

ACHA Guidelines

Tuberculosis Screening and Targeted Testing of College and University Students

Purpose

Screening and targeted testing for tuberculosis (TB) is a key strategy for controlling and preventing infection on college and university campuses. Early detection provides an opportunity to promote the health of affected individuals through prompt diagnosis and treatment while preventing potential spread to others. Implementation of a screening and targeted testing program not only addresses this public health concern in campus communities but also contributes to the larger public health goal of reducing the burden of TB in the United States.

The intent of this document is to provide guidelines for screening the incoming student population, targeting those at increased risk for TB testing, and reviewing appropriate follow-up care for students diagnosed with latent TB infection (LTBI) or TB disease.

Definitions

In this document, “screening” refers to the process of identifying persons at high risk for TB infection and disease. Screening is conducted through a questionnaire where the student identifies risk factors for TB infection and disease. “Testing” refers to the testing procedure for diagnosing LTBI, i.e., the Mantoux tuberculin skin test (TST) or the blood test interferon gamma release assay (IGRA).

Another important distinction to make is between “population” risk and “medical” risk. Populations at risk for LTBI or TB disease are identified through epidemiological and population-based studies (see Table 1). A sample screening questionnaire has been developed using population-based risk factors (see Appendix B). It is designed for use by institutions for the incoming student population, in order to appropriately target students at risk for TB who need testing.

Medical risks refer to those factors that place an individual who is infected with TB at high risk for progressing to active disease. Typically, medical risk factors are identified in individuals by health care providers in the clinic setting and testing is performed at the discretion of the provider (see Table 1). A medical risk assessment is available in Appendix C.

Whom to Screen

All incoming students should be screened for risk factors for TB through a screening questionnaire. The United States is primarily a low-incidence country, so most U.S.-born incoming students will not have risk factors for TB and will not need TB testing. However, international students arriving from countries with an increased incidence of TB should be tested because this subpopulation has been identified epidemiologically as having a higher incidence of LTBI and is subsequently at increased risk for developing active TB disease.¹ All incoming students should be screened. Only those students with identifiable risk factors for LTBI and/or TB disease should be tested. Students with a documented previous positive test should not be retested.

High-incidence areas are defined as countries with an annual incidence of TB disease of greater than or equal to 20 cases per 100,000 population. Most countries in Africa, Asia, Central America, Eastern Europe, and South America are included in this definition (see Appendix A). For a current list of high-incidence and low-incidence countries, refer to the World Health Organization (WHO) Global Health Observatory. Incoming students otherwise at low risk should not be tested for TB.

¹ CDC. Controlling Tuberculosis in the United States: Recommendations from the American Thoracic Society, CDC, and the Infectious Diseases Society of America. MMWR November 2005; 54 (No. RR-12): 4-5.

TABLE 1

High-risk groups who should be tested for TB infection and/or progression to TB disease²

**For Tuberculosis Infection
(Population risks):**

- Foreign-born persons who have immigrated within the last 5 years from countries with high incidence of TB disease (see Appendix A)
- Persons with a history of travel* to/in areas with a high incidence of TB disease
- Persons with signs and symptoms of active TB disease
- Close contacts of a person known or suspected to have TB disease
- Employees, residents, and volunteers of high-risk congregate settings (e.g., correctional facilities, nursing homes, homeless shelters, hospitals, and other health care facilities)
- Some medically underserved, low income populations as defined locally
- High-risk racial or ethnic minority populations defined locally as having an increased prevalence of TB disease
- Persons who inject illicit drugs or other groups of high-risk substance users (e.g., crack cocaine)

**The significance of the travel exposure should be discussed with a health care provider and evaluated.*

**For Progression to Tuberculosis Disease
(Medical risks):**

- Persons with HIV/AIDS
- Persons whose TB skin tests (TSTs) have converted to positive (with ≥ 10 mm increase) within the past 2 years
- Persons with a history of inadequately treated TB, including persons with chest radiographic findings consistent with previous TB disease
- Persons who use illicit drugs or other groups of high-risk substance users
- Persons with the following medical conditions that place them at risk for disease if infection occurs: silicosis, diabetes mellitus, end stage renal disease/chronic renal failure, some hematologic disorders (e.g., leukemias and lymphomas), other malignancies (e.g., carcinoma of head, neck, or lung), low body weight ($\geq 10\%$ below ideal body weight), prolonged corticosteroid use (e.g., prednisone 15 mg/d for 1 month), use of other immunosuppressive treatments (e.g., tumor necrosis factor-alpha [TNF- α] antagonists), organ transplantation, gastrectomy or jejunioileal bypass, chronic malabsorption syndromes

