

BREATHING AND EXCHANGE OF GASES

EXERCISE - 1

1. **In rabbit respiration takes place in** (CPMT 1971)
- a. Cells lining the lung cavities b. Cells found in the blood
c. All living cells of the body d. Only RBC
2. **One common feature between trachea of rabbit and trachea of cockroach is that both** (AFMC 1994; Haryana PMT 1997; CBSE 1993)
- a. Are paired and branched b. Have ciliated epithelium
c. Have non-collapsible wall d. Originate from pharynx in head region
3. **Respiration is** (KCET 1994)
- a. An anabolic process b. A catabolic process
c. A chemical process d. All of these
4. **Tissue respiration is process by which** (PMT 1996)
- a. Carbohydrates are synthesized b. Protein are broken down
c. Fat molecules are metabolized d. Energy is liberated
5. **During hibernation frog performs** [AFMC 1986, Manipal 2001]
- a. Pulmonary respiration
b. Cutaneous respiration only
c. Bucco-pharyngeal respiration
d. Both cutaneous and pulmonary respiration
6. **Insect tracheal system opens to the outside through** [DPMT 2002]
- a. Spiral valve b. Pecten c. Spiracles d. Taenidia
7. **Which one of the following statements is incorrect?** [CBSE 2006]
- a. The principle of countercurrent flow facilitates efficient respiration in gills of fishes
b. The residual air in lungs slightly decreases the efficiency of respiration in mammals
c. The presence of non-respiratory air sacs, increases the efficiency of respiration in birds
d. In insects, circulating body fluids serve to distribute oxygen to tissues

Key:

1. c 2. c 3. b 4. d 5. b 6. C 7. B

EXERCISE - 2

1. Lining of trachea is made of

- a. Simple squamous epithelium b. Simple cuboidal epithelium
c. Pseudostratified epithelium d. Stratified cuboidal epithelium

[Kerala 2002]

2. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is

[AIPMT 2009]

- a. Ciliated b. Squamous c. Cuboidal d. Glandular

3. Lack of pulmonary surfactant causes

[AMU 2009]

- a. Asthma b. Emphysema
c. Cystic fibrosis d. Respiratory distress syndrome

4. Which of the following prevents collapsing of trachea?

(AFMC 1983)

- a. Muscles b. Diaphragm c. Ribs d. Cartilaginous rings

5. The narrowest and most numerous tubes of lungs are termed as

(Delhi PMT 1985)

- a. Hilus b. Bronchus c. Alveoli d. Bronchioles

6. The number of lobes in the right lung of rabbit is

(CPMT; 1981; BHU 1985)

1. b 2. b 3. d 4. b

7. Along trachea of rabbit contains

(CPMT 1987)

- a. Buccal cord b. Thyroid
c. Complete tracheal cartilages d. Incomplete tracheal cartilages

8. Which of these contain vocal cords?

(MPPMT 1995)

- a. Larynx b. Pharynx c. Bronchial tube d. Glottis

9. The membrane covering the lungs is called

(KCET 1996)

- a. Pleural membrane b. Vitelline membrane
c. Pericardial membrane d. Diaphragm

10. Match the structures listed under Column-I with the functional names given under column-II; choose the answer which gives the correct combination of the alphabets of the two columns (PMT 1998)

Column - I

(Structures)

A. Larynx

B. Trachea

C. Alveoli

D. Epiglottis

Column - II

(Functional names)

P. Lid of Larynx

Q. Air sacs

R. Voice Box

S. Wind pipe

T. Common passage

- | | A | B | C | D |
|----|---|---|---|---|
| a. | R | T | Q | S |
| b. | R | S | P | Q |
| c. | R | S | Q | T |
| d. | R | S | Q | P |

11. Anatomical dead space is

(Manipal PMT 2003)

- a. Upper respiratory tract
- b. Space between alveoli and capillaries
- c. Lower respiratory tract
- d. In nasal sacs

