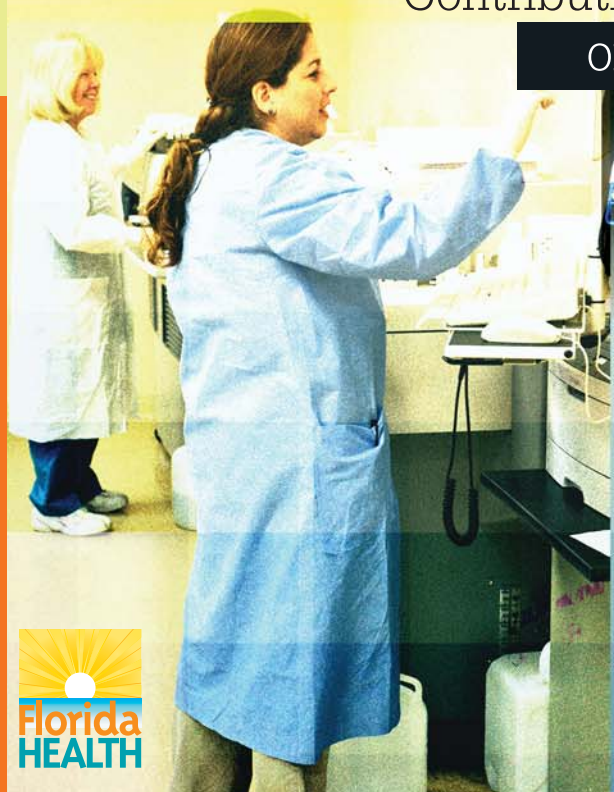
Bureau of Public Health Laboratories

2012: Annual Report

Contributing to a healthier Florida,
one test at a time



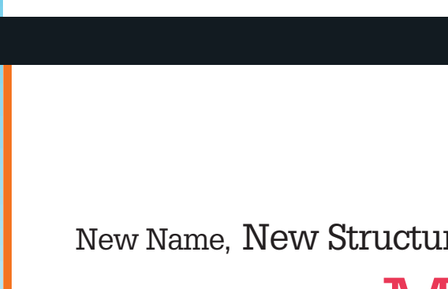
Florida HEALTH

We are committed to the Florida Department of Health mission, "to protect, promote and improve the health of all people in Florida through integrated state, county and community efforts."

New Name, New Structure, New Challenges, New Opportunities.

Mission Accomplished!

Greetings! We are very pleased to present the inaugural *Bureau of Public Health Laboratories 2012: Annual Report*. . .and what an exciting and eventful year 2012 has been!



From top to bottom: Tampa Laboratory and the Jacksonville Laboratory

The Florida Department of Health, Bureau of Public Health Laboratories underwent several changes:

- The Bureau name changed from the Bureau of Laboratories to the "Bureau of Public Health Laboratories" (BPHL).
- There were leadership changes following the retirement of the Jacksonville and Tampa Laboratory Directors and the departure of the Bureau Chief.
- The Bureau moved under the Division of Emergency Preparedness and Community Support.

Despite the changes, it was business as usual as the BPHL staff continued to strive to fulfill the Bureau's mission to "contribute to a healthier Florida by providing diagnostic screening, monitoring, reference, research and emergency public health laboratory services." The BPHL had several successes in 2012 including:

- The implementation of a lifesaving test in the Newborn Screening Laboratory.
- The implementation of a new HIV Diagnostic testing algorithm—he first major change in HIV screening since the BPHL began HIV testing 23 years ago!
- The response to public health events including providing well water testing for those impacted by Tropical Storm Debby and coordinating submission of samples related to the multi-state fungal meningitis outbreak to the Centers for Disease Control and Prevention (CDC) and reporting results back to providers.

In 2012, the BPHL continued to foster the important relationships with our federal, state and county partners as evidenced by the collaborative efforts before and during the Republican National Convention. Additionally, the BPHL has an ongoing partnership with the Florida Department of Health, Bureau of Epidemiology to provide testing for outbreaks and disease surveillance and strong connections with CDC and the Association of Public Health Laboratories (APHL).

In this report, you will learn about these and other noteworthy BPHL accomplishments, all which would not be possible without the efforts of our talented and dedicated staff. As we move into 2013 collaboration will be key, especially with challenges created by decreases in funding and workforce shortages. We are committed to the Florida Department of Health mission, "to protect, promote and improve the health of all people in Florida through integrated state, county and community efforts."

Victor Johnson
Director, Division of Emergency Preparedness and Community Support

Susanne Crowe
Interim Chief, Public Health Laboratories

Kayleigh Jennings isolating an agarose plug of bacterial DNA. These plugs are then treated with enzymes that cut the DNA into different sized pieces. This method allows us to generate a specific DNA fingerprint of the bacterium being studied.

