

國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：免疫學【生科系碩士班甲組選考】

題號：4036
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Answer the following questions on the ANSWER SHEET only:

1. Describe the contributions in immunology by which Bruce Beutler, Jules Hoffmann and Ralph Steinman were honored as Nobel Prize winners? (10%)
2. Superantigens have been involved in several diseases and have been useful as research tools.
 - a. What properties of superantigens distinguish them from usual antigens? (10%)
 - b. By what mechanism are bacterial superantigens thought to cause symptoms associated with food poisoning and toxic shock syndrome? (5%)
 - c. Does the activity of superantigens exhibit MHC restriction? Explain. (5%)
3. NK cells do not express TCR molecules, yet they bind to Class I MHC molecules on potential target cells.
 - a. Explain how NK cells lacking TCRs can recognize infected cells. (10%)
 - b. What is the mechanism used by NK cells to kill target cells? (5%)
 - c. From what precursor cells do NK cells arise? (5%)
4. Despite the fact that there are no licensed vaccines for them, life-threatening fungal infections are not a problem for the common population. Why? Who may be at risk for them? (10%)
5. Scientific analyses of many antibody molecules bound to their respective antigens have revealed that the CDR3 of both the heavy and light chains make contact with the epitope. Sequence analyses reveal that the variability of CDR3 is greater than that of either CDR1 or CDR2. What mechanisms account for the greater diversity in CDR3? (15%)
6. Recent discoveries explored the central role of TLR in innate immunity.
 - a. Draw and explain the basic structure of TLR. (10%)
 - b. Describe a signal transduction pathway of TLR which results in the generation of inflammatory cytokines. (15%)