

02

# TNPSC GROUP II / IIA MAINS SCERT - SCIENCE & TECHNOLOGY QUESTION WITH ANSWER

2. Write Short Notes on  
a) Gene Therapy  
b) Stem Cell therapy

## Gene Therapy :

1. A corrective therapy to a person born with hereditary disease.

## 2. Process :

- a) Transfer of Normal gene into a person's cell that carries one or more mutant alleles.
- b) Delivery - Using vector

## 3. Treat disease :

- a) Cystic Fibrosis
- b) Haemophilia
- c) ADA - Adenosine deaminase deficiency
- d) SCID - Severe combined Immuno Deficiency

## 4. Strategies

- i) Gene Augmentation
  - To replace missing gene
  - Insertion of DNA into genome
- ii) Gene Inhibition
  - Inhibit expression of dominant gene
  - Insertion of anti sense gene

## 5. 2 Approaches

### a) Somatic Cell Gene therapy :

1. Insertion of fully functional & expressible gene into target somatic cells.
2. Correct Genetic disease permanently
3. Introduced into Bone marrow cells, Blood cells, Skin cells etc.
4. Not Inherited to Next generation.

### b) Germ Line Gene Therapy

1. Introduction of DNA into Germ cells.
2. Introduced into Eggs & Sperm
3. Passed onto Successive generation

**Issues :**

- a) Gene has to be harmless to patient
- b) Bodys Immune response should not react to foreign proteins produced by New genes.

**b) Stem Cell therapy :**

Stem cells - Undifferentiated cells found in most of multi cellular animals.

**1. Features of Stem cells :**

- a) Maintain undifferentiated state even after under going numerous mitotic divisions
- b) Cellular Potency - Capable of self renewal
- c) Differentiate into all types of cells - derived from ectodem endoclerm & Mesoderm

**2. Types :****a) Embryonic Stem cell (ES)**

1. Develop into 200 cell types multipotency
2. Pluripotent - Produce 3 primary germ cells
3. Immortal

**b) Adult Stem cells / Sematic Stem cells**

1. Found in various tissues of childrens & adults

**2. Can divide & create Similar cells**

3. Repair system of body
4. Rich Source - Red Bone Marrow

**3. Applications :**

- a) To gene regenerate damages & diseased organs.
- b) Generation of cells & tissues for cell based therapies
- c) To test new drugs

**Stem Cell (More Stem cell)**

- Muscle Cell
- Nerve Cell
- Red Blood Corpuseles

**4. Stem Cells Bank :**

- a) Extraction, Processing & Storage of stem cells for future treatment.
- b) Amniotic Cell bank - Stem cells from amniotic fluid
- c) Cord Blood Banking - Stem cells from Umbilical cord during childbirth.

**5. Sources of Stem Cells**

- a) Placenta, Amniotic Sac & fluid, Umbilical cord, Cord blood