Operational Issues with Implementation of QuantiFERON TB Gold Testing in Iowa

Michael Pentella, Ph.D., D(ABMM), CIC
University Hygienic Lab
How did QFTB Gold testing start in Iowa?

- Requests from:
  - epidemiologists
  - infectious disease physicians
  - infection control preventionists

During verification process UHL was approached by UI Student Health Services
Who is using QFTB Gold in Iowa?

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Count</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Health</td>
<td>5</td>
<td>1602</td>
</tr>
<tr>
<td>Employee Health</td>
<td>2</td>
<td>446</td>
</tr>
<tr>
<td>Health Care</td>
<td>37</td>
<td>1109</td>
</tr>
<tr>
<td>Public Health</td>
<td>20</td>
<td>187</td>
</tr>
</tbody>
</table>
Benefits of QFT-Gold over TST

- Requires only one patient visit
- Assesses responsiveness to *M. tuberculosis* antigens
- Does not boost previous responses
- Interpretation less subjective than for TST
Barriers…

- Cost of doing the test
- The verification process
- The transport of specimens
Cost Barrier?

- Cost-effective alternative to TST
  - Reduction in false positive test results
  - No second visit needed to complete testing
  - Two-step testing not needed
  - Reduction in rates of CXR (due to higher specificity for *M. tuberculosis*)
# Cost Analysis

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reagents and Disposables</td>
<td>$28.13</td>
</tr>
<tr>
<td>Tech time 72 min</td>
<td>$28.80</td>
</tr>
<tr>
<td>Overhead Costs 28.5%</td>
<td>$16.23</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$73.16</td>
</tr>
</tbody>
</table>
Verification Barriers

- Test validation in Iowa lab – low risk population to use for validation testing
- Attempted to get positives from another state
- Need for IRB approval process difficult for multiple sites
New International Students screened 01/06 – 02/06
- 68 Total (TST)
- 34 (50%) TST positive (S. Korea, China, India, Japan)
- 31 CXR
- 6 (18%) started INH

New International Students screened 01/07 – 02/07
- 100 Total (TST) 89 (QFT-G)
- 32 (32%) TST positive (S. Korea, China, India, Germany)
- 4 (4%) QFT-G positive (S. Korea, China, S. America)
- 31 CXR
New International Students TB Screening
Spring Semester 2006 & 2007

- Total screened 2006: 68
- Total screened 2007: 100
- Positive TST 2006: 34
- Positive TST 2007: 24
- CXR done: 31
- CXR done: 89
- QFT-Gs drawn: 4
- QFT-Gs drawn: 6
- Started INH: 3
- Started INH: 6

Number of students
## UHL Verification

<table>
<thead>
<tr>
<th>n</th>
<th>TST Pos</th>
<th>TST Neg</th>
<th>QF Pos</th>
<th>QF Neg</th>
<th>QF Ind</th>
</tr>
</thead>
<tbody>
<tr>
<td>126</td>
<td>45</td>
<td>80</td>
<td>6</td>
<td>112</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4.8%)</td>
<td>(88.8%)</td>
<td>(4.8%)</td>
</tr>
</tbody>
</table>
UI Student Health observations Iowa-specific disadvantages:

- Test validation in Iowa lab – low risk population to use for validation testing
- One lab in state doing tests
  - Located 2.5 hours from SHS
- Lab staffing/training issues
  - Tests done on night shift
  - No testing done Friday – Sunday
- Delay in result reporting due to test batching
  - Tests only run in batches of 22
  - Long wait for test results
- Shifting administrative responsibilities for QFT-G program
  - Courtesy of Gayle Nelson, UI Student Health
Quantiferon “To Do List” 2006

- Build test in LIMS
- Design test request form
- Prepare fact sheet
- Write Verification
- Write SOP
- Investigate courier options

- Arrange for verification specimens
- Get IRB approval
- Prepare lab
- Order supplies
- Train staff
- Competency documents
Contact investigations

Savings

Avoidance of unnecessary treatment and potential drug induced hepatitis

The nagging feeling of “what if it is not TB?”