The Fellowship Experience:

A Journey into the Bureau of Public Health Laboratories

By Kayleigh Jennings

Upon being awarded a one-year training fellowship in emerging infectious diseases (EID) through the Association of Public Health Laboratories (APHL) and the Centers for Disease Control and Prevention (CDC), I was pleased to be accepted as a fellow at the Florida Department of Health, Bureau of Public Health Laboratories' (BPHL) Tampa laboratory.

Acceptance into the APHL/CDC EID Fellowship program is extremely competitive, and I was very excited about the opportunity to work in a state public health laboratory. I began my fellowship in August of 2012 with much enthusiasm and many expectations for the coming year.

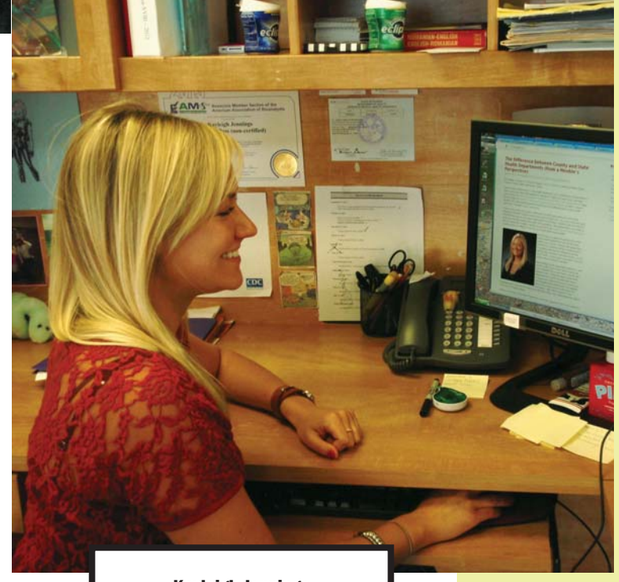
I set a goal to obtain a well-rounded education during my fellowship by rotating through every department at the BPHL Tampa laboratory. I rotated through the arbovirology, virology, serology and microbiology departments. I was also able to experience working in a Biosafety Level-3 laboratory. The rotation schedule was ambitious, but it was important for me to learn as much as possible about the operations of a State Public Health Laboratory.

My first rotation was in the arbovirology department. The arbovirology laboratory tests blood from 'sentinel chickens' for a type of virus called an 'arbovirus' that is carried by mosquitoes. West Nile Virus, Eastern Equine Encephalitis Virus and St. Louis Encephalitis Virus are all examples of arboviruses that are carried by mosquitoes; when these mosquitoes bite humans, they can transmit the virus to humans causing infection, sometimes leading to serious conditions like encephalitis. As part of Florida's arbovirus surveillance program, the sentinel chickens live in flocks, located throughout the state. Since mosquitoes bite chickens, public health workers can monitor what diseases are being carried in mosquitoes by testing the chickens' blood for antibodies to arboviruses. Detecting antibodies in chickens is an early warning sign for the human population. When the chickens test positive for antibodies to an arbovirus, public health workers can take action to protect the public such as spraying for mosquitoes and notifying the public to avoid mosquitoes. I learned a lot from the hardworking team in arbovirology, and I am thankful beyond words for the "behind the scenes" work they do to keep the public health front safe.

Another favorite on my rotation schedule was the microbiology department. There I found my soul mate. . .PulseNet! PulseNet is a national program to track bacteria that can be transmitted in food such as Salmonella, E. coli and Listeria.

Another favorite on my rotation schedule was the microbiology department. There I found my soul mate…PulseNet! PulseNet is a national program to track bacteria that can be transmitted in food such as Salmonella, E. coli and Listeria. Laboratories that participate in the program perform standardized molecular fingerprinting procedures by a method called pulsed-field gel electrophoresis (PFGE). The PFGE 'fingerprints' are entered into a national database and public health workers can use this information to identify and investigate foodborne outbreaks, within and across states. I really enjoyed learning all of the methods involved in Salmonella outbreak surveillance and I was even trained and certified by the CDC to join PulseNet!

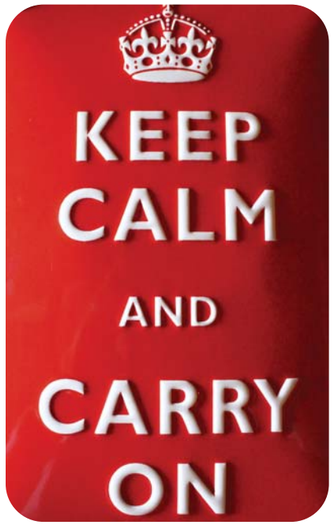
I obtained a vast amount of knowledge from my fellowship experience, yet what impacted me most was discovering that the individuals in the public health field are among the hardest working, caring and most helpful people I have ever met. The BPHL-Tampa laboratory staff are not here for the salary, they are here because they love helping people and making a difference. I have never felt so welcomed or respected as I have felt at the Department of Health. As I prepare to finish my fellowship and move on, I take with me the valuable lesson that public health is for thick-skinned, unbelievably dedicated, caring individuals. Simply put, this has been the greatest opportunity in my career!



