

North Dakota Department of Health
Division of Laboratory Services
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The MicroChem Connection

April 2011

National Chemistry Week

National Chemistry Week was celebrated in October 2010 with the theme of “Behind the Scenes with Chemistry.” Several events were held throughout the week including guessing games, movie trivia, a picture quiz and fun and educational presentations. Employees were able to create their own Slime, Shrinky Dink™ Halloween creations and watch Oozing Pumpkins created by staff. You will find the Oozing Pumpkins recipe below in case you’d like to try it!

Next, pour 30 percent hydrogen peroxide, approx. 30 to 50 mL, into the flask. Add five drops of both dish soap and food coloring to it and mix well. Place the hydrogen peroxide mixture inside the pumpkin and inject 50 mL of 0.1 M solution of potassium iodide into the flask. The result is an oozing pumpkin.

**This demonstration requires chemicals that are not readily available to the public. Persons that are specially trained in the hazards of using these chemicals should be the ones to perform this demonstration. Be careful not to touch the foam with your bare hands. Always wear safety glasses, laboratory coat and protective gloves...and remember to cover your demo surface with a sheet of plastic for easy clean-up. Low grade hydrogen peroxide (3%) will not produce the massive amount of foam. The hydrogen peroxide used in this demonstration is ten times stronger than the over-the-counter hydrogen peroxide. It also is severely corrosive to the skin, eyes and respiratory tract. Also, sodium iodide is slightly toxic by ingestion. For more information on the safety of these chemicals please refer to the manufacturer’s Material Safety Data Sheet (MSDS). A kid safe demonstration can be found at this website: <http://www.stevespanglerscience.com/experiment/elephants-toothpaste>.*

“Elephant’s Toothpaste” Or “Oozing Pumpkin” Demonstration

Todd Duppong, Chemist

Ingredients/Equipment:

30% Hydrogen Peroxide
Potassium Iodide
Dish soap
Food dye
Pumpkin
Goggles
Laboratory Gloves and Coat
250 mL Erlenmeyer Flask
50 mL syringe connected with tubing

Instructions:

First, clean the inside of the pumpkin and decorate/carve your designs. After, place a hole on the bottom of the pumpkin large enough for a 250 mL Erlenmeyer flask to sit inside the pumpkin. In addition, make an opening on the back of the pumpkin for the tubing to fit through. Later, one end of the tubing will be placed into the flask and the other will be connected to the syringe.



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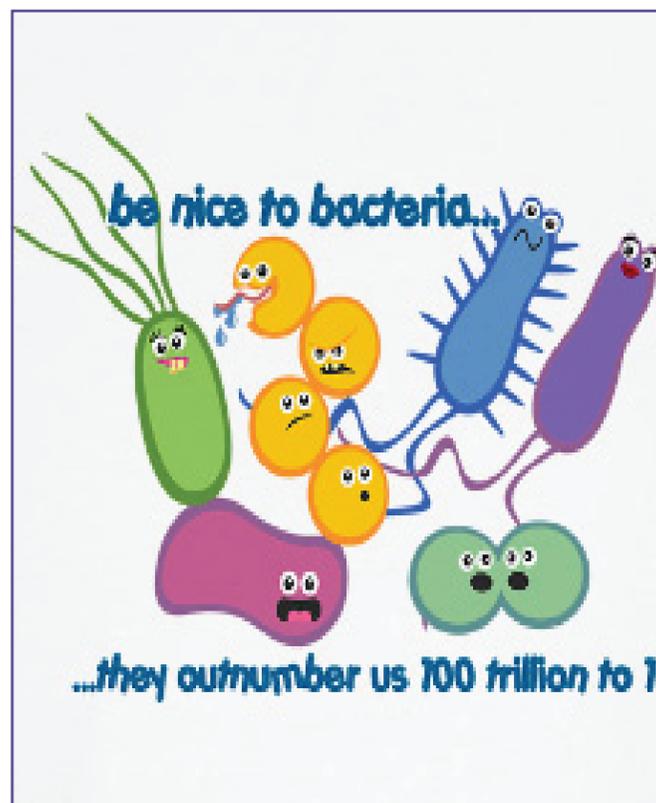
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Multiplex Respiratory Virus Testing

Tracy Hoke, Microbiologist

The North Dakota Department of Health - Division of Laboratory Services - Microbiology, began a 12-virus multiplex testing Assay in September of 2010. The assay is part of the Center for Disease Control and Prevention's Influenza Incidence Surveillance Program, which has five sites that provide samples for analysis.

Testing is performed using the Luminex xTAG™ RVP assay — a multiplex assay that can test for 12 different viruses in one sample well. The technology uses a combination of flow cytometry, tiny beads or “microspheres,” lasers and digital processing to read the assay results. The virus targets include: Influenza A; Influenza A H1; Influenza A H3; Influenza B; Parainfluenza types 1, 2, and 3;

Adenovirus; Rhinovirus; RSV A and B; and human metapneumovirus.

