



PRESENTATION ON

**TO STUDY THE IMPACT OF EARLY DIAGNOSIS AND MONITORING ON
TUBERCULOSIS PROGRESSION**

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INTRODUCTION:-

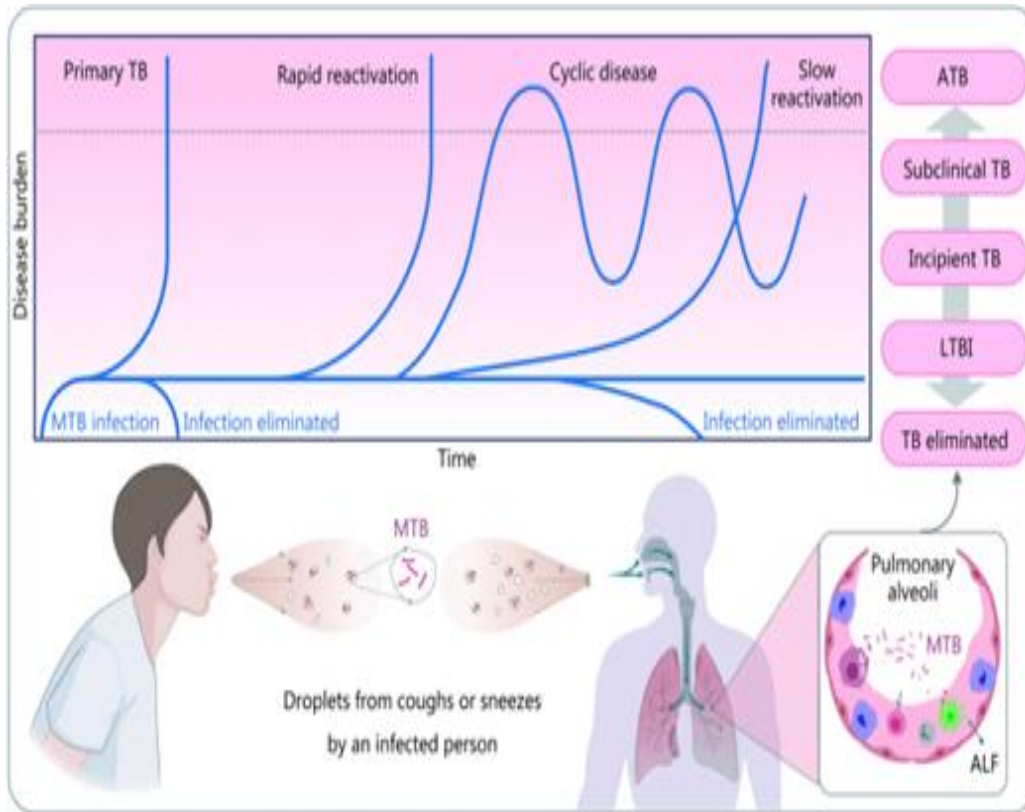


- **Tuberculosis (TB)** is a highly infectious disease caused by the acid fast pathogen **Mycobacterium tuberculosis** (Mtb) and predominantly infect the lungs and discovered in 1882 by Robert Koch. Mtb transmission occurs commonly via air droplets.
- According to global tuberculosis facts given by WHO 2022, Millions of people are getting ill from this disease each year that is nearly around **10.6 million** and almost **1.6 million** people of the world die from TB
- Tuberculosis can affect either the lungs, which is called **pulmonary tuberculosis** (PTB), or other organs, known as **extra pulmonary tuberculosis** (EPTB).
- To achieve the complete eradication of tuberculosis, the World Health Organization (WHO) developed the End TB Strategy. The 67th World Health Assembly approved the strategy in 2014 with the goal of ending the tuberculosis epidemic worldwide by **2035**.

OBJECTIVE:-

- 1.) The objective is to study the impact of early diagnosis and monitoring on tuberculosis progression.
- 2.) To study different conventional methods used for diagnosing tuberculosis and what are the limitations of these methods.
- 3.) To study the advanced and nano diagnostic methods used in the diagnosis of tuberculosis.
- 4.) To study the importance of monitoring tuberculosis.
- 5.) To study different stages of tuberculosis and its progression from latent TB to active TB.

