TB Nurse Network Meeting

Wednesday, October 18, 2017

10:00-11:30 AM ET

Conference call in number: 1-888-557-8511

Access Code: 254-487-3 #

Please Remember to Mute Your Phones

Do Not Put Us on Hold

Agenda	
Announcements	Helen McGuirk
Michigan Learning Opportunities	
Upcoming and Archived Webinars/Seminars	
TB in the News & Interesting Publications	
Presentation: "A Guide to the Phone Call with a Microbiologist"	Jolene Vanneste Senior Microbiologist, MDHHS-BOL
Open Forum	Helen McGuirk
Close and Adjourn	

Announcements

- Next meeting Wednesday, January 17th, 2018
  - Topic: TBD. Suggestions? Contact mcguirkh@michigan.gov

- CDC LTBI Mobile App is retired (9/8/17). Use the Latent TB Infection Online Hub for clinical information, guidance, fact sheets, and messages on targeted testing recommendations for LTBI. Any updates about future mobile app developments will be posted as they come.

- LHD billing for TB services
  - How do you bill for TB services?
  - Survey coming soon

- Looking to update the Michigan TB Control Manual
  - Are you interested in being a workgroup member?
  - Email mcguirkh@michigan.gov

Michigan Learning Opportunities

- **TB Contact Investigation Trainings**
  - Skills 3-day course
    - Late summer, July? Lansing?
    - 18-24 attendees
    - Must be LHD or TB clinic employee
    - First spots: someone who has never taken the course, new to TB (within 5 years), or works in a high TB-burden county
    - Interested? Email mcguirkh@Michigan.gov
  - Introduction to TB Contact Investigations Online Webinar (about 1.5 hours)
    - Open to anyone interested, more information soon

- **Fall 2017 TB Cohort Reviews**
  - More information about cohort reviews: CDC and MDHHS
  - Interested in watching online?

Upcoming Seminars/Webinars

- **Sunstrum Seminar**
  - "A Child Exposed to TB", presenter Pam Hackert
  - Friday 10/20/17; 8:15 – 9:30 AM
  - Wayne County TB Clinic, 2001 S. Merriman Rd, Suite 300, Westland, MI 48186
  - In-person or online (same dial and website info as today for webinar)

- **QuantiFERON®**
  - What's the 'Plus" in QuantiFERON®-TB Gold Plus?
  - Wednesday 10/25/17 1-2 PM ET
  - Register here
  - QuantiFERON®-TB Gold Plus is now FDA approved and will soon launch in the US. The new QFT®-Plus features innovative CD8 technology that provides a more comprehensive picture of a patient's immune response to TB antigens.

- **Southeastern National Tuberculosis Center**
  - TB Vaccine Development: Where Are We and What Needs to be Done?
  - Tuesday 10/24/17 1-2:30 ET
  - Register here

Recently Archived Webinars

Southeastern National Tuberculosis Center: TB and Tobacco Series

- Part 1: What you Need to Know (5/2/17)
- Part 2: Help Them Quit: Tobacco Cessation Interventions for TB Patients (6/6/17)
- Part 3: Assessment and Practical Counseling Skills (7/11/17)
- Part 4: Pharmacotherapy for Tobacco Cessation (8/22/17)
- Part 5: Treating Tobacco Dependence in Special Populations (9/5/17)

TB in the News

Solid Organ Transplant–Transmitted Tuberculosis Linked to a Community Outbreak — California, 2015

- Case of donor-derived TB disease
- limitations in determining the TB status of organ donors through medical evaluation or interviewing.
- Authors suggest reviewing organ donors' medical records from high-risk environments, such as jails, to reveal additional TB risk information.
- The evaluation of TB in organ recipients could include genotyping analysis to evaluate the potential for donor-derived TB.

- TB Alliance moves two novel tuberculosis drugs into human trials
  - Moved to phase 1 clinical trials
  - **TBA-7371** no pre-existing resistance or cross-resistance with other TB drugs
  - **Sutezolid** (same class as linezolid – "Nix-TB Study")

TB in the News

- Accuracy of Negative Tuberculin Skin Test in Predicting In-Hospital Tuberculosis Mortality (10/6/17)
  - Presented at ID Week 2017
  - Malnutrition, increasing age, and negative TST results are factors that may weaken the immune system and increase in-hospital mortality in hospitalized people with TB.

