VELS

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM - CHENNAI
ACCREDITED BY NAAC WITH 'A' GRADE
*Marching Beyond 30 Years Successfully*

## SCHOOL OF PHARMACEUTICAL SCIENCES

Department of Pharmacy Practice

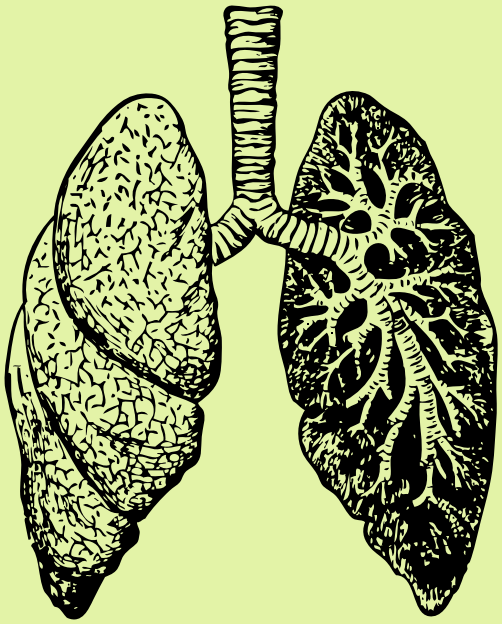
in collaboration with

**ESI HOSPITAL AYANAVARAM**

# WORLD *Tuberculosis* DAY

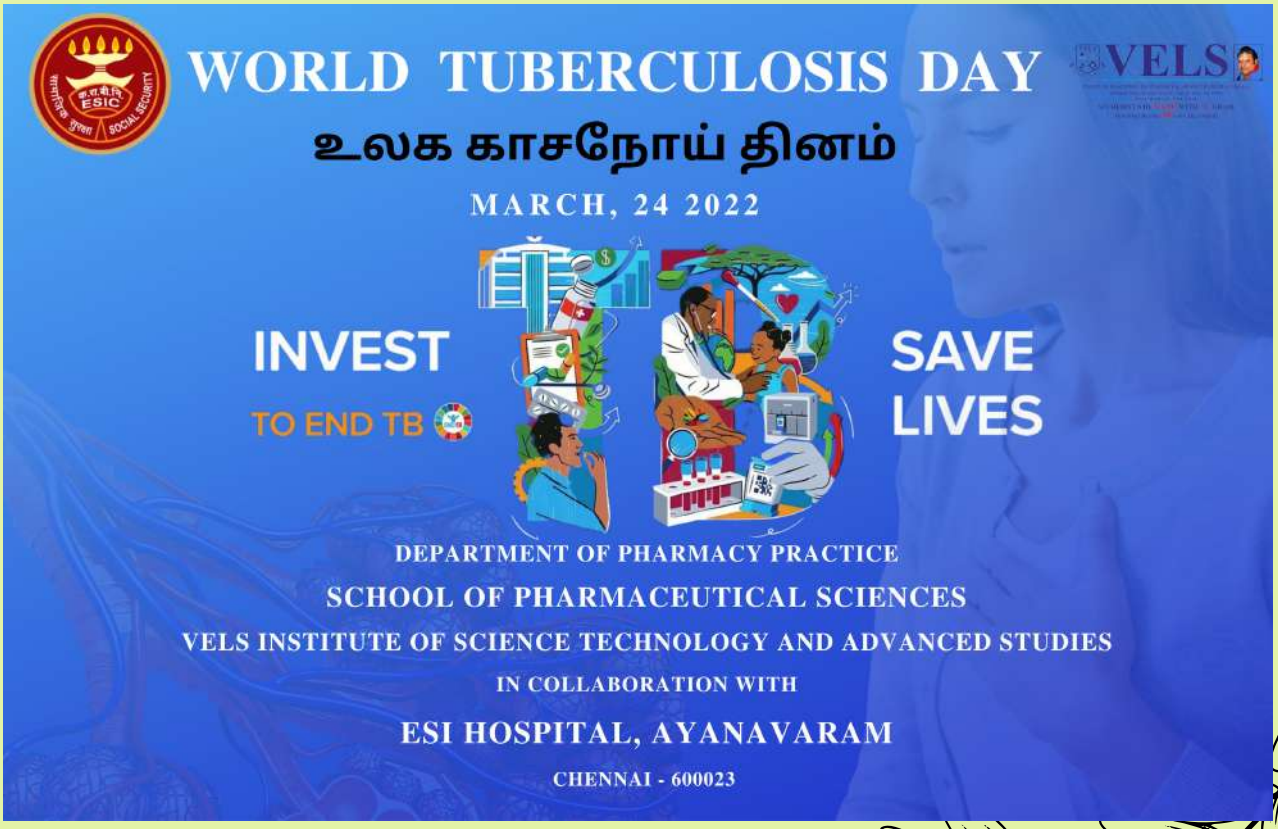
March 24

**THEME: Invest to End TB - Save Lives**

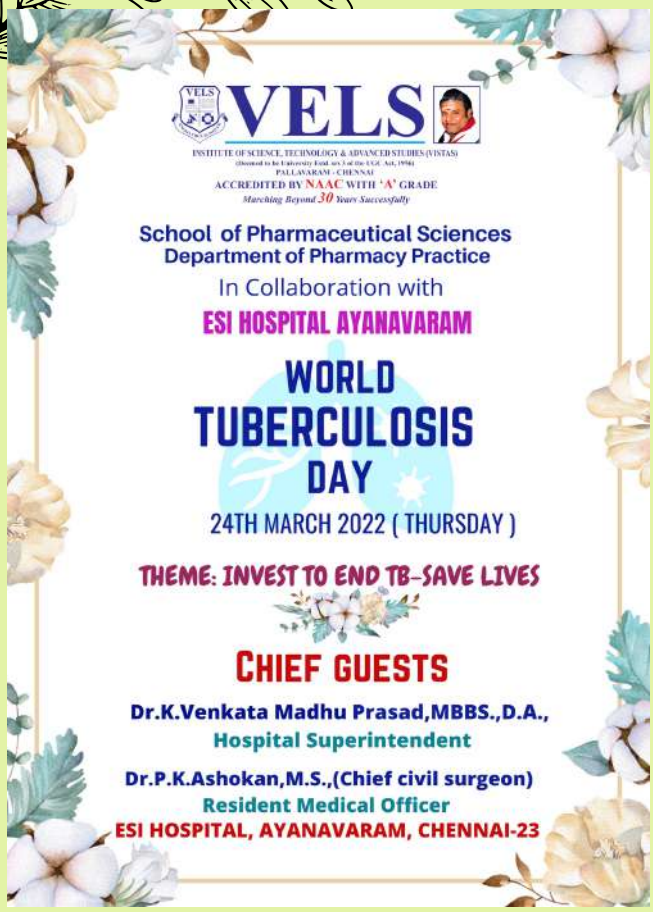


World TB day was organized at ESI Hospital Ayanavaram by the Pharm.D 5th year students on March 24,2022. The Events for the day included competitions like Infographic presentation and Exhibition, Quiz, distribution of TB awareness pamphlets on the theme for this year - **Invest to end TB- SAVE LIVES**.

TB 's health, social and economic consequences has an alarming impact globally. Asit remains as one of the World's deadliest infectious killers, it is an urgent need to ramp up the fight against TB and achieve the commitments made by the global leaders to end TB



# INVITATION





# ORGANIZING COMMITTEE


**Student Committee:**Sandhya.A.M, Sowndarya Valli.A, Uma Maheswari.R, Pranayini.D, Sanjay.G, Abinash.M

The Ceremony was graced by the presence of Dr. K. Venkata Madhu Prasad, Medical Superintendent, ESI Hospital Ayanavaram.

Support and Encouragement from Dr. P. K. Ashokan, Resident Medical Officer and Matron made this event a success.



*Competition-1*

# INFOGRAPHICS

Topics were chosen related to the theme **Invest to end TB: SAVE LIVES.** 9 innovative infographics were presented to the judges and 4 teams were awarded best posters. An exhibition was conducted after the competition. Many Doctors visited the Infographics exhibition and appreciated the students for their efforts

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## School of Pharmaceutical Sciences
## Department of Pharmacy Practice

In Collaboration with

## ESI HOSPITAL AYANAVARAM

# WORLD TUBERCULOSIS DAY 2022

24TH MARCH 2022(THURSDAY)

THEME: INVEST TO END TB - SAVE LIVES

## Infographics Designing Competition

### Topics:

1. TB Advancement in the development of new drugs and treatment regimen
