel layer and slowly return in the sol layer
- b) Cilia beat downward in the viscous gel layer and slowly return in the sol layer
- c) Cilia beat upward in the non-viscous sol layer and slowly return in the gel layer
- d) Cilia beat downward in the non-viscous sol layer and slowly return in the gel layer
- e) Clearance is slow and independent of the mucociliary transport system

1.4) In patients with black lung (occupational disease), where are the highest concentration of particulates found?

- a) Nasopharynx
- b) Oropharynx
- c) Trachea
- d) Bronchioles
- e) Alveoli

1.5) Which of the following is NOT seen in Kartagener Syndrome?

- a) Situs inversus
- b) Immotile cilia
- c) Pneumonia
- d) Sinusitis
- e) Bronchiectasis

2) Which of the following is NOT true regarding the bronchus-associated lymphoid tissue (BALT) component of mucosa-associated lymphoid tissue (MALT)?

- a) Systemic immunity and MALT may work independently of each other so sensitization of one to an antigen may not transpose to the other
- b) BALT aggregates in the upper regions of conducting airways
- c) MALT is the first line of defense to exposed mucosal surfaces
- d) MALT has encapsulated lymph nodes with afferent and efferent drainage
- e) There are no organized lymph structures in the alveolar spaces

3.1) The B-cells in MALT have a selectivity to differentiate into what type of secreting plasma cells? (also the most common inherited immunoglobulin deficiency)

- a) IgA
- b) IgD
- c) IgE
- d) IgG
- e) IgM

3.2) What are the predominant lymphocyte cells throughout MALT, limiting the initiation of an inflammatory response and expressing IgE in response to inhaled antigens or asthma?

- a) Natural killer cells
- b) Helper T cells
- c) Cytotoxic T cells
- d) Gamma-Delta T cells
- e) B cells

3.3) Which of the following plays a major role in protections against herpes?

- a) Natural killer cells
- b) Helper T cells
- c) Cytotoxic T cells
- d) Gamma-Delta T cells
- e) B cells

3.4) What are the first non-epithelial cells within the lungs to contact and respond to foreign inhaled substances?

- a) Alveolar macrophages and gamma-delta T cells
- b) Dendritic cells and alveolar macrophages
- c) Natural killer cells and dendritic cells
- d) Natural killer cells and B cells
- e) B cells, helper T cells, and alveolar macrophages

3.5) A 44-year-old man from China presents with dyspnea, fatigue, and chest pain. History reveals his job involves stone-grinding and mining of coal. The patient has a disorder in which alveolar macrophages consume foreign particles, but cannot destroy the particles, leading to macrophage death. Testing finds interstitial fibrosis and restrictive lung disease. Asbestosis is ruled out. Which of the following is the most likely foreign particle involved?

- a) Gold
- b) Lead
- c) Silica
- d) Carbon

- e) Pollen
- 3.6) Which toll-like receptor (TLR) has specificity to Gram-negative bacteria lipopolysaccharide (LPS)?
- a) TLR-2
  - b) TLR-3
  - c) TLR-4
  - d) TLR-6
  - e) TLR-7
- 3.7) Which toll-like receptor (TLR) has specificity to Gram-positive bacteria?
- a) TLR-2
  - b) TLR-3
  - c) TLR-4
  - d) TLR-6
  - e) TLR-7
- 4.1) A 59-year-old woman complains of shortness of breath and a chronic cough, which have progressively increased during the past 10 years. She worked for 30 years in a metal pouring foundry making molds for sculptures. She has no history of cigarette smoking. On spirometry, her FVC and FEV1 are reduced with a normal FEV1/FVC. You perform a bronchoscopy (i.e. bronchoalveolar lavage with a transbronchial biopsy). What type of lung disease do you suspect?
- a) Obstructive lung disease with increased goblet cells
  - b) Obstructive lung disease with loss of elastic properties
  - c) Restrictive lung disease secondary to infection
  - d) Restrictive lung disease secondary to occupational exposure
  - e) Obstructive lung disease secondary to genetic deficiency
- 4.2) Which of the following would you expect to see on histological examination in the above 59-year-old patient?
- a) Interstitial hemorrhage, edema fluid, and a predominant neutrophil infiltrate
  - b) A granulomatous-like lesion with interstitial fibrosis and abnormal large foamy macrophages
  - c) Interstitial hemorrhage, edema fluid, and a predominant macrophage infiltrate
  - d) A granulomatous-like lesion with interstitial fibrosis and a predominant neutrophil infiltrate
  - e) Minimum inflammatory response with extremely large alveoli called bullae
- 4.3) In the above 59-year-old patient, what would you expect to find for diffusion capacity and lung volume?
- a) Normal
  - b) Increased DLCO, normal lung volume
  - c) Decreased DLCO, decreased lung volume
  - d) Increased DLCO, decreased lung volume
  - e) Decreased DLCO, increased lung volume
- 4.4) A 29-year-old man with immotile cilia is referred to you by a urology clinic for a pulmonary evaluation. He has a history of chronic cough, sinus infection, and chronic ear infections. At the visit, he has no acute respiratory symptoms. What would you predict his pulmonary function test results to be?
- a) FEV1/FVC normal, DLCO normal

- b) FEV1/FVC increased, DLCO increased
  - c) FEV1/FVC decreased, DLCO normal
  - d) FEV1/FVC decreased, DLCO decreased
  - e) FEV1/FVC decreased, DLCO decreased
- 4.5) What would you expect to see on chest x-ray examination of the above 29-year-old patient?
- a) Normal lung fields, normal heart size
  - b) Asymmetrical lung infiltrates, enlarged heart
  - c) Symmetrical lung infiltrates, normal heart size
  - d) Asymmetrical lung infiltrates, normal heart size
  - e) Symmetrical lung infiltrates, enlarged heart

**Respiratory #9 – Microbiology: Part 1 (Chapters 13 & 18)**

- 1) Which of the following is NOT a defense mechanism of the respiratory tract?
- a) Normal flora (diphtheroids, strep, neisseria)
  - b) Mucociliary elevator
  - c) Macrophages and NK cells
  - d) Salivary flushing
  - e) Secretory IgM
- 2) What is the ideal strategy used by respiratory pathogens to overcome host defenses?
- a) Attenuating ciliary activity
  - b) Increasing IgA secretion
  - c) Attaching to cells of the mucociliary sheet
  - d) Releasing endotoxins
  - e) Increasing the activity of Clara and Goblet cells
- 3.1) Which of the following pathogens uses hemagglutinin as microbial adhesion and CD46 as host receptor?
- a) Influenza A virus (influenza)
  - b) Coxsackie A virus
  - c) *H. influenzae*, *S. pneumoniae*, *K. pneumoniae*
  - d) Parainfluenza type I (and respiratory syncytial virus)
  - e) *Mycoplasma pneumoniae* (Atypical pneumonia)
  - f) Measles virus (measles)
- 3.2) What is the microbial adhesion and host receptor used by rhinovirus (common cold)?
- a) Hemagglutinin & Sialyloligosaccharides
  - b) Capsid protein & ICAM-1 (CD54)
  - c) Envelope protein & Sialoglycolipids
  - d) Surface molecule & Carbohydrate sequence in glycolipid
  - e) Mycoplasmal molecule on “foot” & Neuraminic acid
- 3.3) Which of the following pathogens uses neuraminic acid as host receptor?
- a) Influenza A virus (influenza)
  - b) Rhinovirus (common cold)
  - c) *H. influenzae*, *S. pneumoniae*, *K. pneumoniae*
  - d) Parainfluenza type I (and respiratory syncytial virus)
  - e) *Mycoplasma pneumoniae* (Atypical pneumonia)

- 3.4) What is the microbial adhesion and host receptor used by *Haemophilus influenzae*, *Streptococcus pneumoniae*, and *Klebsiella pneumoniae*?
- Hemagglutinin & Sialyloligosaccharides
  - Capsid protein & ICAM-1 (CD54)
  - Envelope protein & Sialoglycolipids
  - Surface molecule & Carbohydrate sequence in glycolipid
  - Mycoplasmal molecule on “foot” & Neuraminic acid
- 3.5) What is the microbial adhesion and host receptor used by influenza A virus?
- Hemagglutinin & Sialyloligosaccharides
  - Capsid protein & ICAM-1 (CD54)
  - Envelope protein & Sialoglycolipids
  - Surface molecule & Carbohydrate sequence in glycolipid
  - Mycoplasmal molecule on “foot” & Neuraminic acid
- 3.6) Which of the following uses integrin or ICAM-1 as host receptor?
- Influenza A virus (influenza)
  - Rhinovirus (common cold)
  - Coxsackie A virus
  - Parainfluenza type I (and respiratory syncytial virus)
  - Measles virus (measles)
- 3.7) What is the microbial adhesion and host receptor used by parainfluenza virus type I (and respiratory syncytial virus)?
- Hemagglutinin & Sialyloligosaccharides
  - Capsid protein & ICAM-1 (CD54)
  - Envelope protein & Sialoglycolipids
  - Surface molecule & Carbohydrate sequence in glycolipid
  - Mycoplasmal molecule on “foot” & Neuraminic acid
- 4) Of the following, which is the least common transmission route for pathogens?
- Fecal-oral
  - Respiratory droplets
  - Biting anthropods
  - Venereal
- 5) Primary (“professional”) invaders would likely infect which of the following, when compared against secondary invaders?
- AIDS patient
  - Congenital immunodeficiency
  - Chronic stress and cigarette smokers
  - Transplant patient
  - Healthy individual
- 6.1) Which of the following is Gram-positive, diplococci, and alpha-hemolytic?
- Staphylococcus aureus*
  - Bordetella pertussis*
  - Streptococcus pyogenes*
  - Streptococcus pneumoniae*
  - Pseudomonas*
- 6.2) Which of the following organisms is an acid-fast rod, thus would not show up on a normal Gram stain?

- a) *Mycoplasma pneumoniae*
  - b) *Mycobacterium tuberculosis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Staphylococcus aureus*
- 6.3) Which of the following is beta-hemolytic, catalase positive, and coagulase positive?
- a) *Pseudomonas*
  - b) *Haemophilus influenzae*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Staphylococcus aureus*
- 6.4) Which of the following is beta-hemolytic, catalase negative, and bacitracin sensitive?
- a) *Bordetella pertussis*
  - b) *Haemophilus influenzae*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Staphylococcus aureus*
- 6.5) What is the required growth factor associated with *Haemophilus influenzae* (grows best on chocolate agar)?
- a) Heme (X)
  - b) NAD (V)
  - c) Heme and NAD (X and V)
  - d) Cysteine
  - e) Cysteine and heme (X)
- 6.6) A company that makes antiseptics is asked to recall one of their bottled products due to a possible outbreak of infection in hospitals. Testing reveals the bacteria grew on the cap-liner adhesive (simple carbon source). Analysis on blood agar reveals greenish-metallic colonies with a fruity grape-like odor. The bacteria Gram stains negative and is rod-shaped. Which of the following is likely?
- a) *Pseudomonas*
  - b) *Legionella*
  - c) *Bordetella pertussis*
  - d) *Haemophilus influenzae*
  - e) *Corynebacterium diphtheriae*
- 6.7) Which of the following bacteria would show with no cell wall, patchy infiltrates, and a “fried egg” appearance?
- a) *Mycoplasma pneumoniae*
  - b) *Mycobacterium tuberculosis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Staphylococcus aureus*
- 6.8) A pet-shop owner presents with a cough. The owner states the cough began after buying parrots from a new seller. Lab analysis reveals Gram-negative bacteria with round, occasionally pear-shaped elementary bodies. Which of the following is most likely?
- a) *Pseudomonas*

- b) *Legionella*
  - c) *Bordetella pertussis*
  - d) *Haemophilus influenzae*
  - e) Chlamydia
- 6.9) Which of the following is a Gram-positive rod that can make dark black colonies on potassium tellurite and reddish granules on Löffler medium?
- a) *Legionella*
  - b) *Pseudomonas*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Corynebacterium diphtheriae*
- 6.10) What is the required growth factor associated with *Legionella*, which is traditionally detected on buffered charcoal yeast extract (BCYE) agar?
- a) Heme (X)
  - b) NAD (V)
  - c) Heme and NAD (X and V)
  - d) Cysteine
  - e) Cysteine and heme (X)
- 7.1) Which of the following is spread via fecal-oral and known as the “summer cold”?
- a) Rhinovirus
  - b) Coxsackie virus A
  - c) Influenza viruses
  - d) Parainfluenza viruses
  - e) Respiratory syncytial virus
- 7.2) Which of the following is NOT involved in transmission of rhinovirus (common cold)?
- a) Nose
  - b) Eyes
  - c) Hands
  - d) Mouth
- 7.3) Which of the following is a cause of pharyngitis, conjunctivitis, and bronchitis, and has 12 penton fibers that bind to cell receptors for transmission?
- a) Epstein-Bar virus (EBV)
  - b) Cytomegalovirus (CMV)
  - c) Coronaviruses
  - d) Adenovirus
  - e) Echovirus
- 7.4) Which of the following can cause cold-like symptoms and croup, and is characteristic of measles and mumps with short-lived immunity?
- a) Rhinovirus
  - b) Coxsackie virus A
  - c) Influenza viruses
  - d) Parainfluenza viruses
  - e) Respiratory syncytial virus
- 7.5) An child presents in the winter with symptoms of the cold after a trip to China. The clinician is concerned about severe acute respiratory syndrome (SARS). It is known that

the virus uses an envelope protein to bind to glycoprotein receptors on cells. Which of the following is most likely?

- a) Epstein-Bar virus (EBV)
  - b) Cytomegalovirus (CMV)
  - c) Coronaviruses
  - d) Adenovirus
  - e) Echovirus (enteric cytopathic human orphan virus)
- 7.6) Which of the following is the most common cause of fatal respiratory tract infections in infants and children?
- a) Rhinovirus
  - b) Coxsackie virus A
  - c) Influenza viruses
  - d) Parainfluenza viruses
  - e) Respiratory syncytial virus
- 7.7) A patient presents with pharyngitis. A lab test reveals infected cells are swollen, multinucleated giant cells with dense, central, “owl’s eye” inclusions. Which of the following is most likely?
- a) Epstein-Bar virus (EBV)
  - b) Cytomegalovirus (CMV)
  - c) Coronaviruses
  - d) Adenovirus
  - e) Echovirus (enteric cytopathic human orphan virus)
- 7.8) A teenager presents with fever and fatigue. He reports his girlfriend having the same symptoms. Lab rests from the tonsils reveal atypical lymphocytes with heterophile antibody. Which of the following is most likely?
- a) Epstein-Bar virus (EBV)
  - b) Cytomegalovirus (CMV)
  - c) Coronaviruses
  - d) Adenovirus
  - e) Rhinovirus
- 8) Viruses are the most common invader of the nasopharynx, leading to epithelial cell damage and release of inflammatory mediators (e.g. bradykinin). Initially, viruses increase flow of virus-rich fluid and trigger the:
- a) Hering-Breuer reflex
  - b) Diving reflex
  - c) Sniff reflex
  - d) Sneeze reflex
  - e) Gag reflex
- 9) Adenovirus infections usually affect infants, children, and immunocompromised patients. Which of the following manifestations of Adenovirus is seen in military recruits?
- a) Gastroenteritis
  - b) Pertussis-like syndrome
  - c) Acute respiratory disease
  - d) Pharyngoconjunctival fever
  - e) Febrile, undifferentiated URT infections

- 10.1) Which of the following microbial causes of acute pharyngitis has protein M and lipoteichoic acid as virulence factors?
- a) *Borrelia vincenti*
  - b) *Haemophilus influenzae*
  - c) *Corynebacterium diphtheriae*
  - d) *Neisseria gonorrhoeae*
  - e) *Streptococcus pyogenes*
- 10.2) What is the major virulence factor of *Neisseria gonorrhoeae*?
- a) Capsule
  - b) Pseudomembrane
  - c) Pili
  - d) M protein
  - e) Streptokinase
- 10.3) What is the major virulence factor of *Corynebacterium diphtheriae*?
- a) Capsule
  - b) Pseudomembrane
  - c) Erythrogenic toxin
  - d) M protein
  - e) Streptokinase
- 10.4) Which of the following microbial causes of acute pharyngitis has capsule as a major virulence factor as well as pili and IgA protease?
- a) *Borrelia vincenti*
  - b) *Haemophilus influenzae*
  - c) *Corynebacterium diphtheriae*
  - d) *Neisseria gonorrhoeae*
  - e) *Streptococcus pyogenes*
- 11) A child presents with facial erythema that has spread to most of the body except the palms and soles. The child's tongue is red and "strawberry" in appearance. The clinician makes a diagnosis of scarlet fever due to *S. pyogenes*. What is the virulence factor responsible for this clinical presentation?
- a) Hyaluronidase
  - b) Streptolysin O and X
  - c) Erythrogenic toxin
  - d) M protein and capsule
  - e) Streptokinase
- 12.1) When doing a rapid diagnostic test for *S. pyogenes*, a positive test is acceptable but a negative result must be cultured. Thus, the rapid diagnostic test has:
- a) Low specificity and low sensitivity
  - b) High specificity and high sensitivity
  - c) Low specificity and High sensitivity
  - d) High specificity and low sensitivity
- 12.2) Patients with scarlet fever may develop rheumatic fever or which of the following?
- a) Acute glomerulonephritis
  - b) Acute epiglottitis
  - c) Encephalitis
  - d) Myocarditis

- 13.1) Along with *S. pneumoniae*, what is the most common cause of otitis media?
- P. aeruginosa*
  - M. catarrhalis*
  - S. agalactiae*
  - H influenzae* type B
  - M. tuberculosis*
- 13.2) Which of the following is a common cause of neonatal otitis media?
- P. aeruginosa*
  - M. catarrhalis*
  - S. agalactiae*
  - H influenzae* type B
  - M. tuberculosis*
- 14.1) A high school swimmer presents with ear pain. Otosopic examination shows a normal tympanic membrane with a red canal. Lab study shows a Gram-negative, non-lactose fermenter that is oxidase positive. There is a blue-green pigment and a fruity smell. The clinician suspects the most common cause of "swimmer's ear," which is:
- Pseudomonas aeruginosa*
  - Proteus mirabilis*
  - Candida albicans*
  - Staphylococcus aureus*
  - Aspergillus* species
- 14.2) A patient presents with otitis externa. Lab study reveals coagulase positive bacteria in golden colonies. Which of the following is most likely?
- Pseudomonas aeruginosa*
  - Proteus mirabilis*
  - Candida albicans*
  - Staphylococcus aureus*
  - Aspergillus* species
- 14.3) Which of the following causes of otitis externa is urease positive, highly motile, and produces H<sub>2</sub>S gas?
- Pseudomonas aeruginosa*
  - Proteus mirabilis*
  - Candida albicans*
  - Staphylococcus aureus*
  - Aspergillus* species
- 14.4) Which of the following causes of otitis externa would be cultured on sabouraud dextrose agar (SDA) and exists as yeast pseudohyphae?
- Pseudomonas aeruginosa*
  - Proteus mirabilis*
  - Candida albicans*
  - Staphylococcus aureus*
  - Aspergillus* species
- 15) An immigrant presents to the Emergency Room with difficulty breathing. The clinician takes a quick look into the patient's throat and sees it is swollen and edematous. The clinician order antibiotics and calls Anesthesiology for an intubation consult. Which of the following is most likely?

- a) Pharyngitis
  - b) Croup
  - c) Epiglottitis
  - d) Sinusitis
  - e) Pneumonia
- 16) What is the major reason that acute epiglottitis is rarely seen in the U.S. in young children?
- a) Increased hand washing
  - b) Hepatitis B (HepB) vaccine
  - c) Measles, Mumps, Rubella (MMR) vaccine
  - d) Varicella zoster virus (VZV, chickenpox) vaccine
  - e) *H. influenzae* type B (HiB) vaccine
- 17) A child presents to the hospital with a dry cough and inspiratory stridor (“crowing”). The nurse describes the sound to the physician as a seal barking. If bacterial causes (e.g. *M. pneumoniae*) have been ruled out, what is the most likely cause of this patient’s croup infection?
- a) Respiratory syncytial virus (RSV)
  - b) Parainfluenza virus
  - c) Influenza virus
  - d) Rhinovirus
  - e) Coxsackie virus type A
- 18) Which of the following must be present for *Cornibacterium diphtheriae* to be pathogenic?
- a) Diphtheria toxin
  - b) Tetanospasmin
  - c) LT toxin
  - d) ST toxin
  - e) TSST-1
- 19) Which of the following populations is at risk for diphtheria?
- a) Elderly or immunocompromised
  - b) Sheep herders and cattle farmers
  - c) Emigrants from the United States
  - d) Patients in the intensive care unit (ICU)
  - e) Non-immunized (e.g. developing country)
- 20) What is the major effect (mechanism) of diphtheria toxin?
- a) Binds to epithelium and ADP-ribosylates Gs, increasing cAMP
  - b) Binds to cell receptor and ADP- ribosylates Gi, increasing cAMP
  - c) Binds to cell receptor and ADP-ribosylates EF-2, inhibiting protein synthesis
  - d) Binds 60S ribosome, inhibiting protein synthesis
  - e) Induces excess cytokine release (e.g IL-1, TNF)

**Respiratory #10 – Microbiology: Part 2 (Chapter 19)**

- 1) Which of the following is NOT true of *B. pertussis* (whooping cough)?
- a) Attaches to ciliated respiratory mucosa
  - b) Characterized by paroxysms of coughs and inspiratory “whoop”
  - c) Organisms survive well outside of the host, making culture simple

- d) Complications include CNS anorexia, exhaustion, and secondary pneumonia
  - e) Hemagglutinin and agglutinogens play a role in attachment
  - f) Infants are at the greatest risk of complications
- 2) Which of the following is NOT a virulence factor of *Bordetella pertussis*?
- a) Trachea cytotoxin
  - b) LT toxin
  - c) Adenylate cyclase toxin
  - d) Pertussis toxin
  - e) Endotoxin
- 3) What is the mainstay of therapy in patients with active pertussis infections?
- a) IV antibiotics
  - b) Chest tube
  - c) Intubation
  - d) Pulmonary lavage
  - e) Supportive care
- 4) Which of the following is NOT true regarding current (2008) the vaccine for whooping cough?
- a) It is administered in combination with diphtheria and tetanus vaccines
  - b) It is administered at five different occasions to build immunity
  - c) The whole cell vaccine may cause fever, malaise, or convulsions
  - d) The acellular vaccine uses one or more inactivated cellular components such as filamentous hemagglutinin, pertactin, and fimbriae
  - e) The whole cell vaccine is recommended over the acellular vaccine
- 5) Bronchiolitis is most common in children under the age of 2 and is mainly caused by:
- a) Rhinovirus
  - b) Coxsackie virus A
  - c) Influenza viruses
  - d) Parainfluenza viruses
  - e) Respiratory syncytial virus
- 6) Peribronchial infiltration and interstitial pneumonia can occur in young children with bronchiolitis because:
- a) Their immune system has not fully developed
  - b) Their bronchi are more vertical, allowing for drainage into the alveoli
  - c) They have narrow airways, leading to alveolar restriction
  - d) They have poorly developed active inspiration muscles
  - e) They have a poor cough reflex
- 7) What is the vector for Sin Nombre Virus (Hantavirus), which can cause pulmonary capillary endothelial invasion with fluid outpouring into the lungs?
- a) Birds (parrots)
  - b) Rodents
  - c) Mosquitoes
  - d) Rabbits
  - e) Arthropod (ticks)
- 8.1) An infant presents with cough, rapid respiratory rate, and cyanosis. On exam there are no adventitious lung sounds and no throat edema. What is the likely cause?
- a) *H. influenzae*