– Courtesy Allan Lynch, TB Program Manager
What happens with test results? Student Health?

- Results will be reported in a minimum report time of 72 hours.
- Letters will be sent to students if they do not have follow up visits for PPD read or if test results are not back when they return to clinic.
- If positive QFT-G test, do TB symptom assessment and schedule patient for CXR as with positive TST.
- Do TB Patient Teaching Protocol and INH education and document on Inform Patient Record (IPR).
Quantiferon TB Gold Test Kit available from UHL
Hygienic Laboratory
The University of Iowa

Quantiferon Gold Testing for Latent Tuberculosis

Submission Requirements

- The time of specimen collection to arrival at UHL is critical. Contact UHL prior to obtaining the specimen to verify that staffing will be available to initiate testing upon arrival. For UHL in Iowa City, please call 319-335-4500. For UHL in Anceny, please call 515-725-1600.
- All specimens must arrive at UHL within 10 hours of specimen collection and before 3:00 PM, Monday thru Thursday.
- A completed Quantiferon TB-Gold test request form must accompany every specimen.
- In instances of known exposure with an initial negative test result, a second specimen is recommended 6 to 10 weeks after exposure cessation.
- Quantiferon TB-Gold does not distinguish between active and latent TB. Active TB needs to be ruled out by additional laboratory and clinical evaluation.
- Testing has not been validated for the following groups: Immunosuppressed individuals, individuals with diseases other than tuberculosis, children aged 17 years and younger, pregnant women

Specimen Collection and Handling

- Whole blood, minimum 5 mL, collected in a Vacutte Greiner lithium-heparin tube is the only validated specimen type. You may contact UHL to obtain a specimen collection kit prior to obtaining the specimen. Do NOT use Beckton-Dickerson (BD) tubes as these tubes have been shown to interfere with the assay.
- Blood should be thoroughly mixed by inverting the tube at least 5 times immediately after collection.
- Label the tube with the patient’s name or unique identifier and the date and time of collection.
- UNLABELED SPECIMENS WILL NOT BE TESTED.
- Blood must be kept at a temperature of 22°C (±5°C) during transport to UHL. Do NOT refrigerate, place on ice, or freeze.
- All specimens must arrive at UHL within 10 hours of specimen collection.
- Specimen collection tube should be wrapped in an absorbent cloth, with enough absorbent material to absorb the entire specimen in the event of a leak. Wrapped specimen should then be placed in a sealed biohazard bag. Place the test request form outside the sample bag.

Complete Test Request Form

- A completed Quantiferon Test Request Form must accompany specimen.
- Required information: Patient name, DOB, test requested, date and time of collection, patient history, name of facility submitting specimen
- TST result

Shipping Instructions

- Transport arrangements are made prior to specimen collection.
- Blood must be kept at a temperature of 22°C (±5°C) during transport to UHL. Do NOT refrigerate, place on ice, or freeze.

Contact Information

- For UHL in Iowa City, please call 319-335-4500. For UHL in Anceny, please call 515-725-1600.
- For additional forms, go to [http://www.uhl.uiowa.edu/labertestforms/](http://www.uhl.uiowa.edu/labertestforms/)
Specimen Type: check appropriate specimen and fill in requested information (Only one sample per form).

- Plasma (heparin - lithium)

Specimen must arrive at the UHL Laboratory in Iowa City or Ankeny no later than 10 hours post draw.
Specimen must be stored and shipped at ambient temperature (22 ± 5°C).

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma (heparin - lithium)</td>
<td></td>
<td>Specimen must arrive at the UHL Laboratory in Iowa City or Ankeny no later than 10 hours post draw. Specimen must be stored and shipped at ambient temperature (22 ± 5°C).</td>
</tr>
</tbody>
</table>

**Required Information**

Test Requested: □ QuantIFERON TB Gold (UHL must be contacted to coordinate draw time, transportation and testing)

- Tuberculin Skin Test Result: □ Positive □ Negative □ Unknown □ Not Done

LTBI Diagnosis: □ TB Diagnosed (active) □ Contact to TB Case □ Time since Exposure: __________

□ Symptomatic □ Other:

This test has not been evaluated on:
- Individuals who have altered or impaired immune function.
- BCG-vaccinated and non-vaccinated individuals with a high likelihood of progression to tuberculosis disease.
- Individuals who subsequent to testing had progression to tuberculosis disease.
- Individuals younger than age 17 years.
- Pregnant women.