2. New treatment for MDR-TB
3. Advances in molecular diagnosis in TB
4. Role of Biomarkers in diagnosis of active TB

**VENUE:** Drug Information Centre at ESI Hospital

### Rules:

1. Two students per team.
2. Last day for Registration 22.03.2022.
3. Infographics can be prepared on anyone of the given topics.
4. High Resolution A3 size (.png , .jpeg) Infographics should be sent to **neena.sps@velsuniv.ac.in** before 6:00pm 23.03.2022.
5. **2** Best Infographics will be awarded
6. Certificate will be issued to all Participants

*Registration Free*

# Team-1

Abdul Aziz. A &
Dhanasekhar. R

# MULTIDRUG-RESISTANT TUBERCULOSIS (MDR-TB)

## GLOBAL BURDEN

*The latest anti-TB drug resistance surveillance data show that 3.5% of new and 18% of previously treated TB cases in the world are estimated to have **multidrug-resistant** or rifampicin-resistant tuberculosis (**MDR/RR-TB**).*

*In 2017, an estimated 558 000 new cases of MDR/RR-TB emerged globally. MDR/RR-TB caused 230 000 deaths in 2017. Most cases and deaths occurred in India and China.*

## DETECTION

***In 2017, 24% of new and 70% of previously treated TB patients notified globally were tested for MDR/RR-TB (up from 12% and 53% respectively in 2015). In many countries a steady increase has occurred in recent years, driven by the continued expansion in the use of rapid molecular tests.***

## TREATMENT OUTCOMES

***Only 55% of the MDR/RR-TB patients who started treatment globally in 2015 were successfully treated, while 15% of patients died and treatment failed in 8% of patients (2 1% were lost to follow-up or not evaluated). The treatment success in XDR-TB patients was only 34%.***

**558 000**

estimated new MDR/RR-TB cases in 2017

**161 000**

MDR/RR-TB cases detected in 2017

**139 000**

patients started on MDR-TB treatment in 2017

**55%**

treatment success in MDR/RR-TB patients starting treatment in 2015

## ABOUT DRUG-RESISTANT TB

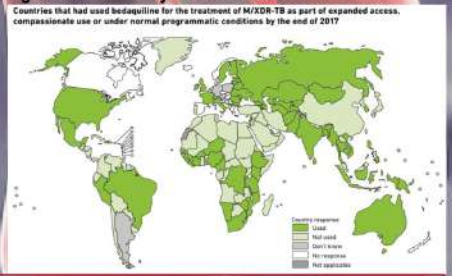
Most anti-TB medicines have been used for decades, and resistance to them is widespread. TB strains that are resistant to at least one anti-TB medicine have been documented in every country surveyed.