PROGRESSION OF TUBERCULOSIS INFECTION:-



Eliminated TB infection

Latent TB infection

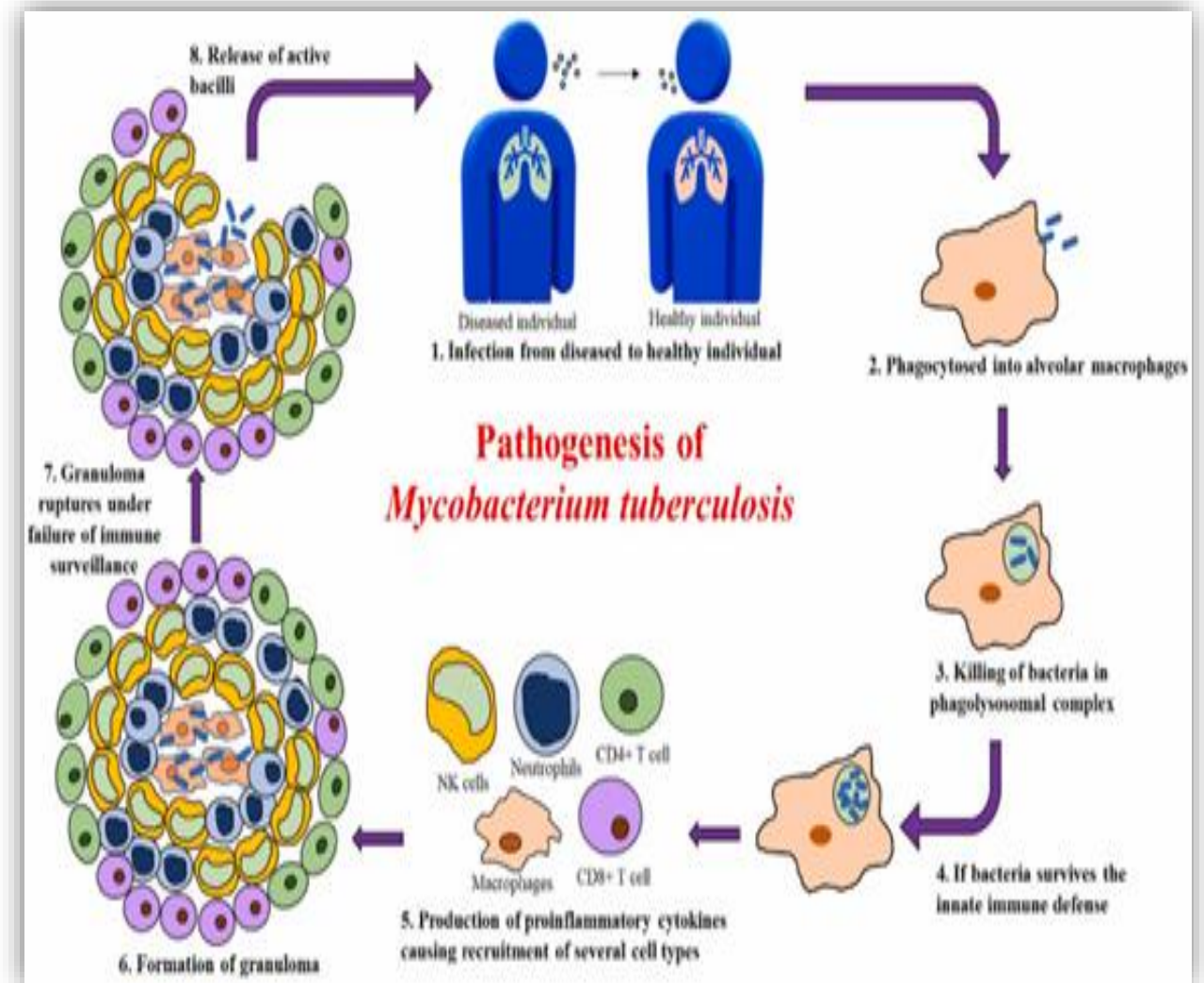
Incipient TB infection

Subclinical TB infection

Active TB infection

PATHOGENESIS OF TUBERCULOSIS:-

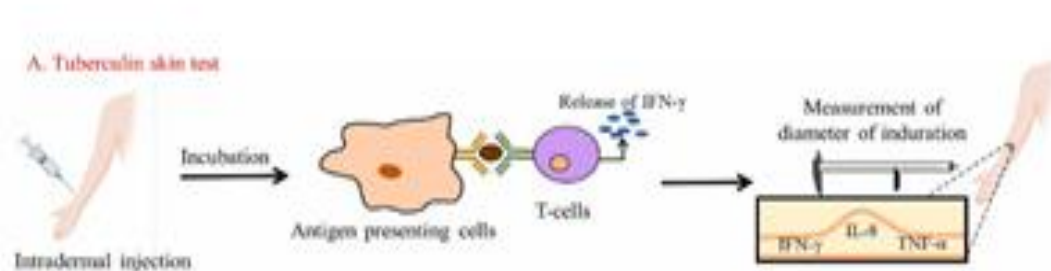
- Infection in a healthy individual begins with inhalation of air droplets containing *Mtb* bacilli.
- The bacteria are phagocytosed by the alveolar macrophages. Formation of phagolysosomal complex occurs in the macrophages to kill the bacteria.
- Few bacteria escape the host innate immune response and replicate in the macrophages. This induces adaptive immune response causing release of pro-inflammatory cytokines and recruitment of other immune cells.
- The immune cells form granuloma to contain the infection at primary site (latent TB infection). Under immune compromised condition the granuloma ruptures causing release of *Mtb* to other sites (active TB infection)



