Maryland Department of
Health & Mental Hygiene
Epidemiology & Disease Control Program

A Slide Presentation for Employees on Reducing Risk of Occupational Exposure to Tuberculosis

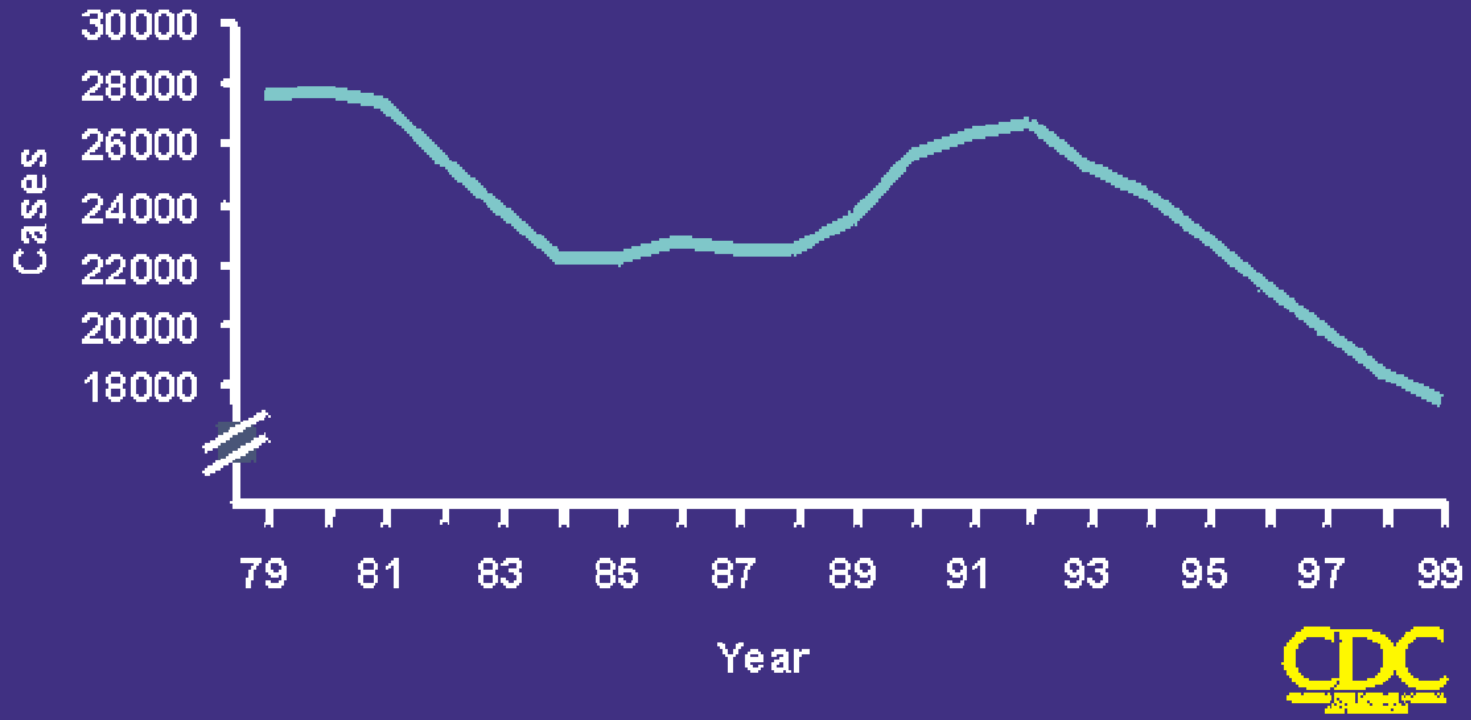
TB Training Objectives

- How is TB spread?
- What is TB infection?
- What is active TB disease?
- How is TB prevented and treated?
- How can you protect yourself from TB?
- What should your employer do for you?

