

# 國立嘉義大學 99 學年度

## 微生物免疫與生物藥學系碩士班招生考試試題

### 科目：生物化學

1. Hypoxia inducible factor-1 $\alpha$  (HIF-1  $\alpha$ ) is a transcription factor that regulates the expression of over 60 genes, including genes that encode vascular endothelium growth factor (VEGF), an angiogenic factor, and multidrug resistance-1 (MDR-1). NCYU990305 is a new developing anti-breast cancer drug. Please design an experiment in detail to demonstrate the anti-cancer mechanism of NCYU990305 is via anti-angiogenesis but not anti-MDR-1. (15分)
2. A graduate student detected the initial rate of an enzyme reaction as a function of substrate concentration in the presence and absence of an inhibitor. The following data are obtained:

[S]	$V_0$	
	-Inhibitor	+Inhibitor
0.0001	33	17
0.0002	50	29
0.0005	71	50
0.001	83	67
0.002	91	80
0.005	96	91
0.01	98	95
0.02	99	98
0.05	100	99
0.1	100	100
0.2	100	100

- (a) What is the  $V_{max}$  in the absence of inhibitor? (5 分)
- (b) When  $[S] = 0.0004$ , what will  $V_0$  be in the absence of inhibitor? (5 分)
- (c) What kind of inhibitor is it likely to be? (5 分)

3. Mitochondria oxidative phosphorylation is an important reaction of energy-yielding metabolism in aerobic organisms. Several steps in the path of oxygen reduction in mitochondria have the potential to produce highly reactive free radicals that damage cells. How do the cells protect themselves from the damage of mitochondria-derived reactive free radicals? (15 分)
4. Describe the synthesis pathway of cholesterol in cells, and how to reduce serum cholesterol concentration? (15 分)
5. A trisaccharide unit of a cell-surface glycoprotein is postulated to play a critical role in mediating cell-cell adhesion between WBC and blood vessel. Please design a simple experiment to test this hypothesis. (15 分)
6. Galactosemia is a rare genetic metabolic disorder that affects an individual's ability to metabolize the sugar galactose properly. People with galactosemia display central nervous system abnormalities even if galactose is eliminated from the diet. The precise reason for it is not known. Suggest a plausible explanation. (15 分)
7. Terminology (每小題 2 分，計 10 分)

(To define the meaning of the following characters)

- A. Ubiquinone
- B. Catalase
- C. isoelectric point
- D. activation energy
- E. lectin