

編號：F 495 系所：分子醫學研究所

科目：生物技術

本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）**A. Problems (60%)**

1. Describe what is the "complementation assay" and how do you use the assay to define whether a mutation is in the same locus or not (10%).
2. Describe three general tools/methods used for the diagnosis of viral infection (10%).
3. Describe your understanding about the lentiviral vector system to deliver genes (10%).
4. There are a number of sequence variations within the human genome. They may be caused by deletion and insertion. Other variations include the number of repeat sequence. Please list eight different methods that can used to assess and examine these sequence variations.(10%)
5. Please described briefly the principles of five different methods described as above.(20%)

**B. Choices (40%)**

單選

1. Which is an example of germline therapy?  
A) transgenic plant or animal  
B) bone marrow transplant  
C) disabled cold virus that delivers genes  
D) removing somatic cells, genetically altering them, and replacing them
2. Gene therapy to supplement LDL receptors on liver cells could treat:  
A) cystic fibrosis.  
B) liver sclerosis.  
C) alcoholism.  
D) familial hypercholesterolemia.
3. A good vector to genetically alter nerve cells is:  
A) Ti plasmid.  
B) a modified cold virus.  
C) a herpes simplex virus.  
D) HIV.
4. A little girl received bone marrow from a compatible donor that manufactured the enzyme her body could not. This is an example of:  
A) protein therapy.  
B) germline therapy.  
C) somatic gene therapy.  
D) retroviral gene therapy.

(背面仍有題目,請繼續作答)

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5. A limitation of using a retrovirus as a vector for gene therapy is that:
- A) it can only deliver genes to cells that divide often.
  - B) a retrovirus causes AIDS.
  - C) it cannot infect rapidly dividing cells.
  - D) it causes fat accumulation.
6. Performing gene therapy on somatic cells removed from the body and then returned to the body is called \_\_\_\_\_ gene therapy.
- A) *in vivo*
  - B) *in situ*
  - C) *in vitro*
  - D) *ex vivo*
7. Genetic engineering manipulates gene products at the level of:
- A) the protein.
  - B) amino acids.
  - C) DNA.
  - D) RNA.
8. A molecule that consists of a piece of DNA from one organism combined with the DNA of a member of another species is called:
- A) restricted DNA.
  - B) recombinant DNA.
  - C) transgenic DNA.
  - D) bioengineered DNA.
9. Bacteriophages can be used as vectors in recombinant DNA experiments because:
- A) they are small and made of double-stranded DNA.
  - B) they are circular and easily imported into bacteria or yeast.
  - C) they insert their genetic material into bacteria.
  - D) they are resistant to protective restriction systems.
10. A piece of foreign DNA was inserted into a plasmid with an antibiotic resistance gene and a lac Z gene. The plasmid DNA was cut with a restriction enzyme, which splits the lac Z gene and opens the circle. The foreign DNA was next inserted into the open restriction site of the plasmid. When the recombinant plasmid was introduced into bacterial cells and grown in the presence of antibiotic, some of the colonies turned blue in the presence of X-gal. The blue colonies contained:
- A) plasmid only.
  - B) foreign DNA only.
  - C) both foreign DNA and plasmid.
  - D) neither plasmid nor foreign DNA.
11. A multicellular organism that carries a specific genetic change in each cell because of an intervention at the fertilized egg stage is a:
- A) transversion.
  - B) transition.
  - C) transgenic.
  - D) transformant.
12. Tiny fat bubbles used to deliver genes are:
- A) electropores.
  - B) phospholipids.
  - C) cholesterol.
  - D) liposomes.

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13. A(n) \_\_\_\_\_ is used to physically inject DNA into cells.  
A) electroporator B) gene gun C) liposome D) vector
14. In gene targeting, the introduced gene:  
A) is injected into a somatic cell and enters the nucleus.  
B) is injected into a gamete, where it enters the nucleus.  
C) is recessive to the host cell gene.  
D) recombines with a homologous gene in a host cell chromosome.
15. In gene targeting, a(n) \_\_\_\_\_ mouse results from swapping a gene of interest with a gene that has an altered function.  
A) outbred B) inbred C) knockout D) knockin
16. Expressed sequence tags (ESTs) allow researchers to identify:  
A) genes that encode proteins. C) ribosomal RNA genes.  
B) microsatellites. D) introns.
17. Which of the following can be used to confirm that a candidate gene causes a disease?  
A) the presence of CpG islands in the gene  
B) the gene is evolutionarily conserved  
C) the gene is expressed in the appropriate tissues  
D) people with the disease have a mutation in the gene
18. The new field of "Proteomics" involves the study of:  
A) the entire complement of proteins produced by an organism.  
B) the complement of proteins produced by a specific cell type.  
C) the variable forms of proteins produced by certain genes.  
D) all of the above
19. Sperm may be "washed" prior to artificial insemination to remove:  
A) antibodies the male immune system produces.  
B) antibodies the woman's immune system produces.  
C) bacteria from the man's body that inhibit fertilization.  
D) the man's HLA antigens.
20. Microsort is a new technique that separates sperm with the Y chromosome, which produces males, from sperm that carry the X chromosome, which produces females. The technique uses a fluorescent dye that reversibly binds DNA. Sperm are sorted using flow cytometry based on DNA content. How do Y bearing sperm differ from X bearing sperm?  
A) X sperm are diploid.  
B) Y sperm never as for directions when they are lost.  
C) Y sperm have less genetic material.  
D) X sperm have less genetic material.