Date
10/feb/21

Bio-Tech CLASS-02

But this technically exposes us to two big diflicultíes

1. for this purpose viruses need to be introduced inside the body which can spill elsewhere
- It can lead to develope cancerous tumours the process through which cancerous tumor develope in this way is called Teratomas.

It allowed to disallow the viruses to spread Synthetic polymer Dendrimer can be used.
It act as a decoy and disallow the spread of viruses.
It can also be used for targeted Drug delivery mechanism
It is a mechanism through Drugs are delivered that part of body where it is required the most.
This, enhances the efficacy of the drug.
Targeted drug delivery mechanism can be conducted in two way
(i) The use of Dendrimer
(ii) The use of nano-robots

Miniature cameras can also be attached to dendrimer with the help of which internal processes conducted

inside the body would be delivered on the screens outside in the dynamic manner.

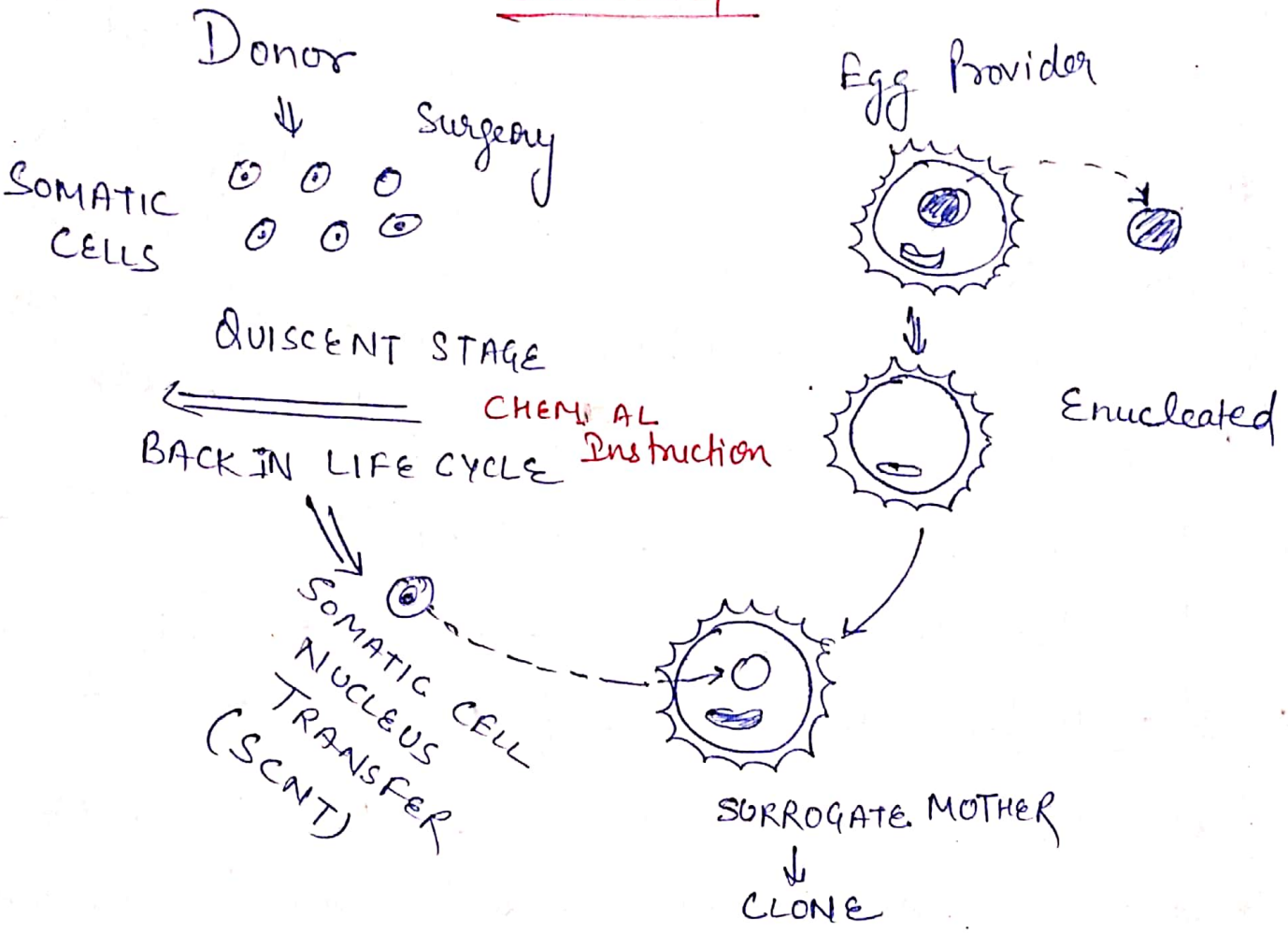
CANCER STEM CELLS

In Cancer tumor, its only a few cell that have the ability to differentiate at a very high speed because of which the cancerous tumor appears to be malignant in nature. Due to their high differentiation ability these cells are called cancer stemp cells. If chemotherapy is applied the purpose is to destroy the cancer stem cells but it will result in destroying the somatic stem cells in the body. As such for cancerous tumor are robotic device called cyberknife is used which consists of two parts.

(i) Linear particle Accelerator which develops the radiation, and

(ii) Robotic Arm which directs the radiation in exact precise dose towards the cancerous tumor so that the tumor gets destroyed but cells nearby are not affected.

CLONING



Cloning is a mechanism through which exact replica of a organism can be prepared. which is both physicaly and genetically similar to the donor. The first successful experiment of cloning was conducting in 1997 when a sheep called DOLLY was cloned. at Roslin Institute Edinburgh under the supervision of Dr. IAN WILMUT.

