

## 5. Parkinson's Disease and Z-scan Method

**Prelims Syllabus:** Science and Technology – Pharmaceuticals and Medicals

**Mains Syllabus:** GS-III Achievements of Indians in Science & Technology; Indigenization of Technology and Developing New Technology.

### Why in News?

- IIT Dhanbad and CSIR-Indian Institute of Chemical Biology (Kolkata) have developed the Z-scan method to monitor the origin as well as the progression of Parkinson's disease in human beings.

### Parkinson's Disease:

- Parkinson's disease is a chronic, degenerative neurological disorder that affects the central nervous system.
- It damages nerve cells in the brain dropping the levels of dopamine. Dopamine is a chemical that sends behavioural signals from the brain to the body.
- The disease causes a variety of "motor" symptoms (symptoms related to movement of the muscles), including rigidity, delayed movement, poor balance, and tremors.
- Medication can help control the symptoms of the disease but it can't be cured.
- It affects the age group from 6 to 60 years. Worldwide, about 10 million people have been affected by this disease.

### Aggregation of a protein - Alpha-synuclein:

- An aggregation of a protein called Alpha-synuclein (ASyn) plays a crucial role in the development of Parkinson's disease. Protein aggregation is a biological phenomenon in which destabilized proteins aggregate (i.e., accumulate and clump together) leading to many diseases.
- Alpha-synuclein is a protein found in the human brain, while smaller amounts are found in the heart, muscle and other tissues.
- In the brain, alpha-synuclein is found mainly at the tips of neurons in specialized structures called presynaptic terminals.
- Presynaptic terminals release chemical messengers, called neurotransmitters.
- The release of neurotransmitters relays signals between neurons and is critical for normal Brain Function.

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**Use of Z-scan Method:**

- The discovered Z-scan method is expected to help in monitoring both the early as well as late stages of the aggregation of ASyn and death of neuronal cells.
- Until now, worldwide studies could not establish any strong relation between ASyn aggregations and subsequent death of neuronal cells observed in Parkinson's Disease.

