BIRSA 101 | National Current Affairs | 20 Nov 2025

Why in News?

The **Minister of Science & Technology** has launched **"BIRSA 101"**, India's first **indigenous CRISPR-based gene therapy** for **Sickle Cell Disease**.

- Named after **Birsa Munda** on his **150th birth anniversary** **(15th November 2025)**, the therapy strengthens India's push for a **"Sickle-Cell-Free Nation,"** with significant benefits for affected **tribal communities** in central and eastern India.

Key Points

- **About BIRSA 101:**
  - The gene therapy was developed by the **Council of Scientific & Industrial Research - Institute of Genomics and Integrative Biology(CSIR-IGIB)** and transferred to the **Serum Institute of India** through a structured **technology-transfer** agreement, ensuring rapid pathway from lab to market.
  - The **public–private model** is designed to deliver **high-quality**, **affordable** genomic therapies to underserved communities.
- **About CRISPR Gene Editing:**
  - **CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)** is a naturally occurring defence mechanism found in bacteria, used to cut viral DNA.
  - Modern gene-editing uses **CRISPR–Cas9**, where **Cas9** functions like molecular scissors to cut DNA at specific target sites.
  - It enables **precise, efficient, and low-cost genome editing**, making it a major breakthrough in biotechnology and medical research.
  - First demonstrated as a gene-editing tool in **2012**, pioneered by **Jennifer Doudna and Emmanuelle Charpentier**, who received the **2020 Nobel Prize in Chemistry**.

- **About Sickle Cell Disease (SCD):**
  - **Sickle Cell Disease** is an **autosomal recessive** **genetic blood disorder** caused by an **HBB gene mutation**, producing abnormal **Hemoglobin-S** that makes red blood cells sickle-shaped and rigid. This leads to **anemia, pain crises, infections, and organ complications**.
  - It is **highly prevalent in tribal communities** of central and eastern India and is a focus area under the **National Sickle Cell Anaemia Elimination Mission (2023–2047)**.
  - Conventional treatment includes **hydroxyurea, blood transfusions**, and **stem-cell transplant**.