

RESPIRATORY

Function of respiratory system

1. Which of the following constitute part of the respiratory portion of the respiratory airways?
 - a. Pharynx and larynx
 - b. Larynx and trachea
 - c. Bronchi and bronchioles
 - d. Terminal bronchioles
 - e. Respiratory bronchioles
2. Which of the following is not a function of the respiratory system?
 - a. Share in phonation
 - b. Maintenance of normal acid-base balance
 - c. Enhancement of venous return and lymph flow
 - d. Transport of O_2 and CO_2 to and from the tissues
 - e. Removal of small particles more than $2\ \mu m$
3. Removal of which of the following substances can be achieved by the respiratory system?
 - a. Surfactant
 - b. Angiotensin II
 - c. Histamine
 - d. Serotonin
 - e. Tissue plasminogen activator
4. Which one of the following functions is not performed by the lungs?
 - a. conversion of angiotensin I into angiotensin II.
 - b. oxygen and carbon dioxide exchange.
 - c. synthesis of surfactant.
 - d. defense against inhaled foreign matter.
 - e. maintenance of acid-base balance by altering the amount of H^+ excreted.
5. The conducting portion of the respiratory system is important for:
 - a. synthesis of surfactant
 - b. air conditioning
 - c. vascular reservoir
 - d. increasing venous return
 - e. maintenance of acid-base balance
6. Which of the following are removed from blood during passage in the lung?
 - a. Clotting factors
 - b. Norepinephrine
 - c. Surfactant
 - d. Tissue plasminogen activator
 - e. Angiotensin-converting enzyme

7. Contraction of the extrinsic intercostal muscles would cause:
 - a. a decrease in the volume of air in the lungs.
 - b. an increase in airway resistance.
 - c. downward movement of the ribs.
 - d. a decrease in intra-abdominal pressure.
 - e. a decrease in intrapleural pressure (i.e., becomes more negative).
8. Which of the following occurs during inspiration?
 - a. Intrapleural pressure increases
 - b. No energy is expended
 - c. Intrapleural pressure becomes equal to the intra-alveolar pressure
 - d. Airflow into the lungs begins when intrapulmonary pressure rises above atmospheric.
 - e. The trans-pulmonary pressure gradient across the lungs increases.
9. Which of the following is true about intra-alveolar pressure?
 - a. it is negative with respect to the atmosphere during expiration
 - b. it is less than the intrapleural pressure throughout quiet breathing.
 - c. It is 756 (i.e., - 4) mm Hg at the end of quiet expiration.
 - d. It is the primary factor determining air flow rate during quiet breathing.
 - e. It is higher than atmospheric pressure at the end of inspiration.
10. Which of the following best describes the intrapleural pressure?
 - a. It is negative because chest wall and lungs recoil in opposite directions to each other
 - b. It is normally in direct communication with the intra-alveolar pressure
 - c. It is the difference between the intra-alveolar pressure and the atmospheric pressure
 - d. It becomes positive at the end of normal quiet expiration
 - e. Its negativity tends to collapse lung and small air ways
11. The intra-pleural pressure may reach -30 mmHg in which of the following situations?
 - a. At the end of quiet inspiration.
 - b. At the end of quiet expiration.
 - c. During deep inspiration
 - d. During deep expiration
 - e. With pneumothorax
12. Which of the following is the intrapleural pressure during forced expiration?
 - a. -30 mmHg
 - b. -6 mmHg
 - c. -4 mmHg
 - d. 0 mmHg
 - e. +30 mmHg
13. Which of the following occurs during a forced expiration?
 - a. internal intercostal muscles relax
 - b. sternocleidomastoid muscles contract
 - c. Intra-abdominal pressure increases
 - d. Intrapleural pressure decreases
 - e. Intra-alveolar pressure decreases