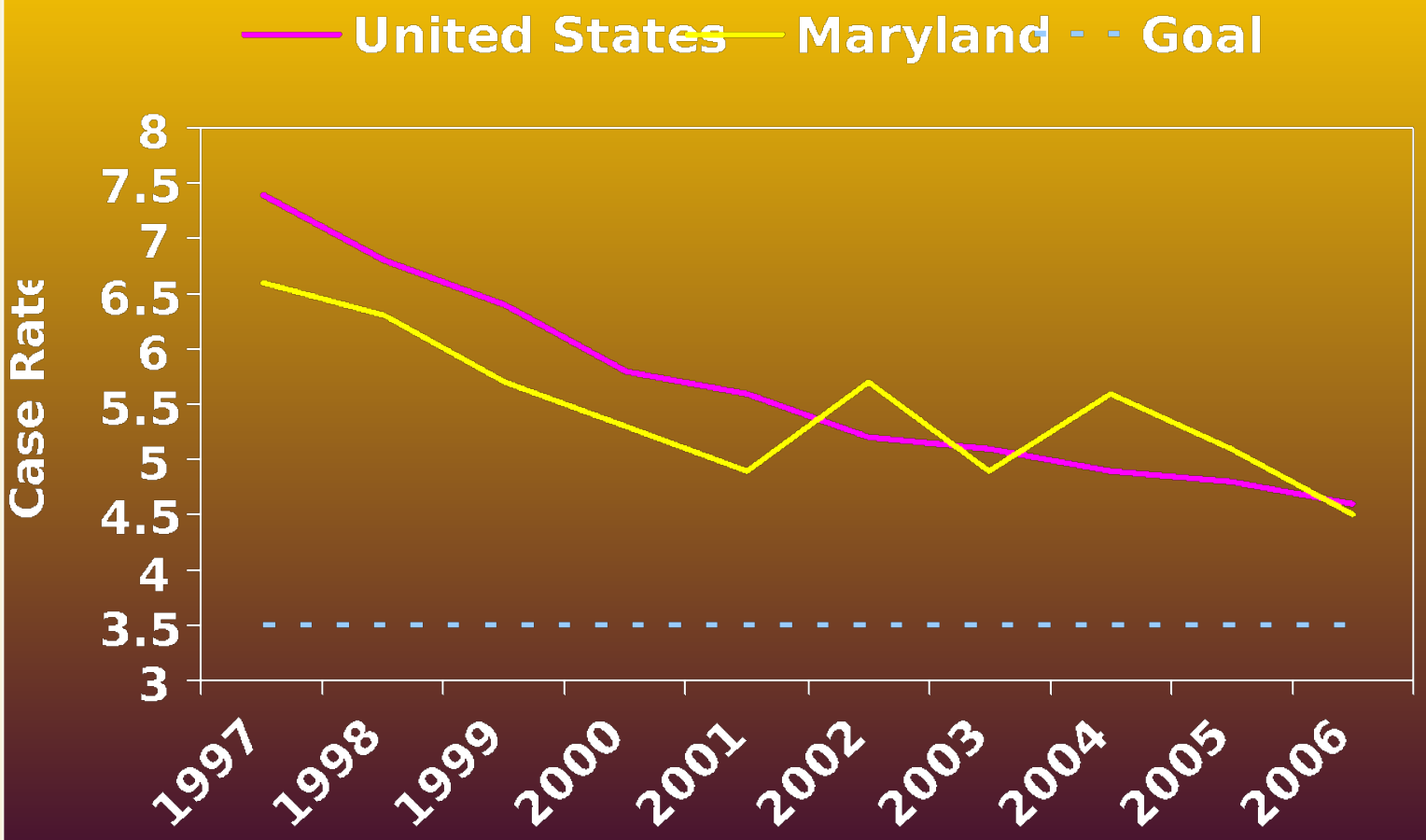
Global Tuberculosis

- One of three people in the world is infected with TB
- Half of the 23 million refugees in the world are infected
- Three million people die each year of TB
- 5.6 million people coinfected with HIV and TB

Reported TB Cases
United States, 1979-1999



TB Case Rates (1997 - 2006)
National and State



MARYLAND TUBERCULOSIS INCIDENCE

New Cases and Rates per 100,000 Population by Jurisdiction and Demographic Features (2001 - 2010)

