

# Lab Focus

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## Q & A . . .

### Reference Laboratory Selection

Q: How do I request a test be sent to a specific laboratory?

A: Individual physicians do not have the option of referring laboratory tests to specific reference laboratories. According to Joint Commission on Accreditation of Health Care Organizations (JCAHO) regulations, selection of reference laboratories is the responsibility of the executive medical staff. Following an evaluation by Fairview's system-wide Integrated Laboratory Services Committee (ILSC), the executive medical staff committees at all Fairview hospitals approved the ILSC recommended reference laboratories: ARUP Laboratories, located in Salt Lake City, Utah, and MedTox in St. Paul, Minnesota, for toxicology testing. A limited number of rare tests are referred to other predetermined, medical executive committee-approved laboratories, which generally offer only one or two highly specialized tests.

In addition to the accrediting organizations' rules, with the advent of a single laboratory information system and soon Fairview Clinical Information System (FCIS) order entry, the clinical laboratories at the different Fairview hospitals are not able to maintain multiple reference laboratory options, which may lead to incorrect testing.

Nevertheless, if there are compelling clinical reasons for a certain specimen or group of specimens, for example pediatric patients or patients with a specific disease, the physician should contact the medical director of the most appropriate lab, or myself.

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## *Bacillus anthracis*

Fairview Laboratories will follow appropriate protocols for identification of *Bacillus anthracis* on any clinical patient request. For clinical patient specimen requests, contact the following laboratories:

- Fairview Lakes at 651-982-7220
- Fairview Northland at 763-389-6391
- Fairview Southdale at 952-924-5150
- Fairview-University at 612-273-3665

Refer any non-patient specimens, such as suspicious powders, etc., to the Minnesota Department of Health (612-676-5414 or 1-877-677-5414).

The Centers for Disease Control and Prevention (CDC) is stepping up efforts to ensure that America's public health system can identify and manage any bioterrorist event that may occur on United States soil. CDC released an alert asking clinical laboratories across the country to familiarize themselves with CDC protocols for anthrax, as well as other agents that could potentially be used in a bioterrorist attack.

The anthrax protocol, excerpted below, and edited by us, can be found in its entirety on the Internet at <http://www.bt.cdc.gov/Agent/Anthraxis20010417.pdf>. The protocol was revised and released in April. Other CDC screening algorithms for chemical agents and biological diseases are also available on the Internet at <http://www.bt.cdc.gov/Agent/Agentlist.asp>.

## Basic Laboratory Protocols for the Presumptive Identification of *Bacillus anthracis*

### Centers for Disease Control and Prevention (CDC)

Anthrax is a zoonotic disease that is transmissible to humans through handling or consumption of contaminated animal products.

The etiological agent of anthrax, *B. anthracis*, is spore forming gram-positive bacillus. *B. anthracis* spores can remain viable in soil for many years.

Humans can become infected with *B. anthracis* by handling products or consuming undercooked meat from infected animals. Infection may also result from inhalation of *B. anthracis* spores from contaminated animal products such as wool, or through the intentional release of spores during a bioterrorist attack. Human-to-human transmission has not been reported. Three forms of anthrax occur in humans: cutaneous, gastrointestinal and inhalational.

### Cutaneous anthrax

Cutaneous infections occur when the bacterium or spore enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather, or hair products (especially goat hair) from infected animals. Skin infections begin as a raised itchy bump or papule that resembles an insect bite. Within one to two days, the bump develops into a fluid-filled vesicle, which ruptures to form a painless ulcer (called an eschar), usually 1 to 3 cm in diameter, with a characteristic black necrotic (dying) area in the center. Pronounced edema is often associated with the lesions because of the release of edema toxin by *B. anthracis*. Lymph glands in the adjacent area may also swell. Approximately 20 percent of untreated cases of cutaneous anthrax result in death either because the infection becomes systemic or because of respiratory distress caused by edema in the cervical and upper thoracic regions. Deaths are rare following appropriate antibiotic therapy, with lesions becoming sterile within 24 hours and resolving within several weeks.

### Gastrointestinal anthrax

The gastrointestinal form of anthrax may follow the consumption of contaminated meat from infected animals and is

characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting and fever are followed by abdominal pain, vomiting of blood and severe diarrhea. The mortality rate is difficult to determine for gastrointestinal anthrax, but is estimated to be 25 to 60 percent.

