CCR5 Receptors – Can they be a cure for HIV?

Why in news?

A man from Germany, has become at least the third person to have been cured of HIV with the virus not being detectable in his body even 4 years after stopping the medicine.

What is the Human Immunodeficiency Virus (HIV)?

- **Type** - HIV is a lentivirus, which is a sub-classification of the retrovirus.
- **AIDS** - It causes the HIV infection which over time leads to Acquired Immunodeficiency Syndrome (AIDS).
- AIDS is a deadly condition in which the affected person's immune system fails, leading to the spread of life-threatening infections and cancers in his body.
- HIV demolishes a particular type of WBC (White Blood Cells) and the T-helper cells.
- **Transmission** - HIV infection can occur by the transference of blood, breast milk, vaginal fluid, semen, or pre-ejaculate.

What is CCR5 mutation?

- HIV mainly attacks the CD4 immune cells in the human body.
- The *CCR5 receptors* on the surface of the CD4 immune cells act as a *doorway for HIV virus*.
- However, the *CCR5-delta 32 mutation* prevents these receptors used by the HIV virus from forming on the surface, effectively removing the doorway.
- Those with the mutation are almost immune to the HIV infection, although some cases have been reported.

What are the challenges in transplanting these receptors in HIV Patients?

- **Heavy load of HIV Patients** - Mutation exist in very few people and nearly 38.4 million people living with HIV across the world.
- It is very difficult to find a matching donor.
- **Restricted donor pool** - The mutation occurs mainly among Caucasians, and restricted the donor pool further.
- **High risk** - Bone marrow Transplant involves high risks, especially that of the person rejecting the donated marrow.
- There is also the likelihood of the virus mutating to enter the cells through other mechanisms in such persons.

What are the current treatments for HIV?

- Although there are no cures for the infection at present, the disease can be managed using antiretroviral therapy.

- **Anti-Retroviral Therapy** - These medicines suppress the replication of the virus within the body, allowing the number of CD4 immune cells to bounce back.
- The drugs have to be taken for life because the virus continues to persist in reservoirs across the body.
- If the drugs are stopped, the virus can again start replicating and spreading.
- When the viral levels are low, the likelihood of a person transmitting the infection is also low.
- **PrEP** - Although there is no vaccine for HIV, there are *Pre-exposure prophylaxis* (or PrEP) medicines that can be taken by people at high risk of contracting the infection.
- PrEP reduces the risk of getting HIV from sex by about 99%.

References

1. Indian Express – Third patient is cured of HIV
2. Wion – Duesseldorf patient cured of HIV
3. DW – Germany's 'Düsseldorf Patient' cured of HIV