Kayleigh Jennings
EID Fellow, 2012–2013

Politics & Public Health

In 1939, the British Government coined the phrase "Keep Calm and Carry On" to raise the morale of the British people with respect to the impending war with Germany. This same phrase was used by the Bureau of Public Health Laboratories (BPHL) Tampa Laboratory during the week of the Republican National Convention (RNC), which convened from August 27 to August 30, 2012, in Tampa.



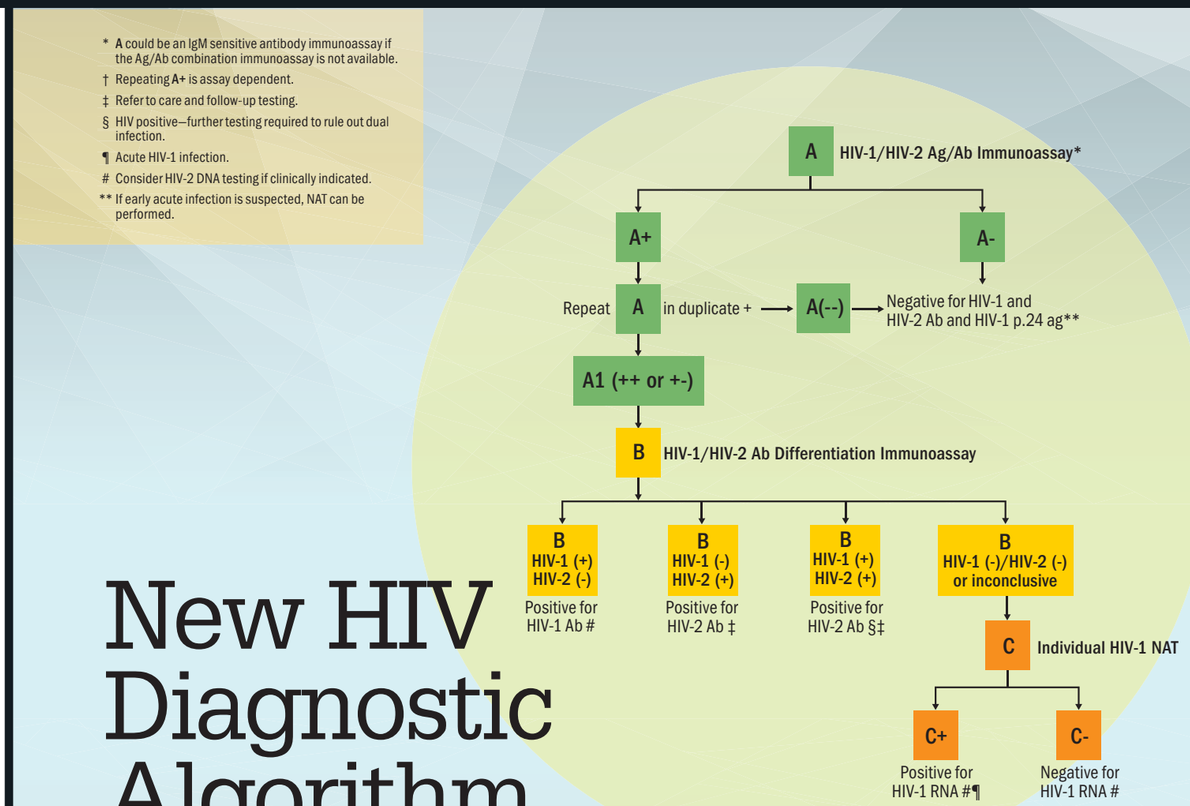
Prior to the convention, BPHL-Tampa planned for a year to be prepared for any event that could negatively impact public health and safety during the RNC event. All biological outbreaks, natural and intentional, were considered. This included norovirus and non-seasonal influenza outbreaks, food and water contamination (all of which can result in large numbers of sick people), chemical threats, and suspicious threat samples—the so called "suspicious powders" that are sometimes sent in letters and packages. Preparations included increased outreach and training with first responders for sample collection for white powder incidents; increased training for chemical threats recognition for the health and medical community; full scale exercises allowing participants to practice for a coordinated response to an intentional exposure event; and participation in an exercise to evaluate the laboratory's response if affected by a hurricane. Staff was cross-trained to provide support to prepare for a surge in the number of samples for testing in one area. Also, a plan was put in place to divert non-critical samples and samples that are not from credible threats to the Jacksonville and Miami laboratories so that BHPL-Tampa could concentrate on only the essentials.

The laboratory's environmental air analysis program was put on heightened alert and readied for extra testing. As a precautionary measure, this program substantially increased their surveillance of environmental air samples. Additional personnel from other national laboratories were brought on board to help out with the extra duties. Shifts continued around the clock during the RNC with a 24/7 operation. During the period of August 24–August 30, the program tested a total of 562 samples, all of which were negative.