### **Inhalational anthrax**

This form of anthrax results from inhaling *B. anthracis* spores, and is most likely to occur following an intentional aerosol release of *B. anthracis*. After an incubation period of one to six days (depending on the number of inhaled spores), disease onset is gradual and nonspecific. Fever, malaise, and fatigue may be present initially, sometimes in association with a nonproductive cough and mild chest discomfort. These initial symptoms are often followed by the abrupt development of severe respiratory distress and dyspnea (labored breathing), diaphoresis (perspiration), stridor (high pitched whistling respiration), and cyanosis (bluish skin color). Shock and death usually occur within 24 to 36 hours after the onset of respiratory distress, and in later stages, mortality approaches 100 percent despite aggressive treatment. Physical findings are usually nonspecific. The chest X-ray is often pathognomonic (disease-specific), revealing a widened mediastinum with pleural effusions, but typically without infiltrates.

*B. anthracis* can be detected by Gram stain of the blood and by blood culture with routine media, but often not until late in the course of the illness. Only vegetative encapsulated bacilli are present during infection. Spores are not found within the blood, partially because CO<sub>2</sub> levels in the body inhibit sporulation. Studies of inhalation anthrax in non-human primates (i.e. rhesus monkeys) showed that bacilli and toxins appear in the blood within two to three days of exposure. The appearance of toxins coincides with the appearance of bacilli in the blood, and tests are available at the CDC to detect toxins rapidly.

### **Antibiotic therapy**

Most *B. anthracis* strains are sensitive to a broad range of antibiotics. Penicillin, ciprofloxacin, or doxycycline are recommended usually for the treatment of anthrax. To be effective, treatment should be initiated early. If left untreated, the disease is highly fatal.

### **Anthrax vaccine**

An anthrax vaccine for humans is licensed for use in the United States. The vaccine is a cell-free filtrate that contains protective antigen and alum. The vaccine is reported to be 93 percent effective in protecting against cutaneous anthrax. Animal studies have suggested that the vaccine may also be protective against aerosol challenge. The anthrax vaccine has been distributed in the past, primarily to the military, by BioPort Corporation, Lansing, Michigan.

*B. anthracis* is considered a potential biological warfare threat agent. The U.S. Department of Defense recommends anthrax vaccination of all U.S. active duty military personnel. No vaccine has been distributed since 1999 because of FDA restrictions on vaccine lot release.

### **Collection of Clinical Specimens**

#### Materials

Sputum cup  
Sterile cotton swabs  
Blood culture collection kit  
Stool collection cup

#### Cutaneous anthrax

Vesicular stage: The organism is best demonstrated at this stage. Soak two dry sterile swabs in vesicular fluid from a previously unopened vesicle.  
Eschar stage: Rotate two swabs beneath the edge of the eschar without removing the eschar.  
Open Wounds: Obtain two swabs.

#### Gastrointestinal anthrax

If the patient is able to produce a stool specimen, stool cultures should be performed. In later stages of disease, blood cultures will yield the organism, especially if specimens are obtained prior to antibiotic treatment.

### Inhalation anthrax

If respiratory symptoms are present and sputum is being produced, obtain a specimen for culture and smear. In later stages of disease (two to eight days post exposure), blood cultures may yield the organism, especially if specimens are drawn before antibiotic treatment.

### Exposure to anthrax by aerosol

Obtain two swabs of the nasopharynx, one for a Gram stain and one for culture.

*Patricia Ferrieri, M.D., Medical Director,  
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## **Fairview Metro Clinics Implement New Prothrombin Instrument**

What began as a search for a better point of care instrument for prothrombin times has turned out to be a great customer service success. Our new prothrombin time instrument used in monitoring coumadin therapy has been well received by patients, providers and staff throughout the metro clinics.

The new instrument allows us to perform a fingerstick instead of a venipuncture to obtain a specimen. In many cases a fingerstick is less painful and quicker. Hard to draw elderly patients can require several venipuncture attempts and may take up to 15 minutes to obtain a specimen. With the new instrument, we are finished with the blood collection and the test in less than three minutes. The provider gets quicker turnaround times, the lab staff saves time, and the patient undergoes a less painful procedure. The International Technidyne Corporation instrument has a sensitive thromboplastin with an ISI of 1.0.

*Edrie Murphy,  
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