TB on a College Campus: A Case Study

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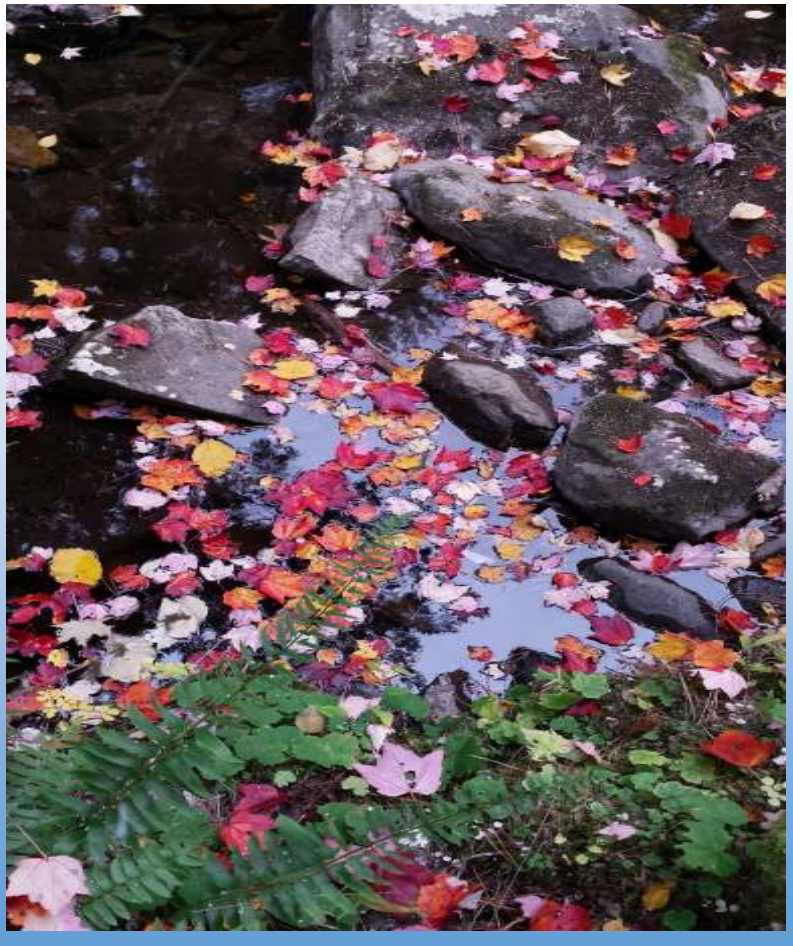


Objectives

- **Discuss the difference between infectious and non-infectious TB**
  - Public health role
  - Diagnostic testing beyond PPD
  - Statistics regarding TB worldwide and U.S. population
- **Explain how to read a PPD and discuss guidelines for results**
  - The role of BCG
  - Public Health referral for follow-up of positive PPDs
- **Identify protocols of care in a case of TB on a local college campus**
  - Notification/testing/education of contacts
  - Direct observed therapy

Review of TB

- Cause
- Spread

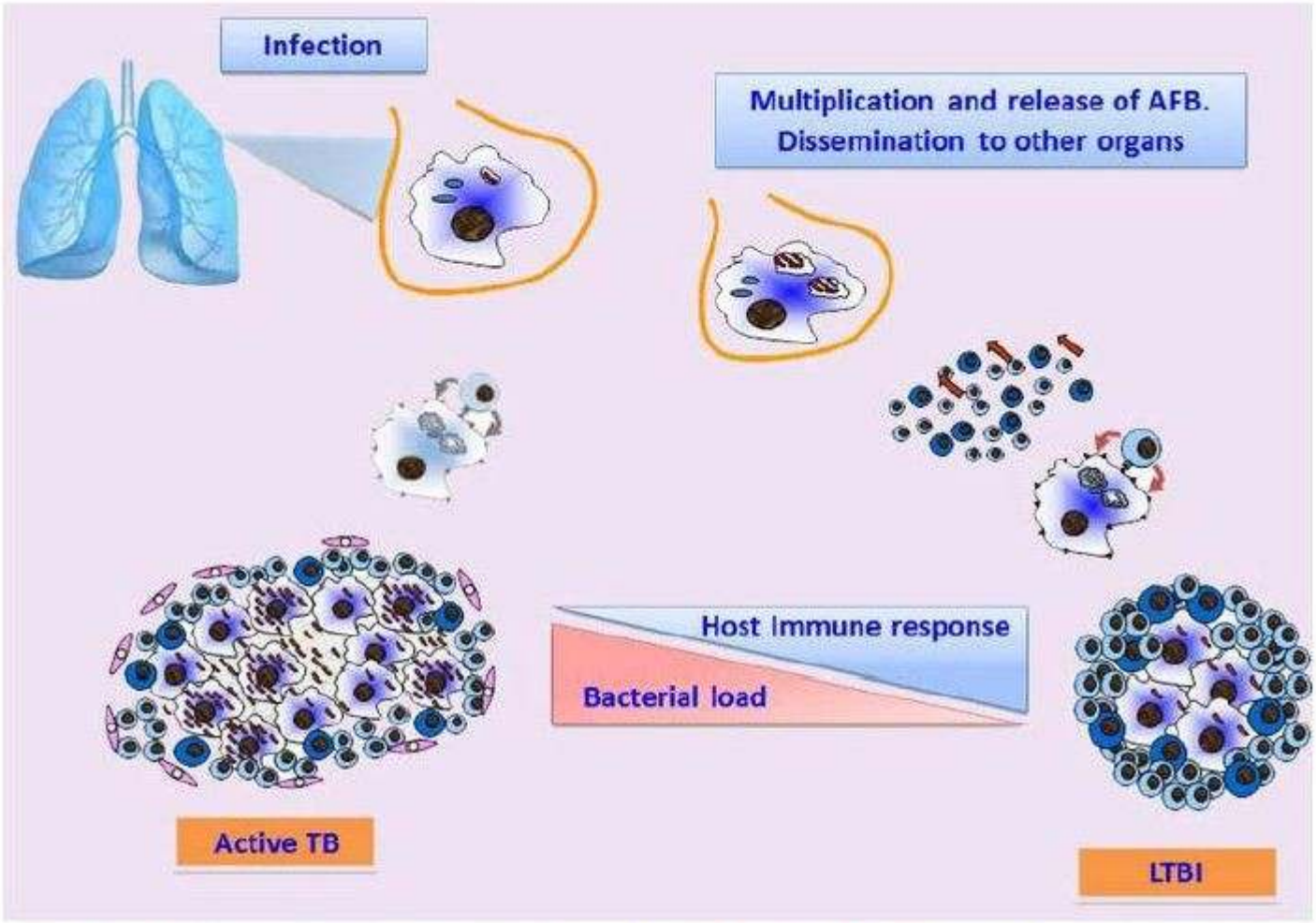


Figure 2 -TB pathogenesis. Tubercle bacilli are inhaled in aerosol droplets, enter into the lungs and, when the host innate immune defenses fail to eliminate the bacteria, *Mtb* start multiplying inside alveolar macrophages and then spreads to other tissues and organs through the bloodstream and lymphatics. Once the cell-mediated immune response kicks in, bacterial replication is usually controlled and in 90-95% of cases non overt signs or symptoms of disease ensue (Latent TB). During latent infection a dynamic equilibrium between the bacilli and host immune responses is established and any event that weakens cell mediated immunity may lead to active bacterial replication, tissue damage and disease occurs (active TB).