- b) *S. aureus*
  - c) Group A strep
  - d) Respiratory syncytial virus
  - e) Parainfluenza virus
- 8.2) Which of the following is a cause of epiglottitis as well as croup in young children?
- a) *H. influenzae*
  - b) *S. aureus*
  - c) Group A strep
  - d) Respiratory syncytial virus
  - e) Parainfluenza virus
- 9.1) A neonate is brought to the hospital by social services after developing interstitial pneumonitis. The child's mother was recently incarcerated on drug and prostitution charges. Which of the following is a likely cause of the child's pneumonitis?
- a) *Mycoplasma pneumoniae*
  - b) *Mycobacterium tuberculosis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Chlamydia trachomatis*
- 9.2) Which of the following describes the common causes of pneumonia in children and adults?
- a) Children and adults mostly develop viral pneumonia
  - b) Children and adults mostly develop bacterial pneumonia
  - c) Children mostly develop viral pneumonia and adults mostly develop bacterial pneumonia
  - d) Children mostly develop bacterial pneumonia and adults mostly develop viral pneumonia
  - e) Development of viral or bacterial pneumonia is evenly distributed between children and adults
- 10.1) Which of the following would most likely cause diffuse, patchy consolidations on radiography (bronchopneumonia)?
- a) *Mycoplasma tuberculosis* or viral (e.g. influenza)
  - b) *Staphylococcus aureus*
  - c) *Streptococcus pneumoniae*
  - d) *Pseudomonas aeruginosa* or *Klebsiella pneumoniae*
- 10.2) Which of the following would most likely cause destruction of the lung parenchyma (lung abscess, necrotizing pneumonia)?
- a) *Mycoplasma tuberculosis* or viral (e.g. influenza)
  - b) *Staphylococcus aureus*
  - c) *Streptococcus pneumoniae*
  - d) *Pseudomonas aeruginosa* or *Klebsiella pneumoniae*
- 10.3) Which of the following would most likely cause a distinct region of complete consolidation on radiography with polymorphic exudates (lobar pneumonia)?
- a) *Mycoplasma tuberculosis* or viral (e.g. influenza)
  - b) *Staphylococcus aureus*
  - c) *Streptococcus pneumoniae*
  - d) *Pseudomonas aeruginosa* or *Klebsiella pneumoniae*

- 10.4) Which of the following would most likely cause interstitial pneumonia?
- a) *Mycoplasma tuberculosis* or viral (e.g. influenza)
  - b) *Staphylococcus aureus*
  - c) *Streptococcus pneumonia*
  - d) *Pseudomonas aeruginosa* or *Klebsiella pneumoniae*
- 11) Which of the following is NOT a cause of atypical pneumonia?
- a) *M. pneumoniae*
  - b) *C. pneumoniae*
  - c) *S. pneumoniae*
  - d) *K. pneumoniae*
  - e) *L. pneumophila*
- 12.1) A 67-year-old man with a history of heavy smoking comes to the doctor complaining of “the flu.” He has a fever, loss of appetite, headache, chest pain, and a mild cough producing little sputum. The doctor believes that the watery diarrhea, which the man also suffers from, is related. Sputum samples reveals neutrophils but no bacteria. Chest x-ray reveals nodular infiltrates. Serum tests are negative for cold agglutinins. Which of the following is most likely?
- a) *Klebsiella pneumoniae*
  - b) *Staphylococcus aureus*
  - c) *Bacillus anthracis*
  - d) *Chlamydia psittaci*
  - e) *Legionella pneumophila*
- 12.2) A bird shop owner visits the doctor complaining of headache, fever, and dry cough that has worsened over the last few days. The patient also complains of a sore throat and muscle aches. A physical exam reveals bilateral rales and mild splenomegaly. The doctor orders a chest x-ray that reveals a patchy pneumonitis. Diagnosis is confirmed with serological tests. The patient is administered tetracycline and the fever diminishes within 2 days. Which of the following is most likely?
- a) *Mycoplasma pneumonia*
  - b) *Chlamydia psittaci*
  - c) *Bacillus anthracis*
  - d) *Coxiella burnetii*
  - e) *Legionella pneumophila*
- 12.3) A cattle farmer goes to his doctor complaining of mild cough and fever. He says that the fever began abruptly several days ago. His occupation as cattle slaughterer leads the doctor towards a diagnosis, and tetracycline is administered. The diagnosis is confirmed by serology and a negative Weil-Felix test. Which of the following is most likely?
- a) *Klebsiella pneumoniae*
  - b) *Chlamydia psittaci*
  - c) *Bacillus anthracis*
  - d) *Coxiella burnetii*
  - e) *Streptococcus pneumonia*
- 12.4) A 33-year-old woman presents with a fever, nonproductive cough, and dyspnea. She has an ulcerous lesion on the neck, with blackened necrotic eschar surrounded by edema. The woman first noticed the lesion 2 weeks ago as a painful, small red macule

that gradually developed into an ulcer, and over the last few days, became painless. After the patient reveals she works in the imported wool and hides industry, the clinician becomes extremely worried as the mortality rate for this disease is near 100%. Which of the following is most likely?

- a) *Klebsiella pneumoniae*
- b) *Chlamydia psittaci*
- c) *Bacillus anthracis*
- d) *Coxiella burnetii*
- e) *Streptococcus pneumoniae*

12.5) An elderly woman presents with a cough producing rusty-colored sputum. She complains of sharp right-sided chest pains, chills, and fevers. Physical exam reveals increased tactile fremitus, dullness to percussion, and bronchial breath sounds on the lower right side. Chest x-ray shows right lower lobe consolidation, and Gram stain of sputum shows Gram-positive diplococci. Physicians begin treatment with cephalosporins. Which of the following is most likely?

- a) *Chlamydia pneumoniae*
- b) *Legionella pneumophila*
- c) *Klebsiella pneumoniae*
- d) *Coxiella burnetii*
- e) *Streptococcus pneumoniae*

12.6) A 22-year-old student presents with a non-productive cough, fever, and sore throat. Chest x-ray demonstrates diffuse interstitial infiltrate. Sputum Gram stain shows many PMNs but no organisms, and a Giemsa stain reveals intracytoplasmic inclusions in epithelial cells. Doxycycline treatment is begun. Which of the following is most likely?

- a) *Chlamydia pneumoniae*
- b) *Legionella pneumophila*
- c) *Klebsiella pneumoniae*
- d) *Coxiella burnetii*
- e) *Streptococcus pneumoniae*

12.7) An alcoholic presents with a fever, pleuritic chest pain, dyspnea, and cyanosis. His cough produces a bloody “currant-jelly” sputum. Chest x-ray shows inflammation involving the right upper lobe with possible cavities. Which of the following is most likely?

- a) *Staphylococcus aureus*
- b) *Legionella pneumophila*
- c) *Klebsiella pneumoniae*
- d) *Mycoplasma pneumoniae*
- e) *Streptococcus pneumoniae*

12.8) A hospitalized patient develops fever with tachypnea, cyanosis, grunting, and retractions. Gram stain is positive. Penicillin is started but is ineffective. Which of the following is most likely?

- a) *Staphylococcus aureus*
- b) *Legionella pneumophila*
- c) *Klebsiella pneumoniae*
- d) *Bacillus anthracis*
- e) *Streptococcus pneumoniae*

12.9) A young woman at an army base thinks she has a cold and goes to her doctor. She complains of malaise, chills, sore throat, and dry cough. Chest x-ray shows interstitial infiltrate more severe than suggested by her symptoms. Laboratory tests indicated that the woman's serum was capable of agglutinating erythrocytes when incubated at 4°C. The doctor prescribes erythromycin. Which of the following is most likely?

- a) *Staphylococcus aureus*
- b) *Legionella pneumophila*
- c) *Klebsiella pneumoniae*
- d) *Mycoplasma pneumonia*
- e) *Streptococcus pneumonia*

13) Human metapneumovirus (hMPV) occurs mostly in winter and is associated with a spectrum of infections. Major symptoms include fever, runny nose, sore throat, and wheeze. Some reports say by age 5 most kids have had an hMPV infection. What virus is hMPV most closely associated to?

- a) Rhinovirus
- b) Coxsackie virus A
- c) Influenza viruses
- d) Parainfluenza viruses
- e) Respiratory syncytial virus

14) An influenza virus structurally appears as genetic material surrounded by a capsid, enclosed in a lipid envelope. There are "spikes" arising from the structure; hemagglutinin (HA, 13 types) and neuraminidase (NA, 9 types). What is the role of these spikes?

- a) HA and NA allow the virus to fuse with cells and initiate infection
- b) HA and NA allow the virus to release from cells to spread infection
- c) HA allows for viral fusion and NA allows for viral release
- d) HA allows for viral release and NA allows for viral fusion

15) Which of the following describes influenza A?

- a) Single-stranded, non-segmented, RNA
- b) Single-stranded, segmented, RNA
- c) Double-stranded, non-segmented, DNA
- d) Double-stranded, segmented, DNA
- e) None of the above

16) If a major change in HA or NA occurred within an influenza virus allowing for spread to previously immune individuals, which of the following occurred?

- a) Antigenic mimicry
- b) Antigenic masking
- c) Antigenic shift
- d) Antigenic drift
- e) Antigenic variation

17) Which of the following would most likely lead to a pandemic (influenza type A)?

- a) Antigenic variation
- b) Antigenic drift
- c) Antigenic masking
- d) Antigenic shift
- e) Antigenic mimicry

- 18) How would influenza be named if it did not cause epidemics, caused only minor respiratory problems, was found in Erie, PA in 2008, had type 8 HA, and type 4 NA?
- a) Influenza A/Erie/08/H8N4
  - b) Influenza B/Erie/H4N8/08
  - c) Influenza C/Erie/08/H8N4
  - d) Influenza C/Erie/H8N4/08
  - e) Influenza C/H8N4/Erie/08
- 19) Annual influenza viruses contain what three (trivalent) egg-grown killed virus types, which are updated yearly depending on the dominant strains?
- a) Type A H1N1, Type A H3N2, Type B
  - b) Type A H3N2, Type A H1N1, Type A H2N3
  - c) Type A H3N2, Type B, Type C
  - d) Type A H1N1, Type B, Type C
  - e) Type A H3N2, Type A H1N1, Type A H4N6
- 20) Which of the following is the most common secondary effect seen with an influenza infection?
- a) Guillain-Barré syndrome
  - b) Polyneuritis
  - c) Bacterial pneumonia
  - d) Encephalomyelitis
  - e) Epiglottitis
- 21) Which of the following is NOT a symptom commonly seen in influenza infections?
- a) Chills and fever
  - b) Muscle aches
  - c) Malaise
  - d) Nausea and vomiting
  - e) Runny nose and cough
- 22.1) Which of the following spreads to lymph tissue, leading to a painful, tender, swollen parotid gland and enlarged submandibular glands?
- a) Influenza
  - b) Parainfluenza
  - c) Mumps
  - d) Measles
  - e) Respiratory syncytial virus (RSV)
  - f) Severe acute respiratory syndrome (SARS)
- 22.2) Which of the following has spikes that present G protein for attachment and fusion (F) protein for initiating viral entry?
- a) Influenza
  - b) Parainfluenza
  - c) Mumps
  - d) Measles
  - e) Respiratory syncytial virus (RSV)
  - f) Severe acute respiratory syndrome (SARS)
- 23) Severe acute respiratory syndrome (SARS) is acquired with person-to-person contact. Symptoms include fever, cough, shortness of breath, and a chest x-ray consistent with pneumonia. What is the microbe responsible for SARS?

- a) *Staphylococcus pneumonia*
  - b) Coxsackievirus
  - c) Coronavirus
  - d) Adenovirus
  - e) Echovirus
- 24) Which of the following is NOT true of *Mycoplasma tuberculosis* (tuberculosis, TB)?
- a) Ziehl-Neelsen stain results for tuberculosis are available within 1 hour
  - b) Lung lesions on chest x-ray (Ghon complexes) and enlarged lymph nodes are consistent with primary tuberculosis infection
  - c) Disseminated tuberculosis (not contained in tubercles) is called miliary TB
  - d) Caseous or “cheesy” lung necrosis occurs within days of contracting TB
  - e) Primary tuberculosis is often asymptomatic and can be detected as early as 4-6 weeks with a PPD skin (Mantoux) test
  - f) Treatment of TB usually involves 3 drugs over a minimum of 6 months
  - g) A BCG vaccine would likely reveal a positive PPD result even if the patient did not have tuberculosis
  - h) Shows growth on Löwenstein-Jensen agar
- 25) Which of the following differentiates Nocardial infections from *Mycobacterium tuberculosis* infections?
- a) Nocardia species are aerobic, Gram-positive rods
  - b) Nocardia species are acid fast
  - c) Nocardia species form branching filaments
  - d) Nocardia species affects the immunocompromised
  - e) Nocardia species affects the lungs primarily
- 26) What is the most common opportunistic pulmonary infection in HIV-infected individuals?
- a) *Pneumocystis jiroveci*
  - b) *Mycobacterium tuberculosis*
  - c) Nocardia species
  - d) *Staphylococcus pneumonia*
  - e) *Klebsiella pneumoniae*
- 27) When would an HIV positive individual be most likely to develop *Pneumocystis jiroveci* (formally *carinii*)?
- a) At the beginning of highly active antiretroviral therapy (HAART)
  - b) Several months after starting highly active antiretroviral therapy (HAART)
  - c) After successful treatment with highly active antiretroviral therapy (HAART)
  - d) When CD4 count is less than 5,000 cells/mm<sup>3</sup>
  - e) When CD4 count is less than 200 cells/mm<sup>3</sup>
- 28) What is the pathogenesis of Pneumocystic pneumonia (PCP)?
- a) Trophic conversion to spore causing alveolar cell rupture
  - b) Inflammatory toxin release causing pulmonary edema
  - c) Alveolar tissue thickening with hypoxia
  - d) Phagocytized by macrophages causing alveolar congestion
  - e) Release of toxin causing pulmonary capillary stiffening
- 29) Which of the following would NOT be used for detection of PCP?
- a) Chest x-ray showing widespread pulmonary infiltrates

- b) Immunofluorescent or histochemical staining or specimen
  - c) Toluidine blue or immunofluorescence assay
  - d) Gram staining and grow on chocolate or MacConkey agar
  - e) Comparing DNA samples of polymerase chain reaction products
- 30) Prophylaxis for PCP includes regular pentamidine inhalations or:
- a) Moxifloxacin or levofloxacin
  - b) Sulfamethoxazole/trimethoprim (TMP-SMX)
  - c) Macrolide antibiotics (e.g. Azithromycin, Erythromycin)
  - d) Aminoglycoside antibiotics (e.g. Streptomycin, Gentamicin)
  - e) Penicillin G
- 31) Cystic fibrosis (CF) is the most common lethal inherited disorder among Caucasians. Which of the following colonizes the lungs of almost all CF patients aged 15-20 years, and grows in a highly mucoid form, almost mimicking the mucoid secretions of the CF patient, and may be impossible to eradicate, frequently causing death?
- a) *P. cepacia*
  - b) *P. aeruginosa*
  - c) *S. aureus*
  - d) *H. influenzae*
- 32) What type of patient is at risk for polymicrobial or anaerobic pneumonia?
- a) Immunocompromized
  - b) Military recruits
  - c) Head injuries, specifically near the nose
  - d) Individuals working with animal pelts or wool
  - e) Aspirators of respiratory or gastric secretions
- 33.1) A patient presents with chest pain and difficulty breathing after a trip to Asia. The patient mentions he ate several freshwater crabs. Sputum test reveals eggs for a parasite that normally lives in the lung. Which of the following is most likely?
- a) *Paragonimus westermani*
  - b) Nematodes (*Ascaris* or hookworms)
  - c) *Echinococcus granulosus*
  - d) *Ascaris*, *Strongyloides*, or *Schistosoma*
  - e) Filarial nematodes (*Wuchereria* or *Brugia*)
- 33.2) A patient presents with cough, respiratory distress, and marked eosinophilia (tropical pulmonary eosinophilia, TPE). Blood tests from peripheral circulation are negative during the day, but at night a parasite is found. Which of the following is most likely?
- a) *Paragonimus westermani*
  - b) Nematodes (*Ascaris* or hookworms)
  - c) *Echinococcus granulosus*
  - d) *Ascaris*, *Strongyloides*, or *Schistosoma*
  - e) Filarial nematodes (*Wuchereria* or *Brugia*)

**Respiratory #11 – Microbiology: Part 3 (Chapter 34, Chapters 74 & 75)**

1.1) Which of the following describes the measles, mumps, rubella (MMR) vaccine, which is given at 6 months of age followed by another dose at 1 year?

- a) Toxoid

- b) Attenuated
  - c) Live attenuated
  - d) Killed virus
  - e) Plasma derived
- 1.2) Which of the following vaccines is targeted at pre-exposure for travelers to high risk areas, with 2-3 doses usually being sufficient?
- a) Polio
  - b) Rabies
  - c) Tubercle bacillus
  - d) Tetanus
  - e) Diphtheria
- 1.3) Which of the following components of the DTaP vaccination is only given during the first injection, instead of three separate dose injections?
- a) Diphtheria
  - b) Tetanus
  - c) Pertussis
- 1.4) Which of the following vaccines is an attenuated virus and is given at birth in high risk countries or at entry of secondary school?
- a) Polio
  - b) Rabies
  - c) Measles
  - d) Tetanus
  - e) Tubercle bacillus
- 2.1) A 30-year-old man from South America presents with ulcerative lesions of the buccal and nasal mucosa. Endoscopy reveals lesions of the gastrointestinal mucosa. Lab test reveals a dimorphic fungi with production of multiple blastoconidia from a single cell. Which of the following is most likely?
- a) *Histoplasma capsulatum*
  - b) *Coccidioides immitis*
  - c) *Paracoccidioides brasiliensis*
  - d) *Blastomyces dermatitidis*
  - e) *Cryptococcus neoformans*
- 2.2) An old man and his great-grandson visit Death Valley National Park in the deserts of southern California. Upon returning from their visit, the man develops breathing difficulties along with arthralgias, periarticular swellings, and erythema nodosum. X-rays reveal a pneumonic infiltrate as well as granulomas. A diagnosis is confirmed by observing spherules containing individual endospores in tissue specimens. As expected, the child remains unaffected but several weeks later tests positive for a fungal antigen DTH reaction. Which of the following is most likely?
- a) *Histoplasma capsulatum*
  - b) *Coccidioides immitis*
  - c) *Paracoccidioides brasiliensis*
  - d) *Blastomyces dermatitidis*
  - e) *Cryptococcus neoformans*
- 2.3) An amateur bird-keeper presents with headache and a stiff neck. Fearing some form of meningitis, the ER physician orders a CT scan. The image reveals well-circumscribed,

ring-like lesions in the brain. Subsequent CSF analysis from a lumbar puncture shows increased CSF pressure, increased protein, decreased glucose, and encapsulated budding yeast with India ink stain. The patient is administered amphotericin B and flucytosine. An HIV test is performed as well. Which of the following is most likely?

- a) *Histoplasma capsulatum*
- b) *Coccidioides immitis*
- c) *Paracoccidioides brasiliensis*
- d) *Blastomyces dermatitidis*
- e) *Cryptococcus neoformans*

2.4) A man from Missouri develops weakness and night sweats after camping near a rotting beaver dam. His physician notes sores on the patient's skin. Biopsy of the lesion reveals large broad-based budding yeast. The doctor informs the patient of his rare, yet serious diagnosis and begins a course of antifungals including amphotericin B. Which of the following is most likely?

- a) *Histoplasma capsulatum*
- b) *Coccidioides immitis*
- c) *Paracoccidioides brasiliensis*
- d) *Blastomyces dermatitidis*
- e) *Cryptococcus neoformans*

2.5) An elderly cave explorer in Ohio complains to his physician of weakness in the last few months. A physical exam reveals sores in his mouth, and X-ray shows small calcifications throughout the body. A lung biopsy reveals small budding cells within macrophages. Based on his age, location, and biopsy results, the physician begins the patient on oral amphotericin B. An HIV test is performed as well. Which of the following is most likely?

- a) *Histoplasma capsulatum*
- b) *Coccidioides immitis*
- c) *Paracoccidioides brasiliensis*
- d) *Blastomyces dermatitidis*
- e) *Cryptococcus neoformans*

3.1) *Aspergillus* species fungi has a pattern of \_\_\_\_ development, while *Mucor* species fungi has a pattern of \_\_\_\_ and is associated with black, oozing pus.

- a) Coenocytic hyphae; Conidiophore
- b) Conidiophore; Coenocytic hyphae

3.2) *Aspergillus* species fungi forms \_\_\_\_ degree angles and is \_\_\_\_, while *Mucor* species fungi forms \_\_\_\_ degree angles and is \_\_\_\_.

