

NH Public Health Laboratories Newsletter

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Fatal Bites

Submitted by Daniel Tullo, Microbiology Program Manager

A ten-year-old girl awakens in the middle of the night and complains that a bird or something flew through the open window and bit her. Upon examination, the mother finds no evidence of any bite wound. Thinking the child had a nightmare, Mom comforts her and puts her back to bed. A few months later the young girl shows symptoms of serious disease and dies soon after. This may sound like the plot of a bad horror movie, but the unfortunate truth is that this disease can happen anywhere. It is called rabies.

Rabies is a viral infection of the central nervous system, usually contracted from the bite of an infected animal. It can also be contracted indirectly by exposure to the saliva or central nervous system of a rabid animal. Patient history, duration and progression of illness and laboratory tests for other common etiologies of encephalitis (inflammation of the brain) will help with a diagnosis. Rabies should be considered when the patient shows neurological signs consistent with encephalitis or myelitis (inflammation of the spinal cord), including dysphagia (difficulty in swallowing), hydrophobia (fear of water) and paresis (slight or partial paralysis). A nonspecific prodrome and a progressive worsening of the neurological systems are characteristics of rabies infection. Negative laboratory results for herpes viruses, enteroviruses and arboviruses would increase the likelihood of a rabies diagnosis.

Several laboratory tests are necessary to diagnose rabies in humans; no single test is sufficient. Saliva is tested by viral isolation or reverse transcription polymerase chain reaction (RT-PCR). Serum and spinal fluid are tested for IgG and IgM antibodies to rabies virus. Skin biopsies from cutaneous nerves at the base of hair follicles taken from the nape of the neck are examined for rabies antigen by direct fluorescent antibody (DFA) and RT-PCR tests.

Once the symptoms of rabies have manifested, the mortality rate among previously unvaccinated patients is invariably 100%. It is for this reason that rapid testing and diagnosis of rabies in ani-

mals, and especially those that have exposed humans, is so critical. The New Hampshire Public Health Laboratories (NH PHL) uses the DFA test to diagnose rabies in animals. This test requires brain tissue from animals suspected of being rabid. Test results are available within twenty-four hours of specimen receipt.

The DFA test has been thoroughly evaluated for more than 40 years and is recognized as the most rapid and reliable of all the tests available for routine use. This test uses a fluorescently labeled anti-rabies antibody, which binds to the rabies virus. In tissue where rabies antigen is present, the antigen-antibody complex can be visualized as fluorescent apple-green areas using a fluorescent antibody microscope.

Did you know??

One person dies every ten minutes from rabies, an infection that is 100% preventable with fast, appropriate care. The seriousness of this disease was recognized on World Rabies Day 2009 on September 28th. This year's theme was "Working Together to Make Rabies History."

After an exposure, the medical provider will usually evaluate the person for post-exposure anti-rabies vaccination even before test results on the animal are given. This is especially true in cases where the animal is considered high risk and presents with symptoms or the bite is close to the head. This regimen consists of wound cleansing with soap and water and administration of passive rabies antibody (human rabies immune globulin) at the site of the wound. The Advisory Committee on Immunization Practices has recently decreased the recommended series of rabies vaccine for a previously unvaccinated patient from five doses to four¹. The first dose should be given as soon as possible after

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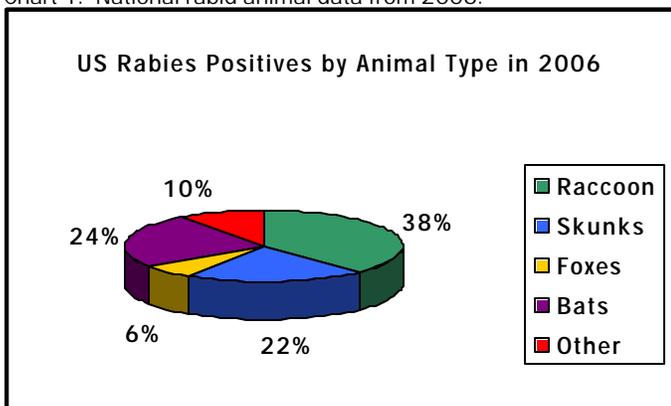


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 exposure and the additional doses should be administered on days 3, 7 and 14 after the first vaccination. This treatment regimen should still be considered even if there is an extended delay after exposure provided the clinical signs of rabies are not yet present in the individual. The recommended treatment regimen for previously vaccinated patients remains unchanged (two doses are administered; one immediately after exposure and the second on day three).

The NH PHL identifies the strain of rabies found in the state, which helps track the epidemiology of rabies in the Northeast. All infected terrestrial animals in NH have the raccoon strain of rabies, named after the animal that carries it most often. The rabies virus is well established in southern New Hampshire. The United States Department of Agriculture is attempting to halt the march of raccoon rabies across the eastern United States by dropping fishy treats laced with rabies vaccine. This bait is dropped by airplane in rural areas and placed by hand in residential areas. So far the program has helped stall the northward advance of raccoon rabies into northern New Hampshire and Canada.

