

Could it be TB?



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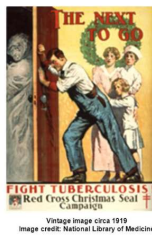
Objectives:

Outline	Differences in Latent and Active TB Disease.
Explain	Sputum sample collection and the importance of a high-quality sample.
Illustrate	Current testing algorithm used to identify <i>Mycobacterium</i> samples at the NDHHS-Laboratory Services, including MALDI-TOF testing for <i>Mycobacterium</i> identification.
Examine	North Dakota tuberculosis workload and national data summary

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Background of TB

- TB has affected humans for millennia
- Historically known by a variety of names, including:
 - Consumption
 - Wasting disease
 - White plague
- TB was a death sentence for many



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Tuberculosis: A serious infectious disease



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Latent TB – Treatment needed for latent TB infection to prevent TB disease

- Have no symptoms
- Don't feel sick
- Can't spread TB bacteria to others
- Usually have a positive TB skin test reaction or positive TB blood test
- May develop TB disease if they do not receive treatment for latent TB infection

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Tuberculin skin test (TST)



- Manual placement, reading and data entry
- Two patient visits required, high no-show rate
- Subjective test
- No internal controls
- Poor surveillance tool
- In-vivo test – causes boosting that can affect future testing

QuantIFERON-TB Gold Plus



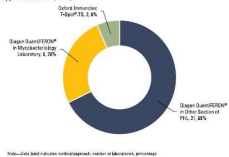
- Highly specific, **not affected by BCG**
- Results with **one patient visit**
- Objective test
- Electronic results (straight to EMR)
- Internal controls and broader picture of the immune response
- Does not cause boosting

• TST is an inefficient and subjective tool that is not patient or program-centered

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NDHHS uses the Quantiferon TB Gold Plus assay and tested 5060 samples in 2022!

Figure 14. IGRA Approaches, 2020 (n=33)



- **IGRA:** Interferon-gamma release assay; whole-blood test used to measure a person's immune reactivity to MTBC.

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Active TB –
Treatment needed
to treat TB disease

Symptoms may include

- a bad cough that lasts 3 weeks or longer
- pain in the chest
- coughing up blood or sputum
- weakness or fatigue
- weight loss
- no appetite
- chills
- fever
- sweating at night

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Sputum Specimen Collection



- Quality specimens are vital for the laboratory diagnosis of TB and sputum is the most frequent specimen collected for TB testing.
- Sputum specimens are preferably collected under the direction of a trained health care professional. Specimens should be collected in containers that are sterile, clear, plastic, and leak-proof.
- Ideally, 5-10 ml in volume, although smaller quantities are acceptable if the quality is satisfactory.

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Sputum Quality

- Thick, Mucopurulent
- Hemoptysis (Bloody Sputum)
- Watery (acceptable if induced)
- Salivary

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Containers used for the collection of AFB samples



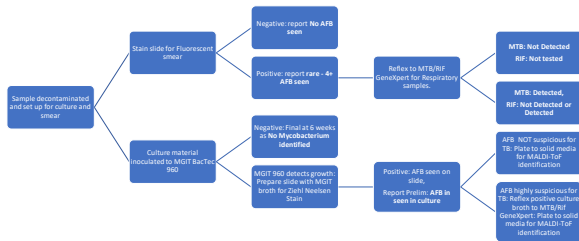
Possible Rejection Criteria

- Labeling of specimen does not match identifiers on requisition form
- Insufficient volume
- Dried swabs – swabs in general are not optimal
- Broken specimen containers or leaking specimens
- Tissue or abscess material in formalin

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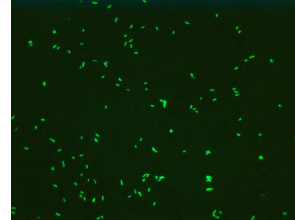
The sample is acceptable for testing, what's next?



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TB Testing for Initial Diagnosis

AFB Smear

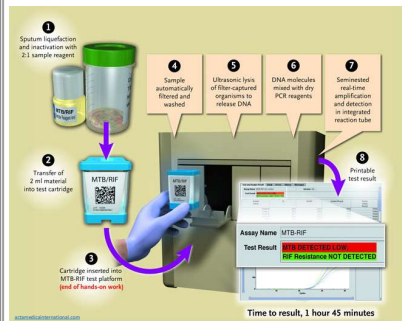


No. of AFB seen	CDC guideline ^a	Study definition
0	Negative	Negative
1-2 per whole smear	Doubtful positive	Scanty
1-9		
Per 100 fields	1+	Positive
Per 10 fields	2+	Positive
Per single field	3+	Positive
>9 per single field	4+	Positive

NOTE. CDC, Centers for Disease Control and Prevention.
^a From Kent and Kubica [15].