Continuing students should be tested only when their activities place them at risk for a new infection or to meet an academic programmatic requirement. While it would be welcomed, no evidence-based data exists that identifies the amount of time spent in a given high-risk country that constitutes significant exposure. Students should discuss the specific travel circumstances with a health care provider who would then determine the appropriate evaluation.

Activities that may result in increased risk may include, but are not limited to, volunteering, conducting research, mentoring, studying abroad, traveling, visiting relatives, or employment which may involve close contact with individuals in areas with increased incidence of TB whether domestically or internationally (see Appendix A). Sponsors of these programs or health care providers caring for these students prior to the activity should

inform students of this risk and recommend testing 8 to 10 weeks afterwards.

Health profession students, whether incoming or continuing, should be tested annually.

In the clinical setting, health care providers are encouraged to identify students who are at increased risk of LTBI or TB disease through screening and to test students at risk using tuberculin skin test (TST) or interferon gamma release assays (IGRAs) as part of a routine evaluation.

When to Screen and Test

TB screening should occur by questionnaire prior to arrival on campus in conjunction with verification of prematriculation immunization requirements. TB testing, directed at high-risk students only, should take place no sooner than 3-6 months prior to college entrance and should be completed by the second quarter/semester registration.

How to Test

Tuberculin Skin Test (TST)

At the present time, the Mantoux test is the only acceptable TST. To perform this test, inject 0.1 ml of

² Adapted from: CDC. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings, 2005. MMWR December 2005; 54 (No. RR-17): 4-5; CDC. Core curriculum on Tuberculosis: What the clinician should know. 4th ed. Atlanta, GA: US Department of Health and Human Services, CDC, 2000; CDC. Guide for primary health care providers: Targeted tuberculin testing and treatment of latent tuberculosis infection. MMWR June 2000; 49 (No. RR-6): 7-9.

purified protein derivative (PPD) tuberculin containing 5 tuberculin units (TU) intradermally into the volar (inner) surface of either forearm.

A history of BCG vaccination should **not** preclude tuberculin skin testing of students.

TST can be administered during pregnancy.

If a student has recently received a live virus vaccination, skin testing should be delayed for 4-6 weeks after the student received the vaccination. However, a TST can be performed on the same day as live virus administration without compromising the integrity of the result.

Two-step testing is particularly important and should be considered for the initial skin testing of persons who will be retested periodically, e.g., all health profession students, workers, and volunteers. Two-step testing is more reliable in identifying remote infection (e.g., infection in childhood). If the first test is positive, the person should be considered infected. If the first test is negative, a repeat test should be administered 1-3 weeks later. If the second test is positive, consider the person infected. If there is documentation of a negative TST within the prior 12 months, only one TST needs to be done, and this is considered the second of the two-step tests.

Interferon Gamma Release Assays (IGRAs)

At the present time, the IGRA method may be used in all circumstances in which the TST is currently used. The U.S. Centers for Disease Control and Prevention (CDC) TB infection control guidelines², indicates that IGRAs should be used with caution in immunocompromised patients as this method has not been studied extensively in this group.

In direct comparisons, the sensitivity of the IGRA is similar to that of TST in infected persons with culture-positive TB. The IGRAs are expected to be more specific than the TST as they will not react to BCG vaccine or to many commonly encountered nontuberculous mycobacteria. Updated 2010 guidelines³ suggest that IGRAs may be preferred for testing persons who have received BCG and persons unlikely to return for TST reading. Multiple additional recommendations are provided that address quality control, test selection, and medical management after testing.