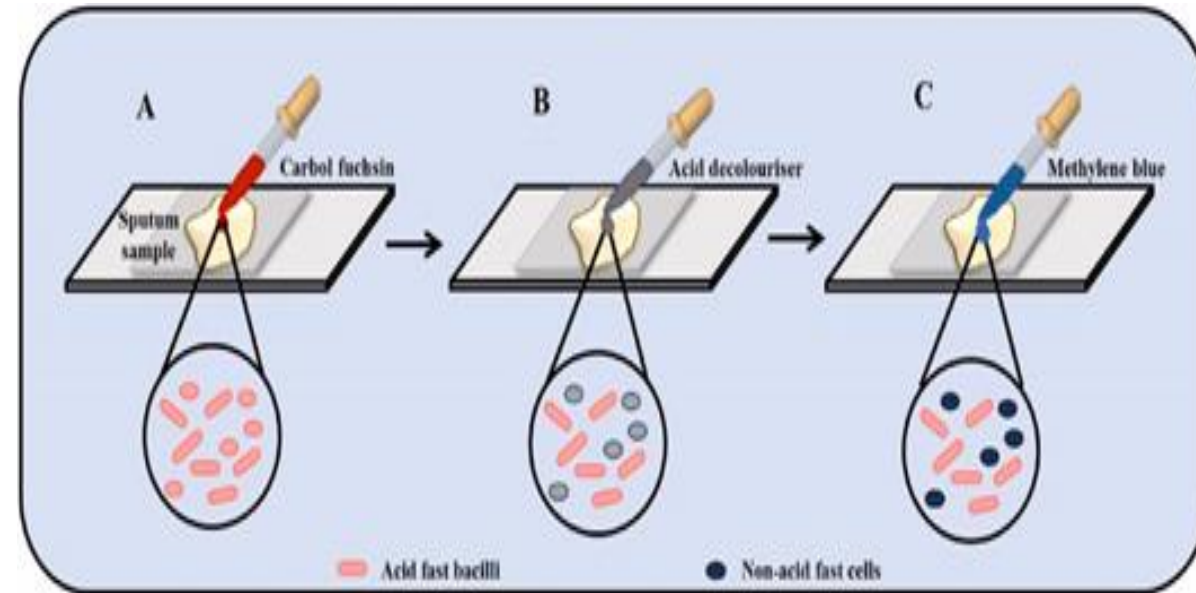
DIAGNOSIS OF TUBERCULOSIS:-

A.) CONVENTIONAL METHODS:-

1.) TUBERCULIN SKIN TEST:-



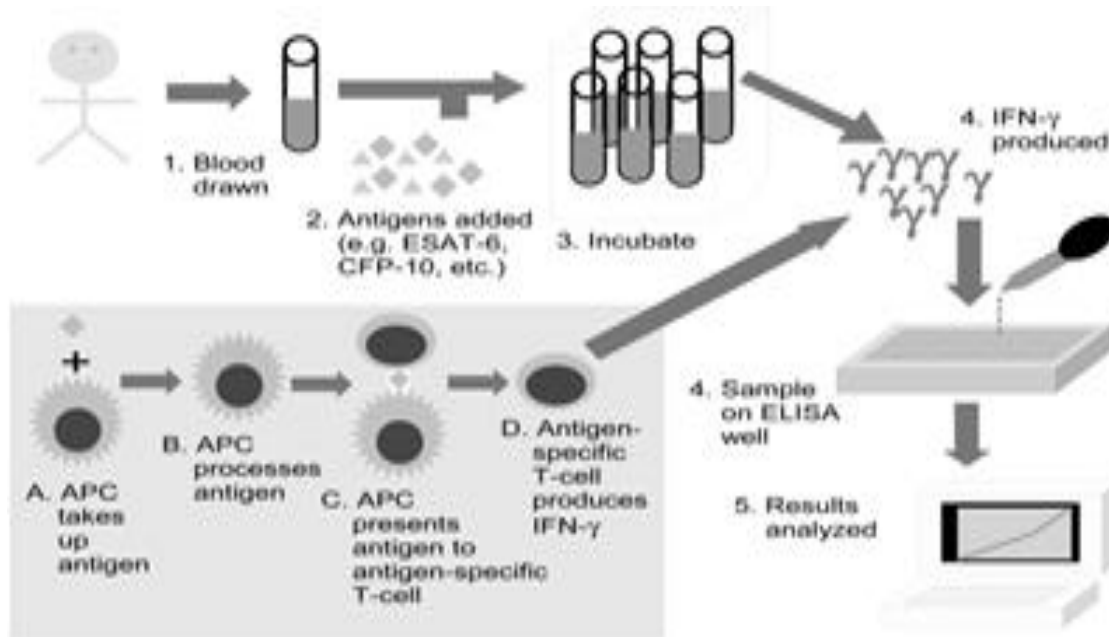
2.) SPUTUM SMEAR MICROSCOPY:-



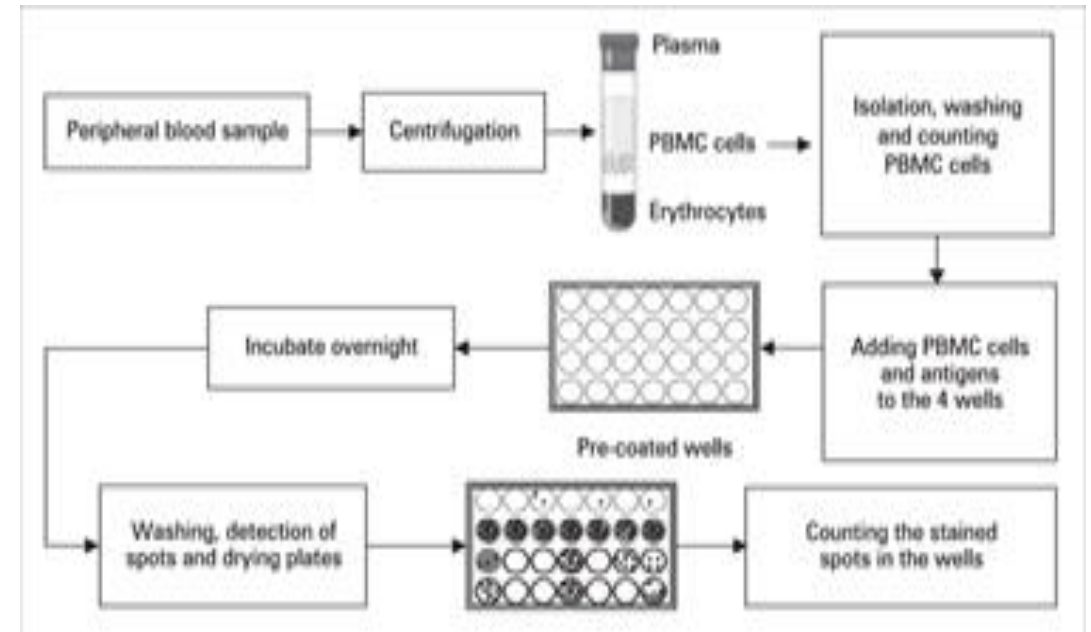
DIAGNOSIS OF TUBERCULOSIS:-

3.) INTERFERON GAMMA RELEASE ASSAY:-

a.) Quanti FERON-TB



b.) T spot TB/ELISPOT ASSAY:-

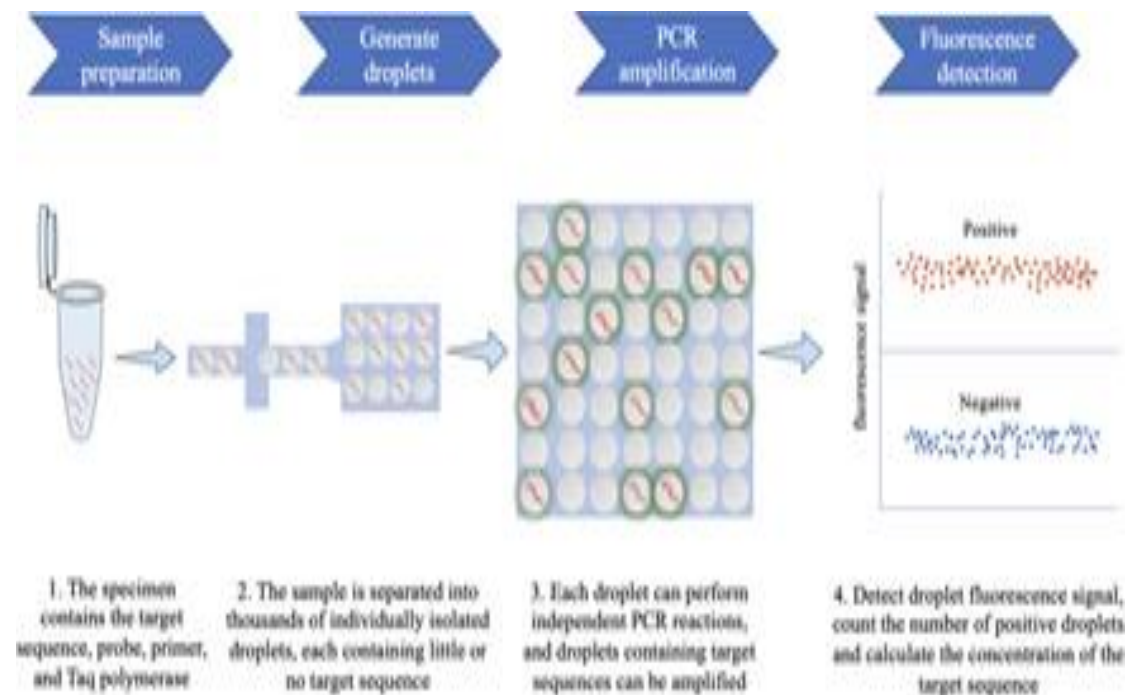