There are several steps to the Luminex xTAG™ assay. First, nucleic acid is extracted and amplified by Polymerase Chain Reaction. Next, the DNA is “tagged” with target-specific sequences, extended and labeled. Color-coded beads, which are specific to each analyte, are added to the tagged primers. Then, the sample plate is loaded into the analyzer, which reads the color-coded beads with two lasers: a classification laser and a reporter laser. Finally, specialized software analyzes the data and interprets each test as either positive or negative.

Xeriscaping

Cindy Auen, Chemist



The Green Building Committee (GBC) is a group functioning for the Environmental Health Section of the North Dakota Department of Health. The committee seeks to implement green building practices

Center, the committee plans to landscape this area using grasses and wild flowers native to the North Dakota landscape. The goal is to achieve an aesthetic, low maintenance plot, eventually attaining a Natural Area designation by the North Dakota Parks and Recreation Department.

With the anticipated project start date of April 1, we hope to see completion of the initial phase by the end of August 2011.

As for the resident “spermophilii,” their neighborhood is getting a facelift. We hope they will like the wild prairie rose at their front door and stick around as part of our natural North Dakota landscape.

that conserve resources and save money. Our current Energy Conservation Action Plan includes xeriscaping a plot next to a building that was recently constructed on the East Lab Campus. Since construction, this area has been problematic in that it sustains only weeds and the native *Spermophilus tridecemlineatus* (thirteen lined ground squirrel).

Consequently, the GBC is in the process of enlisting the help of an Eagle Scout to take on the project. Encarta defines xeriscape as a trademark for a method of landscaping that emphasizes water conservation using drought-resistant plants. Working together with a representative from the NRCS Plant Materials



Biochemical Oxygen Demand: Why is it Important?

Karen Wiest, Laboratory Technician

Biochemical Oxygen Demand (BOD) determination is one of the many tests done to ensure water quality by the Division of Laboratory Services - Chemistry.

The BOD test is a measure of the oxygen used by microorganisms to decompose organic waste in water. When organic matter such as dead plants, leaves, grass clippings, manure, sewage or even food waste is present in a water supply the bacteria will begin the process of breaking down this waste. When this happens, much of the available dissolved oxygen in the water is consumed by aerobic bacteria, robbing other aquatic organisms of the oxygen they need to live. If there is a large quantity of organic waste in the water, there also will be a lot of bacteria present working to decompose this waste. In this case, the demand for oxygen will be high (due to the bacteria) so the BOD level will be high. As the waste is consumed or dispersed through the water, BOD levels will begin to decline. When BOD levels are high, dissolved oxygen levels decrease because the oxygen that is available in the water is being consumed by the bacteria. Since less dissolved oxygen is available in the water, fish and other aquatic organisms may not survive.

In North Dakota, the BOD test is primarily used to determine if the water in sewage lagoons meets permit specifications so that it can be released into the environment. It also may be done on rivers, drinking water from municipalities, fish hatcheries, fish farms and feed lot runoff. Spring and fall are the busiest times for BOD analyses. Extreme events, such as the flooding of the Sheyenne River in 2009 or excessive rainfall, can also trigger BOD testing.

The most common BOD test requires five days for completion. Some tests may last as long as 100 days. Samples are collected by operators of the lagoons and are delivered or mailed to the laboratory. Karen Wiest has been responsible for the BOD determinations for the last 13 years. She has up to 48 hours after the

sample has been collected to begin the BOD test. The first step is to determine the dissolved oxygen (DO) content of the sample. The sample is then incubated at 19 degrees C (about 66 degrees F) in a dark location. After five days, the DO content of the incubated solution is determined. The difference between the initial and final DO levels is the amount of oxygen required for the decomposition of any organic material in the sample and is considered a good representation of the BOD levels.

Generally, permit specifications allow lagoons to be discharged if the BOD result is less than 25 milligrams/liter (mg/L). Most samples tested by the North Dakota Department of Health have a result of less than 6 mg/L.

Staff Invited To Speak

Microbiologists from the Division of Laboratory Services were invited to speak at recent events.

October 14, 2010

Roxanne Gardner presented “Diagnosis of TB: A Laboratory Perspective” to the North Dakota TB Advisory Board at the State Capitol in Bismarck, N.D.

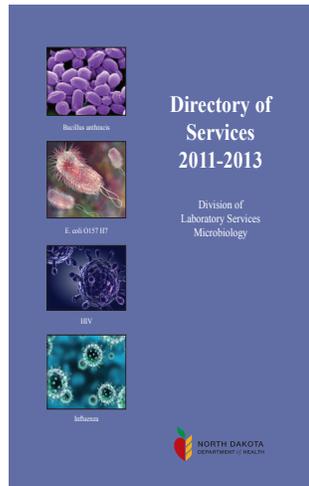
October 29, 2010

Tracy Hoke presented “Influenza – Genetics, History and Future” and Sandy Young presented “QuantIFERON®-TB Gold Applications and Concepts” at a conference for Laboratory Continuing Education for Western North Dakota at St. Joseph's Hospital and Health Center in Dickinson, N.D.

