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978-0-521-70509-7 - MCQs for the Primary FRCA

Khaled Elfituri, Graham Arthurs, Les Gemmell and Richard Shillito

Excerpt

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Paper 1

Questions

Physiology

1 Pulse pressure

- (a) is the median value between the systolic and the diastolic blood pressures
- (b) is reduced during tachycardia
- (c) is determined by the compliance of the arterial tree
- (d) decreases in old age
- (e) at a given time is the same throughout the arterial tree

2 Myocardial work increases when there is an increase in

- (a) stroke volume
- (b) ventricular systolic pressure
- (c) contractility
- (d) heart rate
- (e) systemic vascular resistance

3 Fetal haemoglobin

- (a) forms 60% of circulating haemoglobin at birth
- (b) is normally replaced by haemoglobin A (HbA) within 6–9 months
- (c) has a sigmoid-shaped dissociation curve
- (d) has a greater oxygen content at any given PO_2 than adult haemoglobin
- (e) binds 2,3-DPG more avidly than HbA

4 In the normal ECG the

- (a) Q wave is normally present in lead V6
- (b) T wave is normally inverted in aVR
- (c) Q wave is normally present in V1
- (d) R wave is larger than the S wave in V1
- (e) QRS duration depends on the recording electrode

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[More information](#)**5 Pulmonary vascular resistance is**

- (a) increased when the haematocrit is abnormally high
- (b) decreased when breathing 21% oxygen in 79% helium
- (c) increased by the application of 5 cmH₂O positive end-expiratory pressure
- (d) increased by hypercapnia
- (e) decreased by moderate exercise

6 Concerning baroreceptors

- (a) they are located in the carotid sinus and aortic arch
- (b) they are stretch receptors
- (c) the neuronal discharge decreases as the mean arterial pressure increases
- (d) the neuronal firing increases as the heart rate increases
- (e) baroreceptors in the carotid sinus are more sensitive than aortic receptors to changes in blood pressure

7 Lung compliance

- (a) describes the relationship between pressure and flow
- (b) decreases with age
- (c) is reduced in the supine position
- (d) is normally 1.5–2.0 l/kPa
- (e) is related to body size

8 During normal inspiration there is an increase in

- (a) intrapleural pressure
- (b) alveolar pressure
- (c) intra-abdominal pressure
- (d) the relative humidity of air in the trachea
- (e) the partial pressure of oxygen in the trachea

9 Alveolar dead space is increased in

- (a) pulmonary embolism
- (b) haemorrhage
- (c) increased tidal volumes
- (d) changing from the supine to the erect posture
- (e) intermittent positive-pressure ventilation

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10 Functional residual capacity (FRC)

- (a) measurement by the helium dilution technique gives a higher value than that given by body plethysmography
- (b) is equal to total lung capacity minus the reserve volume
- (c) is increased by changing from the erect to the supine posture
- (d) is reduced during pregnancy
- (e) is decreased in old age

11 The ascending limb of the loop of Henle

- (a) is impermeable to sodium
- (b) is involved in the active transport of potassium ions into the lumen
- (c) is involved in the transport of chloride out of the lumen
- (d) actively transports water
- (e) contains hypotonic urine at the distal end

12 In an awake, healthy individual assuming the lateral position the

- (a) dependent lung has less ventilation
- (b) dependent lung has more perfusion
- (c) \dot{V}/\dot{Q} ratio is higher in the dependent lung
- (d) PO_2 is higher in the lower lung
- (e) P_aCO_2 is lower in the lower lung

13 A pressure volume curve can be used for measuring

- (a) the work of breathing
- (b) compliance
- (c) functional residual capacity (FRC)
- (d) respiratory quotient
- (e) anatomical dead space

14 Cerebrospinal fluid

- (a) is formed by the choroid plexus
- (b) has a specific gravity of 1030 at body temperature
- (c) total volume in a 70-kg adult is 500 ml
- (d) normal pressure in the lateral position is 70–150 kPa
- (e) total protein content is more than that of serum proteins

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[More information](#)**15 Concerning the transport process in the proximal convoluted tubules (PCT)**

- (a) about 50% of the normal filtered load of HCO_3^- ion is absorbed in the proximal tubule
- (b) absorption of glucose is linked to sodium reabsorption
- (c) normally most of the phosphate filtered is excreted
- (d) there are active secretory mechanisms for penicillin and *para*-aminohippuric acid (PAH)
- (e) amino acid absorption is independent of sodium reabsorption

