

ACCEPTABILITY OF INTERFERON-GAMMA RELEASE ASSAYS FOR USE IN ROUTINE EMPLOYEE TB TESTING

**Yael Hirsch-Moverman, MPH
Julie Franks, PhD**

February 10, 2011





Background

- CDC guidelines recommend TB testing for healthcare workers (HCWs) upon hire and periodically thereafter using either
 - Tuberculin skin test (TST)
 - Interferon-gamma release assays (IGRAs), such as QFT-G and T-SPOT
- IGRAs are relatively new diagnostic tests for TB infection
- Little known about their acceptability among healthcare providers and patients, specifically HCWs



Task Order 18 Objectives

- To evaluate performance characteristics of QFT and T-SPOT compared with TST for detecting LTBI in HCWs undergoing routine screening
 - Test result stability over time (i.e. conversion, reversion)
 - Reproducibility
 - Test, re-test repeatability
 - Estimated sensitivity and specificity
 - % of failed tests
 - Impact of TST on IGRA results
- To determine costs, cost-effectiveness
- To determine and compare acceptability of tests among participants



Design and Population

- Longitudinal study
- HCWs undergoing routine LTBI testing
- 4 sites: Denver, Houston, Baltimore, NYC
- Inclusion:
 - ≥ 18 yrs; informed consent; undergoing routine screening
- Exclusion:
 - Current or prior active TB; TST within 6 months prior to enrollment
- Target sample size ~ 2500
- 2,493 completed baseline assessment



Acceptability Objectives

- To assess knowledge, attitudes, beliefs, practices, and barriers in the use of IGRAs with respect to:
 - acceptability and usability of testing procedures
 - patient-provider communication about IGRAs
 - barriers and facilitators in the use of the IGRAs



Acceptability Components

- Quantitative - collection of quantitative data assessing individual responses of HCWs to research questions
- Qualitative - formative research utilizing:
 - focus groups with HCWs
 - key informant interviews with providers



Participant ID: _____

Date Questionnaire Completed: ____/____/____
m m d d y y y y

TASK ORDER #18: ACCEPTABILITY QUESTIONNAIRE

KNOWLEDGE AND BELIEF

1. Before today, how much had you heard about blood tests for TB, for example QuantiFERON (QFT) or T-SPOT?
 Have not heard of these tests
 Have heard a little
 Have heard a lot
 Don't know
 Prefer not to answer
2. If your TB skin test (TST, PPD, or Mantoux) comes back positive, would you believe the result?
 Yes
 No
 Don't know
 Prefer not to answer
3. Imagine that you have a positive TB blood test result. Would you be willing to take treatment to prevent TB disease (active TB)?
 Yes
 No
 Don't know
 Prefer not to answer
4. If your TB blood test comes back positive, would you believe the result?
 Yes
 No
 Don't know
 Prefer not to answer
5. Imagine that you have a positive TB blood test result. Would you be willing to take treatment to prevent TB disease?
 Yes
 No
 Don't know
 Prefer not to answer

Quantitative Component



Study Population and Methods

- The first 100 participants enrolled at each site asked to respond to an acceptability questionnaire
- Assessment tool consisted of 13 questions designed to elicit attitudes regarding:
 - the use of TSTs and IGRAs
 - confidence in the results of each test
 - likelihood of taking LTBI treatment based on the results of either test



Demographics

	Acceptability N = 407
Median age (range)	37 (20-73)
Gender (female)	81.8%
Race/Ethnicity	
Hispanic	24.3%
African-American	15.7%
Caucasian	52.1%
Asian	5.7%
Other	2.2%
Foreign-born	17.4%
BCG vaccinated	11.8%
HIV-infected	0.2%



Work Environment

	N = 407
How frequent in-person contact with pts?	
- never	16.9%
- rare (<5%)	11.9%
- occasional (5-20%)	10.6%
- moderate (21-50%)	7.1%
- frequent (>50%)	53.4%
Job location past year:	
- not used for pt care	18.2%
- rare or no TB pts	28.0%
- occasional reports of TB pts	31.2%
- frequent reports of TB pts	11.8%