2011-2013

Directory of Services

The Division of Laboratory Services - Microbiology, Directory of Services was recently revised and the new edition mailed to our users in January. It is also available on our website under Education and Publications at www.ndhealth.gov/microlab. The directory contains contact information, laboratory testing services, packaging and shipping information, a fee schedule, CPT codes, specimen request forms, a supply order form and other information.



Employee

Years-of-Service Awards

On November 1, 2010, in the Pioneer Room at the State Capitol, State Health Officer Terry Dwelle, M.D., and Deputy State Health Officer Arvy Smith presented Department of Health employees with awards. Ten people in the Division of Laboratory Services were honored.

3 Year Awards: Jaime Anderson, John Gabriel, Tim Traynor

5 Year Awards: Lori Carter, Roxanne Gardner, Michelle Henke, Danita Hunke, Kristie Schwarzkopf

20 Year Award: Jim Quarnstrom

30 Year Award: Myra Kosse

Detection of Carbapenem-Resistant or Carbapenemase-Producing Enterobacteriaceae

Roxanne Gardner, Microbiologist

Carbapenem resistance and carbapenemase-production in any species of Enterobacteriaceae is an infection control concern.

Carbapenem-resistant Enterobacteriaceae (CRE) are usually resistant to all β -lactam agents as well as most other classes of antimicrobial agents. The treatment options for patients infected with CRE are very limited. Patients colonized with CRE are thought to be a source of transmission in the health-care setting. Identifying patients who are colonized with CRE and placing these patients in isolation precautions may be an important step in preventing transmission.

Cultures that are positive for CRE must be reported to the North Dakota Department of Health, Division of

Disease control, as this is now a mandatory reportable condition. CRE isolates should be submitted to the Division of Laboratory Services - Microbiology.

An article provided by the Center for Disease Control and Prevention regarding laboratory protocols, can be found on our website at www.ndhealth.gov/microlab.

Quantiferon-TB Gold In-Tube

Sandy Young, Microbiologist

Introduction

QuantiFERON®-TB Gold In-Tube assay (QFTGold) is an in-vitro diagnostic test for the detection of Mycobacterium tuberculosis (TB) infection. The test uses modern genetic recombination technology to provide a fast, accurate and convenient method of diagnosing TB infection. The assay has a sensitivity of 90 percent and specificity of greater than 98 percent for diagnosing TB.

Principle of the test

The QuantiFERON®-TB Gold In-Tube assay is an in-vitro laboratory test for the measurement of cell mediated immune (CMI) responses in humans using whole blood. The test involves undiluted whole blood being stimulated with test antigen(s), negative control antigen(s) and a mitogen. T-cell responses are then determined by the quantitative measurement of Interferon-gamma (IFN-g) in plasma by a rapid, single-step enzyme linked immunosorbent assay (ELISA).

These antigens are only made by Mycobacterium tuberculosis complex bacteria, and therefore identify the presence of only those T-cells that are specific for TB infection. These antigens are absent from the tuberculosis vaccine organism- BCG, and from most environmental mycobacteria. Thus these proteins are precise markers of true Mycobacterium tuberculosis infection. As a result, unlike the tuberculin skin test (TST or Mantoux test), the QuantiFERON®-TB Gold In-Tube test is completely unaffected by the BCG vaccination status of the individual being tested.

Advantages

- Unaffected by BCG vaccination
- Unaffected by nearly all non-tuberculin mycobacteria
- Requires only a single patient visit
- No possibility of adverse reactions in hypersensitive people

Limitations

- Currently there is no data relating to the use of the QuantiFERON®-TB Gold In-Tube test in individuals younger than 17.
- Performance of QuantiFERON®-TB Gold In-Tube, in particular its sensitivity, and its rate of indeterminate results has not been evaluated in the following groups:
 - o Patients who are immunocompromised such as those with HIV infection, AIDS and transplant recipients
 - o Patients undergoing immunosuppressive therapy
 - o Persons with other clinical conditions that may compromise the immune system: diabetes, silicosis, chronic renal failure and hematological disorders (e.g. leukemia and lymphomas).

Intended use

QuantiFERON®-TB Gold may be used in all circumstances in which the Mantoux test currently is used, including contact investigations, evaluation of recent immigrants and TB screening of health-care workers.

Specimen collection

One milliliter of blood is collected in each of the three collection tubes. The tubes are shaken for five seconds ensuring that the entire surface of the tube is coated with the blood. The tubes can then be shipped at room temperature or incubated at 37°C for 16 to 24 hours. Incubation must occur within 16 hours of collection.

To obtain a set of collection tubes or for further information, please contact The North Dakota Department of Health – Division of Laboratory Services at 701.328.6272.