



Rapid Detection
for the
Public's Protection

Inside this issue:

[Food Testing Enhancements at the State Laboratory](#) 1

[Laboratory Receives Praise for Mycobacterium tuberculosis Testing](#) 2

[Contaminant Corner: Selenium](#) 3

[Calendar of Training Events](#) 4



The Laboratory Reporter

A publication of the Colorado State Public Health Laboratory

Food Testing Enhancements at the State Laboratory

by Laurie Peterson-Wright, Laboratory Services Division Chemistry Program manager

The chemistry lab in the Laboratory Services Division at the Colorado Department of Public Health and Environment recently was awarded a grant from the U.S. Food and Drug Administration (FDA) to enhance food safety.

The grant provides funding to the chemistry laboratory for facility upgrades, supplies and personnel, training in current food testing procedures, testing method development and validation, proficiency testing, and food defense surveillance assignments.

In the event of a large-scale chemical terrorism event affecting food, the Colorado chemistry laboratory may be required to perform selected chemical tests of food samples collected by the FDA or provided by other government agencies through the FDA.

The following equipment has been provided to the laboratory for the two-year grant period:



CEM Mars Xpress microwave for high throughput sample digestion of up to 40 food samples. Other applications include extraction, hydrolysis and synthesis.



Thermo Scientific LCQ XL mass spectrometer with ion trap technology equipped with an Agilent 1200 liquid chromatograph for molecular fingerprinting and identification of toxins and poisons. The system can analyze 96 samples per analytical run.



Agilent 7890A gas chromatography system with an Agilent 5975C inert mass spectrometer to analyze food and beverages for volatile and semi-volatile contaminants. The automated sample system can process up to 100 samples.



Agilent 7500 Series Inductively Couple Plasma mass spectrometer for screening foods for acutely dangerous levels of toxic elements. The autosampler can accommodate up to 170 samples.



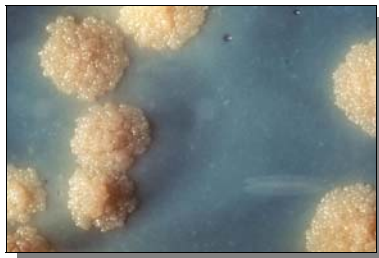
MDS Spectrax M5 with scanwasher, an Enzyme-Linked ImmunoSorbent Assay system to detect pesticide residues, mycotoxins and allergens in food. The system can process 96 samples.



After all the equipment is installed and general training is provided onsite, two analysts will be provided with FDA method-specific training for each analytical platform.

The Colorado chemistry laboratory is part of the Food Emergency Response Network. The network's mission is to integrate the nation's food-testing laboratories at the local, state and federal levels into a network able to respond to emergencies involving biological, chemical or radiological food contamination. The network can respond to emergencies related to agents in food and restore the public's confidence in the food supply.





Mycobacterium tuberculosis bacteria demonstrating a colorless rough surface growing on nutrient agar.
-CDC/Dr. George Kubica

Facts About TB

Tuberculosis, often referred to as TB, is a serious respiratory disease which is spread through the air from person to person.

Transmission of the disease occurs when an infected person coughs or sneezes. TB is not transmitted by shaking hands, sharing food or eating utensils.

Infants, elderly persons or those with cancer or HIV are more susceptible to contracting TB when exposed to it, due to their weaker immune systems.

Symptoms of TB include a severe cough with chest pain lasting longer than 3 weeks, coughing up blood, unintentional weight loss, weakness, chills, fever and night sweats.

While TB can be successfully prevented, treated and cured, some new drug-resistant strains of TB have emerged causing treatment challenges.



Physicians use a chest x-ray, TB skin test and laboratory tests to diagnose TB.

Laboratory Receives Praise for *Mycobacterium tuberculosis* Testing

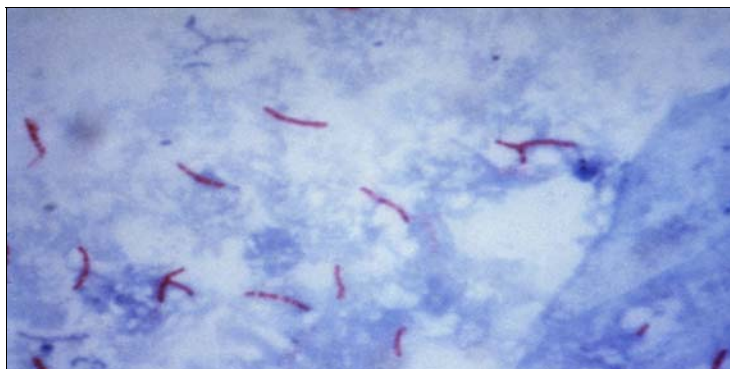
by Laura Gillim-Ross, PhD, Public Health Microbiology/Serology Supervisor

