國立成功大學

113學年度碩士班招生考試試題

編　號：260

系　所：微生物及免疫學研究所

科　目：免疫學

日　期：0202

節　次：第 3 節

備　註：不可使用計算機

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※ 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。

1. Please read the abstract and answer the following questions:

Influenza viruses infect 5–30% of the world's population annually, resulting in millions of incidents of hospitalization and thousands of mortalities worldwide every year. Although annual vaccination has significantly reduced hospitalization rates in vulnerable populations, the current vaccines are estimated to offer a wide range of protection from 10 to 60% annually. Such incomplete immunity may be related to both poor antigenic coverage of circulating strains, as well as to the insufficient induction of protective immunity. Beyond the role of hemagglutinin (HA) and neuraminidase (NA), vaccine-induced Abs have the capacity to induce a broader array of Ab effector functions, including Ab-dependent cellular cytotoxicity, that has been implicated in universal immunity against influenza viruses. However, whether different vaccine platforms can induce functional humoral immunity in a distinct manner remains incompletely defined. In this study, we compared vaccine-induced humoral immune responses induced by two seasonal influenza vaccines in *Homo sapiens*, the i.m. inactivated vaccine (IIV/Fluzone) and the live attenuated mucosal vaccine (LAIV/FluMist). Whereas the inactivated influenza vaccine induced superior Ab titers and FcγR binding capacity to diverse HA and NA Ags, the live attenuated influenza mucosal vaccine induced a more robust functional humoral immune response against both the HA and NA domains. Multivariate Ab analysis further highlighted the significantly different overall functional humoral immune profiles induced by the two vaccines, marked by differences in IgG titers, FcR binding, and both NK cell–recruiting and opsonophagocytic Ab functions. These results highlight the striking differences in Ab Fc-effector profiles induced systemically by two distinct influenza vaccine platforms. (*J Immunol* 2023; ji2200956. https://doi.org/10.4049/jimmunol.2200956).

   (1) How do antibody-mediated humoral immune responses against microbes? (15%)
   (2) Please describe the mechanisms to achieve antibody diversity. (15%)
   (3) Based on your opinion, describe the important contributions of this research. (10%)

2. Please describe what you know about inflammasome, and how is it stimulated? (15%)
3. Please briefly explain the following terms (4% each).
   (1) Antigen-precenting cells (APCs)
   (2) Adjuvant
   (3) Cross-presentation
   (4) MHC restriction
   (5) Host-versus-graft disease (GVHD)
4. Please describe the major types of hypersensitivity reactions. (15%)
5. Please explain the process by which $CD8^+$ T cells induce infected-cell death. (10%)