- Meet The Sisters Who Invented The Tuberculosis Skin Test (Forbes 10/6/17)
  - Florence Seibert figured out how to separate proteins from Mycobacterium tuberculosis, and purify them to get a safe, reliable test.
  - First described her results, Purified Protein Derivative, in a 1934 paper
  - PPD became the standard for TB tests in the 1941 and is still used today
  - Mabel Seibert (youngest sister) worked with Florence from 1927 through 1991 as a research assistant and secretary.

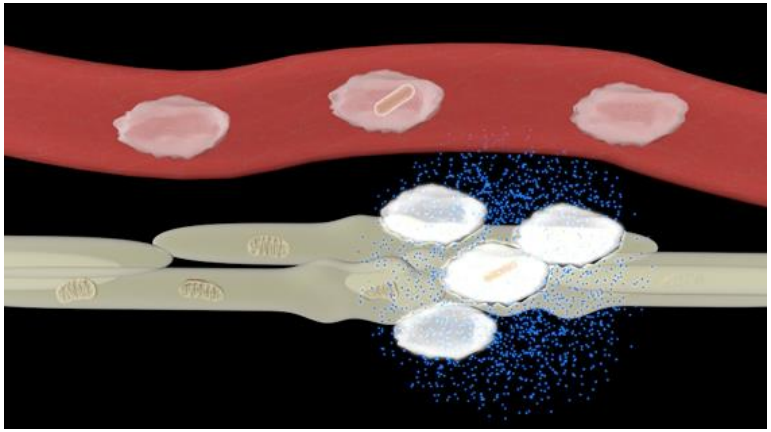
Florence Seibert
Acc. 90-105 - Science Service, Records, 1920s-1970s, Smithsonian Institution Archives

Interesting Publications

How Leprosy and Tuberculosis Bacteria Hijack Immune Cells in Early Infection

- Early infection, *M. Leprae* uses immune system to damage nerves
- Newly-discovered molecule, phenolic glycolipid (PGL), is responsible for this
- Mycobacterial PGL also helps bacteria establish infection by escaping macrophage defenses.
- Could PGL be a potential target for preventing TB and other mycobacterial diseases?

M. leprae-infected macrophages (white with brown capsule) can settle on nerves (beige), where they attract other macrophages to form granulomas. PGL on the bacterial surface causes the infected macrophages to produce an excess of nitric oxide (blue dots), which damages the mitochondria and myelin sheaths of surrounding nerve cells.



CA Madigan *et al*. A macrophage response to *Mycobacterium leprae* phenolic glycolipid initiates nerve damage in leprosy(link is external). *Cell* DOI: 10.1016/j.cell.2017.07.030 (2017)
CJ Cambier *et al*. Phenolic glycolipid facilitates mycobacterial escape from microbicidal tissue-resident macrophages(link is external). *Immunity* DOI: 10.1016/j.immuni.2017.08.003 (2017)

Interesting Publications

The Role of Powerlessness Among Health Care Workers in Tuberculosis Infection Control

Qualitative Health Research
1–12
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/1049732317731317
journals.sagepub.com/home/qhr
SAGE

Helena J. Chapman[1], Bienvenido A. Veras-Estévez[2], Jamie L. Pomeranz[1], Eddy N. Pérez-Then[3], Belkys Marcelino[4], and Michael Lauzardo[1]

- Infection control measures may not be consistently implemented in low- middle-income countries (Dominican Republic)
- HCWs encounter daily challenges to remain up-to-date with evidence-based clinical recommendations and translate educational information into actions in clinical practice
  - "Knowledge-Action Gap"
- Focus group, 24 physicians and 16 nurses from two hospitals

1. Cycle of powerlessness
   - Limited voice as clinicians and observed inaction of health authorities, demonstrating evidence of power dynamics or imbalance in their clinical practice
   - Minimal supervision for oversight from health authorities…feel that no authority figures holds their presence or well-being at high esteem or priority.
   - Absence of collaboration among stakeholders