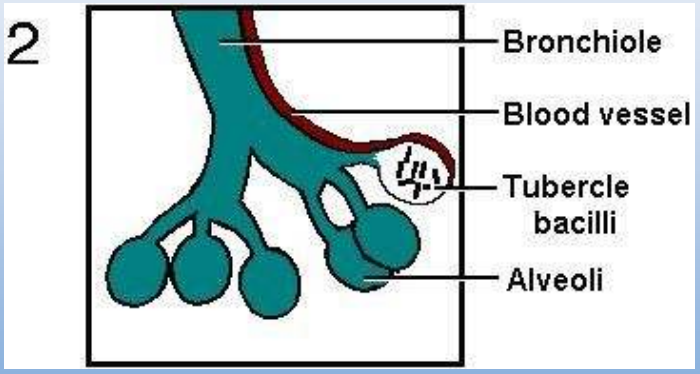
Latent vs Active TB

Not everyone infected with TB bacteria becomes sick. Strong immune system-builds a tubercule around the germ so they are unable to spread

Germs are trapped inside the tubercules, they slow down and stop activity-**Latent (sleeping) TB**

- Do not feel sick
- No symptoms
- Not infectious
- Cannot spread

If TB bacteria become active in the body and multiply, the person will go from having latent TB to being sick with active disease



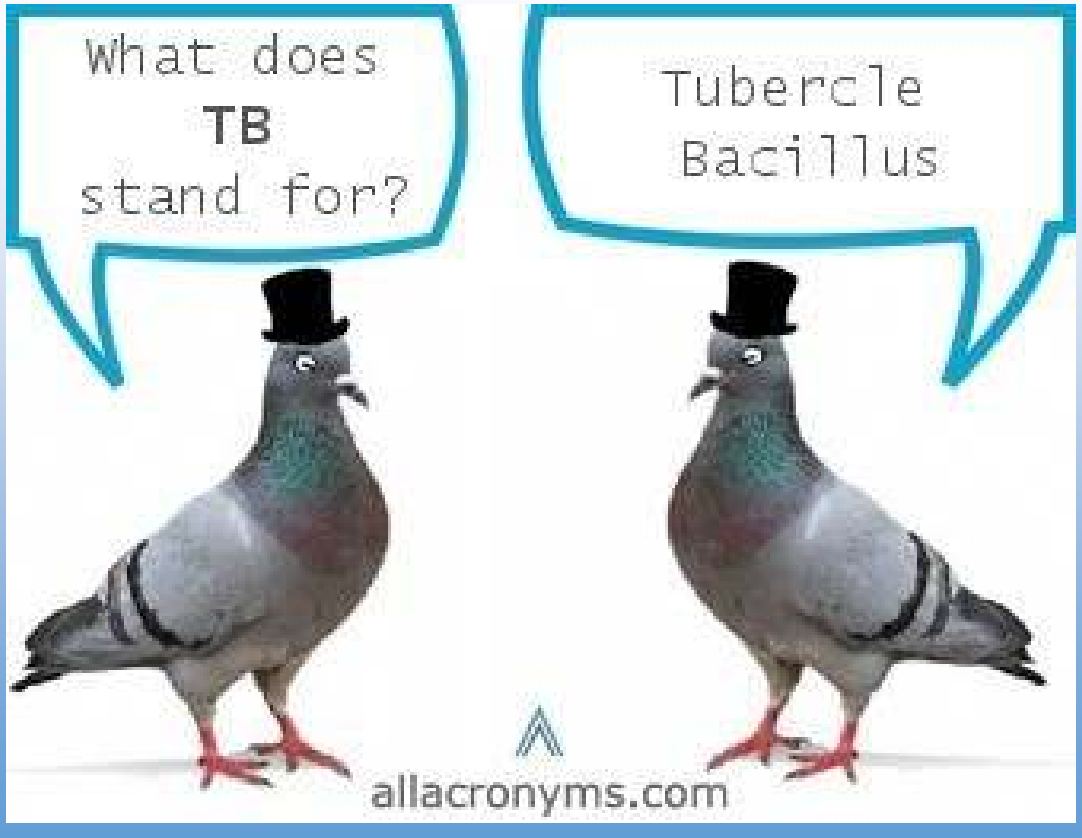
TB disease

TB bacteria become active if the immune system can't stop them from growing

- Sick
- May be able to spread to close contacts

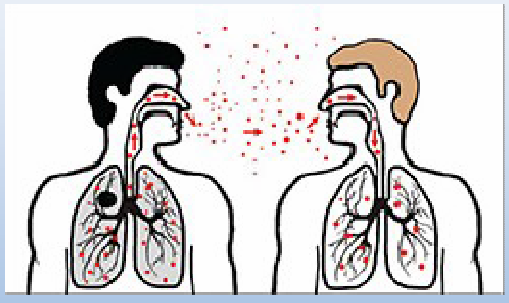
Many people who have latent TB infection never develop TB disease.

Some people develop TB disease soon after becoming infected before their immune system can fight it. Most don't know they have it until they become sick.



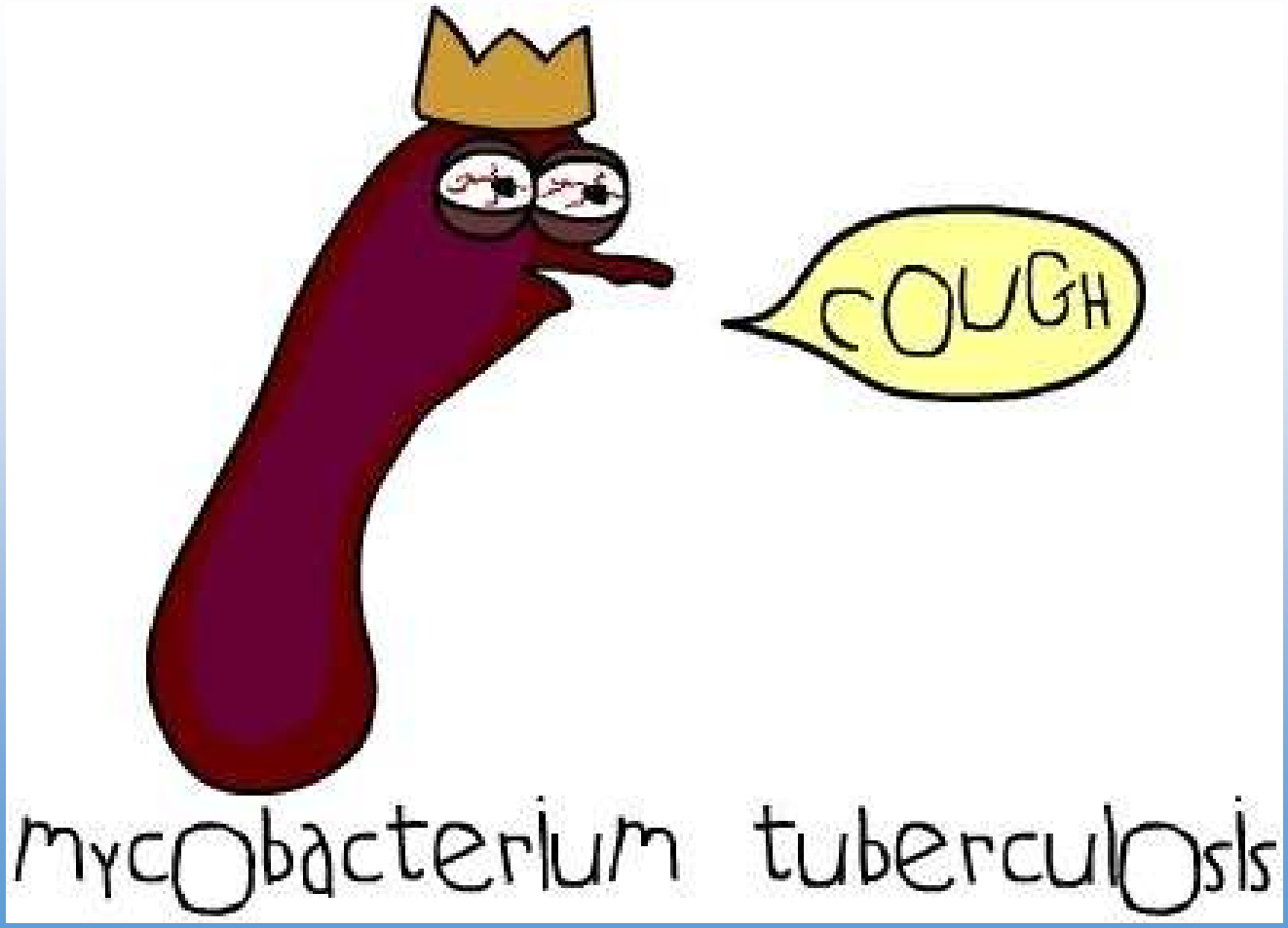
Once a person is infected with TB bacteria, the chance of developing TB disease is higher if the person:

- Has HIV infection
- Has recently been infected with TB bacteria (in the past 2 years)
- Has other underlying health problems (diabetes)
- Abuses alcohol or drugs
- Was not treated for TB infection in the past
- Recent arrivals to the U.S within the past 5 years
- Poor compliance with medications



Signs and symptoms of TB

- A cough that lasts 3 weeks or longer
- Pain in the chest
- Coughing up blood or sputum
- Weakness or fatigue
- No appetite
- Chills
- Fever
- Night sweats



How to place and read a PPD

https://www.khanacademy.org/science/health-and-medicine/infectious-diseases/tuberculosis/v/interpreting-the-ppd

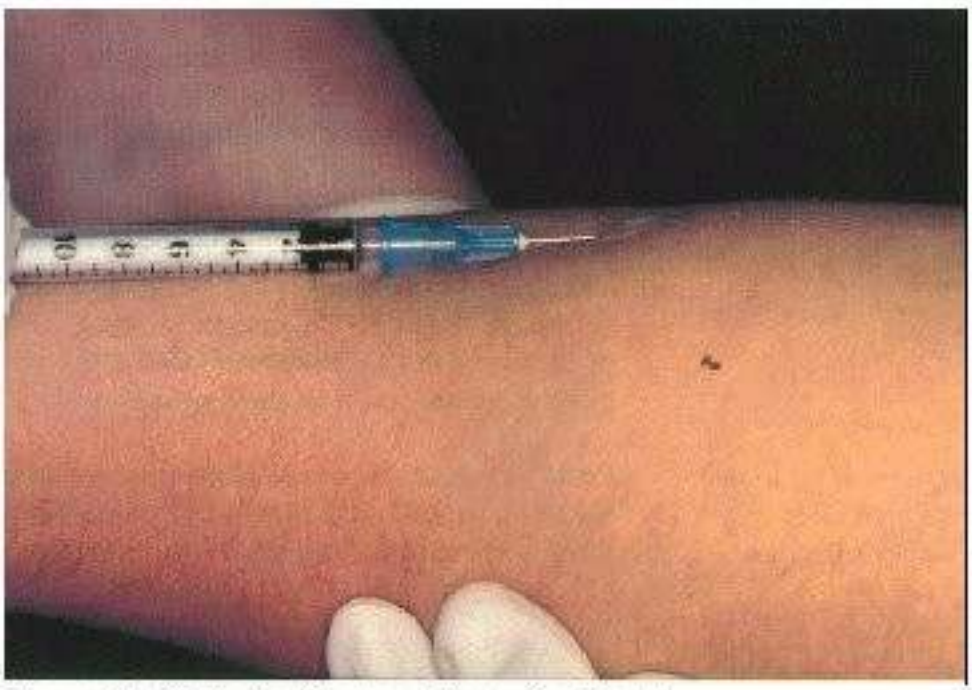


Figure 3.1 Giving the Mantoux tuberculin skin test.

Candidates for Treatment of LTBI

Persons with positive IGRA results or TST reaction >5mm

- HIV positive persons
- Recent contacts of persons with infectious TB disease
- Persons with fibrotic changes on chest x-ray consistent with prior TB and
- Patients with organ transplants and other immunosuppressed patients

Persons with positive IGRA results or TST reaction >10mm

- Recent arrivals (<5 years) from high-prevalence countries (Africa, Asia, Eastern Europe, Latin America, and Russia)
- Injection drug users
- Residents and employees of high-congregate settings (correctional facilities, nursing homes, homeless shelters, hospitals)
- Mycobacteriology laboratory personnel
- Persons with high-risk clinical conditions
- Children < 5years of age
- Infants, children, and adolescents exposed to adults in high –risk categories

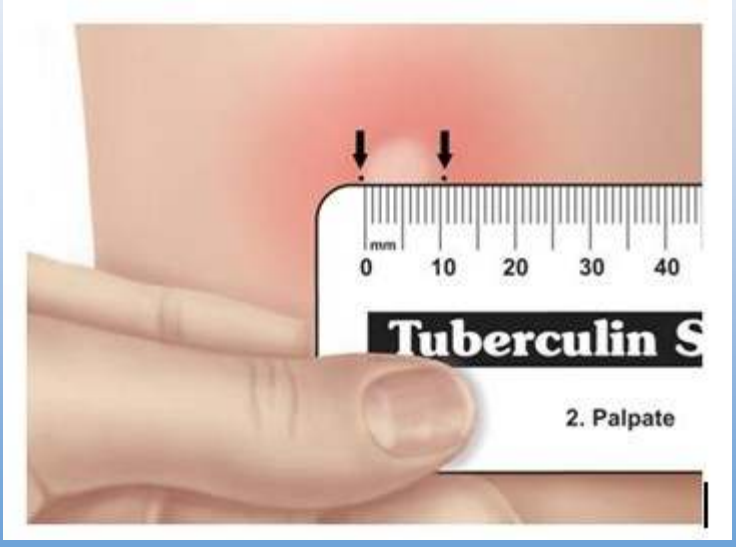
Persons with positive IGRA results or TST reaction >15mm

- Persons with no known risk factors for TB

The role of BCG

BCG (bacilli Calmette-Guerin) is a vaccine for TB disease used in many countries with a high prevalence of TB.

