

# 中山醫學大學 101 學年度碩士班入學招生考試試題

## 護理學系碩士班

考試科目：生理學

時間：80 分鐘

※請注意本試題共( 5 )張，如發現頁數不足，應當場請求補齊，否則缺頁部份概以零分計算。第 ( 1 ) 頁

- I. Please choose correct answer from each question (100 score)
1. Sweat is secreted by exocrine glands. This means that (A). it is produced by epithelial cells. (B). it is a hormone. (C). it is secreted into a duct. (D). it is produced outside the body.
  2. The step in protein synthesis during which tRNA, rRNA, and mRNA are all active is known as (A). transcription. (B). translation. (C). replication. (D). RNA polymerization.
  3. The act of breathing raises the blood oxygen level, lowers the blood carbon dioxide concentration, and raises the blood pH. According to the principles of negative feedback, sensors that regulate breathing should respond to (A). a rise in blood oxygen. (B). a rise in blood pH. (C). a rise in blood carbon dioxide concentration. (D). all of these.
  4. According to the fluid-mosaic model of the plasma membrane (A). protein and phospholipids form a regular, repeating structure. (B). the membrane is a rigid structure. (C). phospholipids form a double layer, with the polar parts facing each other. (D). proteins are free to move within a double layer of phospholipids.
  5. The organelle that combines proteins with carbohydrates and packages them within vesicles for secretion is (A). the Golgi complex. (B). the granular endoplasmic reticulum. (C). the agranular endoplasmic reticulum. (D). the ribosome.
  6. The organelle that contains digestive enzymes is (A). the mitochondrion. (B). the lysosome. (C). the endoplasmic reticulum. (D). the Golgi complex.
  7. In a negative feedback loop, the effector organ produces changes that are (A). in the same direction as the change produced by the initial stimulus. (B). opposite in direction to the change produced by the initial stimulus. (C). unrelated to the initial stimulus. (D). all of these.
  8. The movement of water across a plasma membrane occurs by (A). active transport. (B). facilitated diffusion. (C). simple diffusion (osmosis). (D). all of these.
  9. Which of these statements about the facilitated diffusion of glucose is true? (A). There is a net movement from the region of lower to the region of higher concentration. (B). Carrier proteins in the cell membrane are required for this transport. (C). This transport requires energy obtained from ATP. (D). It is an example of cotransport.
  10. In the control of emotion and motivation, the limbic system works together with (A). the pons. (B). the thalamus. (C). the hypothalamus. (D). the cerebellum.
  11. Which of these statements regarding an increase in blood osmolality is true?

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- (A). It can occur as a result of dehydration. (B). It causes a decrease in blood osmotic pressure. (C). It is accompanied by a decrease in ADH secretion. (D). All of these are true.
12. The supporting cells that form myelin sheaths in the peripheral nervous system are (A). oligodendrocytes. (B). satellite cells. (C). Schwann cells. (D). astrocytes.
13. Depolarization of an axon is produced by (A). inward diffusion of  $\text{Na}^+$ . (B). active extrusion of  $\text{K}^+$ . (C). outward diffusion of  $\text{K}^+$ . (D). inward active transport of  $\text{Na}^+$ .
14. Repolarization of an axon during an action potential is produced by (A). inward diffusion of  $\text{Na}^+$ . (B). active extrusion of  $\text{K}^+$ . (C). outward diffusion of  $\text{K}^+$ . (D). inward active transport of  $\text{Na}^+$ .
15. Which of these is *not* a characteristic of action potentials? (A). They are produced by voltage-regulated gates. (B). They are conducted without decrement. (C).  $\text{Na}^+$  and  $\text{K}^+$  gates open at the same time. (D). The membrane potential reverses polarity during depolarization.
16. Which of these statements about the basal nuclei is true? (A). They are located in the cerebrum. (B). They contain the caudate nucleus. (C). They are involved in motor control. (D). All of these are true.
17. Plasma has an osmolality of about 300 mOsm. The osmolality of isotonic saline is equal to (A). 150 mOsm. (B). 300 mOsm. (C). 600 mOsm. (D). none of these.
18. The neurotransmitter of preganglionic sympathetic fibers is (A). norepinephrine. (B). epinephrine. (C). acetylcholine. (D). dopamine.
19. Tonic receptors (A). are fast-adapting. (B). do not fire continuously to a sustained stimulus. (C). produce action potentials at a greater frequency as the generator potential is increased. (D). are described by all of these.
20. The secretion of which of these hormones would be *increased* in a person with endemic goiter? (A). TSH (B). thyroxine (C). triiodothyronine (D). all of these
21. Which of these terms best describes the interactions of insulin and glucagon? (A). synergistic (B). permissive (C). antagonistic (D). cooperative
22. Which of these muscles have motor units with the highest innervation ratio?

