Precision Biotherapeutics

Prelims: *Current events of national and international importance | Health*

Why in News?

Precision biotherapeutics bring together genetic science, molecular biology, and data analytics to design therapies that identify and rectify the cause of illness.

- It refers to medical interventions like drugs, therapies, or biological products that are designed and optimized based on a ***patient's unique genetic, molecular, or cellular profile.***
- The field draws on multiple cutting-edge technologies like
  - **Genomic and proteomic analysis** — Decoding a person's genetic and protein signatures to identify mutations or dysfunctions causing disease.
  - **Gene editing therapies** — Directly modifying genes to correct underlying problems (e.g., CRISPR-based treatments for blood disorders).
  - **mRNA and nucleic acid therapeutics** — Using RNA molecules to instruct cells to produce specific proteins or suppress harmful ones.
  - **Monoclonal antibodies and biologics** — Laboratory-engineered molecules that bind to precise disease targets, such as cancer cells or viral proteins.
  - **AI-driven drug discovery** — Leveraging big data and machine learning to predict how molecules interact within the body.

*Non-communicable diseases such as diabetes, cardiovascular illness, and cancers account for nearly **65%** of deaths in India.*

- **Status of Precision biotherapeutics in India -** The Department of Biotechnology (DBT) and its funding arm BIRAC have identified Precision Biotherapeutics as one of the 6 focus areas.
- It is identified under the ***BioE³ Policy (Biotechnology for Economy, Environment, and Employment).***
- Indian research institutions such as
  - The Institute of Genomics and Integrative Biology (IGIB),
  - National Institute of Biomedical Genomics (NIBMG), and
  - The Translational Health Science and Technology Institute (THSTI) are leading efforts to map genetic diversity and disease susceptibility across populations.
- In the private sector, several biopharma companies are exploring precision therapies.
  - For example, Biocon Biologics and Dr. Reddy's Laboratories are investing in

biosimilars and monoclonal antibodies.
    - Zydus LifeSciences is working on gene therapies for rare diseases.
- **Other companies -**
    - Immuneel Therapeutics, focused on immuno-oncology,
    - Bugworks Research, developing novel antibiotics,
    - Akrivia Biosciences, providing precision diagnostics for cancer;
    - miBiome Therapeutics, working on patient-centric healthcare solutions;
    - 4baseCare, a precision oncology firm with AI-driven tools; and
    - ImmunoACT, the first Indian company to bring CAR-T technology to India.

Reference

The Hindu | What are precision biotherapeutics?

