

# 國立中山大學 108 學年度 碩士暨碩士專班招生考試試題

科目名稱：分子生物學【生醫所碩士班】

## — 作答注意事項 —

考試時間：100 分鐘

- 考試開始響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- 試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

一、選擇題

本部分為單選題計 20 題，每題 2.5 分

1. Which of the following takes the genetic code to the cytoplasm (A) DNA, (B) deoxyribose, (C) tRNA, (D) rRNA, (E) mRNA
2. A mistake in crossover can result in segments of the chromosome ending up on a completely wrong non-homologous chromosome. This is (A) substitution, (B) deletion, (C) disfunction, (D) mismatch, (E) translocation
3. The methylation of native DNA acts as a sort of primitive immune system, allowing the bacteria to protect themselves from infection by (A) bacteriophage, (B) RNA virus, (C) virus, (D) cytovirus, (E) worm
4. Published case reports describe patients with metastatic melanoma treated with ipilimumab and radiotherapy who demonstrate significant disease response not only in the irradiated site but also at un-irradiated sites. What is the term that refers to the phenomenon in which local radiotherapy is associated with regression of metastatic cancer at a distance from the irradiated site? (A) hormesis, (B) bystander effect, (C) radiation effect, (D) abscopal effect, (E) Warburg effect
5. The chemotherapy drug taxol targets (A) ribosome, (B) the nuclear envelope, (C) microtubules, (D) chromosomes, (E) mitochondria, during mitosis
6. Which of the following can activate a protein by transferring a phosphate group to it? (A) cAMP, (B) calcium, (C) iron, (D) protein kinase, (E) protein phosphatase
7. Which of the following describes a transcription factor? (A) it is a protein that can be activated by a signal and then cause the transcription of DNA to mRNA, (B) it is a hydrophobic signal molecule that binds to a receptor on the external side of the cell membrane, (C) it is a lipid that can diffuse directly through the plasma membrane and bind to a cytoplasmic receptor, (D) it is a protein that determines whether or not a ribosome binds to the endoplasmic reticulum, (E) it is a carbohydrate that can modify a protein.
8. Which of the following is a tumor suppressor? (A) MYC, (B) TP53, (C) E2F1, (D) EGFR, (E) CCND1
9. Intermediate filaments are made of a protein present in nail and hair (A) filamin, (B) tubulin, (C) actin, (D) desmin, (E) keratin
10. Cells are able to take in droplets of fluid from outside of the cell to form vesicles containing this liquid. What is the transport mechanism? (A) exocytosis, (B) phagocytosis, (C) endocytosis, (D) pinocytosis, (E) facilitated diffusion
11. Which part of a plasma membrane is responsible for preventing the free movement of ions into and out of the cell? (A) phospholipid bilayer, (B) channel proteins, (C) glycoprotein, (D) cholesterol, (E) lipid raft

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共 3 頁第 2 頁

12. A membrane protein could have which of the following functions? (A) energy storage, (B) oxygen uptake, (C) thermal insulation, (D) enzymatic action, (E) carbon dioxide exclusion
13. How do gene mutations contribute to evolution? (A) beneficial mutations are passed on to several members of a generation, quickly taking hold in a population, (B) unfavorable mutations have a more significant effect on genes than do favorable mutations, so they are spread through the population, (C) natural selection favors beneficial mutations, so they survive and are passed on to future generations, (D) beneficial and unfavorable mutations take hold in the population equally over numerous generation, (E) beneficial mutations are easily to be drifted
14. Epigenetics is most concerned with (A) changes in a person's genotype resulting from environmental influences, (B) the expression of a particular gene as influenced by external inputs, (C) environmental influences on gene expression over experiential influences, (D) the heritability of genotypes that have been altered over multiple generations, (E) gene has nothing to do with environment
15. What is one purpose behind histone modification? (A) gene deregulation, (B) gene regulation, (C) genetic modification, (D) gene silence, (E) gene overexpression
16. When the regulatory mechanism of DNA methylation is passed on to your offspring it is known as (A) imprinting, (B) chromatin modification, (C) transcription factor binding, (D) DNA re-methylation, (E) gene expression
17. Where miRNAs bind to gene and regulate its expression (A) DNA sense strand, (B) DNA anti-sense strand, (C) mRNA coding region, (D) mRNA 5'-UTR, (E) mRNA 3'-UTR
18. The hypothetical 'stimulin' gene contains two exons that encode a protein of 100 amino acids. They are separated by an intron of 100 bp beginning after the codon for amino acid 10. Stimulin mRNA has 5'- and 3'-untranslated regions of 70 and 30 nucleotides, respectively. A complementary DNA (cDNA) made from mature stimulin RNA would have which of the following size (A) 500 bp, (B) 400 bp, (C) 300 bp, (D) 100 bp, (E) 70 bp
19. The consensus sequence 5'-TATAAAA-3' found in eukaryotic genes is quite similar to a consensus sequence observed in prokaryotes. It is important as the (A) only site of binding of RNA polymerase III, (B) promoter for all RNA polymerases, (C) termination site for RNA polymerase II, (D) major binding site of RNA polymerase I, (E) first site of binding of a transcription factor for RNA polymerase II
20. In base excision repair, the lesion is removed by (A) DNA glycosylase, (B) excisionase, (C) transposase, (D) DNA polymerase, (E) Integrase

背面有題

試題請隨卷繳回

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共 3 頁第 3 頁

二、申論題

(1) (每題 5 分，共 30 分)解釋名詞

- (a) Polymerase chain reaction
- (b) Euchromatin
- (c) MicroRNA
- (d) Alternative splicing
- (e) Chromatin immunoprecipitating assay
- (f) Z-DNA

(2) (10 分)請說明 Epigenetic regulation 的調控機制？

(3) (10 分)請簡述可以影響 mRNA stability 的因素。