During the RNC, BPHL-Tampa worked closely with the DOH in Hillsborough and Pinellas Counties epidemiology programs, which were extra vigilant with their surveillance activities during the RNC. In particular, epidemiologists paid close attention to reports of patients with unusual rash, food-related illnesses, bloody diarrhea, or unexplained severe infectious illness/death in an otherwise healthy person.

Fortunately, the convention proceeded without biological outbreaks or chemical threats of any kind. We stayed calm and carried on!

New HIV Diagnostic Algorithm

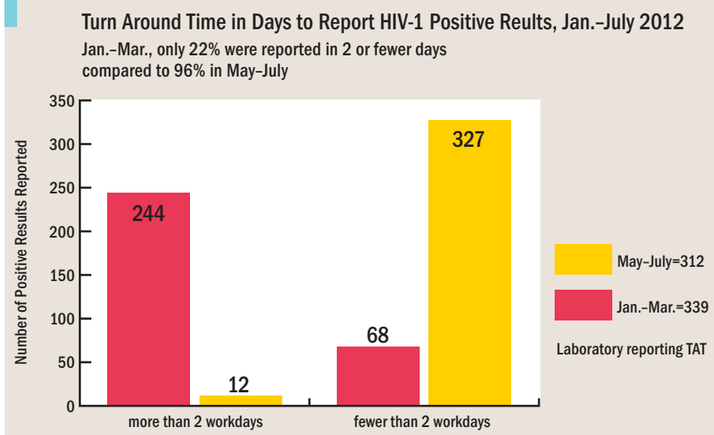


The Bureau of Public Health Laboratories (BPHL) implemented an innovative HIV Diagnostic Algorithm on April 16, 2012. This marked the first major change in HIV diagnostic testing in 23 years. The new algorithm was developed based on the work of experts at the Centers for Disease Control and Prevention (CDC) and members of the Association of Public Health Laboratories (APHL) HIV/HCV sub-committee. The new algorithm has been published by the Clinical and Laboratory Standards Institute (CLSI). The Jacksonville Retrovirology Section Chief was a member of the APHL sub-committee that worked on this new algorithm.

As part of the new testing algorithm, the BPHL implemented an FDA-approved laboratory-based HIV-1/HIV-2 screening assay. This assay, commonly known as a "4th generation HIV-1/HIV-2 antigen/antibody combo immunoassay," is a qualitative immunoassay that can simultaneously detect HIV-1 p24 antigen, antibodies to HIV-1 (Groups M and O) and HIV-2 in human serum or plasma. This is a very sensitive assay and is intended as an aid in the diagnosis of HIV-1 and/or HIV-2 infection, including acute or primary HIV-1 infection. An acute HIV-1 infection occurs when a person is infected with the HIV-1 virus, but they do not have enough antibodies for a laboratory test to detect it. Studies suggest that the rate of HIV transmission during the acute infection stage is 26 times higher than during established HIV infection. Mathematical models indicate that acute HIV infection, despite its short duration, can account for 10%–50% of all new HIV infections. This 4th generation antigen/ antibody screening test is able to detect HIV antigen as early as 15–22 days after the person is infected.

The new HIV algorithm also includes changes in the HIV confirmatory

Besides identifying acute HIV infections, the use of this new algorithm has shortened the BPHL HIV turn-around times (TAT) for reporting positive test results. In a three-month comparison of positive results reporting, BPHL increased to 96% the number of positive results reported in two days or less.



process. The HIV-1/HIV-2 rapid test replaced the Western Blot as the primary supplemental assay in the confirmatory process. The rapid test provides better specificity than the Western Blot and can differentiate between HIV-1 and HIV-2 infections which is important in terms of disease progression, treatment and for epidemiological purposes.

By the end of 2012, four patients with HIV-1 acute infections were identified using the new HIV Diagnostic Algorithm. Importantly, all four patients were referred to a healthcare provider within 14 days of specimen collection. Epidemiological data have suggested that antiretroviral therapy reduces the risk of HIV transmission in heterosexual couples by 92%–98%.

Besides identifying acute HIV infections, the use of this new algorithm has shortened the BPHL HIV turn-around times (TAT) for reporting positive test results. In a three-month comparison of positive results reporting, BPHL increased to 96% the number of positive results reported in two days or less.

The decreased TAT resulted in a four-fold increase in the reporting of positive results during the defined time period compared to the earlier time period. This greatly expedites the linkage to care for affected patients. Lastly, the new HIV Diagnostic Algorithm virtually eliminates indeterminate or inconclusive laboratory interpretations. The transition to the new HIV Diagnostic Algorithm was smooth due to the efforts of the Office of HIV/AIDS Prevention, Surveillance and IT staff that assisted the BPHL during the six months preceding the transition date.

Ketty Ledan, BS, MS, Ph.D.
Health Services manager

"As we continue our efforts to expand HIV testing and linkage to care, we are extremely delighted with the fast turn-around result obtained from this new fourth generation test. The advantages of this new technology prompted us to encourage our registered counseling and testing sites to switch to 'blood testing' whenever possible. Such advantages include the diagnosis of more recent infection, helping make people aware of their HIV status, expediting linkage to care and reducing the spread of HIV in the community by people unaware of their positive status."