- a) 45; Branching; 90; Non-branching
- b) 45; Non-branching; 90; Branching
- c) 90; Branching; 45; Non-branching
- d) 90; Non-branching; 45; Branching

Match the description with the category of aspergillosis:

- 4.1) Bronchiectasis develops with age      a) Allergic aspergillosis ("farmer's lung")
- 4.2) Septate hyphae seen in specimen      b) Noninvasive pulmonary disease (fungal ball)
- 4.3) Occasional hemoptysis, septate elements      c) Invasive aspergillosis
- 5) Which of the following is NOT seen in allergic bronchopulmonary mycoses?
  - a) Asthma

- b) Pneumothorax
  - c) Peripheral eosinophilia
  - d) Elevated serum IgE
  - e) Aspergillus antigen hypersensitivity
- 6) Which of the following patients would NOT be susceptible to Zygomycoses or Mucormycoses?
- a) Metabolic alkylosis
  - b) Diabetes mellitus
  - c) Leukopenia
  - d) Immunosuppressed
- 7) Rhinocerebral mucormycosis originates in the paranasal sinuses and can involve the ocular orbit and palate with extension into the brain. It usually occurs as a terminal even in which of the following patients?
- a) AIDS patients
  - b) Pneumonia patients
  - c) Patients with congestive heart failure
  - d) Patients with hematological neoplasms
  - e) Patients with metabolic acidosis
- 8) Pulmonary mucormycosis manifests nonspecifically as fever, dyspnea, and cough. Most patients with pulmonary disease have a history of which of the following?
- a) Diabetes mellitus
  - b) Pneumonia
  - c) Congestive heart failure
  - d) Hematological neoplasms
  - e) Metabolic acidosis

### **Respiratory #12 – Microbiology: Summary of Respiratory Syndromes**

- 1.1) Which of the following is the most common cause of death from infection in the elderly and is associated with fever, cough, shortness of breath, and rales?
- a) Sinusitis
  - b) Pharyngitis
  - c) Bronchitis/bronchiolitis
  - d) Epiglottitis
  - e) Pneumonia
- 1.2) Which of the following is solely caused by *H. influenzae*, seen in children without uvula involvement (diphtheria)?
- a) Sinusitis
  - b) Pharyngitis
  - c) Bronchitis/bronchiolitis
  - d) Epiglottitis
  - e) Pneumonia
- 1.3) Which of the following can be caused by viruses or bacteria and has brain abscesses as a major complication?
- a) Sinusitis
  - b) Pharyngitis
  - c) Bronchitis/bronchiolitis

- d) Epiglottitis
  - e) Pneumonia
- 1.4) Which of the following is true of the listed respiratory syndromes and their causes?
- a) Pharyngitis and bronchitis/bronchiolitis are mostly caused by bacteria
  - b) Pharyngitis and bronchitis/bronchiolitis are mostly caused by viruses
  - c) Pharyngitis is mostly caused by bacteria and bronchitis/bronchiolitis is mostly caused by viruses
  - d) Pharyngitis is mostly caused by viruses and bronchitis/bronchiolitis is mostly caused by bacteria
- 2.1) Which of the following is most likely to cause otitis externa, versus otitis media?
- a) *S. pneumoniae*
  - b) *S. agalactiae*
  - c) *P. aeruginosa*
  - d) *H. influenzae* type B
  - e) *M. catarrhalis*
- 2.2) Which of the following usually involves a mixture of bacteria and anaerobes and has foul smelling sputum?
- a) Bronchiolitis
  - b) Bronchitis
  - c) Pneumonia
  - d) Lung abscess
  - e) Pleural effusion/empyema
- 2.3) Which of the following is usually caused by herpes simplex virus (HSV) that travels through the blood or trigeminal nerve?
- a) Endophthalmitis
  - b) Conjunctivitis
  - c) Keratitis
  - d) Sinusitis
  - e) Pharyngitis
- 2.4) Which of the following can infect the interior of the eyeball, leading to endophthalmitis?
- a) *Pseudomonas aeruginosa*
  - b) *Proteus mirabilis*
  - c) *Aspergillus* species
  - d) *Staphylococcus aureus*
  - e) *Candida albicans*
- 2.5) Chlamydia is an important cause of which of the following, due to the chance of causing blindness?
- a) Endophthalmitis
  - b) Conjunctivitis
  - c) Keratitis
  - d) Sinusitis
  - e) Pharyngitis
- 2.6) Which of the following is most likely to cause bronchiolitis, when compared with bronchitis?
- a) Influenza

- b) Adenovirus
  - c) *H. influenzae*
  - d) *S. pneumoniae*
  - e) Respiratory syncytial virus
- 2.7) A patient presents with a sore throat and blood-tinged sputum. A PPD test is positive. Culture rules out viruses. Which of the following is most likely?
- a) *Mycoplasma pneumoniae*
  - b) *Mycobacterium tuberculosis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Staphylococcus aureus*
- 2.8) A patient from Toronto, Canada presents with a high fever, cough, shortness of breath, and a chest x-ray consistent with pneumonia. They believe they “got this” in a busy airport where others had similar symptoms. Which of the following is most likely?
- a) Influenza
  - b) Parainfluenza
  - c) Mumps
  - d) Measles
  - e) Respiratory syncytial virus (RSV)
  - f) Severe acute respiratory syndrome (SARS)
- 2.9) What is the major virulence factor of *M. tuberculosis*?
- a) Capsule
  - b) Facultative intracellular
  - c) Erythrogenic toxin
  - d) M protein
  - e) Streptokinase

### Respiratory #13 – Pharmacology: Antiviral Agents

- 1) What is the most common cause of absenteeism from school and work?
- a) Bacterial urinary tract infections
  - b) Viral urinary tract infections
  - c) Bacterial respiratory tract infection
  - d) Viral respiratory tract infections
  - e) Gastroenteritis
- 2) Which of the following is true of influenza and antigenic drift (may cause epidemic)?
- a) Occurs in A subtype only
  - b) Occurs in B subtype only
  - c) Occurs in C subtype only
  - d) Occurs in A and B subtypes
  - e) Occurs in B and C subtypes
- 3) Which of the following is the most common symptom seen in influenza infection?
- a) Anorexia
  - b) Fever
  - c) Chills
  - d) Headache
  - e) Sudden onset

- f) Sore throat
- 4) Which of the following is NOT a target population for influenza vaccination?
- a) Nursing home residents
  - b) Adults with chronic cardiopulmonary disorders
  - c) All healthcare personnel in a hospital or outpatient care setting
  - d) Adults with metabolic disorders such as diabetes mellitus
  - e) Children for prevention of otitis media
- 5) Which of the following is an absolute contraindication to the influenza vaccine?
- a) Recent illness with Guillain-Barré syndrome
  - b) Hypersensitivity reaction to eggs
  - c) Children less than 6 months of age
  - d) Women in first trimester of pregnancy
  - e) Significant febrile illness
- 6) Which of the following antiviral drugs used to treat influenza is, according to the Center for Disease Control (CDC), recommended for anyone greater than 1 year of age?
- a) Amantadine (Symmetrel)
  - b) Oseltamivir (Tamiflu)
  - c) Rimantadine (Flumadine)
  - d) Zanamivir (Relenza)
- 7) Which of the following antiviral drugs used to treat influenza is recommended in adults only and for influenza A?
- a) Amantadine (Symmetrel)
  - b) Oseltamivir (Tamiflu)
  - c) Rimantadine (Flumadine)
  - d) Zanamivir (Relenza)
- 8) Which of the following antiviral agents are neuramidase inhibitors (work for both influenza A and B)?
- a) Oseltamivir and zanamivir
  - b) Zanamivir and rimantadine
  - c) Rimantadine and oseltamivir
  - d) Oseltamivir, zanamivir, and rimantadine
  - e) Amantadine only
- 9) Which of the following is NOT true of the adamantane antiviral agents?
- a) They may increase pH within lysosomes, slowing viral uncoating
  - b) They may block penetration of viruses into respiratory epithelial cells
  - c) They may block uncoating and release of nucleic acids from viruses
  - d) They have a well understood mechanism of action
  - e) They may prevent 70-90% of influenza type A infections
- 10) Which of the following is NOT approved for prophylaxis against influenza?
- a) Amantadine (Symmetrel)
  - b) Oseltamivir (Tamiflu)
  - c) Rimantadine (Flumadine)
  - d) Zanamivir (Relenza)
- 11) Rimantadine doses should be decreased in patients taking quinidine or with:
- a) Hepatic dysfunction
  - b) Renal dysfunction

- c) Splenic dysfunction
  - d) Meningitis
  - e) Diabetes
- 12) Amantadine should be avoided in patients with untreated:
- a) Type II diabetes mellitus
  - b) Gastric ulcers
  - c) Influenza infections
  - d) COPD or asthma
  - e) Angle closure glaucoma
- 13) Neuraminidase inhibitors block the release of newly formed viruses and:
- a) Inhibit viral cleavage of sialic acid
  - b) Promote viral cleavage of sialic acid
  - c) Inhibit viral cleavage of hemagglutinin
  - d) Promote viral cleavage of hemagglutinin
  - e) None of the above
- 14) Zanamivir is NOT recommended in patients with:
- a) Type II diabetes mellitus
  - b) Gastric ulcers
  - c) Influenza infections
  - d) COPD or asthma
  - e) Angle closure glaucoma
- 15) Which of the following is NOT a criterion for hospital admission for respiratory syncytial virus (RSV)?
- a) Hypocarbica
  - b) Less than three months of age
  - c) Respiratory rate > 70/min
  - d) Wheezing or respiratory distress
  - e) Atelectasis or consolidation on chest x-ray
- 16) Palivizumab (Synagis) is used in the prevention of RSV. Which of the following describes its mechanism of action?
- a) Monoclonal antibody to fusion (F) protein
  - b) Inhibits viral cleavage of sialic acid
  - c) Same as RSV-IGIV (Respigam)
  - d) Synthetic nucleoside analog (guanosine)
  - e) Unknown or poorly understood
- 17) What is the mechanism of action for ribavirin (Virazole)?
- a) Monoclonal antibody to fusion (F) protein
  - b) Inhibits viral cleavage of sialic acid
  - c) Same as RSV-IGIV (Respigam)
  - d) Synthetic nucleoside analog (guanosine)
  - e) Unknown or poorly understood
- 18) Which of the following is NOT true of ribavirin?
- a) Pregnancy contraindication
  - b) Pulmonary toxicity
  - c) Hepatic toxicity
  - d) Cardiovascular toxicity

- e) Anemia side-effect

**Respiratory #14 – Pharmacology: Antibiotic Agents**

- 1) Aztreonam (Azactam) is mostly ineffective against which of the following?
- a) Aerobic bacteria
  - b) Many Gram-negative bacteria
  - c) Many Gram-positive bacteria
  - d) *Pseudomonas aeruginosa*
  - e) *Haemophilus* and *Klebsiella*
- 2) A patient presents with persistent purulent nasal discharge despite previous TMP-SMX (Bactrim) therapy and is diagnosed with subacute sinusitis. High-dose amoxicillin is prescribed. What is the most likely pathogen involved?
- a) *S. aureus*
  - b) *M. catarrhalis*
  - c) *S. pneumoniae*
  - d) *H. influenzae* type B
  - e) *C. pneumoniae*
- 3) A patient presents with a dull ache across the midface. They state the pressure leads to headaches at times. Which of the following sinuses is most likely involved?
- a) Frontal
  - b) Maxillary
  - c) Ethmoid
  - d) Sphenoid
- 4) Which of the following would be prescribed for acute sinusitis, not chronic sinusitis?
- a) Amoxicillin clavulanate (Augmentin)
  - b) Cefuroxime (Ceftin)
  - c) Clarithromycin (Biaxin) or azithromycin (Zithromax)
  - d) TMP-SMX (Bactrim)
  - e) Cefpodoxime (Vantin)
- 5) Acute exacerbation of chronic sinusitis is most likely caused by Gram-negative and Gram-positive anaerobic bacteria. Which of the following would be the least effective?
- a) Aztreonam
  - b) Clindamycin
  - c) Clarithromycin
  - d) Fluoroquinolones
  - e) Dicloxacillin/metronidazole
  - f) Cefuroxime/metronidazole
- 6) Drug therapy for uncomplicated acute sinusitis should last:
- a) 5 days
  - b) 7 days
  - c) 10 days
  - d) 14 days
  - e) 14-21 days
- 7) A patient presents with a rash after being treated for sinusitis. The rash has covered most of their upper body and face with blackening of the mucous membranes. Scar tissue

is seen inside the eyelids. Stevens-Johnson syndrome is diagnosed. Which of the following antibiotics may be responsible for this patient's symptoms?

- a) Amoxicillin clavulanate (Augmentin)
  - b) Aztreonam (Azactam)
  - c) Levofloxacin (Levaquin)
  - d) Cefpodoxime (Vantin)
  - e) TMP-SMX (Bactrim)
- 8) What is the most frequent adverse effect, along with urticaria (hives), seen in penicillins and cephalosporins?
- a) Rash
  - b) Malaise
  - c) Pneumonia
  - d) GI complains
  - e) Stevens-Johnson syndrome
- 9) What is the most frequently reported adverse effect seen in macrolide therapy, such as with erythromycin (E-mycin), clarithromycin (Biaxin), azithromycin (Zithromax), and telithromycin (Aventis)?
- a) Rash
  - b) Malaise
  - c) Pneumonia
  - d) GI complains
  - e) Stevens-Johnson syndrome
- 10) What is the most common cause of pharyngitis, which can lead to rheumatic fever?
- a) *M. pneumoniae*
  - b) *S. pyogenes*
  - c) *N. gonorrhoeae*
  - d) *Corynebacterium diphtheriae*
  - e) *C. pneumoniae*
- 11) Which of the following should be given for *Streptococcal* pharyngitis in individuals who are allergic to penicillin (G or V), and has a potential side-effect of cholestatic (obstructive) jaundice?
- a) Erythromycin estolate (Ilosone)
  - b) Chloramphenicol
  - c) Sulfasalazine (Azulfidin)
  - d) Doxycycline (Vibramycin)
  - e) TMP-SMX (Bactrim)
- 12) A patient presents with acute exacerbation of chronic bronchitis associated with COPD. If there is evidence of bacterial infection (e.g. purulent sputum), which of the following antibiotics would NOT be recommended for treatment?
- a) Clindamycin (Cleocin)
  - b) TMP-SMX (Bactrim)
  - c) Levofloxacin (Levaquin)
  - d) Doxycycline (Vibramycin)
- 13) Which of the following is the most common cause of community-acquired pneumonia (CAP), seen in approximately 65% of cases?
- a) *M. pneumoniae*

- b) *C. pneumoniae*
  - c) *S. pneumoniae*
  - d) *K. pneumoniae*
  - e) *H. influenzae*
- 14) Levofloxacin (Levaquin) has been known in some cases to cause tendon rupture, and thus should not be used in children. Also, it should NOT be co-administered with:
- a) Al+++ containing products
  - b) Mg++ containing product
  - c) Ca++ containing products
  - d) Iron containing product
  - e) Any of the above
- 15) Non-ICU admission for CAP should be treated with which of the following?
- a) Clindamycin and azithromycin
  - b) Levofloxacin
  - c) Levofloxacin and clindamycin
  - d) Ceftriaxone and azithromycin
  - e) Piperacillin/tazobactam (Zosyn)
- 16) If a patient with CAP is allergic to beta-lactam antibiotics, what is the recommended drug for treatment of their CAP?
- a) Ceftriaxone
  - b) Clindamycin
  - c) Azithromycin
  - d) Levofloxacin
  - e) TMP-SMX
- 17) If a patient is admitted to the ICU with CAP and suspected *Pseudomonas aeruginosa*, which of the following is recommended?
- a) Levofloxacin and azithromycin
  - b) Levofloxacin and tobramycin
  - c) Levofloxacin and piperacillin/tazobactam
  - d) Ceftriaxone and azithromycin
  - e) Ceftriaxone and tobramycin
- 18) What type of empiric monotherapy should be avoided in CAP because approximately 25% of *S. pneumoniae* are naturally resistant?
- a) Doxycycline
  - b) Levofloxacin
  - c) Azithromycin
  - d) Tetracyclines
  - e) Macrolides
- 19) Which of the following is the least expensive way to optimally treat CAP, has no major side effects, does not have increased resistance with extensive use, and has excellent bioavailability (99%)?
- a) Doxycycline
  - b) Levofloxacin
  - c) Azithromycin
  - d) Tetracyclines
  - e) Macrolides

- 20) Which of the following is rarely needed for penicillin-resistant *S. pneumoniae* CAP?
- a) Vancomycin
  - b) Doxycycline
  - c) Clindamycin
  - d) Levofloxacin
- 21) Doxycycline is effective as a monotherapy against all typical penicillin-resistant *S. pneumoniae*/atypical pathogens in CAP. What is the most common adverse effect?
- a) Rash
  - b) Malaise
  - c) Pneumonia
  - d) GI complains
  - e) Profound hypotension
- 22) Patients taking tetracyclines may experience phototoxicity and GI disturbances. What type of food do they need to avoid at the time of administration?
- a) Iron-rich
  - b) Licorice
  - c) Milk
  - d) High-salt
  - e) Grapefruit juice
- 23) Which of the following would be LEAST effective against *C. pneumoniae*?
- a) Clarithromycin
  - b) Azithromycin
  - c) Erythromycin
  - d) Doxycycline
  - e) Fluroquinolones
- 24) A 70-year-old man presents with community-acquired pneumonia. Which of the following drugs would NOT provide coverage for the pathogens that are most prevalent (e.g. *S. pneumoniae*, *H. influenzae*, Gram-negatives)?
- a) TMP-SMX
  - b) Beta-lactam agents
  - c) Macrolides
  - d) Second-generation cephalosporins
  - e) Third-generation cephalosporins
- 25) In patients older than 60 with or without co-morbidities, which of the following should be added as treatment for CAP if *Legionella* is suspected (plus hospitalization)?
- a) TMP-SMX
  - b) Beta-lactam agent
  - c) Macrolide
  - d) Second-generation cephalosporin
  - e) Third-generation cephalosporin
- 26) Which of the following is the least common cause of nosocomial pneumonia (NP), yet the most important in terms of morbidity and mortality?
- a) *E. coli*
  - b) *P. aeruginosa*
  - c) *H. influenzae*
  - d) *S. pneumoniae*

- e) *K. pneumoniae*
- 27) Early cases of pneumonia in hospitalized patients are termed hospital-acquired pneumonia (HAP), or incubating community-acquired pneumonia (CAP). Nosocomial pneumonia (NP) is defined as occurring how long after hospital admission?
- a) 24-hours
  - b) 48-hours
  - c) 5-days
  - d) 7-days
  - e) 10-days
- 28) Which of the following is NOT an optimal monotherapy for NP, along with ceftazidime (Ceptaz) and imipenem (Primaxin)?
- a) Cefepime (Maxipime)
  - b) Ciprofloxacin (Cipro)
  - c) Meropenem (Merrem)
  - d) Piperacillin (Pipracil)
  - e) Aztreonam (Azactam)
  - f) Amikacin (Amikin)
- 29) Along with meropenem, which of the following is given as the major drug in combination therapy for proven *P. aeruginosa* NP, with the other drugs being the minor drug used in the combination?
- a) Cefepime (Maxipime)
  - b) Amikacin (Amikin)
  - c) Levofloxacin (Levaquin)
  - d) Piperacillin (Pipracil)
  - e) Aztreonam (Azactam)
- 30) TMP-SMX can trigger an asthma exacerbation in sulfite-sensitive individuals, and should NOT be given to patients with:
- a) Hemolytic anemia
  - b) Wilson disease
  - c) Pneumonia
  - d) Hemochromatosis
  - e) G6PD deficiency
- 31) Which of the following drugs requires monitoring for pseudomembranous colitis, caused by overgrowth of *C. difficile*?
- a) Aztreonam
  - b) Clindamycin
  - c) Clarithromycin
  - d) Dicloxacillin
  - e) TMP-SMX
- 32) Which of the following groups of antibiotics is associated with prolongation of the QTc interval, which could lead to ventricular arrhythmias such as Torsade de Pointes?
- a) Aminoglycosides
  - b) Cephalosporins
  - c) Macrolides
  - d) Fluoroquinolones
  - e) Sulfonamides

- 33) Which of the following antibiotics binds to the 50s subunit?
- a) Penicillines
  - b) Cephalosporins
  - c) Macrolides
  - d) Carbapenems
- 34) What is the mechanism of action for tetracyclines?
- a) Cell wall inhibitors
  - b) Cell wall synthesis inhibitors
  - c) Bind to 50s subunit
  - d) Bind to 30s subunit
  - e) Inhibit bacterial folic acid synthesis
  - f) Inhibit topoisomerase II (DNA gyrase)
- 35) What is the mechanism of action for fluoroquinolones?
- a) Cell wall inhibitors
  - b) Cell wall synthesis inhibitors
  - c) Bind to 50s subunit
  - d) Bind to 30s subunit
  - e) Inhibit bacterial folic acid synthesis
  - f) Inhibit topoisomerase II (DNA gyrase)
  - g) None of the above
- 36) What is the mechanism of action for TMP-SMX?
- a) Cell wall inhibitors
  - b) Cell wall synthesis inhibitors
  - c) Bind to 50s subunit
  - d) Bind to 30s subunit
  - e) Inhibit bacterial folic acid synthesis
  - f) Inhibit topoisomerase II (DNA gyrase)
  - g) None of the above
- 37) What is the mechanism of action for clindamycin?
- a) Cell wall inhibitors
  - b) Cell wall synthesis inhibitors
  - c) Bind to 50s subunit
  - d) Bind to 30s subunit
  - e) Inhibit bacterial folic acid synthesis
  - f) Inhibit topoisomerase II (DNA gyrase)
  - g) None of the above
- 38) A 48-year-old Hispanic male presents with a three-day history of cough producing blood-tinged sputum. He developed a headache while vacationing in Puerto Rico, and had night sweats, fever, chills, and watery diarrhea. He has a history of 50 pack years, but quit smoking 5 years ago. Labs show WBC 10,600, BUN 20, pO<sub>2</sub> 60 on room air. Chest x-ray shows evidence of infiltrate. Direct immunofluorescence of sputum detects antigens for *Legionella pneumophila*. What is the drug of choice?
- a) Clarithromycin
  - b) Azithromycin
  - c) Erythromycin
  - d) Doxycycline

e) Fluroquinolones

**Respiratory #15 – Pharmacology: Antifungal & Antituberculin Agents**

- 1) Amphotericin B (Fungizone) remains the most reliable agent against most of the fungal pathogens that cause invasive infections. What is its mechanism of action?
  - a) Cell wall inhibitor (b-1,3-D-glucan)
  - b) Inhibits mycolic acid synthesis
  - c) DNA synthesis inhibitor (thymidylate synthetase)
  - d) Cell membrane inhibitor via ergosterol binding
  - e) Interferes with cytochrome P-450 dependent C-14 lanosterol demethylase
- 2) What is the major toxicity of amphotericin B?
  - a) Anemia
  - b) Thrombocytopenia
  - c) Nephrotoxicity
  - d) Hepatotoxicity
  - e) Hypokalemia inducing Torsade de Pointes
- 3) Which of the following is NOT true regarding amphotericin B complexes with lipids (Amphotec, Abelcet) or in liposomes (AmBisome)?
  - a) They reduce drug solubility
  - b) They alter drug disposition in the body
  - c) They reduce toxicity
  - d) They can be administered at higher doses than Fungizone
- 4) Amphotericin B and flucytosine (Ancobon) have good synergism in non-AIDS patients for which of the following?
  - a) *Aspergillus*
  - b) *Candida*
  - c) *Cryptococcus*
  - d) *Histoplasma*
  - e) *Tinea corporis/pedis*
- 5) What is the mechanism of action for flucytosine?
  - a) Cell wall inhibitor (b-1,3-D-glucan)
  - b) Inhibits mycolic acid synthesis
  - c) DNA synthesis inhibitor (thymidylate synthetase)
  - d) Cell membrane inhibitor via ergosterol binding
  - e) Interferes with cytochrome P-450 dependent C-14 lanosterol demethylase
- 6) Which of the following adverse effects is NOT seen with flucytosine?
  - a) Hair loss
  - b) Bone marrow suppression
  - c) Rash
  - d) Hepatotoxicity
  - e) Nephrotoxicity
- 7) What is the mechanism of action for the azole antifungal agents (e.g. ketoconazole, fluconazole)?
  - a) Cell wall inhibitor (b-1,3-D-glucan)
  - b) Inhibits mycolic acid synthesis
  - c) DNA synthesis inhibitor (thymidylate synthetase)

