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淡江大學 96 學年度碩士班招生考試試題

系別：化學學系

科目：生 物 化 學

准帶項目請打「V」	
	簡單型計算機

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請標明題號，可不必抄題目，依序回答下列問題

第一題：配合題（共 36 分）

active transport	allosteric enzyme	cDNA	chromosome walking
coactivator	coenzyme	coomassive blue	CpG islands
diffusion	DNA library	DNA microarray	Ethidium bromide
gluconeogenesis	glycogenesis	glycolysis	ion channel
ion-exchange resin	ionophore	isozyme	osmosis
primase	prosthetic group	ribozyme	RNA polymerase
short interfering RNA	site-directed mutagenesis	Sodium dodecyl sulfate	TATA box
Ti plasmid	transposable element	Western blotting	yeast two-hybrid assay

請自上述詞句中挑出與下列敘述最配合答案填入空格

1. A compound that binds one or more metal ions and is capable of diffusing across a membrane, carrying the bound ion.
2. A dye used to stain proteins
3. A metal ion or an organic compound that is covalently bound to a protein and is essential to its activity.
4. A regulatory enzyme, with catalytic activity modulated by the noncovalent binding of a specific metabolite at a site other than the active site.
5. An assay for interaction between two proteins. One protein is produced as a fusion protein with a DNA-binding domain from another protein. The other protein is produced as a fusion protein with a transcription-activation domain. If the two fusion proteins interact in the cell, they form an activator that can activate one gene.
6. An RNA enzyme, that is an RNA molecular with catalytic activity
7. Binding site for a transcription factor that guides RNA polymerase II to the promoter in eukaryotes
8. Bulk flow of water through a semipermeable membrane into another aqueous compartment containing solute at a higher concentration.
9. DNA copy of a gene that lacks introns and therefore consists solely of the coding sequence.
10. Deliberate alteration of a specific DNA sequence by any artificial technique
11. DNA segment that move from one place on a chromosome to a completely different site, often affecting gene expression.
12. The biosynthesis of a carbohydrate from simpler, noncarbohydrate precursors such as oxaloacetate or pyruvate.

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第二題：請扼要說明下列生物分子在生物體內所扮演的生化反應角色或功能（共 24 分）

- | | |
|------------------------------------------------|------------------------------------|
| 1. Allopurinol | 5. GTP (guanosine 5'-triphosphate) |
| 2. ATP (adenosine 5'-triphosphate) | 6. NADH |
| 3. cAMP (adenosine 3',5'-cyclic monophosphate) | 7. S-adenosylmethionine |
| 4. Coenzyme A (CoA) | 8. UDP-glucose |

第三題：（共 10 分）

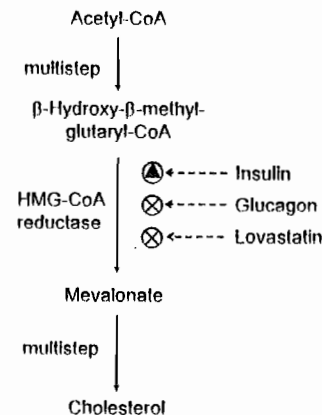
生物體內的葡萄糖（glucose）可經由糖解作用（glycolysis）產生丙酮酸鹽（pyruvate）。請簡要敘述說明所產生的丙酮酸鹽其後接續之可能新陳代謝路徑（catabolic and anabolic fates）？

第四題：（共 10 分）

請簡要敘述：何謂 pentost phosphate pathway？其重要之生化功用為何？

第五題：（共 8 分）

右圖為膽固醇生合成的簡易路徑。其中 HMG-CoA reductase 為膽固醇生合成的關鍵酵素。請問胰島素（Insulin）與降膽固醇藥物（Lovastatin）各自如何調控 HMG-CoA reductase 的酵素活性，進而影響膽固醇的合成？



第六題：（共 12 分）

下列敘述為已發表之科學性文獻的一段摘要，請閱讀後回答問題。

The differential proteomic approach (2D gel analysis coupled to MALDI-MS analysis) of nuclear proteins can provide an extremely useful tool to understand control of cell proliferation and differentiation. In order to identify possible markers of dedifferentiation between normal and cancerous thyroid cells, we used a differential proteomics approach by comparing nuclear extracts from the normal rat thyroid cell line FRTL-5 and the completely undifferentiated Ki-mol cell line, obtained by transformation with the Ki-ras oncogene. Galectin-3 (Gal-3) was identified as highly expressed, in the nuclear compartment, only in the transformed cell line. By using different human cancer cell lines, we showed that Gal-3 is maximally expressed in nuclei of papillary cancer cells. We focused on the functional relationship existing between Gal-3 and the thyroid-specific transcription factor TTF-1, whose expression is maintained in papillary cancer where it can contribute to the proliferating status. By using gel-retardation and transient transfection assays, we demonstrate that Gal-3 upregulates the TTF-1 transcriptional activity. GST-pulldown experiments demonstrate the occurrence of interaction between Gal-3 and TTF-1 homeodomain. Since several lines of

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evidence suggest a role for Gal-3 in controlling proliferation and tumor progression in thyroid cancer. the stimulatory activity played by Gal-3 over TTF-1 would account for a possible molecular mechanism through which the galectin controls proliferation in thyroid cells. (BBRC)

1. 請簡要說明 2D gel analysis (two-dimensional gel electrophoresis) 的生化作用與分析原理。
2. 請您設計任一可行之實驗方法，證明 Galectin-3 (Gal-3) 高度表現在甲狀腺癌細胞的細胞核中。
3. 請根據摘錄之摘要內容，以中文簡要說明 Gal-3 和 TTF-1 在甲狀腺癌細胞中所扮演的分子角色。