Jurisdiction / Demographic Feature	2001		2002		2003		2004		2005		2006		2007		2008		2009		2010	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Maryland	262	4.9	306	5.7	268	4.9	314	5.6	283	5.1	253	4.5	270	4.8	278	4.9	218	3.8	220	3.8
All Counties	202	4.3	235	5.0	225	4.6	256	5.2	215	4.3	218	4.4	223	4.5	246	4.9	202	4.0	188	3.6
Baltimore City	60	9.2	71	10.9	43	6.6	58	9.1	68	10.6	35	5.5	47	7.4	32	5.0	16	2.5	32	5.2
Allegany	1	1.3	1	1.3	0	0.0	1	1.4	0	0.0	0	0.0	0	0.0	1	1.4	1	1.4	0	0.0
Anne Arundel	14	2.8	12	2.4	13	2.6	6	1.2	15	2.9	19	3.7	9	1.8	18	3.5	4	0.8	6	1.1
Baltimore County	26	3.4	31	4.1	26	3.4	31	4.0	20	2.6	17	2.2	31	3.9	20	2.5	24	3.0	28	3.5
Calvert	0	0.0	0	0.0	0	0.0	1	1.2	3	3.4	0	0.0	1	1.1	1	1.1	0	0.0	0	0.0
Caroline	3	10.0	2	6.6	1	3.3	0	0.0	1	3.2	2	6.2	1	3.0	1	3.0	2	5.9	1	3.0
Carroll	4	2.6	1	0.6	0	0.0	2	1.2	1	0.6	4	2.4	1	0.6	5	3.0	1	0.6	2	1.2
Cecil	2	2.3	0	0.0	1	1.1	2	2.1	1	1.0	5	5.0	2	2.0	1	1.0	0	0.0	1	1.0
Charles	2	1.8	1	0.8	1	0.8	0	0.0	1	0.7	4	2.8	5	3.5	4	2.8	2	1.4	3	2.0
Dorchester	2	6.5	0	0.0	2	6.4	4	13.0	1	3.2	1	3.2	0	0.0	0	0.0	3	9.8	0	0.0
Frederick	1	0.5	7	3.4	5	2.4	9	4.2	3	1.4	8	3.6	2	0.9	12	5.3	1	0.4	5	2.1
Garrett	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	3.4	0	0.0	0	0.0
Harford	3	1.4	6	2.7	3	1.3	6	2.6	6	2.5	2	0.8	5	2.1	3	1.3	7	2.9	2	0.8
Howard	8	3.2	9	3.6	13	4.9	14	5.2	12	4.5	6	2.2	11	4.0	11	4.0	9	3.2	18	6.3
Kent	0	0.0	1	5.2	0	0.0	0	0.0	0	0.0	1	5.0	0	0.0	1	5.0	0	0.0	1	5.0
Montgomery	67	7.6	80	9.0	81	8.8	93	10.0	81	8.8	62	6.7	82	8.8	88	9.3	70	7.2	69	7.1
Prince George's	57	7.0	71	8.7	65	7.8	72	8.6	57	6.7	72	8.5	66	7.9	68	8.3	65	7.8	43	5.0
Queen Anne's	1	2.4	2	4.8	0	0.0	1	2.2	0	0.0	0	0.0	0	0.0	0	0.0	1	2.1	1	2.1