14. During normal quiet inspiration which of the following events occurs?
- Contraction of abdominal muscle
 - Intrapulmonary pressure becomes negative
 - Intrapleural pressure become positive
 - Contraction of the internal intercostal muscle
 - Decrease of the transmural pressure gradient across the lungs
15. Air moves out of the lungs when the pressure inside the lung alveoli is:
- less than the intra-pleural pressure
 - greater than the atmospheric pressure
 - equal to the atmospheric pressure
 - equal to the intra-pleural pressure
 - less than the atmospheric pressure
16. During quiet respiration, which of the following events occur?
- Internal intercostal muscles contract in the expiratory phase
 - Intra-alveolar pressure is always sub atmospheric
 - Intra- pleural pressure is always sub atmospheric
 - Volume of air left in the lungs at the end of expiration constitutes the residual volume
 - Volume of air left in the lungs at the end of inspiration constitutes the vital capacity
17. During inspiration there is an increase in:
- Intra- pulmonary pressure
 - Intra- pleural pressure
 - Intra thoracic pressure
 - Intra-abdominal pressure
 - Intra- esophageal pressure
18. The process of forced expiration involves:
- contraction of diaphragm and internal intercostal muscles
 - contraction of diaphragm and abdominal muscles
 - contraction of internal intercostal and abdominal muscles
 - contraction of external intercostal muscles and abdominal muscles
 - contraction of external intercostal muscles and diaphragm
19. A 22-year-old man was exposed to stab wound during fighting. Which of the following is expected to occur?
- The thoracic wall is compressed
 - The lungs get inflated
 - The lungs get collapsed
 - Intra thoracic pressure becomes more negative
 - Intrapleural pressure becomes higher than Intra- alveolar pressure

Airway resistance and disorders

- 20. Diameter of small airways is decreased (i.e., bronchoconstriction) by**
- sympathetic stimulation
 - parasympathetic inhibition
 - increased alveolar CO₂
 - decreased alveolar O₂
 - histamine release
- 21. Airway resistance is:**
- increased by parasympathetic stimulation.
 - decreased by local histamine release.
 - increased after administration of a β -adrenergic agonist.
 - Increased by increased negativity of intrapleural pressure
 - normally responsible for about 65% of work of breathing.
- 22. Which of the following correctly represents airway resistance?**
- Is increased in bronchial asthma
 - Is decreased in emphysema
 - Does not affect the work of breathing
 - Mainly comes from the small peripheral bronchioles
 - Is decreased by parasympathetic stimulation
- 23. Airflow through pulmonary bronchioles is correctly described by which of the following?**
- is inversely proportional to pressure gradient between alveoli and atmosphere.
 - is directly proportional to airway resistance.
 - increases by decreased CO₂ in alveoli.
 - increases in situations of parasympathetic overactivity.
 - increases by lowering intrapleural pressure during inspiration.
- 24. Which of the following factors increases the air flow?**
- Decreased absolute pressure values in airways
 - Increased viscosity of the air
 - Increased Length of the airways
 - Increased airway radius
 - Decreased air pressure gradient
- 25. Which of the following diseases occurs due to lung tissue damage by excessive release of proteases?**
- Emphysema
 - Chronic bronchitis
 - Bronchial asthma
 - Pulmonary fibrosis
 - Hyaline membrane disease
- 26. Airway resistance increases in which of the following conditions:**
- smoking through pipe than through mouth.
 - breathing through mouth than through nose.
 - tracheostomy.
 - terminal bronchioles than in medium sized bronchi.
 - pulmonary fibrosis than emphysema

27. Which of the following correctly explains bronchial asthma?

- a. is characterized by attacks of severe spasm of airway muscles
- b. is associated with more difficulty during inspiration than expiration.
- c. will benefit from inhalation of surfactant.
- d. is associated with irreversible collapse of small airways.
- e. Has an increase in forced vital capacity (FVC).

Lung elasticity, surfactant & work of breathing

28. Increased alveolar surface tension leads directly to an increase in:

- a. airway resistance.
- b. alveolar collapse.
- c. lung compliance.
- d. alveolar surface area.
- e. stability of alveolar size.

29. Lung compliance is increased in which of the following conditions?

- a. Emphysema
- b. Pulmonary congestion
- c. Lung fibrosis
- d. Hyaline membrane disease
- e. Pneumonectomy

30. Damage to type II alveolar epithelium cells would result in:

- a. increased surfactant
- b. decreased alveolar surface tension
- c. decreased elastic work of breathing
- d. increased rate of gas exchange
- e. pulmonary edema

31. Which of the following correctly describes pulmonary surfactant?

- a. increases airway resistance.
- b. is formed by type I alveolar cells.
- c. is distributed between the liquid layer and alveolar epithelium.
- d. is usually at high concentration in the lungs of the premature infant.
- e. decreases surface tension in small alveoli more than in larger alveoli.

32. An infant born prematurely has neonatal respiratory distress syndrome. Which of the following would be expected in this infant?

