UNIVERSITY OF JORDAN

SCHOOL OF MEDICINE

THE RESPIRATORY SYSTEM MIDTERM EXAM

Theory 40 questions

Date: 21-December-2019 **Time:** 9:00-10:00 **Duration:** 70 minutes

Student name:

University No:

Form A

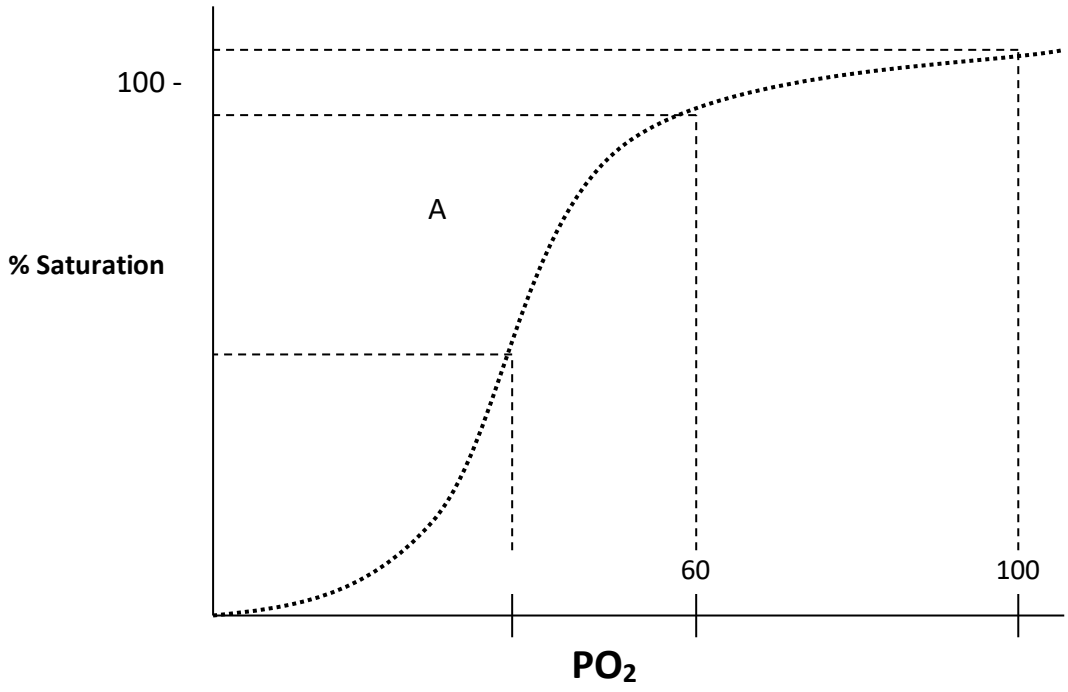
Exam instructions:

You are about to take the Midterm exam for the respiratory module. The exam comprises 40 multiple choice questions (MCQs). Each question below includes five suggested answers. Please read each question carefully and choose the **one best** answer to each question

Mean 65%

1. All the following laboratory values are consistent with pulmonary fibrosis EXCEPT?
0.79 0.36 115 10 5 2 13 A

115 A. Increased residual volume
10 B. Increased vascular resistance
5 C. normal or above normal FEV1/FVC
2. D. decreased lung compliance
13 E. Normal or above normal peak expiratory flow (corrected for lung volume)



2. Which of the following is INCORRECT regarding the above oxyhemoglobin curve?
2 0.79 0.33 14 2 8 114 7 D

14 A. higher P_{50} than normal means that the O2 binds less tightly to Hb.
2 B. HbF is normally shifted to the left
8 C. An increase in PCO2 causes a right shift.
114 D. An increase in blood pH increases P_{50}.
7 E. An increase in temperature shifts the O2 uptake curve to the right.

3. Regarding gas exchange across pulmonary capillaries, which of the following statements is FALSE?

3 0.61 0.52 21 24 89 7 4 C

21 A.The length of capillary required for gas equilibrium is longer during exercise.
24 B.In anemic person, DLCO is less than normal.
89 C.At rest, equilibrium is usually reached at 50% of the capillary length
7 D.CO2 crosses the membrane easier than O2.
4 E.considering the diffusing capacity of the lung for different gases, the least important factor to play role is the molecular weight of the gas.

