

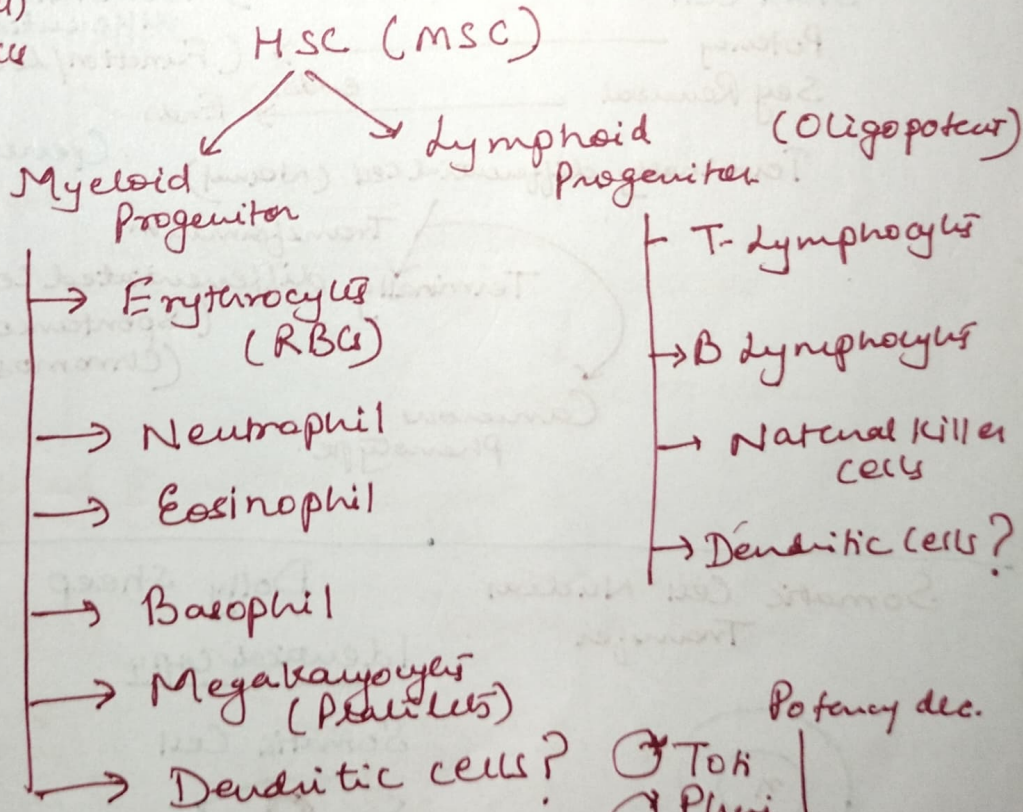
Totipotent → Create the complete body  
 Zygote / Initial cells formed by division of zygote

Pluripotent - Inner cell mass  
 (Embryonic stem cells)  
 (ESCs)

3 Germ layers

- Ectoderm → Organ system
- Mesoderm → Organ system
- Endoderm → Organ system

Multipotent → (lineage specific)  
 (Adult stem cells)  
 Lineage cells



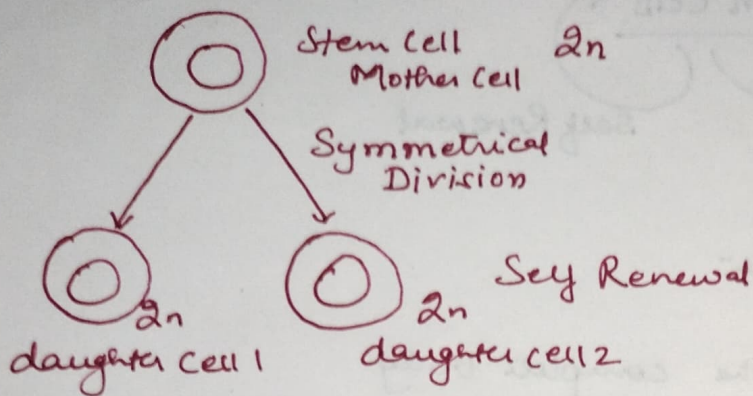
Unipotent  
 Spermatogenesis  
 ↓  
 Sperm

2. Oogenesis  
 ↓  
 Egg

Potency dec.

