

系所組別：生物資訊與訊息傳遞研究所甲組

考試科目：細胞分子生物學

考試日期：0224，節次：3

※ 考生請注意：本試題不可使用計算機

請勿在本試題紙上作答，否則不予計分

- I. 填入正確文字 (每空格 2 分，題號 1-10，總共佔 20%，請注意專有名詞拼字，錯一英文字母即不予計分。)

Fill the right word(s) in each blank, Total score=20%

You will refer to the following library to fill in each blank: (填字參考)

(aneuploidy, autophagy, anoikis, agonist, antagonist, centromere, centrosome, cysteine, crisis, chaperone protein, dominant-negative mutation, endosome, enhancer, gene linkage, homology-directed repair, kinetochore, leucine, loss of heterozygosity, methionine, micro RNA, microsatellite DNA, mismatch repair, nucleosomes, nucleolus, nonsense mutation, non-homologous end joining, promoter, signal-recognition particle, SNARE proteins, serine, small interfering RNA, single-nucleotide polymorphism, temperature sensitive mutation, telomeres)

1. \_\_\_\_\_ are a basic unit of eukaryotic chromosome.
2. One of the reasons for histone heterogeneity is due to phosphorylation of \_\_\_\_\_.
3. \_\_\_\_\_ is very short tandem nucleotide repeats that are found scattered throughout the human genomes of eukaryotes.
4. \_\_\_\_\_ is the basic catabolic mechanism that involves cell degradation of unnecessary or dysfunctional cellular components through the lysosomal machinery.
5. A \_\_\_\_\_ usually means that the resulting protein is has lost a certain part of its function, but it can out-compete the endogenous protein in some way.
6. In cell biology, the \_\_\_\_\_ is an organelle that serves as the main microtubule organizing center (MTOC) of the animal cell as well as a regulator of cell-cycle progression.
7. An \_\_\_\_\_ is an agent that binds to a receptor and activates that receptor in order to elicit an effect typically transmitting a signal to the inside of the cell, either by opening a channel to allow ions to flow in/out, or changing the receptor's shape to cause a cascade of intracellular events to occur.
8. \_\_\_\_\_, defined as a karyotype that is not a multiple of the haploid complement, results in an unbalanced genome.
9. \_\_\_\_\_ in a cell is the loss of normal function of one allele of a gene in which the other allele was already inactivated. This could cause a normal tumor suppressor to no longer be produced which could result in tumorigenesis.
10. A \_\_\_\_\_ directs ER signal sequences to a specific receptor in the rough ER membrane.

(背面仍有題目,請繼續作答)

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**II. 名詞解釋 (每題 4 分，題號 1-10，總共佔 40 分)。**

Please briefly describe the following terms:

1. Heterochromatin
2. Epigenetics
3. Second messenger
4. Missense mutation
5. Nonsense mutation

Please explain the purpose of the following methods:

6. Fluorescence Activated Cell Sorting (FACS).
7. Chromatin Immunoprecipitation (ChIP)
8. Electrophoretic Mobility Shift Assay (EMSA)
9. Small interfering RNA (siRNA)
10. Reverse transcription polymerase chain reaction (RT-PCR)

**III. 問答題 (題號 1-5; 總共佔 40 分)**

Answer the following questions; total score =40%

1. Please describe the moleculars and pathways in regulating cell cycle G1 phase to S phase. (8%).
2. Please describe the processes of protein degradation by ubiquitination and proteasome mechanism. (8%)
3. Explain following terms in transcriptional regulation of eukaryotic cells:  
(1) enhancers (2) N-terminal tails of histones (3) general transcription factors (4) chromatin remodeling complexes. (8%)
4. Telomere are shortened with every cell division. What are "Telomere" and "Telomerase"? (4%) Please describe the reasons cause shortening of telomeres during DNA replication when culturing normal cells (4%), and provide one example of telomerase/telomeres-based approaches to killing tumor cells. (2%).
5. Please define the oncogenes and tumor-suppressor genes (4%), as well as describe two major mechanisms by which p53 acts to prevent a cell from becoming malignant. (2%)