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- (A). leg muscles (B). arm muscles (C). muscles that move the fingers (D). muscles of the trunk
23. When a skeletal muscle shortens during contraction, which of these statements is *false*?  
(A). The A bands shorten. (B). The H bands shorten. (C). The I bands shorten.  
(D). The sarcomeres shorten.
24. When a muscle is stimulated to contract,  $Ca^{2+}$  binds to (A). myosin.  
(B). tropomyosin. (C). actin. (D) troponin.
25. Which of these muscle types is striated and contains gap junctions? (A). single-unit smooth muscle (B). multiunit smooth muscle (C). cardiac muscle (D). skeletal muscle
26. The appearance of glucose in the urine (A). occurs normally. (B). indicates the presence of kidney disease. (C). occurs only when the transport carriers for glucose become saturated. (D). is a result of hypoglycemia.
27. The kidneys help to maintain acid-base balance by (A). the secretion of  $H^+$  in the distal regions of the nephron. (B). the action of carbonic anhydrase within the apical cell membranes. (C). the action of carbonic anhydrase within the cytoplasm of the tubule cells. (D). all of these
28. An ischemic injury to the heart that destroys myocardial cells is (A). angina pectoris. (B). a myocardial infarction. (C). fibrillation. (D). heart block.
29. Edema may be caused by (A). high blood pressure. (B). decreased plasma protein concentration. (C) leakage of plasma protein into tissue fluid. (D). all of these.
30. Both ADH and aldosterone act to (A). increase urine volume. (B). increase blood volume. (C). increase total peripheral resistance. (D). produce all of these effects.
31. The volume of blood pumped per minute by the left ventricle is (A). greater than the volume pumped by the right ventricle. (B). less than the volume pumped by the right ventricle. (C). the same as the volume pumped by the right ventricle. (D). either less or greater than the volume pumped by the right ventricle, depending on the strength of contraction.
32. If a person with normal lung function were to hyperventilate for several seconds, there would be a significant (A). increase in the arterial  $PO_2$ . (B). decrease in the arterial  $PCO_2$ . (C). increase in the arterial percent oxyhemoglobin saturation. (D). decrease in the arterial pH.
33. Erythropoietin is produced by (A). the kidneys. (B). the liver. (C). the

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- lungs. (D). the bone marrow.
34. Most of the carbon dioxide in the blood is carried in the form of (A). dissolved CO<sub>2</sub>.  
(B). carbaminohemoglobin. (C). bicarbonate. (D). carboxyhemoglobin.
35. The chemoreceptors in the medulla are directly stimulated by (A). CO<sub>2</sub> from the  
blood. (B). H<sup>+</sup> from the blood. (C). H<sup>+</sup> in cerebrospinal fluid that is derived from  
blood CO<sub>2</sub>. (D). decreased arterial Po<sub>2</sub>.
36. The cells that normally have the fastest rate of spontaneous diastolic depolarization are  
located in (A). the SA node. (B). the AV node. (C). the bundle of His.  
(D). the Purkinje fibers.
37. Which of these hormones may have a primary role in many circadian rhythms?  
(A). estradiol (B). insulin (C). adrenocorticotrophic hormone (D). melatonin
38. Which of these statements about gastric secretion of HCl is *false*? (A). HCl is  
secreted by parietal cells. (B). HCl hydrolyzes peptide bonds. (C). HCl is  
needed for the conversion of pepsinogen to pepsin. (D). HCl is needed for  
maximum activity of pepsin.
39. During the gastric phase, the secretion of HCl and pepsinogen is stimulated by  
(A). vagus nerve stimulation that originates in the brain. (B). polypeptides in the  
gastric lumen and by gastrin secretion. (C). secretin and cholecystokinin from the  
duodenum. (D). all of these.
40. Which of these statements about hepatic portal blood is true? (A). It contains absorbed  
fat. (B). It contains ingested proteins. (C). It is mixed with bile in the liver. (D).  
It is mixed with blood from the hepatic artery in the liver.
41. Which of these statements about fat digestion and absorption is false?  
(A). Emulsification by bile salts increases the rate of fat digestion. (B). Triglycerides  
are hydrolyzed by the action of pancreatic lipase. (C). Triglycerides are resynthesized  
from monoglycerides and fatty acids in the intestinal epithelial cells.  
(D). Triglycerides, as particles called chylomicrons, are absorbed into blood capillaries  
within the villi.
42. Which of these statements about contraction of intestinal smooth muscle is *true*?  
(A). It occurs automatically. (B). It is increased by parasympathetic nerve stimulation.  
(C). It produces segmentation. (D). All of these are true.
43. A person with the genotype XO has (A). ovaries. (B). testes. (C). both ovaries and  
testes. (D). neither ovaries nor testes.
44. Uterine contractions are stimulated by (A). oxytocin. (B). prostaglandins. (C).

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- prolactin. (D). both *a* and *b*.
45. Contraction of the mammary glands and ducts during the milk-ejection reflex is stimulated by (A). prolactin. (B). oxytocin. (C). estrogen. (D). progesterone.
46. The receptors for taste are (A). naked sensory nerve endings. (B). encapsulated sensory nerve endings. (C). specialized epithelial cells. (D) none of these
47. In an isotonic muscle contraction, (A). the length of the muscle remains constant. (B). the muscle tension remains constant. (C). both muscle length and tension are changed. (D). movement of bones does not occur.
48. The energy for muscle contraction is *most directly* obtained from (A). phosphocreatine. (B). ATP. (C). anaerobic respiration. (D). aerobic respiration.
49. According to the Frank-Starling Law of the Heart, the strength of ventricular contraction is (A) directly proportional to the end-diastolic volume. (B). inversely proportional to the end-diastolic volume. (C). independent of the end-diastolic volume. (D). none of these
50. The greatest resistance to blood flow occurs in (A). large arteries. (B). medium-sized arteries. (C). arterioles. (D). capillaries.