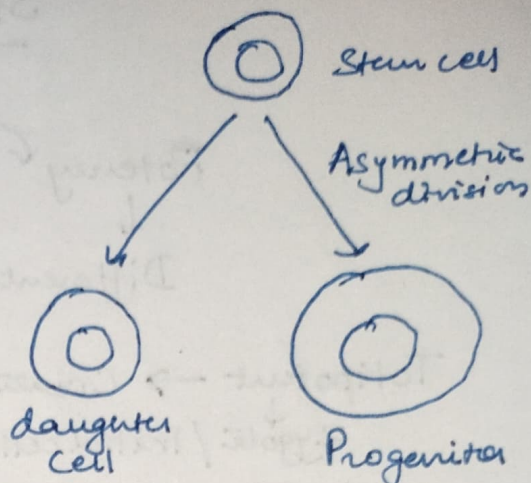
- Toti
- Pluri
- Multi
- Oligo
- Prog
- Uni



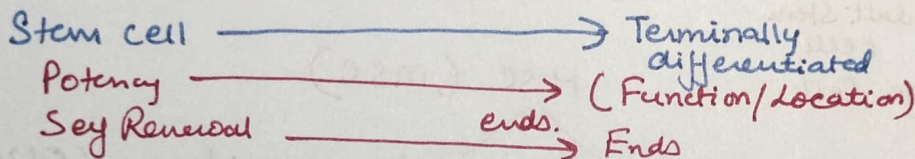


Maintain the population of Stem cell.

Unaltered daughter cell (Self Renewal)

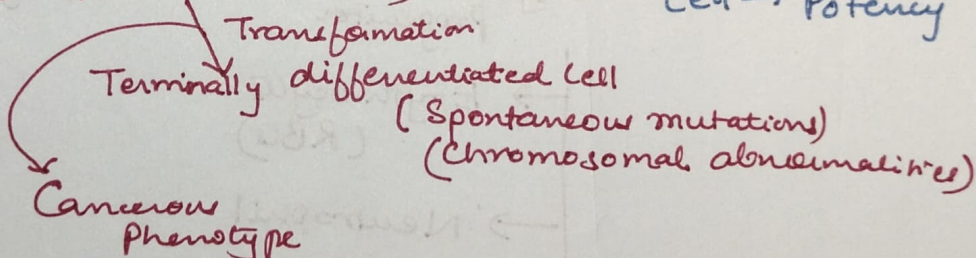


Specialized Cell



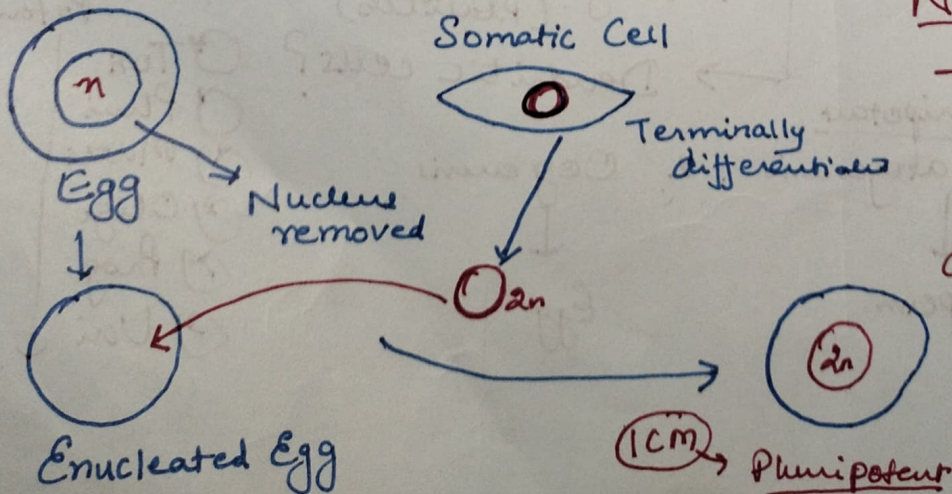
Generation of Specialized Cell  $\rightarrow$  Potency

Terminally differentiated cell (Normal)