Awareness of Blood Tests

How much heard of blood tests?	N=407
Have not heard	75.2%
Heard a little	18.9%
Heard a lot	5.4%
Don't know	0.3%
Prefer not to answer	0.3%



Testing Scenarios

If...	TST+, believe result			
Yes	69.0%			
No	22.4%			
DK	8.4%			



Testing Scenarios

If...	TST+, believe result	TST+, willing to take TLTBI		
Yes	69.0%	79.4%		
No	22.4%	8.1%		
DK	8.4%	12.5%		



Testing Scenarios

If...	TST+, believe result	TST+, willing to take TLTBI	Blood test +, believe result	
Yes	69.0%	79.4%	75.7%	
No	22.4%	8.1%	7.1%	
DK	8.4%	12.5%	17.2%	



Testing Scenarios

If...	TST+, believe result	TST+, willing to take TLTBI	Blood test +, believe result	Blood test +, willing to take TLTBI
Yes	69.0%	79.4%	75.7%	78.9%
No	22.4%	8.1%	7.1%	6.1%
DK	8.4%	12.5%	17.2%	14.7%



General Testing Preferences

Factor/Importance	No	Low	Neutral	Moderate	High
Side effects from test	5.9	9.1	11.8	30.5	42.3
Accuracy of results	1.0	0.5	3.4	10.3	84.0
Amount of time test in use	5.4	9.1	27.0	32.9	25.3
Effect on ability to work	4.4	3.7	9.8	26.3	55.0
Ability to understand how test works	3.4	5.7	13.3	27.3	50.1
Pain of test	11.1	14.0	26.0	24.3	24.1
Convenience of test	4.4	7.4	22.9	33.9	31.2
Ability to understand what results mean	1.5	1.5	4.9	21.4	70.3
Which test HCP recommends	5.4	3.7	13.0	31.0	46.4
How much test costs to you	7.1	6.1	20.4	27.8	38.1



General Testing Preferences

Factor/Importance	No	Low	Neutral	Moderate	High
Side effects from test	5.9	9.1	11.8	30.5	42.3
Accuracy of results	1.0	0.5	3.4	10.3	84.0
Amount of time test in use	5.4	9.1	27.0	32.9	25.3
Effect on ability to work	4.4	3.7	9.8	26.3	55.0
Ability to understand how test works	3.4	5.7	13.3	27.3	50.1
Pain of test	11.1	14.0	26.0	24.3	24.1
Convenience of test	4.4	7.4	22.9	33.9	31.2
Ability to understand what results mean	1.5	1.5	4.9	21.4	70.3
Which test HCP recommends	5.4	3.7	13.0	31.0	46.4
How much test costs to you	7.1	6.1	20.4	27.8	38.1



Most important factor: accuracy of results

BCG Vaccination

BCG vaccination	N=407
Yes	10.8%
No	81.8%
DK	7.1%
PNTA	0.3%

	BCG vaccinated N=44	Not BCG vaccinated N=363
Importance of test ability to tell if infected		
- No importance	0%	0%
- Low importance	2.3%	0.6%
- Neutral	2.3%	1.4%
- Moderate importance	4.6%	11.0%
- High importance	88.6%	85.1%
- DK	2.3%	0.6%
- PNTA	0.0%	1.4%

Test Preference

There are two ways to test for TB. One way is to use the TB skin test. With the TB skin test you are injected with a small amount of tuberculin beneath the surface of your skin. You are then asked to come back in two to three days to have this test read.

The second way to test for TB involves a TB blood test. You will have blood drawn and the specimen sent to a laboratory. Your health care provider will receive the results after the specimen is analyzed.

Which test would you prefer – the TB skin test or the TB blood test?

₁ TB skin test
₂ Blood test
₃ No preference
₉₈ Don't know
₉₉ Prefer not to answer

} **Skip to Question 10**

9a. Why do you prefer this method?