DIAGNOSIS OF TUBERCULOSIS:-

ADVANCED METHODS:-

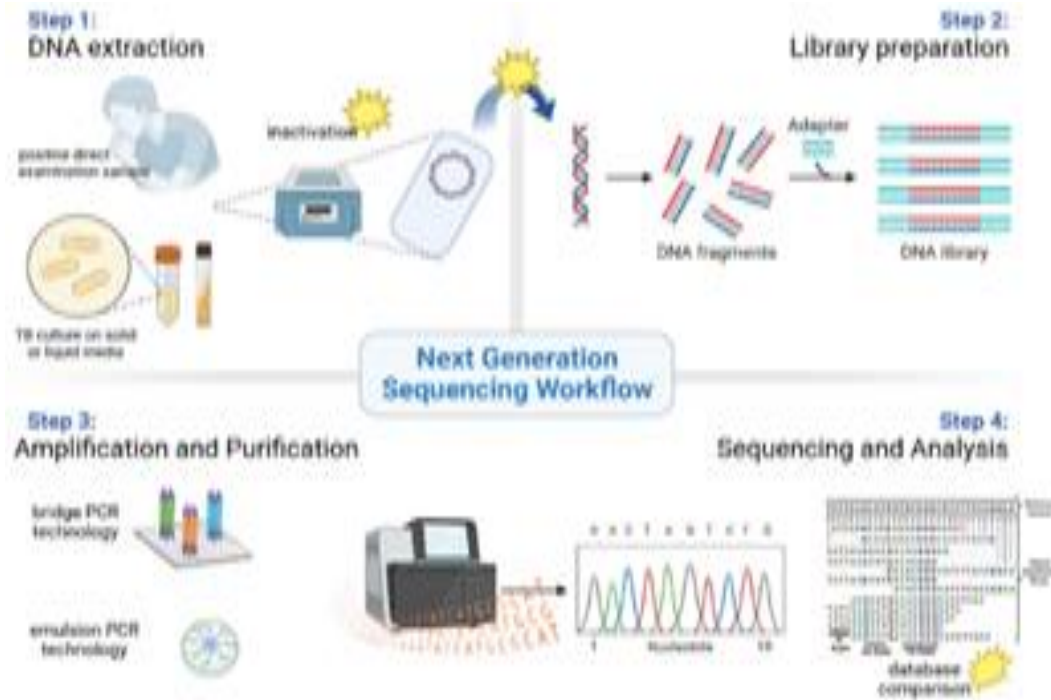
(A)MODERN METHODS:-

1.) DIGITAL PCR:-

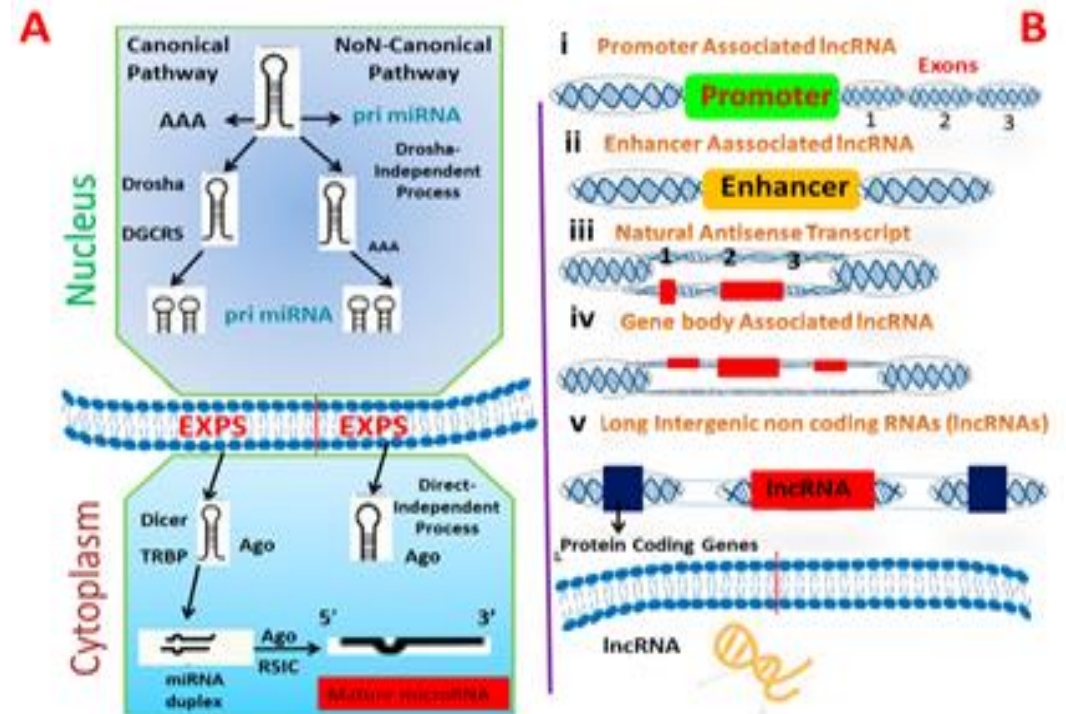


DIAGNOSIS OF TUBERCULOSIS:-

2.) NEXT GENE SEQUENCING:-



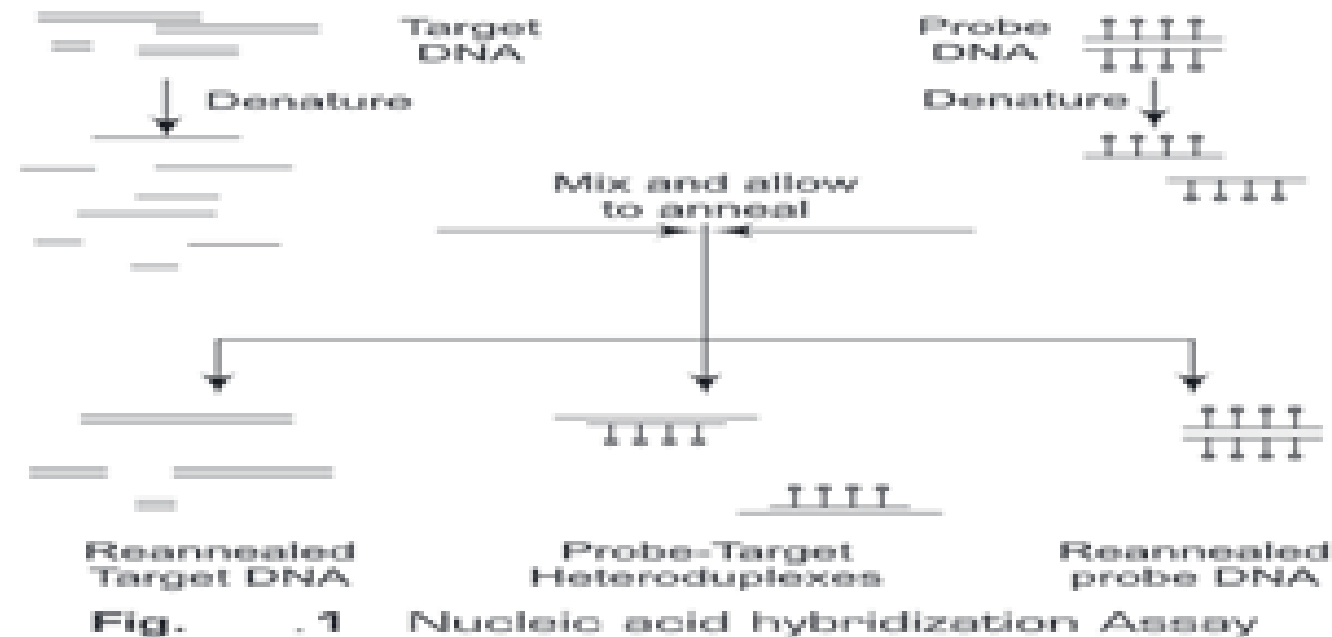
3.) MICRO RNA:-



DIAGNOSIS OF TUBERCULOSIS:-

(B) NANO- DAIGNOSTIC METHODS:-

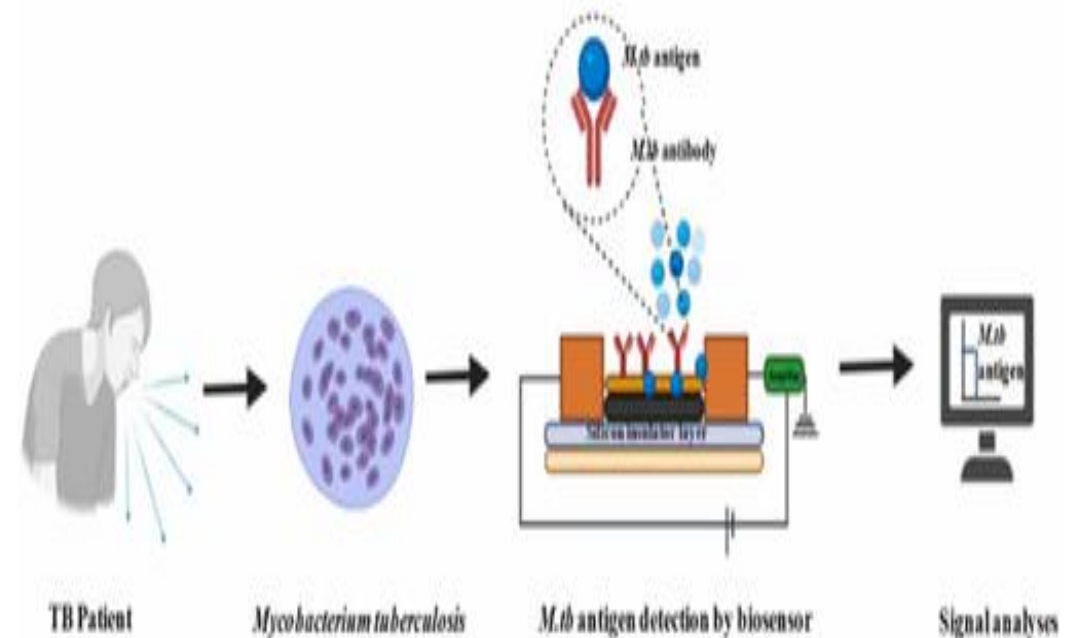