- a. Normal arterial oxygen
- b. Collapse of the alveoli
- c. Increased lung compliance
- d. Normal respiratory rate
- e. Decreased work of breathing

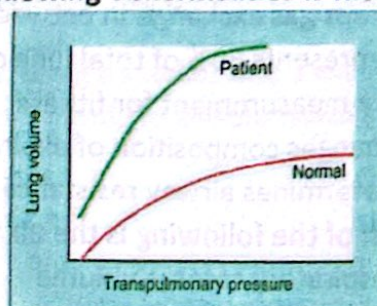
33. The work of breathing is:

- a. decreased in response to histamine.
- b. increased when there is surfactant deficiency.
- c. decreased in emphysema
- d. performed during quiet inspiration and expiration
- e. normally about 30% of the total energy expenditure

34. Resistive work of breathing increases by

- a. increase of alveolar surface tension
- b. increase of elastic tissue of the lung
- c. increase of airway diameter (i.e., bronchodilation)
- d. B₂-adrenergic antagonists
- e. parasympathetic inhibition

35. The volume-pressure curves shown here were obtained from a normal subject and a patient suffering from a pulmonary disease. Which of the following abnormalities is most likely present in this patient?



- a. Emphysema
- b. Pulmonary fibrosis
- c. Pulmonary congestion
- d. Respiratory distress syndrome
- e. Patient had pneumonectomy

36. Work of breathing is lower in which of the following conditions?

- a. Emphysema
- b. Pulmonary fibrosis
- c. Strenuous exercises
- d. Normal quiet breathing
- e. Respiratory distress syndrome

37. Elastic work of breathing increases by

- a. Increase of alveolar surface tension
- b. Increases of lung tissue resistance
- c. decrease of airway diameter (i.e., bronchoconstriction)
- d. B₂-adrenergic antagonists
- e. Parasympathetic stimulation

Lung volumes and capacities

38. Vital capacity is increased by which of the following?

- a. Standing position
- b. Sedentary life
- c. Old age
- d. Obesity
- e. Pregnancy

39. Vital capacity increases in:
- myopathy
 - ascites
 - pleurisy
 - athletes
 - pulmonary fibrosis
40. Which of the following explains the residual volume for the lungs?
- is markedly decreased in restrictive lung disease
 - normally averages 2200 ml
 - can be measured using a spirometer.
 - increases in chronic obstructive pulmonary disease.
 - is the volume of air that remains in the lungs after expiring the resting tidal volume.
41. Which of the following is a function of residual volume?
- Keeps gas exchange in between breaths
 - Represents 30% of total lung capacity
 - Is a measurement for fitness
 - Changes composition of expired air
 - Determines airway resistance
42. Which of the following is the air that exists in the lung at the end of forced expiration?
- Inspiratory reserve volume
 - Expiratory reserve volume
 - Functional residual capacity
 - Total lung capacity
 - Residual volume
43. Which of the following best describes average lung volumes and capacities of a person at rest?
- $TLC > VC > TV > FRC$
 - $TLC > FRC > VC > TV$
 - $TLC > TV > VC > FRC$
 - $TLC > VC > FRC > TV$
 - $TLC > FRC > TV > VC$
44. Anatomical dead space increases in:
- emphysema
 - supine posture
 - rapid shallow breathing
 - decreased respiratory rate
 - bronchoconstriction
45. Which of the following is true about the physiologic dead space?
- normally larger than anatomic dead space.
 - decreases by presence of non-perfused alveoli
 - increases by increasing breath rate.
 - increases by deep slow breathing
 - decreases by alveolar dead space.

46. Alveolar ventilation rate is:
- The tidal volume x respiratory rate.
 - increased in breathing rapidly
 - decreased in slow, deep breathing
 - the volume of air breathed in or out the lungs in one minute.
 - the volume of atmospheric air that reaches alveoli/min.
47. A 65 -year- old man was diagnosed as left-sided heart failure. On examination his respiratory rate was found to be 30 breaths per minute and air inhaled during each breath was 200 ml. Which of the following is the alveolar ventilation of this patient if anatomic dead space equals 150 ml?
- 500 ml/min.
 - 1000 ml/min.
 - 1500 ml/min.
 - 4500 ml/min.
 - 6000 ml/min.
48. A man with an anatomical dead space of 150 ml swims, using a snorkel with a volume of 30 ml. If he breathes 15 breaths/min and his tidal volume = 700 ml, his alveolar ventilation will be:
- 5250 ml
 - 6600 ml
 - 7800 ml
 - 8800 ml
 - 8850 ml
49. In emphysema (Obstructive lung diseases), which of the following is within normal range?
- Residual volume
 - Forced vital capacity
 - Functional residual capacity
 - Total lung capacity
 - FEV₁ / FVC %
50. In pulmonary fibrosis (Restrictive lung diseases), which of the following is within normal range:
- FEV₁
 - FEV₁ / FVC %
 - Total lung capacity
 - Inspiratory capacity
 - Forced vital capacity