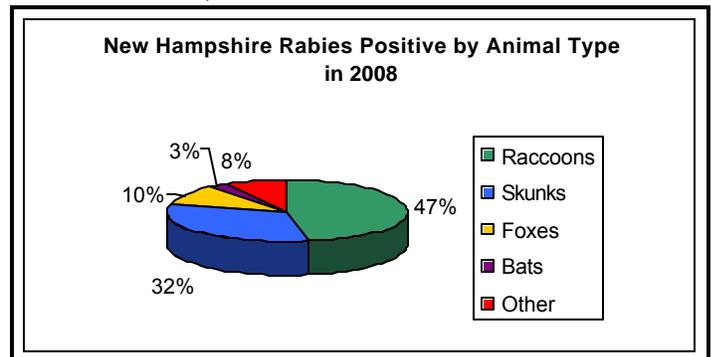
The most current national data available from the Centers for Disease Control and Prevention (CDC) is from 2006². During that year, raccoons were the most common animal type to be positive for rabies virus (Chart 1). The most recent data from the NH PHL

Chart 1. National rabid animal data from 2006.



is from 2008 where 59 animals were identified as rabid. Similar to the national data, raccoons were found to be the most common rabid wildlife species, accounting for 47% of all animal cases in NH (Chart 2).

Chart 2. New Hampshire rabid animal data from 2008.



As with the little girl mentioned earlier, it is often difficult to rule out the possibility of exposure to a bat found in the home. Bats' teeth are so tiny that it may be difficult to see bite marks. When a bat is found in the home and exposure cannot be ruled out, it is prudent to prevent the bat from escaping. Please see the caption box for information on how to safely capture a bat.

Follow these steps to capture a bat that has flown into your home:

1. Close all windows to the outside.
2. Wear leather work gloves and approach the bat slowly after it lands.
3. Place a coffee can or cardboard box over the animal.
4. Slide a piece of cardboard under the container to trap the bat inside.
5. Tape the cardboard to the container securely and punch small holes in the cardboard.
6. Contact your local health officer to determine if testing is necessary.

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The best way to prevent rabies is to teach children never to handle unfamiliar animals, wild or domestic, even if they appear friendly. It is also important to keep your pet's rabies vaccination current. If an exposure occurs, wash any wound thoroughly with soap and water and seek medical attention immediately. For consultation and reporting of rabies exposures in New Hampshire, contact the Communicable Disease Control and Surveillance Program staff at (603) 271-4496. Additional information about rabies can be found online at <http://www.dhhs.nh.gov/DHHS/CDCS/rabies.htm> and <http://www.cdc.gov/rabies/>.

References

¹Advisory Committee on Immunization Practices, (2009, July 10). ACIP provisional recommendations for prevention of human rabies. Retrieved August 27, 2009, from the Centers for Disease Control and Prevention website: <http://www.cdc.gov/vaccines/recs/provisional/downloads/rabies-July2009-508.pdf>

²J. Blanton, C. Hanlon and C. Rupprecht, Q (2007, August 15). Rabies surveillance in the United States during 2006. *Journal of the American Veterinary Medical Association*, 231, Retrieved August 27, 2009, from http://www.cdc.gov/rabies/docs/rabies_surveillance_us_2006.pdf

A Subject of the Sensitive Nature (Part Deux)

Submitted by Margaret Sweeney, TB Unit Supervisor

As discussed in the previous newsletter (Volume 3, Issue 1), the Tuberculosis (TB) Unit of the NH PHL compared the antibiotic susceptibility testing (AST) of *M. tuberculosis* utilizing both the Bactec 460 and the MGIT 960 instruments. The Bactec 460 has been around for years and although it is a reliable method for drug testing, it is getting harder to obtain replacement parts. Since both methods compare the growth of the organism in a drug-containing tube to that of a drug-free tube, the TB Unit needed to determine if the newer MGIT 960 could replace the older Bactec 460. The 460 also has disadvantages such as: utilizing radiometric C¹⁴, the need to use needles to inoculate the vials, the need to manually load and unload the instrument and the need for personnel to read vials daily. See Table 1 for a comparison of the Bactec 460 and MGIT 960.

For the validation study, twenty-seven (27) isolates from past proficiency tests were thawed and grown on Lowenstein-Jensen (LJ) slants. One sample was from 1995 and the rest were from 2003-2008. All of the strains of *M. tuberculosis* had been sent to the NH PHL from the CDC as part of their proficiency panels. The test results obtained at the PHL were compared to the results obtained by the CDC, with the CDC results considered conclusive. After sufficient organism had grown, antimicrobial susceptibility testing was performed per NH PHL's *M. tuberculosis* drug susceptibility testing standard operating procedure.

A total of 335 drugs were tested to compare the two methods. The methods showed a 98.81% concordance with only four drugs not in agreement. In one case, both methods indicated an isoniazid (INH) and streptomycin (STR) resistance, but the 960 also indicated a pyrazinamide (PZA) resistance. In two other cases the 460 showed an ethambutol (EMB) resistance in one strain and an INH resistance in another. In each of those cases, the 960 indicated the organism was sensitive to all drugs even after repeat testing of the drugs. This discrepancy may be due to the age of the strain or to the amount of growth of the organism. In the last case, the Bactec 460 indicated a resistance in EMB at the concentration of 2.5 µg/mL. Neither the MGIT 960, at 5 µg/mL, nor the CDC, at all concentrations, indicated such a resistance. This may be due to the fact that when testing EMB, in vitro, the drug begins to lose its efficiency after an extended period of testing. This segues into the next factor the PHL wanted to study with this validation. Is there a significant difference between the time it takes to run either method?

