

(1) Which of the following substances or items is (are) under homeostatic control? Exactly how they are regulated in our body is an important question for physiologists. Please use one of the following items to define the regulatory mechanism of homeostasis. (15%)

- A. BUN.
- B. Creatinine.
- C. Na^+ or K^+ .
- D. Body temperature.
- E. Blood pressure.

(2) The trend of physiological research direction has been shifted from in vivo to in vitro. What are in vivo and in vitro studies in physiological aspect? What are the reasons which lead to this direction shift? (10%)

(3) Please describe how different cells can communicate with each other and how you can study it. (15%)

(4) Apoptosis is also called programmed cell death or physiological cell death. What are the hallmarks of apoptosis? What are the physiological functions of apoptosis in mammalian tissues. (15%)

(5) Hypertension is a very common disease for human being. Renin-angiotensin system (RAS) plays very important roles in regulation of blood pressure. Please describe what RAS is, how it is involved in blood pressure regulation and finally what strategy we can use to lower blood pressure. (15%)

(6) Diabetes Mellitus (DM) is another common human disease. Hyperglycemia causes a lot of problems leading to the damage of lense, nerve, cardiovascular system and kidney. Controlling blood sugar is the most important strategy for treating DM pateints. Please describe how blood sugar is regulated in normal person and what are the possible defects which cause hyperglycemia in DM patients. (15%)

(7) Congenital deficiency of thyroid hormone results in mental retardation and dwarfism. Hyperthyroidism is cuased by overproduction of thyroid hormone. Please describe the physiological functions of thyroid hormone and explain how they are associated with the clinical symptoms of hypothyroidism and hyperthyroidism. (15%)