**Multidrug-resistant tuberculosis (MDR-TB)** is caused by bacteria that do not respond to, at least, isoniazid and rifampicin, the two most powerful anti-TB medicines.

Patients with **multidrug-resistant** or **rifampicin-resistant tuberculosis (MDR/RR-TB)** require treatment with second-line treatment regimens, which are more complex than those used to treat patients without drug-resistant TB.

## NEW TREATMENTS FOR MDR/RR-TB

***More countries are now using bedaquiline and delamanid, the two new er medicines approved by stringent regulatory authorities for the treatment of MDR-TB in recent years. By the end of 2017, 68 countries reported importing or starting to use bedaquiline (map) and 42 countries had used delamanid. In addition, 62 countries, mostly in Africa and Asia, reported using shorter MDR-TB regimens lasting 9–12 months by the end of 2017.***

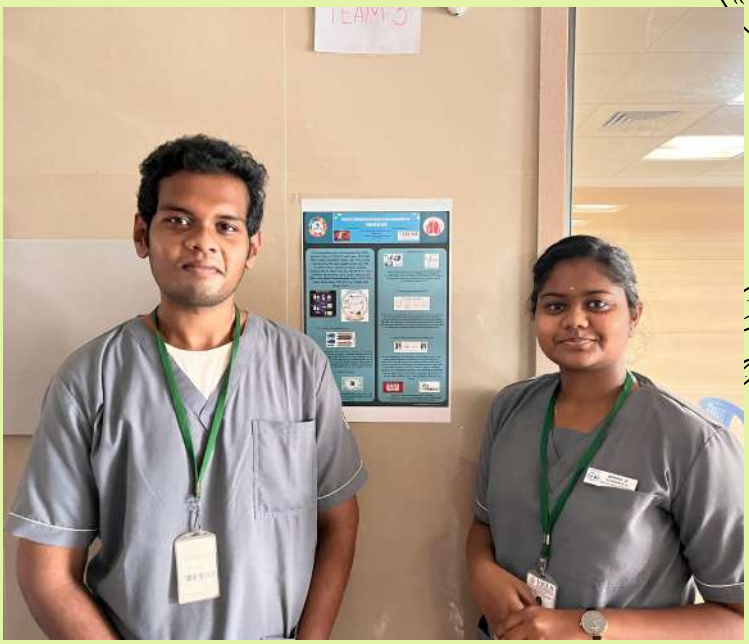



## NEW POLICIES FOR MDR-TB TREATMENT

***In March 2019, WHO consolidated its drug-resistant TB treatment guidelines into one comprehensive document. This groups in one place the latest WHO policies on the care of patients with isoniazid-resistant TB and MDR/RR-TB and provides links to the evidence and the methods used to derive them.***

# Team-2

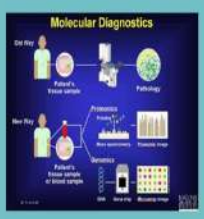
Aishwarya. B &
Yoga Vigneshwaran. C.P



## RECENT ADVANCES IN MOLECULAR DIAGNOSIS OF TUBERCULOSIS

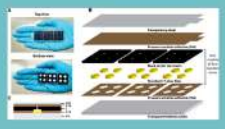
C.P.Yogavigneshwaran & Aishwarya. B.,
Pharm.D V.,
School of Pharmaceutical sciences,
VISTAS.

**Current molecular tests endorsed by WHO include: Xpert MTB/RIF and Xpert MTB/RIF Ultra assays (Cepheid, Sunnyvale, USA); loop-mediated isothermal amplification test (TB-LAMP; Eiken Chemical, Tokyo, Japan); Truenat MTB, MTB Plus and MTBRIF Dx tests (Molbio Diagnostics, Goa, India) and lateral flow urine lipoarabinomannan assay (LF-LAM; Alere Determine TB LAM Ag, Abbott, San Diego, USA).**





1. NAAT - Nucleic Acid Amplification Test



**While most biomolecular tests are NAAT detecting the presence of *Mtb* DNA, the LF-LAM test detects a lipopolysaccharide present in mycobacterial cell walls. While not in use in most countries in the developed world, the LF-LAM assay has been recommended for use in HIV-coinfected patients. It is a urinary antigen test that is often employed in resource-limited settings and is of particular benefit in cases where a sputum sample cannot be obtained. It has a 42% sensitivity in HIV patients with TB symptoms**

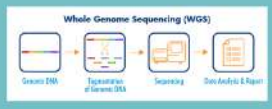
2. Xpert MTB/RIF and Xpert MTB/RIF Ultra assays

**They are cartridge-based nucleic acid amplification tests (NAAT) that detect the presence of TB DNA, as well as common mutations associated with RIF resistance along the *rpoB* gene, within 2 h,**