And the answer is.....wait for it.....no. Using the t-test %, statistically speaking, there was no significant difference between the testing times for either method. The average amount of time for the 460

was 17.3 days and for the 960 it was 14.4 days. This amount of time allows an additional 3 days for each method for preparation before the drug vials/tubes are inoculated. If these samples had been patients, the preparation time would have been eliminated for the MGIT 960. Once a MGIT tube is found to be positive for *M. tuberculosis*, drug susceptibilities can be set up directly from that tube. With the Bactec 460, the preparation time is still required. The ability to eliminate this preparation step using the 960 should decrease the average length of time from set up to final result.

There are other advantages for utilizing the MGIT 960, such as the ability to inoculate the tubes using transfer pipettes as opposed to needles. In addition, the fact that it is a more automated instrument eliminates the need for personnel to come in on Sundays or holidays to manually read vials.

A cost analysis was performed to compare the two methods. The costs for each method were based on testing a complete set of drugs for one patient and one control. Consumables included such things as disposable pipettes, syringes and sterile dilution tubes. The majority of the cost for the Bactec 460 is related to the technician time required to read the vials. Technician time was based on the average hourly salary of the full time TB Unit personnel.

In conclusion, the method comparison experiment showed excellent agreement in the results obtained from both the Bactec 460 and the MGIT 960. The MGIT 960 has advantages in the areas of safety, preparation and reading time and availability of parts. Beginning in November 2009, it is the intention of the NH PHL to utilize the MGIT 960 for antimicrobial susceptibility testing.

Table 1. A comparison of the Bactec 460 and the MGIT 960.

Bactec 460	MGIT 960
Utilizes C ¹⁴	Does not require C ¹⁴
Requires needles to inoculate vials	Requires transfer pipettes to inoculate tubes
Manual reading of vials	Automatic reading of tubes
Requires prep time for organism growth	Drugs set directly from positive tube
Cost analysis: \$334.00 patient & control	Cost analysis: \$184.00 patient & control
Average 17.3 day turn-around-time	Average 14.4 day turn-around-time

DNA Sequencing

Submitted by Dr. Fengxiang Gao, Virology and Special Testing Program Manager

DNA sequencing is the process of determining the precise order of nucleotide bases in a target DNA molecule. Advances in DNA-sequencing technologies have rapidly occurred in molecular diagnostics and microbial genomics. DNA sequencing has been implemented in public health and clinical laboratories and can be used to identify and characterize microorganisms, determine genotypes, monitor genetic changes, determine genetic relatedness and provide drug resistance information.

The NH PHL has one Applied Biosystems 3130XL DNA analyzer. This instrument is an advanced, high-throughput capillary sequencing platform with the ability to sequence 96 samples at a time. There are several basic steps to DNA sequencing. The first step is to prepare the target DNA, which usually involves nucleic acid isolation, DNA amplification and PCR product purification. The second step is DNA synthesis, in which BigDye labeled dideoxynucleotides (ddNTPs) terminate DNA strand extension because there is not a 3' -OH in the ddNTP to which the next nucleotide can be attached. This results in a large number of fluorescently labeled DNA strands of different lengths. The third step is to separate the labeled DNA strands by electrophoresis and translate the electrophoretic data into DNA sequences. The dye-terminator sequencing method, along with automated high-throughput DNA sequence analyzers, is now being used for the vast majority of sequencing projects.

Currently, NH PHL performs DNA sequencing for the following projects:

1. **Hepatitis C virus (HCV):** NH PHL has validated DNA sequencing-based HCV genotyping procedures. The lab is currently working in collaboration with other State agencies to perform HCV genotyping on target populations.
2. **Norovirus:** NH PHL is one of the many state public health laboratories that participates in CaliciNet, a DNA sequence-based surveillance system for norovirus maintained by the CDC.
3. **16s rRNA:** NH PHL is in the process of validating procedures in sequencing 16s rRNA regions for characterization of bacterial isolates, including *Mycobacterium*.



Applied Biosystems 3130XL Genetic Analyzer

The applications of DNA sequencing in molecular diagnostics will only continue to expand. Further updates and possible training opportunities will be announced when available.

Wipes and Swipes

Submitted by Debanond Chakraborty, Radiological Environmental Monitoring Unit Supervisor

The Radiological Chemistry (Radchem) Unit at the NH PHL uses analytical methods that include gamma spectroscopy, gross alpha-beta gas flow proportional counting, liquid scintillation counting and thermoluminescent dosimetry. The staff also provides miscellaneous field support with detection equipment and calibration. The Radchem Unit has four main responsibilities: (i) environmental radiation monitoring, (ii) radiological emergency response, (iii) analysis of samples taken during inspections of licensed radioactive material user facilities and (iv) air and precipitation monitoring for the United States Environmental Protection Agency (US EPA).

Environmental monitoring allows us to determine the normal background radiation levels in the areas surrounding the nuclear power plants in New Hampshire and Vermont as well as the area around the Portsmouth Naval Shipyard. If there is a radiological emergency (nuclear material is released from one of these facilities, i.e. a transportation accident or a terrorist attack), the Radchem Unit will be able to determine elevated radiation levels based on background readings.