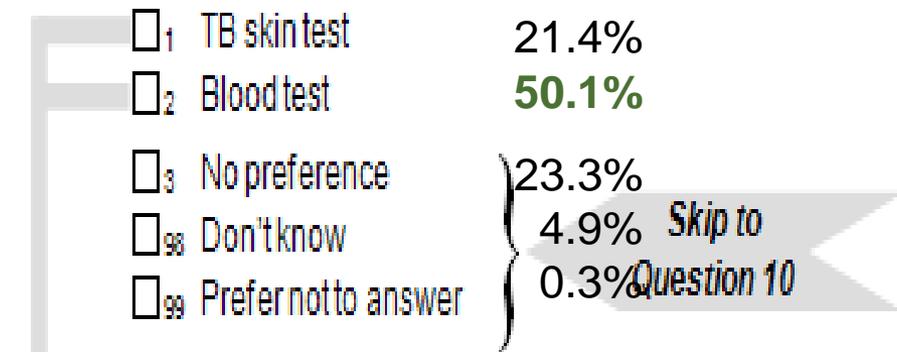


Test Preference

There are two ways to test for TB. One way is to use the TB skin test. With the TB skin test you are injected with a small amount of tuberculin beneath the surface of your skin. You are then asked to come back in two to three days to have this test read.

The second way to test for TB involves a TB blood test. You will have blood drawn and the specimen sent to a laboratory. Your health care provider will receive the results after the specimen is analyzed.

Which test would you prefer – the TB skin test or the TB blood test?



9a. Why do you prefer this method?



Test Preference - Reason

Reason prefer TST	N=85
Familiarity with test	28.2%
Convenience	24.7%
Less invasive/painful	23.5%
Blood draw is hard	3.5%
Can see results	7.1%
Other	10.6%
Accuracy	2.4%



Test Preference - Reason

Reason prefer TST	N=85
Familiarity with test	28.2%
Less invasive/painful	23.5%
Convenience	24.7%
Blood draw is hard	3.5%
Can see results	7.1%
Other	10.6%
Accuracy	2.4%

Reason prefer blood test	N=202
Convenience	48.0%
Accuracy	34.2%
Convenient/accurate	11.4%
Other	4.0%
Not injected with antigen	2.5%



Fears of Tests

Fear of...	injection of fluid N=407	blood test N=407
Yes	10.1%	10.1%
No	88.7%	88.7%
DK	1.0%	1.0%
PNTA	0.3%	0.3%



Belief in Tests

If TST+ and blood test is negative	N=407
TST	14.5%
Blood test	53.6%
DK	31.5%
PTNA	0.5%



Belief in Tests

If TST+ and blood test is negative	N=407
TST	14.5%
Blood test	53.6%
DK	31.5%
PTNA	0.5%

If TST- and blood test is positive	N=407
TST	9.8%
Blood test	54.6%
DK	35.1%
PTNA	0.5%



Conclusions

- Although HCWs indicated preference for IGRAs over the TST and further expressed confidence in IGRA results compared to TST results, the likelihood that HCWs would initiate LTBI treatment based on positive results from either test remained the same.
- Further studies are needed to determine if IGRA positive results will have any impact on HCWs actual acceptance and completion of LTBI treatment.

Qualitative Component

Focus Groups

Key Informant Interviews





Rationale for Qualitative Sub-study

- Provide contextual and anecdotal data to enrich quantitative acceptability data
- Explore factors influencing implementation of LTBI testing and treatment guidelines in occupational health settings
 - HCWs' knowledge, attitudes, and practices
 - provider approaches to implementation
 - institutional factors
- Identify areas for further investigation into LTBI testing and treatment in occupational health settings



Background

- Joseph et al (2004) conducted focus groups in 4 healthcare settings exploring HCWs' reasons for adherence/nonadherence to occupational health requirements for LTBI testing and treatment
- Knowledge and attitudes about LTBI and treatment of LTBI influenced HCW adherence to recommendations
- Institutional factors also influential