- d) Cell membrane inhibitor via ergosterol binding  
e) Interferes with cytochrome P-450 dependent C-14 lanosterol demethylase
- 8) Azole antifungal agents are well absorbed if there is enough gastric acidity. Thus H2-blockers or antacids will reduce absorption. Which azole is the preferred agent for patients with gastric surgery?
- a) Miconazole  
b) Ketoconazole  
c) Itraconazole  
d) Fluconazole  
e) None of the above
- 9) Which of the following side-effects would NOT be seen with the use of ketoconazole
- a) Gynecomastia  
b) GI disturbances  
c) Impotence or diminished libido  
d) Increased cortisol synthesis  
e) Alopecia
- 10) Which of the following is NOT true of drug interactions with ketoconazole?
- a) Decreases blood levels of digoxin  
b) Increases blood levels of phenytoin  
c) Isoniazid increases ketoconazole metabolism  
d) Rifampin increases ketoconazole metabolism  
e) Anticoagulant effects with warfarin may be enhanced
- 11) Fluconazole is used for treatment of oropharyngeal esophageal candidiasis (thrush) as well as for treatment and prevention of meningitis in what form?
- a) *Aspergillus*  
b) *Cryptococcus*  
c) *Histoplasma*  
d) *Tinea corporis*  
e) *Blastomyces*
- 12) Which of the following is NOT true of drug interactions with fluconazole?
- a) Rifampin increases fluconazole concentrations  
b) Hypoglycemic drugs (e.g. tolbutamine) may be enhanced  
c) Warfarin levels may increase  
d) Phenytoin levels may increase  
e) Cyclosporin levels may increase
- 13) Which of the following is FDA approved for histoplasmosis and blastomycosis, and is contraindicated with use of terfanadine?
- a) Miconazole  
b) Ketoconazole  
c) Itraconazole  
d) Fluconazole
- 14) Which of the following can cause mineralocorticoid excess at high doses, such as hypokalemia and urine retention?
- a) Itraconazole  
b) Fluconazole  
c) Miconazole

- d) Ketoconazole
- 15) What is the mechanism of action for the echinocandin drug caspofungin (Cancidas)?
- a) Cell wall inhibitor (b-1,3-D-glucan)
  - b) Inhibits mycolic acid synthesis
  - c) DNA synthesis inhibitor (thymidylate synthetase)
  - d) Cell membrane inhibitor via ergosterol binding
  - e) Interferes with cytochrome P-450 dependent C-14 lanosterol demethylase
- 16) Which of the following is NOT true of caspofungin?
- a) It has poor bioavailability
  - b) It can cause facial swelling and rash
  - c) Dose-adjustment is needed for hepatic impairment
  - d) It can interact with phenytoin, rifampin, and cyclosporin
  - e) It should be administered PO
- 17) Which of the following drugs can cause peripheral edema, visual disturbances, rash, headache, and GI disturbances?
- a) Ketoconazole
  - b) Amphotericin B
  - c) Voriconazole
  - d) Flucytosine
  - e) Fluconazole
- 18) What is the drug of choice for aspergillosis and deep disseminated candidiasis?
- a) Ketoconazole
  - b) Amphotericin B
  - c) Voriconazole
  - d) Flucytosine
  - e) Fluconazole
- 19) Which of the following is a good alternative for mild histoplasmosis infections or cryptococcosis infections in AIDS patients with no disturbances of consciousness?
- a) Griseofulvin
  - b) Amphotericin B
  - c) Voriconazole
  - d) Flucytosine
  - e) Fluconazole
- 20) What is the current drug of choice for tinea capitis (scalp ringworm) as well as onychomycosis (nail fungus)?
- a) Griseofulvin (Gris-PEG)
  - b) Voriconazole (Vfend)
  - c) Flucytosine (Ancobon)
  - d) Itraconazole (Lamisil)
  - e) Amphotericin B
- 21) A 4-year-old child presents with a fever 14 days after liver transplantation. Invasive pulmonary aspergillosis (IPS) is confirmed by needle aspiration of the pulmonary lesion. What would be optimal therapy for this neutropenic child?
- a) Griseofulvin
  - b) Conventional amphotericin
  - c) Lipid-associated amphotericin

- d) Caspofungin
  - e) Flucytosine
- 22) An immune response to *M. tuberculosis* infection occurs between 2 and \_\_\_\_ weeks after initial infection, at which point it can be detected by a skin test.
- a) 4
  - b) 6
  - c) 8
  - d) 12
  - e) 16
- 23) When should directly observed therapy (DOT) be used in the treatment of tuberculosis (TB)?
- a) Active TB
  - b) Latent TB
  - c) Miliary TB
  - d) CNS or pleural TB
  - e) Drug-resistant TB
- 24) Which of the following is NOT a basic principle of treatment for TB?
- a) Provide the safest, most effective therapy in the shortest time
  - b) Use multiple drugs to which the organisms are susceptible
  - c) If a regimen is failing, add a single drug at a time
  - d) Ensure adherence to therapy
- 25) Which of the following is a second-line agent for the treatment of TB?
- a) Isoniazid
  - b) Ethionamide
  - c) Rifampin
  - d) Ethambutol
  - e) Pyrazinamide
- 26) Which of the following drugs is NOT bactericidal (e.g. is bacteriostatic)?
- a) Ethambutol
  - b) Isoniazid
  - c) Rifampin
  - d) Pyrazinamide
  - e) Streptomycin
- 27) Isoniazid is a drug of choice for *Mycobacterium kansasii* and *Mycobacterium tuberculosis*, working by inhibiting mycolic acid synthesis. It can cause optic neuritis and hepatotoxicity in elderly patients or fast acetylators. What vitamin should be supplemented for patients taking this drug?
- a) Vitamin A
  - b) Vitamin B3
  - c) Vitamin B6
  - d) Vitamin B12
  - e) Vitamin D
- 28) A patient is taking a drug to treat *Mycobacterium avium-intracellulare*. They present with joint pain, decreased visual acuity, and new onset difficulty with red-green color discrimination (retrobulbar neuritis). Which is the most likely drug they were taking?
- a) Ethambutol

- b) Isoniazid
  - c) Rifampin
  - d) Pyrazinamide
  - e) Streptomycin
- 29) A patient is taking some kind of RNA synthesis inhibitor for the treatment of a *Mycobacterium* infection. They return back to the primary care clinic extremely worried about recent events. They claim their urine, saliva, sweat, tears, and feces are all a reddish-orange color. What drug is the patient likely taking?
- a) Ethambutol
  - b) Isoniazid
  - c) Rifampin
  - d) Pyrazinamide
  - e) Streptomycin
- 30) Which of the following drugs is a pro-drug and can cause hyperuricemia?
- a) Ethambutol
  - b) Isoniazid
  - c) Rifampin
  - d) Pyrazinamide
  - e) Streptomycin
- 31) When should antiretroviral treatment in TB patients be immediately started?
- a) At any time, regardless of HIV status
  - b) For HIV positive patients with CD4 count  $> 350/\text{mm}^3$
  - c) For HIV positive patients with CD4 count between  $200\text{-}350/\text{mm}^3$
  - d) For HIV positive patients with CD4 count  $< 200/\text{mm}^3$
  - e) For HIV positive patients with CD4 count  $< 50/\text{mm}^3$
- 32) Which of the following drugs is a second-line agent for TB and works by blocking the dihydropteroate synthetase of tubercle bacilli?
- a) Para-aminosalicylic acid
  - b) Ethionamide
  - c) Cycloserine
  - d) Isoniazid
  - e) Rifampin
- 33) Which of the following drugs is an effective antitumor agent and can cause drug-induced psychosis?
- a) Para-aminosalicylic acid
  - b) Ethionamide
  - c) Cycloserine
  - d) Isoniazid
  - e) Rifampin
- 34) TB often shows resistance to streptomycin and/or isoniazid in non-U.S. countries, especially in Asia. Why?
- a) Streptomycin is prescribed extremely often
  - b) Isoniazid is prescribed extremely often
  - c) Both streptomycin and isoniazid are prescribed extremely often
  - d) TB in these countries has evolved
  - e) Streptomycin and isoniazid are sold over-the-counter without prescription

35) A 28-year-old patient who is HIV-1 seropositive presents with a CD4 lymphocytes count of 82 cells/mL. He has a fever of 102F, night sweats for one week, and cough. He had lost 12lbs over the past month. He denied headaches, rash, back pain, or diarrhea. He admits to having sex with men, smoking 1 pack per day, and a history of injection drug use. His pulse is 110, BP 114/70mmHg, has crackles at the lung bases, and an x-ray showing enlarged right paratracheal lymph nodes. Which of the following initial regimens would you choose if the patient is not on protease inhibitors (PIs)?

- a) Isoniazid plus rifampin
- b) Isoniazid, ethambutol, and pyrazinamide
- c) Isoniazid, pyrazinamide, and rifampin
- d) Rifampin and streptomycin
- e) Isoniazid, rifampin, ethambutol, and pyrazinamide

36) At six weeks, the above 28-year-old patient was found to be susceptible to the first-line agents used in his treatment. His treatment was changed to isoniazid, rifampin, and pyrazinamide. However, the viral load of HIV has increased and HAART was initiated. Would you modify his anti-tuberculosis regimen now that PI therapy has begun?

- a) Yes, change to isoniazid and pyrazinamide
- b) No, continue with the initial treatment
- c) Yes, isoniazid only
- d) Yes, isoniazid and ciprofloxacin
- e) Yes, streptomycin and ciprofloxacin

### **Respiratory #16 – Pharmacology: Antihistamine Agents**

1) Which of the following is NOT an autotoxin, which could be released during anaphylactic shock or due to a carcinoid tumor?

- a) Histamine
- b) Serotonin
- c) Octreotide
- d) Prostaglandin
- e) Leukotriene

2) When a person is exposed to an environmental allergen and produces a reaction, which of the following immunoglobulins is produced?

- a) IgA
- b) IgD
- c) IgE
- d) IgG
- e) IgM

3) Systemic injection allergies lead to hypotension and shock. Which of the following types of allergens is most likely to cause facial and laryngeal edema?

- a) Latex
- b) Grass pollen
- c) Animal dander
- d) Mold spores
- e) Foods
- f) Any of the above
- g) None of the above

- 4) Which of the following is NOT true of histamine?
- a) Histamine mediates the allergic symptoms by binding to some receptor of histamine on the cell (theory)
  - b) Histamine is formed when histidine is decarboxylated in a reaction catalyzed by histidine decarboxylase
  - c) Stored in granules in mast cell and basophiles
  - d) Released when IgE interact with an IgA antigen to cause mast cell granulation
  - e) Mast cell degranulation can be triggered by bacterial toxins or drug interaction

*Match the histamine receptor with the function:*

- 5) Presynaptic neural autoreceptor                      a) H1
  - 6) Immune function regulation                              b) H2
  - 7) Gastric acid secretion                                      c) H3
  - 8) Bronchoconstriction and vasodilation              d) H4
- 9) Stimulation of H1 receptors on mucocutaneous nerve endings may cause pruritis and initiation of the:
- a) Cough reflex
  - b) Diving reflex
  - c) Sniff reflex
  - d) Sneeze reflex
  - e) Gag reflex
- 10) Which of the following first generation H-1 receptor antagonists is highly sedating with significant autonomic receptor blocking effects?
- a) Chlorpheniramine
  - b) Dimenhydrinate
  - c) Diphenhydramine
  - d) Hydroxyzine
  - e) Meclizine
- 11) Which of the following second generation (less sedating) H-1 receptor antagonists were withdrawn from the U.S. market?
- a) Cetirizine (Zyrtec), Fexofenadine (Allegra), and Loratadine (Claritin)
  - b) Astemizole (Hismanal)
  - c) Terfenadine (Seldane)
  - d) Astemizole (Hismanal) and Terfenadine (Seldane)
  - e) None of the above
- 12) Research has shown which of the following cannot cross the blood-brain barrier and has eliminated the anticholinergic and antiadrenergic effects?
- a) Cetirizine (Zyrtec)
  - b) Fexofenadine (Allegra)
  - c) Loratadine (Claritin)
  - d) Astemizole (Hismanal)
  - e) Terfenadine (Seldane)
  - f) Azelastine (Astelin)
- 13) Which of the following is used for the treatment of allergic rhinitis, is an intranasal antihistamine, and is more potent than theophylline and sodium cromoglycate?
- a) Cetirizine (Zyrtec)
  - b) Fexofenadine (Allegra)

- c) Loratadine (Claritin)
  - d) Astemizole (Hismanal)
  - e) Terfenadine (Seldane)
  - f) Azelastine (Astelin)
- 14) Which of the following is NOT true of the first generation antihistamines diphenhydramine, hydroxyzine, and promethazine?
- a) Used to prevent motion sickness
  - b) Used to induce sleep
  - c) Used to treat narcolepsy
  - d) Used for preoperative sedation
  - e) Used to treat vertigo
- 15) Which of the following has the weakest antiemetic activity and is used for allergic reactions to pollen, mold spores, and other environmental allergens?
- a) Hydroxyzine (Atarax)
  - b) Chlorpheniramine (Chlor-Trimeton)
  - c) Promethazine (Phenergen)
  - d) Meclizine (Antivert)
  - e) Diphenhydramine (Benadryl)
  - f) Dimenhydrinate (Dramamine)
- 16) Scopolamine is a motion sickness drug that may be applied as a transdermal patch behind the ear. Which of the following is also used to treat motion sickness and vertigo?
- a) Hydroxyzine (Atarax)
  - b) Chlorpheniramine (Chlor-Trimeton)
  - c) Promethazine (Phenergen)
  - d) Meclizine (Antivert)
  - e) Diphenhydramine (Benadryl)
  - f) Dimenhydrinate (Dramamine)
- 17) Which of the following second generation antihistamines has the most sedation properties?
- a) Cetirizine (Zyrtec)
  - b) Fexofenadine (Allegra)
  - c) Loratadine (Claritin)
  - d) Astemizole (Hismanal)
  - e) Terfenadine (Seldane)
  - f) Azelastine (Astelin)
- 18) Which of the following is indicated for treatment of symptoms of allergic rhinitis, including sneezing, nasal itching, and nasal discharge, and is administered as two sprays per nostril twice daily?
- a) Cetirizine (Zyrtec)
  - b) Fexofenadine (Allegra)
  - c) Loratadine (Claritin)
  - d) Astemizole (Hismanal)
  - e) Terfenadine (Seldane)
  - f) Azelastine (Astelin)
- 19) A patient presents with dry mouth and tachycardia after taking several doses of a first generation antihistamine. Which of the following can help reverse these effects?

- a) Atropine
  - b) Fexofenadine
  - c) Diazepam
  - d) Physostigmine
  - e) Phenytoin
- 20) Which of the following is NOT true of drug interactions with antihistamines?
- a) Astemizole and terfenadine can prolong the QT interval
  - b) Erythromycin and itraconazole can inhibit terfenadine metabolism
  - c) Fexofenadine is an active metabolite of terfenadine and thus can cause arrhythmias such as Torsade de Pointes (TdP)
  - d) Cetirizine and loratadine lack cardiac effects
  - e) Azelastine can cause dizziness, headache, and dry mouth
- 21) A 14-year old girl was admitted to MCH with her mother complaining of repeated episodes of rhinorrhea, accompanied by nasal congestion, sneezing, itching eyes over the past few months, starting soon after they bought a Persian cat. Her symptoms are interfering with her schoolwork, she has no history of asthma but her mother is asthmatic. Otherwise she has been healthy over the last year and has taken no medication. Which of the following would be a poor treatment option?
- a) Cetirizine (Zyrtec)
  - b) Diphenhydramine (Benadryl)
  - c) Loratadine (Claritin)
  - d) Chlorpheniramine (Chlor-Trimeton)

**Respiratory #17 – Pharmacology: Asthma**

- 1) Which of the following is NOT diagnostic of asthma?
- a) Episodic chronic symptoms of airflow obstruction
  - b) Symptoms worse at night or in the morning
  - c) Prolonged inspiration
  - d) Diffuse wheezes on physical exam
  - e) Complete or partially reversible airflow obstruction
- 2) Quick relief of asthma with a short-acting bronchodilator (inhaled beta2-agonist) is recommended for what stage of asthma progression?
- a) Step 1: Mild intermittent
  - b) Step 2: Mild persistent
  - c) Step 3: Moderate persistent
  - d) Step 4: Severe persistent
  - e) All steps
- 3) Sustained release theophylline is added for long-term control at what step of asthma?
- a) Step 1: Mild intermittent
  - b) Step 2: Mild persistent
  - c) Step 3: Moderate persistent
  - d) Step 4: Severe persistent
  - e) All steps
- 4) Anti-inflammatory, corticosteroid, or cromolyn or nedocromyl is added for long-term control at what step of asthma?
- a) Step 1: Mild intermittent

- b) Step 2: Mild persistent
  - c) Step 3: Moderate persistent
  - d) Step 4: Severe persistent
  - e) All steps
- 5) Which of the following is NOT part of the mechanism of action for beta2-adrenergic receptor blockers?
- a) Activation of cAMP pathway
  - b) Bronchodilation
  - c) Increased conductance of large  $Ca^{++}$  sensitive  $K^+$  channels
  - d) Inhibition of inflammatory cells (mast, eosinophils, basophils, neurophils)
  - e) Smooth muscle dilation
- 6) Which of the following, along with formotrol (Foradil), is a long-acting?
- a) Albuterol (Proventil)
  - b) Salmeterol (Serevent)
  - c) Metaproterenol (Alupent)
  - d) Terbutaline (Brethaire)
  - e) Pributerol (Maxair)
- 7) What is the mechanism of action for glucocorticoids in asthma?
- a) Short-acting bronchodilator
  - b) Prophylactic long-acting bronchodilator
  - c) Enhance eicosanoid synthesis
  - d) Enhance basophil accumulation
  - e) Prophylactic inhibition of airway inflammation
- 8) Which of the following is a side effect seen with the use of corticosteroids
- a) Immunosuppression
  - b) Osteoporosis
  - c) Skin thickening
  - d) Increase bleeding
  - e) A & B
- 9) Which of the following is a short acting leukotriene synthesis (5-lipoxygenase) inhibitor?
- a) Zileuton (Zyflo)
  - b) Zafirlukast (Accolate)
  - c) Montelukast (Singulair)
  - d) Omalizumab (Xolair)
  - e) Theophylline (Theodur)
- 10) Which of the following can transiently elevate liver enzymes?
- a) Zileuton (Zyflo)
  - b) Zafirlukast (Accolate)
  - c) Montelukast (Singulair)
  - d) Zafirlukast and theophylline
  - e) B & C
- 11) Which of the following is a monoclonal antibody targeted against IgE?
- a) Zileuton (Zyflo)
  - b) Zafirlukast (Accolate)
  - c) Montelukast (Singulair)

- d) Omalizumab (Xolair)
  - e) Theophylline (Theodur)
- 12) Which of the following inhibits cyclic nucleotide phosphodiesterase, thereby increasing intracellular cAMP and cGMP, and is an adenosine receptor antagonist?
- a) Zileuton (Zyflo)
  - b) Zafirlukast (Accolate)
  - c) Montelukast (Singulair)
  - d) Omalizumab (Xolair)
  - e) Theophylline (Theodur)
- 13) A patient is given a drug for long-term control of asthma. They present with tachycardia and jitteriness. The clinician thinks the narrow therapeutic window was overshot. What drug was the patient most likely given?
- a) Omalizumab (Xolair)
  - b) Montelukast (Singulair)
  - c) Theophylline (Theodur)
  - d) Zafirlukast (Accolate)
  - e) Zileuton (Zyflo)
- 14) Which of the following would increase theophylline clearance?
- a) Alcohol
  - b) Carbamazepine
  - c) Cimetidine
  - d) Erythromycin
  - e) Estrogen
  - f) Interferon
- 15) Which of the following would increase theophylline clearance?
- a) Propranolol
  - b) Ticlopidine
  - c) Phenytoin
  - d) Rifampin
  - e) Verapamil
  - f) Methotrexate (MTX)
- 16) Risk of which of the following is increased with theophylline co-administered with fluvoxamine?
- a) Atrial arrhythmias
  - b) Ventricular arrhythmias
  - c) Thrombocytopenia
  - d) Renal toxicity
  - e) Bradycardia
- 17) The mechanism of action for cromones (cromolyn sodium, nedocromil sodium) includes inhibition of mediator release from bronchial mast cells and:
- a) Increased cAMP pathway
  - b) Relaxation of smooth muscle
  - c) Increased conductance of large  $Ca^{++}$  sensitive  $K^+$  channels
  - d) Suppression of leukocyte activation
  - e) Regulation of G protein entry
- 18) Zileuton is effective in treating asthma because it:

- a) Antagonizes leukotriene receptors
  - b) Inhibits cyclooxygenase
  - c) Inhibits mast cell degranulation
  - d) Inhibits prostaglandins
  - e) Inhibits 5-lipoxygenase
- 19) Which one of the following drugs would be best for treatment of an acute attack of asthma?
- a) Inhaled albuterol
  - b) Oral albuterol
  - c) Oral dexamethasone
  - d) Oral salmeterol
  - e) Oral zileutin
- 20) A 21-yr-old woman with severe asthma on three-drug treatment has elevated liver function tests thought to be caused by one of her medications. Which is most likely?
- a) Anticholinergic inhaler
  - b) Beta-agonist inhaler
  - c) Chromone agents
  - d) Glucocorticoid inhaler
  - e) IgE inhibitor
  - f) Leukotriene receptor antagonist
  - g) Lipoxygenase inhibitor
  - h) Methylxanthines
- 21) A 25-yr-old man has bronchospasm that is exercise induced, particularly in winter. He takes his med 15 min prior to exercise, which will help to prevent asthma attack but does not produce bronchodilation. Which is most likely?
- a) Anticholinergic inhaler
  - b) Beta-agonist inhaler
  - c) Chromone agents
  - d) Glucocorticoid inhaler
  - e) IgE inhibitor
  - f) Leukotriene receptor antagonist
  - g) Lipoxygenase inhibitor
  - h) Methylxanthines
- 22) A 16-yr-old girl is placed on multiple medications. She has been taking her meds as instructed, but one of the meds is causing her to have tachycardia and jitteriness. She has been informed of the need to measure serum levels of this med. Which is most likely?
- a) Anticholinergic inhaler
  - b) Beta-agonist inhaler
  - c) Chromone agents
  - d) Glucocorticoid inhaler
  - e) IgE inhibitor
  - f) Leukotriene receptor antagonist
  - g) Lipoxygenase inhibitor
  - h) Methylxanthines
  - i) None of the above

**Respiratory #18 – Pathology**

1) Intralobar sequestrations are associated with recurrent localized infections or bronchiectasis; a majority are acquired through episodes of pneumonia. What group is most likely to have extralobar sequestrations, external to the lung in the thorax or mediastinum?

