All We Need is Three Colonies

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2017
Objectives

- Targeted screening by primary care physicians improves the timely diagnosis of TB disease.

- When dealing with a very fastidious strain, the advances in laboratory methods provide much needed answers for a successful treatment plan.
Patient History

- 39 yo female from Vietnam
- Immigrated to US in 2008
- TST negative in 2009 performed in US
- Traveled back to Vietnam for prolonged visits twice
- Patient resided in a household with 3 other adults, 2 teenagers, and 4 year old daughter
- Patient acquired new health insurance - physical exam
Targeted Screening Program

- 2006 WA State TB Program was performing evaluations of local Health Departments (HD)
- Pierce County HD decided to encourage Target Screening
- 3 Vietnamese Physicians enrolled
  - Patients were given TB questionnaire
  - If certain questions were answered positively, the TB screening was initiated
- 11 years later - the daughter of one of these providers still continues this practice
Physical Exam

- Patient is asymptomatic
- Targeted Screening question:
  - Have you traveled outside of US for more than one week and where?
  - Answer: Vietnam
- TST +, abnormal chest x-ray
- To rule out active TB, 3 sputum specimens were collected
Initial Lab Results

05/24/16

Specimens collected

5/26/16

AFB Smear Negative on all 3 specimens
NAATTB Negative x2

- All specimens were watery and of minimal volume
- Patient was placed on INH monotherapy on 5/31/17
4 Weeks Later….

06/22/16

3 TB colonies
IRZÆ on 6/24/16
Could this be?

1. Cross-Contamination
2. Lab Error
3. True TB Case
4. All of the Above
Sensitivity Results

7 wks later

MGIT Sensitivities
Resistant to:
Streptomycin
Rifampin
Pyrazinamide

Repeated x2

Growth in INH tube
Instrument interpretation was sensitive
How would your lab report such INH results?

1. Resistant – clearly there is growth in the tube
2. Indeterminate
3. Unable to perform, provide a verbal explanation to the clinician, and forward the specimen for molecular screening of drug resistance
### Sequence No: 439550046615

**TIP:** 9;7  
**SOP:** 06/29/2016 16:12  
**Removed Date:** 07/11/2016

**Access No:** 0252919  
**Isolate No:** 1

<table>
<thead>
<tr>
<th>Tube Position</th>
<th>Growth Unit</th>
<th>Status</th>
<th>Concentration</th>
<th>Drug Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/M01</td>
<td>400 mg</td>
<td>C</td>
<td></td>
<td>Growth Control</td>
</tr>
<tr>
<td>C/M02</td>
<td>400 mg</td>
<td>R</td>
<td>1.00 ug/mL</td>
<td>Streptomycin</td>
</tr>
<tr>
<td>C/M03</td>
<td>?? (X) mg</td>
<td>S</td>
<td>0.10 ug/mL</td>
<td>Isoniazid</td>
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<tr>
<td>C/M04</td>
<td>400 mg</td>
<td>R</td>
<td>1.00 ug/mL</td>
<td>Rifampin</td>
</tr>
<tr>
<td>C/M05</td>
<td>0 -</td>
<td>S</td>
<td>5.00 ug/mL</td>
<td>Ethambutol</td>
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### Sequence No: 439550028042

**TIP:** 8;21  
**SOP:** 03/21/2017 15:50  
**Removed Date:** 03/30/2017

**Access No:** 0252919  
**Isolate No:** 1

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<th>Tube Position</th>
<th>Growth Unit</th>
<th>Status</th>
<th>Concentration</th>
<th>Drug Name</th>
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</thead>
<tbody>
<tr>
<td>C/B06</td>
<td>400 SG</td>
<td>C</td>
<td></td>
<td>Growth Control</td>
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<tr>
<td>C/B07</td>
<td>400 mg</td>
<td>R</td>
<td>1.00 ug/mL</td>
<td>Streptomycin</td>
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<tr>
<td>C/B08</td>
<td>9 X</td>
<td>S</td>
<td>0.10 ug/mL</td>
<td>Isoniazid</td>
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<tr>
<td>C/B09</td>
<td>400 mg</td>
<td>R</td>
<td>1.00 ug/mL</td>
<td>Rifampin</td>
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<tr>
<td>C/B10</td>
<td>0 mg</td>
<td>S</td>
<td>5.00 ug/mL</td>
<td>Ethambutol</td>
</tr>
</tbody>
</table>
# Summary of Sensitivities Results

<table>
<thead>
<tr>
<th>Drugs</th>
<th>MDDR</th>
<th>MGIT</th>
<th>Agar Proportion*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strep</td>
<td>N/A</td>
<td>Resistant</td>
<td>25 colonies</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>inhA mutation C-15T</td>
<td>Growth in tube</td>
<td>6 colonies</td>
</tr>
<tr>
<td>Rifampin</td>
<td>rpoB mutation Ser531Leu</td>
<td>Resistant</td>
<td>25 colonies</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>Neutral mutation</td>
<td>Sensitive</td>
<td>No Growth</td>
</tr>
<tr>
<td>PZA</td>
<td>pncA mutation Aps12Ala</td>
<td>Resistant</td>
<td>N/A</td>
</tr>
<tr>
<td>Ethionamide</td>
<td>N/A</td>
<td>N/A</td>
<td>25 colonies</td>
</tr>
</tbody>
</table>

*Agar proportion plates were not reported due to insufficient growth on controls.
Current Regimen

- Patient is doing great

- Current regimen
  - Amikacin, Cycloserine, EMB, Levofloxacin, PAS
Conclusions

- Targeted screening detected the case at a very early stage
  - All of the close contacts tested negative
- Can not always trust the instrument interpretation for sensitivities
  - Visual checks for growth should be routine practice
- Advantages of using molecular screening for mutations
  - Confirmed an MDR case
  - Provide much needed answers for fastidious strains
  - The only answer we had for Isoniazid and Ethionamide resistance
WA State TB Lab staff

Peggy Cooley at Tacoma Pierce County HD
THANK YOU!