The Environmental Monitoring Program involves collecting milk, water and animal feed from farms surrounding the nuclear power plants. Ocean sediment, seafood, seawater, air and particulate filters and surface wipes are also collected from the areas surrounding the plants. All of these samples are tested for gamma radiation with high purity germanium detectors using gamma spectroscopic methods. Water, air and particulate filters and

surface wipes are tested for gross alpha and beta radiation by the gas flow proportional counting method. Water samples are tested for tritium by the liquid scintillation counting method. The Radchem Unit also has thermoluminescent dosimeters (TLDs), which are used to measure trends in natural gamma sources to establish a baseline or background that can be compared to samples, should an incident occur. A total of 70 TLD stations are located around the power plants.

Radiological emergency response requires the Radchem Unit to oversee the deployment of sampling and monitoring teams and to receive samples from the field during a radiological emergency. These samples are screened for alpha, beta and gamma activities and the results are reported to aid in further decision-making (e.g., evacuation, sheltering, control of access, decontamination, food



An example of the thermoluminescent dosimeters located around the nuclear power plants in New Hampshire and Vermont

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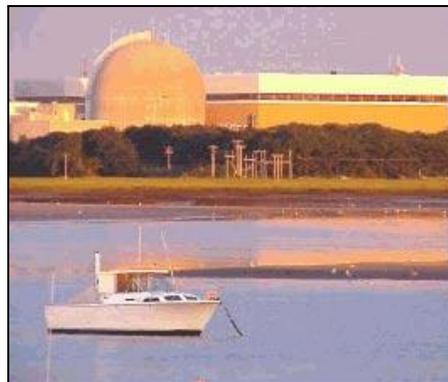
and water control, relocation, etc.). The Radchem Unit participates in combined drills and exercises to prepare for such emergencies. The exercises are evaluated and graded by the United States Federal Emergency Management Agency and the Nuclear Regulatory Commission.

The NH PHL has an air monitoring station on the roof of a State building in Concord. This station detects and measures gamma activity in air samples and sends the data directly to the EPA's National Radiation Lab in Montgomery, AL. The Radchem Unit collects samples using an air filter, reads it on a scintillation counter and sends the data to the EPA lab. Rain and snow are also collected for analysis.

Another responsibility of the lab is to test wipes and swipes for removable radioactive contamination from inspections done by NH Radiological Health (Rad Health), which is a section of the Bureau of Prevention Services. Contamination is defined (in radiation protection) as the presence of radioactive material where it should be absent. Removable contamination is simply radioactive material that can be removed mechanically (i.e. by rinsing or wiping), as opposed to irremovable such as the case of tritium or radium paint that has seeped into a porous material like concrete. Rad Health oversees the licensing and compliance of businesses and individuals that maintain or use radioactive materials or devices that contain radioactive materials or emit radiation (i.e., a plant that uses tritium paint for weapon sights, a chiropractor that uses a x-ray

machine or an industrial radiographer that utilizes an iridium source to detect leaks in gas lines).

For more information about the NH Rad Health program, including New Hampshire's Radiological Emergency Response Plan, please look at the Section's web site at <http://www.dhhs.state.nh.us/DHHS/RADHEALTH/default.htm>. For questions regarding the NH PHL Radchem Unit, please contact Debanond Chakraborty, Radiological Environmental Monitoring Laboratory Program Supervisor at (603) 271-2023 or Sally Hartman, Chemistry Program Manager at (603) 271-4556.



Seabrook Power Station

Varicella Outbreak at a Healthcare Facility

Submitted by Susanne Desrosiers, Microbiologist, Virology and Special Testing Unit

In March 2009, a food worker at a local hospital was diagnosed with varicella zoster virus (VZV), commonly known as chicken pox. VZV has an incubation period of 14-21 days and this worker did not exhibit any symptoms during the days prior to her diagnosis. Her work involved personally delivering meals to patients who had requested this service. Three working days before being diagnosed, she came into contact with over 100 patients as well as almost 150 employees on four different floors of the hospital. Her diagnosis was laboratory confirmed a day later by the NH PHL.

VZV is typically characterized by a rash and fever and is not a serious illness in most people. Unfortunately, it can cause life-threatening complications for some people, especially immunocompromised individuals. Since this occurred in a healthcare facility, there was the danger that susceptible hospital personnel would become infected and transmit the infection to vulnerable patients. The hospital evaluated immune status in all exposed staff members and patients who could not produce proof of vaccination or past infection. It was determined that infection would require face-to-face contact for a minimum of five minutes in a closed room. With these guidelines in mind, the hospital sent 163 specimens to the NH PHL over the course of the next seven days for varicella IgG antibody testing to determine immune status. Patients who had

already left the hospital were contacted and advised to consult with their primary care physicians.

The NH PHL received the first specimens on Friday, March 20, 2009. That day the Virology Unit tested 111 specimens in five separate assay runs. An additional 33 specimens were tested on Saturday, when the PHL is not usually staffed. Nineteen more were tested during the first few days of the following week. Of the 163 specimens tested, three were negative and three were equivocal for IgG antibody to VZV. The hospital administered a first dose of vaccine to those found not immune and no further infections were discovered, although there were one or two suspect cases that were determined to be some other illness.

This situation was an example of how suddenly a health threat in a primary care facility can occur. It was also a test of the NH PHL's procedures for receiving, accessioning and testing a large volume of specimens in a short period of time and during off-hours. It also highlighted the value of cross training staff members. We were gratified at the willingness of lab staff to put in extra hours and work cooperatively with the hospital and the New Hampshire Bureau of Disease Control to bring about a rapid and successful resolution to this potential outbreak situation.