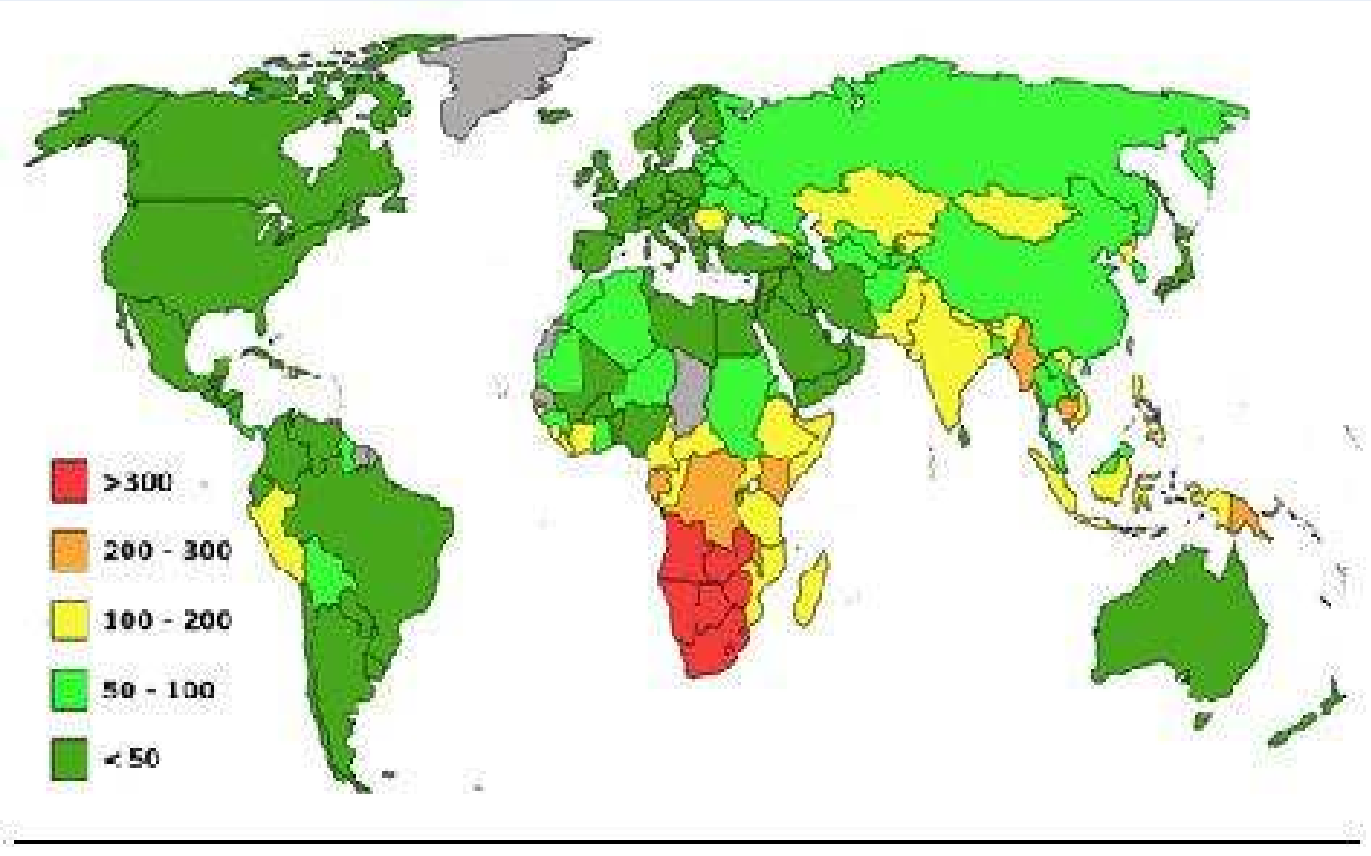
Not generally recommended for use in the U.S.



How common is TB?

TB is one of the most common infectious diseases world-wide. Remains an urgent public health problem in many parts of the world.

Approximately 1/3 of the world's population is infected with TB

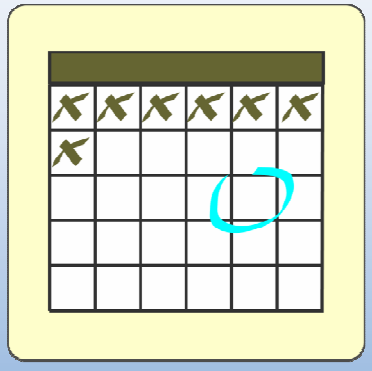


How is TB treated?

Someone with latent TB infection but not TB disease, may be treated with preventative medications for 4-9 months (depending on the medication) to help them from developing active TB disease.

Treatment of latent TB infection reduces the risk that TB infection will progress to TB disease.

TB disease is treated with several drugs, usually for a period of a minimum of 6 months or longer depending on how sick the patient is



Importance of taking medications exactly as prescribed- resistance

DOT– Direct observed therapy

How long does someone need to be on the medications used to treat TB before they take affect?

After 2 weeks of medication therapy, the patient is no longer infectious.

RIPE

Rifampin

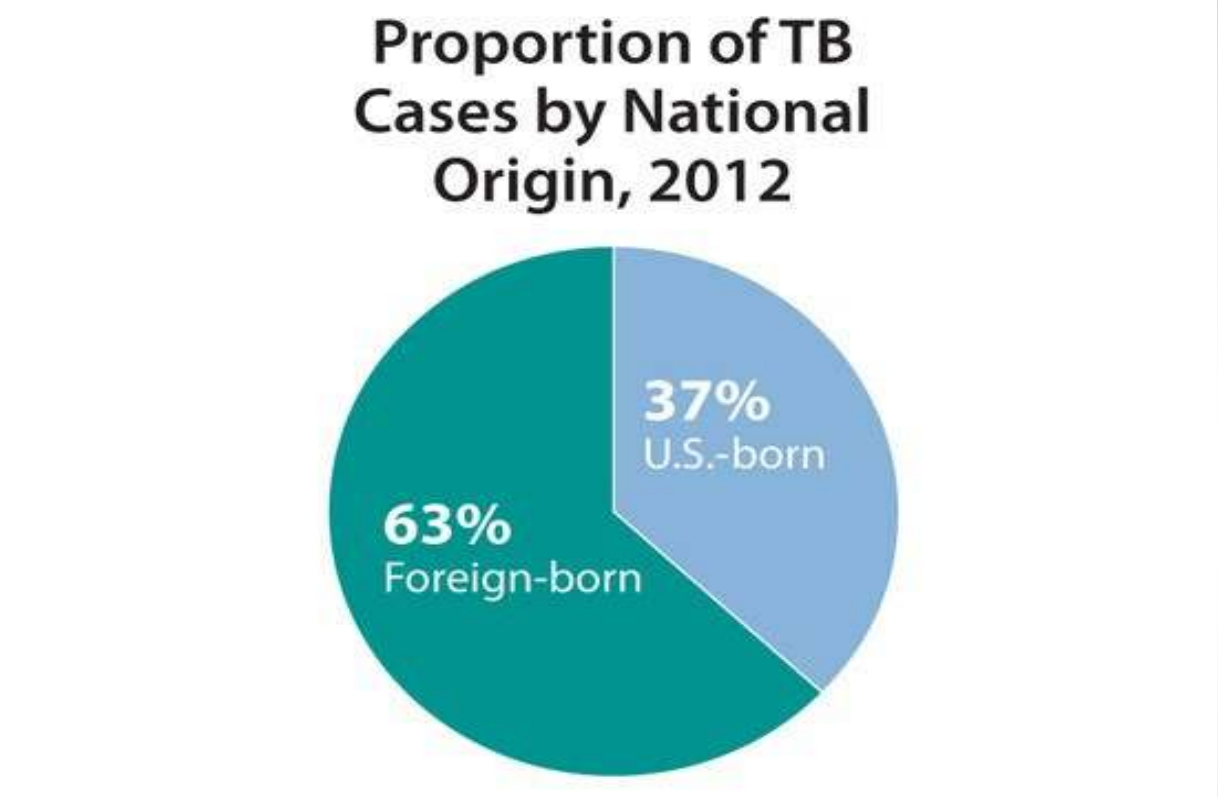
Isoniazid (INH)

Pyrazinamide (PZA)

Ethambutol

How contagious is TB? How likely is it to spread?