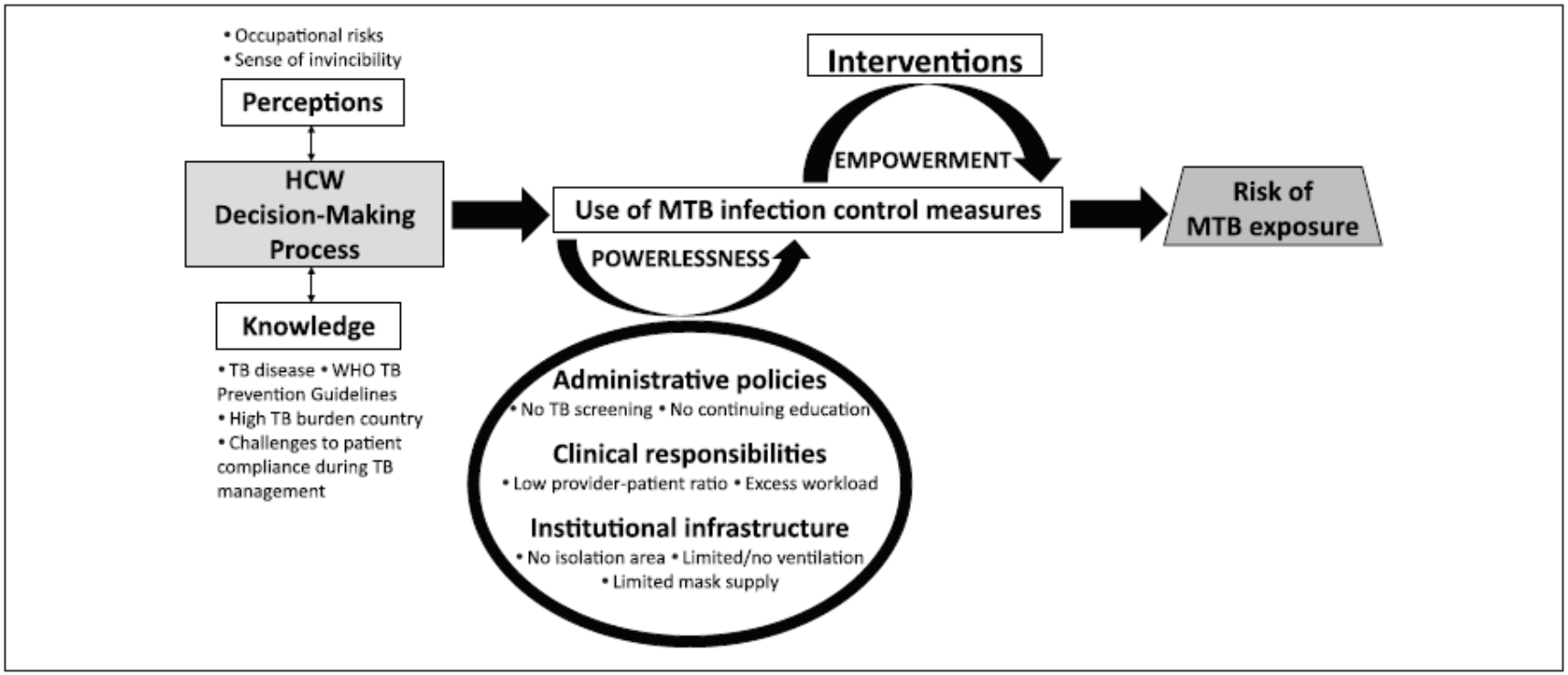

Figure 1. Conceptual model that presents HCWs' perceived limitations in the application of MTB infection control measures in clinical practice, influencing the decision-making process and resulting in the "knowledge–action" gap.
Note. TB = tuberculosis; WHO = World Health Organization; HCW = health care worker; MTB = *Mycobacterium tuberculosis*.