16 The stretch reflex

- (a) consists of only one synapse within the central nervous system
- (b) involves gamma motor fibres as the efferent link
- (c) causes jerkiness of body movements
- (d) involves glutamate as a neurotransmitter at the central synapse
- (e) is highly facilitated in a decerebrate animal

17 Following major surgery a young fit 70-kg man will normally excrete, in 24 h

- (a) 500 ml water
- (b) 30 mmol Na^+
- (c) 10 mmol K^+
- (d) 20 mmol urea
- (e) 10 mmol Cl^-

18 During periods of starvation in humans

- (a) glycogen stores are depleted in 24 h
- (b) amino acids are converted to glucose
- (c) tissue breakdown initially provides 900 calories per day
- (d) urinary nitrogen loss progressively increases
- (e) a loss of 40% body cell mass is compatible with survival

19 In the fetal circulation the

- (a) foramen ovale closes due to pressure change
- (b) ductus venosus carries mixed venous blood
- (c) blood can reach the aorta from the superior vena cava without passing through the left atrium or the left ventricle
- (d) saturation of fetal haemoglobin (Hb F) in the descending aorta is more than in the aortic arch
- (e) oxygen saturation in the umbilical vein is 45%

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20 Delta waves on the EEG are associated with

- (a) hypoxia
- (b) hypercarbia
- (c) sleep
- (d) closing eyes
- (e) deep general anaesthesia

21 Erythropoietin

- (a) is a circulating hormone without which hypoxia has little or no effect on red cell production
- (b) is formed in the kidney and in the liver
- (c) production is stimulated by epinephrine and norepinephrine
- (d) production is increased within minutes of the development of hypoxia
- (e) activity is decreased when the red cell volume is increased

22 The following receptors are present in the chemoreceptor trigger zone (CTZ)

- (a) opioid
- (b) dopaminergic D₁ receptors
- (c) muscarinic M₃ receptors
- (d) adrenergic α ₁ and α ₂
- (e) serotonergic 5HT₃

23 With regard to the vomiting reflex the

- (a) diaphragm relaxes
- (b) glottis opens
- (c) epiglottis closes
- (d) oesophageal sphincter closes
- (e) respiration stops

24 Aldosterone

- (a) does not directly affect renal blood flow
- (b) increases the acidity of urine
- (c) reduces the sodium content of sweat
- (d) potentiates the effects of vasopressin in hypovolaemia
- (e) is excreted in response to angiotensin

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[More information](#)**25 The respiratory quotient (RQ)**

- (a) is the ratio of CO_2 to O_2 at any given time
- (b) is the ratio in the steady-state of the volume of CO_2 produced to the volume of O_2 consumed per unit of time
- (c) is 0.7 with a diet of carbohydrate
- (d) is decreased during hyperventilation
- (e) increases during severe exercise

26 Compensatory reactions activated by haemorrhage include

- (a) decreased movement of interstitial fluid into the capillaries
- (b) decreased plasma protein synthesis
- (c) increased secretion of ADH
- (d) decreased glomerular filtration rate
- (e) decreased filtration fraction

27 In the renal tubule

- (a) hydrogen ions are excreted in combination with ammonia
- (b) hydrogen ions are excreted mostly as phosphate
- (c) aldosterone increases sodium absorption in the distal convoluted tubule (DCT) and collecting duct
- (d) ADH increases water permeability in the DCT
- (e) almost 99% of the glomerular filtrate is reabsorbed

28 When compared to normal people athletes have

- (a) a larger stroke volume at rest
- (b) a lower heart rate at any given level of exercise
- (c) a decreased maximal oxygen consumption ($\dot{V}\text{O}_{2 \text{ max}}$)
- (d) a smaller increase in blood lactate production with exercise
- (e) a higher muscle blood flow

29 Plasma proteins

- (a) exert an osmotic pressure of approximately 5.3 kPa (40 mmHg)
- (b) provide one-half of the buffering capacity of the blood
- (c) include plasminogen
- (d) are mostly in the anionic form
- (e) are the main source of carbamino groups

30 The motility of the gastrointestinal tract is increased by

- (a) vagotomy
- (b) complete transection of the spinal cord at T3

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- (c) stellate ganglion block
- (d) mechanical bowel obstruction
- (e) neostigmine

Pharmacology

31 The following statements are true regarding drug receptors

- (a) they are found only in cell membranes
- (b) drug receptor activity is always G-protein-coupled
- (c) the concentration of receptors in the cell membranes is dynamic
- (d) GABA receptors are ligand-gated ion channels
- (e) competitive antagonists bind reversibly to the receptors

