

Organoids

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Why in news?

Organoids are the so-called 'brains in a bowl' that neuroscientists produce in laboratories.

What are organoids?

- These are **essentially organs developed in a laboratory** or they are a collection of cells that have been produced in laboratories into **three-dimensional, miniature structures** that replicate the cell structure of the entire organ.
- Although small in size, the maturity of an organ is reached quite early.
- These only include cells but not other features such as blood vessels, etc.

How are organoids produced in the laboratory?

- They are grown in the lab with stem cells, which can be one of the specific cells in the human body or cells induced to behave like stem cells, scientifically known as **induced pluripotent stem cells (iPSC)**, from organ and adult cells.
- Nutrients and other unique molecules are given for stem cells to grow and become cells identical to a certain organ.
- The developing cells can assemble themselves into the cell structures of a given organ and can partly reproduce the complex functions of mature organs via **physiological regeneration process**.
- The laboratory has already developed organoids from the brain, small intestines, kidneys, heart, stomach, eyes, liver, pancreas, prostate, salivary glands and interior ears.

How have organoids helped in our understanding of diseases?

- Researchers have used brain organoids for research into how the Zika virus affects embryonic brain development.
- Organoids can be used to research the safety and effectiveness of new medications and also to check tissue reaction to current medications.
- Organoids will bring precision medicine closer to reality by developing treatment strategies for individual patients by studying which drugs the patient is most susceptible to.

What are the ethical challenges of growing organoids?

- Scientists argue that organoids have no sensory inputs and that sensory connections are limited from the brain. Isolated brain regions can not interact or produce motor impulses with other brain regions. Therefore, the likelihood of consciousness or other perceptive property of higher order[like the ability to feel trouble] remains extremely remote.