On one side from the egg provider, egg would be extracted and the nucleous of that egg would be

mechanically removed to make it enucleated.
On the other side from Donor through surgery SOMATIC CELL would be extracted and they would be put in the QUIESCENT stage, chemical instructions would be given to these cells so they can return back in Life cycle. after which one cell would be selected the nucleus of which is transferred to the excell

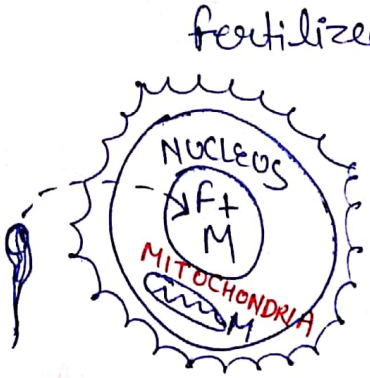
This mechanism is called SOMATIC CELL Nucleus transfer on which cloning is based. The ex-cell would be planted in the womb of the surrogate mother. The child that is born is a clone of the donor. But won't be exactly the same as mitochondria has not been transferred. Mitochondria also consists of DNA. But in one case it can be exactly the same when the donor and egg provider happens to be the same person.

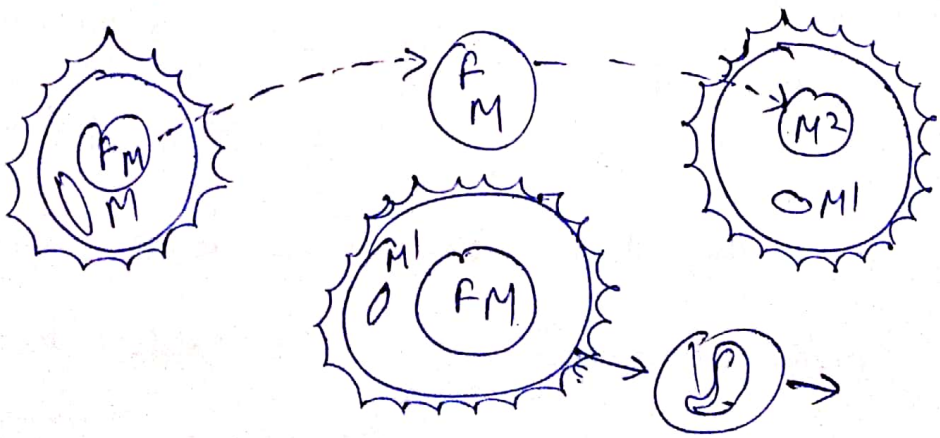
The reason why chemical instructions were given to the somatic cells was to bring them closer to the exa and make nucleous transfer compatible as these two cells are in two different phases of their life cycles. This mechanism of cloning is referred to as Reproductive Cloning.

The second mechanism of cloning is called as Therapeutic Cloning. which is utilised for a person suffering from diseases in which stem cell therapy would be required and for which embryonic stem cell would be the most preferred. The same mechanism (SCNT) is conducted in this case also but here the patient becomes the donor and when blastocyst is reached pluripotent embryonic cell can be extracted and used for therapy but this would be regarded as unethical as it would destroy a life form. but doctors debate it that at what stage it should be considered as life form. as it is responsible for saving a life also.

