

系所組別：微生物及免疫學研究所甲、丁組

考試科目：微生物學

考試日期：0226，節次：2

Please read the following paragraph and answer questions 1 to 4.

Elongation factor P (EF-P) is posttranslationally modified at a conserved lysyl residue by the coordinated action of two enzymes, PoxA and YjeK. Here we report that, like *poxA* and *yjeK* mutants, *Salmonella* strains lacking EF-P (the *efp* mutants) displayed increased susceptibility to hypoosmotic conditions, antibiotics and detergents and showed enhanced resistance to the compound *S*-nitrosoglutathione. The susceptibility phenotypes could be largely explained by the enhanced membrane permeability of the *efp* mutant, which exhibited increased uptake of the hydrophobic dye 1-*N*-phenylnaphthylamine (NPN). Analysis of the membrane proteomes of wild-type and *efp* mutant *Salmonella* strains revealed few changes, including the prominent overexpression of a single porin, KdgM, in the *efp* mutant outer membrane. Removal of KdgM in the *efp* mutant ameliorated the detergent, antibiotic, and osmosensitivity phenotypes and restored wild-type permeability to NPN. Our data support a role for EF-P in the translational regulation of a limited number of proteins that, when perturbed, renders the cell susceptible to stress by the adventitious overexpression of an outer membrane porin. (modified from the abstract of an article published in *J. Bacteriol.* 2012 194: 413-425)

1. Explain the following terms:
 - a. Porin (6%)
 - b. Proteome (6%)
 - c. Osmosensitivity (6%)
2. Briefly describe the morphology and pathogenicity of *Salmonella* strains. (10%)
3. Propose two possible mechanisms that lead to enhanced resistance to *S*-nitrosoglutathione in the *efp* mutant. (11%)
4. Design an experiment by which you can show to people that EF-P is posttranslationally modified by PoxA and YjeK? (11%)

(背面仍有題目,請繼續作答)

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5. Please describe how the following viruses replicate their genomes (30%).
 - A. Herpesviruses
 - B. Hepatitis B virus
 - C. Enterovirus 71
 - D. Rabies virus
 - E. Human immunodeficiency virus
6. Bird flu, A (H5N1), can induce mortality in humans, but it does not infect mice very efficiently. If you get a project to increase the virus infectivity in mice, how are you going to do it? (10%).
7. Please describe two types of immune responses that humans use to clear viruses (10%).