

# Lecture 19: Cloning and Stem cells

## Stem cells

1. Key between undifferentiated cells and our adult bodies
2. they maintain their undifferentiated state.
3. they renew themselves
4. potential to form one, many or all types of cell in an organism.

Embryonic Stem cells are derived from the inner cell mass (ICM) of the mammalian blastocyst embryo.

pluripotent ~~blastocyst embryo~~

evidence that they are pluripotent: Chimera and embryonic stem cells.

\* pigment of mice used as a marker.

1. blastocyst from female pigmented mouse and remove ICM
2. culture & progeny of single ICM cell
3. Add ~~gene~~ <sup>DNA</sup> that you want to disrupt our gene and by homologous recombination it is taken into the cell.

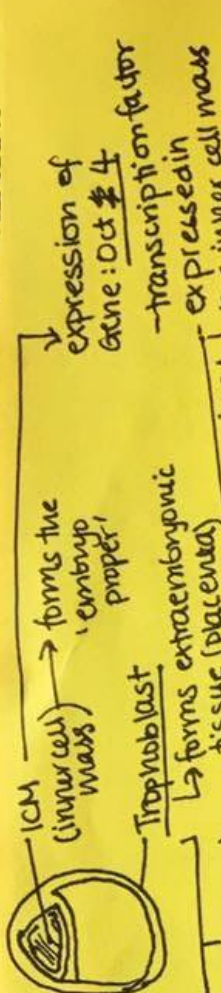
4. plate on medium that selects for the one in a million cell that took up the foreign DNA by homologous recombination
5. inject the cell into a non-pigmented mouse embryo
6. Forms chimera (chimeric) some cells from pigmented + some from non-pigmented
7. MAKE 100% knockout mouse!

Form partial knockout: enter embryo in non-pigmented mother

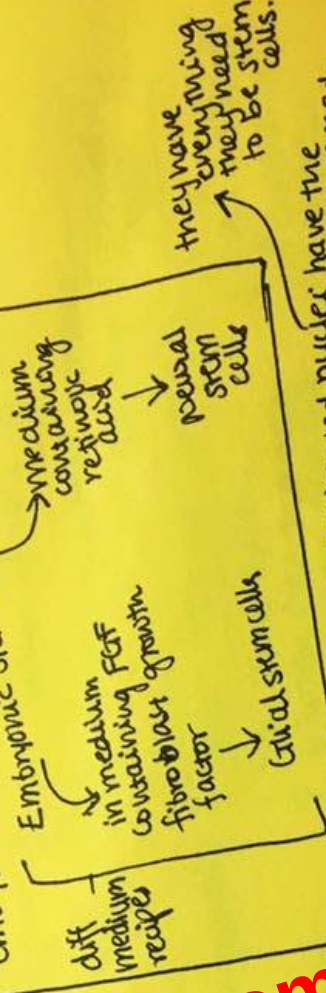
Birth to

early work when it's germ cell has the mutation

1/4 no 1/2 heterozygotes 1/4 full knockout [punnett square]



How can we produce specific differentiated cells useful for clinical applications from embryonic stem cells?



JOHN GURDON: showed nuclei have the potential to be reprogrammed. Cultured epidermis from adult pigmented frog

get nucleus Took an egg from unpigmented albino mother and took out nucleus, to get an enucleated oocyte.

Inject the nucleus into the enucleated oocyte

Creates a full tadpole

cytosolic determinants in the oocyte (EGG)!!!

WHAT IS DOING THAT? WHAT REPROGRAMMING? - KANS! - mited!!!

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