

Genome Editing or Gene Editing

December 14, 2018

Manifest Pedagogy

Ethical issues around Gene Editing makes it an interesting topic to be debated upon. Recent progress in Gene Editing across globe necessitate an aspirant to look into the techniques of Gene Editing too. Eg: Question on CRISPR in 2018 Prelims. It will stay as a hot topic for many years.

In news

Summit on Human Genome Editing in Hong Kong

Placing it in syllabus

Science and Technology- developments and their applications and effects in everyday life.

Awareness in the fields of Biotechnology

Static dimensions

1. Genome editing
2. Germline editing
3. Ethical issues of gene editing

Current dimensions

1. Genome editing in India and world
2. Summit on Human Genome Editing

Content

What is Genome Editing?

Genome editing is a way of **making specific changes to the DNA of a cell or organism**. An enzyme cuts the DNA at a specific sequence, and when this is repaired by the cell a change or 'edit' is made to the sequence.

Genome editing (also called gene 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.

How Germline Editing is different from Gene Editing?

- Genome of an individual is edited in such a way that the change is heritable.
- Deliberately changing the genes passed on to children and future generations.
- Achieved through genetic alterations within the germinal cells, or the reproductive cells, such as the oocyte and spermatocyte.

Gene editing- key events around the world

There are two trials which are in progress—one at the University of Pennsylvania (Penn), US and the other at Hangzhou Cancer Hospital, China.

Both trials examine the impact of CRISPR-Cas9, a gene editing technology, on cancer.



India and Gene Editing:

India is yet to release a comprehensive gene editing policy.

India has aligned with international consensus on healthcare policies.

Right now, germline gene editing continues to be banned in line with international opinion. The debate on germline editing is overshadowing the more urgent testing of gene editing for healthcare treatments.

Ethical issues involved in gene editing:

1. Morality of eugenics, which is theory and practice of improving the genetic quality of the human population.
2. Selection of powerful genes which may lead to racial race.
3. Failed trails will have adverse legal and ethical issues.
4. Unforseen consequences.
5. Deciding on which is a good gene and which is a bad gene.
6. Danger of genetic misuse.
7. Techno-eugenic race may harm the humanity.
8. Genobility (Ruling genetic class) will lead to Inequality and discrimination.
9. Challenges of regulating gene editing.
10. Biosafety and biosecurity concerns related to implications of technology.
11. Gene drives or selection of genes for specific traits which changes the dynamics of genes and alter ecological balance.

Test yourself: Mould your thoughts

What is Gene Editing? Explain various techniques of Gene Editing. Also, comment on the ethical issues involved in it?