

Tuberculosis

WRAIR-GEIS Operational Infectious Disease Course

WRAIR

Walter Reed Army
Institute of Research

Soldier Health • World Health

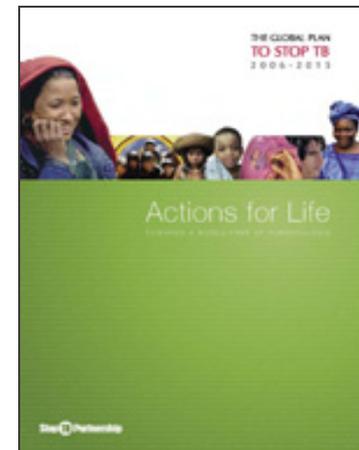


Outline

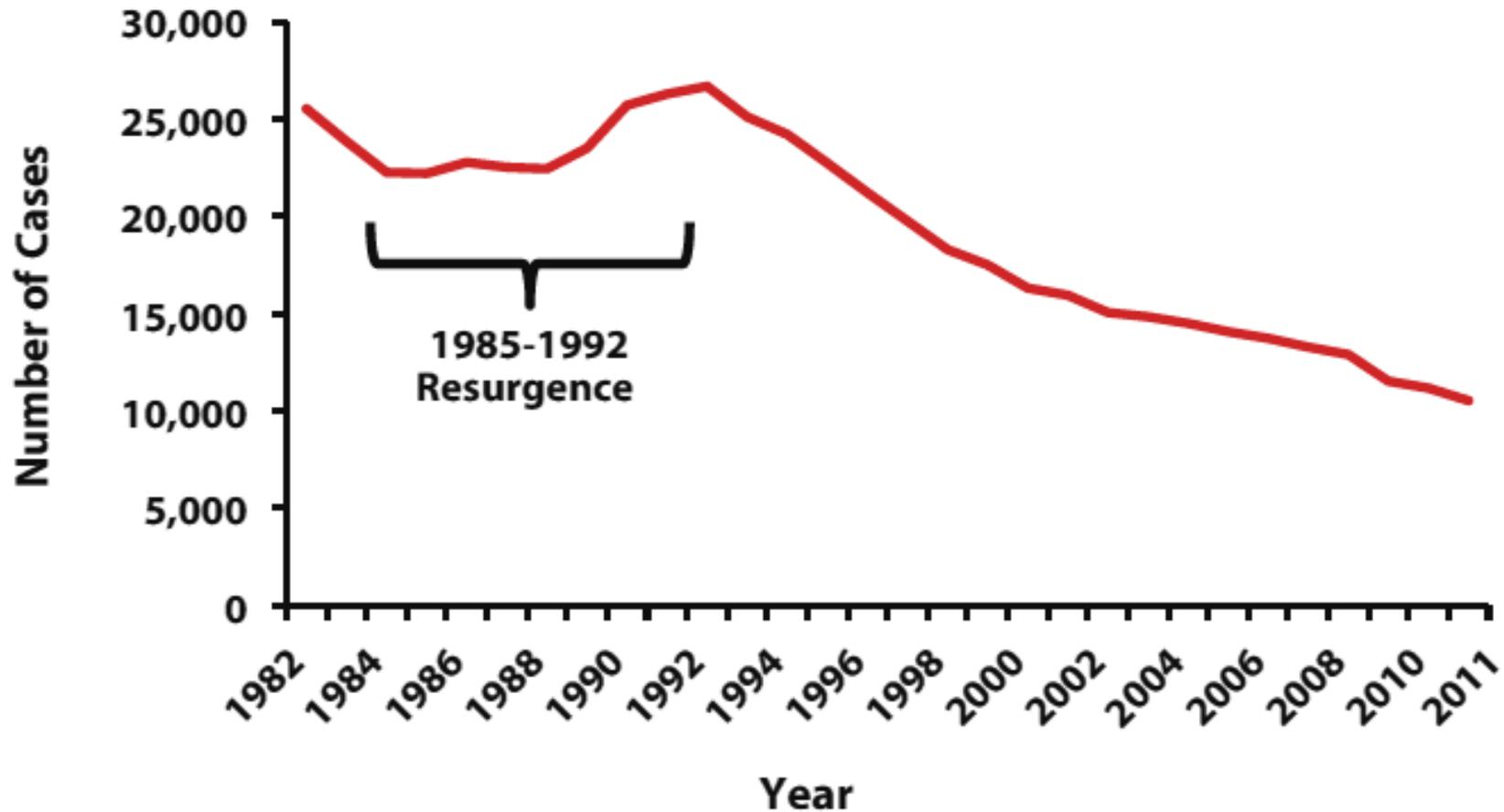
- EPIDEMIOLOGY AND PATHOPHYSIOLOGY
- LATENT VS. ACTIVE INFECTION
- ACTIVE TB DIAGNOSIS AND TREATMENT
- LATENT TB DIAGNOSIS AND TREATMENT
- MILITARY SCREENING POLICIES

Global Burden of Tuberculosis

- **9.2 MILLION CASES AND 1.7 MILLION DEATHS YEARLY**
- **ASSOCIATED WITH CO-PANDEMIC OF HIV**
- **DRUG-RESISTANCE INCREASINGLY COMMON**
- **1/3 OF THE WORLD'S POPULATION ESTIMATED TO BE INFECTED WITH LTBI**
 - Focus on identification and treatment of active TB (DOTS)
 - LTBI not a well-known concept outside the US
 - Increasing efforts to extend LTBI treatment to HIV populations

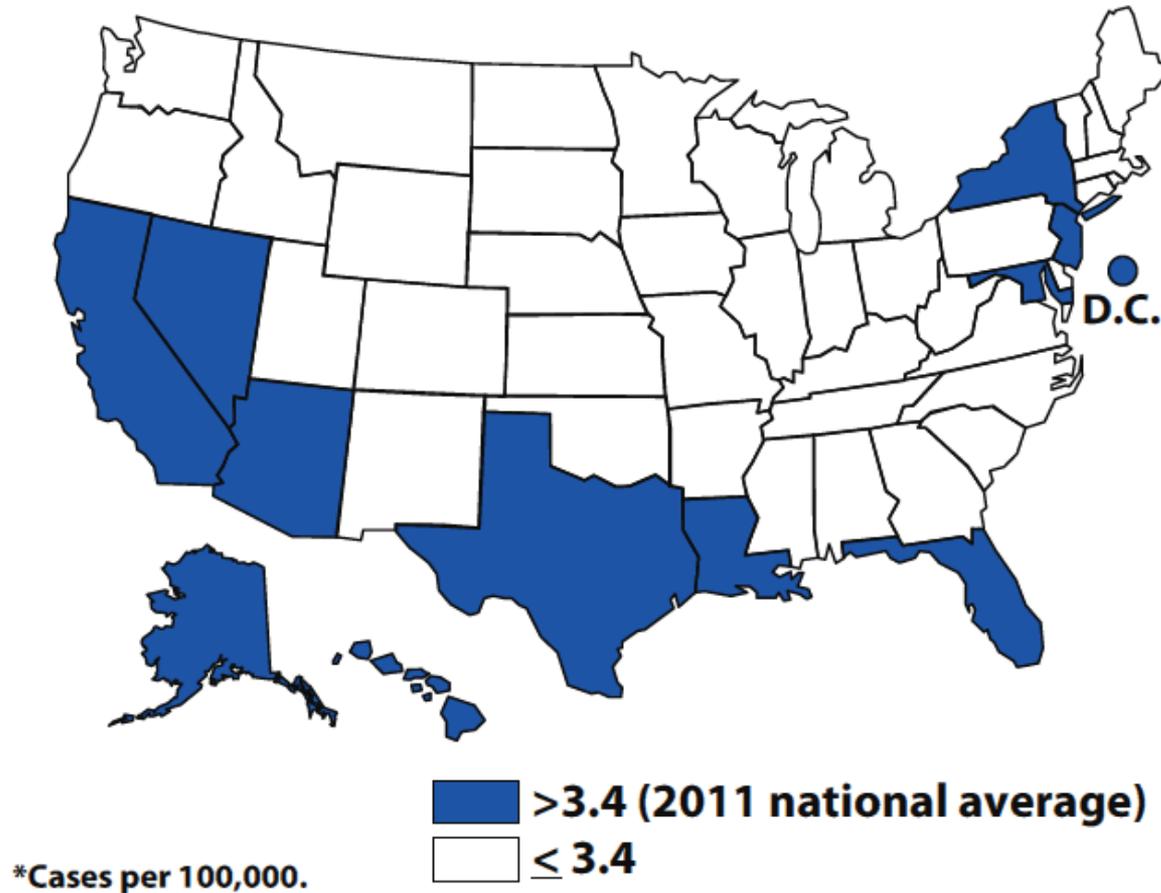


Reported TB Cases United States, 1982-2011



CDC, TB Core Curriculum, 2013

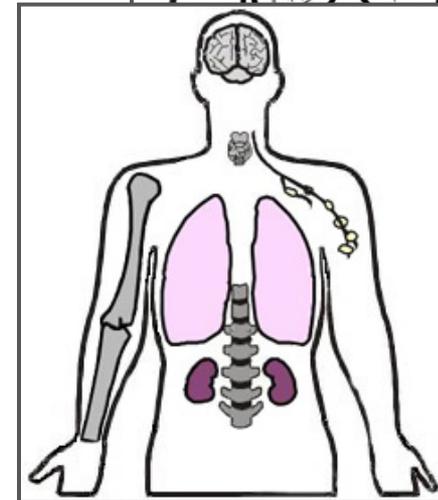
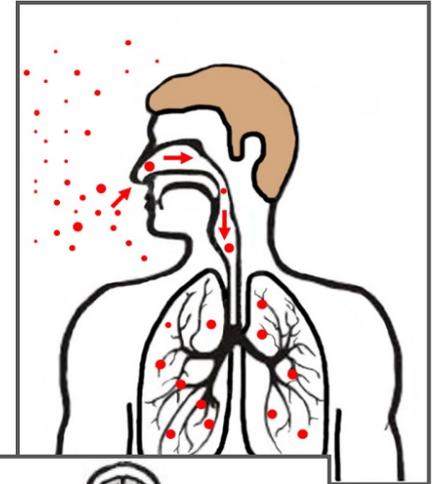
TB Case Rates United States, 2011