2. Intrinsic and extrinsic conditions that influence the use of IC measures
   - Intrinsic:
     - Knowledge about TB disease and management
     - Perception about occupational risk
   - Extrinsic
     - Administration policies
     - Clinical responsibilities
     - Institutional infrastructure

Interesting Publications

- Management of Latent Tuberculosis Infection among Healthcare Workers: 10-year Experience at a Single Center
  - HCW acceptance and compliance with LTBI treatment regimens has been problematic
  - 10-year retrospective study of employee health at one facility
  - 927 HCWs diagnosed and accepted LTBI tx; compared those who took INH (202), RIF (106), and 3HP (55)
  - HCWs who took RIF or 3HP were more likely to compete treatment, compared to INH
  - Rates of discontinuation due to side-effects were lower among those taking 3HP
  - Shorter LTBI tx regimens should be considered for HCWs in the US.

- Effect of HIV on the frequency and number of Mycobacterium tuberculosis-specific CD4+ T cells in blood and the airways in latent tuberculosis infection
  - HIV infection increases risk of LTBI activating to TB disease
  - Extensive depletion of M tb-specific CD4+ T cells in blood in early HIV infection
  - Authors compared M tb-specific CD4 cells from both blood and bronchioles in persons with LTBI and untreated HIV
  - Study TB immunity at the site of disease during HIV infection

	BAL	Blood
HIV+	15-fold lower	2-fold lower
HIV-	BAL Baseline	Blood Baseline

Interesting Publications

- Transmission of Mycobacterium Tuberculosis in Households and the Community: A Systematic Review and Meta-Analysis
  - Individual- and population-level impact of household TB exposure on transmission is unclear
  - Compared children exposed and unexposed to a household member with TB
  - Exposed children 3.79 times more likely to be infected compared to community counterparts
  - Higher infection rate among children aged 0-4 and smear positive index cases
  - At population level, a small proportion (<20%) of transmission was attributable to household exposure.
  - Targeting TB prevention efforts to household contacts is highly effective, however a large proportion of transmission at population level may occur outside of household.

Presentation

A Guide to the Phone Call with a Microbiologist

Jolene Vanneste, Senior Microbiologist MDHHS-BOL

A Guide to the Phone Call with a TB Microbiologist

Jolene Vanneste
Senior Microbiologist
Mycobacteriology Unit
Michigan Department of Health and Human Services

Prevent Disease – Promote Wellness – Improve Quality of Life

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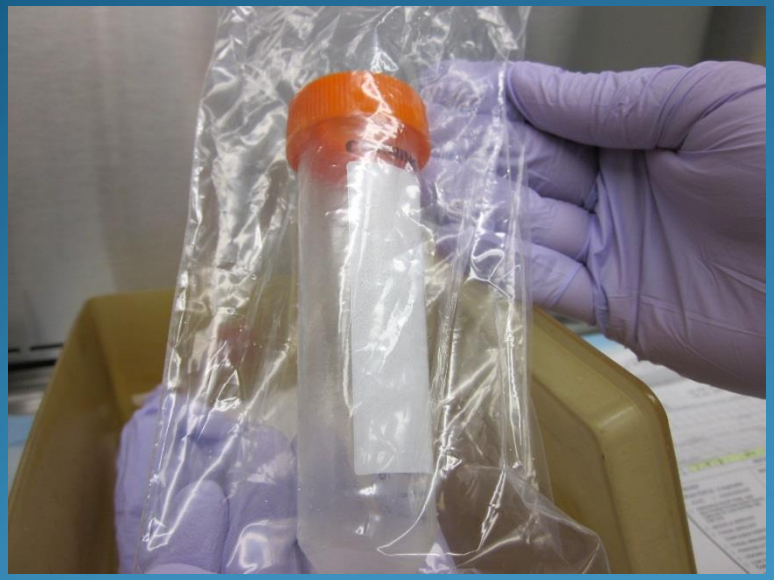
Specimen Collection

- Sterile Container labeled with patient name and at least one identifier
- Cap tight then parafilmed or taped – threads on straight
- Absorbent material wrapped around container then sealed in plastic bag
- Bag placed in metal can – requisition around metal can
- Metal can placed in outside mailer
- Send to Lab

Things that can go wrong…



For sputum and urine specimens, these 2 situations would result in an EXAMINATION UNSATISFACTORY result