TB spreads most easily in closed spaces over a long period of time. Over half the cases in the US are among people born in countries with a high incidence of the disease.



Brief contact with people who are sick with TB is unlikely to give a person TB.

How does Skidmore Health Services screen for TB?

All incoming students are screened.

-Students coming from countries that are high risk are screened by either a TB test or chest x-ray prior to arrival on campus

Afghanistan	Congo	Kenya	New Caledonia	Sri Lanka
Algeria	Congo DR	Kiribati	Nicaragua	Sudan
Angola	Cote d'Ivoire	Korea DPR	Niger	Suriname
Anguilla	Croatia	Korea-Republic	Nigeria	Syrian Arab Rep.
Argentina	Djibouti	Kuwait	Niue	Swaziland
Armenia	Dominican Rep	Kyrgyzstan	N. Mariana Islands	Tajikistan
Azerbaijan	Ecuador	Lao PDR	Pakistan	Tanzania-UR
Bahamas	Egypt	Latvia	Palau	Thailand
Bahrain	El Salvador	Lesotho	Panama	Timor-Leste
Bangladesh	Equatorial Guinea	Liberia	Papua New Guinea	Togo
Belarus	Eritrea	Lithuania	Paraguay	Tokelau
Belice	Estonia	Macedonia	Peru	Tonga
Benin	Etiopia	TFYR	Phillippines	Tunisia
Bhutan	Fiji	Madagascar	Poland	Turkey
Bolivia	French Polynesia	Malawi	Portugal	Turkmenistan
Bosnia &	Gabon	Malaysia	Qatar	Tuvalu
Herzegovina	Gambia	Maldives	Romania	Uganda
Botswana	Georgia	Mali	Russian Federation	Ukraine
Brazil	Ghana	Marshall Islands	Rwanda	United Arab
Brunei	Guam	Mauritania	St VIncent &	Emirates
Darussalam	Guatemala	Mauritius	The Grenadines	United Kingdom
Bulgaria	Guinea	Mexico	Sao Tome &	Uruguay
Burkina Faso	Guinea-Bissau	Micronesia	Principe	Uzbekistan
Burundi	Guyana	Moldova-Rep	Saudi Arabia	Vanuatu
Cambodia	Haiti	Mongolia	Senegal	Venezuela
Cameroon	Honduras	Montenegro	Seychelles	Viet Nam
Cape Verde	India	Morocco	Sierra Leone	Wallis & Futura Islands
Central Africa Rep	Indonesia	Mozambique	Singapore	W. Bank & Gaza Strip
Chad	Iran	Myanmar	Solomon Islands	Yemen
China	Iraq	Namibia	Somalia	Zambia
Colombia	Japan	Nauru	South Africa	Zimbabwe
Comoros	Kazakhsten	Nepal	Spain	

-Students coming from countries that are low risk are screened using a questionnaire.

Skidmore College Health Services
815 North Broadway
Saratoga Springs, NY 12866
Phone: (518) 580-5550 Fax: (518) 580-5556

STUDENT NAME: _____

DOB: _____

SECTION I TUBERCULOSIS (TB) SCREENING FORM

To Be Completed By Incoming Students and Their Health Care Provider Within 6 Months Prior to the Student's Arrival on Campus (Health Care Provider's Signature REQUIRED on the Reverse/Side 2 of this Form)

Please answer the following questions:

	Yes	No
Do you have a history of a positive TB skin test or IGRA blood test? If yes, document on page 2. A **chest x-ray** within 6 months prior to student's arrival on campus is required (proceed to item #4 on page 2).	☐	☐
Do you have a history of BCG vaccination? If yes, consider IGRA if possible. A history of BCG vaccination should NOT preclude testing of a member of a high risk group	☐	☐
Have you ever had close contact with persons known or suspected to have active TB disease?	☐	☐
Were you born in one of the countries listed below that have a high incidence of active TB disease? (If yes, please **CIRCLE** the country below.)	☐	☐
Have you had frequent or prolonged visits to one or more of the countries listed below with a high prevalence of TB disease?	☐	☐

(If yes, **CHECK** the countries below.) *The significance of the travel exposure should be discussed with a health care provider and evaluated.*

Afghanistan	Congo	Kazakhstan	Nepal	Somalia
Algeria	Côte d'Ivoire	Kenya	Nicaragua	South Africa
Angola	Democratic People's	Kiribati	Niger	South Sudan
Argentina	Republic of Korea	Kuwait	Nigeria	Sri Lanka
Armenia	Democratic Republic of	Kyrgyzstan	Niue	Sudan
Azerbaijan	the Congo	Lao People's	Pakistan	Suriname
Bahrain	Djibouti	Democratic Republic	Palau	Swaziland
Bangladesh	Dominican Republic	Latvia	Panama	Tajikistan
Belarus	Ecuador	Lesotho	Papua New Guinea	Thailand
Belize	El Salvador	Liberia	Paraguay	Timor-Leste
Benin	Equatorial Guinea	Libya	Peru	Togo
Bhutan	Eritrea	Lithuania	Philippines	Trinidad and Tobago
Bolivia (Plurinational	Estonia	Madagascar	Poland	Tunisia
State of)	Ethiopia	Malawi	Portugal	Turkey
Bosnia and Herzegovina	Fiji	Malaysia	Qatar	Turkmenistan
Botswana	Gabon	Maldives	Republic of Korea	Tuvalu
Brazil	Gambia	Mali	Republic of Moldova	Uganda
Brunei Darussalam	Georgia	Marshall Islands	Romania	Ukraine
Bulgaria	Ghana	Mauritania	Russian Federation	United Republic of
Burkina Faso	Guatemala	Mauritius	Rwanda	Tanzania
Burundi	Guinea	Mexico	Saint Vincent and the	Uruguay
Cabo Verde	Guinea-Bissau	Micronesia (Federated	Grenadines	Uzbekistan
Cambodia	Guyana	States of)	Sao Tome and Principe	Vanuatu
Cameroon	Haiti	Mongolia	Senegal	Venezuela (Bolivarian
Central African Republic	Honduras	Morocco	Serbia	Republic of)
Chad	India	Mozambique	Seychelles	Viet Nam
China	Indonesia	Myanmar	Sierra Leone	Yemen
Colombia	Iran (Islamic Republic of)	Namibia	Singapore	Zambia
Comoros	Iraq	Nauru	Solomon Islands	Zimbabwe

