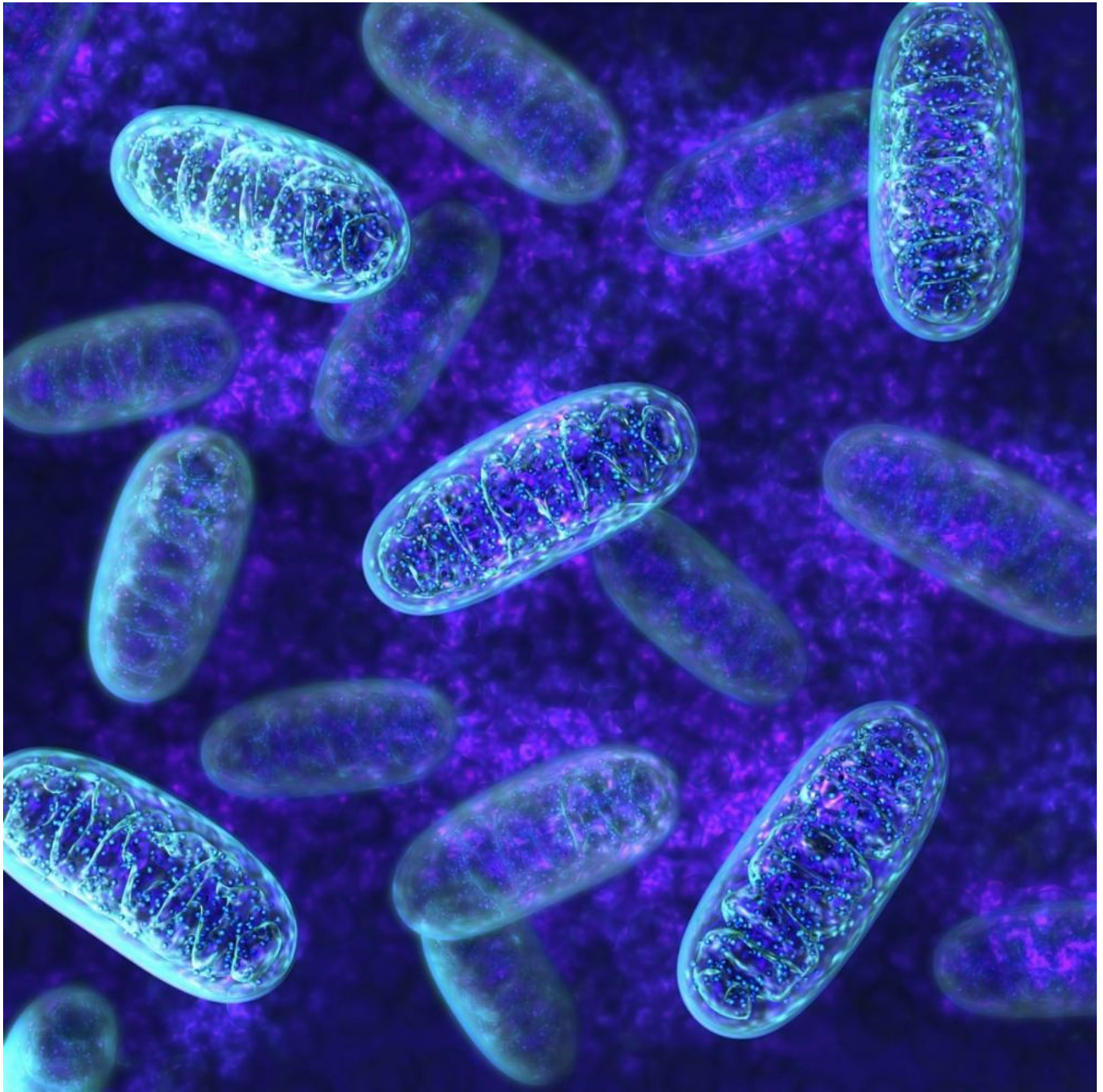


What is Mitochondrial Replacement Therapy (MRT)?

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Why in News?

- In 2015, the United Kingdom became the first country to regulate mitochondrial replacement therapy (MRT).

About Mitochondrial Replacement Therapy (MRT):

- **What is it?** It is a new form of **reproductive in-vitro fertilization (IVF)** which works on the principle of **replacing a women's abnormal mitochondrial DNA (mt-DNA) with the donor's healthy one.**
- **Why is MRT done?**
 - **People have two types of DNA** in their cells, **nuclear DNA**, which is **inherited from both** parents and **mitochondrial DNA (mtDNA)**, which is **inherited only from the mother.**
 - MRT is designed **to prevent women who are carriers of mitochondrial diseases from passing on these heritable genetic diseases to their children.**
- **How is MRT carried out?**
 - MRT involves **using an egg** from an egg donor who **doesn't have mutations.**
 - The **nucleus of the egg is removed** and **replaced with the nuclear DNA from the woman who has mitochondrial DNA mutations.**
 - The **egg is then fertilized** with the father's sperm in the embryology lab.
 - **If it grows into an embryo** for transfer during IVF treatment, the embryo **would be free of mitochondrial disease.**

What is in-vitro fertilization (IVF)?

- It is a type of **assisted reproductive technology (ART)** where **sperm and an egg are fertilized outside of the human body.**
- IVF is a complex process that **involves retrieving eggs from ovaries** and manually **combining them with sperm in a lab for fertilization.**
- Several days after fertilization, the **fertilized egg (now called an embryo) is placed inside a uterus.** Pregnancy occurs when this embryo implants itself into the uterine wall.

What is Mitochondria?

- Mitochondria are **membrane-bound cell organelles** that **generate most of the chemical energy** needed to power the cell's biochemical reactions.
- Mitochondria are often **referred to as the powerhouses of the cell.**
- Chemical **energy produced** by the mitochondria **is stored in a small molecule called adenosine triphosphate (ATP).** **ATP is the chemical energy "currency"** of the cell that powers the cell's metabolic activities.
- Generally, mitochondria, and therefore mitochondrial DNA, are **inherited only from the mother.**

Q1) What is mitochondrial DNA (mt-DNA)?

Mitochondrial DNA is the circular chromosome found inside the cellular organelles called mitochondria. Located in the cytoplasm, mitochondria are the site of the cell's energy production and other metabolic functions. Offspring inherit mitochondria — and as a result mitochondrial DNA — from their mother.

Source: U.K. sees success in mitochondrial replacement therapy

Source: <https://vajiramandravi.com/current-affairs/what-is-mitochondrial-replacement-therapy-mrt/>

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