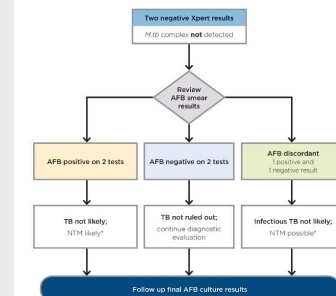
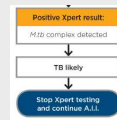
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MTB/RIF Screen on Cepheid GeneXpert



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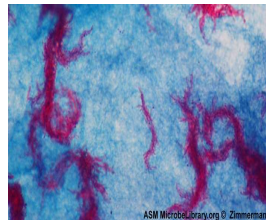
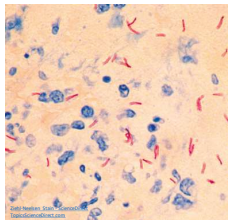
Application of AFB Sputum Smear Microscopy to Xpert Results



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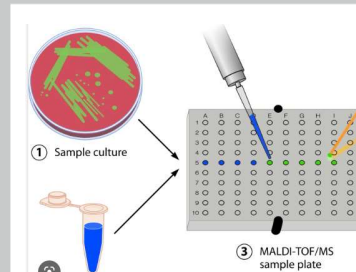
A sample is positive for AFB: Now what?

Ziehl-Neelsen Stain



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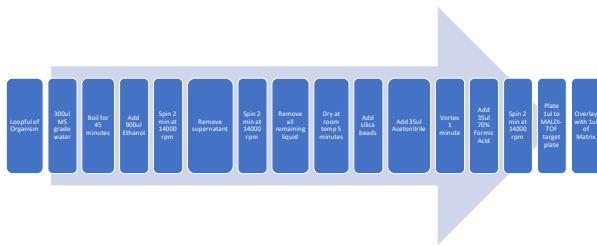
- Standard plating of MALDI-TOF for bacteria samples



Europe PMC

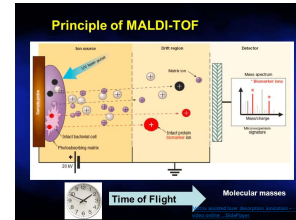
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Laboratory Workflow for MALDI-TOF MS ID of *M. tuberculosis* complex after growth in culture



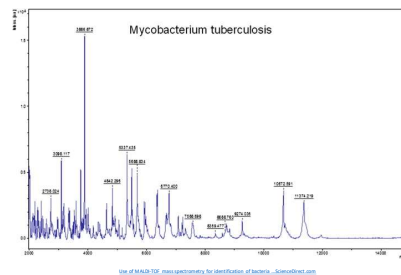
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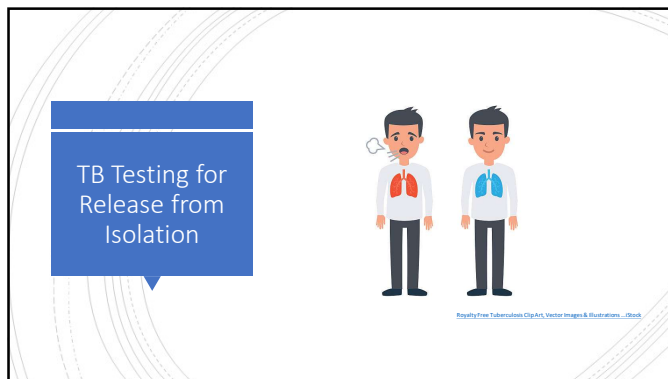
MALDI-TOF MS



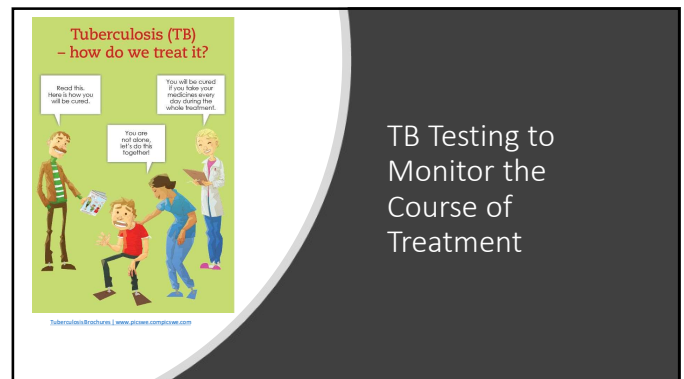
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MALDI-TOF TB Spectrum

