Birla Institute of Technology and Sciences Pilani, Pilani Campus

PHA G619 Screening Methods and Techniques in Pharmacology

Comprehensive Exam **Close Book** **I Semester 2023-2024**

Date: 08/12/2023 **Duration: 90 min** **Max. Marks: 20**

Instructions:

1. Figures in parenthesis indicate maximum marks
2. Draw Diagrams wherever necessary
3. Write the correct question number on the answer sheet

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1. The process of programmed cell death, or apoptosis, is considered a vital component of various processes, including normal cell turnover, proper development and functioning of the immune system, hormone-dependent atrophy, embryonic development, and chemical-induced cell death. Explain the intrinsic and extrinsic pathways of apoptosis. [6]

2. (i) Describe the biogenesis and mechanism of action of miRNAs. [3]
   (ii) Elucidate the process of cryopreservation of adherent cells. [3]

3. A wide number of models for inducing gastric lesions are used to screen for the ability of new therapeutics to protect the gastric mucosa. Using the pylorus ligation model, how will you evaluate an NCE against peptic ulcer? Does this model give any insight into the mechanism of action of the NCE? [4]

4. **Statement**: "Experience of pain is a subjective phenomenon."
   How does the gate control theory provide a rationale for this statement? [4]

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1. Pre-clinical screening involves screening compounds in cell culture (*in vitro*) and animal models (*in vivo*). Cell culture is the process of growing animal cells *in vitro* in a flask or dish under controlled conditions. You performed viability assay like MTT and got the following data:

	0 µM	**10 µM**	**20 µM**	**30 µM**	**Blank**
Replicate 1	0.9845	0.6785	0.5835	0.3765	0.08
Replicate 2	0.9267	0.7642	0.6745	0.4368	0.08
Replicate 3	0.9125	0.8452	0.5899	0.3957	0.08
Replicate 4	0.9965	0.7932	0.7658	0.4367	0.08

   Calculate % viability at all concentrations. [8]

2. You are working in the area of inflammation. Suppose a gene Nrf2 is said to be anti-inflammatory. You create a Nrf2 knock-out model to study its role in inflammation. Write all the procedures involved in the creation of this knock-out mice using embryonic stem cells explaining the rationale of each step in detail. Emphasize the use of positive and negative selection markers. [8]

3. Explain the following: [2+2=4]

   (i) Why is leptin knocked down/ knocked out in many genetic models of diabetes Mellitus?

   (ii) Why can the formalin test be used to screen both central and peripheral analgesics?