Although routine testing with both TST and IGRA is not recommended there are situations when results from **both** tests may be useful³:

- When the initial test is **negative** and
 - high risk for infection, progression to disease, and poor outcome (e.g., persons with HIV) are increased
 - clinical suspicion for TB disease and confirmation of M. tuberculosis infection is desired; in this case having a positive result from the second test as evidence of infection increases detection sensitivity
- When the initial test is **positive** and
 - additional evidence of infection is required to encourage acceptance and adherence (e.g., in foreign-born persons who attribute a positive TST to prior BCG vaccination)

Two-step testing is not needed with IGRAs. The effect of live virus administration in IGRA results has not been fully investigated.

How to Interpret the TST

The TST should be read 48 to 72 hours after injection of PPD by measuring the transverse diameter of the induration across the forearm, perpendicular to the long axis. Redness or bruising is not measured.

The results are recorded in millimeters (mm) of induration. If no induration is present, "0 mm" is recorded.

Interpretation of the TST depends on both the millimeters of induration and the factors related to risk of exposure to TB disease and risk for progression to TB disease once infected.

>5mm is positive in the following:

- recent close contacts of an individual with infectious TB disease
- persons with fibrotic changes on a prior chest x-ray, consistent with past TB disease
- organ transplant recipients
- immunosuppressed persons: taking equivalent of >15 mg/d of prednisone for >1 month; taking TNF- α antagonist.
- persons with HIV/AIDS

³ Updated Guidelines for Using Interferon Gamma Release Assays to Detect Mycobacterium tuberculosis Infection – United States, 2010. MMWR 2010; 59 (RR-5); 1-25.

>10mm is positive in the following:

- persons born in a high prevalence country or who resided in one for a significant* amount of time
- history of illicit drug use
- mycobacteriology laboratory personnel
- history of resident, worker, or volunteer in high-risk congregate settings
- persons with the following clinical conditions: silicosis, diabetes mellitus, chronic renal failure, leukemias and lymphomas, head, neck, or lung cancer, low body weight (>10% below ideal), gastrectomy or intestinal bypass, chronic malabsorption syndromes

>15mm is positive in the following:

- persons with no known risk factors for TB disease

**The significance of the exposure should be discussed with a health care provider and evaluated.*

What to do When the TST or IGRA Is Positive

Persons with a positive TST or IGRA must undergo chest radiography and medical exam. If any x-ray changes or signs and symptoms of active TB are identified, active TB disease must be excluded.

If the chest x-ray and medical exam are normal, treatment for LTBI should be recommended since this greatly reduces the risk of TB infection progressing to TB disease in the student and serves to reduce the burden of TB in the U.S. Treatment is most important for those with a particularly high risk for progression from latent infection to active disease including individuals who had a TST conversion within 2 years and those with HIV/AIDS or other clinical conditions associated with suppressed immunity (see “Whom To Screen”). Treatment with INH daily for nine months is the preferred regimen; however other regimens may be appropriate⁴.

Completion of treatment should be a high priority and should be supported by providing education in the student's primary language, insuring confidentiality, offering incentives to mark treatment milestones, and case management by a culturally competent health care provider to build trust and gain buy-in.

Laboratory testing should be performed for patients who are taking treatment for LTBI to evaluate possible adverse reactions. Routine laboratory monitoring of ALT, AST, and bilirubin during treatment of LTBI is indicated only for students

- with a history of liver disorder,
- with a risk of hepatic disease,
- who regularly use alcohol,
- with HIV/AIDS,
- who are pregnant or up to three months postpartum, or
- who are taking medications with a potential for liver toxicity⁵.

All others receiving treatment for LTBI need only monthly review of symptoms to monitor for medication side effects.

Post-treatment follow up should include providing the student documentation of TST or IGRA results, chest radiograph results, and the dosage and duration of medication treatment. Students who have completed LTBI therapy, as well as those who elected not to take therapy, should be educated regarding signs and symptoms of TB disease and instructed to seek medical care immediately upon developing any of the signs or symptoms of TB.

Additional Resources *(in addition to footnotes)*

ATS/CDC/IDSA. Treatment of Tuberculosis. MMWR June 2003; 52 (No.RR-11).

Francis J. Curry National Tuberculosis Center: TB Program Manual Template. (www.nationaltbcenter.edu/resources/tb_manual_template.cfm/)

Heartland National TB Center: Model Tuberculosis Prevention Program for College Campuses, June 007 Edition (www.heartlandntbc.org/products/model_tb_prevention_program_college_campuses.pdf)

⁴ Guide for Primary Health Care Providers: Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection. www.cdc.gov/tb/pubs/LTBI/treatment.htm.