CDC, TB Core Curriculum, 2013

TB Pathophysiology

- CAUSED BY *MYCOBACTERIUM TUBERCULOSIS*
- SPREAD PERSON-TO-PERSON THROUGH AIRBORNE DROPLET NUCLEI
- ENTER ALVEOLI AND MULTIPLY; MAY THEN ENTER THE BLOODSTREAM AND SPREAD TO OTHER PARTS OF THE BODY
- ENGULFED BY MACROPHAGES AND DEVELOP INTO GRANULOMAS
- IF IMMUNE SYSTEM DOES NOT KEEP TB BACTERIA UNDER CONTROL, BACILLI REPLICATE AND DISEASE ENSUES



LTBI vs. Active Disease

LATENT TB INFECTION

- TB BACILLI REMAIN CONTAINED WITHIN GRANULOMAS
- RELATIVELY SMALL NUMBER OF BACILLI PRESENT
- NO SIGNS OR SYMPTOMS OF DISEASE
- NOT CONTAGIOUS

ACTIVE TB DISEASE

- TB BACILLI BREAK OUT FROM PROTECTIVE GRANULOMAS
 - LARGER AMOUNT OF ACTIVELY REPLICATING BACILLI PRESENT
- SIGNS AND SYMPTOMS BASED ON LOCATION OF INFECTIOUS PROCESS
 - VERY OFTEN CONTAGIOUS

Progression from LTBI to Active TB

- **RISK IS GREATEST SOON AFTER EXPOSURE**
- **LIFETIME RISK IS 10% IN LOW RISK INDIVIDUALS**
 - 5% risk within 1 to 2 years of exposure
 - 5% risk over remaining lifetime
- **RISK IS SIGNIFICANTLY HIGHER IN THOSE WITH RISK FACTORS**
 - HIV or other immunosuppressive conditions
 - Diabetes
 - Chronic renal failure
 - Prior healed TB on CXR
 - Children < 5 y/o
 - IV drug use



Active TB Disease

- **PULMONARY TB DISEASE IS THE MOST COMMON MANIFESTATION (80%)**
- **EXTRAPULMONARY DISEASE ALSO POSSIBLE (20%)**
 - Laryngeal TB
 - Plueral TB
 - Lymph nodes (scrofula)
 - CNS (meningitis)
 - Bone/spine (Pott's disease)
 - Kidney
 - Miliary TB

Contagious Forms of Active TB

- **PULMONARY TB**
- **LARYNGEAL TB**
- **TB OF THE ORAL CAVITY**
- **OPEN SITES WITH POSSIBLE AEROSOLIZATION**

Signs/Symptoms of Pulmonary TB

- **FEVER**
- **CHRONIC COUGH (> 3 WEEKS)**
- **NIGHT SWEATS**
- **WEIGHT LOSS (UNPLANNED)**
- **FATIGUE**
- **HEMOPTYSIS**

Signs/Symptoms of Extrapulmonary TB

- **FEVER, FATIGUE, NIGHTS SWEATS, WEIGHT LOSS**
- **HEADACHE/CONFUSION (MENINGITIS)**
- **BACK PAIN (SPINE)**
- **HEMATURIA (KIDNEY)**
- **LYMPHADENITIS (SCROFULA)**
- **HOARSENESS (LARYNX)**

Diagnosis of TB

- **CLINICAL SIGNS AND SYMPTOMS**
- **TST OR IGRA – ALSO POSITIVE IN LATENT TB**
- **CXR – BUT NOT CONFIRMATORY**
- **SPUTUM TESTING**

TST and IGRA

MANTOUX TUBERCULIN SKIN TEST (TST) – ALSO KNOWN AS PPD

- SKIN TEST THAT PRODUCES DELAYED-TYPE HYPERSENSITIVITY REACTION IN PERSONS WITH *M. TUBERCULOSIS* INFECTION

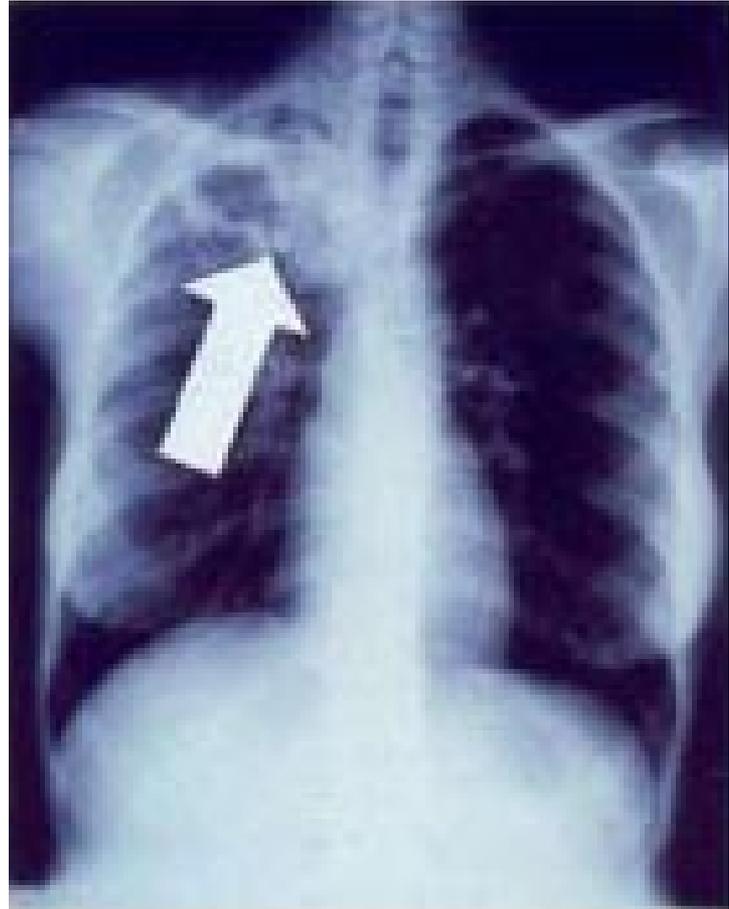
INTERFERON GAMMA RELEASE ASSAYS (IGRAS)

- BLOOD TESTS THAT MEASURE AND COMPARE AMOUNT OF INTERFERON-GAMMA (IFN- γ) RELEASED BY BLOOD CELLS IN RESPONSE TO ANTIGENS.
- THESE INCLUDE:
 - QUANTIFERON® GOLD-IN-TUBE (QFT-GIT)*
 - T-SPOT®.TB*