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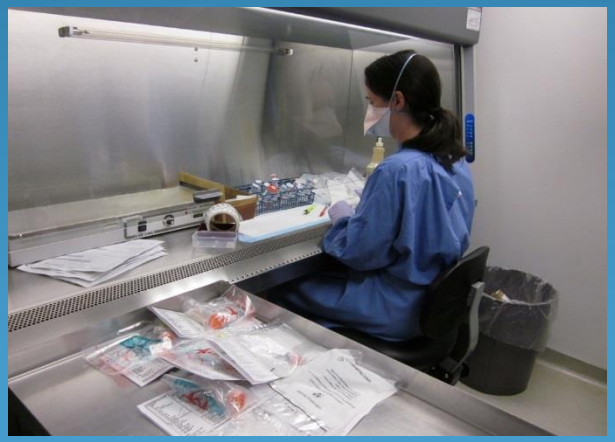
Specimen Processing

Open specimen – check for leaking specimens, mismatched/unlabeled specimens and requisitions

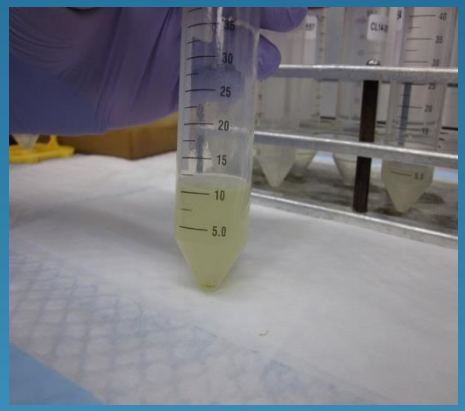
Specimens are labeled with MDHHS number (CL#)



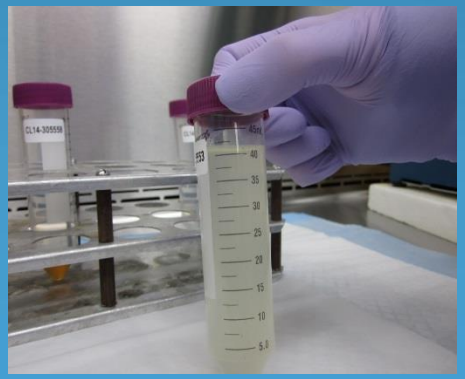
Specimen Processing

Specimen transferred to a new 50 ml centrifuge tube

Digestant added to kill the normal flora and break up the mucous which helps release the bacteria



Buffer added to stop the killing action



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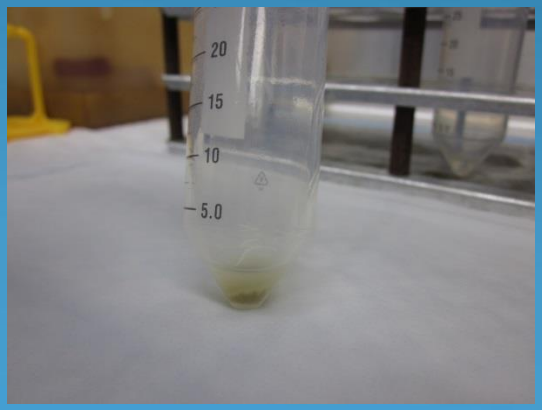
Specimen Processing

