



KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2020/2021
FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF PHARMACY (BPharm Level II)
HMP 210: MEDICAL PHYSIOLOGY III

DATE: MONDAY, 19TH JULY, 2021

TIME: 2.00 P.M. - 5.00 P.M.

INSTRUCTIONS:

SECTION A: MULTIPLE CHOICE QUESTIONS

CHOOSE THE SINGLE BEST ANSWER

1. Spirometry can be used to accurately measure all of the following **EXCEPT**
 - A. Expiratory reserve volume.
 - B. Inspiratory reserve volume.
 - C. Residual volume.
 - D. Tidal volume.
2. If a patient had a progressive lung disease that required an ever-increasing pressure to fill the same volume of lung, the lung compliance
 - A. Would increase
 - B. Would stay the same.
 - C. Would decrease
 - D. Are not affected by these variables
3. Two healthy women with identical tidal volumes are subjected to spirometry and blood gas measurements. Subject A doubles her tidal volume and decreases her respiratory rate to $\frac{1}{2}$ of baseline. Subject B decreases her tidal volume to $\frac{1}{2}$ of baseline and doubles her respiratory rate. The following statements about the resulting alveolar ventilation in the two women is true:
 - A. Alveolar ventilation increases in both subjects
 - B. Alveolar ventilation decreases in both subjects
 - C. Alveolar ventilation increases in subject A and decreases in subject B
 - D. Alveolar ventilation decreases in subject A and increases in subject B
4. Administration of an agonist for which of the following autonomic receptors would be expected to cause airway resistance to **DECREASE**
 - A. Muscarinic-cholinergic
 - B. Alpha-adrenergic
 - C. Beta-adrenergic
 - D. Histaminic
5. The following is the first branching of the bronchial tree that has gas exchanging capabilities
 - A. Terminal bronchioles.
 - B. Respiratory bronchioles.

- C. Alveoli
 - D. alveolar ducts.
6. The muscle which does not contract during forced expiration is
- A. Internal intercostals
 - B. External intercostals
 - C. Transversus abdominus
 - D. Rectus abdominis
7. Expiration depends on these two factors:
- A. the recoil of elastic fibers that were stretched during inspiration and the inward pull of surface tension due to the film of alveolar fluid
 - B. the expansion of respiratory muscles that were contracted during inspiration and the lack of surface tension on the alveolar wall
 - C. the negative feedback of expansion fibers used during inspiration and the outward pull of surface tension due to surfactant
 - D. combined amount of CO₂ in the blood and air in the alveoli
8. Air moves out of the lungs when the pressure inside the lungs is ____
- A. Less than the pressure in the atmosphere.
 - B. Greater than the pressure in the atmosphere.
 - C. Equal to the pressure in the atmosphere.
 - D. Greater than the intra-alveolar pressure.
9. The carrier for the transport of gases from lungs to the tissue cells and vice-versa is
- A. Carbonate ion
 - B. Blood
 - C. Haemoglobin
 - D. Partial pressure
10. The most important factor to describe the affinity of oxygen towards hemoglobin is
- A. Partial pressure of oxygen
 - B. Temperature
 - C. pH
 - D. 2, 3-DPG
11. Chloride shift refers to:
- A. Movement of Cl ions from plasma to the RBCs
 - B. Movement of HCO₃⁻ from plasma to the RBC
 - C. Movement of Cl ion from RBC to the plasma
 - D. Movement of HCO₃⁻ from RBC to the plasma

12. When the partial pressure of CO_2 rises, the oxyhemoglobin bond

- A. Bond breaks easily in tissue
- B. Bond is strong in tissue cells
- C. No effect
- D. Effect is not constant

13. When temperature rises, the oxygen affinity:

- A. Decreases affinity
- B. Increases affinity
- C. Constant
- D. No constant effect

14. CO_2 transport is determined by:

- A. Temperature
- B. Pco_2 .
- C. Acidity.
- D. none of the above

15. The normal skull vault contains blood and CSF in the ratio

- A: 1:1
- B: 1:2
- C: 1:3
- D: 2:1

16. The most important energy source of the brain is

- A: Amino acids
- B: Free fatty acids
- C: Glucose
- D: Pyruvate

17. An elderly man has a heart rate of 160. Tachycardia impairs coronary perfusion most in the:

- A: Left atrium
- B: Left ventricle
- C: Right atrium
- D: Right ventricle

18. The following substance/s can move passively across cerebral capillary endothelium:

- A: Carbohydrates
- B: Lipid-soluble substances
- C: Polypeptides
- D: Water-soluble solutes

19. Cerebrospinal fluid is formed in

- A: Arachnoid villi
- B: Choroid plexus
- C: Venous sinuses
- D: Ventricular walls

20. During aerobic exercise, blood flow is reduced within

- A. The skin
- B. The heart
- C. The brain
- D. The kidneys

21. The Monro-Kellie doctrine states:

- A: Cerebral perfusion can be measured by determining the amount of a substance it removes from the bloodstream.
- B: Flow to many tissues is maintained at constant levels despite variations in perfusion pressure.
- C: The rate of CSF absorption is proportional to intraventricular pressure.
- D: The volume of blood, CSF and brain within the cranium is constant.