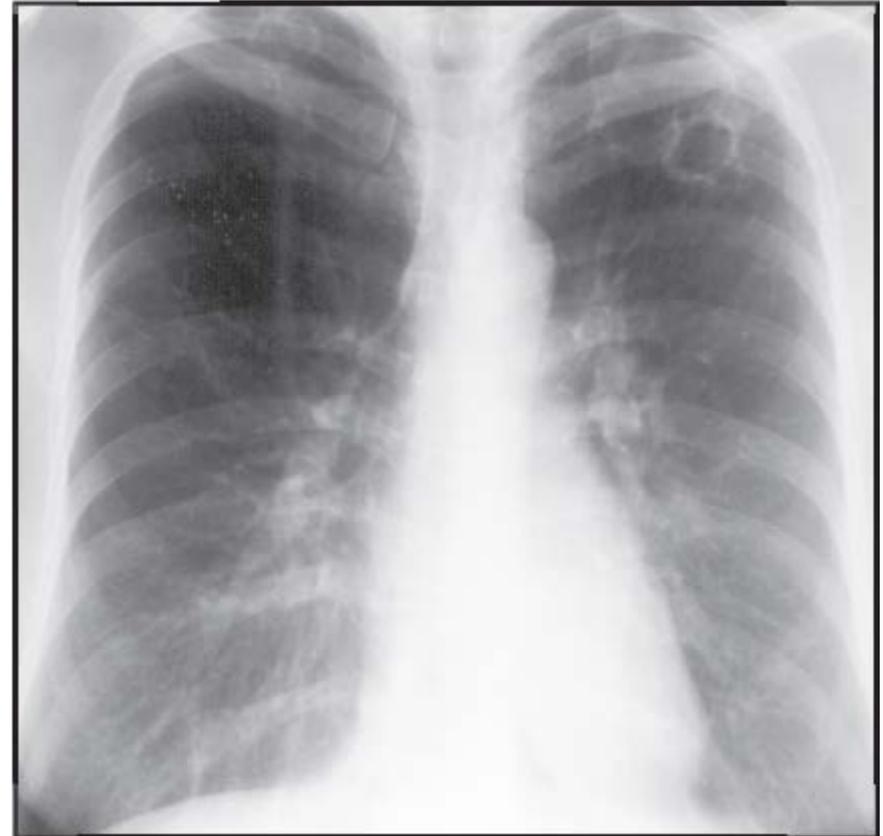
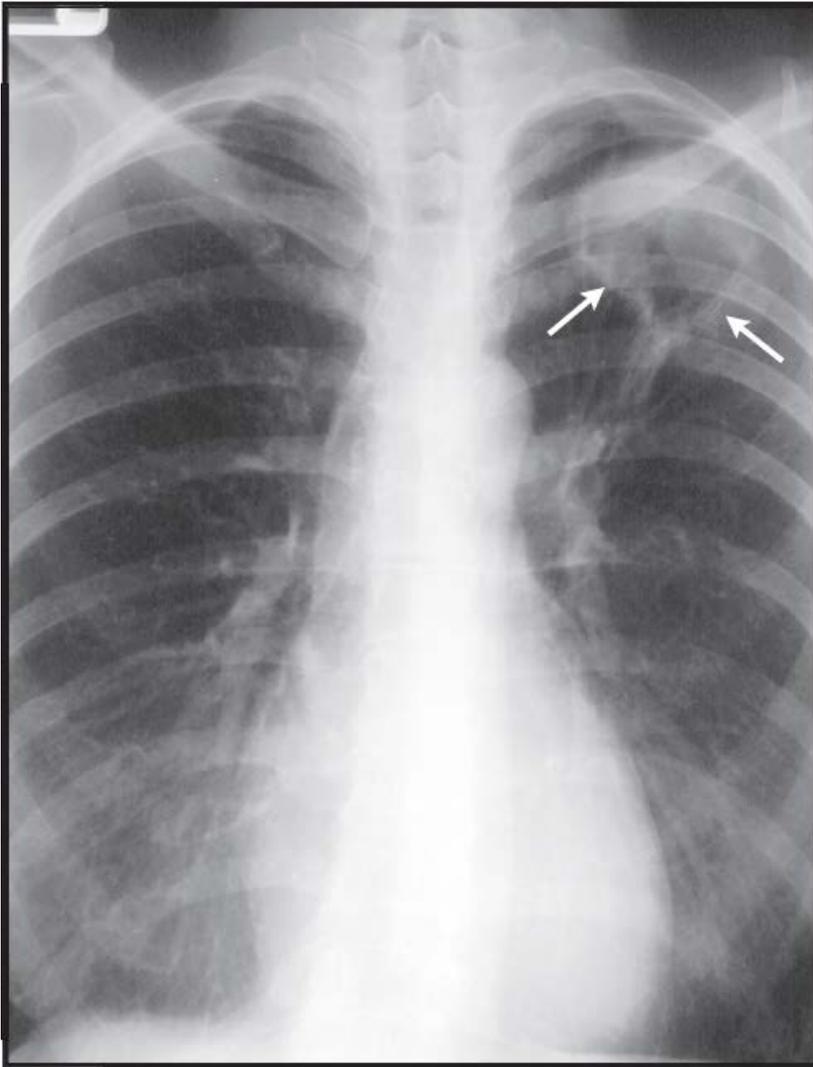


