2016

BIOTECHNOLOGY

BIT 402
STEM CELL BIOLOGY

Full Marks : 80
Time : 3 Hrs

Figures in the right hand margin indicate full marks for the question

1. Answer the following questions (any eight): $8 \times 1 = 8$

   a) Who first made the iPS cells 1

      i) Yamanaka ii) Thomson

      iii) Jaenisch iv) Daley

   b) Expression of Sox, Nanog, Oct4 are found in 1

      i) Specifically to non Stem Cells

      ii) Specifically to all cells

      iii) Characteristic Marker of a specific tissue

      iv) Stem Cells

   c) What is the most accurate statement about human pluripotent cells? 1

      i) Can make all known types of human cells

      ii) Can differentiate and self-renew

      iii) Can make all types of human cells except extraembryonic tissues

      iv) Only embryonic stem cells fit that category

d) What does the acronym SCNT stand for? 1

i) Stem Cell Nuclear Transplant

ii) Somatic Cell Nuclear Transplant

iii) Stem Cell Nuclear Transfer

iv) Somatic Cell Nuclear Transfer

e) How long post-in vitro fertilization are the blastocysts used to make human ES cells? 1

i) 4-5 days ii) 0-1

iii) 1-2 iv) 3-4

f) Which of the following cells would be considered differentiated? 1

i) Blastomere ii) Myotome of the somite

iii) Muscle cell iv) Spemann organizer

g) What are the unique properties of all stem cells? 1

i) Stem cells are unspecialized, capable of dividing and renewing themselves for long periods &can give rise to specialized cells

ii) Stem cells are unspecialized, capable of dividing and renewing themselves for 24 hours & give rise to specialized cells

iii) Stem cells are unspecialized, capable of dividing and renewing themselves for long periods & can give rise to unspecialized cells

iv) Stem cells are specialized, capable of dividing and renewing themselves for long periods & can give rise to specialized cells

h) Embryonic stem cells can differentiate into which types of cell? 1

i) Only brain stem cells and specialized brain cells

ii) All types of specialized cells

iii) Only cells that can produce insulin

iv) Only cells that can produce artificial skin

i) A blastocyst is... 1

i) A very early stage embryo

ii) A type of stem cell

iii) Part of the blood system

iv) A type of brain cell

2. Distinguish between (any six): $2 \times 6 = 12$

a) Osteoblast and endothelial Cells

b) Adult NSC microenvironment & NSC microenvironment in disease

c) Allograft and Xenograft

d) Exogenous and endogenous antigen processing

e) MHC-I and MHC-II

f) Hematopoetic Stem Cell and Adult Progenitor Cells

g) Primitive endoderm and Parietal endoderm

3. Write short notes on (any four): $5 \times 4 = 20$

a) Regulation of Cell Cycle

b) Quiescent Stem Cells

b) Spermetogonial Stem cell

c) Autoimmune disease

d) Self & Non-Self recognition

e) Stem Cell Database

f) Therapeutic Cloning

4. Answer the following (any two)

a) Describe in detail the protocol for formation of parthenogenetic embryo. 8

b) What is cell line? Descrine a process in detail about formation of cell line. 2+6=8

c) Write a process for Cell harvesting after lymphocyte culture. 8

5. Answer the following (any two):

a) What is Cell migration? Describe in detail trafficking of hematopoietic stem cells during embryogenesis and fetal development with suitable illustration. 2+10=12

b) Describe the isolation and characterization of hematopoietic stem cells. 12

c) What are liver stem cell? How does the normal adult liver maintains and regenerate the lost cells for proper functioning? 2+10=12

d) Describe in detail the event of hemopoetic stem cell trafficking in embryogenesis and fetal development. 12

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