St. Mary's	1	1.1	1	1.1	2	2.2	2	2.1	1	1.0	2	2.0	0	0.0	2	2.0	2	1.9	0	0.0
Somerset	2	8.0	1	4.0	2	8.0	0	0.0	5	19.2	3	11.6	2	7.8	1	3.8	0	0.0	2	7.6
Talbot	1	2.9	1	2.9	2	5.7	1	2.9	1	2.8	0	0.0	0	0.0	0	0.0	2	5.5	4	10.6
Washington	2	1.5	1	0.8	2	1.5	4	2.9	3	2.1	3	2.1	0	0.0	1	0.7	3	2.0	0	0.0
Wicomico	3	3.5	5	5.8	2	2.3	6	6.8	3	3.3	5	5.5	4	4.3	6	6.4	4	4.2	2	2.0
Worcester	2	4.2	2	4.2	4	8.0	1	2.0	0	0.0	2	4.1	1	2.1	1	2.0	1	2.0	0	0.0
FOREIGN-BORN	155	34.8	164	31.6	175	29.6	188	30.8	173	27.6	171	26.4	186	28.4	198	28.4	166	23.5	150	20.0
ETHNICITY: Hispanic	30	25.5	35	29.8	44	16.4	45	16.5	48	15.3	51	15.2	39	11.1	52	13.9	35	8.8	42	8.9
RACE: (Non-Hispanic)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-		-
White, single race	33	1.0	40	1.2	28	0.8	38	1.1	22	0.7	29	0.9	26	0.8	30	0.9	13	0.4	18	0.6
Black, single race	138	9.4	158	10.8	134	8.8	154	10.0	150	9.3	119	7.3	126	7.7	111	6.8	96	5.8	90	5.4
Asian, single race	59	27.7	73	34.2	60	24.4	77	30.3	63	23.9	54	19.9	79	28.0	85	29.5	74	25.3	68	21.5
Other,[1] sincle races	2	0.9	0	0.0	1	6.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	7.1
Two or more races	-	-	-	-	1	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SEX: Male	145	5.8	166	6.4	157	5.9	172	6.4	154	5.7	143	5.3	161	5.9	168	6.2	116	4.2	133	4.8
Female	117	4.2	141	5.1	111	3.9	142	4.9	129	4.4	110	3.8	109	3.7	110	3.8	102	3.5	87	2.9
AGE: 0 - 14	19	1.7	22	1.9	8	0.7	13	1.1	17	1.5	8	0.7	13	1.1	12	1.1	12	1.1	10	0.9
15 - 34	101	7.1	88	6.2	85	5.8	106	7.2	113	7.6	88	5.9	100	6.7	100	6.7	84	5.6	73	4.8
35 - 64	96	4.4	127	5.8	125	5.5	137	5.9	114	4.9	107	4.6	111	4.8	113	4.9	87	3.7	97	4.1
65 +	47	7.8	69	11.2	50	7.8	58	9.0	39	6.0	50	7.6	46	6.9	53	7.7	36	4.9	40	5.4

