



Stem Cell Transplants

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Why in News?

A recent study published in *Science Translational Medicine* examined long-term outcomes in patients who underwent **hematopoietic stem cell transplants (HSCT)**, focusing on how transplanted stem cells evolve and mutate over time.

What are the Key Findings of the Study?

- The research involved 16 pairs of donors and recipients where both exhibited surprisingly low mutation rates, average 2% in donors and 2.6% in recipients annually.
 - This finding suggests a stable clonal expansion of stem cells over decades.
- While all donors exhibited some level of **clonal hematopoiesis**, the absence of widespread clonal expansion indicates a robust regenerative capacity of the bone marrow.
- **Implications:**
 - Crucial for improving long-term transplant outcomes.
 - Potential risk of developing blood cancers or chronic diseases in recipients due to the presence of clonal hematopoiesis

Note:

Clonal hematopoiesis occurs when one type of blood cell increases in number compared to others in the blood system. Common examples of this condition include **chronic myeloid leukemia** and **myelodysplastic syndromes (MDS)**.

What are Hematopoietic Stem Cells ?

- **Stem Cells:** Stem cells are the body's raw materials — cells from which all other cells with specialised functions are generated.
- **Hematopoietic Stem Cells (HSC):** They are immature cells capable of developing into all blood cell types, including white blood cells, red blood cells, and platelets. It was first explored for use in humans in the 1950s.
 - Hematopoietic stem cells are located in peripheral blood and bone marrow, also known as **blood stem cells**.
- **Transplant of HSCs:** It involves administering healthy hematopoietic stem cells to patients with dysfunctional or depleted bone marrow.
 - Hematopoietic stem cell transplants **can save lives for those with blood cancers**.
 - After the transplant, the donated stem cells help restore the recipient's blood cell production system.

Prelims:

Q1. In the context of hereditary diseases, consider the following statements: (2021)

1. Passing on mitochondrial diseases from parent to child can be prevented by mitochondria replacement therapy either before or after in vitro fertilization of the egg.
2. A child inherits mitochondrial diseases entirely from mother and not from father.

Which of the statements given above is/are correct?

- (a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans: (c)

Q2. With reference to 'stem cells', frequently in the news, which of the following statements is/are correct? (2012)

1. Stem cells can be derived from mammals only
2. Stem cells can be used for screening new drugs
3. Stem cells can be used for medical therapies

Select the correct answer using the codes given below:

- (a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) 1, 2 and 3

Ans: (b)