Buffered specimens is centrifuged to concentrate the bacteria

The supernatant is poured leaving a concentrated pellet of material



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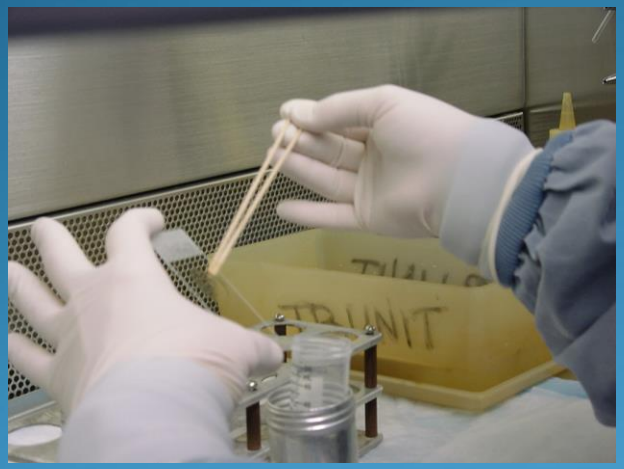
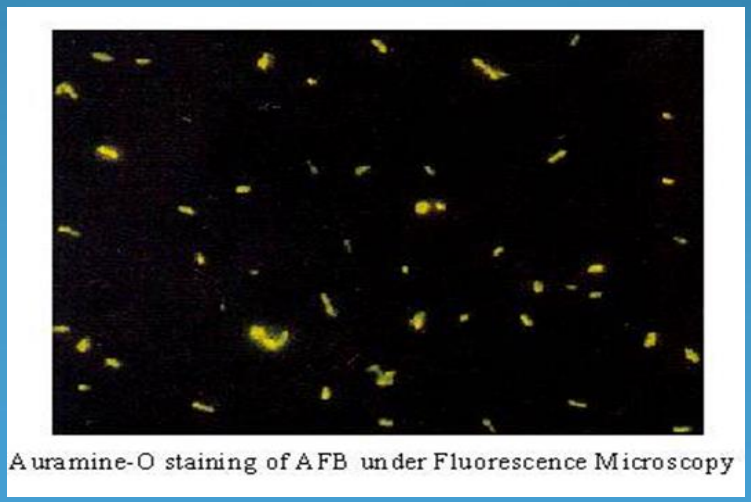
Slide Prep, Staining, and Reading

Slides are made from the concentrated pellet (or sediment) – NO dilutions have been made at this point



Each specimen slide is stained using Auramine-O (AO or fluorescent) stain



Auramine-O staining of AFB under Fluorescence Microscopy

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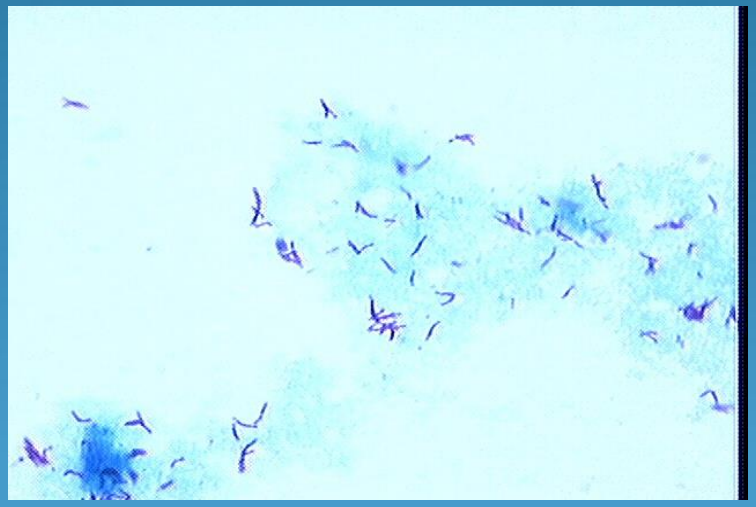
Slide Prep, Staining, and Reading cont.

When an AO smear is positive for AFB, a confirmatory stain needs to be performed – the Ziehl Neelson or ZN



Slide Reporting – 1st Result Out

Acid Fast Bacilli – Not Found

Auramine-O negative

Auramine-O positive?, ZN negative

Acid Fast Bacilli – Few Found

Auramine-O positive, ZN positive <10 AFB seen

Acid Fast Bacilli – Found

Auramine-O positive, ZN positive >10 AFB seen

PCR on Clinical Specimens

- New slide positive patients with no history of tuberculosis
  - Patients with a history of TB infections will be considered based on culture history
- Slide positive patients that have a NTM history with no NTM culture positives within the last year
- Case by Case Situations:
  - Patients who have slide negative results but were AO positive? and ZN negative
  - Patients that are slide negative but have other signs / symptoms suggestive of a tuberculosis infection, or whom may have had contact to a known active case

PCR Reporting

M. tuberculosis complex DNA – DETECTED / Not Detected

M. Avium complex DNA – DETECTED / Not Detected

-NAA testing was developed and its performance characteristics determined by the Michigan Department of Health and Human Services. It has not been cleared or approved by the U.S. Food and Drug Administration (FDA). The FDA has determined that such clearance or approval is not necessary if performance characteristics are verified at the testing laboratory.