[1]OTHER RACE: INCLUDES ALL REPORTED 'ALASKA NATIVE / AMERICAN INDIAN' OR 'NATIVE HAWAIIAN / PACIFIC ISLANDER'

POPULATION SUPPLIED BY THE MARYLAND DEPARTMENT OF PLANNING (METHODOLOGY AVAILABLE)

MD CHMH, IDSHA

Center for TB Control & Prevention 02/22/2011

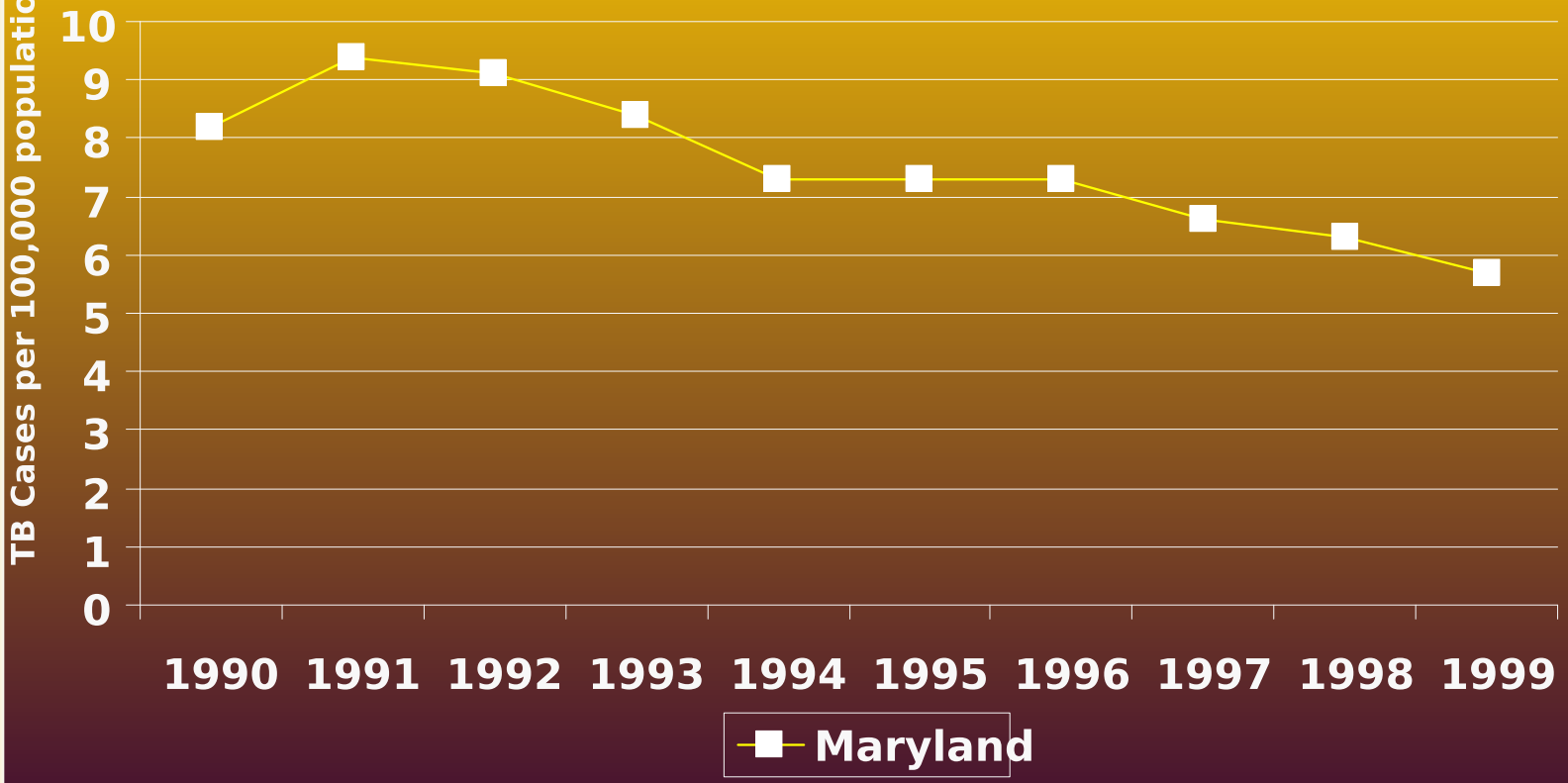
Why did TB Increase in the U.S.?

- Homelessness
- Intravenous drug use
- Overcrowding in institutional settings
- HIV infection
- Reduced resources for TB control and treatment
- Immigration from high TB prevalence areas

Why is TB again decreasing in the U.S.?

