

# 國立清華大學 103 學年度碩士班考試入學試題

系所班組別：生命科學院甲組、醫學生物科技學程

考試科目（代碼）：細胞生物學(0405、0705)

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1. Why is two-photon microscopy better than confocal microscopy? (5%)
2. Describe the roles of kinesin and dynein in maintaining the Golgi stacks. (5%)
3. What is the function of T-tubules in muscle contraction? (5%)
4. Why Type O person is a universal donor, and Type AB person is an universal recipient? (5%)
5. Describe an experiment to show both E-cadherin and P-cadherin on cell adhesion is homophilic interactions. (5%)
6. Explain why a myelinated neuron conducts signals more rapidly than an unmyelinated neuron. (8%)
7. Explain in your own words why increasing the density of voltage-gated  $\text{Na}^+$  channels decreases the threshold potential of a neuron. (8%)
8. Why can't graded potentials be propagated across long distances in neuron. (9%)
9. What are the functions of membranes? (10 %)
10. Imagine protein X, destined to go to the plasma membrane. Assume that the mRNA carrying the genetic message for protein X has already been translated by ribosomes in a cell culture. If you fractionate the cell, in which fraction would you find protein X? Explain by describing its transit. (10 %)
11. What is phagocytosis? What is pinocytosis? Explain the similarities and differences between the two. (5 %)
12. Please describe (a) how receptor tyrosine kinase acts through Ras-dependent pathway to promote cell proliferation, (b) how receptor tyrosine kinase acts through Ras-independent pathways to promote cell survival and (3) how Transforming growth factor beta receptor pathway inhibits cell division (15%)
13. Please explain how p53 and APC function as tumor suppressor genes, respectively? (10%)