A 10-year-old boy presents with dyspnea. Clinical examination reveals wheezing in the chest. Pulmonary function test is done, and the findings are as follows:

$$FEV_1 = 2 \text{ L} \quad FVC = 3 \text{ L}$$

51. All the following are true about this patient, **EXCEPT**:

- a. His dyspnea is at least partly due to bronchoconstriction.
- b. The degree of dyspnea is more during expiration than inspiration.
- c. Residual volume is higher than normal.
- d. He might be improved by giving him β -adrenergic agonist.
- e. He might have pulmonary fibrosis

Ventilation/perfusion ratio

52. Pulmonary ventilation and perfusion are correctly represented by which of the following?

- a. V/Q ratio is about 0.6 at the apex, in the upright position
- b. V/Q ratio is less at the base than that at apex, in the recumbent position
- c. V/Q ratio is more at the base than that at apex, in the erect position
- d. ventilation is more at the base than that at apex in the erect position
- e. perfusion is more at the apex than that at base in the erect position

53. A healthy 10-year-old boy breathes quietly under resting conditions. His tidal volume is 400 ml, and his ventilation frequency is 12/min. Which of the following best describes the ventilation of the lower lung zones in this boy compared to apex?

- a. It is equal to 3000 ml/min
- b. It is the same as in the apex.
- c. It is higher than apex due to more negative intrapleural pressure.
- d. It is high due to more alveolar compliance.
- e. It shows lower PCO_2 than at the apex

54. In erect position, the base of lung compared to apex had:

- a. wasted ventilation
- b. lower ventilation
- c. lower perfusion
- d. lower compliance
- e. lower V/Q ratio.

55. In a healthy lung. Which of the following is characteristic for ventilation/perfusion ratio?

- a. Ventilation is equal to perfusion at the apex.
- b. Ventilation is more than perfusion at the base
- c. Ventilation increases from apex to base
- d. Perfusion is more than ventilation at apex
- e. Perfusion is equal to ventilation at base

56. In the erect position, which of the following decreases at lung base?

- a. Pulmonary compliance.
- b. Alveolar size.
- c. Pulmonary ventilation.
- d. Intrapleural pressure.
- e. Pulmonary perfusion.

57. In a lung area with low ventilation/perfusion ratio ($\downarrow V/P$), which of the following occurs:

- a. PO_2 increases
- b. PCO_2 decreases
- c. Airway diameter increases
- d. Vascular resistance decreases
- e. Airway resistance increases

58. A rise in the ventilation/perfusion ratio ($\uparrow V/Q$) would cause:

- a. lower systemic arterial oxygen content.
- b. higher systemic arterial carbon dioxide content.
- c. wasted perfusion.
- d. increase in the physiological dead space.
- e. increase in the physiological shunt

Gas exchange and diffusion capacity

59. At basal activity, the partial pressure of carbon dioxide (PCO_2) in the venous blood equals:

- a. 46 mm Hg
- b. 40 mm Hg
- c. 60 mm Hg
- d. 75 mm Hg
- e. 100 mm Hg

60. Compared to CO_2 diffusion in the lung, the diffusion of O_2 is characterized by which of the following:

- a. Has higher molecular weight
- b. Has higher diffusion capacity
- c. Has more pressure gradient
- d. Has more solubility in alveolar-capillary membrane
- e. Reaches to equilibrium in diffusion across alveolo-capillary membrane rapid before CO_2

61. Which of the following factors decreases the diffusion of gases in case of newborn respiratory distress syndrome?

- a. decreased pressure gradient
- b. Increased thickness of alveolar membrane
- c. increased temperature of diffused gas
- d. increased surface area for exchange
- e. decreased alveolar surface tension

62. Which of the following factors affect the diffusing of gases in case of ascent to high altitude?

- a. Pressure gradient
- b. Thickness of alveolar membrane
- c. Decreased surface area for exchange
- d. Diffusion coefficient of the gas
- e. Molecular weight of the gas

63. The volume of gas transfer across the alveolar-capillary membrane per unit time is inversely proportional to the:
- a. partial pressure gradient of the gas
 - b. surface area of the membrane.
 - c. solubility of the gas.
 - d. diffusion coefficient of the gas
 - e. molecular weight of the gas

