

國立成功大學
110學年度碩士班招生考試試題

編 號： 275

系 所： 生理學研究所

科 目： 生理學

日 期： 0203

節 次： 第 2 節

備 註： 不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、選擇題 (單選，每題 2 分)

1. Under physiological condition, what is the value of ventricular action potential in heart muscle?
 - a. 10 msec
 - b. 1 sec
 - c. 200 msec
 - d. 2 sec
2. Which of the following statements regarding voltage-activated Na^+ current is incorrect?
 - a. This current is not present in neurons.
 - b. This current is closely linked to generation of neuronal action potential.
 - c. This current is permeable to Na^+ ions.
 - d. The activation of this current is not required for ATP consumption.
3. Which of the following statements regarding nicotinic cholinergic receptors located at neuromuscular junction is incorrect?
 - a. The acetylcholine molecule can bind to this type of receptor, leading to direct activation of voltage-activated Na^+ channels.
 - b. Once this receptor is bound by acetylcholine, the activity of a unique population of non-selective ion channel would be activated.
 - c. As this type of receptor was bound irreversibly, skeletal muscle would be paralyzed.
 - d. As acetylcholine at the junction is degraded, the channel activity linked to its binding to the receptor would be decreased.
4. Which of the following statements regarding funny current in sinoatrial node is incorrect?
 - a. This current is responsible for diastolic depolarization of sinoatrial cells.
 - b. This current is sensitive to decrease by the increase of intracellular cyclic AMP inside sinoatrial cells.
 - c. This current is subjected to be blocked by acetylcholine release from parasympathetic nerve ending.
 - d. This current can be permeable to Na^+ and K^+ ions.
5. Which of the following statements regarding cytosolic calcium concentration in vascular smooth muscle is incorrect?
 - a. Cytosolic Ca^{2+} can be raised by the increase of intracellular inositol trisphosphate.
 - b. Cytosolic Ca^{2+} is not sensitive to change in the magnitude of L-type Ca^{2+} channels in the surface membrane of smooth muscle cells.
 - c. Change in cytosolic Ca^{2+} of smooth muscle is closely linked to the contraction of smooth muscle cells.

- d. As cytosolic Ca^{2+} is increased, the amplitude of Ca^{2+} -activated K^+ current present in surface membrane can be enhanced.
6. What is not the main signs or symptoms in patients with Parkinson's disease?
- Resting tremor
 - Muscle resistance
 - Increased deep tendon reflex
 - Masked face
7. What of the following statements regarding skeletal muscle is incorrect?
- Skeletal muscle is innervated by autonomic nerve.
 - Skeletal muscle is manifested by striation pattern seen in light microscopy.
 - Skeletal muscle can be voluntarily contracted.
 - As repetitive stimuli, skeletal muscle can result in tetanic contraction.
8. What of the following statements regarding ionic dysequilibria of the mammalian cell is incorrect?
- Intracellular K^+ concentration is higher than extracellular one.
 - Intracellular Na^+ concentration is higher than extracellular one.
 - Extracellular Ca^{2+} concentration is higher than intracellular one.
 - Ca^{2+} concentration inside the sarcoplasmic reticulum is higher than that in the cytosol.

二、問答題

- 請比較在視網膜中有直接突觸連結關係的桿細胞 (rods)、雙極細胞 (bipolar cells) 及節細胞 (ganglion cells) 在登錄光子時，其相對的接受域 (receptive field) 大小為何 (6%)。三原色理論 (trichromatic theory) 導引出三種錐細胞 (cones) 的發現，這三種錐細胞在登錄單一頻率的可見光所產生動作電位的生理現象有何不同 (8%)?
- Please take an example to describe the difference of long-loop and short-loop negative feedback in the hypothalamo-anterior pituitary gland system. (10%)
- Please list and describe at least three methods to determine the cardiac output and heart function. (10%)
- Please describe the factors to decrease the affinity of hemoglobin for O_2 . (10%)
- Please explain the inputs controlling thirst. (10%)
- How can the satiety signals (factors to decrease appetite) affect controlling appetite and food intake? (10%)
- Sertoli cells play important roles in male spermatogenesis. Please describe the functions of Sertoli cells. (10%)
- Although immune responses can protect our body, sometimes immune response can be harmful. Please take an example to describe the harmful immune responses. (10%)