3. Line probe assays

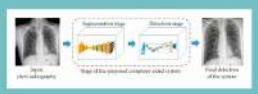
**Another method of molecular detection of *Mtb* resistance is line probe assay (LPA). Genotype MTBDR*plus* and Genotype MTBDRs*l* (Hain LifeScience GmbH, Nehren, Germany) are used for the detection of *Mtb* and its associated drug resistance. This *in vitro* test delivers results in <6 h**

4. Whole-genome sequencing (WGS)




**WGS provides a comprehensive review of the entire *Mtb* genotype with a 96% concordance for culture-based sensitivity testing. It provides genotypic sensitivity to most drugs required for the treatment of MDR-TB. While full clarification on the clinical correlation between genotypic and phenotypic sensitivities remains to be shown, progress has been made in assigning the probability of pDST based on genotypic results.**

5. Computer aided detection for chest radiographs



**Given the limitations, in terms of time, cost and infrastructure, to the above testing methods, it has become clear that there need to be affordable, accessible methods of screening available in high-burden areas to assist with risk stratification for allocating further testing. One such proposed method is the use of computer software to digitally interpret chest radiographs, and assign a score indicating the likelihood of TB. The most commonly studied software is CAD4TB, currently on version 6. When compared with NAAT, CAD4TB has been shown to have 90–100% sensitivity, and 23–45% specificity at detecting TB disease**

References: WHO consolidated guidelines for TB-2021,
Cara M. Gill, Lorraine Dolan, Laura M. Piggott, Anne Marie McLaughlin
Breathe 2022 18: 210149; DOI: 10.1183/20734735.0149-2021

# Team-3

Rakshana. S & Indhira. R

WORLD TUBERCULOSIS DAY

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## ADVANCEMENT OF MOLECULAR DIAGNOSIS IN TB

RAKSHANA.S, INDHIRA.R PHARM.D V

Tuberculosis (TB) is a potentially serious infectious disease that mainly affects the lungs. The bacteria that cause tuberculosis are spread from person to person through tiny droplets released into the air via coughs and sneezes.

### TESTING AND DIAGNOSIS

### How Drug Resistance Develops?

Changes in DNA can cause TB bacteria to become resistant to treatments. Even one change in the right location in a DNA sequence can lead to DR.

### Why is WGS Useful to Tuberculosis Programs?

By comparing the Mtb DNA from different patients, WGS allows health officials to find and investigate the spread of TB.

This information can help public health officials better respond to TB outbreaks.

### WGS is a Significant Scientific Advancement

Conventional genotyping methods examine less than 1% of the genome.

Whole genome sequencing can examine more than 90% of the genome.

### Why is MDDR Service Important?

The Mycobacterium tuberculosis organism grows slowly. The MDDR service can provide molecular test results in days. These results are used to decide the best treatment regimens for patients.

Rapid detection of DR TB saves lives and money.

Earlier initiation of effective therapy:

- Improves patient outcomes.
- Can reduce periods of infectiousness of MDR TB cases.


### It's time to prevent TB to end TB

early diagnosis, effective prevention and advanced treatment aids in eradication of TB

**ABBREVIATIONS:**

WGS- WHOLE GENOME SEQUENCING

MDDR- MOLECULAR DETECTION OF DRUG RESISTANCE

**REFERENCE:**

https://www.cdc.gov/tb/publications/infographic/default.htm

https://pubmed.ncbi.nlm.nih.gov/19650669/#:~:text=The%20majority%20of%20molecular%20tests,are%20associated%20with%20resistance%20to

# Team-4

Fhamitha Saara. A & Nitharshana Ashi. A


## ROLE OF BIOMARKERS IN DIAGNOSIS OF ACTIVE TUBERCULOSIS

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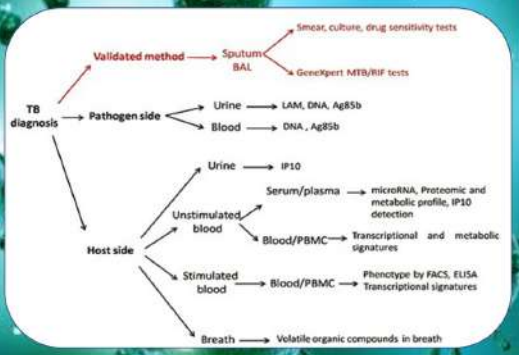
Active tuberculosis is a multi-organ disease caused by primary infection or as a reactivation of latent tuberculosis. Active tuberculosis could be primary tuberculosis or reactivation tuberculosis. Primary tuberculosis occurs when the immune system is unable to defend against the Mycobacterium tuberculosis bacterium (MTB) infection. Reactivation tuberculosis is the reactivation of contained mycobacterial infection. Reactivation Tb is the most common form of active tuberculosis, representing 90% of the cases.

### BIOMARKERS

A biomarker is a predictor of a natural biological process. TB biomarker is a component of both hosts as well as pathogenic origin.

**PATHOGEN**

- Diagnostic biomarkers: urine, sputum, plasma, saliva, CSF, and pleural fluid.
- Most promising antigen lipoarabinomannan (LAM) found in the outer cell of Mtb excreted by the kidney and detectable in urine.
- Assay used to detect is based on a sandwich capture ELISA format to detect LAM in sputum or urine. This antigen is considered for rapid diagnosis via urine.
- Another rapid test to detect Mtb antigens (LAM and Ag85B) using polyclonal antibodies for the diagnosis of active TB.