Florida Pubic Health–
Prepared for Emergencies

Dr. Rick France acting as the exercise director coordinates events for the 2012 BPHL statewide, multi-agency exercise.

Jim woke up very early Saturday morning. He was excited about the day ahead. This was the day the Big Moose Lodge hosted their annual fundraising carnival. There would be rides, games and a lot of great food! Jim was looking forward to spending the day at the carnival with his wife and grandkids! Jim and his family were having a great time at the carnival but suddenly, Jim started feeling nauseous. At first he thought he had ridden one too many rides, but soon one of his grandchildren was complaining that his stomach hurt too. Jim and his wife headed to take their grandson to the first aid tent. The first aid tent was packed with people and many were vomiting uncontrollably and some began passing out. The paramedics were working frantically to try to keep people calm and comfortable and transporting the sickest to the hospital. Soon, all of the local hospital emergency rooms were full with people from the carnival. A man rushed into the tent saying that he heard from a friend that the local newspaper had received an anonymous letter from an anti-government group stating that they had poisoned the food at the carnival. Rumors began to spread and the parents' worried look was etched upon their faces as they feared for the worst.

Wonder what happened next? Well, this was not an actual event but rather a dress rehearsal to test how well prepared local, state and federal agencies are to respond to emergency situations such as large scale biological or chemical exposures. Preparedness exercises like this one provide the Bureau of Public Health Laboratories (BPHL) and Florida's health and medical community partners with the means of attaining, practicing, validating, and improving capabilities.

The 'Big Moose Lodge Carnival' event was part of a 2012 preparedness exercise in which over 20 federal, state and local agencies and fourteen hospitals across the state participated. The Centers for Disease Control & Prevention (CDC) and the Federal Bureau of Investigation (FBI) participated at the federal level. The Florida Poison Information Center and several Department of Health programs along with the Florida Department of Law Enforcement and Florida Department of Agriculture and Consumer Services participated at the state level. Eleven county health departments and hospitals participated locally. The exercise evaluated important aspects of responding to emergencies including information sharing; public health laboratory testing; public health surveillance and epidemiological investigations. Most important of all was achieving a collaborative attitude with all of the participating agencies. In this case, the poison used was ricin, which is both a biological and a chemical agent.

The BPHL Chemical Threat (CT) Program has designed, planned and participated in preparedness exercises since 2006. The BPHL CT Program has consistently promoted a robust program for developing innovative training classes and exercises that assess roles of hospitals, emergency medical services, emergency management, county health departments, and law enforcement. In recognition of their community preparedness efforts, the BPHL CT Program received the Outstanding Outreach to Poison Control Centers or Hospitals award presented by the CDC and the Association of Public Health Laboratories (APHL) at the 2012 National Laboratory Response Network (LRN) Meeting.

In 2012, the Florida Biological Defense program staff performed 223 tests on environmental and clinical samples.

80% of the samples tested were clinical and 20% were environmental.

The CDC Laboratory Response Network (LRN) maintains a proficiency testing program and requires participation by all Select Agent laboratories. This year's proficiency panel included *Coxiella* (Q Fever), *Brucella* (Brucellosis), Poxvirus species (Pox) and *Yersinia pestis*.

The Chemical Threat (CT) program staff can test for many chemical agents. Here are a few agents that BPHL staff tested for in 2012:

- **Ricin metabolites**
- **Lead, cadmium and other heavy metals**
- **Arsenic metabolites**
- **Cyanide in blood**
- **Nitrogen and sulfur mustard metabolites**
- **Nerve agent metabolites**
- **Volatile organic compounds**
- **And other toxic elements**

