

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
SECOND SEMESTER 2021-22
BIO G515 STEM CELL & REGENERATIVE BIOLOGY
Mid Semester Examination (Closed Book)

Max. Marks: 30

Time: 90 min

Date: 14/03/2022

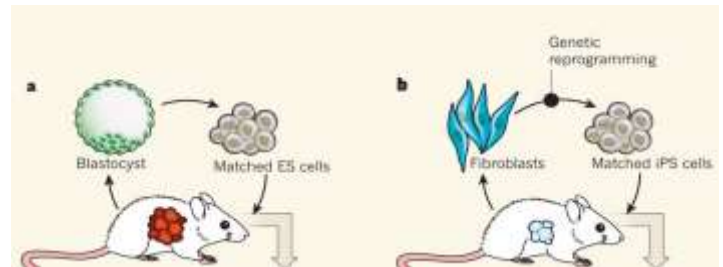
Note: (i) Please Answer Briefly. No justification, NO marks.

Q1. a. Name the gene associated with tumorigenicity of stem cells upon transplantation. Schematically show the pathway through which it induces tumorigenicity. **2M**

b. Stem cells are immunoprivileged. Describe the molecular mechanisms that may not allow cells to present antigens. **2M**

c. However some allogeneic immune rejection has been observed with hESCs. Mention mechanisms to confer immune-protection. **2M**

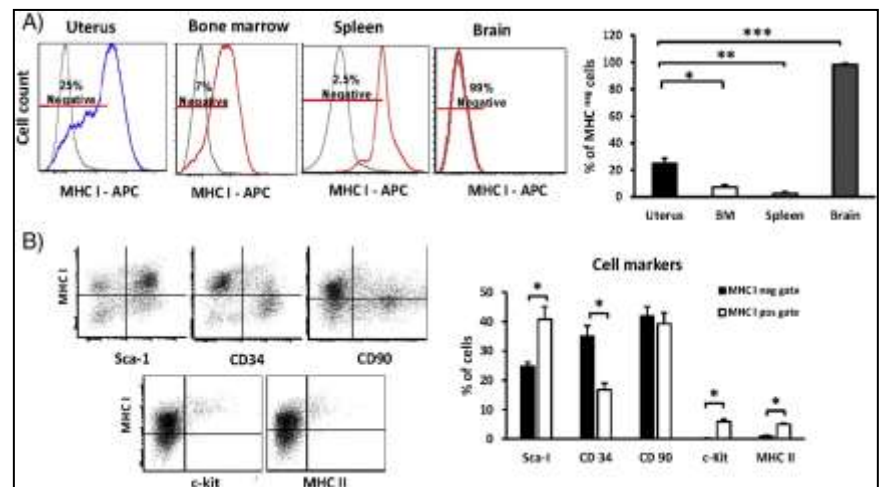
d. How would you experimentally prove that rejection of transplanted stem cell is mediated by a particular class of immune cells. **2M**



e. The adjoining figure represents experiments that check for immunogenicity associated with stem cells. It was observed that in "a" there was no rejection, while in "b" there was rejection. Based on your classes of stem cells can you speculate the reasons for the above observation?

2.5M

f. In the given figure tissues of different origin were analyzed for probable future use in transplantation. The brain cells were taken as control. Based on image 'A', state which group of cells you think can be the most prospective ones for transplantation, and why. Furthermore, different stem cell markers were analyzed in the selected group of cells. Mention the stem cell marker/s that these cells predominantly express. Justify. **3.5M**



Q2. The figure (a-k) given below demonstrates the effect of cytokine IL-6 in colorectal cancer cells. Information: Cell lines used- HT-29 and DLD1; CD44/CD133 are stem cell surface markers; FRA1 is a member of the FOS family of TFs encoded by the FOSL1 gene and downstream target of STAT3; TCZ is an anti-human IL-6 receptor; siNC is non-specific siRNA; EV is empty vector.

a. In **there-four lines** write the major conclusion that you can draw from the analysis of the given figures. Do NOT describe each figure individually. **4M**

b. Write your interpretation of figure **d, e and h** in not more than two lines (for each). **4.5M**

c. What can you hypothesize about the role of FRA1 in stemness? What additional experiments you would have done to gain new information (apart from what is already given) about the molecular role of this gene. **3.5M**

Q3. a. What is side population in context to stemness. Schematically show steps of your experiment leading to identification of side population. **2.5M**

b. Manifestation of stemness is often the resultant effect of antagonistic signaling. Justify in two lines. **1.5M**