22. The following hormone is secreted less at night

- A. Insulin
- B. ACTH
- C. Growth hormone
- D. Melatonin

23. The acidophils of the anterior pituitary gland secrete:

- A. ACTH

- B. TSH
- C. FSH
- D. Growth hormone

24. Endocrine glands differ from exocrine glands in that:

- A. Endocrine glands are ductless and exocrine glands release secretions at the body's surface or into ducts.
- B. Endocrine glands release hormones, whereas exocrine glands release waste.
- C. Endocrine glands are formed by epithelial tissue, but exocrine glands are primarily connective tissue.
- D. Endocrine glands are all interconnected; whereas exocrine glands act completely independently.

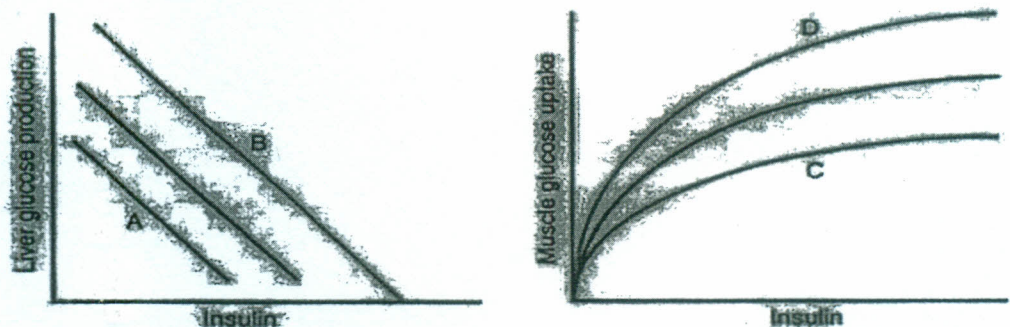
25. The following is **NOT** an endocrine property

- A. Hormones reach targets through the blood
- B. Effects are slow and cyclic
- C. Rapid acting effects
- D. Effects caused by chemicals.

26. The following hormones use cAMP as a second messenger **EXCEPT**

- A. FSH
- B. Norepinephrine
- C. Androstenedione
- D. Glucagon

Use the following diagram to answer questions 27 and 28



27. In the figure, the lines that most likely illustrate the relationships in a patient with acromegaly are:

- A. A and C
- B. A and D
- C. B and C

D. B and D

28. In the figure, line D most likely illustrates the influence of:

- A. Exercise
- B. Obesity
- C. Growth hormone
- D. Cortisol

29. A patient has an elevated plasma thyroxine (T₄) concentration, a low plasma thyroid stimulating hormone (TSH) concentration, and a thyroid gland that is smaller than normal. The following is the most likely explanation for these findings:

- A. Patient has a lesion in the anterior pituitary that prevents TSH secretion
- B. Patient is taking propylthiouracil
- C. Patient is taking thyroid extract
- D. Patient is consuming large amounts of iodine

30. If a radioimmunoassay is properly conducted and the amount of radioactive hormone bound to antibody is low, this would indicate:

- A. Plasma levels of endogenous hormone are high
- B. Plasma levels of endogenous hormone are low
- C. More antibody is needed
- D. Less radioactive hormone is needed

SECTION B: SHORT ANSWER QUESTIONS (5 MARKS EACH)

WRITE YOUR ANSWERS IN THE BOOKLETS PROVIDED

1. Describe the types of dead space
2. Outline the effect of gravity on ventilation perfusion ratio (V/Q ratio)
3. State the factors that influence diffusion of a gas at the aveolar-capillary membrane.
4. Explain the transport and trapping of glucose into cells.
5. List the roles of parathyroid hormone in calcium metabolism.
6. Outline five factors that determine how much oxygen is bound to haemoglobin .
7. Explain the neural control of ventilation.
8. Describe the role of cutaneous circulation in temperature control
9. Outline the regulation of splanchnic circulation.
10. List the factors that affect the cerebral blood flow

SECTION C: LONG ANSWER QUESTION (10 MARKS EACH)

WRITE YOUR ANSWERS IN THE ANSWER BOOKLET PROVIDED

1.

A) Define acclimatization. (2 marks).

B) Explain the process of acclimatization in response to High altitude (4 marks)

C) Outline the conditions where acclimatization in high altitude fails to occur. (4 marks)

2. Elaborate on regulation of coronary blood flow

3. Concerning physical aspects of ventilation, explain normal pressure changes and the changes that occur when a person suffers an open chest wound.

4. Describe thyroid hormone synthesis