Source: World Health Organization, Global Health Observatory, Tuberculosis Incidence 2012. Countries with incidence rates of ≥ 20 cases per 100,000 population. For future updates, refer to http://apps.who.int/ghodata

Have you been a resident, employee, volunteer or health-care worker of high-risk congregate settings (e.g. correctional facilities, long-term care facilities and homeless shelters) or who served clients who are at increased risk for active TB disease?	☐	☐
Have you ever been a member of any of the following groups that may have an increased incidence of latent *M. tuberculosis* infection or active TB disease – medically underserved, low-income, or abusing drugs or alcohol?	☐	☐

If the answer is NO to all of the above questions, *no further testing is required however; Health Care Provider must indicate LOW RISK below and complete Section III.*

If the answer is YES to any of the above questions, *Skidmore College requires that you have a documented TB test within 6 months prior to your arrival on campus (no earlier than March 1, 2015). Health Care Provider must complete Sections II and III.*

SECTION II – TUBERCULOSIS (TB) RISK ASSESSMENT & TESTING (To be Completed by Health Care Provider)

Clinicians should review and verify the information above. Persons answering YES to any of the questions in Section 1 are candidates for either Mantoux tuberculin skin test (TST) or Interferon Gamma Release (IGRA), unless a previous positive test has been documented.

As determined by review of the Section I screening questionnaire, this STUDENT IS CONSIDERED TO BE (please check appropriate box):

☐ **Low Risk** – proceed directly to Section III – PROVIDER SIGNATURE

☐ **High Risk** – complete Sections II and III – TB TESTING & PROVIDER SIGNATURE

Student Name: _____ **DOB:** _____

1. TB Symptom Check

Does the student have signs or symptoms of active pulmonary tuberculosis disease? ☐ Yes ☐ No

If NO, proceed to 2 or 3

If YES, check below:

☐ Cough (especially if lasting for 3 weeks or longer) with or without sputum production
☐ Chest pain
☐ Unexplained weight loss
☐ Fever
Coughing up blood (hemoptysis)
Loss of appetite
Night Sweats

Proceed with additional evaluation to exclude active tuberculosis disease including tuberculin skin testing, chest x-ray, and sputum evaluation as indicated.

2. Tuberculin Skin Test (TST) – PPD or Mantoux

(TST result should be recorded as actual millimeters (mm) of induration, transverse diameter; if no induration, write "0". The TST interpretation should be based on mm of induration as well as risk factors.)**

Date Given: ___/___/___ (M D Y) Date Read: ___/___/___ (M D Y) Result: _____mm of induration **Interpretation: positive ___ negative ___

****Interpretation guidelines**

>5 mm is positive in:

- recent close contacts of an individual with infectious TB
- persons with fibrotic changes on a prior chest x-ray, consistent with past TB disease
- organ transplant recipients and other immunosuppressed persons (including receiving equivalent of >15 mg/d of prednisone for > 1 month)
- HIV-infected persons

>10 mm is positive in:

- recent arrivals to the U.S. (>5 years) from high prevalence areas or who resided in one for a significant amount of time
- injection drug users
- mycobacteriology laboratory personnel
- residents, employees, or volunteers in high-risk congregate settings
- persons with medical conditions that increase the risk of progression to TB disease including silicosis, diabetes mellitus, chronic renal failure, certain types of cancer (leukemias and lymphomas, cancers of the head, neck, or lung), gastrectomy or jejunoileal bypass and weight loss of at least 10% below ideal body weight.

>15 mm is positive in:

- persons with no known risk factors for TB

3. Interferon Gamma Release Assay (IGRA)

Date Obtained: ___/___/___ (M D Y) (specify method) ☐ QFT-G ☐ QFT-GIT ☐ other _____

Result: negative ____ positive ____ indeterminate ____

4. Chest X-Ray: Required within 6 months prior to student's arrival on campus if either the TST or IGRA result is positive, there is a past history of a positive tuberculosis test, or is experiencing signs or symptoms of active pulmonary tuberculosis disease.

Date of chest x-ray: ___/___/___ (M D Y) Result: normal ___ abnormal ___

5. Preventive or Therapeutic Tuberculosis Treatment

Medication(s) – Please List:

_____Dates Taken: _____ _____Dates Taken: _____

☐ Treatment offered but student declined. _____

SECTION III - PROVIDER INFORMATION and SIGNATURE REQUIRED:

_____
(Print) Name and Title/Degree of Health Care Provider

_____
Provider Signature

Date Signed: _____

Address: (Please print or stamp)_____

_____

_____

Phone: (_____)

_____ Fax: (

For Administrative Purposes Only:

Form Complete: ___Yes ___No Action Needed: _____Date Reviewed: _____

Reviewer: _____Date Contacted: _____Date Requested Info Received: _____Reviewer: _____

SKIDMORE
COLLEGE

Health Services
815 North Broadway
Saratoga Springs, NY 12866
Phone: (518) 580-5550 Fax: (518) 580-5556

STUDENT NAME: _____

DOB: ___/___/___
MM DD YY

TUBERCULOSIS TESTING – REQUIRED for all international students within 6 months prior to arrival on campus*

*If the student **has ever** had a previous positive tuberculin skin test or IGRA, then a *chest x-ray* within 6 months prior to student's arrival on campus is REQUIRED (item #3) in lieu of testing. All dates should be recorded in the format of *month/day/year.*
Please note: a history of BCG vaccination should NOT preclude testing of a member of a high risk group.

1. Tuberculin Skin Test (TST) – PPD or Mantoux
TST result should be recorded as actual millimeters (mm) of induration, transverse diameter; if no induration, write "0". The TST interpretation should be based on mm of induration as well as risk factors.) *See ** interpretation guidelines on reverse/side 2 of this form.)*

Date Given: ___/___/___ (M D Y) Date Read: ___/___/___ (M D Y)
Result: _____mm of induration **Interpretation: ☐ positive ☐ negative

2. Interferon Gamma Release Assay (IGRA)

Date Obtained: ___/___/___ (M D Y) (specify method) ☐ QFT-G ☐ QFT-GIT ☐ other _____
Result: ☐ positive ☐ negative ☐ indeterminate

3. Chest X-Ray: Required within 6 months prior to student's arrival on campus if either the TST or IGRA result is positive or there is a past history of a positive tuberculosis test

Date of chest x-ray: ___/___/___ (M D Y) Result: ☐ normal ☐ abnormal

4. Preventive or Therapeutic Tuberculosis Treatment:

Medication(s) – Please List:

_____ Dates Taken: _____

_____ Dates Taken: _____

_____ Dates Taken: _____

☐ Treatment offered but student declined. _____

PROVIDER INFORMATION & SIGNATURE REQUIRED

(Print) Name and Title/Degree of Health Care Provider

Provider Signature

Date Signed: _____

Address: (Please print or stamp)

Phone: (_____) _____

Fax: (_____) _____

For Administrative Purposes Only:

Form Complete: ___Yes ___No Action Needed: _____ Date Reviewed: _____

Reviewer: _____ Date Contacted: _____ Date Requested Info Received: _____ Reviewer: _____