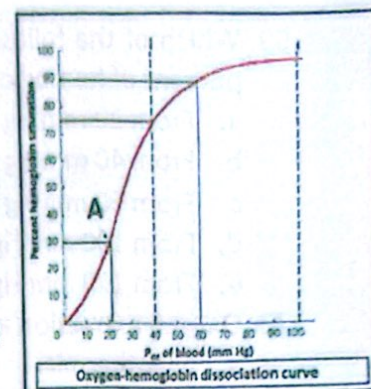
O₂ transport & O₂-Hb dissociation curve

64. The total amount of O₂ carried by blood is the:
- a. physically dissolved O₂
 - b. blood PO₂
 - c. O₂ content
 - d. O₂ carrying capacity of blood
 - e. % Hb saturation
65. Which of the following is the primary factor affecting hemoglobin saturation with oxygen?
- a. Amount of Hb in 100 ml blood
 - b. Arterial PO₂
 - c. Arterial PCO₂
 - d. Blood pH
 - e. 2,3, DPG
66. Blood O₂ transport is correctly described by which of the following:
- a. physically dissolved O₂ is of no importance
 - b. physically dissolved O₂ is not affected by carbon monoxide poisoning
 - c. hemoglobin is 100% saturated by O₂ in arterial blood
 - d. the blood is unloaded completely from O₂ at venous blood
 - e. O₂ carrying capacity of blood is equal to its O₂ content.
67. Which of the following is a definition of oxygen carrying capacity of the blood?
- a. Amount of O₂ dissolved in the plasma
 - b. Maximum amount of O₂ carried by hemoglobin
 - c. Amount of O₂ carried by blood
 - d. Percent of saturation of Hb with oxygen
 - e. Amount of oxygen bound to Hb
68. O₂-hemoglobin (Hb) dissociation curve is represented by which of the following:
- a. describes the relation between physical dissolved O₂ and % Hb Saturation.
 - b. is 75% saturated with O₂ at PO₂ of 60 mm Hg.
 - c. its saturation reaches more than 100% with excess O₂ in atmosphere.
 - d. is shifted to left in newly born, which facilitates release of O₂ from fetal Hb to fetal tissue.
 - e. describes the higher affinity of Hb to O₂ with higher P₅₀.

69. Which of the following changes in PO_2 would have the greatest effect on the changes in percent of hemoglobin saturation with O_2 :
- From 20 mm Hg to 40 mm Hg.
 - From 40 mm Hg to 60 mm Hg.
 - From 60 mm Hg to 100 mm Hg.
 - From 100 mm Hg to 120 mm Hg.
 - From 120 mm Hg to 150 mm Hg.
70. Oxygen extraction at tissue capillaries is increased in:
- hypothermia.
 - hypocapnea.
 - stored blood ($\downarrow$ 2,3 DPG).
 - acidosis ($\uparrow$ H^+ , $\downarrow$ pH).
 - carbon monoxide poisoning.
71. Which of the following factors cause shift to the right of O_2 -hemoglobin dissociation curve?
- Decreased PCO_2
 - Decreased 2,3 DPG
 - carbon monoxide poisoning
 - Decreased temperature
 - Decreased pH
72. A shift of the oxygen-hemoglobin dissociation curve of blood to the right is explained by which of the following?
- Occurs in the pulmonary capillaries.
 - Occurs if blood temperature decreases.
 - impairs oxygen delivery to the tissues.
 - Favors oxygen uptake from the lungs by alveolar-capillary blood.
 - Increases the P_{50} .
73. A shift of the oxygen-hemoglobin dissociation curve of blood to the left is not described by which of the following?
- Decreases the O_2 content of arterial blood at a given PO_2 .
 - Impairs O_2 delivery to the tissues at the normal tissue PO_2 .
 - Occurs in blood perfusing cold extremities.
 - Occurs in blood stored for several weeks.
 - Is characteristic of fetal blood when compared with adult blood.
74. Which of the following factors causes shift to the left of O_2 -hemoglobin dissociation curve?
- Increased PCO_2
 - Increased 2,3 DPG
 - carbon monoxide poisoning
 - Increased temperature
 - Decreased pH

75. The arrow marked A in the following figure of adult O_2 -hemoglobin dissociation curve indicates which of the following:

- slow release of O_2 to tissues
- plateau portion of the curve
- average resting PO_2 of venous blood
- normal PO_2 of arterial blood
- PO_2 of venous blood in exercise



76. What causes the O_2 -hemoglobin dissociation curve to shift towards the right side?

- Increase pH
- Decrease 2-3 DPG
- Strenuous exercise.
- Fetal-Hb
- cyanide poisoning

77. Bohr's effect describes which of the following?

- The effect of O_2 on Hb ability to bind with CO_2 and H^+
- The indirect effect of PCO_2 on the O_2 -Hb dissociation curve
- The effect of 2,3 DPG on the affinity between O_2 and Hb
- The relationship between O_2 content and % Hb saturation
- The effect of blood temperature on O_2 -Hb dissociation curve

CO_2 transport and CO_2 -dissociation curve

78. A Greater quantity of carbon dioxide is carried in the blood in

- combination with the hemoglobin molecule.
- combination with plasma proteins.
- physical solution in plasma.
- red blood cells than in plasma.
- HCO_3^- ions than in other forms.

