CRISPR Cas9

April 14, 2020

Why in news?

A Chinese researcher recently claimed that he had altered the genes of a human embryo that eventually resulted in the birth of twin girls. The genes were claimed to be “edited” to ensure that they do not get infected with HIV.

How does it work?

- The system CRISPR-Cas9 acts on genetically modified molecules like a process of cut-and-paste.
- A special position is found on the DNA strand with genetic codes, which must be modified or “fixed”.
- Using the **Cas9 protein acting like a pair of scissors**, gene is removed from the strand.
- A DNA molecule has a natural propensity to fix itself, if it is damaged.
- In this automated repair process, scientists intervene to supply a necessary genetic code sequence that attaches to the damaged DNA strand.

What is CRISPR Cas9?

- The **Clustered Regularly Interspersed Short Palindromic Repeats (CRISPR 9)** (CRISPR-Cas9) method has streamlined gene editing, making it simpler and easier for most laboratories to access.
- CRISPR technology is basically a **gene-editing technique which can be used to modify or change the organism’s genome**.
- The technique can be used to **target specific parts of the genetic code** or to edit the DNA at certain locations.

- **Researchers can change DNA sequences and gene activity**
- **Other potential applications** include genetic defect repair, treatment and prevention of disease transmission and the improvement of crops.

Concerns: Manipulation of the genetic code is more controversial in human beings. For many years, leading scientists in the field have called for the “world pause” on clinical applications to humans before international level standards are established.

- University of Stanford research, U.S. showed that the device CRISPR-Cas9 implants unanticipated off-target results in the mice, outside the expected editing sites.
- The fear of a premature rush of the CRISPR system for therapeutic use still remains. Studies have shown that cells edited from CRISPR-Cas9 can lead to cancer.
- The risk of mutations in those cells elsewhere in the genome may increase. Although the technique of CRISPR-Cas9 has been used widely to treat many disorders, what diseases or characteristics should be decided through genetic modification is still unknown.
- Regarding ethical concerns, there is doubt over human embryo development for one’s own sake.