- Increased funding
- Improved TB infrastructure

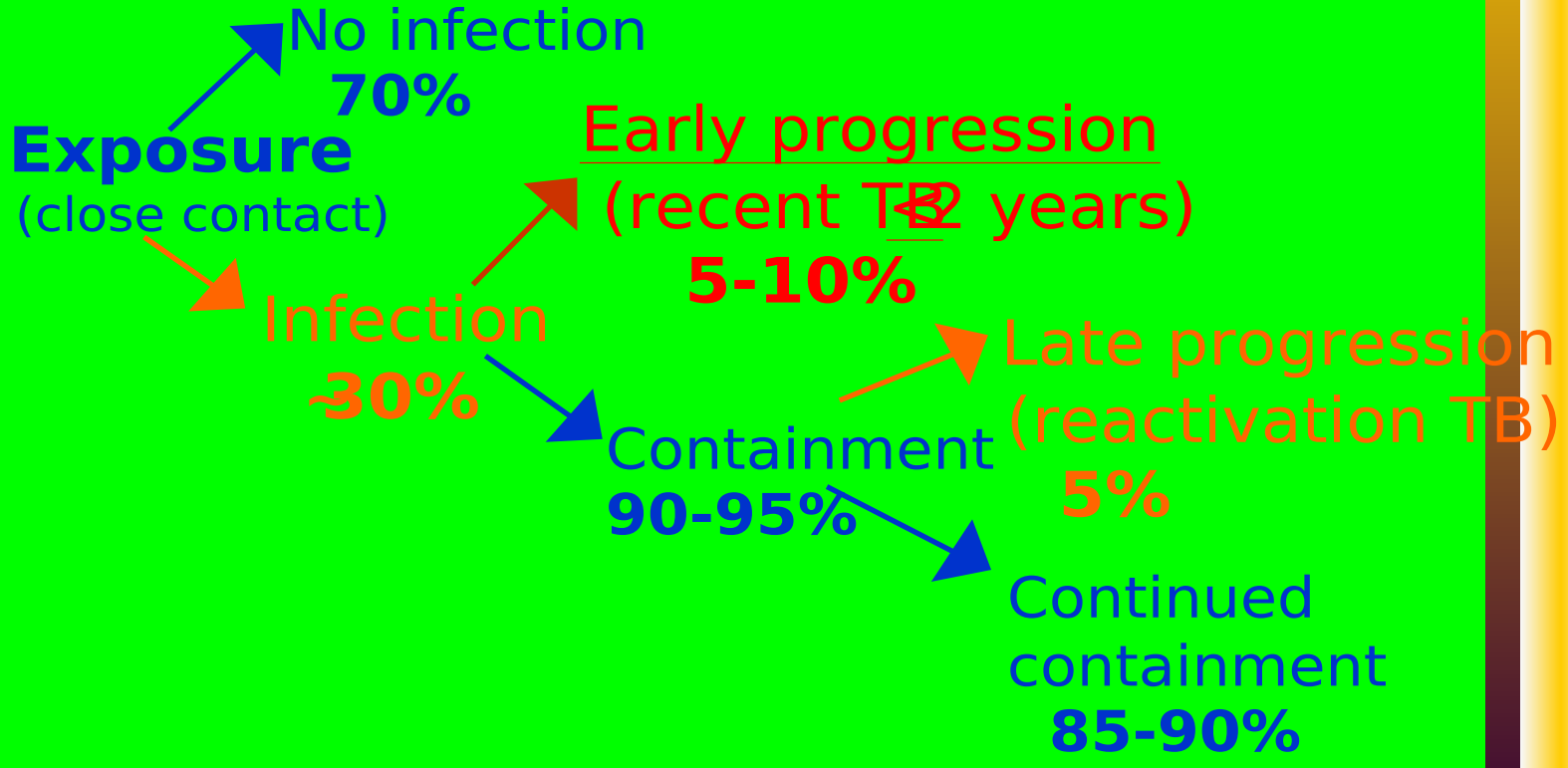
Graph of Tuberculosis Cases Maryland (1960-1999)



TB Transmission

- Infectious disease caused by *Mycobacterium tuberculosis*
- Spread by airborne droplets, "droplet nuclei", to 5 microns in size
- Droplet nuclei generated when a person with TB disease coughs, sneezes, speaks or sings
- TB infection occurs when a person inhales the bacteria and it becomes established in the body

Risk of TB infection and disease among exposed individuals



Symptoms of Active TB Disease

- Persistent cough
- Productive cough
- Fever
- Weight loss
- Night sweats
- Coughing up blood
- Loss of appetite
- Fatigue