79. CO_2 reactions at the lungs involves:

- HCO_3^- diffusion from the RBCs to the interstitial tissue.
- Carbonic anhydrase is not essential for this step.
- Chloride shifting into the RBCs.
- CO_2 diffusion from the lungs to the blood.
- HCO_3^- reaction with H^+ to form H_2CO_3 that dissociates into water and CO_2 .

80. A drug that inhibits the action of the carbonic anhydrase enzyme would affect which of the following physiological processes in the human body:

- oxygen transport in the blood.
- carbon dioxide transport in the blood.
- oxygen consumption in the tissues.
- physical solubility of carbon dioxide in the blood.
- the arterial partial pressure of oxygen

81. When CO_2 diffuses into blood in systemic capillaries, which of the following occurs for most of it?

- a. Remains in solution as CO_2
- b. Converts to carbamino compounds
- c. Converts to bicarbonate ions in RBC
- d. Combines with Hb directly
- e. Combines with H_2O in plasma to form carbonic acid

82. Which of the following occurs as blood passes through systemic capillaries?

- a. Cl^- ion concentration in red cells falls.
- b. HCO_3^- ions pass from red cells to plasma.
- c. pH rises (decrease in H^+ concentration).
- d. Its O_2 -hemoglobin dissociation curve shifts to the left.
- e. Its ability to deliver oxygen to the tissues is reduced.

83. Which of the following occurs in pulmonary capillary blood?

- a. Carbonic anhydrase in erythrocytes catalyzes the formation of H^+ and HCO_3^-
- b. Hydrogen ions is buffered by binding to hemoglobin.
- c. The rise in PO_2 is of greater magnitude than the fall in PCO_2 .
- d. The oxygen content is linearly related to alveolar PO_2 .
- e. The pH is lower than that in the pulmonary arterial blood.

84. The CO_2 dissociation curve for whole blood shows that:

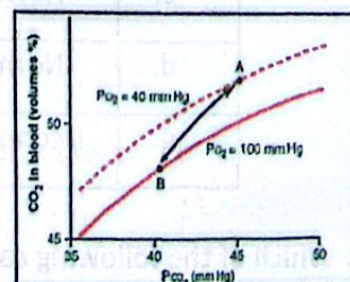
- a. its shape is sigmoid.
- b. it is linear, in the physiological range of PCO_2
- c. any change in PCO_2 will produce a little change in CO_2 content of the blood.
- d. oxygenation of the blood increases CO_2 bound to hemoglobin.
- e. adding CO_2 to the blood increases O_2 release at tissues.

85. Haldane effect is best described by which of the following:

- a. increases the ability of Hb to release CO_2 at the lung.
- b. is the effect of CO_2 on Hb binding with O_2 .
- c. facilitates release of O_2 from Hb at tissue level.
- d. is the effect of O_2 on the ability of Hb to bind CO_2 .
- e. Both A and D are correct.

86. Which of the following characterizes this CO_2 -dissociation curve?

- a. Point A represents PCO_2 in arterial blood during rest
- b. Point B represents PCO_2 in venous blood during rest
- c. The line AB indicates effect of CO_2 on hemoglobin (Hb) binding with O_2
- d. The line AB represents Haldane effect
- e. Haldane effect facilitates CO_2 uptake by Hb at pulmonary capillaries



Hypoxia, Cyanosis & O2 therapy.

87. A patient is found to have a lowered arterial oxygen partial pressure (hypoxemia). This condition is not due to:

- a. Ventilation/perfusion mismatch.
- b. Low blood hemoglobin content.
- c. Hypoventilation.
- d. Pulmonary fibrosis.
- e. High altitude exposure.

88. Anemic hypoxia is caused by:

- a. cyanide poisoning.
- b. high altitude.
- c. decreased hemoglobin content.
- d. abnormal ventilation/perfusion ratio.
- e. slow circulation.