12. Which is the correct sequence of the air passage in man?

(CBSE PMT 1994; KCET 2003)

- a. Nasal cavity → larynx → pharynx → trachea → bronchi → bronchioles → alveoli
- b. Nasal cavity → pharynx → trachea → Larynx → bronchi → bronchioles → alveoli
- c. Nasal cavity → larynx → bronchi → pharynx → bronchioles → alveoli
- d. Nasal cavity → pharynx → larynx → trachea → bronch → bronchioles → alveoli

13. Schneiderian membrane is found in

(AIIMS 1995)

- a. Trachea
- b. Nasal mucosa
- c. Loop of henle
- d. Bowman's capsule

14. **The correct one is** (CBSE 1995)
- a. Larynx-trachea-alveoli-bronchus-pharynx
 - b. Pharynx-larynx-trachea-bronchus-alveoli
 - c. Trachea-larynx-bronchus-pharynx-alveoli
 - d. Alveoli-larynx-pharynx-bronchus-trachea

15. **Which of the following prevents collapsing of trachea ?** (AFMC 1983)
- a. Muscles b. Diaphragm
 - c. Ribs d. Cartilaginous rings

Key:

1. c 2. a 3. d 4. d 5. d 6. C 7. d 8. a 9. a 10. d 11. a 12. D
13. b 14. b 15. d

EXERCISE - III

1. Respiratory centre of brain is stimulated by [AIIMS 2000]
- a. Carbon dioxide content in venous blood
 - b. Carbon dioxide content in arterial blood
 - c. Oxygen content in venous blood
 - d. Oxygen content in arterial blood
2. People living at sea level have around 5 million RBC per cubic millimeter of their blood whereas those living at an altitude of 5400 meters have around 8 million. This is because at high altitude
- a. people eat more nutritive food, therefore more RBCs are formed
 - b. people get pollution-free air to breathe and more oxygen is available
 - c. atmospheric O₂ level is less and hence more RBCs are needed to absorb the required amount of O₂ to survive
 - d. there is more UV radiation which enhances RBC-production [CBSE 2006]
3. At the time of inspiration in mammals, the diaphragm (NCERT 1980)
- a. Contract b. Expand c. Relax d. Shows no change
4. **In rabbit the inspiration is promoted by** (CPMT 1981)
- a. Contraction of facial muscles of the diaphragm
 - b. Contraction of intercostal muscles
 - c. Ribs movement and sternum movement
 - d. All of the above

5. **Respiratory movements are under control of** (AFMC 1985)
a. Cerebral hemispheres b. Cerebellum c. Medulla oblongata d. Crura cerebri
6. **The Ventilation movements of the lungs in mammals are governed by**(CBSE PMT 1995)
a. Diaphragm b. Coastal muscles
c. Muscular walls of lung d. Both 1 and 2
7. **Persons living at high altitude will have** (AFMC 1995)
a. High alveolar capacity b. More number of erythrocytes
c. Hemoglobin curve shifts towards right d. All of these
8. **Respiratory movements are controlled by** (Orissa JEE 1996)
a. Cerebellum b. Cerebrum c. Medulla d. Crura cerebri
9. **Respiratory centre is located in** (Kerala PMT 2002)
a. Cerebellum b. Cerebrum c. Hypothalamus d. Medulla oblongata

Key

1. b 2. c 3. a 4. d 5. c 6. D 7. d 8. c 9. d

EXERCISE - IV

1. **Exchange of O₂ and CO₂ at the respiratory surface occurs through**
a. Passive transport b. Active transport
c. Osmosis d. Diffusion
[CPMT 1991, Karnataka 2002]
2. **Hamburger's phenomenon is also known as**
a. HCO₃⁻ shift b. Na⁺ shift
c. H⁺ shift d. Chloride shift
[CPMT 1988, '91; AMU 2001; JIPMER 2002]
3. **Which statement is correct?**
a. Respiratory centers are not affected by CO₂
b. In humans vital capacity is just double the expiratory volume
c. A human lung has 10³ alveoli
d. During inspiration the lungs act as suction pump

