

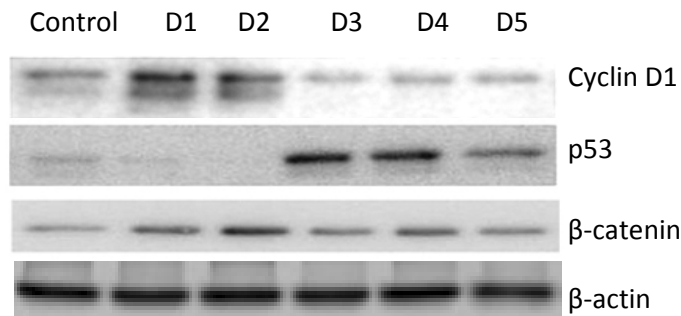
M.Sc. 3rd Semester Examination in Zoology, 2021

ZET – 325 (Molecular Cell Biology)

Full Marks – 30

Answer any 3 questions; each question bears 10 marks

1. In an experiment, developing mouse embryos were injected with cyclopamine, an SMO inhibitor. How would it effect digit formation in mice and explain the principle behind it? Describe the pathway it would affect in detail.
2. What are the major conditions that drive the formation, progression and metastasis of a cancer? If a proto-oncogene mutated into an oncogene in an otherwise normal cell, what changes would you observe in the cell? How does a benign tumor undergo metastasis?
3. Figure below shows western blots for lung cancer cells incubated with and without putative anti-cancer drugs (D1-D5). What is the hypothesis and rationale behind this experiment? Why did the authors choose the specific antibodies as mentioned below? Elucidate the results in details for each drug.



4. Explain why PARP (poly (ADP ribose) polymerase) inhibitors can be effective drugs for treating cancers containing mutation in the BRCA1 or BRCA2 genes. Design an experiment to establish that on exposure to heavy metals, cells undergo autophagy-induced apoptosis. How can autophagy be detected stage-wise?
5. How would you characterize and quantify the frequency of cancer stem cells (also called "cancer initiating cells") in a human cancer? What properties separate them from the dividing cancer cells? How can you identify such properties?
6. How would you isolate and identify a negatively charged protein with a molecular weight of 90 kDa? What factors would determine whether the protein would be translocated to the nucleus through the NPC? Describe the importance of Ran-GTP.