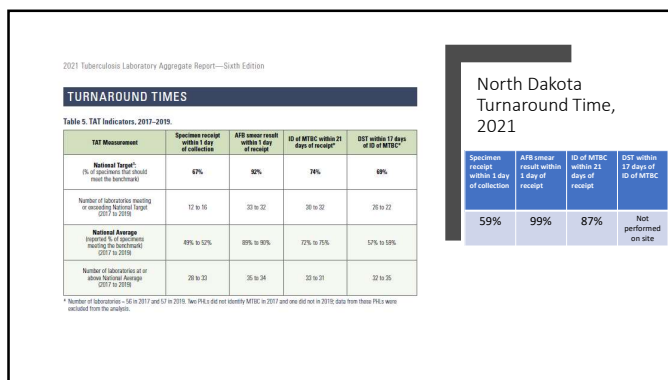




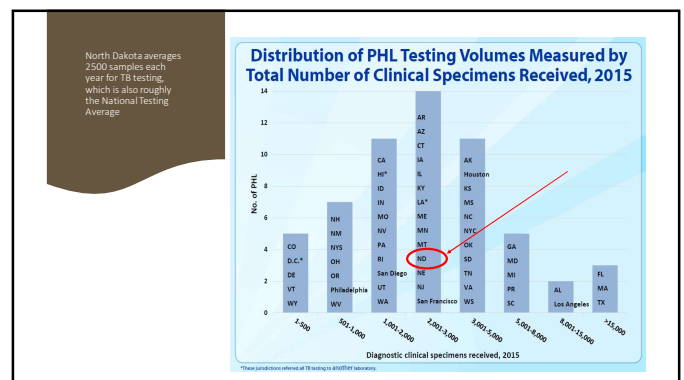
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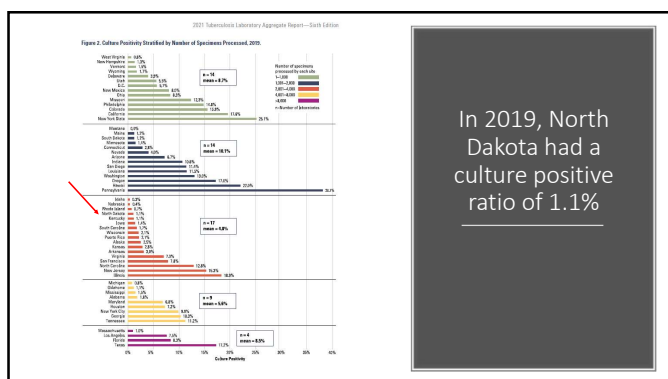
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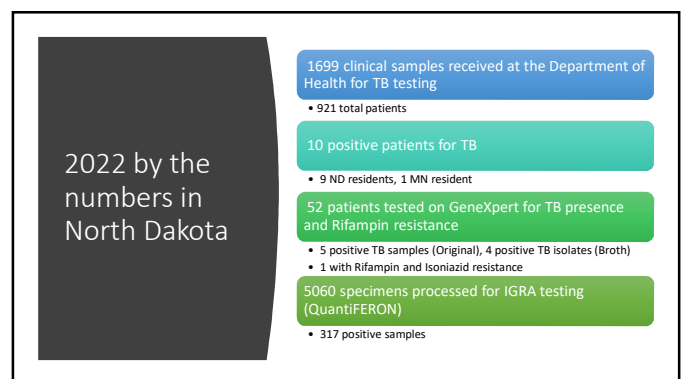
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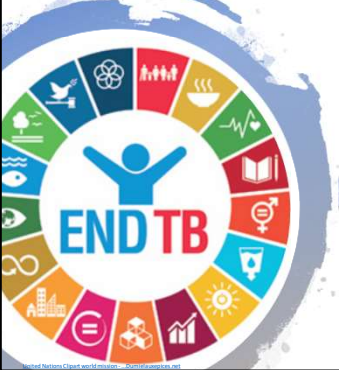
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END TB

Be Legendary.

NORTH Dakota | Health & Human Services

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