TB GENOME SAMPLES: SCIENCE & TECHNOLOGY

NEWS: DBT completes sequencing of 10,000 TB genome samples, aims to reach target of 32,500 samples by November 2025

WHAT'S IN THE NEWS?

India's **Dare2eraD TB initiative** aims to sequence **32,500 TB samples** to improve understanding of **drug-resistant TB** and enhance diagnostic accuracy. This effort, along with the **TB-Mukt Bharat Abhiyaan**, aims to achieve **TB eradication by 2025**, five years ahead of the WHO target.

Genomic Sequencing for Tuberculosis (TB) – A Data-Driven Research Initiative

About the Dare2eraD TB Initiative

- **Genome Sequencing Initiative**: The Department of Biotechnology (DBT) under the **Ministry of Science and Technology** has undertaken a significant initiative called **Dare2eraD TB** aimed at conducting **genomic sequencing** of **Mycobacterium tuberculosis** (the bacterium responsible for TB). This initiative focuses on identifying **drug-resistant strains** and capturing the unique genomic features of the TB bacterium prevalent in India.

- **Launch and Objectives**:

    - **Launched in 2022**, the initiative aims to **sequence 32,500 TB samples** across India, contributing to a broader understanding of **drug-resistant TB**.

    - The primary objective is to improve diagnostic methods, create faster resistance profiling systems, and ultimately tailor treatments to individual patients, reducing the time taken to confirm TB from **weeks to hours or days**.

- **Key Achievements**:

    - As part of the project, **10,000 samples** of TB have already been sequenced.

    - **7%** of these samples showed resistance to **at least one drug**, highlighting the importance of identifying resistant strains early in the treatment process.

    - The sequencing project has been a joint effort of the **DBT**, the **Council of Scientific and Industrial Research (CSIR)**, and the **Indian Council of Medical Research (ICMR)**, working together under the umbrella of **Indian Tuberculosis Genomic Surveillance**.

Significance of the Genome Sequencing Project

- **Revolutionizing Diagnostics and Resistance Prediction**:

    - The **genomic dataset** generated from this research has the potential to **transform TB diagnostics** and enhance the **prediction of drug resistance**. This could lead to:

    - **Improved Diagnostic Accuracy**: Genomic sequencing allows for more **precise and accurate diagnosis** of TB, including identifying **drug-resistant strains** more quickly.

    - **Faster Resistance Profiling**: By utilizing the data, **resistance profiles** can be developed in a much shorter time, aiding in the **faster detection** of drug-resistant TB.

    - **Tailored Treatments**: Understanding the genetic makeup of the bacterium will help in **customizing treatment regimens** to better suit the needs of individual patients, thereby **reducing treatment failures** and **relapse rates**.

- **Impact on Treatment Outcomes**:

    - The genomic information will assist in **reducing the time** to confirm a TB diagnosis from **weeks to hours**, and **improve patient outcomes** by enabling the **personalization of treatment**.

    - **Reducing the Risk of Treatment Failure**: By tailoring treatment based on genetic profiling, the risk of **relapse** or **treatment failure** will be significantly lowered, improving the overall success rates of TB treatments.

Key Status of Tuberculosis in India

- **Prevalence in India**:

    - **India** has the **highest number of diagnosed TB cases** globally. According to the **latest estimates**:

        - In 2022, **India had 1,990 TB cases per million**, which is an improvement from **2,370 per million** in 2015.

        - India accounts for **28% of the world's new TB cases**.

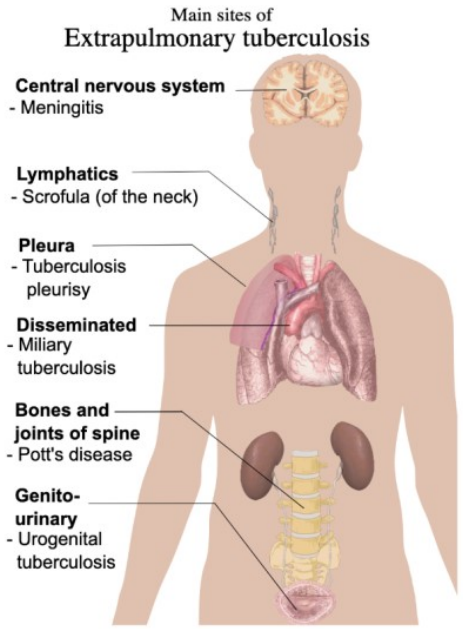
- **Latent TB**:

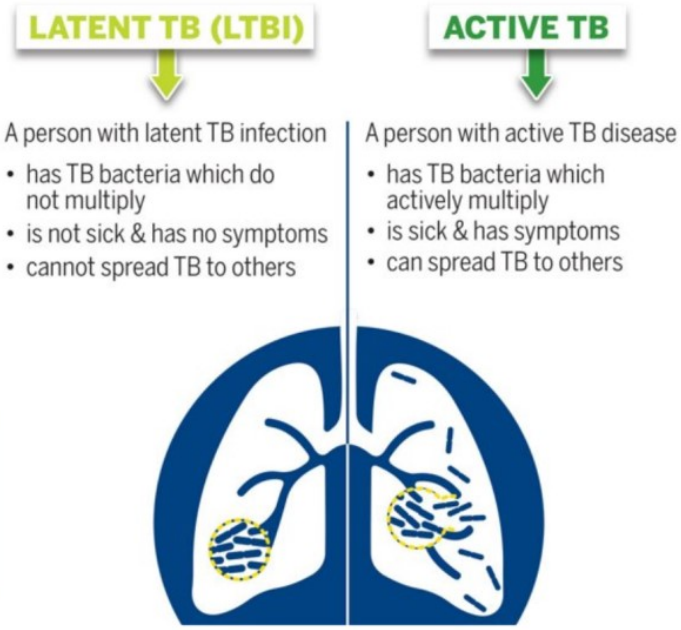
    - The number of people with **latent or asymptomatic TB** could be as high as **3,000 per million**, meaning many more individuals are carrying the bacteria without showing symptoms.

- **National Targets for TB Eradication**:

    - India has set a **target to eradicate TB by 2025**, five years ahead of the **World Health Organization's (WHO)** target of **2030**.

    - **WHO's Definition of Eradication**: Eradication means reducing the number of cases **to nearly zero**, while **eliminating** TB refers to reducing the number to approximately **one case per million** people.





TB-Mukt Bharat Abhiyaan (TB-Free India Campaign)

- **Launch and Scope**:
    - The **TB-Mukt Bharat Abhiyaan** (TB-Free India Campaign) started on **December 7, 2024** with a focus on **community awareness** and **screening** for TB across India.
- **Campaign Details**:
    - **13 lakh Nikshay Shivirs** (community screening and awareness camps) were organized during the campaign to bring **vital screening** and **diagnostic services** to **remote and underserved areas**.
    - The use of **handheld X-ray units** and **Nucleic Acid Amplification Testing (NAAT)** allowed **rapid detection** of TB in areas where healthcare services were previously inaccessible.
    - The campaign successfully screened **12.97 crore** people and notified over **7 lakh TB patients** across the country in just **100 days**.

Impact and Future Directions

- **Eradication and Elimination Goals**:

    - The **Dare2eraD TB initiative** and the **TB-Mukt Bharat Abhiyaan** are key components of India's strategy to **eradicate TB** by **2025**, far ahead of the **WHO** timeline. These initiatives are part of India's efforts to enhance **diagnostic capabilities**, **treatment strategies**, and **patient engagement**.

- **Importance of Data-Driven Approaches**:
    - **Genomic sequencing** and **data-driven research** play an essential role in overcoming the **challenges** of **drug-resistant TB** and understanding the **diverse genomic features** of the TB bacterium, particularly in India, where the burden of TB remains high.

- **Need for Coordinated Efforts**:
    - To achieve the ambitious goal of **TB eradication by 2025**, continued efforts from government agencies, healthcare providers, and communities are required to improve **screening**, **early detection**, and **treatment adherence**.

Conclusion

- The **Dare2eraD TB initiative** and the **TB-Mukt Bharat Abhiyaan** represent significant milestones in India's **fight against tuberculosis**.
- **Genomic sequencing** offers the potential to enhance **diagnosis**, **resistance profiling**, and **treatment customization**, which could ultimately contribute to India's ambitious target of **eradicating tuberculosis by 2025**.
- **Community awareness**, **screening efforts**, and **innovative diagnostic tools** are key to addressing the challenges posed by TB in India, particularly in **remote regions** with limited access to healthcare resources.

Source: **https://www.thehindu.com/sci-tech/health/dbt-completes-sequencing-of-10000-tb-genome-samples-aims-to-reach-target-of-32500-samples-by-november-2025/article69369586.ece**