Chest X-ray

**Classic cavitory lesion of
pulmonary TB on CXR**

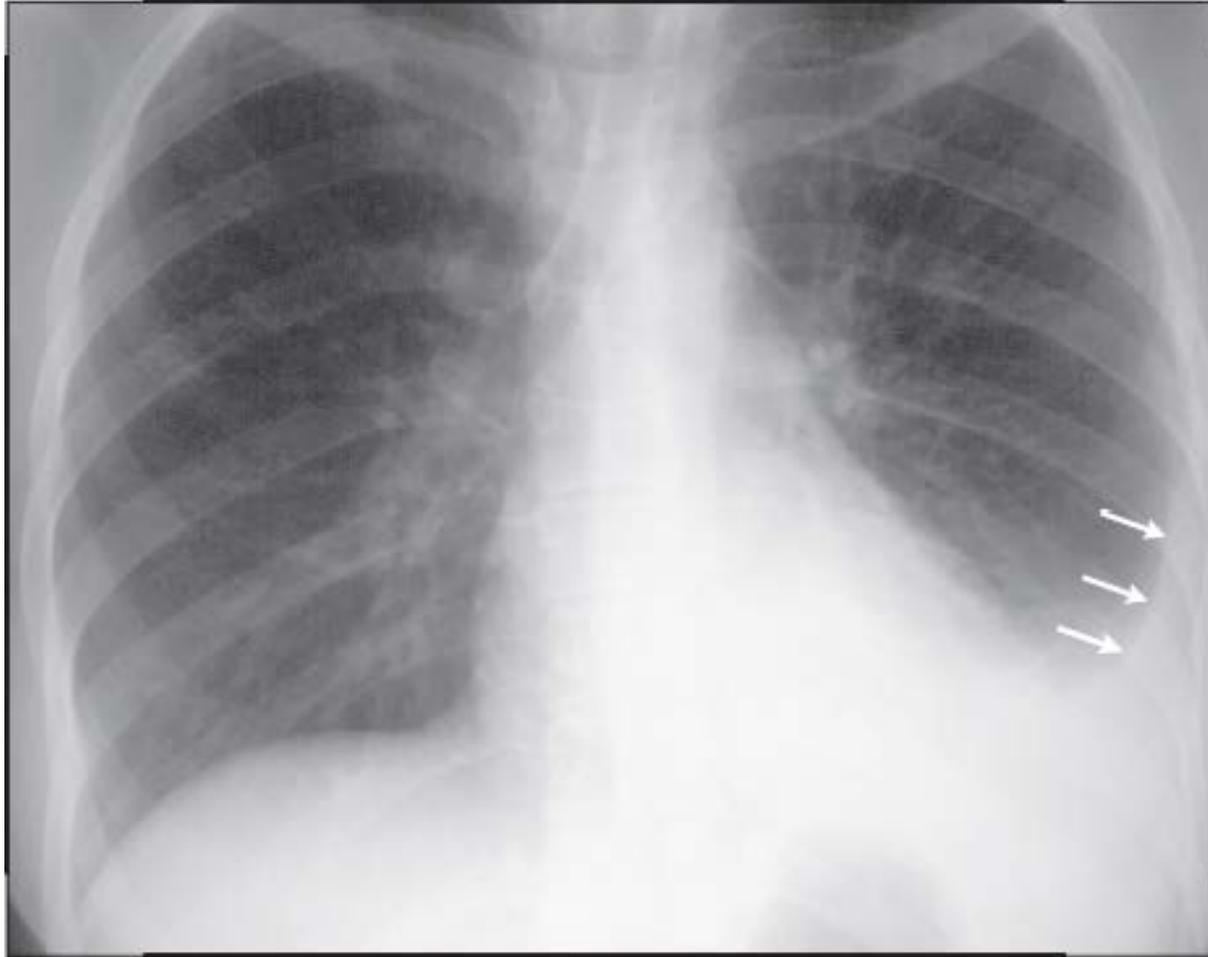


Pulmonary Tuberculosis



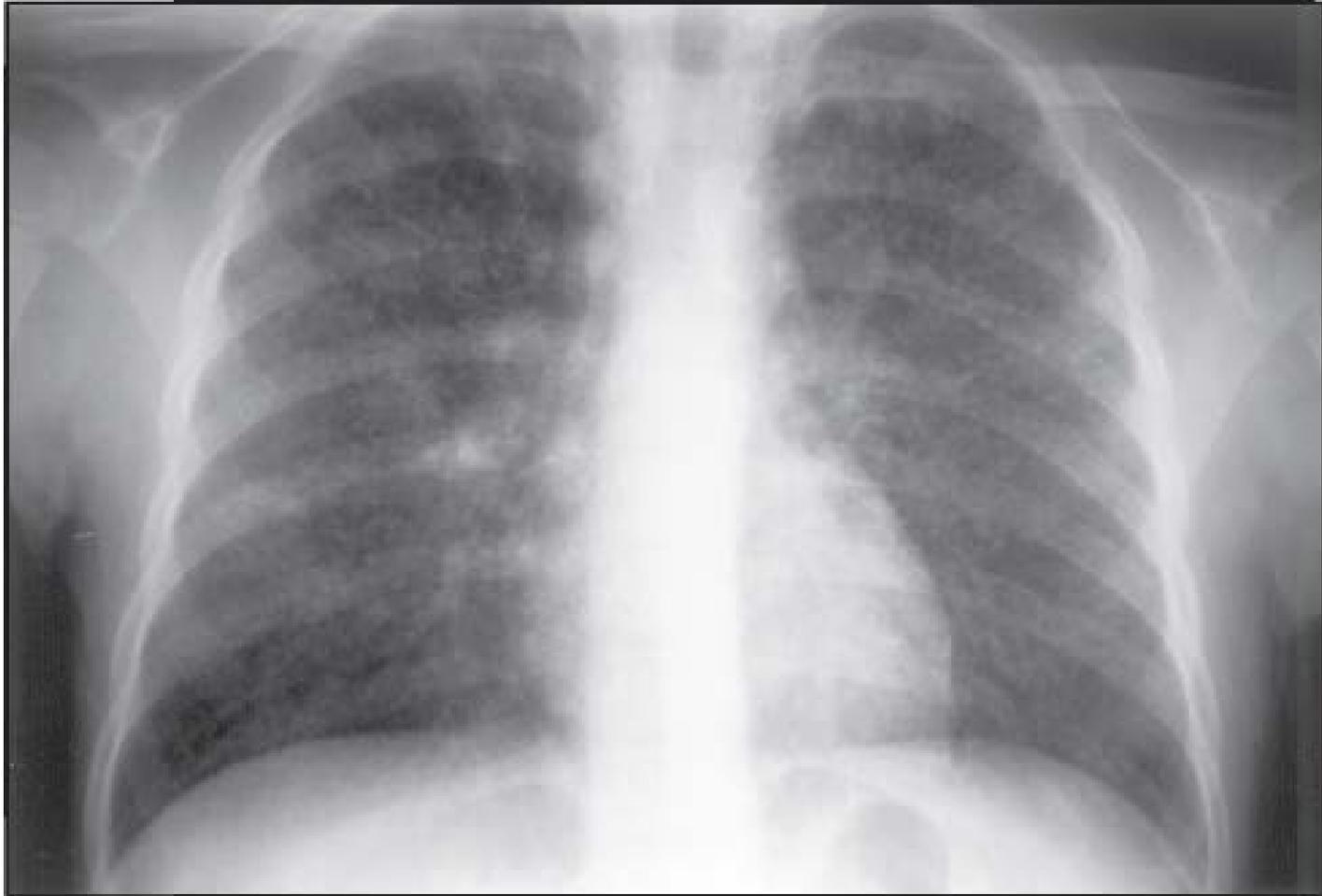
Daley CL. *Radiographic Manifestations of Tuberculosis, 2 Ed.*

LLL Consolidation and Pleural Effusion



Daley CL. *Radiographic Manifestations of Tuberculosis, 2 Ed.*

Military Tuberculosis



Daley CL. *Radiographic Manifestations of Tuberculosis, 2 Ed.*

Sputum Testing

- **THREE SPECIMENS AT 8 TO 24 HOUR INTERVALS, AT LEAST ONE IN THE AM**
- **TESTING SHOULD INCLUDE:**
 - Acid fast bacilli (AFB) smear – sensitivity 50%
 - Nucleic acid amplification test (NAAT)
 - Culture – gold standard for confirmation
 - Antibiotic sensitivities

AFB Smear

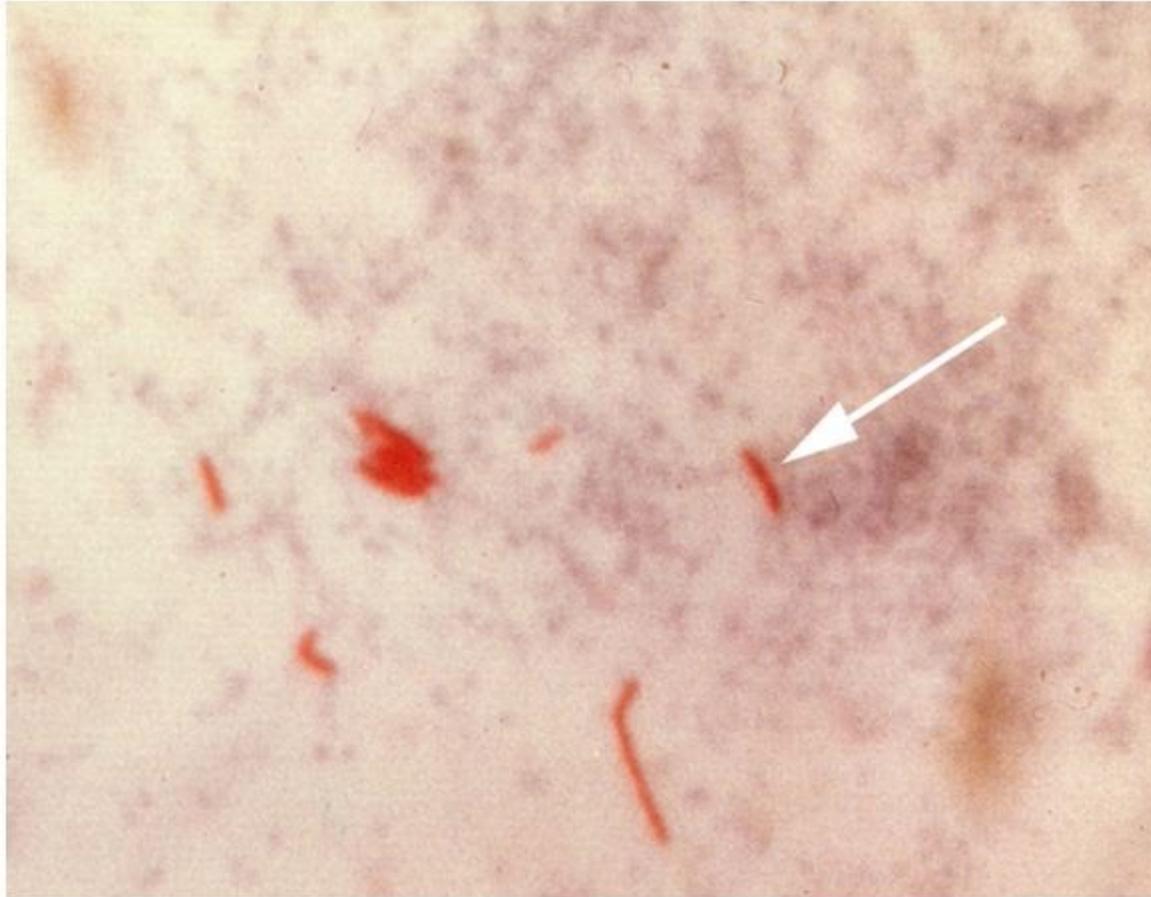
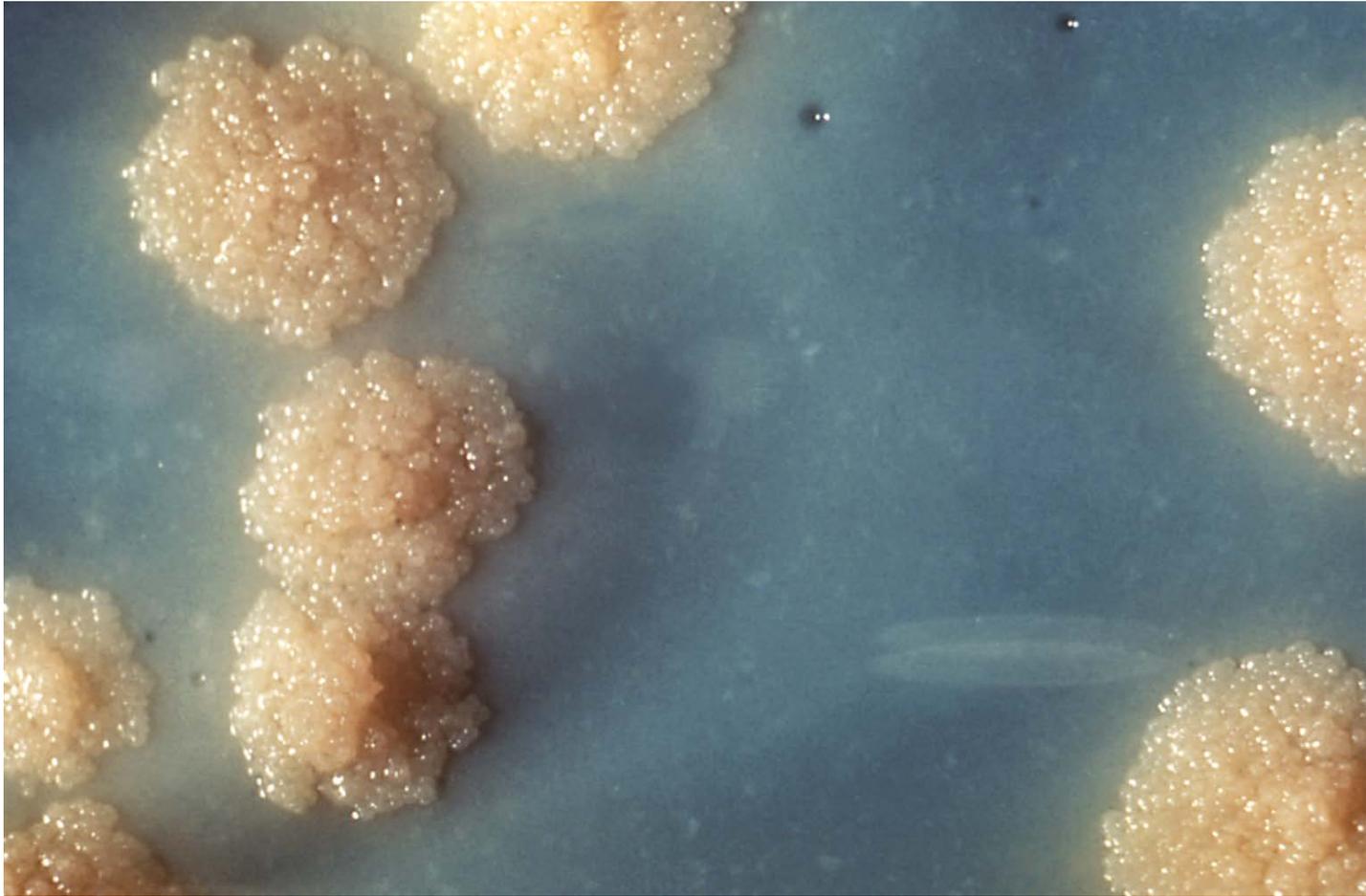