**MEDICAID / MEDICARE INFORMATION**

<table>
<thead>
<tr>
<th>MEDICAID / MEDICARE INFORMATION</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s Medicaid/Medicare #:</td>
<td>□ Medicaid □ Medicare</td>
</tr>
<tr>
<td>Physician Provider #:</td>
<td></td>
</tr>
<tr>
<td>Patient’s Medicaid/Medicare ICD9 Code:</td>
<td></td>
</tr>
<tr>
<td>Referring Physician #: (Medpass only):</td>
<td></td>
</tr>
<tr>
<td>If Insurance is primary to Medicaid / Medicare</td>
<td></td>
</tr>
<tr>
<td>Insured’s Name:</td>
<td>□ Insured’s ID#:</td>
</tr>
<tr>
<td>Insurance Company Name:</td>
<td>□ Insurance Company Address:</td>
</tr>
<tr>
<td>Insurance Company:</td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td>□ State: □ Zip:</td>
</tr>
</tbody>
</table>

Facility Name: ____________________________
Address: ____________________________
City: ________ State: ________ Zip: ________
UHL Results
(Aug 2007 to July 2008)

- 2048 Tests performed
- 66 Facilities submitted specimens
- 9 Samples rejected
Test Results
(August 2007 to July 2008)

<table>
<thead>
<tr>
<th>Tests</th>
<th>Positive</th>
<th>Negative</th>
<th>Indeterminate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2048</td>
<td>300 (14.6%)</td>
<td>1712 (83.6%)</td>
<td>32 (1.6%)</td>
</tr>
</tbody>
</table>
CAUTION: Before a specimen is drawn...

- UHL must be contacted before collection
  - there are critical time and temperature requirements
  - Specimens not meeting requirements must be rejected
- UHL will provide you with a collection kit and instructions
- UHL will discuss transportation options
- UHL will arrange for testing to begin as soon as the specimen arrives
- March 2008 cost - $85/test
  - Cost of courier separate charge
  - CPT code 86480
QFTB Gold In Tube
QFTB In-Tube Option #1

- Call UHL to arrange for testing at least 24 hours prior to collection
  - Specimens only accepted Monday-Thursday
  - Must arrive before 4 p.m.
- Arrange for Transport at least 24 hours prior to collection
  - Courier option: CDS (Central Delivery System) is one courier we have had good experiences with. CDS can be reached at (515) 771-8541 (Courier fees apply)
- Label each of the 3 tubes with patient information
- Collect tubes in order (Nil, Antigen, Mitogen)
  - Tubes are calibrated to accept 1 mL of whole blood
  - Do not use Butterfly needles, as this will affect the calibration.
- 5) Shake tubes vigorously for 5 seconds, foaming is O.K.
- Send to UHL
  - Must arrive at UHL within 10 hours of collection
  - Must remain at room temp 25°C (DO NOT REFRIDGERATE OR FREEZE)
QFTB In-Tube Option #2

1) Label each of the 3 tubes with patient information
2) Collect tubes in order (Nil, Antigen, Mitogen)
   - Tubes are calibrated to accept 1 mL of whole blood
   - Do not use Butterfly needles, as this will affect the calibration.
3) Shake tubes vigorously for 5 seconds, foaming is O.K.
4) Incubate as soon as possible, and within 16 hours of collection
   - a. Keep tubes upright
   - b. Prior to incubation tubes must remain at room temperature (25°C)
   - c. If tubes are not incubated right away re-shake immediately before incubation
   - d. Incubate in 37°C incubator for 16-24 hours
5) Following incubation specimens should be stored and transported between 2°C and 27°C
6) Send to UHL
   - a. Must arrive at UHL within 3 days after incubation.