- a) Elderly
  - b) Diabetics
  - c) COPD patients
  - d) Asthmatics
  - e) Infants
- 2) Which of the following is NOT true of the subtypes of atelectasis?
- a) Reabsorption atelectasis is due to complete obstruction of an airway
  - b) Reabsorption atelectasis shifts the mediastinum toward the atelectatic lung
  - c) Compression atelectasis is due to partial obstruction of an airway
  - d) Compression atelectasis shifts the mediastinum toward the atelectatic lung
  - e) Contraction atelectasis occurs with fibrotic changes, preventing expansion
- 3) Which of the following is true of hydrodynamic (hemodynamic) edema, not edema due to microvascular injury?
- a) Seen with heroin use
  - b) Pressure is not elevated
  - c) Presence of hemosiderine-laden macrophages
  - d) Fluids and proteins leak into interstitial space
  - e) Vascular endothelial or alveolar cell injury
- 4) What is the hallmark sign of acute respiratory distress syndrome (ARDS)?
- a) Walls lined with hyaline membranes
  - b) Diffuse alveolar damage
  - c) Cyanosis, dyspnea, tachycardia
  - d) Widespread surfactant abnormalities
  - e) No known etiology, similar to acute interstitial pneumonia
- 5) Which of the following is seen in restrictive (not obstructive) lung disease?
- a) Reduced total lung capacity with normal flow rate
  - b) Partial or complete airway obstruction
  - c) Seen with emphysema and asthma
  - d) Seen with chronic bronchitis and bronchiectasis
  - e) Maximal airflow rates limited with forced expiration
- 6) What is the most common cause of chronic obstructive pulmonary disease (COPD)?
- a) Bronchiectasis
  - b) Chronic bronchitis
  - c) Cigarette smoking
  - d) Emphysema
  - e) Asthma
- 7.1) What form of emphysema is shown here?
- a) Centriacinar
  - b) Panacinar
  - c) Paraseptal (distal acinar)



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7.2) Currently, the most plausible reason to account for destruction of the alveolar walls is the protease-antiprotease mechanism, abided by the oxidant-antioxidant imbalance. Which of the following forms of emphysema is associated with an alpha1-antitrypsin ( $\alpha$ 1-AT) deficiency?

- a) Centriacinar
- b) Panacinar
- c) Paraseptal (distal acinar)

7.3) Which of the following forms of emphysema is the most common, most severe in the upper lobes, and is seen in heavy smokers?

- a) Centriacinar
- b) Panacinar
- c) Paraseptal (distal acinar)

7.4) Which of the following forms of emphysema likely underlies spontaneous pneumothorax in young adults?

- a) Centriacinar
- b) Panacinar
- c) Paraseptal (distal acinar)

8) Which of the following is NOT true of chronic bronchitis?

- a) Seen in smokers and inhabitants of smog-laden cities
- b) It is frequently seen in middle-aged men
- c) Bacterial or viral infections can acutely exacerbate the disease
- d) An early sign is hypersecretion due to mucus stimulated by neutrophils
- e) As disease progresses, there is a decrease in goblet cells

9) Once a reversible obstruction in the bronchioles and small bronchi has been established, what is the last step seen before chronic bronchitis?

- a) Initial infection
- b) Bronchospasm
- c) Repeated injury (smoking)
- d) Hypersecretion of mucus
- e) Emphysema (alveolar wall destruction)

10.1) Drug-induced asthma is most commonly caused by:

- a) Acetaminophen
- b) Naproxen
- c) Aspirin
- d) Ibuprofen
- e) Codeine

10.2) Which of the following types of asthma is caused by virus-induced inflammation of the mucosa lowering the threshold of the epithelial vagal receptors to irritants?

- a) Atopic asthma
- b) Non-atopic asthma
- c) Drug-induced asthma
- d) Occupational asthma
- e) Status asthmaticus

11) Atopic asthma usually begins at childhood and is triggered by environmental antigens. What immunoglobulin mediates this hypersensitivity reaction?

- a) IgA

- b) IgD
  - c) IgE
  - d) IgG
  - e) IgM
- 12) Which of the following is NOT a suspected mediator of atopic asthma?
- a) Cytokines (IL-1, TNF, IL-6)
  - b) Chemokines (Eotaxin)
  - c) Prostaglandin D2
  - d) Nicotine
  - e) Histamine
  - f) Leukotrienes
- 13) Which of the following forms of asthmas can persist for days or even weeks, can lead to cyanosis or death, and may respond to helium-oxygen (heliox) treatment?
- a) Atopic asthma
  - b) Non-atopic asthma
  - c) Drug-induced asthma
  - d) Occupational asthma
  - e) Status asthmaticus
- 14) Which of the following is NOT true of bronchiectasis?
- a) Seen in cystic fibrosis, intralobar sequestration, and Kartagener syndrome
  - b) Seen in necrotizing pneumonia (e.g. TB)
  - c) Seen with SLE, RA, tumor, mucous impaction
  - d) Manifested by spitting up copious amounts of foul-smelling purulent sputum
  - e) Causes permanent constriction of the bronchi and bronchioles
- 15) What is the earliest manifestation of diffuse interstitial diseases of the lung?
- a) Accumulation of leukocytes and immune infector cells in the alveolar spaces
  - b) End-inspiratory crackles and cyanosis
  - c) Dyspnea and wheezing
  - d) Restrictive lung disease
  - e) Ground glass shadows with diffuse infiltrations on x-ray
- 16) Lung changes with lupus erythematosus involve patchy, transient parenchymal infiltrates. Which of the following is seen in scleroderma (and rheumatoid arthritis)?
- a) Chronic pleuritis with or without effusions
  - b) Pulmonary hypertension
  - c) Intrapulmonary rheumatoid nodules
  - d) Diffuse interstitial pneumonitis
  - e) Diffuse interstitial fibrosis
- 17) Anthracosis is a pneumoconiosis (1-5micron particles) caused by the inhalation of:
- a) Asbestos dust
  - b) Silica dust
  - c) Coal dust
  - d) Iron or cotton dust
  - e) Butter popcorn flavor dust
- 18) A patient presents with suspected occupational pneumoconiosis. X-ray reveals nodular lesions within the lungs, in the upper region around respiratory bronchioles. Tissue sample from pulmonary lymph nodes reveals macrophages aggregated as

granular, black areas. The sample itself appeared black on gross examination. Which of the following is the most likely cause?

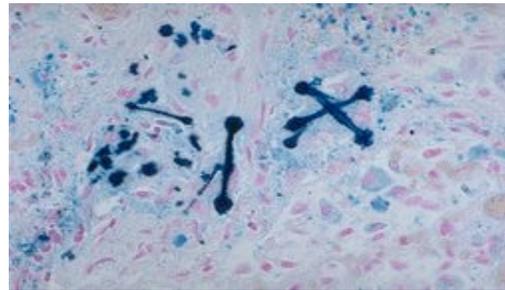
- a) Asbestos dust
- b) Silica dust
- c) Coal dust
- d) Iron dust
- e) Cotton dust

19) A patient presents with a nodular fibrosing pneumoconiosis. It is diagnosed as the most common pneumoconiosis worldwide, which is due to:

- a) Asbestos dust
- b) Silica dust
- c) Coal dust
- d) Iron dust
- e) Cotton dust

20.1) Which pneumoconiosis is seen here?

- a) Coalworker's pneumoconiosis (CWP)
- b) Silicosis ("grinder's disease")
- c) Berylliosis (beryllium dust)
- d) Asbestosis (asbestos dust)
- e) Bauxite fibrosis (bauxite dust)
- f) Byssinosis (cotton dust)



20.2) A 50-year-old male career roofer from New York City presents difficulty breathing. X-ray reveals lung mesothelioma. Lab tests show inclusion bodies in macrophages as "dumbbell shaped." What are these inclusions coated with?

- a) Zinc
- b) Carbon
- c) Iron
- d) Copper
- e) Calcium

21) A 50-year-old African American presents with bilateral hilar lymphadenopathy. There is a CD4+ helper T cell response to an unknown antigen. Genetic testing shows HLA genotypes. Lab tests show non-caseating granulomas. Which of the following is most likely?

- a) Desquamative interstitial pneumonia (DIP)
- b) Emphysema
- c) Tuberculosis
- d) Silicosis
- e) Sarcoidosis

22) A 55-year-old male presents with difficulty breathing. History reveals they have been a heavy smoker "all their life." There is little evidence of fibrosis. Lab tests show diffuse intraalveolar filling and many macrophages with abundant cytoplasm containing a dusty brown pigment. Granular iron is seen in the macrophage cytoplasm. Which of the following is most likely?

- a) Desquamative interstitial pneumonia (DIP)
- b) Emphysema
- c) Cystic fibrosis

- d) Asbestosis
  - e) Sarcoidosis
- 23) What is the most common clinical sign seen in a saddle embolism, arising from the femoral vein?
- a) Pulmonary hypertension
  - b) Pulmonary edema
  - c) Pulmonary micro-hemorrhages
  - d) Hypercoagulability
  - e) Instant death
- 24) A 30-year-old female presents with dyspnea and fatigue. Previous testing had revealed mutations in the bone morphogenetic protein receptor 2 (BMPR2). Testing reveals atheromatous deposits in the pulmonary artery. Treatment with vasodilators and antithrombotics is begun. Normally pulmonary pressure is 1/8th of systemic pressure. What would you expect to find in this individual?
- a) Pulmonary pressure 1/32nd of systemic pressure
  - b) Pulmonary pressure 1/16th of systemic pressure
  - c) Normal pulmonary pressure
  - d) Pulmonary pressure 1/4th of systemic pressure
  - e) Pulmonary pressure 1/2 of systemic pressure
- 25) Which of the following is NOT an etiology of secondary pulmonary hypertension?
- a) Acute cor pulmonale
  - b) Recurrent thromboemboli
  - c) Autoimmune disorders
  - d) Antecedent congenital or acquired heart disease
  - e) Chronic Obstructive or interstitial lung diseases
- 26) A patient presents with hemoptysis and focal pulmonary consolidations on radiography. Lungs show areas of red-brown consolidation and focal necrosis of the alveolar walls. There is evidence of pneumonitis, glomerulonephritis, and a type II cytotoxic antibody-mediated hypersensitivity. Lab test reveal autoantibodies targeted against the alpha3-chain of collagen IV. Treatment is begun to prevent uremia. Which of the following is most likely?
- a) Idiopathic pulmonary hemosiderosis
  - b) Wegener granulomatosis
  - c) Goodpasture syndrome
  - d) Rheumatoid arthritis
  - e) Systemic lupus erythematosus
- 27) A child presents with a productive cough, hemoptysis, anemia, and weight loss. Pulmonary infiltrates are seen. No antibodies are detected, but immunosuppression therapy is started and shows good long-term results. Which of the following is most likely?
- a) Idiopathic pulmonary hemosiderosis
  - b) Graves disease
  - c) Goodpasture syndrome
  - d) Rheumatoid arthritis
  - e) Systemic lupus erythematosus

28.1) Lung cancer is the leading cause of death worldwide. Regular smokers have a 10 times greater risk of getting lung cancer and 2 pack/day smokers have a 60 times greater risk. Which of the following is a common lung carcinoma that is highly correlated with smoking?

- a) Small cell carcinoma
- b) Large cell carcinoma
- c) Squamous cell carcinoma
- d) Adenocarcinoma
- e) Bronchioloalveolar carcinoma (BAC)

28.2) Which of the following is NOT true of genetic lung carcinoma?

- a) c-MYC, K-RAS, EFGR, and HER-2neu are the dominant oncogenes
- b) RB and p16INK4a are commonly deleted or inactivated
- c) Genetic variation is seen in the P-450 gene CYP1A1
- d) p53 is commonly activated

29) Which of the following produces mucin and is the most common lung cancer in women and non-smokers?

- a) Small cell carcinoma
- b) Large cell carcinoma
- c) Squamous cell carcinoma
- d) Adenocarcinoma
- e) Bronchioloalveolar carcinoma (BAC)

30.1) Which of the following is correlated with cigarette smoking, has epithelial cells with scant cytoplasm, ill-defined borders, finely granular nuclear chromatin with absent nucleoli, and has a survival time of a little over 6 weeks if untreated?

- a) Small cell carcinoma
- b) Large cell carcinoma
- c) Adenocarcinoma
- d) Squamous cell carcinoma
- e) Carcinoid tumor

30.2) Which of the following is an undifferentiated malignant epithelial tumor?

- a) Small cell carcinoma
- b) Large cell carcinoma
- c) Adenocarcinoma
- d) Squamous cell carcinoma
- e) Carcinoid tumor

31) Which of the following is NOT seen in paraneoplastic syndrome, which is an indirect effect on the body by a tumor?

- a) ADH produced by small cell carcinomas
- b) Cushing syndrome from ACTH produced by small cell carcinomas
- c) Hypocalcemia produced by squamous cell carcinomas
- d) Lambert-Eaton myasthenic syndrome and Sweet syndrome
- e) Peripheral (sensory) neuropathy and finger clubbing

32) A 30-year-old non-smoker presents with cough, hemoptysis, and bronchiectasis. Low-grade malignant epithelial neoplasms are discovered. No p53 mutations or BCL2/BAX imbalances are found. Testing shows the neoplasms have finger-like

projections into the lumen of the bronchus that are covered by an intact mucosa. Which of the following is most likely?

- a) Benign pulmonary hemartoma
  - b) Small cell carcinoma
  - c) Adenocarcinoma
  - d) Squamous cell carcinoma
  - e) Carcinoid tumor
- 33) A patient with difficulty breathing undergoes a chest x-ray. Results show peripheral, solitary, 2cm well-circumscribed rounded-focus opacities (coin lesions). Which of the following is most likely?
- a) Carcinoid tumor
  - b) Large cell carcinoma
  - c) Small cell carcinoma
  - d) Squamous cell carcinoma
  - e) Benign pulmonary hemartoma
- 34) Which of the following is NOT a malignant tumor that can metastasize to the lung?
- a) Thyroid carcinoma
  - b) Soft tissue sarcoma
  - c) Pituitary adenoma
  - d) Esophageal carcinoma
  - e) Mediastinal lymphoma
- 35) Which of the following is most likely to cause non-inflammatory pleural effusions (hydrothorax or chylothorax)?
- a) Bronchiectasis
  - b) Rheumatoid arthritis
  - c) Infections or uremia
  - d) Right sided heart failure
  - e) Tuberculosis
- 36) A patient presents with jugular vein distention (JVD), decreased breath sounds on the right, hyper-resonant chest wall on the left, hypotension, tachycardia, and unequal chest rise. A gunshot wound is found on examination. If the patient has a tension pneumothorax, what is the recommended treatment?
- a) Treat the underlying emphysema
  - b) Treat the underlying asthma
  - c) Treat the underlying tuberculosis
  - d) Needle decompression on the right
  - e) Needle decompression on the left
- 37) A patient presents with chest pain, dyspnea, and recurrent pleural effusions. Lung tissue is ensheathed by a thick layer of soft, grayish pink tumor tissue. There is evidence of spreading to the hilar lymph nodes. Malignant mesothelioma is suspected. What is the most likely cause?
- a) Smoking
  - b) Asbestos
  - c) Silica dust
  - d) Chronic bronchitis
  - e) Cystic fibrosis

38) An elderly man from a poor urban area presents with difficulty breathing, night sweats, fever, and malaise. Coughed sputum does not Gram stain. Chest x-ray reveals cavitations and localization to the apex of the upper lobes. A hypersensitivity response leads to caseous granulomas. Which of the following is most likely?

- a) Pancoast tumor
- b) Emphysema
- c) Tuberculosis
- d) Silicosis
- e) Sarcoidosis

39) An Eskimo presents with fever and cough producing bacilli. X-ray reveals lower and middle lobe consolidation, hilar adenopathy, and pleural effusion. Acute bacterial pneumonia is suspected. A gray-white inflammatory consolidation emerges but no cavitation is seen. Which of the following is most likely?

- a) Primary tuberculosis
- b) Secondary tuberculosis
- c) Tuberculous meningitis
- d) Miliary tuberculosis
- e) None of the above

40) An AIDS patient presents with fever and cough producing bacilli. Testing reveals foci with sharply circumscribed, gray-white to yellow areas with central caseation. Cavitation is seen. X-ray reveals consolidation at the apex of the upper lobe. Parenchymal involvement is not seen. Which of the following is most likely?

- a) Primary tuberculosis
- b) Secondary tuberculosis
- c) Tuberculous meningitis
- d) Miliary tuberculosis
- e) None of the above

41) The most common cause of aspiration pneumonia in the first few days of life is:

- a) Decreased lecithin-to-sphingomyelin ratio
- b) Hypoplastic lung
- c) Oligohydramnios
- d) Sequestered lung
- e) Tracheo-esophageal fistula

42) Which form of atelectasis is reversible?

- a) Contraction atelectasis
- b) Compression atelectasis
- c) Micro atelectasis
- d) Reabsorption atelectasis

43) Atelectasis refers to:

- a) Overinflation of the lung
- b) Incomplete expansion or collapse of lung
- c) Obstruction of the pulmonary lymphatics
- d) Alveolar-capillary block
- e) Diffuse alveolar damage

44) The basic lesion associated with adult respiratory distress syndrome is:

- a) Pulmonary arterial and arteriolar necrosis

- b) Diffuse thromboemboli in end-arteries
  - c) Occlusion of small bronchioles due to muscle spasm
  - d) Diffuse damage to alveolar walls
  - e) Accumulations of blood in alveolar spaces
- 45) Pulmonary edema may be the result of obstruction to lymphatic drainage by dysfunction in which of the following areas?
- a) T5 to T9 on the left
  - b) First rib right
  - c) Left sternocleidomastoid muscle
  - d) Diaphragmatic flattening
  - e) Sacrum
- 46) A 24-year-old AIDS patient develops chronic abdominal pain, low-grade fever, diarrhea, and malabsorption. Oocytes are demonstrated in the stool. Which of the following organisms is most likely to be the cause of the patient's diarrhea?
- a) *Diphyllobothrium latum*
  - b) *Entamoeba histolytica*
  - c) *Giardia lamblia*
  - d) *Isospora belli*
  - e) *Microsporidia*
- 47) A neonate does not pass meconium until 48 hours after his birth. Two weeks later, his mother reports that he has not been passing stool regularly. Anorectal manometry reveals increased internal anal sphincter pressure on rectal distension with a balloon. Radiographic studies reveal massive dilation of the colon proximal to the rectum. The findings in this case indicate a developmental abnormality of which of the following embryonic tissues?
- a) Ectoderm
  - b) Endoderm
  - c) Neural crest
  - d) Neural ectoderm
  - e) Splanchnic mesoderm
- 48) A letter carrier is severely bitten by a pit bull guarding a junkyard. The wound is cleansed, and the letter carrier receives a booster injection of tetanus toxoid and an injection of penicillin G. Several days later, the wound is inflamed and purulent. The exudates is cultured on blood agar and yields Gram-negative rods. Antibiotic sensitivity tests are pending. The most likely agent to be isolated is:
- a) *Bartonella henselae*
  - b) *Brucella canis*
  - c) *Clostridium tetani*
  - d) *Toxocara canis*
  - e) *Pasturella multocida*
- 49) A 25-year-old man presents to a rheumatologist with complaints of joint pain involving the large joints of the legs. On questioning, the patient indicated that exacerbations in the joint pain are frequently accompanied by diarrhea. Which of the following is the most likely diagnosed?
- a) Amebic colitis
  - b) Chronic appendicitis

- c) Diverticulosis
  - d) Pseudomembranous colitis
  - e) Ulcerative colitis
- 50) A 55-year-old hypertensive man develops sudden onset of excruciating pain beginning in the anterior chest, and then radiating to the back. Over the next two hours, the pain moves downward toward the abdomen. Which of the following is the most likely diagnosis?
- a) Aortic dissection
  - b) Aortic valve stenosis
  - c) Atherosclerotic aneurysm
  - d) Myocardial infarction
  - e) Syphilitic aneurysm
- 51) A Guatemalan child with a history of meconium ileus is brought to the clinic because of a chronic cough. The mother notes a history of respiratory tract infections and bulky, foul-smelling stools. After assessment of the respiratory tract illness, the practitioner should look for signs of:
- a) Cystinuria
  - b) Hypoglycemia
  - c) Iron deficiency anemia
  - d) Sphingomyelin accumulation
  - e) Vitamin A deficiency
- 52) A 15-year-old is brought to the emergency department in a coma. An alert ambulance attendant notes that the patient's breath smells like acetone. This observation is most consistent with which of the following diagnoses?
- a) Alcohol intoxication
  - b) Diabetic hyperosmolar coma
  - c) Diabetic ketoacidosis
  - d) Heroin overdose
  - e) Profound hypoglycemia
- 53) A patient presents with dyspnea and symptoms of an acute MI. Serum shows high LDH. If a pulmonary embolism is suspected, what is the gold standard test to be performed?
- a) ECG
  - b) Spirometry
  - c) Pulmonary angiography
  - d) Coronary angiography
  - e) Spiral CT scan
- 54) A patient presents with upper respiratory complaints, including sinusitis, cough, and hemoptysis. Lab test is positive for c-ANCA. Which of the following is most likely?
- a) Idiopathic pulmonary hemosiderosis
  - b) Wegener granulomatosis
  - c) Goodpasture syndrome
  - d) Rheumatoid arthritis
  - e) Systemic lupus erythematosus
- 55) Which of the following antihistamines is most likely to cause sedation?
- a) Desloratadine

- b) Chlorpheniramine
  - c) Fexofenadine
  - d) Cetirizine
- 56) A muscarinic receptor mediated side-effect of diphenhydramine is:
- a) Sedation
  - b) Psychomotor impairment
  - c) Dry mouth
  - d) Relief of nasal congestion
- 57) Peripherally acting antihistamines are considered ineffective in managing:
- a) Rhinorrhea
  - b) Motion sickness
  - c) Allergic conjunctivitis
  - d) Urticaria
- 58) A pilot with seasonal allergies is on an inhaled steroid and needs a prescription for an antihistamine. Your best choice is:
- a) Diphenhydramine
  - b) Chlorpromazine
  - c) Desloratadine
  - d) Scopolamine
  - e) Hydroxyzine
- 59) The most common symptom of influenza infection includes which of the following?
- a) Gradual onset
  - b) Chest tightness
  - c) Fever
  - d) Constipation
  - e) Weight gain
- 60) For which of the following patients is the influenza vaccination indicated, according to CDC guidelines?
- a) Residents of nursing homes
  - b) Adults with chronic leukemias
  - c) Elderly patients on chronic aspirin therapy
  - d) Military personnel
  - e) Fire fighters
- 61) Which of the following describes the mechanism of action of RSV immune globulin?
- a) Antibodies against IgG causing symptoms
  - b) IgG against RSV antigen
  - c) RSV proteins which induce immune response
  - d) IgE against RSV antigen
  - e) Mixture of IgG and IgE against RSV
- 62) Which toxicity is most associated with RSV immune globulin?
- a) Fluid overload
  - b) Psychosis
  - c) Bronchospasm
  - d) Anemia
  - e) Liver failure
- 63) Which is the correct sequence of viral replication?