Figure 9. Sputum specimen demonstrating acid fast bacilli (AFB) (arrow). Source CDC.

TB Colonies on Growth Media



Treatment

- **“4 FOR 2 AND 2 FOR 4”**

- INH, RIF, PZA, EMB X 2 months

- INH, RIF X 4 months

INH = isoniazid

RIF = rifampin

PZA = pyrazinamide

EMB = ethambutol

- **DOT IS STANDARD OF CARE**

- **CHECK BACTERIOLOGIC RESPONSE MONTHLY**

- **HIV TEST**

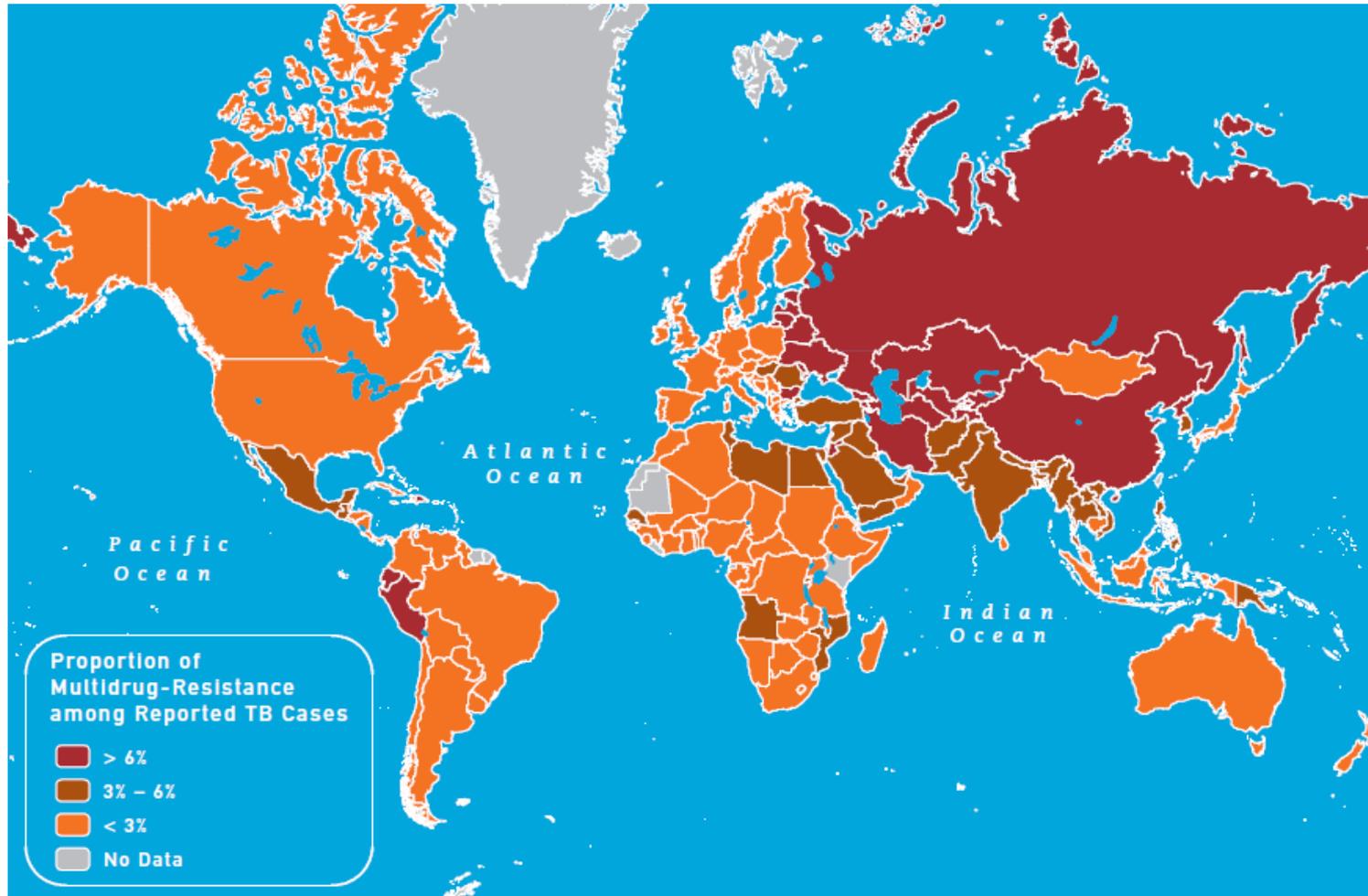
- **DRUG SUSCEPTIBILITY VS. ADHERENCE FOR PERSISTENT CASES**

- **“NEVER ADD A SINGLE DRUG TO A FAILING REGIMEN”**

Multi-Drug Resistant (MDR) and Extensively Drug Resistant (XDR) Tuberculosis

- **MDR TB = INH + RIF RESISTANCE**
- **XDR TB = MDR+**
 - Any fluoroquinolone; AND
 - 1 of 3 injectable second line drugs
 - Capreomycin
 - Kanamycin
 - Amikacin

Global MDR TB Rates (2009)



CDC Health Information for International Travel, 2012

When is a patient no longer infectious?

MUST MEET THREE CONDITIONS:

- On adequate therapy
- Clinical response
- Three consecutive negative AFB smears from sputum collected on different days

Infection Control

ADMINISTRATIVE CONTROLS

- Primary strategy for infection control!****
- Policies and protocols to ensure rapid identification, isolation, diagnostic evaluation, and treatment of persons with TB



ENGINEERING CONTROLS

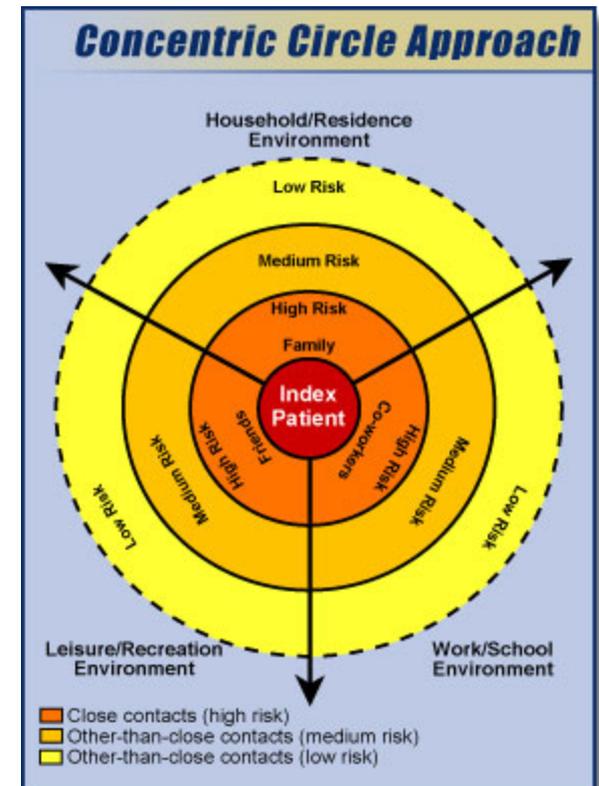
- Negative pressure room

PERSONAL PROTECTIVE EQUIPMENT

- N95 mask

Contact Investigations

- **CONCENTRIC CIRCLES OF CONTACTS**
- **NEED TO RETEST 8-10 WEEKS AFTER LAST CONTACT WITH CASE**
- **GARRISON**
 - Refer to Preventive Medicine
 - CDC.MMWR 2005;54(RR-15).
- **DEPLOYMENT**
 - Refer to Preventive Medicine



Other important management issues

- **DIRECTLY OBSERVED THERAPY (DOT)**
 - Standard of care for Active TB
 - May be used for LTBI, but uncommon
 - Refer to Preventive Medicine
- **DISEASE REPORTING**
 - Active TB is a reportable disease, LTBI is not
 - Positive TST or IGRA must be documented in an electronic registry (ALTHA, MEDPROS, etc)
 - Reportable diseases are reported to Preventive Medicine both in Garrison **and Deployment**

Case Study

- **YOU'RE EVALUATING A 24 YEAR OLD MALE SOLDIER FOLLOWING A 12 MONTH DEPLOYMENT TO AFGHANISTAN. HIS PAPERWORK SAYS "POSITIVE PPD."**
 - What is your first priority?
 - What more do you want to know from the history?
 - What does "positive PPD" mean?
 - Physical exam?
 - Other tests necessary?
 - Is treatment necessary?