**HOST**

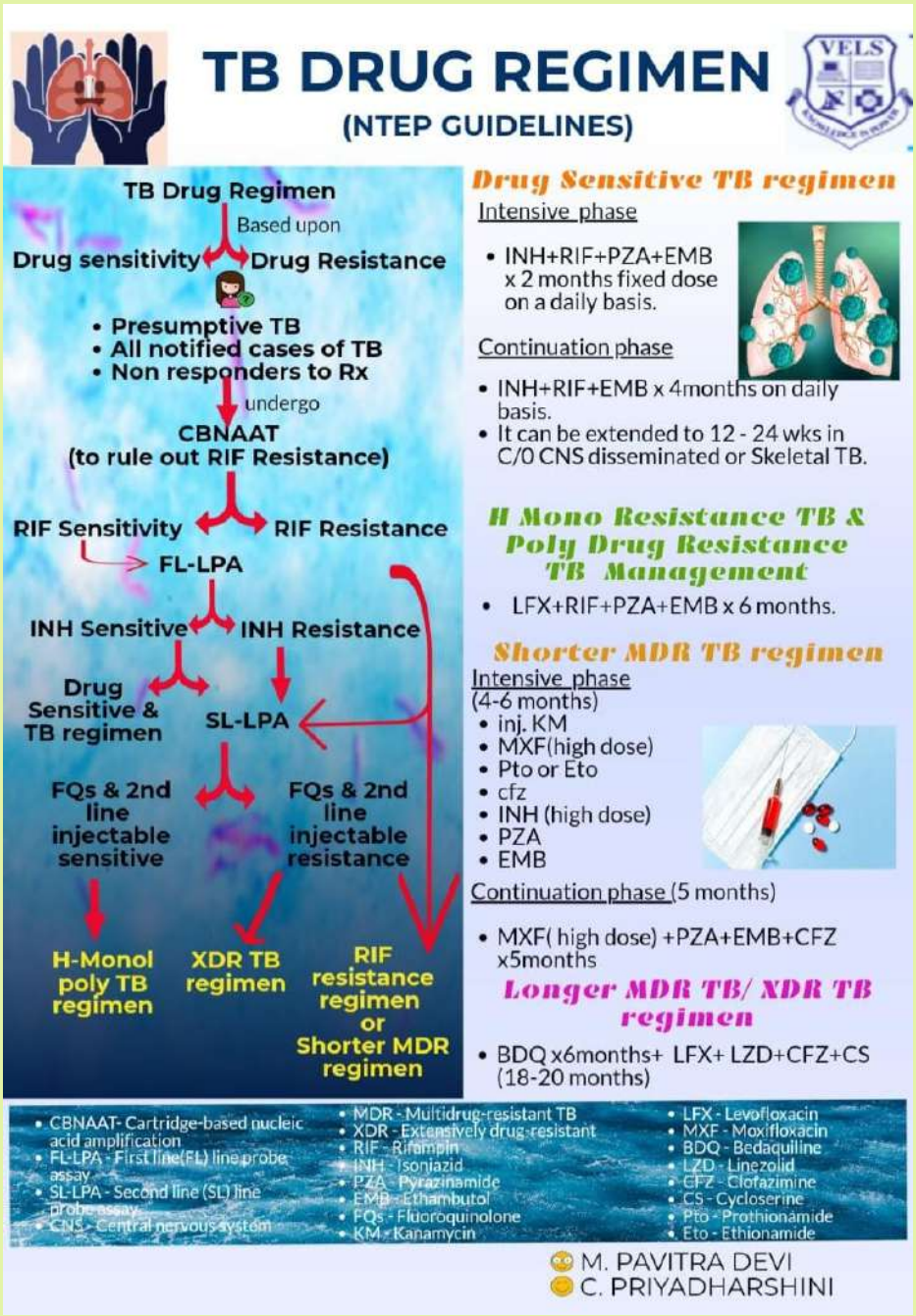
- Diagnostic biomarkers: urine, unstimulated blood, stimulated blood, and breath.
- Volatile organic compounds(VOC) in breath contain metabolites of Mtb(Biomarker) in the host.
- Detection of VOC is technically difficult because breath VOCs are excreted in picomolar concentration(parts per trillion).
- IFN, TFN, CD4+ T cells in pleural fluid have promising performance.

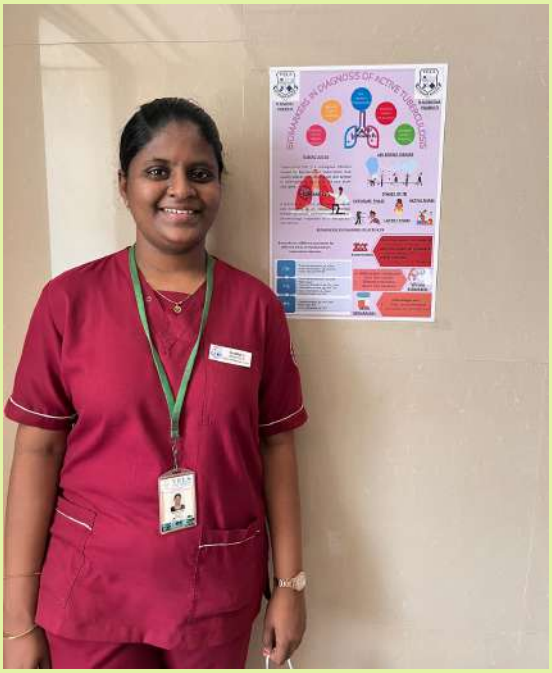
- Biomarkers for active TB can be revealed by plasma proteomic profile.
- Biomarker helps to monitor TB therapy efficacy
- High accuracy for detecting Mtb is a biomarker in sputum.
- Detection of pathogen DNA on the basis of WHO endorsed PCR-based diagnostic test.
- Detection of Mtb pathogen marker has higher specificity than host marker.