[CPMT '80,'02; BHU '95; MPPMT '98; CBSE '99]

4. Carbon dioxide entering erythrocytes reacts with water to form carbonic acid. The enzyme is
a. Carbonic anhydrase b. Carboxypeptidase
c. Hydrolase d. Oxidoreductase
5. A higher CO₂ concentration of blood causes [AIIMS 2000]
a. Slow diffusion of O₂ from blood
b. Slow transport of O₂ in blood
c. Quick diffusion of O₂ from blood
d. Both (1) and (2) [AMU 2001]
6. The majority of carbon dioxide produced by our body cells is transported to the lungs [CBSE 2006]
a. attached to hemoglobin
b. dissolved in the blood
c. as bicarbonates
d. as carbonates
7. What is true about RBCs in humans? (AIPMT (Pre) 2010)
a. They *frarisport* about 80 per cent oxygen only and the rest; 20 per cent of it is transported in dissolved state in blood plasma
b. They do not carry CO₂ at all
c. They carry about 20–25 per cent of CO₂
d. They do not carry CO₂ at all They carry about 20-25 per cent of CO₂ They transport 99.5 percent of O₂
8. Which two of the following changes (a-d) usually tend to occur in the plain dwellers when they move to high altitudes (3,500 m or more)? [AIPMT (Pre) 2010]
(a) Increase in red blood cell size
(b) Increase in red blood cell production
(c) Increased breathing rate
(d) Increase in thrombocyte count
Changes occurring are:
a. (a) and (d) b. (a) and (b) c. (b) and (c) d. (c) and (d)
9. The urge to inhale in human result from [DPMT 2010]
a. Rising PCO₂ b. Rising PO₂ c. Falling PCO₂ d. Falling PO₂
10. In vertebrates O₂ is transported by the blood as follows (CPMT 1982)
a. Absorbed on the surface of RBC b. Complex with hemoglobin
c. Dissolved in plasma d. By all above means
11. Dissociation curve is associated with (BHU 1985)
a. Oxygen b. Oxyhaemoglobin c. Carbon dioxide d. Carbonic anhydrase
12. The metal associated with hemoglobin is (CPMT1985)
a. Copper b. Magnesium c. Iron d. Manganese

13. Oxygen is transported to every cell of the body through (Delhi PMT 1985)
a. RBC b. WBC c. RBC and WBC d. RBC and Hormones
14. Blood contains CO₂ in which of the following form (BHU 1987)
a. NaHCO₃ b. Carbonic acid c. Hb-CO₂ d. CO
15. Chloride shift is essential for transport of (CPMT 1990)
a. CO₂ and O₂ b. N₂ c. CO₂ d. O₂
16. Amount of O₂ normally carried by 100ml of pure blood, is (CPMT 1990)
a. 40 ml b. 5 ml c. 10 ml d. 30 ml
17. CO₂ is transported mainly as (CBSE 1995)
a. Dissolved in blood plasma b. Carbonic acid
c. In carbamino hemoglobin d. Carbamino hemoglobin and bicarbonate
18. CO has greater affinity for hemoglobin as compared to O₂ (CBSE 1995)
a. 2 times b. 20 times c. 200 times d. 1000 times
19. What is incorrect about oxygen binding with hemoglobin? (AIIMS 1995)
a. The bond between oxygen and Hb is very loose bond
b. Oxygen becomes ionic when it binds to Hb
c. Hb and oxygen is readily reversible combinations
d. None of the above
20. Hemoglobin oxygen dissociation curve is (BHU 1995)
a. Sigmoid b. Constant c. Straight line d. Parabolic
21. Which of the following statements correctly defines Bohr effect ? (AIIMS 1995; Haryana PMT 1997)
a. Rise in P₅₀ with a decrease in CO₂ conc.
b. Rise in P₅₀ with decrease pH
c. Rise in P₆₀ with a decrease pH
d. Rise in P₅₀ with a decrease pH