Reflections on the 2009 H1N1 Influenza Virus Outbreak

Many units at the NH PHL were asked to respond to the H1N1 outbreak. From accessioning the specimens and answering telephones, to testing and faxing results, it seemed like just about everyone at our lab was either directly or indirectly affected. The following are some reflections on the first wave of the outbreak.

A Laboratorian's Perspective

When the H1N1 flu hit, it went from 0 to 60 at the laboratory! We were inundated with phone calls before we even knew what to say. Phones rang off the hook with providers and clinicians seeking answers; it was such a relief when the press release came out and we had definitive answers to give them. But information was constantly changing as well. Besides doing our regular jobs, we had to keep abreast of all the current information, so we would be knowledgeable and could answer all those phone calls appropriately. Another challenge that we faced as laboratorians was the increased testing. Flu testing takes quite a number of hours and lots of coordination between support staff and lab staff to get those results out! This meant extending our workday because it took time to sort through all the specimens and enter them into our computer system before they even reached the Virology Unit. Once the specimens arrived at the lab, it took the efforts of several laboratorians to complete the entire process of testing. When testing was completed, the process moved on to support staff who created reports, sent faxes and updated spreadsheets in order to disseminate the data to all who needed it. Overall, it was a tiring time for all involved, but it was invigorating as well. When outbreaks like this occur, it really reminds you how important your work is and how many people are out there helping in the background.

Support Staff Perspective

The whole H1N1 experience for the office was pretty interesting. The first week the office was bombarded with phone calls from providers, laboratories and citizens wanting information on how to test, how to get supplies, who to test, etc. The following weeks began to run much smoother as everyone involved had a better understanding of what their roles were. It was great to see everyone work together and get the job done.

Director's Perspective

From the perspective of the Lab Director, the technical response was quite efficient and few gaps were identified. Staff shortages are a problem that would have become clearer had the surge gone on for a longer period of time. During the surge, the NH PHL pulled a number of individuals who had been cross-trained from their routine duties to assist with H1N1 testing and support. This proved to be a valuable plan and cross-training will continue for Continuity of Operations planning. Also, a second ABI 7500 Fast instrument was purchased during the surge, so the lab now has two functioning instruments for response.

The major gaps in the lab response were in the reporting of test results. The NH PHL does not have a Laboratory Information Management System (LIMS). Instrument interfaces that would allow the movement of test data from the instrument to the LIMS to the provider are non-existent at the lab. Test reports cannot be sent electronically. This caused delays in reporting of results because each test required a phone call and/or a fax to the provider. LIMS acquisition is a top priority and the lab will continue to investigate funding sources as H1N1 planning and implementation funds become available.

Central Services – Kit Preparation

When we first realized the amount of testing was going to skyrocket, outgoing specimen kits for the collection of flu samples were doubled, then tripled, then quadrupled....until supplies ran out! To no surprise, the kit preparation staff was deluged with orders and overwrought. As the country became aware of the need for sampling supplies, vendors began to run out themselves. CDC stepped in with guidelines to limit testing, which helped decrease the amount of kits to prepare. With long hours and many people pitching in, we were able to supply NH with test kits and are now preparing for the upcoming flu season.

Central Services – Specimen Receiving

Most specimens were received with the afternoon courier around 2:30, so it made it difficult to get all of the mailers opened and specimens entered and labeled, and to still give the Virology Unit time to test. Daily, we had to have someone from Virology come help us with opening, labeling and organizing the specimens, so it would be easier for them to do the testing. We were also short-staffed as one of our employees was pulled to help out with H1N1 in another capacity, which made things even more difficult. We received a lot of specimens from people just dropping them off at the lab and delivered from private couriers, which was out of the norm for us. We were a very busy place for a few weeks! Overall I think people worked very well together and I thought it all to be very exciting.

Data

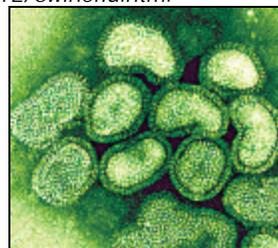
Between April 26, 2009 and September 15, 2009, the PHL tested 1,836 specimens for influenza virus. The lab is using the FDA approved CDC Human Influenza Virus Real-time RT-PCR Detection and Characterization panel (rRT-PCR flu panel) and the Emergency Use Authorized rRT-PCR Swine Flu panel.

Of the 1,836 specimens, 322 tested positive for H1N1 (Swine-like) influenza. Twenty-six (26) specimens tested positive for seasonal influenza. Fifty-two (52) specimens were rejected and 1436 specimens were negative for influenza.

The majority of specimens were received early in the outbreak, with over 1,000 specimens received and tested by the end of May.

Of interest: Almost 70% of the swine positive cases in NH were in patients less than 20 years old.

Overall, it seems there is a general opinion that despite the surge in testing, the employees at the NH PHL stepped up to the plate and took on the challenge with an optimistic outlook. From being asked to work in areas outside of their department to extending their workday, the people at our lab worked as a team to complete testing in a timely, safe and accurate manner for the citizens and residents of New Hampshire. For more information on H1N1 influenza, please visit http://www.dhhs.state.nh.us/DHHS/DHHS_SITE/swineflu.htm.