Initial Evaluation

SYMPTOMS?

- Sputum X 3 (Smear and Culture)
- 1 NAAT

EXPOSURES?

- Foreign born?
- Contact with known **ACTIVE** TB case?
- Other risk factors? (occupation, activities, medical history)

TB TEST (TST OR IGRA) RESULTS?

- How many mm?
- Previous positive?
- Previous BCG vaccine?
- Use of Quantiferon Gold-in-tube or T-SPOT.TB?

CXR?

TREATMENT?

LTBI vs. Active Disease

LATENT TB INFECTION

- TST OR IGRA USUALLY POSITIVE
- NO SIGNS OR SYMPTOMS OF DISEASE
 - CXR NEGATIVE

Active TB Disease

- TST or IGRA usually positive
- Signs and symptoms of disease present
- CXR usually positive in pulmonary disease

The TB Skin Test (TST)

- **CELL-FREE PURIFIED PROTEIN FRACTION EXTRACTS OBTAINED FROM A HUMAN STRAIN OF *M. TUBERCULOSIS***
- **HISTORY AND SIGNIFICANCE**
 - 100 years of use with known endpoints of active TB disease
- **PROBLEMS WITH TST**
 - *Positive predictive value is low if prevalence of infection is low*
 - Errors and variability in administration
 - False negatives and false positives
- **PSEUDOEPIDEMICS OF TST REACTIONS IN HOSPITALS AND PRISONS**

Administering the TST

- INJECT 0.1 ML OF 5 TU PPD TUBERCULIN SOLUTION INTRADERMALLY ON VOLAR SURFACE OF LOWER ARM USING A 27-GAUGE NEEDLE
- PRODUCE A WHEAL 6 TO 10 MM IN DIAMETER



CDC. *MMWR* (Appendix F) 2005;54(RR-17):138-9.

Reading the TST

- MEASURE REACTION IN 48 TO 72 HOURS
- MEASURE INDURATION, NOT ERYTHEMA
- RECORD REACTION IN MILLIMETERS, NOT “NEGATIVE” OR “POSITIVE”
- ENSURE TRAINED HEALTH CARE PROFESSIONAL MEASURES AND INTERPRETS THE TST



CDC. *MMWR* (Appendix F) 2005;54(RR-17):138-9.

Table 7. Criteria for tuberculin positivity, by risk group

Reaction ≥ 5 mm of induration	Reaction ≥ 10 mm of induration	Reaction ≥ 15 mm of induration
Human immunodeficiency virus (HIV)-positive persons	Recent immigrants (i.e., within the last 5 yr) from high prevalence countries	Persons with no risk factors for TB
Recent contacts of tuberculosis (TB) case patients	Injection drug users	
Fibrotic changes on chest radiograph consistent with prior TB	Residents and employees [†] of the following high-risk congregate settings: prisons and jails, nursing homes and other long-term facilities for the elderly, hospitals and other health care facilities, residential facilities for patients with acquired immunodeficiency syndrome (AIDS), and homeless shelters	
Patients with organ transplants and other immunosuppressed patients (receiving the equivalent of ≥ 15 mg/d of prednisone for 1 mo or more)*	Mycobacteriology laboratory personnel Persons with the following clinical conditions that place them at high risk: silicosis, diabetes mellitus, chronic renal failure, some hematologic disorders (e.g., leukemias and lymphomas), other specific malignancies (e.g., carcinoma of the head or neck and lung), weight loss of $\geq 10\%$ of ideal body weight, gastrectomy, and jejunioileal bypass	
	Children younger than 4 yr of age or infants, children, and adolescents exposed to adults at high-risk	

Note: includes patients taking TNF- α antagonists

* Risk of TB in patients treated with corticosteroids increases with higher dose and longer duration.
[†] For persons who are otherwise at low risk and are tested at the start of employment, a reaction of ≥ 15 mm induration is considered positive.
 SOURCE: Adapted from Centers for Disease Control and Prevention. Screening for tuberculosis and tuberculosis infection in high-risk populations: recommendations of the Advisory Council for the Elimination of Tuberculosis. MMWR 1995;44(No. RR-11):19-34.

Boosting and Two-step Testing

- **BOOSTING**

- May have an initially negative test due to waning responsiveness
- First test may stimulate immune response for 2nd test
- 2nd test positive = boosted reaction

- **TWO-STEP TESTING**

- Standard of care when doing repeated testing (e.g. healthcare worker surveillance programs)
- Initial test followed by 2nd test 1-2 weeks later
- Differentiates boosted reaction from recent infection

When should I use the IGRA?

DEPENDS WHO YOU TALK TO

- CDC guidelines: may be used in place of TST, but don't do both
- UK, many other European countries: use IGRA as confirmatory test
- Evolving issue, not yet fully resolved

BENEFITS OF IGRA OVER TST

- Single visit for the patient
- Less subjective interpretation of results
- Two-step testing not necessary with IGRAs
- Preferred among BCG vaccinated individuals

Decision to Treat LTBI

- **“A DECISION TO TEST IS A DECISION TO TREAT”**
 - Don't ignore a positive test
 - However, don't test low-risk populations!
- **MUST RULE OUT ACTIVE TB FIRST**
 - Symptoms of active TB
 - Chest x-ray
 - If symptoms → 3 sputum smear & cx, at least 1 NAAT test
- **LOOK AT CRITERIA TO DETERMINE CUTOFF**
- ***ASSESS RISKS & BENEFITS FOR EACH INDIVIDUAL PATIENT***
 - Medical history (esp. liver disease, alcohol abuse)
 - Pregnancy
 - Allergies
 - How close and how recent was contact with active TB case

LTBI Treatment Options

Drug(s)	Duration	Dose	Frequency	Total Doses
Isoniazid (INH)	9 months	Adult: 5 mg/kg Children: 10-20 mg/kg** Maximum dose: 300 mg	Daily	270
		Adult: 15 mg/kg Children: 20-40 mg/kg** Maximum dose: 900 mg	Twice weekly*	76
	6 months	Adult: 5 mg/kg Children: Not recommended Maximum dose: 300 mg	Daily	180
		Adult: 15 mg/kg Children: Not recommended Maximum dose: 900 mg	Twice weekly*	52
Isoniazid (INH) and Rifapentine (RPT)	3 months	Adults and Children 12 years of age and older: INH* : 15 mg/kg rounded up to the nearest 50 or 100 mg; 900 mg maximum RPT* : 10.0-14.0 kg 300 mg 14.1-25.0 kg 450 mg 25.1-32.0 kg 600 mg 32.1-49.9 kg 750 mg ≥50.0 kg 900 mg maximum	Once weekly*	12
Rifampin (RIF)	4 months	Adult: 10 mg/kg*** Maximum dose: 600 mg	Daily	120

INH/RPT DOT Regimen for Treatment of LTBI

- **ISONIAZID (INH) 900MG + RIFAPENTINE (RPT) 900MG**
- **ONCE WEEKLY X 12 WEEKS**
- **ADMINISTERED UNDER DIRECTLY OBSERVED THERAPY**
- **“EQUAL ALTERNATIVE TO THE 9 MONTH INH REGIMEN”**
- **NOT RECOMMENDED FOR:**
 - Children < age 2
 - HIV receiving ARTs
 - Pregnant women
 - INH or RIF resistance

CDC. *MMWR* 2011;60:1650-1653.

LTBI Treatment Myths

- **MUST BE UNDER 35 YEARS OLD TO TREAT**
 - Liver disease is the more important factor
- **PATIENTS WITH BCG VACCINATION SHOULD NOT BE TREATED**
- **SERIAL LIVER ENZYME TESTS SHOULD BE PERFORMED FOR ALL LTBI PATIENTS**
 - Liver enzymes are not routinely done (see next slides)
 - Clinical monitoring monthly
- **6 MONTH THERAPY IS THE STANDARD REGIMEN**
 - 9 months of INH (isoniazid) is the preferred regimen

Patient Instructions

No alcohol!