89. Which of the following correctly describes the arterial partial oxygen pressure and content in anemic hypoxia?

- a. Both normal
- b. Both decreased
- c. Both increased
- d. Increased PO_2 and decreased O_2 content
- e. Normal PO_2 and decreased O_2 content

90. In hypoxic hypoxia, which one of the following sets is present?

	Arterial PO_2	Arterial O_2 content	Venous PO_2	Venous O_2 content
a.	Normal	Normal	Normal	Normal
b.	Normal	Normal	Decreased	Decreased
c.	Normal	Normal	Increased	Increased
d.	Normal	Decreased	Decreased	Decreased
e.	Decreased	Decreased	Decreased	Decreased

91. Which of the following can cause stagnant hypoxia?

- a. Anemia
- b. Chronic bronchitis
- c. Heart failure
- d. Cyanide poisoning
- e. Carbon monoxide poisoning

92. Carbon monoxide poisoning is indicated by which of the following laboratory values in arterial blood:

	PO ₂ (mm Hg)	PCO ₂ (mm Hg)	pH	O ₂ content (mL/dL)	Hemoglobin (g/dL)
a.	110	20	7.19	20	15
b.	100	40	7.4	5	16
c.	65	30	7.45	18	18
d.	50	65	7.21	16	15
e.	100	40	7.4	10	8

93. Which of the following correctly describe cyanosis?

- Occurs more easily in anemic than in polycythemic patients.
- Is severe in cyanide poisoning.
- Occurs in hypoxic hypoxia
- May be caused by high levels of carboxyhemoglobin in the blood.
- Is seen in fingers of hands immersed in iced water.

Neural control of respiration

94. The ventral respiratory group (VRG) of neurons is explained by which of the following:

- send out impulses to expiratory muscles during deep breathing.
- are activated by impulses from pulmonary stretch receptors.
- are inhibited by impulses from the apneustic center.
- are activated by impulses from the pneumotaxic center.
- send out impulses to inspiratory muscles during quiet respiration.

95. The dorsal respiratory group of neurons (DRG) plays an important role in neural control of breathing as they:

- inhibit the pneumotaxic center.
- inhibit the apneustic center.
- are the pacemaker for the respiration.
- directly stimulate the muscles of expiration.
- send impulses to the motor neurons supplying the inspiratory muscles.

96. A patient with bilateral vagal injury would have:

- a normal breathing pattern
- increased breathing rate
- slow and deep breathing
- slow and shallow breathing
- deep breathing only

97. Which of the following characterizes the network of neurons located in pre-Bötzinger complex?
- Produces rhythmic discharges in phrenic motor neurons, supplying diaphragm.
 - modulates the basic rhythm of ventilation.
 - Is present in the upper pons.
 - Send impulses to expiratory muscles
 - Sends impulses to the VRG

Chemical control of respiration

98. Peripheral chemoreceptors are inhibited by:

- drop of arterial blood PO_2 below 60 mm Hg.
- marked increase of arterial PCO_2 above 80 mm Hg
- increases in arterial PCO_2 above 40 mm Hg
- increase in arterial blood H^+ concentration
- decrease in arterial blood H^+ concentration

99. Which of the following characterizes peripheral chemoreceptors?

- Is inhibited in patients with diabetes mellitus.
- Is the main sensor of arterial PCO_2 changes.
- Is inhibited by an increase in arterial pH.
- Is activated whenever arterial PO_2 falls just below normal
- Is inhibited if one holds his breath for few minutes.

100. Injection of a drug that stimulates the carotid bodies would be expected to cause:

- a decrease in pH of arterial blood.
- a decrease in the PO_2 of arterial blood.
- an increase in the HCO_3^- concentration in arterial blood.
- a reduction in the arterial PCO_2 (Respiratory alkalosis).
- accumulation of CO_2 in arterial blood.

101. Central chemoreceptors are stimulated by:

- drop of arterial blood PO_2 below 60 mm Hg.
- marked increase of arterial PCO_2 above 80 mm Hg
- increases in arterial PCO_2 above 40 mm Hg
- increase in arterial blood H^+ concentration
- decrease in arterial blood H^+ concentration

102. The main stimulus for the central chemoreceptors is arterial level of:

- CO_2
- O_2
- HCO_3^-
- Ca^{2+}
- K^+

103. Central chemoreceptors are stimulated by which of the following:
- increased arterial HCO_3^- concentration
 - increased arterial H^+ concentration
 - decreased arterial O_2 concentration
 - decreased cerebrospinal fluid (CSF) CO_2 concentration
 - increased CSF H^+ concentration
104. Each of the following conditions may cause increased ventilatory drive ($\uparrow$ Respiratory rate) due to low arterial PO_2 (hypoxemia), EXCEPT:
- Severe chronic obstructive pulmonary disease.
 - Immediate breathing of a low oxygen level (acute hypoxia)
 - Prolonged breathing of a low oxygen level (chronic hypoxia)
 - Carbon monoxide poisoning.
 - Adaptation to high altitude.