2009 H1N1
influenza virus

Limit of Detection Study

Submitted by Denise Bolton, Emergency Response and Arbovirus Unit Supervisor

In 2008, the NH PHL was one of eight states selected by the Laboratory Response Network (LRN) for participation in a Limit of Detection (LoD) study for LRN DNA extraction procedures and real-time PCR assays. Participants were selected based upon available equipment, personnel, time and recent proficiency testing results. For this study, the limit of detection was defined as the lowest concentration of DNA for which at least 95% of test results are positive. CDC's Division of Bioterrorism and Response Laboratory sponsored the study in collaboration with the Association of Public Health Laboratories.

The LoD study was designed to provide CDC with performance data for several different methods and instruments. These assays, which are in use at over 160 labs around the country, have become key components for the initiation of federal, state and local consequence management responses. Having an understanding of the limit of detection improves confidence in negative results. During the study, the NH PHL performed approximately 100 PCR runs. Data from the LoD study was analyzed by the CDC and presented at the LRN national meeting in March 2009. The results are available to Lab Directors and Bioterrorism Coordinators on the LRN website.

Laboratory Week 2009

Submitted by Rebecca Adams, Microbiologist, Clinical Microbiology Unit

Laboratory professionals play a vital role in the diagnosis and prevention of disease and are dedicated to maintaining and improving health through quality and timely laboratory testing. This year the NH PHL celebrated National Medical Laboratory Professionals Week (April 19-25, 2009) with the theme "Laboratory Professionals Get Results."



During the course of the week, we had educational activities that included a lecture by Wendy Lamothe, Clinical Microbiology Unit Supervisor and Jason Stull, Public Health Veterinarian for the State of NH, as guest speakers on "Things That Bug You; Vector Borne Diseases."

Other activities that the NH PHL enjoyed were a chili cook-off for lunch, an employee fact game and some laboratory-themed puzzles. The week ended with a lab coat decorating contest and a food drive for the NH Food Bank.

Lab week is a special time for labs to recognize all the hard work and dedication their employees do each and everyday and the vital role they play in patient's lives. The NH PHL staff hopes that you took the opportunity to celebrate the work you do with your fellow co-workers.

From QAC to QIC...State Laboratory Quality Improvement Project

Submitted by Jill Power, NH PHL Quality Assurance Manager

The State of New Hampshire Division of Public Health Services participated in the National Public Health Performance Standards Program (NPHSP) in 2005. The NPHSP is a CDC national partnership initiative that has developed national public health performance standards for state and local public health systems and for public health governing bodies. From this, the Association of Public Health Laboratories (APHL) and the CDC collaborated to model a similar program to improve the state public health laboratory system. In March 2007, many New Hampshire laboratory partners and stakeholders were invited to a one-day state public health laboratory system assessment. Since the original assessment, the name was changed to the Laboratory System Improvement Program (L-SIP) in 2008.

From the results of this assessment, quality improvement (QI) projects have been planned and implemented in NH. The following is a summary of activities and processes that have taken place.

- The NH PHL has had a Quality Assurance Committee, comprised of laboratory employees for many years. The

committee changed its name to the Quality Improvement Committee, and thus changed its focus, allowing the lab to take on a more global approach to its quality management system. It developed a mission and vision to promote and guide laboratory staff.

- External to the lab, laboratory staff employees participate on a Public Health Improvement Team (PHIT), which is a cross section of staff from the New Hampshire Division of Public Health Services. The PHIT is charged with developing a process to manage change and achieve QI in public health policies, programs and infrastructure. They do this by using:
 - A Plan, Do, Study, Act approach to performance improvement
 - The Institute for Healthcare Improvement's Model for Improvement
 - An electronic tracking database for quality measures

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The NH PHL has also:

- Revived its newsletter
- Performed customer satisfaction surveys with partners
- Launched an internal audit program
- Promoted stakeholder and partner involvement
- Participated in many different committees, meetings and trainings to improve relationships with partners and stakeholders

QI is a continuous project that will always require maintenance to offer the best in service and in product. In the case of the NH PHL, we offer our best to improve the well being of New Hampshire's public health.

Trace Metals Analyses

Submitted by George Robinson, Inorganic Chemistry Unit Supervisor

The Inorganic Chemistry Unit at the NH PHL performs trace metal analyses to determine human exposure to natural and man-made toxic elements. For example, previous studies in humans have shown that exposure to arsenic (As) may contribute to cancer of the liver, kidney, bladder, prostate, lymphoid, skin, lung and colon, as well as to other adverse health effects. Other studies have shown that lead (Pb) in children can affect growth and development and in adults causes brain and nervous system problems along with a variety of other symptoms. Mercury (Hg) consumed by a pregnant mother can have toxic effects on the fetus.

Heavy Metals Analysis

The inductively coupled plasma mass spectrometer (ICP MS) can analyze multiple elements to trace levels. In New Hampshire, this instrument has been used for arsenic and mercury biomonitoring projects to determine how much of these elements are found in humans as a result of external exposure. The ICP MS is also used to simultaneously analyze up to sixty different elements in environmental and food samples.

In an Arsenic Biomonitoring Program study, it was found that human urinary arsenic levels correlated with the arsenic level in the subject's well water.

