BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
FIRST SEMESTER 2023-24
BIO G526 CANCER BIOLOGY
COMPREHENSIVE EXAMINATION-Closed Book

Max. Marks:20 **Time: 90 Min** **Date:18.12.2023**

Q1. What mechanisms might cause a certain region of chromosomal DNA to accidentally undergo amplification? b.Why are mutant TSG's transmitted through germline and proto-oncogenes not?[2+1=3M]

Q2**.** Anamika was working with 2 different sets of breast cancer cell lines. She treated both the cells with Retinoic acid and did an MTT assay to assess cell viability. But she was surprised to see that cells of **culture A** died more compared to cells of **culture B**. Is her experiment working fine or she needs to repeat it? Being a cancer biology student how do you explain her results? [2M]

Q3**.** Cancer cell and normal cell were fused together as in **Fig. 1.** What can be the 2 probable fate of the daughter cell and why? Is VHL a tumor suppressor gene or oncogene. Justify your answer? [2+1=3M]

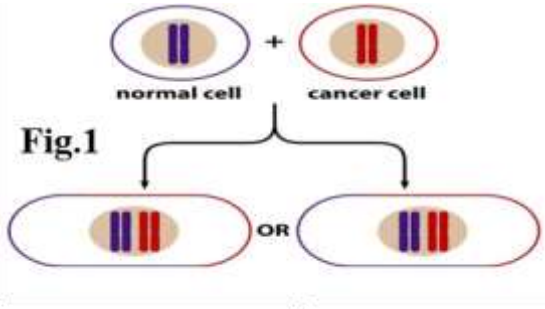


Fig.1

Q4. How are the decisions that cell growth versus quiescence coupled mechanistically with the decisions governing cell differentiation? Why must these 2 processes be tightly coupled? [2+1=3M]

Q5. In the light of the fact that DNA tumor viruses must suppress the apoptosis of infected cells in order to multiply, what are the strategies available to them to do so? [2M]

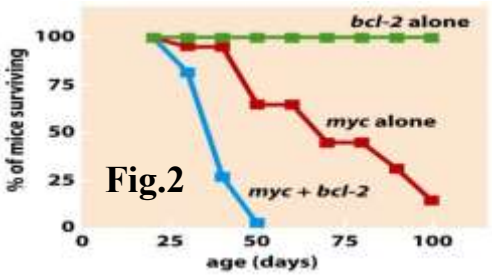
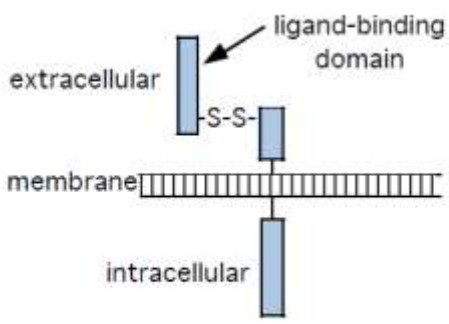
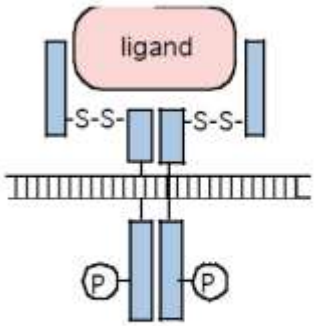


Fig.2

Q6. What are the 3 different mechanism by which c-myc activation takes place? B. Can you explain from the following Fig.2 why Bcl-xl or Myc alone is unable to cause tumor? [1.5+1.5=3M]

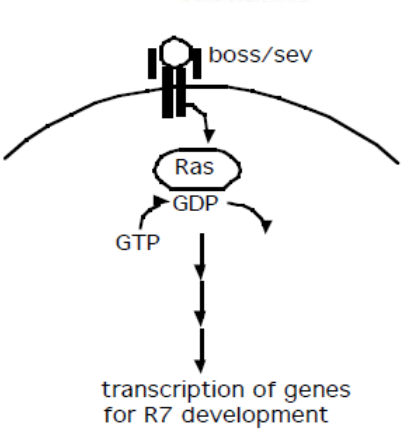
Q7. The boss/seven receptor is required for differentiation of a particular cell, called R7. It is a receptor tyrosine kinase with the structure below. As a monomer, the protein is inactive. Binding of ligand causes the receptor to dimerize, causing phosphorylation of the intracellular domain, activating the protein. During processing of the protein, the extracellular domain is cleaved and a disulfide bridge forms between two cysteines, tethering the ligand-binding domain to the rest of the protein. [4M]

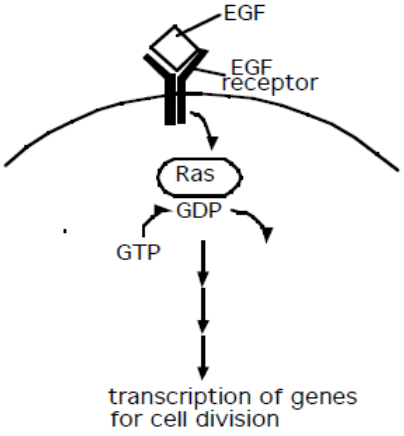




a) How would receptor activity be affected by changing one of the two cysteines shown above to an alanine? Explain.

b) What effect would this mutation have on the differentiation of R7?





c)Given that these cells exist in the same animal, name one component in the pathway that could be mutated to give each of the following results (consider each situation independently). Describe how the mutant component differs from the wild-type component, and whether it is a loss-of-function or gain-of-function mutation.

i) You never see differentiation of R7 cells.

ii) You see uncontrolled cell proliferation.

……***All The Best***……