Prepared by:
A.Fhamitha Saara &
A.Nitharshana Ashi
Pharm.D –V
SPS-VISTAS.


# Team-5

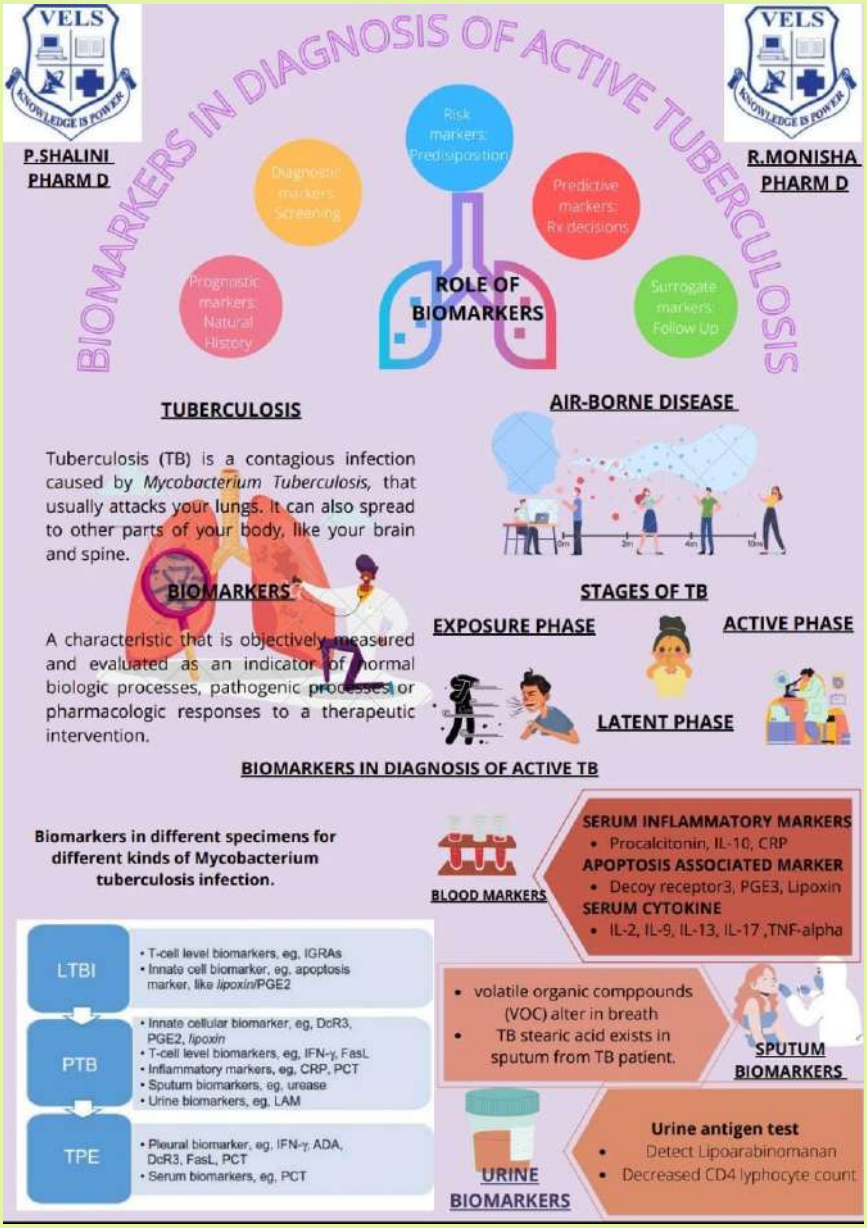
Pavitra Devi. M &
Priyadarshini. C





# Team-6

Monisha. R & Shalini.P

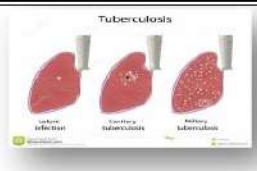


# Team-7

Nasrudeen. A & Malini.N

VELS

# WHAT IS ADVANCES MOLECULAR DIAGNOSIS IN TB ?

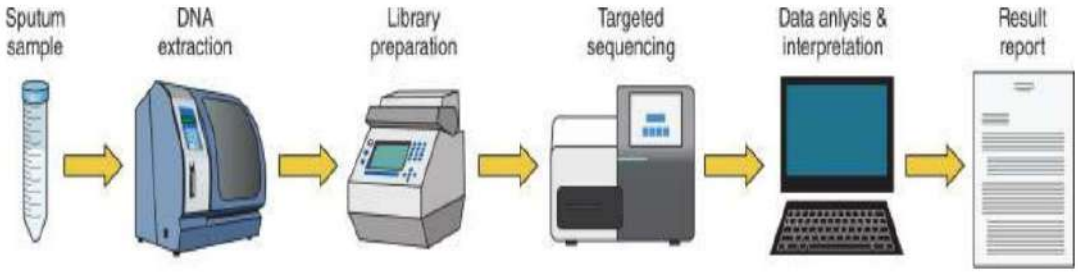



WHO has recommended the use of molecular nucleic acid amplification tests (NAATs) tests for TB detection instead of smear microscopy, as they are able to detect TB more accurately, particularly in patients with paucibacillary disease and in people living

