

acellular layer
Air-liquid interface
lifting

Bioengineering of Stem Cells

REGENERATIVE MEDICINE

* Stem Cells

* Niche

If we wish to convert stem cell into a particular cell, you will require information for what will trigger the desired differentiation.

If desired differentiation has occurred, is the cell/substitute can be used in the body.

Cells release Extra cellular matrix (ECM)

- It maintains the cells
- It makes the cell reside at its place
- Helps in all transportation.
- Tensile strength.
- Shape & size maintains the help of other cells.

* TISSUE ENGINEERING

Embryonic Stem Cells

ICM \rightarrow able to differentiate in the required cell type.

- * Adult Stem Cells \rightarrow quiescent for extended period + proliferate (self renewal) + potency
- * Normal cell \rightarrow life span \rightarrow finite \rightarrow lost after certain no. of divisions
- * Adult Stem Cells \rightarrow where do they reside?

Every organ of the body \rightarrow ASCs.

Niche



Microenvironment in which cells reside

- * remains quiescent
- * proliferate
- * Differentiate

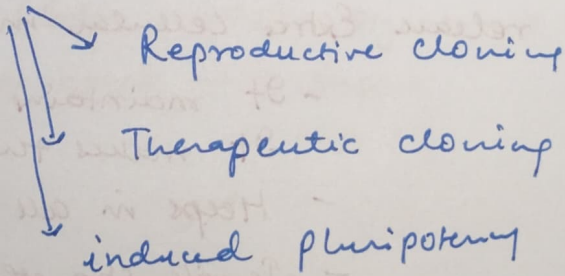
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Less in no. and are usually inaccessible

\downarrow
Particular niche.

Understanding of niche is very important. Because of therapeutic aspects and conditions can be mimicked in culture cond?

Engineering of Stem Cells

- * Producing Stem cells \rightarrow SCNT



Stem Cells

Pluripotent stem cell which resembles ESCs.

- * Developing strategies, devices, techniques to mimic local environments for the controlled, *ex vivo* culture of pluripotent, omnipotent or multipotent stem cells

REGENERATIVE MEDICINE
One needs to understand.

Stem cell → stemness is maintained?

What are the cells assisting it?

What triggers proliferation?

What " differentiation?

How stem cell maintains itself?

Q.Q. What triggers neoplastic transformation?

i) Hematopoietic

ii) Gastrointestinal

iii) Skin →

ASC niche → Highly complex → coordinated appearance and interactions of numerous mechanical & biochemical factors.