4. In a normal person breathing room air at sea level at rest (in standing position). All the following statements are true EXCEPT?

4 0.64 0.52 3 93 13 25 11 B

3 A.dead space accounts for almost one third of the tidal volume
93 B. volume of anatomic dead space ÷ volume of physiologic dead space is equal or greater than 1.0
13 C.mixed venous [O2] is 15 ml/dl blood
25 D.physiologic dead space is greatest at the lung apex
11 E.compliance is greatest at the lung base.

5. In diving, divers first hyperventilate before they go into water. This hyperventilation allows one to hold one's breath for a longer period of time, because hyperventilation:

5 0.63 0.22 17 91 4 1 32 B

17 A.increases the oxygen reserve of systemic arterial blood
91 B. decreases the PCO_2 of systemic arterial blood
4 C.decreases the pH of systemic arterial blood
1 D. increases brain blood flow
32 E.make alveolar air full of O2 which divers can use while diving

6. Which of the following is NOT true at FRC?

6 0.80 0.52 116 10 2 6 11 A

116 A.It is about 75% TLC.
10 B. The elastic recoil of the chest wall is outward.
2 C.The elastic recoil of the lung is inward.
6 D.The lung-thorax system is at rest.
11 E.pulmonary vascular resistance is the lowest

7. While obtaining the arterial blood sample, the blood-gas technician draws room air into the syringe before measuring the blood-gas values. As a result, which of the following is true?

7 0.68 0.50 9 4 99 10 23 C

9 A.The measured values of both PaO2 and PaCO2 will be higher than the patient's actual values

4 B.The measured values of both PaO2 and PaCO2 will be lower than the patient's actual values

99 C.The measured PaO2 will be higher and the measured PaCO2 will be lower than the patient's actual blood gas values

10 D.The measured PaO2 will be lower and the measured PaCO2 will be higher than the patient's actual blood gas values

23 E.The measured values of PaO2 and PaCO2 will accurately reflect the actual values

8. Regarding pulmonary vascular resistance

8 0.80 0.52 20 8 116 1 0 C

20 A.is low at high lung volumes

8 B. is low at low lung volumes

116 C.if increased, can cause right heart failure

1 D.is measured through routine pulmonary function tests

0 E.is more than systemic vascular resistance.

9. Regarding dead space, choose the FALSE statement

9 0.59 0.61 1 85 12 33 14 B

1 A. is defined as the volume of gas which does not take part in gas exchange

85 B.physiological dead space is the same as alveolar dead space

12 C.physiological dead space is measured by measuring mixed expiratory PCO2

$V_D = = VT\left[\frac{PaCO2 - PECO2}{PaCO2}\right]$ ..... Bohr's equation

33 D. mechanical ventilation (respirator) increases dead space volume.

14 E.increases whenever V/Q ratio is increased

10. Which of the following sets of differences best describe the hemodynamics of the pulmonary circulation when compared with systemic circulation?

10 0.88 0.30 127 6 1 8 3 A

	Flow	Resistance	Arterial P
127 A.	Same	Lower	Lower
6 B.	Same	Higher	Lower
1 C.	Higher	Same	Higher
8 D.	Lower	Lower	Lower
3 E.	Higher	Higher	Higher

11. Regarding carbon monoxide poisoning, one of the following is TRUE:

11 0.59 0.55 21 86 24 2 12 B

21 A.Increase firing rate from the peripheral chemoreceptors to the respiratory center
86 B.decrease arterial O_2 concentration
24 C.Decrease arterial PO_2
2 D.is can be self-limited disease
12 E.as long as PCO arterial is below 1 mmHg, we should not worry.

12. If 1 g of hemoglobin has an oxygen capacity of 1.34 mL of oxygen, what is the oxygen content of blood containing 10 g of hemoglobin when the blood PO_2=40 mmHg?