## Molecular Biology advances with Nucleic acid based tests

- NAATs are molecular systems that can detect small quantities of genetic material (DNA or RNA) from microorganisms such as Mycobacterium tuberculosis. PCR is the most common among the variety of NAATs. NAATs are available as commercial kits and in-house tests and are used routinely in high-income countries for TB detection

## TARGETED SEQUENCING WORKFLOW SCHEMATIC:




## CFDA-endorsed molecular test for TB diagnosis and drug susceptibility testing[a]

| Technology | Method principle | Intended use | Sensitivity (%) | Specificity (%) | Target setting of use |
|---|---|---|---|---|---|
| EasyNAT | Cross priming amplification | *M. tuberculosis* diagnosis | 87 (pooled) | 97 (pooled) | District or subdistrict laboratory |
| SAT-TB | Isothermal amplification of *M. tuberculosis* 16S RNA | *M. tuberculosis* diagnosis | 71–94 (range) | 54–83 (range) | District or reference laboratory |

**CONCLUSION**: optimizing the impact of NAATS.

**Advances in molecular TB diagnostics in the last decade have resulted in TB tests that are highly accurate and faster than conventional microbiological tests, and emerging technologies promise to continue this trend. In some respects, NAATs are having a positive clinical impact.**

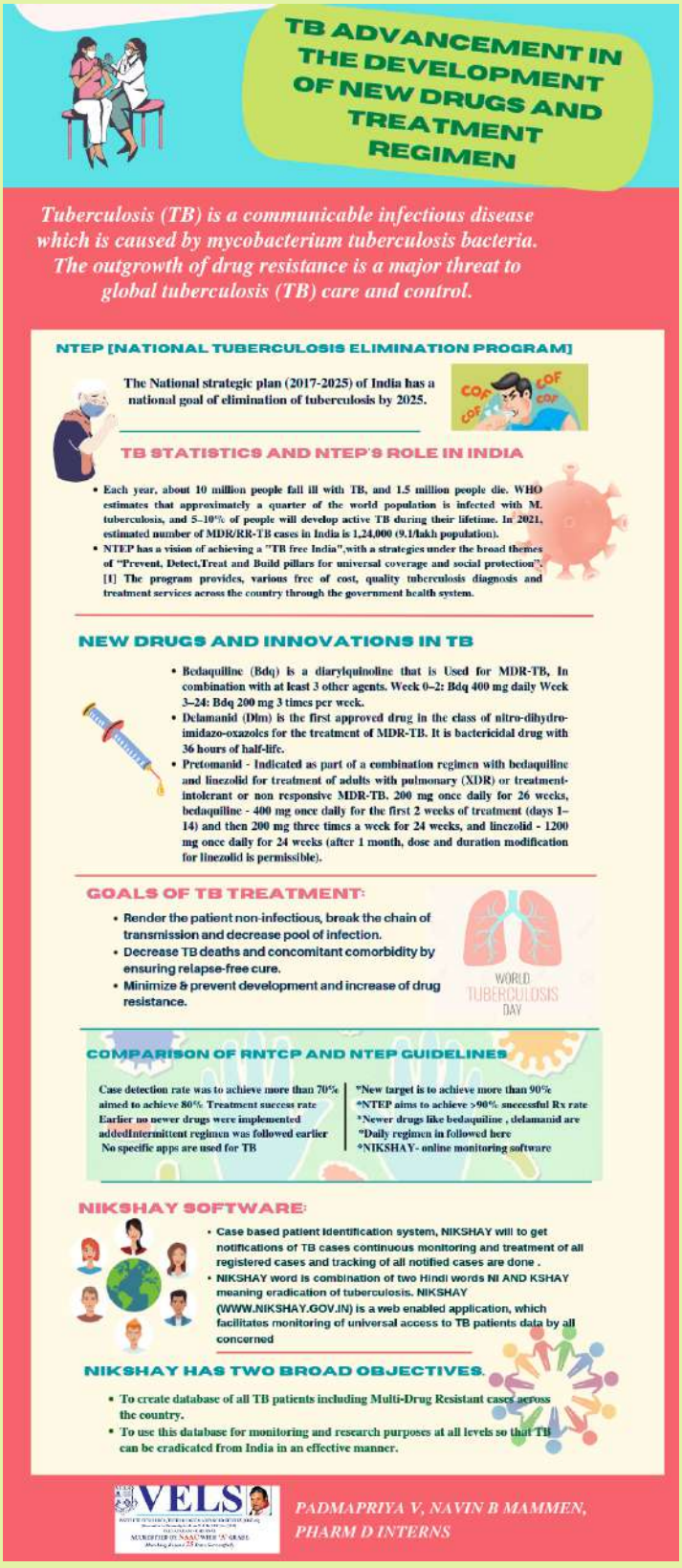
BY.

