



## Uterus Transplantation

**For Prelims:** Uterus Transplantation, Artificial Uteri, [In vitro fertilization](#)

**For Mains:** Science and Technology- Developments and their Applications, Bio-technology.

[Source: TH](#)

### Why in News?

Recently, the United Kingdom's **first uterus transplant** was conducted, providing new hope for women facing reproductive challenges.

- India is one of a few countries to have had a successful uterine transplant; others include Turkey, Sweden, and the U.S.
- Doctors now **aim to reduce the surgery cost**, currently at Rs 15-17 lakh in India, and develop a bioengineered **artificial uterus** to simplify transplants and eliminate live donors for [ethical organ transplantation](#).

### What is a Uterus Transplant?

- **About:**
  - Unlike heart or liver transplants, uterus transplants aren't life-saving transplants. Instead, they are more like limb or skin transplants – which **improve the quality of individuals' lives**.
  - Uterus transplants **can help women who lack a uterus fulfill their reproductive needs**.
  - The first live birth after a uterus transplant occurred in Sweden in 2014, marking a breakthrough in treating uterine factor infertility.
- **Steps Involved in a Uterus Transplant:**
  - The recipient undergoes thorough physical and mental health evaluations before the transplant.
  - The donor's uterus, whether from a live or deceased donor, is rigorously examined for viability.
    - Live donors undergo various tests, including **gynaecological examinations** and cancer screenings.
  - The procedure **doesn't connect the uterus to the fallopian tubes**, which ensures the ovum from the ovaries moves to the uterus – so the individual can't become pregnant through natural means.
    - Instead, doctors remove the recipient's ova, create **embryos using in vitro fertilization**, and freeze them embryos (**cryopreservation**).
      - Once the newly transplanted uterus is 'ready', the doctors implant the embryos in the uterus.
  - Robot-assisted laparoscopy is used to precisely remove the donor's uterus, making the process less invasive.

- After the transplantation procedure, the vital **uterine vasculature**(the network of **vessels connecting the heart to other organs and tissues** in the body) and other important linkages are methodically re-established.
- **Post-Transplant Pregnancy:**
  - Success is determined in three stages:
    - Monitoring **graft viability in the first three months.**
    - **Assessing uterus function** between six months to one year.
    - **Attempting pregnancy** with in vitro fertilization, but with higher risks like rejection or complications.
    - The final stage of success is a **successful childbirth.**
  - Frequent check-ups are essential due to potential risks like rejection, abortion, low birth weight, and premature birth.
- **Considerations and Side Effects:**
  - **Immunosuppressant drugs** are necessary to prevent rejection but may cause side effects.
  - Side effects include kidney and bone marrow toxicity and an increased risk of diabetes and cancer.
  - For these concerns, the **uterus must be removed after successful childbirth** and regular follow-ups for at least a decade are recommended after childbirth.

## Artificial Uteri

- Researchers, at the University of Gothenburg, are working on **bioengineered uteri**. These are created using stem cells taken from a **woman's blood or bone marrow as a foundation for a 3D scaffold.**
  - Preliminary experiments with rats show promise.
- Artificial uteri could eliminate the need for live donors, addressing **ethical concerns** and reducing the **potential risks to healthy donors.**
- Artificial uteri could benefit women facing **infertility issues** as well as members of the **LGBTQ+ community.**
  - However, trans-women recipients may still need additional procedures, like castration(removing the testicles of a male animal or human) and hormone therapy.
  - Also, Ensuring consistent **blood flow to support a developing fetus** is a challenge in creating artificial uteri, as the **male body lacks the necessary structures for uterine and fetal development.**
- **Future Possibilities:**
  - Artificial uteri offer exciting possibilities for reproductive medicine but require further research and development before becoming a practical solution for human reproduction.