Mitochondrial Donation Treatment

Why in news?

An announcement was made recently that a baby was born using three persons' DNA in the UK.

What is mitochondria?

- **Mitochondria** - They are membrane-bound cell organelles that are the powerhouses of the cells as they generate the energy needed to power the cell's biochemical reactions.
- Chemical energy produced by the mitochondria is stored in a small molecule called *adenosine triphosphate (ATP).*
- Mitochondria contain their own *small chromosomes.*
- Generally, mitochondria, and mitochondrial DNA, are inherited ***only*** *from the mother.*
- **Mitochondrial diseases** - When the mitochondria are impaired and do not produce sufficient energy, it affects the functioning of organs.
- The diseases that arise out of mitochondrial mutations are called mitochondrial diseases.
- Mitochondrial diseases are ***only*** *passed on by the mother.*
- It has no cure, but can be treated.
- In order to prevent the child from inheriting the mother's mitochondrial disease, the three parent technology was used.

What is Mitochondrial Donation Treatment?

- Mitochondrial donation treatment is also known as ***mitochondrial replacement therapy (MRT).***
- ***Advanced in-vitro fertilization technique*** is used for mitochondrial donation treatment.
- The baby's biological father's sperm was used to fertilise the eggs from the biological mother, who has a mitochondrial disease, and a third, female donor with clear mitochondria, separately.
- Then, the nuclear genetic material from the donor's egg is removed and replaced with the genetic material from the biological parents'.
- The final product (the egg) which has the genetic material from the parents, and the mitochondria from the female donor, is implanted in the uterus.
- This baby (three-parent baby) will be ***free from the mother's mitochondrial disease.***

What are the short falls of mitochondrial donation treatment?

- Sometimes it is possible that a small amount of the maternal mitochondria with errors may get passed on during the procedure.
- So-called reversion or reversal could lead to a disease in the child.

The UK is not the first country to create babies from MDT. In 2016, a US doctor announced the world's first MDT birth after treating a woman who carried mitochondrial mutations that cause Leigh syndrome.

References

1. The Hindu | Short Falls Of Mitochondria Donation Treatment
2. The Guardian | Mitochondria Donation Treatment
3. NHGRI | About Mitochondria