A.NASRUDEEN. B.Pharm

N.MALINI. B.Pharm

# Team-8

Padmapriya. V & Navin. B. Mammen




# Team-9

Somasundaram. P
&
Venkatesh. N


# Infographics Exhibition

# BEST INFOGRAPHICS

1. Rakshana.S & Indhira.R
2. Somasundaram.P & Venkatesh.N
3. M.Pavitra Devi & Priyadarshini.C
4.Nitharshana Ashi.A & Fhamitha Saara.A

*Competition-2*

# QUIZ COMPETITION

# QUIZ RESULTS

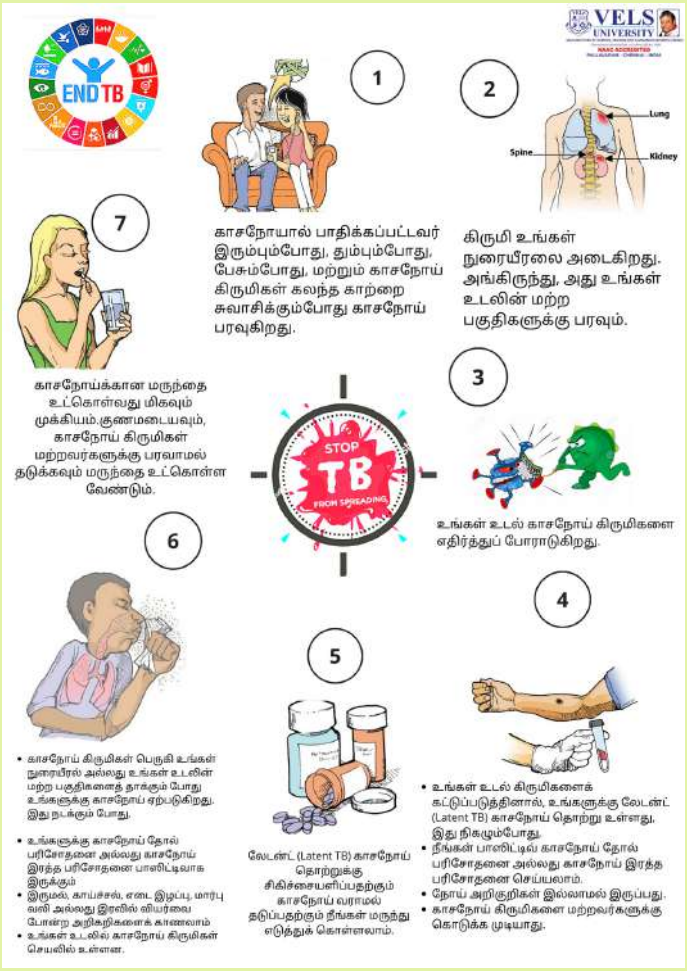
**Winners:** Priyadarshini.C, Navin.B.Mammen & Selvakumar.K

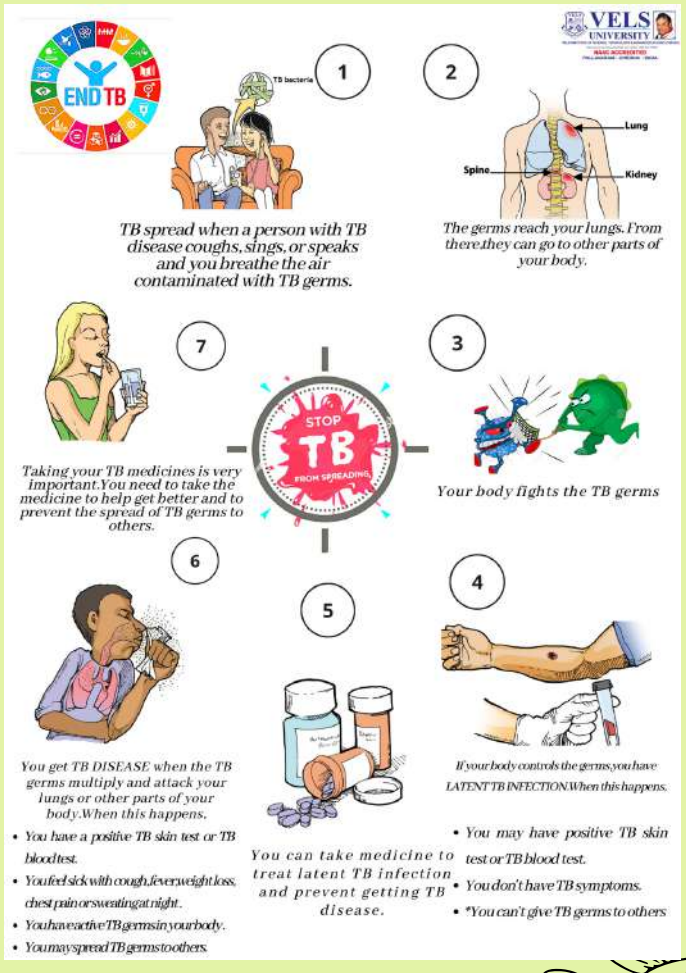
**Runners**: Gadi Anusruthi, Padmapriya.V & Nitharshana Ashi.A

# Infographics evaluation & Prize Distribution



# TB Day Awareness Pamphlet



# Pamphlet Distribution




# Pharm.D Interns


# Pharm.D V years