Instruct patient to report signs or symptoms of adverse drug reactions:

- ANOREXIA, NAUSEA, VOMITING, OR ABDOMINAL PAIN
- FATIGUE OR WEAKNESS
- DARK URINE, LIGHT-COLORED STOOLS
- PERSISTENT NUMBNESS IN HANDS OR FEET
- RASH

Monthly Clinical Monitoring

Monthly visits should include a brief physical exam and a review of:

- RATIONALE FOR TREATMENT
- ADHERENCE WITH THERAPY
- SYMPTOMS OF ADVERSE DRUG REACTIONS
- PLANS TO CONTINUE TREATMENT

Baseline Laboratory Monitoring

BASELINE LIVER FUNCTION TESTS (E.G., AST, ALT, AND BILIRUBIN) ARE NOT NECESSARY EXCEPT FOR PATIENTS WITH THE FOLLOWING RISK FACTORS:

- **HIV infection**
- **History of liver disease**
- **Alcoholism**
- **Pregnancy or in early postpartum period**

Continued Laboratory Monitoring

Repeat laboratory monitoring if patient has:

- Abnormal baseline results
- Current or recent pregnancy
- High risk for adverse reactions
- Symptoms of adverse reaction
- Liver enlargement or tenderness on exam

Adverse Effects of Medications: Isoniazid (INH)

10-20% HAVE ELEVATED LIVER ENZYMES

- Up to 5 times normal
- Usually return to normal even if rx is continued

CLINICAL HEPATITIS IN 0.1%

PERIPHERAL NEUROPATHY IN 0.2%

- More common with liver disease, diabetes
- Rx with Vitamin B6 (Pyridoxine)

Adverse Effects of Medications: Rifampin (RIF)

- **HEPATOTOXICITY IN 0.6%**
- **CUTANEOUS REACTIONS IN 6%**
- **GI SYMPTOMS RARELY SEVERE**
- **ORANGE DISCOLORATION OF BODY FLUIDS**
- **DRUG INTERACTIONS (WARFARIN, OCPS, PHENYTOIN)**
- **CONTRAINDICATED IN HIV-INFECTED INDIVIDUALS ON CERTAIN PIS OR NNRTIS**
 - Substitute with Rifabutin

Who handles these cases?

- **CIVILIAN: PUBLIC HEALTH/PRIMARY CARE PARTNERSHIP**
 - Most county health departments offer therapy free of charge
- **MILITARY: USUALLY REFERRED TO PREVENTIVE MEDICINE**
 - Can be ID, pulmonology, or primary care
 - Public health nurses usually do monthly clinical follow-up
- **IN THE FIELD (E.G. PRE-DEPLOYMENT TEST IS POSITIVE)**
 - Many elect to defer therapy until after deployment
 - Depends on comfort level, available resources, and closeness of contact

CDC Guidelines Call for Targeted Testing Only

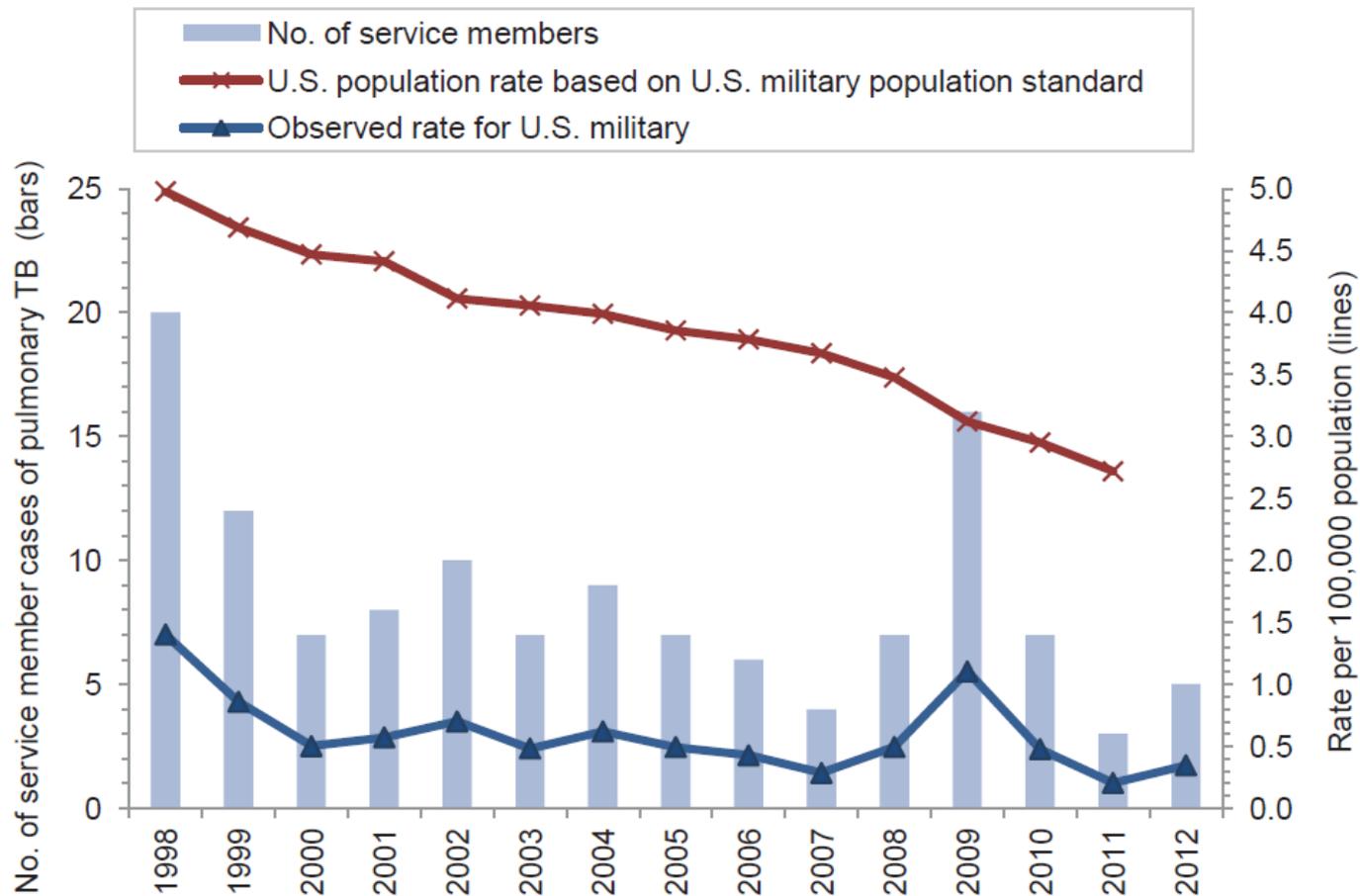
- **TARGETED TESTING:**

- “...targeted tuberculin testing programs should be conducted only among groups at high risk and discouraged in those at low risk.” (MMWR 2000)

- **CDC CLEARLY CONSIDERS HIGH-RISK:**

- Hospitals and health care settings (MMWR 2005)
- Prisons (MMWR 2006)
- HIV-infected, homeless, contacts of active case, etc. (MMWR 2000, 2005)
- Military not considered high-risk

FIGURE 1. Numbers of cases and rates of pulmonary tuberculosis (TB), active component, U.S. Armed Forces, and expected age-adjusted rates of pulmonary tuberculosis in the general U.S. population, based on U.S. military population standard, 1998-2012^a



^aData not available from the CDC in 2012

What do the US Military Services Do?

- **OVER 250,000 TESTS PER YEAR AMONG RECRUITS**
- **ACCESSIONS: ALL SERVICES DO UNIVERSAL SCREENING**
 - Army (DA PAM 40-11; 20 Oct 2008)
 - Navy (BUMED Instruction 6224.8A; 12 Feb 2009)
 - Air Force (AFI 48-105; 1 Mar 2005)
- **PREVALENCE OF TST REACTORS**
 - Navy: 5%
 - Army: 3%
 - Air Force: 1.5%
 - *Depends on proportion of foreign-born*
- **DEPLOYMENT-RELATED SCREENING**

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY MEDICAL COMMAND
2748 Worth Road
JBSA Fort Sam Houston, Texas 78234-6000

MEDCOM Regulation
No. 40-64

26 November 2013

Medical Services

THE TUBERCULOSIS SURVEILLANCE AND CONTROL PROGRAM

Supplementation of this regulation and establishment of forms other than MEDCOM forms are prohibited without prior approval from HQ MEDCOM, ATTN: MCPO-SA.

- 1. History.** This issue publishes a new regulation.
- 2. Purpose.** The purpose of the Tuberculosis (TB) Surveillance and Control Program is to prevent new cases of TB through prompt identification and treatment of both TB infection and disease. This regulation prescribes policy and procedures for testing, evaluating, treating, monitoring, referring, documenting, and tracking Army personnel and beneficiaries at risk for TB. It also assigns responsibilities applicable to key personnel working with this program.
- 3. Applicability.** This regulation applies to personnel in all U.S. Army Medical Command (MEDCOM) installations and activities.
- 4. References.** References are listed at appendix A. (See *Note* at appendix A for information specific to references in this regulation.)
- 5. Responsibilities**
 - a.** The Office of The Surgeon General/MEDCOM G-3/5/7 Health & Wellness is responsible for the oversight of practice standards and providing regulation updates as applicable.
 - b.** The U.S. Army Public Health Command (PHC) will provide disease and epidemiology surveillance, relevant training, and resources that support the TB Surveillance and Control Program.
 - c.** Regional medical command preventive medicine (PM) physicians will ensure subordinate military treatment facilities (MTFs) maintain effective TB control programs.
 - d.** MTF Commanders are responsible for ensuring that PM personnel have sufficient staffing, resources, and training to implement the TB Surveillance and Control Program.