- a) Attachment, uncoating, assembly, release
- b) Uncoating, attachment, release
- c) Attachment, release, uncoating, assembly
- d) Attachment, assembly, uncoating
- e) Assembly, release, uncoating, attachment

**Respiratory #19 – Clinical: Symptoms & Signs**

1) Chronic cough does not involve an obvious cause (e.g. cigarette smoking) and is defined as lasting longer than:

- a) 3 days
- b) 5 days
- c) 2 weeks
- d) 3 weeks
- e) 4 weeks

2) What is the most common cause of chronic cough?

- a) Viral infection
- b) Bacterial infection (TB, TWAR, Bordetella)
- c) Postnasal drip
- d) Gastroesophageal reflux
- e) Asthma

3) Sputum with blood from which of the following locations would be considered hemoptysis (versus pseudohemoptysis)?

- a) Supraepiglottic area
- b) Below the larynx
- c) GI tract
- d) Nose

4.1) A patient develops subjective awareness of breathlessness (dyspnea) after walking 100 yards and needs to stop and catch his breath. What grade dyspnea would this patient receive using the NY Association classification?

- a) Grade 0
- b) Grade 1
- c) Grade 2
- d) Grade 3
- e) Grade 4
- f) Grade 5

4.2) Which of the following is usually seen in tumors of the main bronchi, unilateral pleural effusion, or after pneumonectomy?

- a) Tachypnea (>20 breaths/min)
- b) Orthopnea (supine posture)
- c) Trepopnea (lateral decubitus)
- d) Platypnea (upright posture)
- e) Paroxysmal nocturnal dyspnea

4.3) Which of the following is usually seen with increased right-to-left shunting in lung bases, liver disease, severe lung fibrosis, or after pneumonectomy?

- a) Tachypnea (>20 breaths/min)
- b) Orthopnea (supine posture)

- c) Trepopnea (lateral decubitus)
  - d) Platypnea (upright posture)
  - e) Paroxysmal nocturnal dyspnea
- 5) A patient presents with cyanosis and severe hypoxia ( $\text{PaO}_2 < 55\text{mmHg}$ ). Since the patient is cyanotic, capillary content of reduced hemoglobin is likely greater than:
- a) 1g/dL
  - b) 5g/dL
  - c) 12g/dL
  - d) 21g/dL
  - e) 45g/dL
- 6) Cherry-red flush is seen, although rarely, in very severe cases of:
- a) Hypoxia
  - b) Hypovolemia
  - c) Cyanide poisoning
  - d) CO poisoning
  - e) Asbestosis
- 7) Which of the following is NOT a cause of finger clubbing (bulbous enlargement of the distal segment of a digit due to increased soft tissue mass)?
- a) Cyanotic heart disease
  - b) Lung cancer
  - c) Bronchiectasis
  - d) GI disease
  - e) Liver disease
- 8) A patient presents with clubbing, painful periosteal hypertrophy of long bones, and symmetrical arthralgia. The patient is diagnosed with hypertrophic pulmonary osteoarthropathy (HPO). What is the most common cause?
- a) Bronchogenic carcinoma
  - b) Benign methothelioma
  - c) Cystic fibrosis
  - d) Infective endocarditis
  - e) Lung abscess
- 9) A patient presents with neurologic defects. X-ray shows a superior sulcus lung tumor (Pancoast tumor) on the left. Which of the following symptoms would NOT be associated with Horner syndrome?
- a) Anhidrosis on the left
  - b) Ptosis on the left
  - c) Tingling left hand
  - d) Ipsilateral miosis
- 10) A COPD patient presents with asterixis. Severe hypercarbia is suspected. What other symptoms might the patient have?
- a) Retinitis pigmentosa
  - b) Conjunctival suffusion
  - c) Temporal arteritis
  - d) Retinal detachment
  - e) Strabismus

**Respiratory #20 – Clinical: Diagnostic Tests**

- 1.1) Which of the following is seen in pleural effusion?
- a) Decreased tactile fremitus and decreased resonance on percussion
  - b) Decreased tactile fremitus and increased resonance on percussion
  - c) Increased tactile fremitus and increased resonance on percussion
  - d) Increased tactile fremitus and decreased resonance on percussion
- 1.2) Which of the following is seen in lung consolidation (e.g. lobar pneumonia), which also includes egophany and bronchial breath sounds?
- a) Decreased tactile fremitus and decreased resonance on percussion
  - b) Decreased tactile fremitus and increased resonance on percussion
  - c) Increased tactile fremitus and increased resonance on percussion
  - d) Increased tactile fremitus and decreased resonance on percussion
- 1.3) Which of the following is seen in pneumothorax?
- a) Decreased tactile fremitus and decreased resonance on percussion
  - b) Decreased tactile fremitus and increased resonance on percussion
  - c) Increased tactile fremitus and increased resonance on percussion
  - d) Increased tactile fremitus and decreased resonance on percussion
- 2) What is the main indication for pulmonary angiography?
- a) Pneumothorax
  - b) Status asthmaticus
  - c) Left-sided heart failure
  - d) Bronchiectasis
  - e) Pulmonary emboli
- 3) What is the main indication for a pulmonary function test (PFT)?
- a) Dyspnea
  - b) Chest pain
  - c) Asthma
  - d) Tachypnea
  - e) Hemoptysis
- 4) A patient undergoes a PFT with normal results. However, DLCO is decreased. Which of the following is most likely?
- a) Restrictive lung disease (fibrosis)
  - b) Obstructive lung disease (COPD)
  - c) Anemia, pulmonary emboli
  - d) Diaphragmatic paralysis
  - e) Asthma
- 5.1) A 63-year-old heavy smoker undergoes pulmonary function testing. Their TLC is 140, VC is 52, RV is 160, FEV1 is 35, FEV1/FVC is 40, FEF25-75 is 18, MVV is 62, diffusing capacity is 9 (normal is 22). Which of the following is most likely?
- a) Restrictive lung disease (fibrosis)
  - b) Obstructive lung disease (COPD)
  - c) Anemia, pulmonary emboli
  - d) Diaphragmatic paralysis
  - e) Asthma
- 5.2) A 43-year-old non-smoker undergoes pulmonary function testing. Their TLC is 118, VC is 78, RV is 110, FEV1 is 48, FEV1/FVC is 40, FEF25-75 is 35, MVV is 60,

diffusing capacity is 28 (normal is 28). Bronchodilator testing elicits improvements. Which of the following is most likely?

- a) Restrictive lung disease (fibrosis)
  - b) Obstructive lung disease (COPD)
  - c) Anemia, pulmonary emboli
  - d) Diaphragmatic paralysis
  - e) Asthma
- 5.3) A 58-year-old non-smoker undergoes pulmonary function testing. Their TLC is 56, VC is 62, RV is 65, FEV1 is 85, FEV1/FVC is 88, FEF25-75 is 82, MVV is 108, diffusing capacity is 8 (normal is 26). Which of the following is most likely?
- a) Restrictive lung disease (fibrosis)
  - b) Obstructive lung disease (COPD)
  - c) Anemia, pulmonary emboli
  - d) Diaphragmatic paralysis
  - e) Asthma
- 6) Which of the following is NOT a diagnostic or therapeutic indication for bronchoscopy?
- a) Atelectasis
  - b) Hemoptysis
  - c) Pulmonary emboli
  - d) Airway stenosis
  - e) Diffuse lung disease
- 7) Which of the following are seen in a normal bronchoalveolar lavage (BAL)?
- a) Macrophages and neutrophils
  - b) Lymphocytes and neutrophils
  - c) Eosinophils and basophils
  - d) Macrophages and lymphocytes
  - e) Lymphocytes and eosinophils

### **Respiratory #21 – Clinical: Obstructive Lung Disease**

- 1) Which of the following is NOT one of the three most common obstructive lung disease conditions?
- a) Asthma
  - b) Emphysema
  - c) Pneumoconiosis
  - d) Chronic bronchitis
- 2) Which of the following would NOT lead to airflow obstruction?
- a) Destruction of lung parenchyma
  - b) Damage of lung tissue by mucous hypersecretion and hypertrophy
  - c) Pulmonary vascular changes
  - d) Airway narrowing and fibrosis
  - e) Excessive response to bronchodilator therapy
- 3) Which of the following is characterized by enlargement of the airspaces distal to the terminal bronchioles and destruction of the alveolar walls?
- a) Asthma
  - b) Emphysema

- c) Pneumoconiosis
  - d) Chronic bronchitis
  - e) None of the above
- 4) A patient presents with acute respiratory distress syndrome (ARDS) and is found to have associated alpha1-antitrypsin deficiency. What is the treatment for this patient?
- a) Bronchodilator therapy and corticosteroids
  - b) Bovine-derived alpha1-antitrypsin replacement therapy
  - c) Human-derived alpha1-antitrypsin replacement therapy
  - d) Lab-created alpha1-antitrypsin replacement therapy
  - e) There is currently no treatment available for this patient
- 5) A chronic smoker who is often exposed to occupational dust undergoes PFT and shows decreased flow rates. DLCO is diminished and parenchymal destruction is seen. Pulmonary vascular abnormalities lead to hypoxemia. Which of the following treatments is by far the most important and most effective in treating this patient?
- a) Bronchodilators (short-acting and long-acting)
  - b) Inhaled or systemic corticosteroids
  - c) Anticholinergic agents and phosphodiesterase inhibitors
  - d) Theophylline and home oxygen
  - e) Smoking cessation

**Respiratory #22 – Clinical: Asthma**

- 1) What are the histological hallmarks of asthmas?
- a) Mucous gland hypertrophy and intense eosinophilic infiltration of submucosa
  - b) Widened basement membrane zone and mucoid hyposecretion
  - c) Decreased intraepithelial leukocytes and mast cells
  - d) Regional damage to bronchial epithelium with absence of mucoid cells
  - e) Macrophage aggregation with intracellular inclusion bodies
- 2) Which of the following is diagnosed as chronic airway inflammation with episodes of reversible bronchospasm?
- a) Asthma
  - b) Emphysema
  - c) Pneumoconiosis
  - d) Chronic bronchitis
  - e) Cystic fibrosis
- 3) Which of the following gastrointestinal (GI) conditions is the most likely to exacerbate asthma?
- a) Gastroesophageal reflux (GERD)
  - b) Irritable bowel syndrome (IBS)
  - c) Chronic ulcerative colitis
  - d) Crohn disease
  - e) Hemochromatosis
- 4) Which of the following asthma severity categories has treatment including inhaled low-dose steroid, cromolyn, nedocromolyn, zafirlukast, or zileuton?
- a) Mild intermittent asthma (< 3 per week)
  - b) Mild persistent asthma (3-6 per week)
  - c) Moderate persistent asthma (daily)

- d) Severe persistent asthma (continual)
  - e) Exercise-induced asthma
- 5) A patient presents with asthma, bronchiectasis, increased total serum IgE, and IgE antibody to *Aspergillus*. A diagnosis of allergic bronchopulmonary aspergillosis is made. What is the treatment of choice for this patient?
- a) Amphotericin B
  - b) TMP-SMX
  - c) Fluconazole
  - d) Inhaled corticosteroids
  - e) Systemic corticosteroids

**Respiratory #23 – Clinical: Cystic Fibrosis & Bronchiectasis**

- 1) Which of the following describes the etiology of cystic fibrosis (CF)?
- a) X-linked recessive
  - b) X-linked dominant
  - c) Autosomal recessive
  - d) Autosomal dominant
  - e) Complete deletion of chromosome 7
- 2) A young adult presents with difficulty breathing, nasal polyps, and purulent sputum. Sweat chloride is > 80mEq/L with positive family history and pancreatic insufficiency. Aggressive chest physiotherapy and tobramycin is prescribed. What was the diagnosis?
- a) Asthma
  - b) Emphysema
  - c) Bronchiectasis
  - d) Chronic bronchitis
  - e) Cystic fibrosis
- 3) A patient presents with difficulty breathing. Chest x-ray shows segmental atelectasis, loss of lung volume, and “tram track” patterns on the airways. High-resolution computed tomography (HRCT) shows signet-ring shadows, bronchial wall thickening, and dilate bronchi. Which of the following is most likely?
- a) Asthma
  - b) Emphysema
  - c) Bronchiectasis
  - d) Chronic bronchitis
  - e) Cystic fibrosis
- 4) Which of the following is NOT a common cause of bronchiectasis?
- a) Yellow nail syndrome
  - b) Obstructive Azoospermia (Young disease)
  - c) Viral or bacterial infection
  - d) Sjögren syndrome
  - e) Hypogammaglobinemia
  - f) Kartagener syndrome
- 5) A 23-year-old patient presents with bronchiectasis and sinusitis. Chest x-ray reveals situs inversus. Which of the following is most likely?
- a) Hypogammaglobinemia
  - b) Young disease

- c) Kartagener syndrome
  - d) Right middle lobe syndrome
  - e) Yellow nail syndrome
- 6) What is the fundamental defect seen the above 23-year-old patient?
- a) Loss of cilia plasma membrane
  - b) Loss of cilia dynein arm
  - c) Loss of cilia nexin
  - d) Loss of cilia center bridge
  - e) Loss of cilia subfiber A or B

**Respiratory #24 – Clinical: Pleural Effusion**

- 1) Pleural effusions consist of transudates and exudates. Which of the following would describe a pleural transudate?
- a) Pleural fluid lactate dehydrogenase (LDH)-to-serum ration is 1.6
  - b) Pleural fluid cholesterol is 60mg/dL
  - c) Pleural fluid LDH is 75% of the upper limit
  - d) Pleural fluid protein-to-serum ration is 0.75
  - e) Pleural fluid protein is 0.9g/dL
- 2) What is the most common cause of a transudate?
- a) Asthma
  - b) Pneumonia
  - c) Bronchiectasis
  - d) Cystic fibrosis
  - e) Congestive heart failure
- 3) What is the most common cause of an exudate?
- a) Asthma
  - b) Pneumonia
  - c) Bronchiectasis
  - d) Cystic fibrosis
  - e) Congestive heart failure
- 4) Which of the following is NOT a likely cause of chylous effusion (turbid or milky white appearance of fluid)?
- a) Thoracic duct dysfunction
  - b) Trauma
  - c) Tumor
  - d) Tension pneumothorax
  - e) Tuberculosis
- 5) What is the most common cause of non-traumatic chylous effusion?
- a) Lymphoma
  - b) Asbestosis
  - c) Tuberculosis
  - d) Bronchiectasis
  - e) Congestive heart failure

**Respiratory #25 – Clinical: Sleep-Related Breathing Disorders**

- 1) A reluctant 45-year-old male is brought to the primary care clinic by his wife. The wife claims he falls asleep while driving, snores very loudly, and wakes up several times during the night. She is concerned because at times “he doesn’t seem to be breathing.” Which of the following is most likely?
- Central sleep apnea
  - Obstructive sleep apnea
  - Status asthmaticus
  - Cystic fibrosis
  - COPD
- 2) Which of the following describes the demographic of patients who develop obstructive sleep apnea (OSA)?
- Elderly, male, obese
  - Elderly, female, smoker
  - Middle-aged, male, alcoholic
  - Boy, athlete
  - Girl, asthmatic
- 3) What is the treatment for obstructive sleep apnea?
- Stop smoking, drinking, and decrease blood pressure
  - Flow-restricted oxygen-powered ventilation device (FROPVD)
  - Continuous positive airway pressure (CPAP) device
  - Implantable cardioverter defibrillator (ICD) device
  - Non-opiate sedatives (sleep-aids)

**Respiratory #26 – Clinical: Diffuse Lung Disease**

- 1.1) Radiation-induced diffuse lung disease is categorized as:
- Occupational
  - Malignant
  - Drug-induced
  - Genetic
  - Vasculitide
- 1.2) Rheumatoid arthritis and SLE-induced diffuse lung disease are categorized as:
- Vasculitide
  - Collagen vascular
  - Drug-induced
  - Genetic
  - Infectious
- 2) Pulmonary function testing (PFT) in diffuse lung disease shows results similar to:
- Restrictive lung disease
  - Obstructive lung disease
  - Anemia, pulmonary emboli
  - Diaphragmatic paralysis
  - Asthma

**Respiratory #27 – Clinical: Specific Diagnosis**

- 1) A 60-year-old presents with a dry, progressive cough. Lab test reveals mild abnormalities to antinuclear antibodies, sed rate, rheumatoid factor, and gamma

globulins. HRCT show lower lobe thickening with honeycombing and ground-glass opacities. Which of the following is most likely?

- a) Lymphangiomyomatosis
  - b) Pulmonary sarcoidosis
  - c) Kartagener syndrome
  - d) Hypersensitivity pneumonitis
  - e) Idiopathic pulmonary fibrosis
- 2) A 25-year-old patient presents with sudden symptoms of inflammatory lung disease. X-ray shows diffuse fibrosis. Lab tests show non-caseating granulomas in the lungs and lymph nodes. Which of the following is most likely?
- a) Lymphangiomyomatosis
  - b) Pulmonary sarcoidosis
  - c) Kartagener syndrome
  - d) Hypersensitivity pneumonitis
  - e) Idiopathic pulmonary fibrosis
- 3) Aside from the lung and lymph nodes, which of the following is an organ involved in sarcoidosis?
- a) Eye and CNS
  - b) Parotid glands
  - c) Pituitary gland
  - d) Skin and bone
  - e) All of the above
- 4) Sarcoidosis is associated with anemia and increased liver enzyme levels. What electrolyte abnormality may be seen?
- a) Hypercalcemia
  - b) Hypocalcemia
  - c) Hyperkalemia
  - d) Hypokalemia
  - e) Hyponatremia
- 5) A patient presents with sarcoidosis (Besnier-Boeck disease, or Lofgren syndrome). What is the first-line therapy for this patient?
- a) Methotrexate
  - b) Cyclosporine
  - c) Bronchodilators
  - d) Corticosteroids
  - e) Disease modifying antirheumatic drugs (DMARDs)
- 6) What test is not helpful in diagnosis of sarcoidosis but is used as a marker for disease activity?
- a) Erythrocyte sedimentation rate
  - b) Serum ACE
  - c) C-reactive protein
  - d) Serum albumin
  - e) Alanine aminotransferase
- 7) A 25-year-old female presents with a history of recurrent pneumothoraces, chylous pleural effusions, diffuse infiltrates with hypoxemia, and airway obstruction. The

patient's current complaint is hemoptysis, which worries her because she is trying to get pregnant. Which of the following is most likely?

- a) Lymphangiomyomatosis
  - b) Pulmonary sarcoidosis
  - c) Kartagener syndrome
  - d) Hypersensitivity pneumonitis
  - e) Idiopathic pulmonary fibrosis
- 8) A patient presents with dyspnea, cough, fever, headache, and malaise. Blood tests show non-specific leukocytosis and eosinophilia with an increased sed rate. Ground-glass opacities are seen in the upper lobes on x-ray. The clinician questions the patient about grain dust with farming, pet birds, and hot tub use. Which of the following is most likely?
- a) Lymphangiomyomatosis
  - b) Pulmonary sarcoidosis
  - c) Kartagener syndrome
  - d) Hypersensitivity pneumonitis
  - e) Idiopathic pulmonary fibrosis
- 9) What is the general treatment strategy for hypersensitivity pneumonitis?
- a) Bronchodilator therapy and corticosteroids
  - b) Smoking and drinking cessation
  - c) Human-derived alpha 1-antitrypsin replacement therapy
  - d) Dual-lung transplantation and life-long steroid therapy
  - e) There is currently no treatment available for this patient
- 10) A pipefitter/plumber presents with dry cough, dyspnea, bilateral rales, and clubbing. Diffuse interstitial lung disease is found along with mesothelioma. X-rays show a basilar predominance with interstitial infiltrates. Which of the following is most likely?
- a) Tuberculosis
  - b) Emphysema
  - c) Asbestosis
  - d) Silicosis
  - e) Sarcoidosis
- 11) A quarry driller presents with dry cough and dyspnea. X-ray shows 1-3mm nodular infiltrates of the upper lobes and eggshell calcifications of the mediastinal and hilar lymph nodes. Lab tests show antinuclear antibodies. Pulmonary function test is normal. Which of the following is most likely?
- a) Tuberculosis
  - b) Emphysema
  - c) Asbestosis
  - d) Silicosis
  - e) Sarcoidosis
- 12) Which of the following is seen in both asbestosis and silicosis?
- a) Bilateral hilar lymph node adenopathy
  - b) Large pulmonary nodules on x-ray
  - c) High titre antinuclear antibodies
  - d) Ghon complexes
  - e) Dry cough and dyspnea
- 13) Patients with silicosis are at an increased risk for what type of infection?

