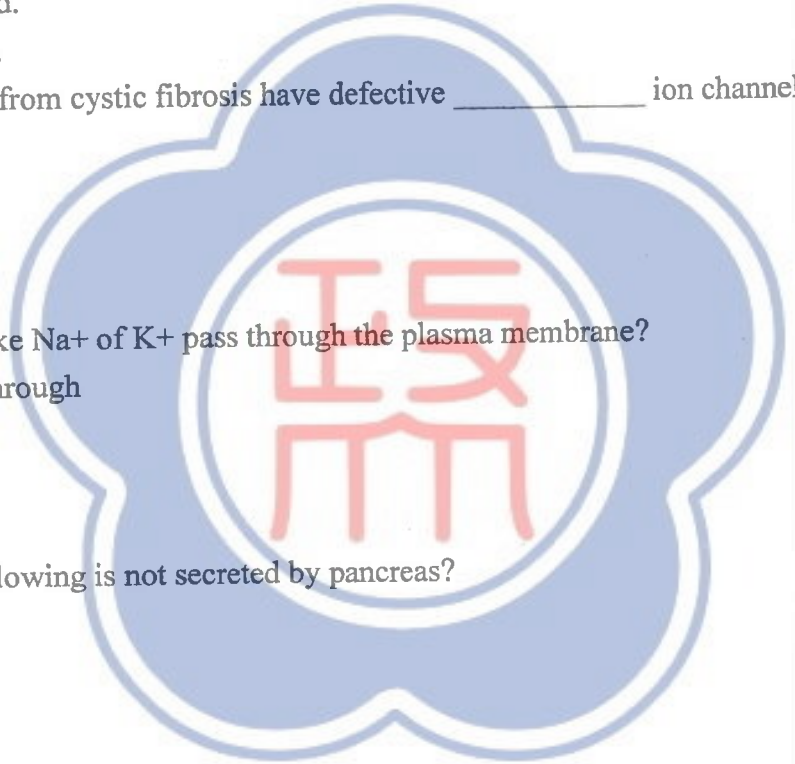


考 試 科 目	生理學	系 所 別	神經科學所	考 試 時 間	2 月 18 日(一) 第一節
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一、選擇題 (30 分，每題 2 分)

- Damage to which one of the following brain areas is most likely to have difficulty in remembering the location of a new restaurant?  
 (a) amygdala  
 (b) cerebellum  
 (c) hippocampus  
 (d) lateral hypothalamus
- What is the osmolarity (滲透壓) of 1M  $MgCl_2$  solution?  
 (a) 1 Osm      (b) 2 Osm      (c) 3 Osm      (d) 0.5 Osm
- What causes cGMP to convert to GMP and close  $Na^+$  channels in a photoreceptor?  
 (a) dark current  
 (b) light  
 (c) darkness  
 (d) opsin
- Which process is (are) involved in carbohydrate metabolism  
 (a) glycolysis   (b) Krebs cycle   (c) oxidative phosphorylation   (d) a, b, and c
- The process that membrane bound vesicles in the cytoplasm fuse with the plasma membrane and release their contents to the outside of the cell  
 (a) endocytosis  
 (b) exocytosis  
 (c) degeneration  
 (d) fertilization
- Most of the water found in the body is in the  
 (a) blood  
 (b) intracellular fluid compartment.  
 (c) extracellular fluid compartment.  
 (d) blood and extracellular fluid compartment.
- \_\_\_\_\_ reactions require energy to synthesize large molecules from small molecules.  
 (a) Combustion  
 (b) Catabolic  
 (c) Anabolic  
 (d) Decomposition

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8. The transport of protons from the intermembrane space to the mitochondrial matrix occurs via
- (a) ATP synthase.
  - (b) transaminase.
  - (c) lactate dehydrogenase.
  - (d) FADH-coenzyme Q reductase complex.
9. Active transport
- (a) utilizes energy.
  - (b) cannot transport molecules against a concentration gradient.
  - (c) cannot be saturated.
  - (d) requires cofactors.
10. Individuals suffering from cystic fibrosis have defective \_\_\_\_\_ ion channels.
- (a) sodium
  - (b) potassium
  - (c) calcium
  - (d) chloride
11. How do small ions like  $\text{Na}^+$  or  $\text{K}^+$  pass through the plasma membrane?
- (a) They can't pass through
  - (b) ion channels
  - (c) carrier proteins
  - (d) simple diffusion
12. Which one of the following is not secreted by pancreas?
- (a) HCl
  - (b) lipase
  - (c) bicarbonate
  - (d) insulin
13. Regarding taste receptors, which one of the following is correct?
- (a) One receptor can only detect one tastant
  - (b) There is no need to transduce the presence of a given chemical into a receptor potential
  - (c) Basal cells of taste buds can divide and differentiate to continually replace taste receptor cells damaged
  - (d) Taste receptor cells produce action potentials during gustatory(味覺) transduction
  - (e) All of above
14. Bile is produced by
- (a) gallbladder
  - (b) liver
  - (c) the duodenum of the small intestine
  - (d) stomach
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15. Which type of receptor responds to physical deformation of its cell membrane?

- (a) chemoreceptors
- (b) photoreceptors
- (c) thermoreceptors
- (d) mechanoreceptors

二、

問答題 (70 分)

1. What is Ulcers? What type of bacteria contributed to this phenomenon? (6pts)
2. Please calculate the amount of sucrose needed to prepare a six molar sucrose (molecular weight = 342g) solution. (10pts)
3. What will happen to cells in the following condition? (6pts)  
(a) Hypertonic solution (b) Hypotonic solution (c) Isotonic solution
4. Please use testosterone (a gonadal hormone) as an example to explain what a typical 3-hormone sequence of hormone control is and negative feedback. (10pts)
5. Briefly describe the regulation of blood pressure (8pts)
6. While visiting 政大, you notice that there are 2 groups of birds look similar and have closely related genetic background. However, one group of female bird sing and the other group of female do not.  
(a) What is your hypothesis for this particular phenomenon? (10pts)  
(b) Please design experiments to test your hypothesis and explain your hypothetical results (10pts)
7. To best of your knowledge, please describe how neurons communicate with each other.(10pts)

備

註

- 一、作答於試題上者，不予計分。
- 二、試題請隨卷繳交。

考 試 科 目	細胞與分子生物學	系 所 別	神經科學研究所	考 試 時 間	2 月 18 日 (一) 第 ( 節
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## 問答題

1. Explain each of the following terms (1) genetic codon (2) anticodon (3) ribosomal binding site (15pts)
2. Explain how the following molecular entities or events regulate gene expression levels (1) transcription factors (2) untranslated regions (UTR) on the mRNA (3) splicing (15pts)
3. Describe the chemical modifications on (1) DNA and (2) histones that can modulate epigenetic states, and how the transcription will be altered by these modifications (10pts)
4. Compare the biochemical properties and the downstream signaling of the following 2 types of receptors (1) G protein coupled receptor (2) Receptor tyrosine kinase (10pts)
5. Depict the process of autophagy and explain its biological functions (10pts)
6. Compare the molecular mechanisms that govern the protein sorting to each of following destinations (1) secretory proteins (2) lysosome (3) mitochondria (15pts)
7. Compare the biochemical properties and biological functions of the following extracellular matrix proteins (1) collagen (2) fibronectin (10pts)
8. List 3 experimental methods that can be used to analyze the expression of a specific gene, and explain the differences and the suitable conditions that each method can be applied (15pts)

備 註

- 一、作答於試題上者，不予計分。
- 二、試題請隨卷繳交。