12 0.42 0.66 25 13 61 19 27 C

25 A.≈ 6 mL/dL
13 B.≈ 8 mL/dL
61 C.≈ 10 mL/dL
19 D.≈ 12 mL/dL
27 E.Cannot be calculated from the information provided

13. Which of the following decreases oxygen content but does not alter PaO_2 or percentage saturation of hemoglobin?

13 0.71 0.69 19 7 8 103 8 D

19 A.Ascent to an altitude of 3500 m
7 B.Polycythemia (high RBC count)
8 C.Breathing 50% oxygen
103 D.Anemia
8 E.Development of a large right-to-left shunt

14. In normal healthy person, if oxygen is added to inspired air to increase arterial PO2 from 100 mmHg to 300 mmHg, choose the correct statement

14 0.67 0.50 97 19 15 10 4 A

97 A.dissolved oxygen will increase three-fold.
19 B. the oxygen content of the blood will increase approximately three-fold
15 C.the PaN_2 will remain the same
10 D.the PaCO2 will decrease to one third-normal
4 E.Increasing arterial PO2 from 100 mmHg to 300 Hg can correct any form of hypoxia.

15. Which of the following conditions would result in the highest oxygen content per milimeter of blood?

15 0.54 0.44 10 14 2 79 40 D

10 A.Hemoglobin concentration= 5 PaO2=90 mmHg
14 B.Hemoglobin concentration= 5 PaO2=500 mmHg
2 C.Hemoglobin concentration=3 PaO2=90 mmHg
79 D.Hemoglobin concentration=10 PaO2=60 mmHg
40 E.Hemoglobin concentration=16 PaO2=28 mmHg

16. According to the Law of Laplace, small alveoli don't coexist with large alveoli at the same region. In the lungs, several factors counter that tendency, and stabilize the alveolar structures. Which of the following is NOT one of them?

16 0.39 0.36 6 18 56 52 13 C

6 A.Surfactant lowers surface tension to a greater degree when it is on a smaller surface area, allowing the smaller alveoli to stay open.
18 B.Mechanical stability is given by surrounding alveoli (alveoli support each other's =alveolar interdependency)
56 C.Intrapleural pressure is lower (more negative) for smaller alveoli, allowing them to stabilize in comparison to the bigger ones.
52 D.Surface tension increases as alveolar surface area increases.
13 E.surfactant makes surface tension volume-dependent

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

17 0.89 0.25 3 1 7 5 129 E

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

18. Alveolar ventilation normally increases above normal when breathing:

18 0.14 0.19 3 47 21 38 36 C

حذف

3 A. 21 % oxygen and 79 % nitrogen.
47 B.17 % oxygen and 83 % nitrogen.
21 C.2 % carbon dioxide and 98 % oxygen.
38 D.100 % oxygen and 0 % carbon dioxide.
36 E.air available in Jordan Valley (غور الأردن).

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

19 0.62 0.66 2 90 6 25 22 B

2 A.Measured using the single breath N_2 washout curve.
90 B.Marks the point where the alveoli at the apex close.
6 C.Marks a sudden increase in nitrogen concentration in the expelled breath.
25 D.Marks when the overinflated, poorly ventilated alveoli at the apex expel their air with high N2 concentrations.
22 E.It increases in smokers and in chronic bronchitis

20. If respiratory minute ventilation and rate of CO_2 production are kept constant, the arterial PCO_2 can be reduced by increasing:

20 0.21 -0.08 14 37 56 31 7 D

حذف

14 A.functional residual capacity.
37 B. F_iO_2 (fraction of inspired O_2)
56 C.breathing frequency.
31 D. tidal volume.

7 E. local temperature

21. In normal resting individual breathing room air at sea level, voluntary trebling (3x normal) of alveolar ventilation:

21 0.54 0.63 79 10 28 7 20 A

79 A.raises plasma pH.
10 B.raises alveolar PCO_2 .
28 C.trebles the partial pressure of oxygen in the alveoli.
7 D.raises arterial blood oxygen saturation by 3 %.
20 E.raises arterial blood oxygen content by 3 %.