Consuming fish is known to be an important part of a healthy diet, yet some fish have high levels of mercury. The danger of ingesting mercury, even in small amounts, can lead to toxic effects such as brain, kidney and lung damage in humans. To determine mercury levels, the NH PHL uses a cold vapor atomic absorption spectrometer. The laboratory tested over a thousand fish from bodies of water all over the state and used the data to establish the current NH Freshwater Fish Consumption Guidelines. These guidelines can be found online at http://www.wildnh.com/Fishing/fish_consumption.htm.

Miscellaneous-

Other samples of interest that the NH PHL has received for trace metals analyses include foods, breast milk, rugs, herbal tonics, barn boards, candy, crayons and metal nails.

The Inorganic Chemistry Unit has fulfilled the requirements of the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Programs (AIHA-LAP), LLC in conformance to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories*.

For clinical specimens, the NH PHL holds a *Certificate of Compliance* from the Centers for Medicare & Medicaid Services, Clinical Laboratory Improvement Amendments, also known as CLIA. A copy of this certificate can be found on the NH PHL website at: <http://www.dhhs.nh.gov/DHHS/PHL/default.htm>.

George Robinson working with "Greta," a graphite furnace atomic absorption spectrophotometer



Staff Updates

Retired

Sue MacRae, Virology and Special Testing Unit Supervisor

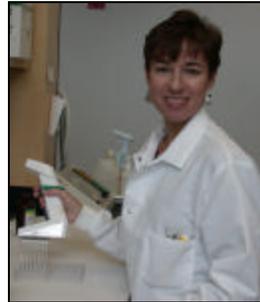


Sueann MacRae, the supervisor of the NH PHL's Virology and Special Testing Unit since 1983, retired in May 2009. Sue was the first supervisor of this "new" PHL unit and helped build it to the busy and varied lab it is today. Her experience as microbiology supervisor at the Lakes Region General Hospital laboratory and her many years of teaching microbiology at the New

Hampshire Technical Institute have contributed to her background knowledge of virology, molecular testing and efficient staff and lab management. Her retirement will give her more time to enjoy her family and her beloved pets at her home base in Belmont, NH, as well as in Florida and on Prince Edward Island. She is very much missed by her co-workers and we wish her a wonderful and relaxing retirement!

Promoted

Carol Loring, Virology and Special Testing Unit Supervisor



Microbiologist Carol Loring, of the Virology and Special Testing Unit of the NH PHL, has recently been promoted to supervisor of that unit. Carol has worked at the PHL for seven years. Prior to joining the PHL, Carol worked at the NH Veterinary Diagnostic Laboratory at the University of New Hampshire. She is currently enrolled in the Master of Science in Clinical Laboratory Sciences program at the University of Massachusetts. The Virology Unit is

a very busy section that performs a mixture of culture, traditional serology and molecular diagnostic assays, and Carol is looking forward to the challenges this new position presents. We're very happy to have her on board to fill the gap left by Sue MacRae's retirement.

Staff Spotlight



Joanne Pollock is a part-time laboratory assistant for the NH PHL. She began working for the Lead Unit in 1995 where she performed lead screening tests. After a short session with the Clinical Microbiology Unit, Joanne moved to the TB Unit in 1998 and has been there ever since. She is a great asset to the TB Unit doing

data entry, making reagents and media and wrestling with the fax machine to fax the myriad of reports to our providers.

Interviewer:

Why did you choose to work in public health?

Joanne Pollock, Lab Assistant, Tuberculosis Lab:

I had worked in the clinical labs since 1955 - Wow!! I thought working at the NH Public Health Labs would be a nice change.

Laboratory Updates

Specimen Kits – The NH PHL provides complete specimen collection kits for the many numbers of tests we perform. Some have items in it that need to be replaced periodically as they expire. We always provide the complete kit expiration date on the outside mailer. Please take notice of the expiration date. Upon expiration of the kit, please check the contents of your kit to see what item has expired. Contact us for a replacement of just that item. These items may include Regan-Lowe solid media, Thayer-Martin (Jembec) plates, universal transport media, urine transport tubes, broth or sterile equipment. All items post-expiration date can safely be disposed in your facility following state and local waste guidelines. Please contact the laboratory office at (603) 271-4661 for kits or replacement items.