**Tuberculosis Skin Test Interpretation Guidelines[i]

tation guidelines:

positive in:
ose contacts of an individual with infectious TB
with fibrotic changes on a prior chest x-ray, consistent with past TB disease
nsplant recipients and other immunosuppressed persons (including receiving equivalent of >15 mg/d of prednisone for > 1 month)
ted persons

s positive in:
rivals to the U.S. (>5 years) from high prevalence areas or who resided in one for a significant* amount of time
drug users
teriology laboratory personnel
, employees, or volunteers in high-risk congregate settings
with medical conditions that increase the risk of progression to TB disease including silicosis, diabetes mellitus, chronic renal failure,

cancer (leukemias and lymphomas, cancers of the head, neck, or lung), gastrectomy or jejunoileal bypass and weight loss of at

eal body weight.

s positive in:
with no known risk factors for TB who, except for certain testing programs required by law or regulation, would otherwise not be

can College Health Association has published guidelines on "Tuberculosis Screening and Targeted Testing of College and University Students." To
uidelines, visit http://www.acha.org/For_Members/Policy_Guideline_index.cfm

Case Study

Entering freshman August 2011, from Zimbabwe

6/21/11 Negative chest x-ray prior to coming to Skidmore (no PPD)

11/13/13– Positive PPD for travel abroad to London in spring 2014, negative chest x-ray, declined prophylactic meds

9/23/14-

Cold symptoms x 5 days

T-98.2

Pulse ox-99%

9/29/14-

Sick for 14 days

T-99.7

Pulse ox-98%

9/30/14-

Intermittent fevers, feels worse at the end of the day

T-100.5

Pulse ox-98%

10/3/14-

Sick for 18 days with URI symptoms

Afebrile

Pulse ox-99%

10/20/14-

Increased cough

T-103.1

Pulse ox-98%

10/22/14-

T-103.1

Chest x-ray ordered-”dense consolidation right upper lobe suspicious for developing infectious process”

To ER

10/29/14-

Re-check, day 5 of antibiotic

T-98.2

Pulse ox– 98%

11/7/14-

Fever last evening, increased cough

T-98.5

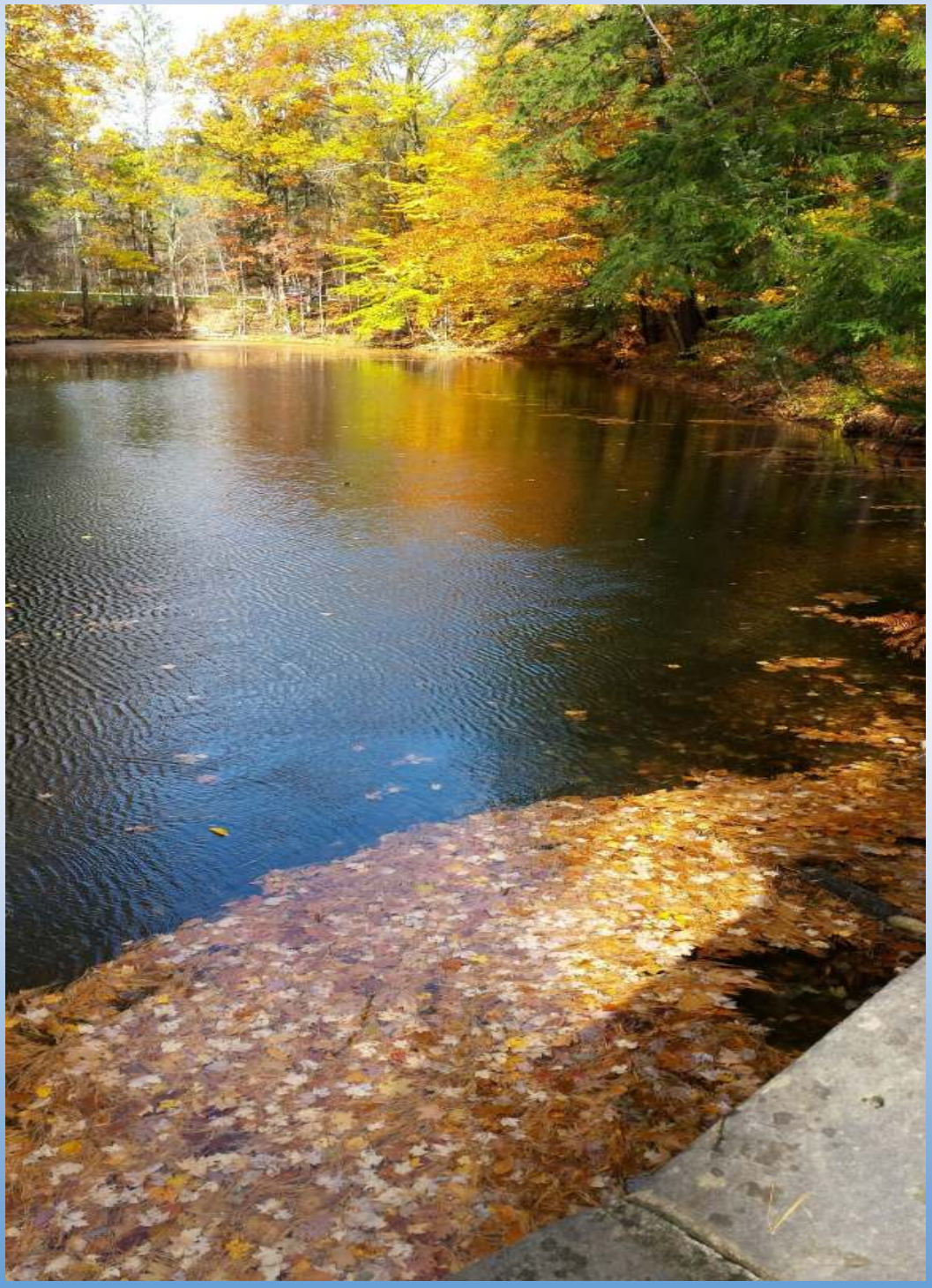
Pulse-136

To ER (please)- “I’ll go tomorrow”