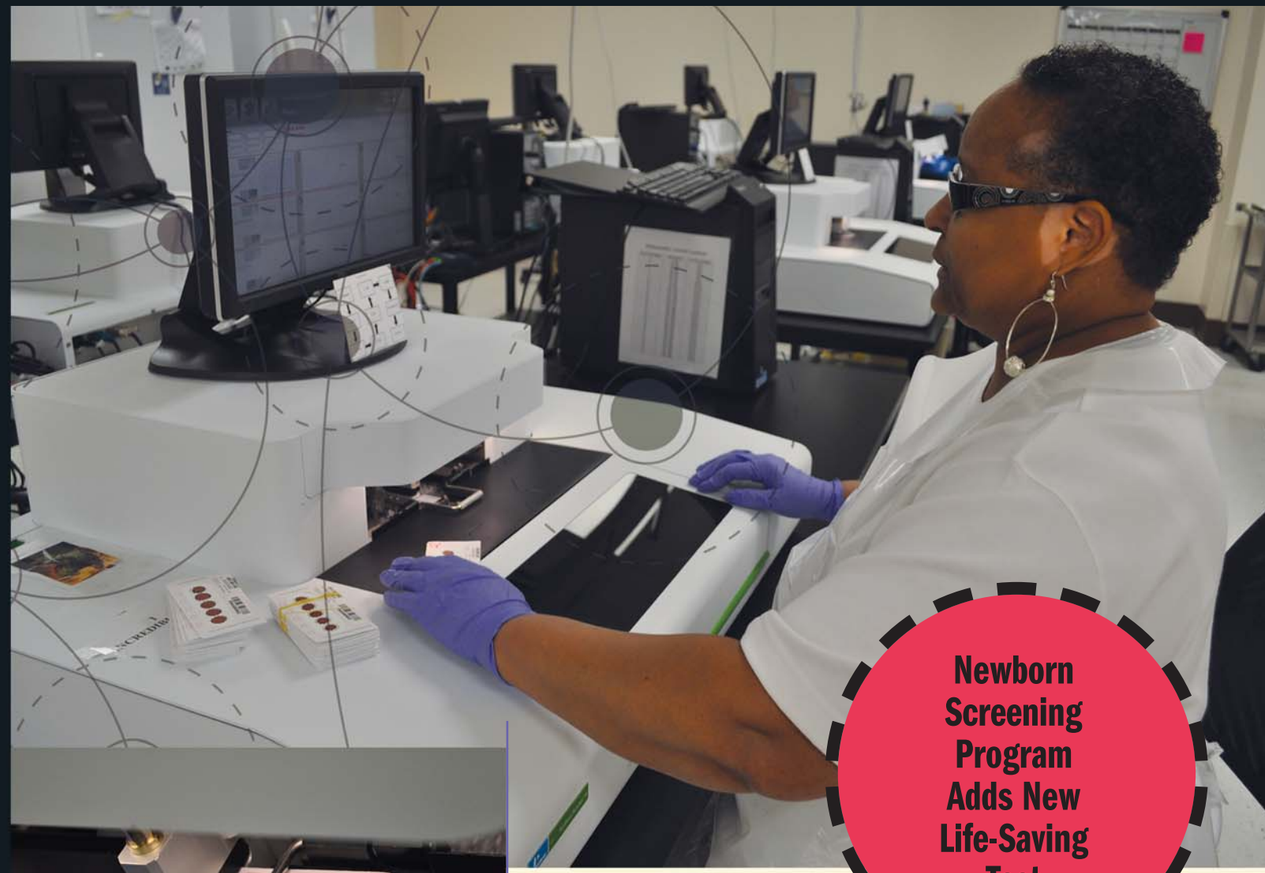
In 2012, the CT lab staff also analyzed 243 samples of hair and saliva to test for exposure to second hand smoke. This study of non-smokers is part of the Florida Behavioral Risk Factor Surveillance System (BRFSS) survey.

Photos from top to bottom:

Reden Salonga and Dr. Jason Palcic unwrap patient specimens that have been shipped to the BPHL laboratory to test for chemical agents as part of the exercise.

Melissa Geiger prepares patient specimens for testing as they arrive from the regional hospitals as part of the exercise.

Patient specimens are auto-pipetted in preparation for testing for chemical agents as part of the exercise.



From top to bottom:
Patricia Onasanya is punching 1/8-inch discs from dried blood spots collected from newborns.

A closer look of the dried blood spots being punched with automated punchers.

Newborn Screening Program Adds New Life-Saving Test

Baby Aaliyah was born in Florida on October 20, 2012—a happy healthy baby girl! What Aaliyah's parents did not know was that although she appeared to be normal and healthy, Aaliyah's immune system was not functioning correctly. Aaliyah was lacking vital, functioning T-lymphocytes (T-cells) that facilitate the correct functioning of B-lymphocytes (B-cells). These T- and B-cells are major players in our immune systems that help fight off infectious diseases. When T and B lymphocytes do not work properly, the body is vulnerable to attack from every little germ. This disorder is called "Severe Combined Immunodeficiency" (SCID).

Because babies are born with antibodies from their mother, babies that have SCID usually appear healthy for the first few months of life. How ever, after a few months, babies with SCID will begin to get infections. Doctors will eventually suspect the baby has an immune disorder, but because SCID is so rare (estimated at 1 in 40,000 to 100,000 live births) it is often way down the list of possible diagnoses. Sadly, without early treatment, babies born with SCID may not live past age 2. Therefore, screening babies for SCID when they are 24-48 hours old is game-changing.

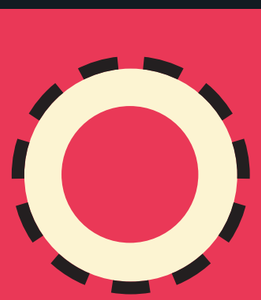
Baby Aaliyah was fortunate. By the time she was one week old, her parents had been notified of her positive SCID screening test result and were able to meet with experts to get the appropriate counseling regarding their daughter's condition.

