

1. Please define small interfering RNA, microRNA, non-coding RNA and mRNA; how are they synthesized and what are their functions in the cell? (20%)
2. Student A is studying the regulation of a novel gene X. He finds that the mRNA expression of this gene is largely increased. Please list all the possibilities which may cause the increase of mRNA expression. (10%)
3. Please define NGS (next generation sequencing); describe its principle and importance in genomic study. (20%)
- 4、 請解說蛋白質磷酸化作用 (phosphorylation)。假設你要研究 Protein X，有那些實驗證據可支持說它可能是一種磷酸化蛋白質？如何證明磷酸化作用對 Protein X 的酵素功能有影響？ (20%)
- 5、 腫瘤細胞的細胞數目增加比正長細胞快很多。請說明可能的原因。(10%)
- 6、 請說明 *in vitro* study 跟 *in vivo* study 的不同。(10%)
- 7、 請說明以小鼠為實驗動物模型來研究細菌的致病性跟直接研究該細菌在病人體內的致病性，在研究的手法上應考慮的事項有什麼不同？ (10%)