22. **Vant Hoff's law states that** (KCET1996)
- a. Respiration rates is constant irrespective of change in temperature
 - b. Respiration stops with increase of temperature beyond 10^0C
 - c. Respiration rate increases two or three times for every rise of 10^0C
 - d. Respiration rate decreases two or three times for every rise of 10^0C
23. **Oxyhaemoglobin is an unstable compound because** (RPMT 1996)
- a. O_2 and hemoglobin reaction depends upon partial pressure
 - b. Hemoglobin is a conjugated protein
 - c. Hemoglobin is contained with in RBC
 - d. One hemoglobin binds with four molecules of O_2
24. **Hb most strongly combines with** (CPMT 1997)
- a. CO b. O_2 c. CO_2 d. O_3
25. **The opposite of Bohrs effect is called** (CPMT 1998)
- a. Tyndall effect b. Haldane effect c. Haldane effect d. Chloride shift
26. **How many molecules of oxygen can associate with a molecule of haemoglobin** (CPMT 1998)
- a. One b. Two c. Three d. Four
27. **In which form CO_2 is mostly carried in** (MP PMT 1998)
- a. Sodium carbonate b. Carbonic acid
 - c. Bicarbonate ions d. Carbamino hemoglobin
28. **When partial pressure of CO_2 ($p\text{CO}_2$) rises the oxygen dissociation curve of hemoglobin at 37^0C will** (CPMT 1998)
- a. Shift towards right b. Towards left
 - c. Become regular d. Remain unchanged
29. **Hamburger phenomenon is associated with** (Kerala Med.Ent.2000)
- a. Transport of oxygen b. Transport of oxygen CO_2
 - c. Transport of oxygen hormones d. Transport of oxygen CO

30. **Blood will lose most of the oxygen through** (Cet Chd.2001)
a. Arteries b. Veins c. Capillaries d. Lungs
31. **What can determine the percentage of oxygen carried by Hb ?** (CET Chd.2001)
a. pH of blood b. Percentage of CO₂
c. Partial pressure of oxygen d. All the above
32. **Hamburger phenomenon is known as** (AIIMS 1994; jipmer 2002)
a. Calcium shift b. Bohr Effect c. Chlordie shift d. Synergogenesis
33. **Carbon dioxide is mostly transported as** (MGIMS Wardha 2001; BMT 2003)
a. Carbamino haemoglobin b. Oxyhaemoglobin
c. Amino acids d. HCO₃⁻
34. **Dissociation curve shifts to the right when** (MP PMT 2002)
a. CO₂ concentration decreases b. CO₂ concentration increases
c. O₂ concentration decreases d. Cl⁻ concentration increases

Key

1. d 2. d 3. d 4. a 5. c 6. c 7. c 8. c 9. a 10. b 11. b 12. c
13. a 14. a 15. c 16. b 17. d 18. C 19. b 20. a 21. a 22. c 23. a 24. a
25. b 26. d 27. c 28. a 29. b 30. C 31. d 32. c 33. d 34. b

EXERCISE - V

1. **'Hiccough (hiccup) is due to activity of** [Manipal 2001]
a. Intercostal muscles
b. Food in air tract
c. Diaphragm
d. Inadequate oxygen in environment
2. **Apnoea is** [DPMT 2001]
a. Decreased ventilation
b. Absence of breathing
c. Labored breathing
d. Increased ventilation