The public health microbiology laboratory at the state laboratory performs testing for *Mycobacterium tuberculosis* (MTb) as part of the Centers for Disease Control and Prevention (CDC) Tuberculosis Elimination Cooperative Agreement for public health entities and for private customers such as local hospitals and clinics. Specimens appropriate for MTb testing include sputum, urine, gastric washes, wound aspirates, blood and feces. The laboratory has received praise from both internal and external customers for its accuracy and rapid results turn-around time. Acid-fast staining (smear) and inoculation for culture are performed daily on specimens received by the laboratory by 11 a.m., and smear results are available by 4 p.m.

Direct nucleic amplification for MTb was incorporated into the laboratory's testing algorithm in 2005. This assay is routinely performed on both smear positive sputum specimens and smear negative sputum specimens originating from patients suspected of having the disease. Nucleic acid amplification results are available within 24-48 hours of receipt of a specimen, allowing for quicker clinical decisions in patient treatment. Nucleic acid probe testing is performed on culture positive specimens, allowing for the identification of MTb complex or *Mycobacterium avium* complex (MAC) positive specimens.

The laboratory also performs antibiotic susceptibility upon request and routinely provides reference services (identification and antibiotic susceptibility testing) to hospital laboratories that do not have the DNA probe or amplification testing capability. A greater number of these facilities have come to rely on the services of the Colorado Department of Public Health and Environment laboratory and have been able to obtain identification reports much more quickly to provide guidance in patient management decisions. Telephone or fax test reports are made to submitting agency clinicians, the department's Tuberculosis (TB) Program, and typically a local health department at the time of detection.

Infrequently, isolates other than MTb and MAC are referred to the Mycobacteriology Laboratories of the CDC and, on specific request of the TB Program, to National Jewish Center for identification. For more information on *Mycobacterium tuberculosis* testing, please contact Dr. Laura Gillim-Ross, 303-692-3484 or laura.gillim-ross@state.co.us.



Acid-fast staining of patient sputum reveals the presence of red, beaded TB bacteria which have absorbed the staining dye.
-CDC/Dr. George P. Kubica

Contaminant Corner: Selenium

by Laurie Peterson-Wright, Laboratory Services Division Chemistry Program manager

What is selenium?

Selenium is a naturally occurring substance commonly found in sedimentary rock. Selenium is not often found in its pure form but is usually combined with other substances. Much of the selenium in rocks is combined with sulfide minerals or with silver, copper, lead and nickel minerals.

Where is selenium found in Colorado?

The highest concentrations of selenium in groundwater have been found in shallow wells located in the soil overlying the Mancos shale layer of marine muds and sand deposited during the Cretaceous age. Mancos shale outcrops are found on the Colorado Plateau and also on the floors of the Mancos River Valley surrounding Mesa Verde, the Grand Valley, the Gunnison Valley between Delta and Montrose, and the high plateaus of southwest Colorado.

Investigations by the National Irrigation Water Quality Program and the United States Geological Survey in 1987-88 indicate that irrigation water from the Uncompahgre Project might be a source of selenium in the Gunnison and Uncompahgre rivers and Sweitzer Lake. [Click to read more about the Uncompahgre project.](#)



How can I be exposed to selenium?



Humans are exposed daily to selenium in their food. Estimates of the average intake of selenium from food for the U.S. population range from 0.071 to 0.152 milligrams of selenium per person per day (mg selenium/day). Most of the daily intake of selenium comes from eating grains, cereals and meat.

Plants easily take up selenium compounds from water. In soils that contain high levels of selenium, some plants can build up selenium to levels that are harmful to livestock feeding on these plants. In these areas, humans can be exposed to too much selenium if they eat locally grown grains and vegetables that have built up high levels of selenium. In fresh water containing high levels of selenium, fish may contain elevated levels of selenium.

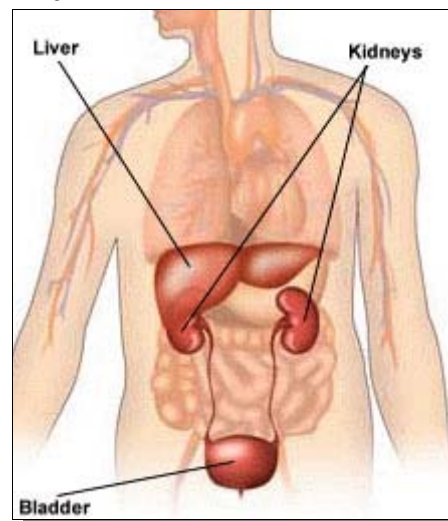
Humans also can be exposed to selenium in drinking water, but less than 1 percent of the daily intake of selenium is estimated to come from drinking water.