L17: Non-chemical regulation of respiration

105. Breaking occurs after breath holding because of:
- accumulation of Ca^{2+} in the blood.
 - stimulation of the peripheral chemoreceptors.
 - voluntary cerebral stimulation of breathing.
 - stimulation of the central chemoreceptors.
 - accumulation of oxygen in the blood.
106. Breaking of breath-holding after a while is caused by
- decrease of H^+ in the cerebrospinal fluid (CSF)
 - decrease of the arterial PO_2
 - increase of CO_2 in the CSF
 - decrease of the PO_2 in the CSF
 - decrease of the arterial PCO_2
107. Stimulation of J-receptors (Juxta-capillary receptors) by lung inflation mediates:
- sneezing reflex
 - coughing reflex
 - Herring-Breuer reflex
 - pulmonary chemoreflex
 - swallowing reflex
108. Complete transection of the brainstem above the pons would:
- result in cessation of all breathing movements
 - prevent any voluntary holding of breath
 - prevent the central chemoreceptors from exerting any control over ventilation
 - prevent the peripheral chemoreceptors from exerting any control over ventilation
 - abolish the Herring-Breuer reflex

L18: Effect of exercise and high altitude on ventilation

- 109. The body reacts to muscular exercise by:**
- Increasing the cardiac output to 5.5 L/min.
 - Shifting the O₂-haemoglobin dissociation curve to the left.
 - increasing H⁺ ion in blood during mild exercise.
 - Maintaining normal oxygen delivery to the active muscles.
 - Increasing ventilation to match the oxygen uptake and CO₂ output.
- 110. The increase in ventilation observed at very high altitudes is due to:**
- decreased arterial PO₂
 - increased arterial PO₂
 - increased arterial PCO₂
 - increased arterial H⁺ concentration
 - increased CO₂ in the CSF
- 111. The abrupt increase in ventilation at the onset of exercise is due to:**
- increase in body temperature
 - sympathetic stimulation
 - increased arterial H⁺ concentration
increased plasma K⁺ level
 - afferent impulses from proprioceptors in muscles
- 112. Which of the following events occurs on exposure to severe exercise?**
- The PO₂ in the alveolar air may decrease.
 - Acidosis is the main stimulant for ventilation.
 - Arterial PCO₂ increases.
 - O₂-Hb dissociation curve is shifted to left.
 - Hyperventilation is only in the form of increased rate of breathing.
- 113. In acclimatization to high altitude, there is increase in all the following EXCEPT:**
- excretion of H⁺ by renal tubules
 - ability of blood to carry O₂
 - Number of capillaries
 - Excretion of HCO₃⁻ in urine
 - 2,3 DPG

114. A 35-year-old man remains at high altitude too long. Which of the following sets of changes best describes the man condition?

	Mitochondrial number	Arterial pH	Blood Viscosity
a.	Decreased	Decreased	Decreased
b.	Decreased	Increased	Decreased
c.	Decreased	Normal	Decreased
d.	Increased	Normal	Increased
e.	Increased	Decreased	Increased



RESPIRATOR

1. E	17. D	33. B	49. D	65. B	81. C	97. A
2. D	18. C	34. D	50. B	66. B	82. B	98. E
3. D	19. C	35. A	51. E	67. B	83. C	99. C
4. E	20. E	36. D	52. D	68. A	84. B	100.D
5. B	21. A	37. A	53. D	69. A	85. E	101.C
6. B	22. A	38. A	54. E	70. D	86. D	102.A
7. E	23. E	39. D	55. C	71. E	87. B	103.E
8. E	24. D	40. D	56. B	72. E	88. C	104.D
9. D	25. A	41. A	57. C	73. A	89. E	105.D
10. A	26. A	42. E	58. D	74. C	90. E	106.C
11. C	27. A	43. D	59. A	75. E	91. C	107.D
12. E	28. B	44. C	60. C	76. C	92. B	108.B
13. C	29. A	45. C	61. B	77. B	93. C	109.E
14. B	30. E	46. E	62. A	78. E	94. A	110.A
15. B	31. E	47. C	63. D	79. E	95. E	111.D
16. C	32. B	48. C	64. C	80. B	96. C	112. B
						113.A
						114.D