

(一) 請比較下列名詞之差異 (每題 6 分, 共 30 分)

- (a) Exon shuffling, Alternative splicing
- (b) Homology, Similarity (由 Evolution 角度解釋之)
- (c) Isozyme, Abzyme
- (d) Retroposon, Transposon
- (e) Oxidative phosphorylation, phosphorylation

(二) 下面為一篇已發表論文摘要, 請由此列舉作者欲達成實驗目標所需進行之實驗步驟 (10 分)

Two cDNAs encoding the splice variants of K(+) channel-interacting protein 2 (KChIP2) recently reported as human KChIP2 have been identified from rat, mouse, and human heart by RT-PCR. A longer variant, KChIP2L encodes a protein of 270 amino acids, which has a 50-amino-acid insertion in N-terminus in comparison with a shorter one, KChIP2S. Interestingly, both KChIP2S and KChIP2L (KChIP2S/L) but not the original KChIP2 were expressed in human heart and umbilical vein endothelial cells (HUVECs). KChIP2S transcripts but not KChIP2L were predominantly expressed in rat, mouse, and human heart and HUVECs, whereas both transcripts were expressed at low levels in other tissues such as brain, aorta, and kidney. Using chimeric proteins of green fluorescence protein (GFP) fused to the N-terminus of KChIP2S/L, the interactions between Kv4.3 and KChIP2S/L were analyzed in native and Kv4.3-expressed HEK293 cells. Specific localization of GFP-fused KChIP2S/L proteins on or near cell membrane was observed only in Kv4.3-expressed HEK293 cells.

(三) 一酵素的 Lysine-252 以 Trinitrobenzene sulfonate 進行化學修飾後, 發現其 K_m 及 K_{cat} 分別為原來的 95% 及 10%, 如以 Site-directed mutagenesis 將此 Lysine 分別改變為 Arginine、Aspartic acid 及 Alanine, 此酵素之 K_m 值分別為原來的 90%、98% 及 92%, 但 K_{cat} 值分別為原來 80%、10% 及 30%, 請描述此 Lysine-252 在此酵素催化機制中所扮演之角色。又在相同蛋白質濃度下, 三個突變蛋白其 V_{max} 與 Wide-type 相較為何 (10 分)

(四) 以 Two-dimensional gel electrophoresis 分析正常組織及癌組織在, 發現在正常組織之某 Y 蛋白質在癌組織轉變成 N 蛋白質, Y 蛋白質及 N 蛋白質具有不同之 pI 值及分子量, 請問此兩蛋白質產生如此變異原因可能為何, 如何證明 (10 分)

國立中山大學九十二學年度碩士班招生考試試題

科目：生物化學(生醫所碩士班)

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(五) 請舉出兩種實驗方法可用於分析 Protein-Protein 分子間交互作用，並敘述其原理(10 分)

(六) 解釋名詞 (每題 5 分，共 30 分)

- (a) Histone acetylation
- (b) Zinc finger
- (c) Urea cycle
- (d) Phospholipid
- (e) Ubiquitin
- (f) Calmodulin

國立中山大學九十二學年度碩士班招生考試試題

科目：遺傳學 (生物醫學研究所碩士班)

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1. Who and when discovered the structure of DNA? Describe the DNA structure and how does it replicate? (10 points)
2. How much and what kinds of repetitive DNA in human genome? (10 points)
3. How are the sex of the human and Drosophila determined? (10 points)
4. How are human sperms and eggs produced? (10 points)
5. Describe the genomic organization of human insulin gene, and how does it produce the functional insulin? (10 points)
6. How to make the DNA chips? What are their applications? (10 points)
7. Define and contrast the following terms: (8 points each pairs, total of 40 points)
 - a. Amphidiploids vs tetraploids
 - b. Telomeres vs telomerase
 - c. Transition mutations vs transversion mutations
 - d. Mutagens vs carcinogens
 - e. Bacterial transformation vs mammalian cell transformation