Determining Potential Biomarkers to Identify Drug Resistant Tuberculosis

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Tuberculosis

Tuberculosis (TB) is an infectious disease caused by the bacterium Mycobacterium tuberculosis. It primarily affects the lungs and is spread through the air when an infected person coughs or sneezes.
Treatment:Rifampin, Isoniazid, pyrazinamide, ethambutol

Difference between TB and Drug Resistant-TB

- Drug-resistant tuberculosis (DR-TB) is a form of TB in which the bacteria that cause the disease have developed resistance to one or more of the antibiotics used to treat TB.
- DR-TB is more difficult to treat than non-drug-resistant TB and requires specialized laboratory testing and a longer course of antibiotics, often using less effective and more toxic drugs.

The Global Plan to End TB, 2023-2030

It is a strategy developed by the World Health Organization (WHO) and its partners to eliminate tuberculosis (TB) as a major public health threat by the year 2030.

Is the target really achievable by 2030?

- The 2016-2020 plan was a five-year plan that aimed to accelerate the implementation of the End TB Strategy, which was launched in 2015. While progress was made during the 2016-2020 plan, it was not sufficient to achieve the targets set for that period.
- Tuberculosis cases have been decreasing for several years but we are a long way from complete eradication.
- The India TB Report 2022 puts the total number of TB patients in 2021 at 19,33,381 as against 16,28,161 the previous year.
- DR-TB is a factor contributing to this increase.

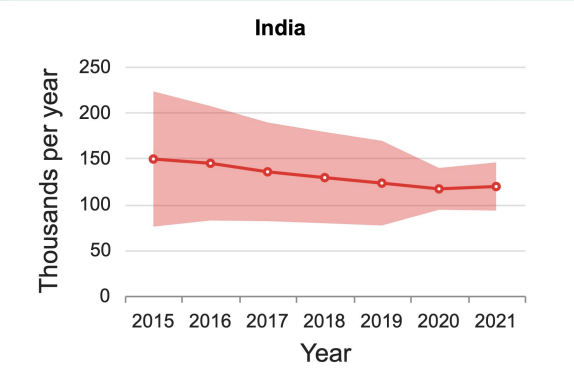
Concerns

75 million people

Estimated to die due to TB in next 35 years globally

46%

of total new cases occurred in WHO South-East Asian Region in 2021



Number of incident cases of DR-TB 2015-2021

Why Identify BioMarkers?

- Biomarkers are measurable indicators such as molecules, physical characteristics and genetic mutations which can distinguish between normal and Multi-Drug Resistant TB.
- Identifying Biomarkers is necessary to diagnose, monitor, and develop treatments for diseases.
- In our project, we'll be focusing on determining genetic biomarkers which can identify whether a person is suffering from DR-TB, and what drugs they might have resistance to.

OUR GOAL

- Identification of potential genetic biomarkers to identify and understand the evolution of drug-resistant tuberculosis.

- Analyze **GSE183787** and **GSE157657** data series
  - Data preprocessing
  - Differential Expression Analysis
  - Functional Analysis

GSE183787

Title Expression data of lncRNAs and mRNAs extracted from serum of tuberculosis patients and healthy individuals

Organism Homo sapiens

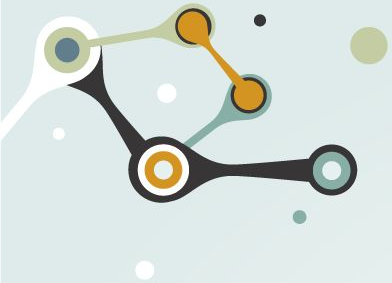
Experiment type Expression profiling by array

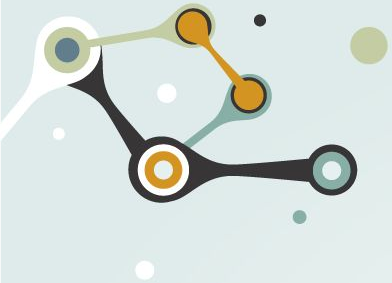
GSE157657

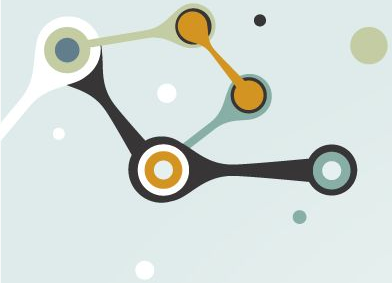
Title Blood transcriptomics for diagnosis, risk, and treatment monitoring in tuberculosis reveal the evolution and resolution of TB disease: Does one signature capture all?

Organism Homo sapiens

Experiment type Expression profiling by high throughput sequencing







Contribution

Anubhav Patel(2021017) : Literature Review , Identifying a dataset for analysis,Approach

Arnav Agarwal(2021235) : Literature Review, Background research

Mayank Gupta(2021065): Identifying a dataset, identify tools

Raj Pratap Singh(2021084): Identifying significant Biomarkers

Arpan Kumar(2021020): Literature Review, Background research

Manya Tyagi(2021064): Creation of presentation

Janesh Kapoor(2021466): Research of WHO Global plan

References:

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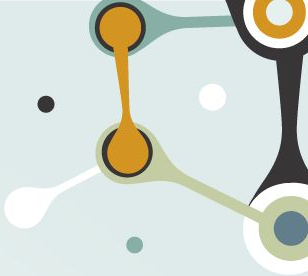

THANK YOU!