11/8/14-

Back to ER

Admitted



11/24/14-

Notification from Public Health, positive TB

Non-infectious

11/25/14-

Shared information with SAIG and conference call

12/1/14-

Dean of Student Affairs and Communications

12/2 and 12/3/14-

Roommates

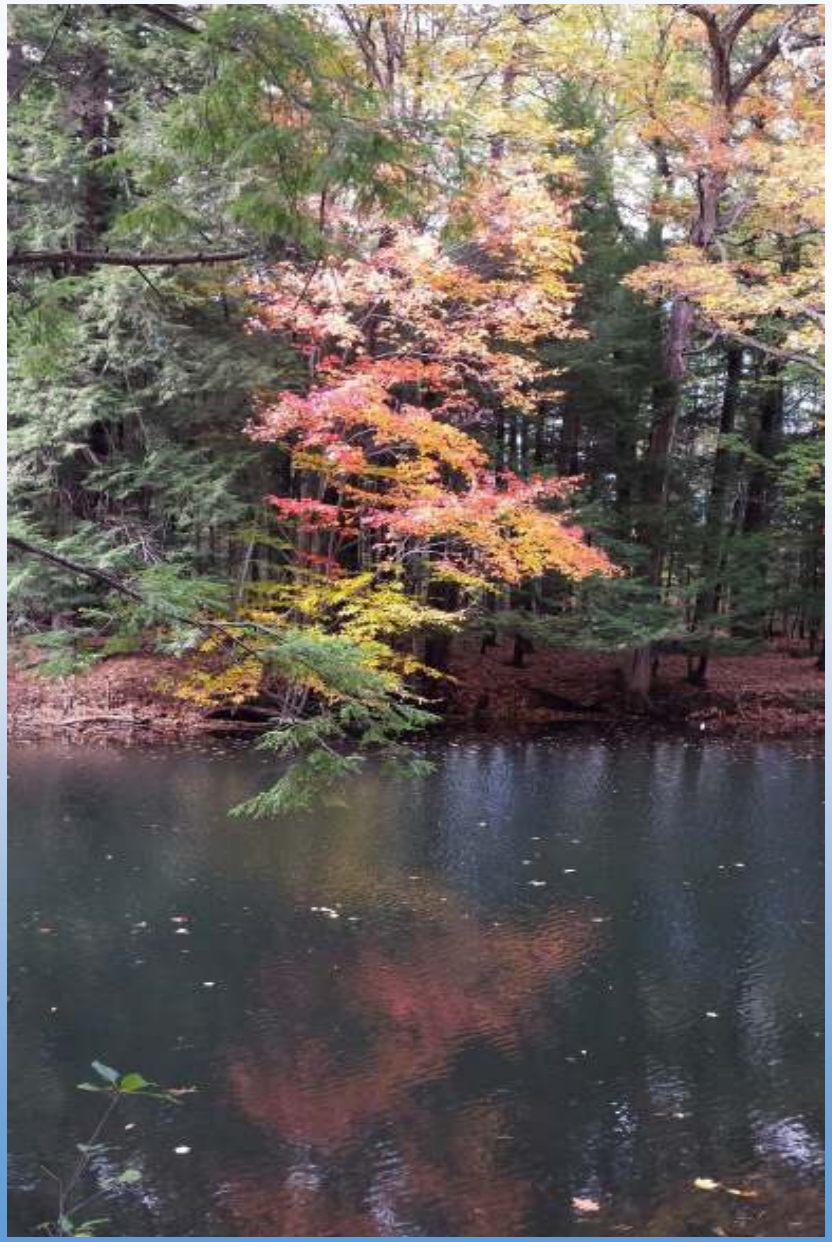
12/4/14-

Discharge from hospital (27 days!)

12/5/14-

Admitted to Public Health

Roommate #2



12/10/14-

Sensitivity results

12/12/14-

Roommate follow-up

Visits to Health Services

9/23/14

9/29/14

9/30/14

10/3/14

10/20/14

10/22/14-To ER, overnight stay

10/29/14

11/7/15

11/8/14– Back to ER-admitted

11/24/14-Positive TB notification from Public Health

12/4/14-Discharge date

12/5/14– Admitted to Public Health, DOT for 6 months

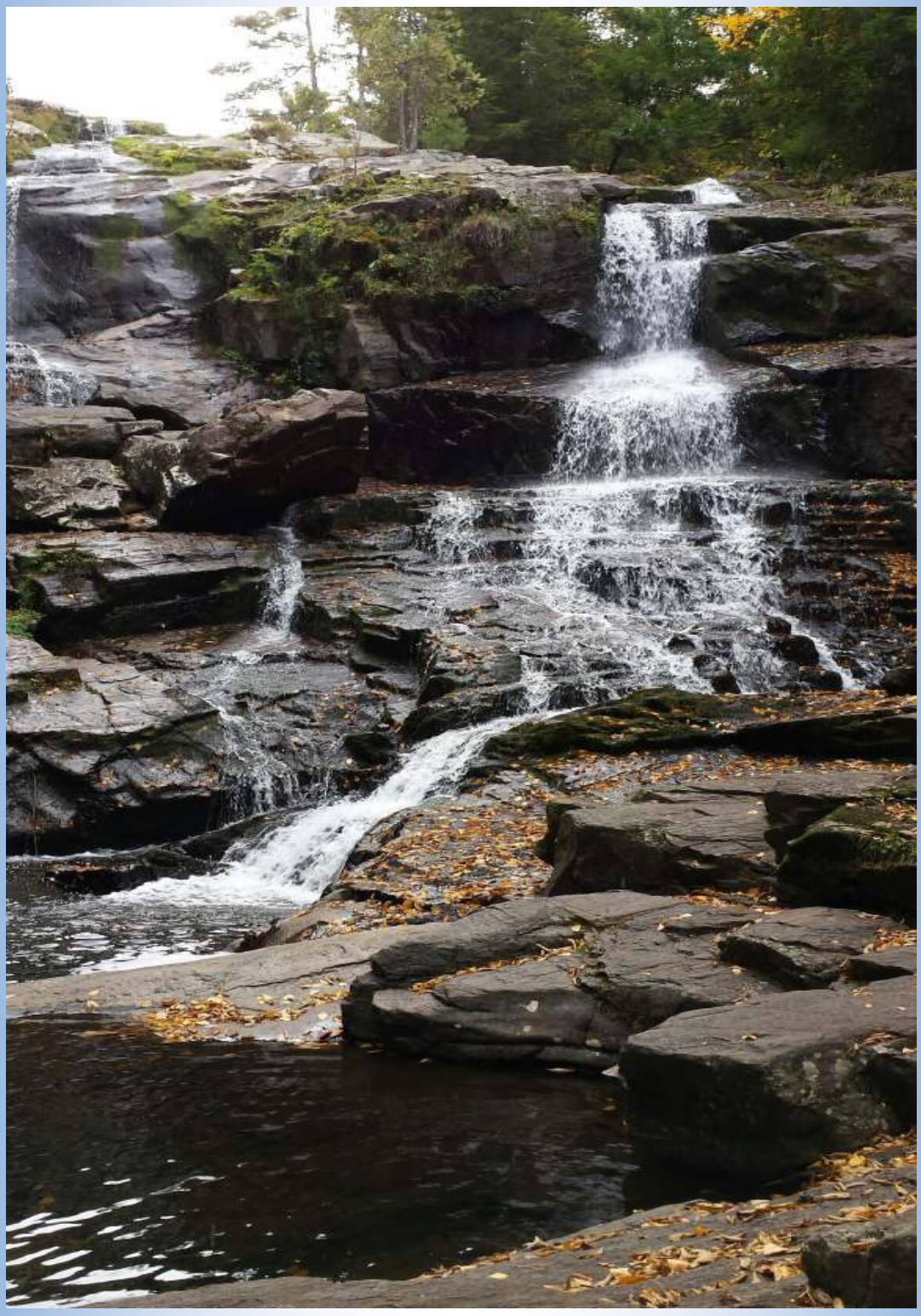
5/15/15-Graduation!!!!!!

Questions/thoughts/what does your campus do?

- Negative pressure room
- PPDs post-travel abroad
- Classroom and housing accommodations
- Isolation versus quarantine
- IGRA

Isolation versus Quarantine

Isolation	Quarantine
Used for:	
People who are ill with contagious diseases	People who have been exposed to a contagious disease, but are not sick
Process:	
Receive care for the disease, with precautions put into place to prevent the spread of disease	Individuals are separated from others who have not been exposed to the disease, and can receive vaccinations, antibiotics, early diagnostic testing, and symptom monitoring
Length:	
Period of infectiousness for the disease	Incubation period of the disease
Location:	
Hospital, care facility, or patient's home	Home, designated emergency facility or specialized hospital



Thank-you!