國　立　清　華　大　學　命　題　紙

95 學年度＿＿＿＿＿生命科學院＿＿＿＿＿系（所）＿甲＿組碩士班入學考試

科目＿＿生理學＿＿＿＿ 科目代碼＿＿＿0803＿＿＿共＿2＿頁第＿1＿頁 *請在【答案卷卡】內作答

選擇題及問答題，都請在答案卷內作答

Choice questions (2 points each)

1. **What is the function of statocyst** of an invertebrate? (A) vision (B) olfaction (C) reproduction (D) balance (E) development.
2. What is the major nitrogenous waste in birds? (A) ammonia (B) urea (C) uric acid (D) amine (E) amino acid.
3. Which hormone is involved in a positive feedback? (A) calcitonin (B) insulin (C) ADH (D) oxytocin (E) epinephrine.
4. Which one has the lowest blood pressure? (A) systolic pressure (B) diastolic pressure (C) aorta (D) capillaries (E) veins.
5. Which one along the digestive track is the first place to digest proteins (A) oral cavity (B) stomach (C) duodenum (D) small intestine (E) large intestine.
6. What is the function of T-tubules in muscle contraction? (A) increase calcium release (B) increase membrane surface (C) transmit depolarization signals into muscle cells (D) regulate myosin motility (E) decrease muscle length.
7. Why cuttlefish cannot live below 240 m? (A) cuttlebone is rigid (B) gas in cuttlebone is low (C) no food (D) buoyancy is negative below 240 m (E) buoyancy is positive below 240 m.
8. How does a shark detect a flounder completely buried in the sand? (A) by olfactory signals (B) by infrasound signals (C) by infrared signals (D) by echo location (E) by electrical signals.
9. 下列敘述，何者為真？(A) 下視丘 (hypothalamus) 分泌 GnRH 的神經細胞，其神經末梢 (nerve terminal, axonal terminal) 位於腦下腺前葉 (anterior pituitary)。(B) 小明剛剛吃掉一大塊巧克力蛋糕，此時他血液中的 insulin 以及 insulin carrier protein 的濃度均較正常值為高。(C) 腦下腺後葉 (posterior pituitary) 分泌 vasopressin 的神經細胞，其神經末梢 (nerve terminal, axonal terminal) 位於腎臟 (kidney)。(D) 腎上腺髓質 (adrenal medulla) 分泌的 epinephrine 係經由血液傳送至其 target cells。(E) 以上皆非。
10. 大偉因腎上腺 (adrenal gland) 細胞病變，以手術切除左側之腎上腺，手術後兩個小時，其血液中 glucocorticoid 濃度約為正常值的一半，此時 (A) 大偉血液中 ACTH 之濃度較正常值為低。(B) 大偉腦下下腺前葉分泌 ACTH 的細胞，其細胞內 glucocorticoid receptor 之數目較正常值為高。(C) 大偉血液中 mineralocorticoid 之濃度較正常值為高。(D) 護士抽取大偉之靜脈血液，發現其中 CRH 之濃度較正常值為高。(E) 以上皆非。

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Assay questions:

1. Explain the significance of lateral inhibition in sensory system, and give an example to demonstrate its function (8 points).

2. What is the major difference between "countercurrent multiplier" and "countercurrent exchanger"? Give an example each to support your explanations (5 points).

3. Explain why the anterior pituitary gland is sometimes referred to as the "master gland" and why this reference is misleading. (10 points)

4. Compare the mechanism of excitation-coupling in striated muscle with that in smooth muscle. (10 points)

5. Distinguish between the respiratory and metabolic components of acid-base balance. What are some of the causes of acid-base disturbances? (10 points)

6. Describe the role of macrophages in activating the specific immune response to antigen. (10 points)

7. Describe the formation, composition and function of pulmonary surfactant. What happens when surfactant is absent? How is this condition treated? (10 points)

8. Explain how glomerular ultrafiltrate is produced and why it has a low protein concentration. (10 points)

9. Describe how pancreatic enzymes become activated in the lumen of the intestine. Why are these mechanisms needed? (7 points)