

1. 請說明 RNAi 之功能與作用機轉。(8%)
2. Please describe the structure and functions of immunoglobulin G (IgG) (10%)
3. "Please describe several molecular methods for DNA amplification" (10%)
4. What is microRNA? Please describe three possible applications of microRNA in cancer therapy. (8%)
5. Gene regulation is very important for specific gene expression. Please provide the specific example to explain what is the positive regulation and negative regulation. (10%)
6. Since the middle of August 2011, the US CDC has received 12 reports of human infections with a new flu virus — a swine influenza A strain called H3N2. So far the cases come from five states — Indiana, Iowa, Maine, Pennsylvania and West Virginia — and all but one of the affected individuals were below the age of 18. While the virus itself seems to have originated in pigs and initially jumped directly from swine to human beings, half of the cases had no documented contact with pigs, which means there's at least minimal person-to-person transmission. Because there's already a common seasonal flu called H3N2, health officials are calling the new strain H3N2v — meaning v for "variant." (10%)
 - (a) Please describe the method to identify the new H3N2v
 - (b) Please describe how to test whether the current flu vaccine can protect H3N2v infection or not.
7. You are asked to PCR (Polymerase Chain Reaction)-amplify a DNA fragment for subsequent sub-cloning process. Your advisor gives you a tube containing a plasmid that harbors the target fragment you are supposed to amplify. Your advisor also gives you a pair of primers that you are supposed to use in your PCR reactions. Please answer the following questions accordingly.
 - (1) What else (reagents) will you need to accomplish your mission? (2%)
 - (2) Have you ever wondered why your advisor asked you to PCR-amplify the fragment, instead of directly cutting the fragment from the amplified plasmids? Please provide at least one reason for why the fragment needs to be obtained from PCR. (2%)
 - (3) Supposed that you'd found what you needed and done the experiment. However, the experiment did not work (meaning that you did not get the fragment amplified). What will you do next and why? (You can do more than one thing to try to solve the problem, but be sure that you provide the reason(s) for each action you take. (4%)

(背面仍有題目,請繼續作答)

系所組別： 醫學檢驗生物技術學系

考試科目： 生化與分生

考試日期： 0226，節次： 3

8. Please describe how Prof. Shinya Yamanaka produces induced pluripotent stem cells (iPS cells) and briefly describe the potential application of iPS cells in human diseases. (10%)
9. You found a sequence of a mouse gene thought to be involved in controlling the recognition of pathogen on macrophage. You believe that a similar gene in human. Please describe how you identify the human homolog and confirm the biological function. (9%)
10. How to identify specific biomarkers to develop a promising clinical diagnosis for early screening of colon cancer? (9%)
11. What is LDL receptor pathway? What target would be used as the LDL Cholesterol-Lowering Drugs? (6%)
12. Describe the events of the following figure. What is the final outcome of these events? (2%)