- a) *Mycoplasma pneumoniae*
  - b) *Mycobacterium tuberculosis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Chlamydia trachomatis*
- 14) Which of the following is NOT a cause of acute respiratory distress syndrome (ARDS)?
- a) Sepsis
  - b) Pneumonia
  - c) Pancreatitis
  - d) Hepatitis
  - e) Trauma

**Respiratory #28 – Clinical: Pulmonary Hypertension**

- 1) Which of the following is NOT a cause of secondary pulmonary hypertension?
- a) COPD
  - b) Sleep-disordered breathing
  - c) Pulmonary embolism
  - d) Mitral stenosis
  - e) Idiopathic
- 2) Which of the following is NOT a physical finding seen in pulmonary hypertension?
- a) Intense or palpable P2 sound
  - b) Right-sided S3 sound
  - c) Pulmonary and tricuspid insufficiency murmurs
  - d) Neck vein flattening

**Respiratory #29 – Clinical: Pulmonary Neoplasms**

- 1) A solitary pulmonary nodule, seen on chest x-ray, is round, ovoid, or lobulated and is less than how many centimeters in diameter?
- a) 2cm
  - b) 4cm
  - c) 6cm
  - d) 8cm
  - e) 10cm
- 2) Which of the following is NOT a cause of a solitary pulmonary nodule?
- a) Mycoses
  - b) Tuberculosis
  - c) Carcinoma
  - d) Hamartoma
  - e) Mesothelioma
- 3) What is the major risk factor for primary lung cancer?
- a) Asbestos exposure
  - b) Radon exposure
  - c) Cigarette smoke
  - d) Vinyl chloride
  - e) Genetic factors

- 4) Which of the following is the most common form of peripheral primary lung cancer?
- a) Small cell carcinoma
  - b) Large cell carcinoma
  - c) Adenocarcinoma
  - d) Squamous cell carcinoma
  - e) Mixed cell carcinoma
- 5) Which of the following is most representative of a patient with primary lung cancer?
- a) 55-year-old with a cough
  - b) 55-year-old with a hemoptysis
  - c) 25-year-old with a cough
  - d) 55-year-old with a hemoptysis
  - e) Newborn with a cough
- 6.1) Squamous cell carcinoma most often affects the:
- a) Distal tracheobronchial tree
  - b) Proximal tracheobronchial tree
  - c) Alveolar ducts
  - d) Alveolar sacs
  - e) Lung periphery
- 6.2) A patient presents with a peripheral solitary pulmonary nodule on x-ray. Physical examination reveals clubbing. Which of the following is most likely?
- a) Small cell carcinoma
  - b) Large cell carcinoma
  - c) Adenocarcinoma
  - d) Squamous cell carcinoma
  - e) Mixed cell carcinoma
- 6.3) A patient undergoes a chest x-ray, which reveals a unilateral hilar mass with widening of the mediastinum. Testing reveals the tumor originated from neuroendocrine cells. Which of the following is most likely?
- a) Small cell carcinoma
  - b) Large cell carcinoma
  - c) Adenocarcinoma
  - d) Squamous cell carcinoma
  - e) Mixed cell carcinoma
- 7.1) A patient presents with bronchorrhea. X-ray shows a solitary nodule lesion. The clinician thinks type II pneumocytes or Clara cells may be involved. Bronchoalveolar cell carcinoma is diagnosed. What is the treatment?
- a) Lesion resection
  - b) Corticosteroids and bronchodilators
  - c) Long-term immunosuppression
  - d) High-dose chemotherapy
  - e) Prophylactic brain irradiation
- 7.2) Small cell carcinoma ("oat cell") responds to radiotherapy better than other forms of lung tumors. What other treatment is standard?
- a) Lesion resection
  - b) Corticosteroids and bronchodilators
  - c) Long-term immunosuppression

- d) High-dose chemotherapy
  - e) Prophylactic brain irradiation
- 8.1) Which of the following would be most likely to cause paraneoplastic syndrome involving the production of parathyroid hormone-related protein (PTHrP)?
- a) Small cell carcinoma
  - b) Large cell carcinoma
  - c) Adenocarcinoma
  - d) Squamous cell carcinoma
  - e) Bronchoalveolar cell carcinoma
- 8.2) Which of the following would be most likely to cause paraneoplastic syndrome involving the production of adrenocorticotropic hormone (ACTH or corticotropin)?
- a) Small cell carcinoma
  - b) Large cell carcinoma
  - c) Adenocarcinoma
  - d) Squamous cell carcinoma
  - e) Bronchoalveolar cell carcinoma
- 9) Which of the following is NOT a cause of paraneoplastic syndrome?
- a) ADH
  - b) ACTH
  - c) Hypocalcemia
  - d) Pancoast tumor
  - e) Eaton Lambert syndrome

**Respiratory #30 – Clinical: Vascular Disease**

- 1) Which of the following is the most common originating site for pulmonary embolism (PE)?
- a) Lower leg veins (e.g saphenous)
  - b) Upper leg veins (e.g. femoral)
  - c) Great veins (e.g. IVC)
  - d) Upper arm veins (e.g. cephalic)
  - e) Hand and foot veins
- 2.1) Which of the following is not a cause of primary hypercoagulable state (thrombophilia)?
- a) Factor V Leiden
  - b) Prothrombin mutation
  - c) Protein C or S deficiency
  - d) Antiphospholipid antibodies
  - e) Low homocysteine levels due to MTHFR mutation or vitamin deficiency
- 2.2) Which of the following is not a cause of secondary hypercoagulable state?
- a) Cancer
  - b) Pregnancy
  - c) Diabetes
  - d) Liver cirrhosis
  - e) Oral contraceptives
- 3) Along with impedance plethysmography (IPG), what other test is the most commonly used to diagnose deep vein thrombosis (DVT)?

- a) Duplex ultrasonography
  - b) Venography
  - c) MRI
  - d) CT scan
  - e) Plain-film radiograph
- 4) Which of the following is seen in nearly all patients with a pulmonary embolism (PE)?
- a) Pleuritic chest pain
  - b) Dyspnea
  - c) Tachycardia and tachypnea
  - d) Friction rub
  - e) Wheezing
- 5) In critical patients with suspected PE, what should be done early to assess right ventricular hypokinesia or dysfunction?
- a) D-Dimer
  - b) Chest x-ray
  - c) ECG
  - d) Echocardiography
  - e) CT scan
  - f) Pulmonary angiography
- 6) What is the gold standard test in the diagnosis of pulmonary embolism?
- a) D-Dimer
  - b) Chest x-ray
  - c) ECG
  - d) Echocardiography
  - e) CT scan
  - f) Pulmonary angiography
- 7) Which of the following is the first-line therapy in the treatment of PE?
- a) Streptokinase and urokinase
  - b) Heparin and warfarin
  - c) tPA alone
  - d) Heparin and streptokinase
  - e) Warfarin and tPA
- 8) Which of the following is used to treat massive pulmonary embolisms?
- a) Antiplatelet agents
  - b) Anticoagulant agents
  - c) Vitamin K blockers
  - d) Thrombolytic agents
  - e) Anti-fibrinogen antibodies
- 9) Warfarin (Coumadin) prevents the activation of all of the following clotting factors in the clotting cascade EXCEPT:
- a) Factor II (prothrombin)
  - b) Factor VII (stable)
  - c) Factor IX (Christmas)
  - d) Factor X (Stuart-Prower)
  - e) Factor XII (Hageman)
- 10) What is an absolute contraindication for the use of warfarin (heparin can be used)?

- a) Osteoporosis
  - b) Pregnancy
  - c) Orthopedic surgery
  - d) Vitamin K deficiency
  - e) Artificial heart valves
- 11) Heparin therapy should be started in conjunction with warfarin therapy, as warfarin could cause clotting during the initial stages due to which of the following mechanisms?
- a) Inhibition of vitamin K dependent processes
  - b) Activation of clotting factor VII
  - c) Inhibition of regulatory factor protein C
  - d) Osteocalcin and matrix GIa protein modification
  - e) Inhibition of clotting factor VII
- 12) Which of the following is NOT true when comparing low molecular weight heparin (LMWH) to unfractionated heparin?
- a) LMWH has greater bioavailability when give by subcutaneous injection
  - b) LMWH has a longer duration of anticoagulant effect
  - c) A fixed dose of LMWH can be safely administered for most patients
  - d) Outpatient LMWH is as effective and save as hospital IV unfractionated
  - e) Unfractionated heparin is nearly as usual as LMWH in the outpatient setting
- 13) A patient with suspected pulmonary embolism develops hemothorax, pulmonary infection, and hemoptysis. Which of the following is most likely?
- a) Myocardial infarction
  - b) Pulmonary hemorrhage
  - c) Pulmonary infarction
  - d) Pulmonary hypertension
  - e) Aortic dissection
- 14) A 24-year-old female smoker presents with severe shortness of breath and hypoxemia. A chest x-ray is normal. History reveals marijuana use and months of unprotected sex. A urine pregnancy test and STD screen is negative. Lab test reveals high estrogen levels. Which of the following is most likely?
- a) Myocardial infarction
  - b) Pulmonary embolism
  - c) Pulmonary infarction
  - d) Aortic dissection
  - e) Asthma
  - f) None of the above
- 15) A 55-year-old smoker presents with shortness of breath, hypoxemia, pleuritic chest pain, and hemoptysis. Chest x-ray looks like pneumonia. Which of the following is most likely?
- a) Myocardial infarction
  - b) Pulmonary embolism
  - c) Pulmonary infarction
  - d) Aortic dissection
  - e) Fat embolism
  - f) none of the above

**Respiratory #31 – Clinical: Fat Embolism**

1) A 25-year-old pharmacy student is brought to the Emergency Room by ambulance after being struck by a car while using a crosswalk. The patient's right leg is in a Hare traction splint and the thigh is bruised and hard to the touch. The patient is in severe pain with dyspnea and confusion. Petechiae are seen around the neck and in the conjunctiva.

Which of the following is most likely?

- a) Myocardial infarction
  - b) Pulmonary embolism
  - c) Pulmonary infarction
  - d) Aortic dissection
  - e) Fat embolism
- 2) What is the treatment of choice for the above 25-year-old patient?
- a) Antiplatelet agents
  - b) Anticoagulant agents
  - c) Corticosteroids
  - d) Thrombolytic agents
  - e) Supportive care

**Respiratory #32 – Clinical: Pulmonary Vasculitides**

1) A white male presents with fever, malaise, and weight-loss. They have upper and lower airway necrosis, glomerulonephritis, and test positive for rheumatoid factor and c-ANCA. Corticosteroids and TMP-SMX are started. Which of the following is most likely?

- a) Churg-Strauss syndrome
  - b) Takayasu arteritis
  - c) Behçet disease
  - d) Wegener granulomatosis
  - e) Mixed cryoglobulinemia
  - f) Goodpasture syndrome
- 2) A patient with a history of allergies presents with allergic rhinitis, nasal mucosa crusting, and septal perforation. Extravascular granulomas and eosinophilia are found. Lab test is positive for p-ANCA. The patient shows signs of pleural effusions. Which of the following is most likely?
- a) Churg-Strauss syndrome
  - b) Takayasu arteritis
  - c) Behçet disease
  - d) Wegener granulomatosis
  - e) Mixed cryoglobulinemia
  - f) Goodpasture syndrome
- 3) Which of the following is associated with aphthous stomatitis, uveitis, cutaneous nodules, meningoencephalitis, pulmonary emboli, and hemoptysis?
- a) Churg-Strauss syndrome
  - b) Takayasu arteritis
  - c) Behçet disease
  - d) Wegener granulomatosis
  - e) Mixed cryoglobulinemia

- f) Goodpasture syndrome
- 4) Which of the following affects the aorta with major branches, including the pulmonary artery and may involve difficult to palpate peripheral pulses?
- a) Churg-Strauss syndrome
  - b) Takayasu arteritis
  - c) Behçet disease
  - d) Wegener granulomatosis
  - e) Mixed cryoglobulinemia
  - f) Goodpasture syndrome
- 5) A patient presents with recurrent episodes of purpura, arthralgias, weakness, and multiorgan involvement. Lab tests find rheumatoid factor is increased. The clinician is concerned about glomerulonephritis. Which of the following is most likely?
- a) Churg-Strauss syndrome
  - b) Takayasu arteritis
  - c) Behçet disease
  - d) Wegener granulomatosis
  - e) Mixed cryoglobulinemia
  - f) Goodpasture syndrome
- 6) What type of hypersensitivity reaction is seen in Goodpasture syndrome?
- a) Type I: Allergy
  - b) Type II: Cytotoxic
  - c) Type III: Immune complex
  - d) Type IV: Delayed
  - e) None of the above
- 7) Which of the following is the immunological finding in Goodpasture syndrome?
- a) Anti-glomerular basement membrane (anti-GBM) antibodies
  - b) Anti-neutrophil cytoplasm antibodies
  - c) Anti-dsDNA antibodies
  - d) p-ANCA
  - e) c-ANCA
- 8) A 22-year-old man presents with recurrent hemoptysis, pulmonary insufficiency, renal involvement with hematuria, and proteinuria. Lab results show increased serum creatinine and anemia. X-ray shows a diffuse alveolar filling process. Which of the following is most likely?
- a) Churg-Strauss syndrome
  - b) Takayasu arteritis
  - c) Behçet disease
  - d) Wegener granulomatosis
  - e) Mixed cryoglobulinemia
  - f) Goodpasture syndrome

**Respiratory #33 – Clinical: Pulmonary Arterial Hypertension (PAH)**

- 1) Which of the following is NOT pathological for pulmonary arterial hypertension (PAH)?
- a) Pulmonary vascular remodeling
  - b) Pulmonary vasodilation

- c) Pulmonary thrombosis
  - d) Right-sided heart failure
  - e) Increased pulmonary vascular resistance
- 2) How is pulmonary arterial hypertension diagnosed?
- a) Increased RV systolic pressure on transesophageal echocardiography
  - b) Decreased LV systolic pressure on transesophageal echocardiography
  - c) Increased RV systolic pressure on Swan-Ganz catheterization
  - d) Decreased RV systolic pressure on Swan-Ganz catheterization
  - e) Transthoracic echocardiography and ECG stress test
- 3) Which of the following is NOT a common cause of pulmonary arterial hypertension?
- a) Idiopathic
  - b) Left heart failure
  - c) Right heart failure
  - d) COPD

**Respiratory #34 – Clinical: Pulmonary Viral Infections**

- 1) A patient presents with fever, headache, malaise, and severe pleuritic pain that has lasted for several days. The doctor suspects pleurodynia (Bornholm disease, devil's grip), which is caused by one of the "common cold" viruses. Which virus is this?
- a) Adenovirus
  - b) Coxsackie virus
  - c) Respiratory syncytial virus
  - d) Rhinovirus
  - e) Parainfluenza virus
- 2) What is the most common cause of viral respiratory tract infection in the summer and fall seasons?
- a) Adenovirus
  - b) Coxsackie virus
  - c) Respiratory syncytial virus
  - d) Rhinovirus
  - e) Parainfluenza virus
- 3) Influenza A is subtyped based on:
- a) Hemagglutinin
  - b) Neuraminidase
  - c) Both hemagglutinin and neuraminidase
  - d) Either hemagglutinin or neuraminidase
  - e) None of the above
- 4) What is the main complication seen with influenza type A infections?
- a) Pharyngitis
  - b) Croup
  - c) Epiglottitis
  - d) Sinusitis
  - e) Pneumonia
- 5) Which of the following would be effective against influenza type A and type B?
- a) Amantadine
  - b) Rimantadine

- c) Oseltamivir
  - d) Zanamivir
  - e) A & B
  - f) C & D
- 6) What is the antigenic subtype of Avian Influenza A (along with H7N3 and H7N7)?
- a) H1N1
  - b) H3N2
  - c) H5N1
  - d) H2N3
  - e) H1N5
- 7) What is the reservoir for hantavirus?
- a) Deer mice
  - b) Kissing bugs and ticks
  - c) Birds
  - d) Rabbits
  - e) Mosquitoes
- 8) A camper from the southwestern U.S. presents with respiratory distress. Recent symptoms a day before coming to the Emergency Room included headache, fever, abdominal pain, and vomiting. On examination and testing, pleural effusions are found with transudates. Hemoconcentration and thrombocytopenia are found. X-ray shows bilateral pulmonary infiltrates. Which of the following is most likely the cause?
- a) Coxsackievirus
  - b) Coronavirus
  - c) Adenovirus
  - d) Hantavirus
  - e) Echovirus
- 9) What is the microbe responsible for severe acute respiratory syndrome (SARS)?
- a) *Staphylococcus pneumonia*
  - b) Coxsackievirus
  - c) Coronavirus
  - d) Adenovirus
  - e) Hantavirus
- 10) A patient from Toronto, Canada presents with a high fever, cough, shortness of breath, and a chest x-ray consistent with pneumonia. He noticed others with similar symptoms at a busy international airport during a business travel. Which of the following is most likely?
- a) Influenza
  - b) Hantavirus
  - c) Parainfluenza
  - d) Respiratory syncytial virus (RSV)
  - e) Severe acute respiratory syndrome (SARS)
- 11) Which of the following is an unlikely location to find the SARS virus?
- a) Korea
  - b) China
  - c) Singapore
  - d) Taiwan

e) Hong Kong

**Respiratory #35 – Clinical: Pulmonary Bacterial Infections**

- 1.1) Which of the following is most common in chronic sinusitis?
- a) *Staphylococcus*
  - b) *Bordetella*
  - c) *Streptococcus*
  - d) *Pneumococcus*
  - e) *Haemophilus*
- 1.2) Which of the following is most common in acute sinusitis?
- a) *Staphylococcus*
  - b) *Bordetella*
  - c) *Streptococcus*
  - d) *Pneumococcus*
  - e) *Haemophilus*
- 2) What is the leading cause of community acquired pneumonia (CAP)?
- a) *M. pneumoniae*
  - b) *C. pneumoniae*
  - c) *S. pneumoniae*
  - d) *K. pneumoniae*
  - e) *L. pneumophila*
- 3) Which of the following would NOT be seen in common community acquired pneumonia or a patient with pneumonia after a splenectomy?
- a) Lobar pneumonia on x-ray
  - b) Pleurisy and effusion on x-ray
  - c) Fever cough
  - d) Rusty sputum
  - e) Lymphangitis
- 4) Which of the following is usually involved with pneumonia in patients on dialysis, immunocompromised, or patients with diabetes mellitus?
- a) *Staphylococcus aureus*
  - b) *Bordetella pertussis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Pseudomonas*
- 5) An IV drug user presents with signs of pneumonia. Chest x-ray shows an abscess with an air-fluid level. Consolidation, empyema and pneumatocele are also found. Which of the following is the most likely cause?
- a) *Staphylococcus aureus*
  - b) *Bordetella pertussis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Pseudomonas*
- 6) Which of the following is LEAST likely to make a patient susceptible to infection with *Pseudomonas aeruginosa*?
- a) Tracheostomy

- b) ET tube and ventilator
  - c) Diabetes mellitus
  - d) Bronchiectasis
  - e) Cystic fibrosis
- 7) In general, *Pseudomonas aeruginosa* is resistant to which of the following?
- a) Aminoglycosides
  - b) Fluoroquinolones
  - c) Cephalosporins
  - d) Carbapenems
  - e) Penicillins
- 8) Patients with *Haemophilus influenzae* pneumonia usually have COPD or are:
- a) Elderly
  - b) Diabetic
  - c) Alcoholic
  - d) Smoker
  - e) Newborn
- 9) A patient presents with *Haemophilus influenzae* pneumonia. What is the initial treatment of choice until antibiotic sensitivities become available?
- a) Aminoglycoside
  - b) Fluoroquinolone
  - c) Cephalosporin
  - d) Carbapenem
  - e) Penicillin
- 10) *Moraxella catarrhalis* is NOT associated with which of the following?
- a) Otitis
  - b) Sinusitis
  - c) Community acquired pneumonia
  - d) Alcoholic pneumonia
- 11) A patient presents with dry cough, diffuse bilateral rales, pleuritis chest pain, and diarrhea. Patchy bilateral pulmonary infiltrates are found. Recent history reveals spending time in the fraternity house hot tub. Labs show increased leukocytes, increased liver enzymes, and decreased sodium and phosphorus. Since the bacteria is resistant to beta-lactam drugs and aminoglycosides, the clinician starts with a macrolide. Which of the following was diagnosed?
- a) *Pseudomonas*
  - b) *Legionella*
  - c) *Bordetella pertussis*
  - d) *Haemophilus influenzae*
  - e) *Moraxella catarrhalis*
- 12) Which of the following is NOT a common cause of anaerobic pneumonia?
- a) Anaerobic cocci
  - b) Anaerobic streptococci
  - c) *Bacteroides melaninogenicus*
  - d) *Streptococcus pneumoniae*
  - e) *Fusobacterium nucleatum*

- 13) What type of patient, along with those who have poor oral hygiene, is at increased risk for anaerobic pneumonia?
- a) Military recruits
  - b) Immunocompromized
  - c) Head injuries, specifically near the nose
  - d) Individuals working with animal pelts or wool
  - e) Aspirators of respiratory or gastric secretions
- 14) Which of the following is considered a typical pneumonia causing bacteria?
- a) *Haemophilus influenzae*
  - b) *Mycoplasma pneumoniae*
  - c) *Francisella tularensis*
  - d) *Chlamydia psittaci*
  - e) *Chlamydia pneumoniae*
- 15) A military recruit develops a cough and fever after several days in the barracks. Chest x-ray shows interstitial pneumonia and acute bronchiolitis. There is unilateral bronchopneumonia with lower lobe involvement and pleural effusions. Lab results show increased cold agglutins. Erythromycin is prescribed. What was the diagnosis?
- a) *Coxiella burnetii*
  - b) *Francisella tularensis*
  - c) *Chlamydia psittaci*
  - d) *Mycoplasma pneumoniae*
  - e) *Chlamydia pneumoniae*
- 16) Which of the following is associated with pharyngitis, pneumonia, pharyngeal erythema, wheezing, sinusitis, bronchitis, and requires a lab test for direct fluorescent antibody?
- a) *Coxiella burnetii*
  - b) *Francisella tularensis*
  - c) *Chlamydia psittaci*
  - d) *Mycoplasma pneumoniae*
  - e) *Chlamydia pneumoniae*
- 17) What is the vector of transmission for psittacosis?
- a) Birds (parrots)
  - b) Rodents
  - c) Mosquitoes
  - d) Rabbits
  - e) Arthropod (ticks)
- 18) A patient presents with flu-like symptoms, fever, and malaise. History reveals contact with cattle and domestic cats. Q Fever is diagnosed. What is the bacteria responsible?
- a) *Coxiella burnetii*
  - b) *Francisella tularensis*
  - c) *Chlamydia psittaci*
  - d) *Mycoplasma pneumoniae*
  - e) *Chlamydia pneumoniae*
- 19) Which of the following is NOT involved in the transmission of *Francisella tularensis* to humans?
- a) Ticks

- b) Rabbits
  - c) Humans
  - d) Mosquitoes
  - e) Deer flies
- 20) What is the causative agent of black plague?
- a) *Salmonella typhi*
  - b) *Salmonella enteritidis*
  - c) *Shigella dysenteriae*
  - d) *Yersinia enterocolitica*
  - e) *Yersinia pestis*
- 21) What is the mode of transmission of the black plague?
- a) Birds (parrots)
  - b) Rodents and fleas
  - c) Mosquitoes and ticks
  - d) Rabbits and ticks
  - e) Flies and cattle
- 22) An AIDS patient presents with necrotizing pneumonia with lung abscess formation. No inflammatory response or granuloma formation is seen. Lymphohematogenous spread is seen and brain abscess is feared. Lab tests show weakly acid-fast bacilli. Which of the following is most likely?
- a) Actinomyces species
  - b) *Mycobacterium tuberculosis*
  - c) Nocardia species
  - d) *Staphylococcus pneumonia*
  - e) *Klebsiella pneumoniae*
- 23) A patient presents with cough, fever, pulmonary lesions, and pleural effusions. They recently underwent several dental procedures for cavities and gingivitis at the free dental clinic in the area. Examination reveals fistulas and sinus tracts. Which of the following is most likely?
- a) Actinomyces species
  - b) *Mycobacterium tuberculosis*
  - c) Nocardia species
  - d) *Staphylococcus pneumonia*
  - e) *Klebsiella pneumoniae*
- 24) Which of the following is most commonly seen in hospital acquired pneumonia (HAP)?
- a) *Staphylococcus aureus*
  - b) *Streptococcus pneumonia*
  - c) Gram-negative bacilli
  - d) *Legionella*
  - e) Anaerobes
- 25) Which of the following is NOT a risk factor for HAP?
- a) Coma
  - b) Hypertension
  - c) Azotemia or acidosis
  - d) Prolonged treatment with antibiotics

- e) Mechanical ventilation
- 26) Which of the following is NOT a risk factor for aspiration pneumonia?
- a) Anesthesia
  - b) Alcoholism
  - c) Nasogastric tube
  - d) Prolonged treatment with antibiotics
  - e) Seizures
- 27) Which of the following is NOT known to cause a lung abscess?
- a) Anaerobic cocci
  - b) Anaerobic bacilli
  - c) Aerobic Gram-positive cocci
  - d) Aerobic Gram-negative bacilli
- 28) Which of the following would be an expected chest x-ray finding for a patient with a lung abscess?
- a) An air-fluid level in the cavity
  - b) Diffuse lobar pneumonia
  - c) Pleural effusions without cavities
  - d) "Swiss cheese" appearance
  - e) Caseous necrosis and bronchial collapse
- 29) What is the primary cause of lung abscess?
- a) Tuberculosis
  - b) Asbestosis
  - c) Septicemia
  - d) Diabetes
  - e) Aspiration
- 30) How is tuberculosis (TB) transmitted from person to person?
- a) Food
  - b) Sexual contact
  - c) Air droplet
  - d) Injection
  - e) Via a vector (arthropod)
- 31) A person who does not have signs of tuberculosis but has a positive purified protein derivative (PPD) skin test would be diagnosed with:
- a) Active tuberculosis
  - b) Latent tuberculosis
  - c) Miliary tuberculosis
  - d) Tuberculosis immunity
  - e) Non-infected
- 32) A person with tuberculosis that affects the spleen, liver, and lung with chest x-ray lesions would be diagnosed with:
- a) Active tuberculosis
  - b) Latent tuberculosis
  - c) Miliary tuberculosis
  - d) Tuberculosis lymphadenitis
  - e) Tuberculosis immunity
- 33) What is the most common site for extrapulmonary tuberculosis?