3. A person is suffering from frequent episodes of nasal discharge, nasal congestion, reddening of eyes and watery eyes. These are the symptoms of [KCET 2009]
- a. Cyanosis b. Bronchitis
c. Rhinitis d. Bronchial carcinoma
4. Excessive pulmonary ventilation decreases the hydrogen ion concentration. This condition is called (AIIMS 1995)
- a. Respiratory acidosis b. Emphysema
c. Respiratory alkalosis d. Atelectasis
5. Dyspnea is the (Haryana PMT 1998)
- a. Normal breathing b. Difficult breathing
c. Rapid breathing d. Stage without breathing
6. Mountain sickness results due to (Pb.PMT 1998)
- a. Anaemia hypoxia b. Arterial hypoxia
c. Lack of sufficient Hb d. Lack of sufficient RBC

Key

1. c 2. b 3. c 4. c 5. b 6. B

EXERCISE - VI

1. Volume of air breathed in and out during effortless respiration is
- a. Residual volume b. Vital volume
c. Tidal volume d. Normal volume
- [Kerala 2001]
2. Listed below are four respiratory capacities (a-d) and four jumbled respiratory volumes of a normal human adult:
- [AIPMT (Pre) 2010]

Respiratory Capacities	Respiratory volumes
(a) Residual volume	2500 ml
(b) Vital capacity	3500 ml
(c) Inspiratory reserve	1200 ml
(d) Inspiratory capacity	4500 ml

Which one of the following is the *correct* matching of two capacities and volumes?

- a. (d) 3500 ml (a) 1200 ml
- b. (a) 4500 ml (b) 3500 ml
- c. (b) 2500 ml (c) 4500 ml
- d. (c) 1200 ml (d) 2500 ml

3. **When 1500ml air is in the lungs, it is called** (CBSE PMT 1996)

- a. Vital capacity b. Tidal volume
- c. Residual volume d. Inspiratory reserve volume

4. **A person breathing normally at rest takes in and expels approximately half a liter of air during each respiratory cycle. This is called** (KCET 1996)

- a. Expiratory reserve volume b. Vital capacity
- c. Inspiratory reserve volume d. Tidal volume

5. **The largest quantity of air that can be expired in a single respiratory effort is called**

(Haryana PMT 1996; AFMC 1997)

- a. Residual volume b. Tidal volume
- c. Vital capacity d. Total lung volume

6. **The volume of air breathed in and out during normal breathing is called**

(Kerala PMT 2002)

- a. Vital capacity b. Inspiratory reserve volume
- c. Expiratory reserve volume d. Tidal volume

7. **After a forceful expiration some air is left in the lungs which is** (Haryana PMT 2003)

- a. Residual volume b. Vital capacity c. Total capacity d. Tidal volume

Key

1. c 2. a 3. c 4. d 5. c 6. D 7. a

EXERCISE --VII

1. The relative proportion between the volume of CO_2 released and O_2 absorbed in respiration, is termed as (NCERT 1980)

- a. Respiratory exchange b. Respiratory quotient
c. Respiratory phase d. None of the above

2. The substrate that is relatively reduced in oxygen will give RQ (Pb.PMT 1995)

- a. One b. Less than one c. More than one d. Infinity

3. What is the value of R.Q. with organic acids as the substrate? (RPMT 1998)

- a. 1 b. >1 c. <1 d. 0

4. The substrate that are relatively reduced in oxygen will give RQ (Pb.PMT 1995)

- a. One b. Less than one c. More than one d. Infinity

5. What is the value of R.Q. with organic acids as the substrate? (RPMT 1998)

- a. 1 b. >1 c. <1 d. 0

Key

1. b 2. b 3. b 4. b 5. B

SPECIAL EXERCISE

1. The exchange of gases in the alveoli of the lungs takes place by (JIPMER-2011)

- a. Osmosis b. Simple diffusion c. Passive transport d. Active transport

2. Carbon monoxide is a pollutant because it (JIPMER-2011)

- a. Reacts with oxygen b. Inhibits glycolysis
c. Reacts with hemoglobin d. Makes nervous system inactive