Somatic Cell Nuclear Transfer

Dolly sheep (1st animal clone)

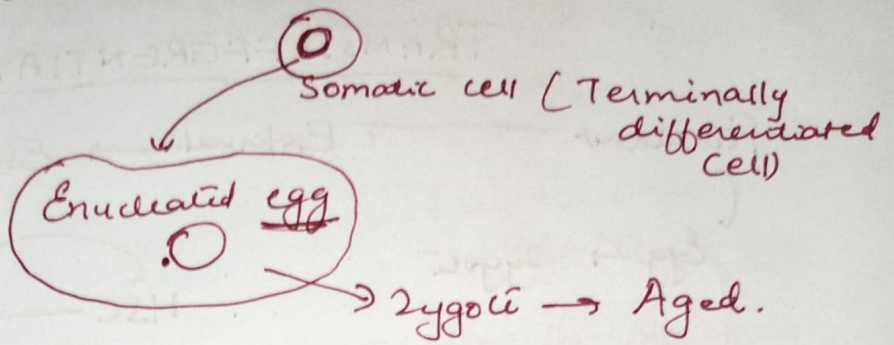


Nuclear Reprogramming

dedifferentiate  $\rightarrow$  Zygotic nucleus  $\rightarrow$  New animal



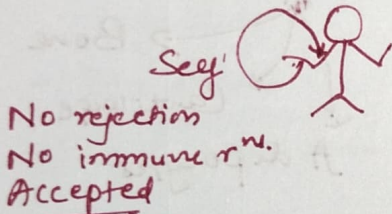
# Somatic Cell Nuclear Transfer



## Nuclear Reprogramming Yes.

### Embryonic stem cell

Transplantation  
\* Autologous



\* Allogenic

Same sp but different individual.

- \* Rejection
- \* Immune reactions
- \* Difficult to obtain

\* Xenogenic

Pig → Human

Blastocyst (embryo)

ESCs X

Pluripotent stem cell  
Inner Cell Mass

Ecto  
Meso  
Endo

### SCNT

- laboratory conditions
- Inducing somatic nucleus

Zygotic nucleus

Zygote

All the Blastocyst stages

mature individuals

### Nuclear Reprogramming

Possible

External factor → Egg

Inner cell mass  
Pluripotent stem cells  
ESCs

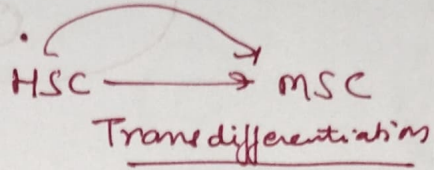
External factor → Somatic nuclei → Dedifferentiate → Rediff.  
iPS cell  
INDUCED PLURIPOTENT STEM CELL



# TRANSDIFFERENTIATION

Fibroblast → External → ESC.

Egg → Zygote



Connective tissue → Mesoderm.

Multipotent

↳ Hematopoietic Stem Cell

Bone marrow

- ├ RBCs
- ├ WBCs
- └ Platelets

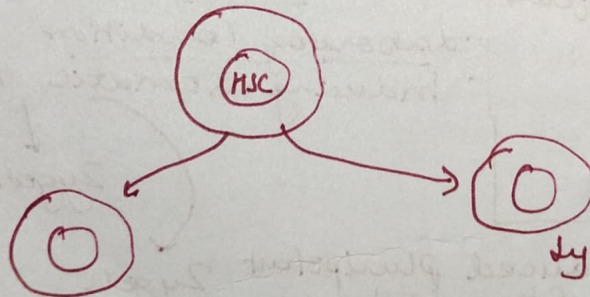
Mesenchymal Stem Cell

- ├ Bone
- ├ Cartilage
- └ Adipocytes

Lineage

System defined  
Cell types  
will be defined

Trace the progeny



Myeloid Progenitor

- ├ RBC Erythrocyte →
- ├ Neutrophil
- ├ Monocyte
- ├ Eosinophil
- ├ Basophil
- ├ Megakaryocyte
- └ DC?

Lymphoid Progenitor

- ├ T cell
  - ├ TH
  - ├ Tc
  - └ Treg
- ├ B cell
- ├ NK cell
- └ DC?

