Early Neurological Disorder Detection

Why in News?

According to the sources, the researchers at the **Indian Institute of Technology-Banaras Hindu University (BHU) Varanasi** have **developed a groundbreaking 'lab-on-chip' device** that can **detect early-stage diseases** with remarkable accuracy.

Key Points

- This innovative breakthrough holds the **potential to transform healthcare** by enabling **faster and more reliable identification of neurological conditions** like **Parkinson's disease, depression, and Schizophrenia.**
- The innovation by the scientists at the **Nanomaterials for Electronics and Energy Devices (NEED) lab at IIT-BHU** has the potential to **revolutionize the comprehension of brain function** and pave the way for new treatments for **neurological disorders** at a very early stage.
- The newly developed device incorporating **metallic nanoparticle decorated atomically-thin, two-dimensional (2D) semiconductor** leverages advanced **Surface-Enhanced Raman Scattering (SERS) technology.**
    - This allows for the detection of **minute concentrations of neurotransmitters** like **dopamine** with unparalleled precision and speed.
- The implications of such innovation are profound, where **developing novel materials and transforming them into a device could potentially support the various national missions** of device manufacturing, as **proposed by the Government of India.**

Surface-Enhanced Raman Scattering (SERS)

- SERS is a **commonly used sensing technique** in which **inelastic light scattering by molecules is greatly enhanced** when the molecules are adsorbed onto corrugated metal surfaces such as **silver or gold nanoparticles (NPs).**
- It enhances the **Raman scattering light from molecules**, thus leading to effective analysis of the molecules.

Parkinson's Disease

- Parkinson's disease is a **progressive neurodegenerative disorder** that impairs movement and can lead to immobility and dementia over time.
- The disease usually **occurs in older people,** but younger people can also be affected. Men are affected more often than women.
- The prevalence of **Parkinson has doubled in the past 25 years**. **India** shares around **10% of the global burden of Parkinson's disease.**

Schizophrenia

- It is a severe **mental disorder,** characterized by **profound disruptions in thinking, affecting language, perception, and the sense of self.** It **affects** more than **21 million people worldwide.**

- Researchers believe that **genetic as well as environmental factors** such as exposure to viruses contribute to causation, and also **life stressors** may play a role in the disorder's onset and course.

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