What are the health effects of selenium?

Selenium is an essential element for humans and helps prevent damage by oxygen to tissues. However, selenium is harmful to humans when consumed in amounts that are not much higher than the amounts needed for good nutrition.

Selenium is an essential nutrient at low levels. However, the Environmental Protection Agency (EPA) has found selenium to potentially cause the following short-term health effects when people are exposed to it at elevated levels for relatively short periods of time: hair and fingernail changes, damage to the peripheral nervous system, fatigue and irritability.

Selenium has the potential to cause the following effects from a lifetime exposure at levels above the maximum contaminant level: hair and fingernail loss and damage to kidney and liver tissue and the nervous and circulatory systems.



Three organs (liver, kidneys and bladder) are major targets of toxic chemicals.

(Continued on page 4)



LABORATORY SERVICES DIVISION

8100 Lowry Boulevard
Denver, CO 80230
Phone 303-692-3090
Order Line 303-692-3074

Online ordering for testing supplies:
www.coloradostatelab.us

24-hour Emergency Line 877-518-5608

E-mail: cdphe.lab@state.co.us

Website: www.coloradostatelab.us

Business Hours: 8 a.m. - 5 p.m.
Monday through Friday
Closed holidays.



Mission

The mission of the Laboratory Services Division is to protect the health, safety, and environment of all Coloradoans by providing accurate and timely laboratory analyses and information.

Testing Services Include:

Drinking water testing (lead, nitrites and more)
Newborn Screening (38 disorders)
Tuberculosis, Parasite Identification, Confirmation of food poisoning bacteria (and more)
Human Immunodeficiency Virus (HIV)
Influenza (and other respiratory viruses)
Preparedness (Anthrax, Plague, and more)
Food and Milk Bacterial Contaminants

Visit our website for more information:
www.coloradostatelab.us

Division Director:

David A. Butcher, MBA, MT(ASCP) SM

Editor/Graphic Design:

Suzanne Kelley, MEd, MT(ASCP)

Newsletter contributors:

Laura Gillim-Ross, PhD
Laurie Peterson-Wright, MS

Calendar of Training Events

More information and registration at: <https://www.co.train.org>

Training below offered at the State Public Health Lab unless otherwise noted

Annual Ethics Training for Environmental Labs

March 12th—11 a.m. - 12 p.m.

Method Development—Agilent Liquid Chromatography Series

March 18th—12 p.m. - 1 p.m.

Selection of a Capillary GC Column—Agilent Gas Chromatography Series

March 19th—12 p.m. - 1 p.m.

Plasmodium knowlesi: Simian malaria in humans

March 25th—11 a.m. - 12 p.m.

Contaminant Corner: Selenium *continued*

Why is selenium regulated?

The limit for selenium has been set at 0.01 parts per million (ppm) because EPA believes this level of protection would not cause any of the potential health problems described on page 3.

The Food and Drug Administration allows a selenium level of 0.010-ppm in bottled water.

How will I know if selenium is in my drinking water?

If levels of selenium exceed the maximum contaminant level, public water systems must notify the public via newspapers, radio, TV and other means.

Private well owners should have their wells tested by a certified laboratory. The chemistry laboratory of the Colorado Department of Public Health and Environment is EPA-certified to test drinking water for selenium. Click for a list of other certified drinking water labs. Please contact Laurie Peterson-Wright for more information at 303-692-3039 or laurie.peterson-wright@state.co.us.

References for Contaminant Corner:

United States Environmental Protection Agency (EPA)

Toxicological Profile for Selenium December 1989

Agency for Toxic Substances and Disease Registry

United States Public Health Service

National Irrigation Water Quality Program

U.S. Department of the Interior

Distribution and Mobilization of Dissolved Selenium in Ground Water of the Irrigated Grand and Uncompahgre Valleys, Western Colorado

Winfield G. Wright

David L. Butler, U.S. Geological Survey

Reconnaissance Investigation of Water Quality, Bottom Sediment, and Biota Associated with Irrigation Drainage in the Gunnison and Uncompahgre River Basins and at Sweitzer Lake, West-Central Colorado, 1988-89

David L. Butler, U.S. Geological Survey

Richard P. Krueger, U.S. Fish and Wildlife Service

Barbara Campbell Osmundson, U.S. Fish and Wildlife Service

Andrew L. Thompson, U.S. Fish and Wildlife Service

Steven K. McCall, U.S. Bureau of Reclamation