TRIPLE PARENT BABY

one father — Two Mothers





(6)

If cloning is based on SOMATIC Cell nucleus transfer. Triple parent baby is based on mitochondrial DNA transfer. In a fertilizer egg the genetic material of the father present in the nucleus along with the genetic material of Mother. but the mitochondrial DNA exclusively belongs to mother.

Out of 20,000 genes present in humans, 37 genes are determined by Mitochondrial DNA which can be responsible for diseases like Cancer, Heart problem, blindness etc. These diseases can get transfer from the mother to the child. Triple parent baby is a remedy for it. In this case first of all the nucleus of the fertilized egg is removed and the egg is discarted through of Another mother is selected with proper mitochondrial DNA her ex-cell is extracted and made enucleated The nucleus of the fertilizer egg now transferred into it. It is now planted inside the womb of sarrogate mother. the baby which is born would be free from Mitochondrial DNA diseases but she would be having one father and two mother.

Countries like Canada and Australia have given a gohead for development of this kind of baby. Mitochondria is basically a bacterial cell which has left side its self existance and combined with the cells of organism.

Biotechnology

There are two broad form of Biotechnology.

1→ Tissue Culture
2→ Genetic Engineering

Culture is a process through which cells of plants, Animals, microorganisms would be developed in a control condition in the lab. exclusively the cells of plants & animals are developed in similar condition. It is referred to as Cell Culture or Tissue culture. for this purpose a medium is selected which can be liquid or semisolid. first of all the medium is sterilised. and then nutrients and harmons are used in the medium so that cells are multiply in number.

The medium is constantly changed also for the purpose of removing the waste product. A big contribution in this field has been made by the National chemical lab of Pune by developing a variety of bamboo which can flower in weeks instead of years.

* Genetic Engineering

It is also referred to as recombinant Gene Technology or Genetic Engineering or Genetic manipulation.

After the double helix structure of DNA was given by Watton Greek it became possible to alter the genetic makeup of organ by either deleting and existing gene from it or by introducing a new gene into it.

The resultant gene is referred to as recombinant gene.

* Genetically Modified Crops

→ These crops are suitable to different climatic conditions.

→ essentialy they should have recombinant DNA present in it.

→ They are used for enhancing crop production.
→ They can be used for removing Diseases from the crops.
→ They can also be used for enhancing the nutrient content. This process is called biofortification.
→ The first GM crop was developed in 1983 called anti-biotic Resistant tobacco.
→ In the year 1994, GM tomato was developed called Flavr Savr., in US.

There are numerous examples of GM crops —

(1) GOLDEN RICE → Rice naturally lacks Beta Carotene which gets converted into Retinal or Vitamin A inside the body. This drawback was removed by two scientist Peter Berger and Ingo Potrykus when they developed Genetically Modified Golden Rice by taking genes from other organism. Since the color of Beta Carotene is golden hence it is called as Golden rice.

(2) SUPER RICE → Rice not only lacks Beta Carotene but also Iron and Zinc. Scientist from Italy have developed a transgenic (GM) variety called Super rice in which the iron content has

been enhanced 4 times and zinc content ~~can~~ has been enhanced two times.

GM Bananas Banana also lack Beta Carotene and the scientist of Queensland Technological Institute have developed a transgenic variety called GM Bananas where this drawback have been removed. But much talked about varieties of GM crop in India includes Bt. Cotton, Bt. Brinjal and G.M Mustard.

Bt. Cotton Cotton generally suffers from a diseases called Ballworm Diseases because of which the production is less. Monsanto company develop a transgenic variety of cotton called BT cotton by taking genes from Bacterium called Bacillus Thuringesis. The genes which were taking include CRY 1 A(C), CRY 1 A(B) & CRY 9C.

CRY Gene is a protoxin, essentially they are protein but would get converted into toxin when the environment get altered. they get activated in alkaline environment. Since the intestinal gut of insects responsible for ballwarm is alkaline in nature when they reached this gut they get converted

into toxin and is responsible for forming numerous Pores on the wall of the gut because of which the insect dies

Bt Brinjals ⇒

Brinjals suffers from a diseases called fruit & Shoot Borer diseases because of which its production happens to be low. Bt Brinjal is a transgenic Variety which was approved by genetic engineering Appraisal committee in the year 2009. In this variety the same genes from the same bactrium has been used. But there were a number of compaign against it. Environmental groups opposed it on the protest of better experience of Bt Cotton. As such the Govt declared moratorium on cultivation of this variety otherwise it would have become the first GM food crop to be cultivated in India.

GM Mustard ⇒