- a) Spleen
  - b) Liver
  - c) Lymph
  - d) Heart
  - e) CNS fluid
- 34) What is the first-line drug for latent tuberculosis as well as active tuberculosis?
- a) Rifampin
  - b) Rifabutin
  - c) Pyrazinamide
  - d) Isoniazid
  - e) Ethambutol
- 35) Which of the following patients would NOT be a likely candidate for directly observed therapy (DOT) in the treatment of tuberculosis?
- a) Diabetics
  - b) IV drug users
  - c) Prisoners
  - d) Homeless
  - e) AIDS patients
- 36) A patient presents with chronic cough, fever, and night sweats. X-ray reveals extrapulmonary nodules and bilateral exudative effusions. A Mantoux test is positive. There is no history of BCG vaccination. Which of the following is the likely cause?
- a) *Mycoplasma pneumoniae*
  - b) *Mycobacterium tuberculosis*
  - c) *Streptococcus pyogenes*
  - d) *Streptococcus pneumoniae*
  - e) *Chlamydia trachomatis*
- 37) Which of the following groups of people is most likely to get re-activation type pulmonary tuberculosis?
- a) Infants
  - b) Children
  - c) Adults
  - d) Immunocompromised
  - e) None of the above
- 38) A pet-shop cleaner presents with a chronic indurated nodule on the finger. Which of the following forms of mycobacteria is most likely?
- a) *Mycobacterium haemophilum*
  - b) *Mycobacterium avium intracellulare*
  - c) *Mycobacterium leprae*
  - d) *Mycobacterium kansasii*
  - e) *Mycobacterium marinum*
  - f) None of the above
- 39) Which of the following nontuberculous mycobacteria forms is an important cause of infection in AIDS patients?
- a) *Mycobacterium haemophilum*
  - b) *Mycobacterium avium intracellulare*
  - c) *Mycobacterium leprae*

- d) *Mycobacterium kansasii*
- e) *Mycobacterium marinum*
- f) None of the above

40) Which of the following should be used to treat *Mycobacterium avium intracellulare* (MAI)?

- a) Moxifloxacin or levofloxacin
- b) Sulfamethoxazole/trimethoprim (TMP-SMX)
- c) Macrolide antibiotics (e.g. Azithromycin, Clarithromycin)
- d) Aminoglycoside antibiotics (e.g. Streptomycin, Gentamicin)
- e) Penicillin G
- f) None of the above

Match the anti-tuberculosis drugs with their toxic effect:

- |                    |                                 |
|--------------------|---------------------------------|
| 41.1) Rifampin     | a) Ototoxicity, nephrotoxicity  |
| 41.2) Pyrazinamide | b) Hepatitis                    |
| 41.3) Isoniazid    | c) Optic (retrobulbar) neuritis |
| 41.4) Ethambutol   | d) Red-orange body fluids       |
| 41.5) Streptomycin | e) Hyperuricemia                |

### Respiratory #36 – Clinical: Pulmonary Mycosis

1) Coccidioidomycosis is geographically spread across what region?

- a) Southwestern United States
- b) Midwestern United States
- c) Eastern and Southeastern United States
- d) Eastern Asian countries
- e) Africa and Middle Eastern countries

2) A patient presents with flu-like symptoms after a family trip. Chest x-ray shows thin walled cavities, pneumonic infiltrate, and granulomas. Examination reveals erythema nodosum. Tissue specimen shows spherules. Which of the following is most likely?

- a) *Histoplasma capsulatum*
- b) *Coccidioides immitis*
- c) *Sporothrix schenckii*
- d) *Blastomyces dermatitidis*
- e) *Cryptococcus neoformans*

3) What is the treatment of choice for coccidioidomycosis in pregnant patients?

- a) Amphotericin B
- b) Fluconazole (Diflucan)
- c) Itraconazole (Sporanox)
- d) Ketoconazole (Nizoral)
- e) None of the above

4) An 18-year-old presents with weakness and sores in his mouth. History reveals IV drug use. When further questions about the drug use, the patient describes injecting drugs under a bridge near the St. Lawrence river where there are many Starling nests. The patient also admits to unprotected sex with several different partners. X-ray shows small calcifications throughout the body. A lung biopsy reveals small budding cells within macrophages. Which of the following is most likely?

- a) *Histoplasma capsulatum*

- b) *Coccidioides immitis*
  - c) *Sporothrix schenckii*
  - d) *Blastomyces dermatitidis*
  - e) *Cryptococcus neoformans*
- 5) What is the treatment of choice for severe cases of histoplasmosis?
- a) Amphotericin B
  - b) Fluconazole (Diflucan)
  - c) Itraconazole (Sporanox)
  - d) Ketoconazole (Nizoral)
  - e) None of the above
- 6) *Blastomyces dermatitidis* is a thermally dimorphic broad based budding yeast. Which of the following is NOT a likely location to find *Blastomyces*?
- a) Wisconsin
  - b) Arkansas
  - c) Mississippi
  - d) Nevada
  - e) Kentucky
- 7) Which of the following is NOT affected by disseminated blastomycosis?
- a) Prostate
  - b) Skin
  - c) Liver
  - d) CNS
  - e) Lung
- 8) What is the treatment of choice for non-life threatening blastomycosis?
- a) Amphotericin B
  - b) Fluconazole (Diflucan)
  - c) Itraconazole (Sporanox)
  - d) Ketoconazole (Nizoral)
  - e) None of the above
- 9) A patient presents with small, raised ulcerations extending proximally from his left index finger. The physician learns that the patient enjoys gardening as a hobby. Upon further questioning, the patient reports that he only started using gloves 3 months ago, following a painful thorn prick received while weeding his rose garden. The doctor cultures a nodule specimen and notices organisms shaped differently at different temperatures. Oral potassium iodide is considered. Which of the following is most likely?
- a) *Histoplasma capsulatum*
  - b) *Coccidioides immitis*
  - c) *Sporothrix schenckii*
  - d) *Blastomyces dermatitidis*
  - e) *Cryptococcus neoformans*
- 10) What is the most common sign or symptom seen in patients with sporotrichosis?
- a) Cough and hemoptysis
  - b) Large boils on the hands and lower arms
  - c) Subcutaneous emphysema with sharp pain
  - d) Pleuritic chest pain and fever
  - e) Cutaneous nodules along lymph vessels

- 11) How is sporotrichosis transmitted?
- Injection or ingestion
  - Ingestion or inhalation
  - Inhalation or absorption
  - Abs portion or injection
  - Injection or inhalation
- 12) What is the drug of choice for cutaneous sporotrichosis?
- Amphotericin B
  - Fluconazole (Diflucan)
  - Itraconazole (Sporanox)
  - Ketoconazole (Nizoral)
  - Oral potassium iodide
- 13) An AIDS patient develops a cough, fever, dyspnea, and pleuritic chest pain. If aspergillosis is suspected, what is the most likely form?
- Invasive pulmonary aspergillosis (IPA)
  - Obstructing bronchial aspergillosis
  - Ulcerative or pseudomembranous tracheobronchitis
  - Aspergilloma
  - Empyema
- 14) A patient with a history of tuberculosis presents with hemoptysis. A fungus ball is seen in a pre-existing lung bullae. Surgical resection is scheduled to prevent lethal hemorrhage. What is the diagnosis?
- Histoplasmosis
  - Coccidioidomycosis
  - Sporotrichosis
  - Aspergillosis
  - Cryptococcosis

**Respiratory #37 – Clinical: Acute Respiratory Distress Syndrome**

- 1) Acute respiratory distress syndrome (ARDS) is a diffuse acute lung injury with all of the following major features EXCEPT:
- Severe hypoxemia due to shunting
  - Pulmonary hypertension with or without hemoptysis
  - Normal or low pulmonary capillary wedge pressure
  - Diffuse pulmonary infiltrates
  - Severe hypoxemia due to ventilation-perfusion mismatch
- 2) Which of the following is NOT a cause of acute respiratory distress syndrome?
- Cardiac (left ventricular heart failure)
  - Sepsis (lung infection)
  - Shock or trauma (lung contusion)
  - Aspiration (gastric, near drowning)
  - Hematologic (intravascular coagulation)
- 3) Therapy for acute respiratory distress syndrome should be aimed at:
- Empirical antibiotics
  - Nitric oxide
  - Corticosteroids

- d) Surfactant therapy
- e) Airway management

**Respiratory #38 – Extra: Migraine, Effective Pharmacologic Strategies**

- 1) Migraine headaches affect women twice as much as men. How many adults are affected by migraine headaches?
- a) 1 in 3
  - b) 1 in 4
  - c) 1 in 6
  - d) 1 in 9
  - e) 1 in 12
  - f) 1 in 15
- 2) What appears to be the most important neuropeptide (vasodilatory and inflammatory) in migraine headaches?
- a) Acetylcholine substance P
  - b) Epinephrine neuropeptide Y (NPY)
  - c) Dopamine cholecystokinin (CCK)
  - d) GABA somatostatin (GHIH)
  - e) Calcitonin gene-related peptide (CGRP)
- 3) What cranial nerve is involved in the pain or cutaneous allodynia response seen in migraines?
- a) CN II: Optic
  - b) CN V: Trigeminal
  - c) CN VII: Facial
  - d) CN VIII: Vestibulocochlear
  - e) CN X: Vagus
  - f) CN XI: Accessory
- 4) Which of the following drugs used in the treatment of migraines is the most effective?
- a) Beta blocker (e.g. propranolol, Inderal)
  - b) Calcium channel blocker (e.g. verapamil, Covera)
  - c) Anti-depressant (e.g. amitriptyline, Elavil)
  - d) Anti-epileptic (e.g. valproic acid, Depakote)
  - e) Triptan (e.g. sumatriptan, Imitrex)
  - f) Angiotensin II receptor blocker (e.g. candesartan, Atacand)
  - g) Analgesics and NSAIDs (e.g. aspirin)
- 5) Preventative therapy is recommended for patients who suffer how many migraine headaches per month?
- a) 25
  - b) 11
  - c) 14
  - d) 7
  - e) 5
- 6) Which of the following is NOT an option for abortive therapy in migraines?
- a) Triptans
  - b) Dihydroergotamine
  - c) Acetaminophen, codeine

- d) Ibuprofen, naproxen sodium
  - e) Acetaminophen, aspirin, caffeine
- 7) Which of the following treatment strategies for abortive therapy in migraines is the most effective?
- a) Stratified care
  - b) Stepped care within attacks
  - c) Stepped care between attacks
  - d) Any of the above
  - e) None of the above
- 8) Which of the following abortive therapies for migraine headaches would be the most effective?
- a) Almotriptan at the onset of symptoms
  - b) Almotriptan when symptoms are severe
  - c) Rizatriptan when symptoms are severe
  - d) Aspirin plus metoclopramide
  - e) Ergotamine plus caffeine

AnswerKey	11) E	3.2) D	5.6) D	13) D
<b>Resp #1</b>	12.1) E	4) B	6.1) C	14) B
1) A	12.2) C	5.1) D	6.2) B	15) B
2.1) E	12.3) B	5.2) D	7) C	16) E
2.2) D	12.4) C	6.1) A	8) E	17) B
3) D	12.5) B	6.2) D	9) C	18.1) C
4.1) C	12.6) E	6.3) C	10) B	18.2) B
4.2) C	12.7) C	6.4) C	11) A	19) A
5) D	12.8) D	6.5) C	12) A	20) B
6) A	12.9) C	7) D	13) D	21) E
7) C	12.10) B	8.1) C	14) B	22) E
8) A		8.2) A	15) D	23.1) C
9) E	<b>Resp #3</b>	9) D	16) D	23.2) D
10) E	1) B	10) D	17) E	24) C
11.1) B	2) D	11) B	18) B	25) A
11.2) A	3) D	12.1) C	19) E	26.1) A
12) D	4) C	12.2) B	20.1) C	26.2) E
13) C	5) A	13) A	20.2) B	26.3) D
14) E	6) E	14.1) E	20.3) D	26.4) B
15) B	7.1) C	14.2) C	20.4) A	
16.1) E	7.2) B	15.1) B	20.5) D	<b>Resp #7</b>
16.2) D	7.3) A	15.2) D	21.1) C	1) B
16.3) A	7.4) D	15.3) A	21.2) B	2.1) D
16.4) E	8) E	15.4) B	22) A	2.2) A
16.5) C	9) C	15.5) C	23) C	2.3) A
16.6) D	10.1) B	15.6) C	24.1) B	2.4) C
16.7) A	10.2) A	15.7) D	24.2) B	2.5) A
16.8) B	11.1) D	15.8) D	24.3) D	2.6) E
	11.2) C	15.9) B	24.4) D	3.1) B
<b>Resp #2</b>	11.3) D	15.10) C	24.5) B	3.2) D
1.1) D	12.1) E	15.11) A	24.6) E	3.3) C
1.2) B	12.2) E	15.12) A		3.4) E
1.3) C	12.3) D	15.13) E	<b>Resp #6</b>	4.1) C
2.1) E	13.1) D		1) C	4.2) E
2.2) C	13.2) C	<b>Resp #5</b>	2.1) D	4.3) A
2.3) B	13.3) E	1) C	2.2) D	4.4) C
3) E	13.4) B	2) D	3) A	4.5) B
4) B	13.5) A	3) E	4) B	4.6) D
5.1) D		4.1) B	5) B	5.1) A
5.2) B	<b>Resp #4</b>	4.2) D	6) E	5.2) D
6) B	1.1) B	4.3) D	7) A	5.3) E
7.1) C	1.2) C	5.1) C	8) C	6.1) C
7.2) B	1.3) D	5.2) B	9) C	6.2) B
8) C	2.1) C	5.3) B	10) B	6.3) C
9) A	2.2) E	5.4) A	11) D	6.4) E
10) D	3.1) A	5.5) C	12) A	7.1) E

7.2) A  
7.3) D  
7.4) A

**Resp #8**

1.1) D  
1.2) A  
1.3) E  
1.4) E  
1.5) C  
2) D  
3.1) A  
3.2) D  
3.3) A  
3.4) B  
3.5) C  
3.6) C  
3.7) A  
4.1) D  
4.2) B  
4.3) C  
4.4) C  
4.5) A

**Resp #9**

1) E  
2) C  
3.1) F  
3.2) B  
3.3) E  
3.4) D  
3.5) A  
3.6) C  
3.7) C  
4) C  
5) E  
6.1) D  
6.2) B  
6.3) E  
6.4) C  
6.5) C  
6.6) A  
6.7) A  
6.8) E  
6.9) E  
6.10) D

7.1) B  
7.2) D  
7.3) D  
7.4) D  
7.5) C  
7.6) E  
7.7) B  
7.8) A  
8) D  
9) C

10.1) E  
10.2) C  
10.3) B  
10.4) B  
11) C  
12.1) D  
12.2) A  
13.1) D  
13.2) C  
14.1) A  
14.2) D  
14.3) B  
14.4) C  
15) C  
16) E  
17) B  
18) A  
19) E  
20) C

**Resp #10**

1) C  
2) B  
3) E  
4) E  
5) E  
6) C  
7) B  
8.1) D  
8.2) A  
9.1) E  
9.2) C  
10.1) B  
10.2) D  
10.3) C  
10.4) A

11) C  
12.1) E  
12.2) B  
12.3) D  
12.4) C  
12.5) E  
12.6) A  
12.7) C  
12.8) A  
12.9) D  
13) E  
14) C  
15) B  
16) C  
17) D  
18) C  
19) A  
20) C  
21) D  
22.1) C  
22.2) E  
23) C  
24) D  
25) C  
26) A  
27) E  
28) C  
29) D  
30) B  
31) B  
32) E  
33.1) A  
33.2) E

**Resp #11**

1.1) C  
1.2) B  
1.3) C  
1.4) E  
2.1) C  
2.2) B  
2.3) E  
2.4) D  
2.5) A  
3.1) B  
3.2) B

4.1) A  
4.2) C  
4.3) B  
5) B  
6) A  
7) E  
8) D

**Resp #12**

1.1) E  
1.2) D  
1.3) A  
1.4) B  
2.1) C  
2.2) D  
2.3) C  
2.4) E  
2.5) B  
2.6) E  
2.7) C  
2.8) F  
2.9) B

**Resp #13**

1) D  
2) D  
3) E  
4) E  
5) B  
6) B  
7) C  
8) A  
9) D  
10) D  
11) B  
12) E  
13) A  
14) D  
15) A  
16) A  
17) D  
18) C

**Resp #14**

1) C  
2) C

3) B  
4) D  
5) A  
6) C  
7) E  
8) A  
9) D  
10) B

11) A  
12) C  
13) C  
14) E  
15) D  
16) D  
17) B  
18) E  
19) B  
20) A  
21) D  
22) C  
23) C  
24) C  
25) C

26) B  
27) D  
28) B  
29) A  
30) E  
31) B  
32) D  
33) C  
34) D  
35) F  
36) E  
37) C  
38) C

**Resp #15**

1) D  
2) C  
3) A  
4) C  
5) C  
6) E  
7) E  
8) B

- 9) D  
10) A  
11) B  
12) A  
13) C  
14) A  
15) A  
16) E  
17) C  
18) B  
19) E  
20) D  
21) B  
22) D  
23) E  
24) C  
25) B  
26) A  
27) C  
28) A  
29) C  
30) D  
31) D  
32) A  
33) C  
34) E  
35) E  
36) A
- Resp #16**  
1) C  
2) C  
3) E  
4) D  
5) C  
6) D  
7) B  
8) A  
9) A  
10) C  
11) D  
12) B  
13) F  
14) C  
15) B  
16) F
- 17) A  
18) F  
19) D  
20) C  
21) B
- Resp #17**  
1) C  
2) E  
3) C  
4) B  
5) E  
6) B  
7) E  
8) E  
9) A  
10) A  
11) D  
12) E  
13) C  
14) B  
15) D  
16) B  
17) D  
18) E  
19) A  
20) G  
21) D  
22) H
- Resp #18**  
1) E  
2) D  
3) C  
4) B  
5) A  
6) C  
7.1) A  
7.2) B  
7.3) A  
7.4) C  
8) E  
9) C  
10.1) C  
10.2) B  
11) C
- 12) D  
13) E  
14) E  
15) A  
16) E  
17) C  
18) C  
19) B  
20.1) D  
20.2) C  
21) E  
22) A  
23) E  
24) D  
25) A  
26) C  
27) A  
28.1) C  
28.2) D  
29) D  
30.1) A  
30.2) B  
31) C  
32) E  
33) E  
34) C  
35) D  
36) D  
37) B  
38) C  
39) A  
40) B  
41) E  
42) A  
43) B  
44) D  
45) D  
46) D  
47) C  
48) E  
49) E  
50) A  
51) E  
52) C  
53) C  
54) B
- 55) B  
56) C  
57) B  
58) C  
59) C  
60) A  
61) B  
62) A  
63) A
- Resp #19**  
1) D  
2) C  
3) B  
4.1) D  
4.2) C  
4.3) D  
5) B  
6) D  
7) E  
8) A  
9) C  
10) B
- Resp #20**  
1.1) A  
1.2) D  
1.3) B  
2) E  
3) A  
4) C  
5.1) B  
5.2) E  
5.3) A  
6) C  
7) D
- Resp #21**  
1) C  
2) E  
3) B  
4) C  
5) E
- Resp #22**  
1) A
- 2) A  
3) A  
4) B  
5) E
- Resp #23**  
1) C  
2) E  
3) C  
4) D  
5) C  
6) B
- Resp #24**  
1) E  
2) E  
3) B  
4) D  
5) A
- Resp #25**  
1) B  
2) A  
3) C
- Resp #26**  
1.1) C  
1.2) B  
2) A
- Resp #27**  
1) E  
2) B  
3) E  
4) A  
5) D  
6) B  
7) A  
8) D  
9) A  
10) C  
11) D  
12) E  
13) B  
14) D

**Resp #28**

- 1) E
- 2) D

**Resp #29**

- 1) B
- 2) E
- 3) C
- 4) C
- 5) A
- 6.1) B
- 6.2) C
- 6.3) A
- 7.1) A
- 7.2) E
- 8.1) D
- 8.2) A
- 9) C

**Resp #30**

- 1) B
- 2.1) E
- 2.2) D
- 3) A
- 4) C
- 5) D
- 6) F
- 7) B
- 8) D
- 9) E
- 10) B
- 11) C
- 12) E
- 13) C
- 14) B
- 15) C

**Resp #31**

- 1) E
- 2) E

**Resp #32**

- 1) D
- 2) A
- 3) C
- 4) B

- 5) E
- 6) B
- 7) A
- 8) F

**Resp #33**

- 1) B
- 2) A
- 3) C

**Resp #34**

- 1) B
- 2) B
- 3) C
- 4) E
- 5) F
- 6) C
- 7) A
- 8) D
- 9) C
- 10) E
- 11) A

**Resp #35**

- 1.1) C
- 1.2) D
- 2) C
- 3) E
- 4) A
- 5) A
- 6) C
- 7) E
- 8) C
- 9) B
- 10) C
- 11) B
- 12) D
- 13) E
- 14) A
- 15) D
- 16) E
- 17) A
- 18) A
- 19) C
- 20) E
- 21) B

- 22) C
- 23) A
- 24) C
- 25) B
- 26) D
- 27) A
- 28) A
- 29) E
- 30) C
- 31) B
- 32) C
- 33) C
- 34) D
- 35) A
- 36) B
- 37) C
- 38) E
- 39) B
- 40) C
- 41.1) D
- 41.2) E
- 41.3) B
- 41.4) C
- 41.5) A

**Resp #36**

- 1) A
- 2) B
- 3) A
- 4) A
- 5) A
- 6) D
- 7) C
- 8) C
- 9) C
- 10) E
- 11) E
- 12) C
- 13) A
- 14) D

**Resp #37**

- 1) B
- 2) A
- 3) E

**Resp #38**

- 1) D
- 2) E
- 3) B
- 4) E
- 5) E
- 6) C
- 7) A
- 8) A