3. Dead space air in man is (JIPMER-2011)

- a. 500ml b. 150ml c. 250ml d. 1.5l

4. Amount of CO_2 in expired air is about (JIPMER-2011)

- a. 0.04% b. 0.03% c. 4.5% d. 21%

5. Which of the following is a respiratory disease (JIPMER-2010)
a. Polio b. Arthritis
b. c. Asthma d. Cancer
6. In blood, CO_2 is transported majorly as (JIPMER-2009)
a. Sodium carbonate b. Carboxyhaemoglobin c. Bicarbonate d. CO_2 as such
7. 'Hamburger' shift is also known as (JIPMER-2008)
a. Bicarbonate shift b. Chloride shift c. Potassium shift d. All of the above
8. After a deep inspiration and maximum expiration, the capacity of lungs is known as (JIPMER-2008)
a. Vital capacity b. Tidal volume c. IRV d. ERV
9. On high mountains, difficulty in breathing is due to (JIPMER-2006)
a. Decrease in partial pressure of O_2 b. Decrease in amount of O_2
c. Increase in CO_2 concentration d. All of the above
10. At high altitude, RBC's of human blood will (JIPMER-2004)
a. Increase in number b. Decrease in number
c. Decrease in size d. Increase in size
11. The vital capacity of lungs is equal to (JIPMER-2004)
a. 4000 ml b. 5000 ml c. 6000 ml d. 7000 ml
12. R.Q is (JIPMER-2004)
a. $\frac{CO_2}{O_2}$ b. $\frac{O_2}{CO_2}$ c. Both a and b d. Non of the above
13. The most important function of diaphragm is (JIPMER-2004)
a. To aid in digestion b. To aid in respiration
c. To protect lungs d. To divide body cavity into compartments
14. Anaerobic respiration in animals produces (JIPMER-2001)
a. Glucose and O_2 b. Lactic acid c. C_2H_5OH and CO_2 d. CO_2 and H_2O

15. **Which of the following events takes place during inspiration in rabbit** (JIPMER-2000)
- a. Due to contraction of external intercostal muscles and flattening of diaphragm the volume of thoracic cavity decreases
 - b. The abdominal muscles contract
 - c. Due to contraction of external intercostal muscles and flattening of diaphragm the volume of thoracic cavity increases
 - d. The internal intercostal muscles relax
16. **Severe Acute Respiratory Syndrome (SARS)** (AIIMS-2008)
- a. is caused by a variant Pneumococcal pneumonia
 - b. is caused by a variant of the common cold virus (corona virus)
 - c. is an acute form of asthma
 - d. affects non-vegetarians much faster than the vegetarians
17. **Formation of non-functional methaemoglobin causes blue-baby syndrome. This is due to** (AIIMS-2008)
- a. Excess of arsenic concentration in drinking water
 - b. Excess of nitrates in drinking water
 - c. Deficiency of iron in food
 - d. Increased methane content in the atmosphere
18. **Arrange the following in the order of increasing volume** (AIIMS-2007)
1. Tidal volume 2. Residual volume
3. Expiratory Reserve volume 4. Vital capacity
- a. 1<2<3<4 b. 1<3<2<4 c. 1<4<3<2 d. 1<4<2<3
19. **Which fact suggests that most oxygen is transported from lungs to the tissue combined with hemoglobin rather than dissolved in blood plasma** (AIIMS-2003)
- a. O_2 carrying capacity of whole blood is much higher than that of plasma and O_2 content of blood leaving the lungs is greater than that of blood entering the lungs
 - b. Hemoglobin can combine O_2
 - c. Oxyhaemoglobin can dissociate into hemoglobin and O_2
 - d. Increase in CO_2 concentration decreases the O_2 affinity of hemoglobin

KEY

- | | | | |
|------|-------|-------|-------|
| 1. b | 6. c | 11. b | 16. b |
| 2. c | 7. b | 12. a | 17. b |
| 3. b | 8. a | 13. b | 18. b |
| 4. c | 9. a | 14. b | 19. a |
| 5. c | 10. a | 15. a | |

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