Methods

- Purposive sampling of HCWs and providers experienced in transition from TST to IGRA in serial screening
 - purposive sample is a non-representative sample of a specific sub-population defined by research question
- Semi-structured interview guides refined after initial round of focus groups with providers
- HCWs recruited through occupational health staff for participation in focus groups
- Providers recruited directly for individual interviews



Methods (con't)

- 5 focus groups at 3 sites with total of 46 HCWs (7/08-9/09)
- 7 key informant interviews at 2 sites (9/09-4/10)
- Audio-recorded interviews transcribed and entered in Atlas.ti database for analysis
- Coding categories determined a priori and as emerged from transcripts
- Analysis on-going

HCWs Experiences with TB Testing

Factors Influencing Preference for Testing Method

Factor	IGRA	TST
Convenience of administration	single visit	two visits
Perceived drawbacks	reluctance to get blood drawn	misgivings about tuberculin injection
Confidence in method	perceived inherent accuracy of blood test	administrator variability
	lack of experience w/IGRAs qualitative presentation of results	subjectivity of interpretation influence of BCG familiarity w/test
Cost/Logistics	general unease about cost of IGRA	ease of use in the field



HCWs Experiences with TB Testing

- Factors influencing acceptability are complex
 - accuracy, convenience, implications of cost
- Perceived consequences of testing
 - repercussions of inaccurate diagnosis in work settings
 - confusion about LTBI and rationale for its treatment (“why don’t they just x-ray everyone?”)
 - misgivings about need for and toxicity of LTBI treatment
- Need for information about testing rationale and methods
 - in retrospect, desire for more information about testing
 - rationale for new procedures in work setting
 - information is more valuable when provided in the health care encounter



General HCW Themes

- HCWs identified conveniences and drawbacks in both TST and IGRAs
- See IGRAs as potential improvement but misgivings persist:
 - Perceived lack of information about IGRAs
 - Interpretation of test not understood
 - Unease concerning cost of IGRA
- Low awareness of rationale for routine screening in HCWs and treatment of LTBI
- Range of preferences for education
 - Desire for information that addresses HCWs as patients



Provider Themes

- Implementation of IGRAs requires increased coordination with other departments and outside entities
 - “QFT is a clinic within the clinic”
 - Blood draw implies more intensive patient [HCW] interaction
- Shift from provider-based to laboratory assessment
 - perceived as beneficial BUT
 - implies loss of provider control over process: “a doctor looking at a patient’s arm at least sort of knows what to say to a patient, whereas when they get lab results, sometimes if they’re not really sure what the lab results mean.”



Provider Themes

- **Challenges of interpreting QFT results**
 - difficulty of interpreting indeterminate results
 - May be reduced by reliance on actual results, not categorization as negative or positive
 - patient history and consultation with colleagues remain essential to diagnostic process
- **Limited role of IGRAs in treatment for LTBI**
 - diagnostic tools are only part of complex interaction between patient and provider
 - distinction between uptake of LTBI treatment (facilitated by use of IGRA) and adherence to treatment (multifactorial)
- **Benefit of sharing information about use of IGRAs in routine occupational health settings**



Preliminary Qualitative Conclusions

- Appreciation of potential of IGRAs to detect TB infection
- HWCs' concerns about the overall rationale for LTBI testing and treatment
- Perceived need for more information about performance of IGRAs
- Provider decision to recommend treatment based on complex set of factors, of which testing method is a part



Acknowledgements

TO 18 PIs:

Chuck Daley, Susan Dorman, Denise Garrett

TO 18 Sites

Baltimore: Wendy Cronin, Susan Dorman, Bee Munk

Denver: Randall Reves, Kirsten Wall, Bob Belknap

NYC: Neil Shluger, Yael Hirsch-Moverman, Joyce Thomas, Julie Franks

Texas: Ed Graviss, Larry Teeter

CDC

Nick DeLuca, Amera Khan, Allison Maiuri, Paul Weinfurter (Westat)

Occupational Health Collaborators

Jackie Kinnard, Sierra Health, Nevada

Susanne Paulson, Nevada Department of Health

Jennifer Bunger-Wheeler, Penrose Hospital, Colorado



Thank you!