So how did Aaliyah's doctors learn that she had SCID so soon after her birth? When Aaliyah was just one day old, a simple needle prick was made in the heel of her foot. This prick provided a few tiny drops of blood which were placed on a special filter paper. The blood spots were dried on the paper and sent to the Florida Bureau of Public Health Laboratories (BPHL) in Jacksonville where 35 different screening tests were performed on the blood sample. The results for these screening tests were reported back to the doctor within 48 hours. In addition to a hearing test, these screening tests make up the Newborn Screening Panel that is performed on all babies born in the state of Florida. In 2011, there were approximately 215,000 babies born in Florida which represents about 5.5% of the total births in the US.

In the BPHL Newborn Screening Laboratory, all of the screening tests done on baby Aaliyah's blood sample came back normal except for one. The screening test for SCID, which had been implemented just a short 20 days before Aaliyah was born, was positive! As with all screening tests that are positive, the laboratory staff repeated the test and again it was positive. The hospital and the Department of Health's Children's Medical Services Newborn Screening Program follow-up team were notified of Aaliyah's positive SCID result and immediately leapt into action.

If the BPHL had not performed the screening test for SCID, Aaliyah could have been several months old and seriously ill before the doctors discovered she had SCID. But today Aaliyah is happy and healthy. Her parents continue to follow the advice the doctors have given them and have protected Aaliyah from infectious germs. She is living at home with her parents in isolation. In the future Aaliyah will need a bone marrow transplant which will increase her chances of a long, healthy life.

The implementation of statewide testing for SCID was no small feat. It involved hard work and commitment from many groups including the Florida Genetics and Newborn Screening Advisory Council, PerkinElmer, Children's Medical Services Follow-up Program, the Bureau of Public Health Laboratories Newborn Screening Laboratory and referral centers at the University of Florida, University of South Florida and the University of Miami. There is a cost associated with performing this test on all babies. But ultimately, this test can save a life which is priceless. Just ask baby Aaliyah's parents.



36

Florida Department of Health tests for 36 disorders as part of the Newborn Screening Program.

2,369,358

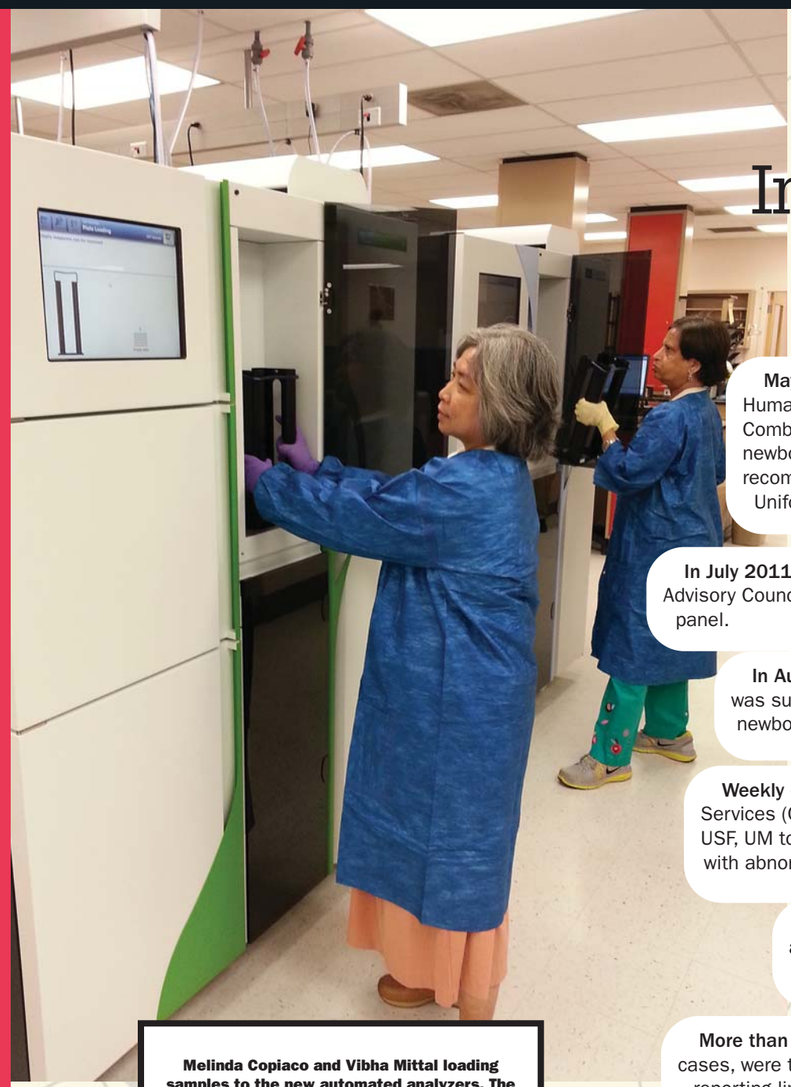
BPHL staff performed 263,000 panels in 2012 which is 2,369,358 individual tests!

209 & 62

In 2012 the lab identified 209 infants with sickle cell disease and 62 infants with congenital hypo-thyroidism which are two of the most common disorders seen in Florida.