-All NAAT results should be confirmed by culture. A negative result does not rule out the possibility of isolating M. tuberculosis complex and/or M. avium complex from this specimen.

For specimens processed at MDHHS:

-MYCOBACTERIUM CULTURE IN PROGRESS

For concentrated sediment received for PCR testing only:

-SPECIMEN RECEIVED AS PROCESSED SEDIMENT

-SLIDE AND CULTURE EXAMINATION NOT PERFORMED

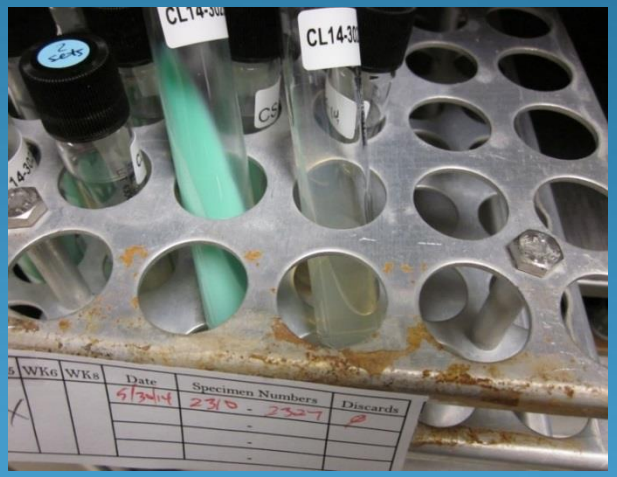
Isolation (Culture) Inoculation and Reading

While the microbiologist is reading slides, 3 types of media are inoculated for culture:

MGIT broth culture

Read hourly by instrument

Lowenstein-Jensen Slant
Middlebrook 7H11 Slant



Read weekly by microbiologist

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Isolation Positive

If a MGIT flags positive on the instrument or a slant has suspicious growth, a smear is made a stained by the ZN staining method

- ZN Results:
  - Non-acid fast organisms – tube/slant maybe discarded due to contamination
  - Acid-fast bacilli – tube/slant is sent for identification

Isolation (Culture) Reporting

Acid-Fast Bacilli Found on Culture – Identification to follow

When at least ONE piece of medium is positive with acid-fast bacilli

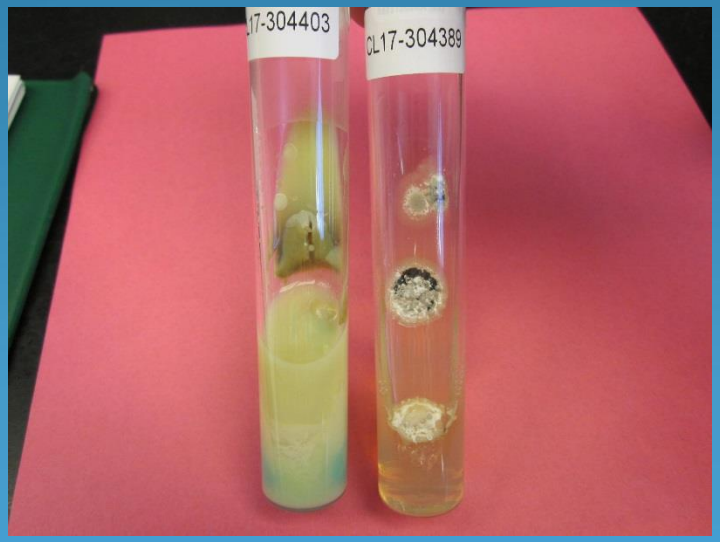
Mycobacterium Not Found

No acid-fast bacilli found on any piece of medium after six weeks of incubation

Isolation (Culture) Reporting cont.

Examination Unsatifactory

When ALL THREE pieces of media are overgrown with non-acid-fast organisms



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Isolate to AF Id Lab

MGIT tube or slant is subcultured to a 7H9 broth bottle and for most broth cultures, an isolation plate is inoculated.

