World's First Gene Edited Babies

A Chinese researcher, He Jiankui, has claimed that he used **CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)** to produce the world's first gene-edited babies.

- He said that he altered the genes of a pair of twins while they were embryos to make them resistant to HIV, the virus that causes AIDS.
- If proven, it would be the first instance of human offspring having been produced with specific desired attributes, using gene editing.
- Many scientists have called this experiment as unethical. As there are serious unanswered questions about the safety of embryo editing.

What is a Gene?

- Genes are made up of DNA (Deoxyribonucleic acid).
- Genes contain the **bio-information that defines any individual.** Physical attributes like height, skin or hair colour, more subtle features like intelligence or eyesight, susceptibility to certain diseases, and even behavioural traits can be attributed to information encoded in the genetic material.
- An ability to alter this information gives scientists the power to control some of these features in humans.

What is Gene Editing?

- Gene editing is also called as genetic modification, genetic manipulation or genetic engineering.
- Genome editing is a group of technologies that give scientists the **ability to change an organism's DNA.** These technologies allow genetic material to be added, removed, or altered at particular locations in the genome.
- Gene Editing is widely practised in agriculture, to increase productivity or resistance to diseases, etc.

What is CRISPR?

- Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is a gene editing technology, which **replicates natural defence mechanism** in bacteria to fight virus attacks, using a special protein called Cas9.
- CRISPR-Cas9 technology behaves like **a cut-and-paste mechanism on DNA strands that contain genetic information.** The specific location of the genetic codes that need to be changed, or edited, is identified on the DNA strand, and then, using the Cas9 protein, which acts like a pair of scissors, that location is cut off from the strand.
- A DNA strand, when broken, has a natural tendency to repair itself. Scientists intervene during this auto-repair process, supplying the desired sequence of genetic codes that binds itself with the broken DNA strand.
- CRISPR-Cas9 is a simple, effective, and incredibly precise technology with potential to revolutionise human existence in future.

Applications and Potential Impact

- The most promising use of the CRISPR technology is in **treatment of wide variety of diseases,** including single-gene disorders such as cystic fibrosis, hemophilia, and sickle cell disease.
- It also holds promise for the treatment and **prevention of more complex diseases,** such as cancer, heart disease, mental illness, and human immunodeficiency virus (HIV) infection.
- CRISPR is extremely precise, but not 100% precise every time. So, it can have unintended outcomes with effects unknown.
- Leading scientists in the field have for long been calling for a **“global pause”** on clinical applications of the technology in human beings, till such time as internationally accepted protocols are developed.
- This technology also raises serious **ethical questions like designer babies and changing genes without the informed consent of future generation**