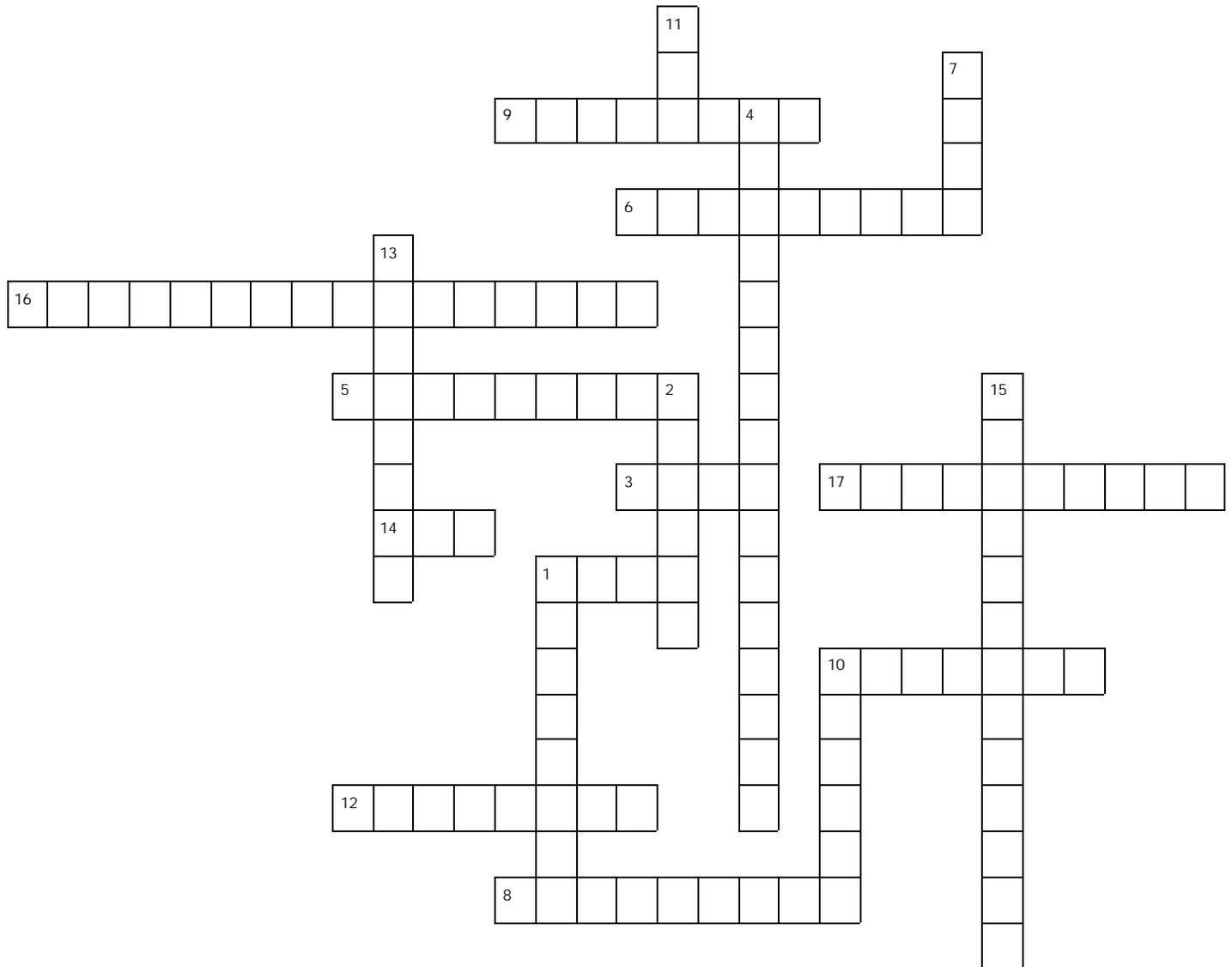
QI Score Cards – As a quality improvement monitor, the NH PHL tracks all information sent along with specimens from our health-care providers. Many of our providers have expressed interest in receiving a summation of this information regarding quality improvement at their facilities. In the near future, we will be offering a "QI Score Card" based on pre-analytical quality assurance evaluation. If you would like to receive one on your facility, please contact Jill Power at (603) 271-5869. All reports will remain confidential.

H1N1 Quality Monitor – The Quality Assurance Unit is monitoring all specimens received for novel H1N1 influenza testing from September 1, 2009 to December 31, 2009. Parameters measured will be the actual specimen received, transportation mode, average daily temperature, turn-around-time of specimen collection to receipt at the laboratory, quality of the specimen (an analytical value that identifies if the specimen was taken properly), the CDC criteria for testing and the facility submitting the specimen. Our goal is to identify the best possible specimen type that detects the virus within the State of New Hampshire. Stay tuned for a published report in a subsequent newsletter!

Lead Testing Discontinued – The New Hampshire Public Health Laboratories (NHPHL) discontinued the performance of blood lead, erythrocyte protoporphyrin (EP) and zinc protoporphyrin (ZPP) testing on Wednesday, October 28, 2009. The last date that samples were accepted for testing was Monday, October 26, 2009.

The NH Childhood Lead Poisoning Prevention Program (CLPPP) will continue to provide case management services for children with elevated blood lead levels and will continue to be a resource for families, health care providers and property owners. Please contact the CLPPP at 1-800-852-3345, ext. 4507 or at (603) 271-4507 if you have any questions about CLPPP services.

Search the articles in this edition and in the last edition of the newsletter for the answers to this puzzle. Have fun!



Across:

1. Liquid media used to promote the growth of *M. tuberculosis*
3. A DNA fingerprint of organisms
5. For example: EEE, WNV, or SLE
6. Recent NH PHL retiree
8. An unwelcome dinner companion while on a cruise
9. Recent pandemic scare
10. Paralytic shellfish poisoning
12. A toxic chemical recently found in pet food
14. A proficiency program provider
16. Federal agency for natural disasters and bioterrorism events
17. An organism recently found in peanut butter

Down:

1. Hungry blood sucking critter
2. Limited space and unlimited clutter may be issues for this
4. The smallest amount your method can measure
7. An acronym of drugs used to treat *M. tuberculosis*
10. Disease of Old Yeller and Cujo
11. A viral infection of horses and humans
13. Carrier of the causative agent of Lyme disease
15. Tracking the amount of specific chemical in the environment

Answers can be found in the next issue of the NH PHL Newsletter.