

系所組別： 臨床醫學研究所

考試科目： 生命科學

考試日期： 0220，節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

PART I

1. What are the components of the cell membrane? (5%)
Please summarize the principles of membrane transport. (5%)
2. What is RNA interference? (5%)
Please describe the potential target of RNAi-based therapy in your interested disease (please provide one example). (5%)
3. What is stem cell? (5%)
How to take advantage of the stem cell study in regenerative medicine (please provide one example)? (5%)
4. What is gene knockout mouse? (3%)
Please state the general strategy for generating the mouse. (7%)
5. What is the major finding of the Nobel Prize in Physiology or Medicine 2010? (5%)
2008 Nobel Prize in Chemistry was awarded to Drs. Roger Tsien, Osamu Shimomura and Marty Chalfie; please provide an example in basic or clinic medicine by using their finding. (5%)

(背面仍有題目,請繼續作答)

系所組別： 臨床醫學研究所

考試科目： 生命科學

考試日期： 0220，節次： 3

※ 考生請注意：本試題 可 不可 使用計算機**PART II**

Question 1-5 (5% each for questions 1-4, 15% each for questions 5-6)

A particular mouse colony was found in the animal facility of NCKU during the breeding of BALB/c mice for experiments on disease models. The mice from this colony can breed normally and have normal appearance and life span when they were kept in an aseptic room. However, if they were moved to other rooms without aseptic precautions, 90% of the mice died before the age of 3 months. Examination of the sick animals showed that they were infected with Gram-negative bacteria which lead to strong inflammatory responses in the lungs. The inflammation leads to low oxygen concentration in the tissue and directly causes the death of the animals. Genetic characterization of the mouse colony showed that the mice are syngeneic and the susceptibility to Gram negative bacteria is due to a mutation on one of the pathogen pattern recognition receptors (PRRs).

1. Which of the following statements about these mice in this particular colony is true ?

A.	Natural mutations always occur in both copied of genes simultaneously.
B.	The mutation can be inherited from parents to offspring.
C.	X-linked hereditary diseases only occur in male animal.
D.	Some of the mice in the colony are black while others are white.
E.	All of the above are false.

2. Regarding Gram-negative bacteria, which of the following is true ?

A.	These are rare microorganisms found only in high mountains.
B.	They are eukaryotic microorganism.
C.	These bacteria cause common cold.
D.	Streptococcus pneumonia is one of the most commonly encountered species.
E.	All of the above are false.

系所組別： 臨床醫學研究所

考試科目： 生命科學

考試日期：0220 節次：3

※ 考生請注意：本試題 可 不可 使用計算機

3. The so-called pathogen recognition receptors include which of the following ?

A.	T cell receptors
B.	B cells receptors
C.	MHC class I molecules
D.	NOD-like receptors
E.	CD1 molecules

4. These mice were found to have particularly high levels of carbon dioxide due to respiratory failure before their death. Which of the following factors may NOT aggravate this phenomenon ?

A.	Lung edema
B.	Decreased pulmonary blood flow
C.	Increased volume of air exchange
D.	Lack of central drive for respiration
E.	Increased oxygen consumption in the muscle

5. Although the causative gene mutation (on a PRR gene) has been known, staff scientists in the NCKU animal facility still have no idea why Gram-negative bacterial infections cause such severe lung inflammation. Please propose some experiments to help the staff scientists to understand the mechanism of the mysterious mouse death.

6. One of the major differences between normal epithelial cells and carcinoma cells is the ability to leave the original location in the epithelia and traffic to other part of the body, which process is termed "metastasis". Please explain how the process of metastasis can be accomplished by tumor cells.