ANCHOR

Prelims: *Current events of national and international importance*

Why in News?

Recently, world's most detailed 3D atlas of human brainstem at cell resolution was released.

- **ANCHOR –** Atlas of Neurochemical Characterization of the Human Brainstem with 3D Reconstruction.
- **Released by** – The Indian Institute of Technology Madras (IIT Madras).
- **Features –** The world's most detailed three-dimensional atlas of the human brainstem at cellular resolution.
- It is a comprehensive, multimodal digital atlas that maps the human brainstem from the prenatal stage to adulthood.
- **Technologies used** – It integrates advanced imaging technologies such as Magnetic Resonance Imaging (MRI), histology, and detailed chemo-architectural analysis to provide an unprecedented view of brain structures and cellular organization.
- The atlas includes more than 200 brainstem nuclei and fiber tracts reconstructed from hundreds of serial brain sections.
- To identify distinct neurochemical cell types, researchers overlaid eight complementary immunostains across more than 500 sections, creating highly detailed maps of the brainstem.

Significance

- The platform enables visualization at nearly microscopic resolution, allowing researchers to examine neural structures far beyond the capabilities of conventional MRI.
- Developed using IIT Madras' high-throughput brain imaging and computing platform, ANCHOR has been made publicly accessible through an online portal, facilitating global research collaboration in neuroscience and clinical medicine.
- The brainstem plays a vital role in regulating essential bodily functions such as breathing, sleep, wakefulness, cardiovascular control, and motor coordination.
- Consequently, ANCHOR is expected to significantly enhance understanding of brain development, ageing, and neurological disorders.
- The atlas can help identify specific cell populations affected by conditions such as Alzheimer's disease, dementia, and other neurodegenerative disorders, thereby supporting advances in diagnosis and treatment.
- As a major scientific milestone, ANCHOR strengthens India's position in cutting-edge brain research and contributes to global efforts to map the human brain across

different stages of life and disease.

Reference

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