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AFB Identification

Identification Techniques:

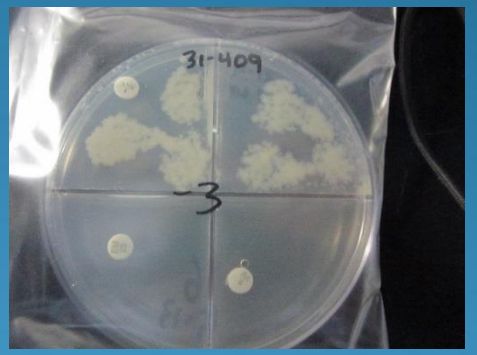
- MALDI-TOF: performed on growth from solid media or a subculture of original broth culture
- AccuProbe: performed on broth or solid media cultures
- PCR: performed on broth cultures for patients with NO history of Mycobacterium sp. or NTM history greater than 1 year ago
- HPLC – No longer available at MDHHS…

The AF Lab will perform which ever test is appropriate to get the quickest result out

Susceptibility

MDHHS performs susceptibility on *Mycobacterium tuberculosis* complex isolates on new patients:

- First culture – MGIT AST and screen plate – generally results are available within 1-2 weeks from positive isolation or identification of MTBC



- Repeat positive cultures at 4 week and 8 week intervals will have a screen plate set-up – results are not usually reported
- Repeat positive cultures at 12 weeks – repeat MGIT AST and screen plate – this will be reported

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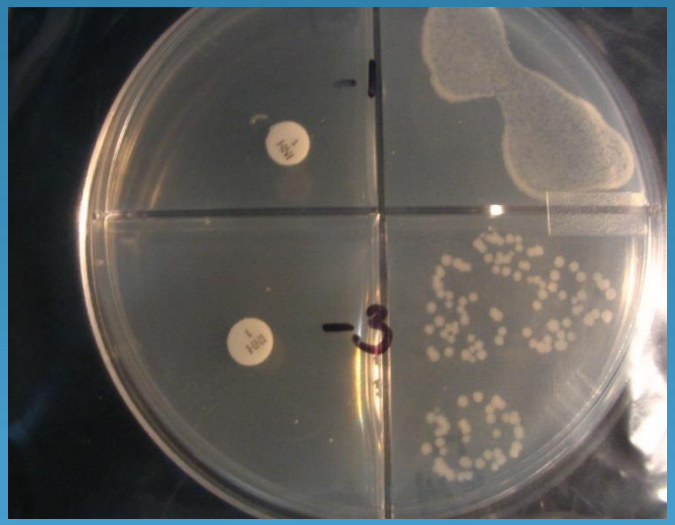
Susceptibility

If there is any resistant to the four primary drugs, an agar proportion plate test will be set up for secondary antibiotics:

- Fluoroquinolone (ciprofloxacin, levofloxacin or moxifloxacin)
- Ethionamide
- Cycloserine
- Capreomycin
- Amikacin
- Kanamycin
- Streptomycin
- PAS



Results are available 3 weeks from when resistance is seen

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MDDR Susceptibility by CDC

- Testing can be performed on NAAT positive clinical specimens or cultures with a MTBC identification
- Test requests and submission must go through MDHHS – approval by CDC is needed
- Story is needed:
  - Patient from country with high rate of resistant TB
  - Contact to known MDR case
  - High profile patient – lots of contacts involved
  - Patient is having drug reactions with primary antibiotics
  - Mixed culture
- 3-4 day turnaround time

Genotyping

Provides a fingerprint of each isolate

Michigan performs MIRU-VNTR testing and CDC performs the Spoligo testing

Used with traditional investigations, genotyping has

- Identified outbreaks not previously recognized
- Identified risk factors for recent infection
- Demonstrated re-infection with different strains
- Documented lab cross-contamination

Questions?

If questions comes to mind later,
the TB Lab can be reached at 517-335-9636

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Open Forum

Thank you!

Meeting notes and presentations will be sent to everyone on the TB Nurse Network list and posted on our website.

Next TBNN meeting

Wednesday, January 17th, 2018

10-11:30 AM ET

Please contact Helen McGuirk with questions, comments, or suggestions for presentations and content:

mcguirkh@michigan.gov

517-284-4957