32 The following drugs are extensively metabolised

- (a) prilocaine
- (b) digoxin
- (c) chlorpromazine
- (d) diazepam
- (e) paracetamol

33 The following drugs are well absorbed from the stomach

- (a) morphine
- (b) diamorphine
- (c) midazolam
- (d) loperamide
- (e) propranolol

34 The following factors enhance the diffusion of a drug across the blood-brain barrier

- (a) high plasma protein binding
- (b) high degree of ionisation at physiological pH
- (c) high molecular weight
- (d) high lipid solubility
- (e) high plasma–brain concentration gradient

35 pH alters the structure of the following drugs

- (a) diazepam
- (b) midazolam
- (c) lidocaine

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- (d) atracurium
- (e) suxamethonium

36 The following drugs induce the enzyme cytochrome P450

- (a) carbamazepine
- (b) nitrazepam
- (c) metronidazole
- (d) ranitidine
- (e) rifampicin

37 The following anaesthetic agents cause direct sympathetic stimulation

- (a) enflurane
- (b) sevoflurane
- (c) desflurane
- (d) halothane
- (e) isoflurane

38 The following speed up the induction of anaesthesia with volatile anaesthetics

- (a) use of CO₂
- (b) increased cardiac output
- (c) agents with a high blood/gas solubility coefficient
- (d) increased alveolar ventilation
- (e) hypotension

39 The following cause dystonic reactions

- (a) ondansetron
- (b) metoclopramide
- (c) cyclizine
- (d) prochlorperazine
- (e) domperidone

40 Etomidate

- (a) reduces intraocular pressure
- (b) is solubilised in propylene glycol
- (c) causes a higher incidence of venous sequelae than thiopentone

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- (d) reduces plasma cortisol concentrations by an action on the pituitary gland
- (e) is excreted unchanged in the kidney

41 Prilocaine

- (a) has a pKa of 5.0
- (b) has a longer duration of action than lidocaine
- (c) is metabolised by plasma cholinesterase
- (d) has a higher pKa than bupivacaine
- (e) is more protein bound than bupivacaine

42 Lidocaine (lignocaine)

- (a) prolongs the duration of action of the cardiac action potential
- (b) inhibits plasma cholinesterase
- (c) causes sedation
- (d) causes atrioventricular block
- (e) has a high hepatic extraction ratio

43 Which of the following are true of the mechanisms of opioid action?

- (a) there are currently five separate opioid receptors
- (b) the mu (μ) receptor has been classified as the op1 receptor
- (c) opioid receptors are found at peripheral sites
- (d) buprenorphine is a partial agonist at the mu (μ) receptor
- (e) nalbuphine is an effective mu (μ) receptor antagonist

44 Naloxone

- (a) is a kappa receptor agonist
- (b) has a high oral bioavailability
- (c) has an elimination half-life of 1–2 h
- (d) causes pulmonary oedema
- (e) prevents conversion of angiotensin I to angiotensin II

45 The following are 5HT₃ blockers

- (a) octreotide
- (b) methysergide
- (c) cyproheptadine
- (d) ketanserin
- (e) ondansetron

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46 Flumazenil

- (a) is a competitive benzodiazepine antagonist
- (b) is an inverse agonist at the benzodiazepine receptor
- (c) has a relatively short half-life
- (d) is useful in treating hepatic encephalopathy
- (e) is indicated in status epilepticus

47 Midazolam when compared with diazepam

- (a) is more lipid soluble
- (b) produces longer-acting active metabolites
- (c) causes less discomfort on injection
- (d) has a significantly lower volume of distribution
- (e) has a shorter elimination half-life

48 Neostigmine

- (a) is a tertiary amine
- (b) is metabolised in the liver
- (c) may prolong the action of suxamethonium
- (d) inhibits both cholinesterase and pseudocholinesterase
- (e) if given during pregnancy can cause fetal muscle weakness

49 Potentiation of neuromuscular block by neomycin is

- (a) more likely with a non-depolarising block than with a depolarising block
- (b) intensified by enflurane
- (c) lessened by the administration of calcium
- (d) antagonised by the administration of neostigmine
- (e) increased by simultaneously administering trimethoprim

50 Class 1a anti-arrhythmic drugs usually

- (a) slow depolarisation
- (b) increase the threshold potential
- (c) increase the action potential
- (d) are indicated for atrial arrhythmias
- (e) have local anaesthetic activity