⁵ Official ATS Statement: Hepatotoxicity of Antiuberculosis Therapy, Am J Respir Crit Care Med, vol 174, pp 935 – 952, 2006.

APPENDIX A

Countries with Estimated or Reported Tuberculosis Incidence, 2009

(Source: World Health Organization Global Health Observatory, Tuberculosis Incidence 2009.)

For future updates, refer to <http://apps.who.int/ghodata/?vid=510>

“High Incidence” areas are defined as areas with reported or estimated incidence of ≥ 20 cases per 100,000 population

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

“Low Incidence” areas are defined as areas with reported or estimated incidence of < 20 cases per 100,000 population

Albania, Andorra, Antigua and Barbuda, Australia, Austria, Bahamas, Barbados, Belgium, British Virgin Islands, Canada, Chile, Costa Rica, Cuba, Cyprus, Czech Republic, Denmark, Dominica, Egypt, Fiji, Finland, France, Germany, Greece, Grenada, Hungary, Iceland, Iran (Islamic Republic of), Ireland, Israel, Italy, Jamaica, Jordan, Lebanon, Luxembourg, Malta, Mexico, Nauru, Netherlands, New Zealand, Norway, Oman, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Samoa, Saudi Arabia, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom, United States of America, West Bank and Gaza Strip

APPENDIX B

Tool for Institutional Use to be Completed by Incoming Students

Tuberculosis (TB) Screening Questionnaire

Please answer the following questions:

- Have you ever had a positive TB skin test? Yes No
- Have you ever had close contact with anyone who was sick with TB? Yes No
- Were you born in one of the countries listed below and arrived in the U.S. within the past 5 years? (If yes, please CIRCLE the country) Yes No
- Have you ever traveled* to/in one or more of the countries listed below? (If yes, please CHECK the country/ies) Yes No
- Have you ever been vaccinated with BCG? Yes No

* The significance of the travel exposure should be discussed with a health care provider and evaluated.

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

Source: World Health Organization Global Health Observatory, Tuberculosis Incidence 2009. Countries with incidence rates of ≥ 20 cases per 100,000 population. For future updates, refer to <http://apps.who.int/ghodata/?vid=510>

If the answer is YES to any of the above questions, [insert your college/university name] requires that a health care provider complete a tuberculosis risk assessment (to be completed within 6 months prior to the start of classes).

If the answer to all of the above questions is NO, no further testing or further action is required.

3. Interferon Gamma Release Assay (IGRA)

Date Obtained: / / (specify method) QFT-G QFT-GIT T-Spot other
 M D Y

Result: negative positive indeterminate borderline (T-Spot only)

Date Obtained: / / (specify method) QFT-G QFT-GIT T-Spot other
 M D Y

Result: negative positive indeterminate borderline (T-Spot only)

4. Chest x-ray: (Required if TST or IGRA is positive)

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

****Interpretation guidelines**

>5 mm is positive:

- 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
- Immunosuppressed persons: taking > 15 mg/d of prednisone for > 1 month; taking a TNF- α antagonist
- Persons with HIV/AIDS

>10 mm is positive:

- Persons born in a high prevalence country or who resided in one for a significant* amount of time
- History of illicit drug use
- Mycobacteriology laboratory personnel
- History of resident, worker, or volunteer in high-risk congregate settings
- Persons with the following clinical conditions: silicosis, diabetes mellitus, chronic renal failure, leukemias and lymphomas, head, neck or lung cancer, low body weight (>10% below ideal), gastrectomy or intestinal bypass, chronic malabsorption syndromes

>15 mm is positive:

- Persons with no known risk factors for TB disease

**The significance of the exposure should be discussed with a health care provider and evaluated.*

END of SAMPLE FORM

If reproduced for use by a college or university health center, please insert your health center's contact information.
This form should not be returned to ACHA.

*Prepared originally by ACHA's Tuberculosis Guidelines Task Force
Revised by Emerging Public Health Threats and Emergency Response Coalition*

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