Concerns with Gene editing

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What is the issue?

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Ethical concerns have been raised over the clinical application of gene editing technique in recent times.

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What is CRISPR?

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- It is a gene editing technique which stands for Clustered Regularly Interspaced Short Palindromic Repeats.
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- It harnesses the natural defence mechanisms of bacteria to alter an organism's genetic code.
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- The bacteria are likened to a pair of molecular scissors that can cut the two DNA strands at a specific location and modify gene function.
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- The cutting is done by enzymes like Cas9, guided by pre-designed RNA sequences, which ensure that the targeted section of the genome is edited out.
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What are the practical applications?

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- CRISPR was used successfully to repair a heart-damaging gene in human embryos.
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- It marked a step towards preventing inherited diseases from being passed on to the next generation.
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- It can be useful in learning how genes cause disease or influence development and what therapies might help.
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- It was also found that gene editing in the brain can help decrease the repetitive behaviours, which is a symptom of autism spectrum disorders.
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- The approach can also be used to treat other neurological diseases such as epilepsy and the brain cancer glioblastoma.
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- Scientists in the UK have used genome editing to study DNA function in human embryos that could help better understand the biology of our early development.
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- The findings could improve IVF treatments and understand some causes of pregnancy failure in the future if key genes responsible for successful development of embryos are identified.
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- Researchers also are using gene editing to hatch malaria-resistant mosquitoes, grow strains of algae that produce bio-fuels, improve crop growth, even make mushrooms that don't brown as quickly.
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What are the concerns?

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- Safety is a key question because gene editing has the possibility of accidentally cutting DNA that is similar to the real target.
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- A study published in the journal Nature Medicine, found that therapeutic application of the genome-editing tool may increase the risk of cancer.
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- It could be potentially used to edit out undesirable traits in human beings in the name of improving genetic quality of a human population, as Eugenics.
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- It could also be used by governments to create a 'superior' race and by the private sector in the name of creating a perfect child for the parents.
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- Altering genes in sperm, eggs or embryos through "germ line" engineering leads to concerns regarding creation of designer babies with enhanced traits.

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- This leads to the argument that gene editing be reserved for serious diseases with no good alternatives and performed under rigorous oversight.
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Source: The Hindu

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