Tuberculosis Infection - No Disease

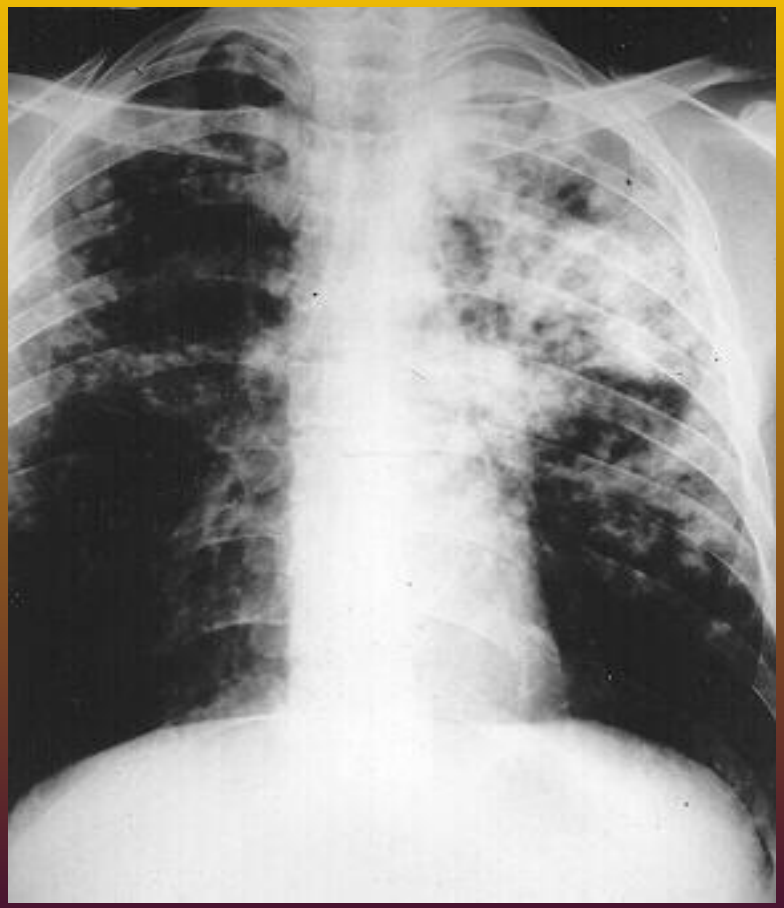
- Cannot spread to others
- Not considered "case" of active TB disease
- Positive skin test reaction
- X-ray negative
- No symptoms
- Potential for active TB disease
- Not reportable to health department

Sites of Active TB Disease

- Lungs * (most common site)
- Other sites:
  - Larynx *
  - Lymph nodes
  - Brain
  - Kidney
  - Bones
  - Other locations

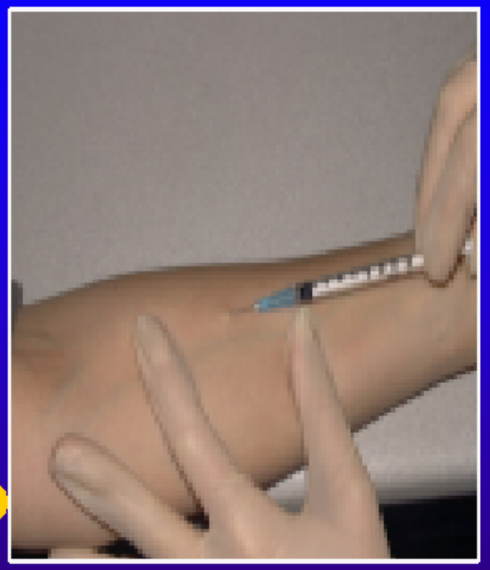
* Only pulmonary and laryngeal TB are infectious

Pulmonary Tuberculosis



Diagnosing TB Infection: Mantoux Tuberculin Skin Test

- Inject PPDintradermally
- Read in 48-72 hours
- Measure for size of swelling (not redness)
- A positive test means a person has TB infectio



* Size of induration (swelling) read as "positive" depends on the situation

Treatment of Latent TB Infection (TB Preventive Therapy)

- For certain infected persons <u>without</u> active TB disease:
  - A single drug, INH (isoniazid), usually recommended (other regimens now available)
  - Reduces risk of developing active TB
  - People are monitored for side effects on a regular basis

Treatment for Active TB Disease

- Essential to cure TB and prevent drug resistance
- A combination of 4 drugs used initially
- Directly observed therapy (DOT) is the standard of care in Maryland

TB Disease Often More Serious In:

- HIV-infected persons
- Persons with other immunocompromising conditions
- The very young

HIV Infection

- More frequent and rapid development of active TB disease after infection
- Unusual presentations of TB disease making diagnosis difficult

Multi-Drug Resistant (MDR) TB

- Resistance to at least isoniazid (INH) and rifampin
- Difficult to treat because other drugs are not as powerful and are more toxic
- Long duration of treatment (at least 2 years)