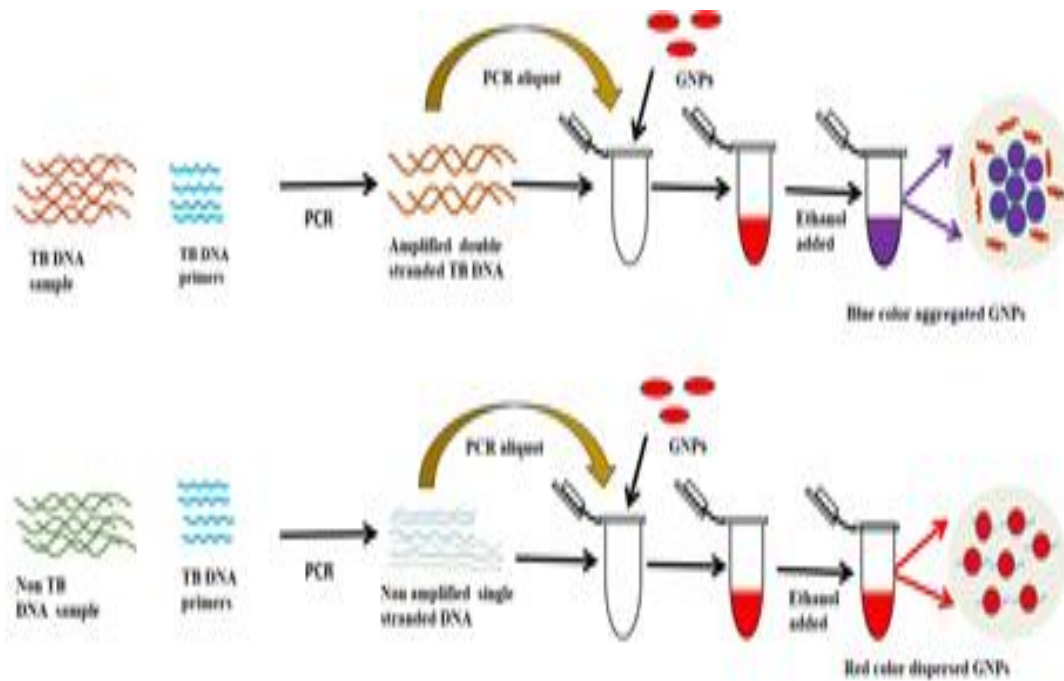
1.) NUCLEIC ACID HYBRIDIZATION:-



DIAGNOSIS OF TUBERCULOSIS:-

2.) AuNPS or GOLD NANOPARTICLE:

3.) BIOSENSORS BASED NANODIAGNOSIS:-



LIMITATIONS OF CONVENTIONAL METHODS:-

- Low sensitivity.
- Low efficacy.
- Lack of specificity.
- Lengthy processing times.
- Inability to distinguish between various strains.
- Inability to detect bacterial viability.



IMPACT OF EARLY DIAGNOSIS AND MONITORING ON TUBERCULOSIS:-



REDUCTION IN
TRANSMISSION



IMPROVED
TREATMENT
OUTCOMES



PREVENTION
OF DRUG
RESISTANCE



REDUCED
MORTALITY



ENHANCED TB
SURVEILLANCE

RESULT:-

- The result of the study conduct shows that advanced diagnostic methods are very helpful in determining tuberculosis as they are not time consuming which results in the proper and timely diagnosis of the infection. The conventional methods used takes time and have low specificity as compared to advanced methods. Moreover, the early diagnosis and monitoring of TB progression are crucial for improving patient outcomes, reducing disease transmission, enhancing surveillance and contact tracing, decreasing economic burden, and advancing diagnostic tools. These strategies are essential for achieving global TB control and elimination goals, particularly in high-burden countries.

CONCLUSION:-

- With the help of this review we concluded that it is significant to have proper diagnosis and monitoring of tuberculosis infection which will help to reduce the spread of infection that can be contagious. If tuberculosis is diagnosed and treated quickly, so the chances of patient survival and recovery increases and it also reduces complication.