

# 臺北醫學大學 100 學年度碩士班暨碩士在職專班招生入學考試

分子生物學試題

本試題第1頁；共2頁

(如有缺頁或毀損，應立即請監試人員補發)

注  
意  
事  
項

- 一、本試題共三大題，共計 100 分。
- 二、請將正確答案依題次作答於答案用卷內。
- 三、試題答錯者不倒扣；題次號碼錯誤或不按順序或鉛筆作答，不予計分。

一、選擇題(每題 2%，共 38%)

1. Prions are defined as:  
Ⓐ ions about to form  
Ⓑ ions with an inappropriate number of protons  
Ⓒ proteinaceous infectious particles  
Ⓓ ionic proteins that bind DNA
2. All are characteristics of transposons EXCEPT:  
Ⓐ segments of DNA moved non-enzymatically in the genome  
Ⓑ unstable location within genome  
Ⓒ range in size from hundreds of bps to 8 kb  
Ⓓ the smallest transposons are called insertion sequences
3. Treatment of the RNA polymerase/DNA complex with DNase *in vitro* is a DNA footprinting technique used to:  
Ⓐ identify the termination sequence for transcription  
Ⓑ locate the promoter site  
Ⓒ locate the start site for transcription  
Ⓓ identify the position of enhancer sequences
4. The DNA-binding proteins that recognize and accurately initiate transcription at specific eukaryotic promoter sequences are called:  
Ⓐ Enhancers  
Ⓑ response elements  
Ⓒ chromatin-remodeling complexes  
Ⓓ transcription factors
5. Enzymes that acetylate the  $\epsilon$ -amino group of lysine in the histidine tails are called \_\_\_\_\_ and are involved in \_\_\_\_\_.  
Ⓐ histone deacetylases; restoring chromatin to a repressed state  
Ⓑ histone acetyltransferases (HATs); initial events in transcriptional activation  
Ⓒ histone activases; formation of the de-repression complex  
Ⓓ Schiff base formation; promoting the formation of closed complexes
6. Amino-acyl-tRNA synthetases catalyze the reaction of a:  
Ⓐ specific amino acid attachment to the 3'-OH at the 3'-CCA of a specific tRNA  
Ⓑ specific amino acid attachment to the 5'-OH at the 5'-CCA of a specific tRNA  
Ⓒ specific tRNA with ATP to form a so called "charged tRNA" that interacts with a specific site on mRNA  
Ⓓ specific tRNA with ATP to form a so called "charged tRNA" that interacts with a specific site on amino acid
7. Eukaryotic secretory proteins are synthesized and translocated via the endoplasmic reticulum. Order the following sequence of events for this process.  
a. signal sequence removed  
b. glycosylation in the ER lumen  
c. signal sequence synthesis on ribosomes  
d. SRP binds signal sequence and subsequently binds SRP-receptor  
e. ribosome dissociates  
Ⓐ a, c, e, b, d  
Ⓑ c, d, a, b, e  
Ⓒ c, a, d, b, e  
Ⓓ a, c, b, d, e
8. The appropriate sequence for ubiquitination of proteins to be degraded is:  
a. multiple ubiquitinations may occur on a protein substrate.  
b. ubiquitin-protein ligase ( $E_3$ ) transfers ubiquitin to free amino groups on the protein.  
c.  $E_3$  selects a protein for degradation by the nature of the N-terminal amino acid.  
d. ubiquitin-carrier protein ( $E_2$ ) picks up ubiquitin.  
e. ubiquitin-activating enzyme ( $E_1$ ) attaches via ATP-dependent formation of thioester bond to C-terminal of ubiquitin.  
Ⓐ a, c, b, d, e  
Ⓑ e, d, a, b, c  
Ⓒ c, e, d, b, a  
Ⓓ e, d, c, b, a

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分子生物學試題

本試題第2頁；共2頁  
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9. RFLP is a:
- Ⓐ bacteriophage vector for cloning DNA                      Ⓑ genetic disease  
Ⓒ plasmid vector for cloning DNA                              Ⓓ variation in DNA base sequence
10. Which of the following does not play a role in the degradation of proteins?
- Ⓐ protease                      Ⓑ ubiquitin                      Ⓒ proteasome                      Ⓓ chaperonin
11. Integral membrane proteins can be anchored to the plasma membrane by all of the following except:
- Ⓐ a hydrocarbon moiety such as farnesyl.  
Ⓑ a fatty acyl group such as palmitate.  
Ⓒ a glycosylated phospholipid such as glycosylphosphatidylinositol (GPI).  
Ⓓ a simple sugar such as mannose.
12. Which of the following methods can separate particles based on density?
- Ⓐ centrifugation                      Ⓑ ion exchange chromatography  
Ⓒ SDS polyacrylamide gel electrophoresis                      Ⓓ affinity chromatography
13. An enzyme that breaks DNA, dispels the tension, and reseals strand ahead of a DNA replication growing fork is called a(n):
- Ⓐ topoisomerase                      Ⓑ DNA polymerase                      Ⓒ phosphodiesterase                      Ⓓ aminoacyl-tRNA synthetase
14. Which of the following factors recognizes the UAG, UAA, UGA codons?
- Ⓐ RNA polymerase                      Ⓑ initiation factors                      Ⓒ termination factors                      Ⓓ elongation factors
15. Which of the following is not involved in translation?
- Ⓐ topoisomerase                      Ⓑ ribosomal RNA                      Ⓒ initiation factors                      Ⓓ aminoacyl-tRNA synthetase
16. Which of the following could be used to visualize subcellular structure in living cells?
- Ⓐ transmission electron microscopy                      Ⓑ scanning electron microscopy  
Ⓒ brightfield microscopy                      Ⓓ differential interference light microscopy
17. In preparation for cell fractionation, plasma membrane disruption may be facilitated placing the cells in (which condition)?
- Ⓐ a hypertonic solution                      Ⓑ a hypotonic solution                      Ⓒ an acidic solution                      Ⓓ an organic solution
18. A piece of DNA 750kb long would be cloned into which cloning vector?
- Ⓐ bacterial artificial chromosome (BAC)                      Ⓑ yeast artificial chromosome (YAC)  
Ⓒ cosmid                      Ⓓ lambda vector
19. Which of the following is not used in the electrophoretic mobility shift assay (EMSA)?
- Ⓐ a radiolabeled DNA fragment                      Ⓑ a polyacrylamide gel  
Ⓒ a DNA binding protein                      Ⓓ DNase I

## 二、解釋名詞(每題 4%，共 12%)

1. Attenuator                      2. Apoptosis                      3. Spliceosome

## 三、問答題(共 50%)

1. You take an optical density reading of a DNA sample but it is too concentrated to give you an accurate reading. You take 1 $\mu$ L of the DNA sample and dilute it with 14 $\mu$ L of dH<sub>2</sub>O. You then take a reading of the DNA of the spectrophotometer and it gives you an OD reading of 0.123. What was the concentration of your original DNA sample? (7%)
2. How do you make a 1.25% w/v Agarose gel with a final TBE buffer concentration of 0.5X if your gel is 60 mL in volume and your stock TBE solution is 10X? (7%)
3. Eukaryotic genomic DNA containing the  $\beta$ -globin gene can be cloned into plasmid that replicated in *E.coli*, but the globin polypeptide is not expressed from this plasmid in *E.coli*. Why? How can expression of eukaryotic genes in bacteria be accomplished? (12%)
4. What is RNA silencing? (8%)
5. Explain four differences between DNA and RNA. (8%)
6. How to make cDNA? (8%)