TB and MDR-TB in Maryland 1994-1999

Year	No. TB Cases	No. MDR-TB Cases
1994	362	2 (0.6%)
1995	370	4 (1.1%)
1996	319	1 (0.3%)
1997	340	1 (0.3%)
1998	324	2 (0.6%)
1999	294	3 (1.0%)

Protecting Yourself and Others at Work against Exposure to Tuberculosis (TB)

OSHA/MOSH Enforcement Guidelines for Occupational Exposure to TB

- Based on CDC 2005 *"Guidelines for Preventing the Transmission of Mycobacterium Tuberculosis in Health Care Facilities"*
- Covers work places identified by CDC with a high incidence of TB

Work Places Identified by CDC with High Incidence of TB

- Health care settings
- Correctional institutions
- Homeless shelters
- Long-term care facilities for the elderly
- Drug treatment centers

OSHA General Duty Clause Used to Cite Employers Whose Employees:

- Have potential exposure to exhaled air or perform hazardous procedures on confirmed or suspected TB cases
- Work in CDC-designated high TB incidence facilities

High Hazard Procedures

- Characterized by potential to generate airborne secretions:
  - Aerosolized medication treatment
  - Bronchoscopy
  - Sputum induction
  - Endotracheal intubation and suctioning
  - Autopsies

Employer Responsibilities

- Keep a safe work place
- Have a written plan to identify and manage people with active TB disease
- Place patients with suspected or confirmed infectious TB in an AFB (acid fast bacilli) isolation room
- Teach you about TB and how to protect yourself at work
- If needed, provide you with respirator and teach you how to use it

EMPLOYER RESPONSIBILITIES (CONT'D)

- Regular skin testing to employees who have negative skin tests
- Proper care if you develop TB infection or active TB disease
- Written policy on when employees who have active TB can work
- Policy on voluntary work reassignment options for immunocompromised employees
- Medical records kept confidential

If You Develop Symptoms of TB or Have a Positive PPD Skin Test:

- Seek medical attention
- Get proper therapy
- Prevent spread to others
- Notify your employer if you are diagnosed with active TB disease

Fundamentals of TB Infection Control

- Find cases of active TB promptly
- Isolate TB cases promptly
- Initiate effective anti-TB drugs promptly
- Use precautions for cough-inducing or high risk procedures (e.g., sputum collection, bronchoscopy)

Fundamentals of TB Infection Control (cont'd)

- Screen persons at high risk for TB and provide treatment for latent TB infection
- Identify and evaluate people exposed to infectious TB
- Screen with skin tests periodically
- Look for TB cases among patients and workers

Hierarchy of TB Infection Control Measures

Engineering Controls

- AFB (acid fast bacilli) isolation rooms
- Adequate air flow and filtration

Hierarchy of TB Infection Control Measures

Work practice controls:

- early identification and isolation of suspected or confirmed TB cases
- have suspected or confirmed TB cases wear masks during transport

Hierarchy of TB Infection Control Measures

Personal Protective Equipment

- Wearing N95 masks when in contact with confirmed or suspect cases.
- wearing respirators when required

TB Respiratory Protection

- Respirators are required when:

  - Entering rooms housing persons with suspected or confirmed TB disease
  - Performing high hazard procedures on persons with suspected or confirmed TB disease
  - Transporting a person with suspected or confirmed TB disease

TB Respiratory Protection (Cont'd)

Where respirators are required employers must:

- Make sure employees use NIOSH-approved high-efficiency particulate respirators
- Have a respiratory protection program in accordance with OSHA
- Conduct annual "fit-testing"
- Assure respirators are "fit-checked" by employees prior to each use

coughing up blood

POSITIVE SKIN TEST

MALAISE

Night Sweats

Weight Loss

CHILLS

FEVER

HEMOPTYSIS

THINK TB !

Loss of Appetite

Difficulty breathing

Chest pains

Failure to thrive

fatigue

Exposure to Tuberculosis

Cough

ANOREXIA

Abdominal X-Ray

Shortness of Breath

Significant Skin Test