Indigenous Placenta-on-chip Platform

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Why in News?

Scientists at IIT Bombay and ICMR-NIRWoH (Mumbai) developed an indigenous placenta-on-a-chip platform.

- It is ***India's first indigenous lab-grown "placenta-on-a-chip"*** platform, recreating key functions of the human placental barrier.
- The initiative combined engineering design and microfabrication (led by IIT Bombay) with biological validation and cell culture models (led by ICMR-NIRRCH).
- The microfluidic device reproduces essential placental operations, including hormone production, glucose transport, waste exchange (e.g., urea clearance), and selective barrier protection.
- The platform successfully simulated hyperglycemic conditions to ***mimic gestational diabetes***, allowing real-time observation of altered transport dynamics across the placental barrier.
- Unlike conventional foreign placenta-on-chip models that require complex microfluidic pumps and continuous perfusion setups, this system is engineered to integrate seamlessly into standard laboratory workflows.

Quick facts

Placenta	• It is a temporary mammalian organ that develops during pregnancy. • It anchors to the uterine wall and acts as the fetus's life-support system by delivering oxygen and nutrients while clearing metabolic waste.
Organ-on-Chip (OoC) Technology	• Microfabricated microfluidic devices containing living human cell cultures that simulate the structural microenvironment and physiological responses of whole organs.

Gestational Diabetes	• It is a form of high blood sugar (glucose intolerance) 1st recognized during pregnancy, which can impair fetal growth and cause maternal complications.

Reference

The Hindu | Key functions of human Placenta on chip