Army

(MEDCOM Reg 40-64, Dec 2013)

3rd DRAFT INITIAL ENTRY TUBERCULOSIS (TB) RISK ASSESSMENT TOOL 3rd DRAFT		3rd DRAFT
12 NOV 2013		12 NOV 2013
For use of this form see, MEDCOM Reg 40-XX, the proponent agency is MCPO-SA		
INITIAL ENTRY Tuberculosis (TB) Risk Assessment Tool		REVIEWER INSTRUCTION
1. Have you ever had face-to-face contact with someone who was sick with tuberculosis (TB)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2. Were you born outside the United States? If yes, list the country: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3. Did you ever live with a family member who was born outside the United States? If yes, list the country: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4. Have you ever had a positive TB test, prior diagnosis of TB, or prior treatment for TB?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If "NO" answers = low risk → STOP. Any "YES" answers = increase risk → Go to question #5		If all "NO" responses, then do NOT test.
5. Do you have any of the following symptoms of tuberculosis?: cough > 2 weeks, fever > 2 weeks, drenching night sweats, or unplanned weight loss.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If "YES" → STOP. If "NO" → Go to question #6.		If "YES" then refer immediately to provider for evaluation of TB disease.
6. Do you have documentation of previous TB treatment with you today?	<input type="checkbox"/> Yes <input type="checkbox"/> No STOP.	

What about guidelines for travelers?

- US GUIDELINES (CDC YELLOW BOOK): BOTH PRE- AND POST-TRAVEL TESTING FOR THOSE WITH “PROLONGED EXPOSURE TO TUBERCULOSIS...E.G. [ROUTINE CONTACT WITH] HOSPITAL, PRISON, AND HOMELESS SHELTER POPULATIONS”
- IDSA GUIDELINES: TST “SHOULD BE PERFORMED FOR THOSE WITH ANTICIPATED EXPOSURE TO TB OR LONG-TERM STAYS IN DEVELOPING AREAS OR WHEN REQUESTED BY THE TRAVELER BECAUSE OF CONCERN ABOUT EXPOSURE”
- TRAVAX: “TRAVELERS TO COUNTRIES WITH HIGH RISK (I.E., > 100 CASES PER 100,000) SHOULD HAVE PRE-DEPARTURE TESTING IF STAYING FOR > 1 MONTH; TRAVELERS TO COUNTRIES WITH MODERATE RISK (APPROXIMATELY 25-100 CASES PER 100,000) SHOULD HAVE PRE-DEPARTURE TESTING IF THEY PLAN ON STAYING FOR > 3 MONTHS”
- CANADIAN GUIDELINES: A SINGLE, POST-TRAVEL TEST BASED ON DURATION OF TRAVEL AS WELL AS TB INCIDENCE IN THE COUNTRY VISITED.

Recent Deployment TB Epidemiology

- **OUTBREAKS ON NAVY SHIPS—COMMON IN THE 1960S**
 - USS Wasp (1998): 21 infected from failure to diagnose index case
 - USS Ronald Reagan (2003): 1 case reactivated despite prior INH Rx
- **ACTIVE TB: LOWER RATE OF DISEASE THAN IN THE US POPULATION**
- **TST REACTORS DURING DEPLOYMENT**
 - Risk of TST conversion: about 1-2% per test
 - Problems with false positives and pseudo-outbreaks of TST conversions

Lamar. *Mil Med* 2003; 168(7):523-7.

CDC. *MMWR*. 2007;55:1381-2.

Camarca MM and Krauss MR. *Mil Med* 2001;166(5):452-6

Mancuso J. *AJRCCM* 2008;177:1285-9.

Pseudoepidemics of TST conversions in the US Army and their attributed causes, 1983-2005

Year	Population	Location	Pre-investigation estimate of % conversions	Post-investigation estimate of % conversions	% of conversions with negative repeat test	Active TB cases identified	Primary attributed cause(s) of outbreak
2005	Aviation unit	Afghanistan	15% (30 of 198)	4.3% (16 of 374)	81% (13 of 16)	0	Test administration and reading; use of Aplisol; prior positives not documented; foreign birth
2005	Army National Guard	TF Falcon, Kosovo	5% (75 of 1500)	2.5% (37 of 1500)	95% (38 of 40)	0	Test administration and reading; use of Aplisol
2003	Army National Guard	TF Eagle, Bosnia	1.6% (19 of 1222)	0.5% (6 of 1222)	--	0	68% (13 of 19) were prior reactors; conversion rate was not elevated
1996	Hospital Staff	TF Eagle, Bosnia	1.3% (1 of 80)	1.3% (1 of 80)	--	1	Conversion rate not elevated
1996	Prisoners and prison guards	Ft. Leavenworth, KS	2.5% (34 of 1345)	--	30% (9 of 30)	0	Use of Aplisol
1995	Military Police	Guantanamo Bay, Cuba	6.3% (81 of 1280)	3.6% (46 of 1280)	100% (6 of 6)	0	33% (25 of 75) were prior reactors; foreign birth
1984	Prisoners and prison guards	Ft. Leavenworth, KS	9.1% (191 of 2106)	--	36% (62 of 172)	0	Increased surveillance, variability in test administration and reading; ethnic group and region of birth
1983	Medical students	Ft. Benning, GA	7.7% (5 of 65)	3.1% (2 of 65)	--	0	60% (3 of 5) had dominant reactions to PPD-B, indicating cross-reactions with non-tuberculous mycobacteria (NTM)

Mancuso JD. *Am J Resp Crit Care Med* 2008;177:1285

So what does the US military do for “travelers” (deployers)?

- **AIR FORCE MOVED TO TARGETED TESTING AFTER DEPLOYMENT IN '05 (AFI 48-105)**
- **ARMY**
 - Used to test before deployment, after deployment, and then again 3-6 months after deployment (3 tests per deployment)
 - In 2008, moved to targeted testing after deployment using DD 2796 (OTSG Memo, 25 Sept 2008)
 - In 2013, moved to totally targeted testing (MEDCOM Reg 40-64)
- **NAVY**
 - Used to test operational units yearly with TST
 - Now targets testing during PHA with questionnaire (BUMEDINST 6224.8B, 21 Feb 2013)
- **POLICIES AVAILABLE AT: WWW.PDHEALTH.MIL**

Army

(MEDCOM Reg 40-64, Dec 2013)

3RD DRAFT 20 AUG 2013	PERIODIC TUBERCULOSIS (TB) RISK ASSESSMENT TOOL	3RD DRAFT 20 AUG 2013
<small>For use of this form see, MEDCOM Reg 40-XX, the proponent agency is MCPO-SA</small>		
Periodic Tuberculosis (TB) Risk Assessment Tool		REVIEWER INSTRUCTION
1. Since your last TB risk assessment, did you have face-to-face contact with someone who was sick with tuberculosis (TB)? If yes, nature of exposure: Household - Co-worker - Family - Other _____ Dates of exposure _____	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2. Since your last TB risk assessment, did you work, volunteer, or reside in a detainee facility, prison, homeless shelter, refugee camp, or drug treatment facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3. Since your last TB risk assessment, did you develop any of the following conditions: organ transplant; HIV infection; immunosuppression secondary to use of prednisone (equivalent of >15mg/day for >1 month) or other immunosuppressive medication such as Humira, Enbrel or Remicade?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4. Since your last TB risk assessment, did you develop any of the following conditions: diabetes, silicosis, cancer of head or neck, Hodgkin's disease, leukemia, end-stage renal disease, intestinal bypass or gastrectomy, chronic malabsorption syndrome, low body weight [10% or more below ideal weight], or injection drug use?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
All "NO" answers = low risk → STOP. Any "YES" answers = increased risk → Go to question #5.		If all "NO" responses → Do NOT test for TB
5. Do you have any of the following symptoms of tuberculosis: cough > 2 weeks, fever > 2 weeks, drenching night sweats, or unplanned weight loss?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If "NO" → Go to question #6. If "YES" → STOP.		If "YES" then refer immediately to provider for evaluation of TB disease.
6. Have you had a prior TB test, prior diagnosis of TB, or prior	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Policy Discussion

- **NO COMPELLING INDICATION TO USE IGRAS**
- **SCREENING ≠ TESTING**
- **TARGETED TESTING IN BASIC TRAINING...**
 - Followed by compulsory treatment!
- **D/C PRE- AND POST-DEPLOYMENT TESTING**
- **INITIATE ANNUAL SCREENING AT PHA**
 - Use validated questions to target testing
- **MONITORING AND ACCOUNTABILITY**

Questions?

