

系所組別：微生物及免疫學研究所乙、丁組

考試科目：免疫學

考試日期：0223，節次：2

※ 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 describe the role of T helper 17 cells ( $T_H17$ ) in autoimmune diseases. (7%)

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

Autophagy and phagocytosis are conserved cellular functions involved in innate immunity. However, the nature of their interactions remains unclear. We evaluated the role of autophagy in regulating phagocytosis in macrophages from myeloid-specific autophagy-related gene 7-deficient ( $Atg7^{-/-}$ ) mice.  $Atg7^{-/-}$  macrophages exhibited higher bacterial uptake when infected with *Mycobacterium tuberculosis* (Mtb) or with *M. tuberculosis var. bovis* BCG (BCG). In addition, BCG-infected  $Atg7^{-/-}$  mice showed increased bacterial loads and exacerbated lung inflammatory responses.  $Atg7^{-/-}$  macrophages had increased expression of two class A scavenger receptors: macrophage receptor with collagenous structure (MARCO) and macrophage scavenger receptor 1 (MSR1). The increase in scavenger receptors was caused by increased activity of the nuclear factor (erythroid-derived 2)-like 2 (NFE2L2) transcription factor resulting from accumulated sequestosome 1 (SQSTM1 or p62) in  $Atg7^{-/-}$  macrophages. These insights increase our understanding of the host-pathogen relationship and suggest that therapeutic strategies should be designed to include modulation of both phagocytosis and autophagy.

(Immunity 39:537, 2013)

- a. What is autophagy? (5%)
- b. Please describe the experiments the authors might perform to complete this research paper. (8%)
- c. Please describe the most important contribution of this research. (6%)

3. Please explain the following terms. (24%)

- a. M2 macrophages
- b. Toll-like receptors
- c. Regulatory T cells
- d. Inflammasome
- e. NKT cells
- f. Pathogen-associated molecular pattern
- g. Langerhans cells
- h. T cell homeostasis

(背面仍有題目，請繼續作答)

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4. Explain how B cells can produce millions of antibodies recognizing different foreign proteins. (25%)
5. Describe how foreign antigen is presented to T cells. (25%)