1

In 2012 SCID testing was implemented and 1 infant was detected by the screening process.



Melinda Copiaco and Vibha Mittal loading samples to the new automated analyzers. The instrumentation produces more accurate results and reduces total analysis time.

SCID Test Implementation Timeline

May 21, 2010, the U. S. Secretary of Health and Human Services approved the addition of Severe Combined Immunodeficiency (SCID) to the core panel of newborn screening disorders as part of the recommendation to adopt the national Recommended Uniform Screening Panel (RUSP).

In July 2011 the Florida Genetic and Newborn Screening Advisory Council unanimously voted to add SCID to our screening panel.

In August 2011, Legislative Budget Request (LBR) was submitted to implement SCID screening for all newborns in Florida.

Weekly conference calls conducted with Children's Medical Services (CMS) follow-up group and immunologists from UF, USF, UM to develop criteria for reporting and follow-up of babies with abnormal screening test results.

In June 2012, contract was approved for PerkinElmer to perform SCID screening on-site for Florida.

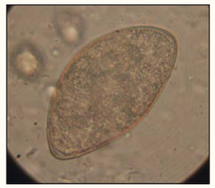
More than 2000 samples, including 18 from known SCID cases, were tested to validate the test method and establish reporting limits.

On October 1, 2012, Florida statewide SCID screening was implemented.

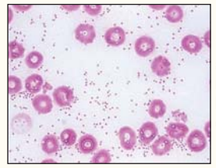
After 20 days, a baby was confirmed with an unknown SCID variant.

Learn more about SCID: www.scidangelsforlife.com/

Florida Department of Health Genetics and Newborn Screening Advisory Council met to discuss a variety of topics including the potential addition of testing for Severe Combined Immunodeficiency Disease (SCID) and Critical Congenital Heart Disease (CHD). In January 2012 the testing panel included 35 disorders.



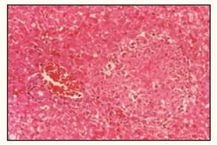
The parasite Spirometra was identified in a patient who had been boar hunting and had consumed undercooked boar meat. This parasite is a tapeworm that is found in animals. Humans can become infected by drinking contaminated water, eating undercooked meat from an infected animal or if broken skin comes into contact with infectious parasite larvae.



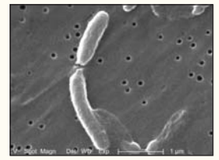
The bacterium Capnocytophaga canimorsus was identified from a patient. This bacteria is commonly found in cats and dogs, but rarely causes human infection. The patient had to have both hands, both feet and part of his lip removed due to gangrene caused by a severe infection with this organism.

The 2012 Florida Biological Chemical Agent Full Scale Exercise was conducted over 5 days. The exercise involved local, state and federal agencies. The scenario was based on intentional food-poisoning with exposure to a biological toxin, ricin, which is also considered a chemical agent. Testing of the agent was performed at BPHL as part of the exercise.

Brucella suis was isolated in samples submitted from two separate Florida hospitals in different regions of the state. One case was related to a potential laboratory exposure. Brucella suis is the most commonly reported laboratory acquired bacterial infection.

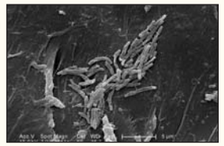


The bacterium Vibrio cholerae, non-01 serotype, was identified from a patient in the panhandle. Vibrio cholerae causes cholera and is transmitted by contaminated food or water. Cholera is relatively uncommon in the U.S. The patient had traveled to Haiti where the 01 serogroup has been associated with epidemic cholera cases in Haiti since the 2010 earthquake.



JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

The Mycobacteriology laboratory began testing specimens as part of the effort to screen and test potentially exposed persons in the TB cluster investigation of the homeless population in Jacksonville.

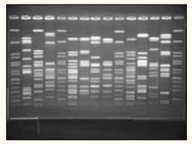


BPHL started testing private well water samples from counties affected by Tropical Storm Debby. The lab tested a total of 418 samples from Suwannee, Clay, Nassau, and Gilchrist counties over a period of 2 months.

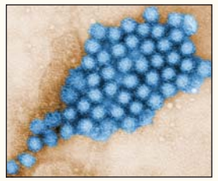
The BPHL Environmental Chemistry section started work on a joint project with the BPHL Chemical Threat section to perform the analysis to test for arsenic in urine and water samples. The project is being funded by the Environmental Public Health Tracking (EPHT) program through a CDC grant.

In response to the multistate outbreak of fungal meningitis associated with epidural pain injections, the Jacksonville and Pensacola labs received and shipped over 40 samples from patients to the CDC for testing. The lab reported results from CDC back to the Bureau of Epidemiology and the County Health Departments.

A foodborne outbreak in Lake City was identified following testing of patients and a chicken/rice dinner. Stool samples from several patients and the chicken samples tested positive for Salmonella Javiana. Fifteen patient isolates and two food isolates had matching “fingerprint” patterns by Pulse Field Gel Electrophoresis (PFGE).

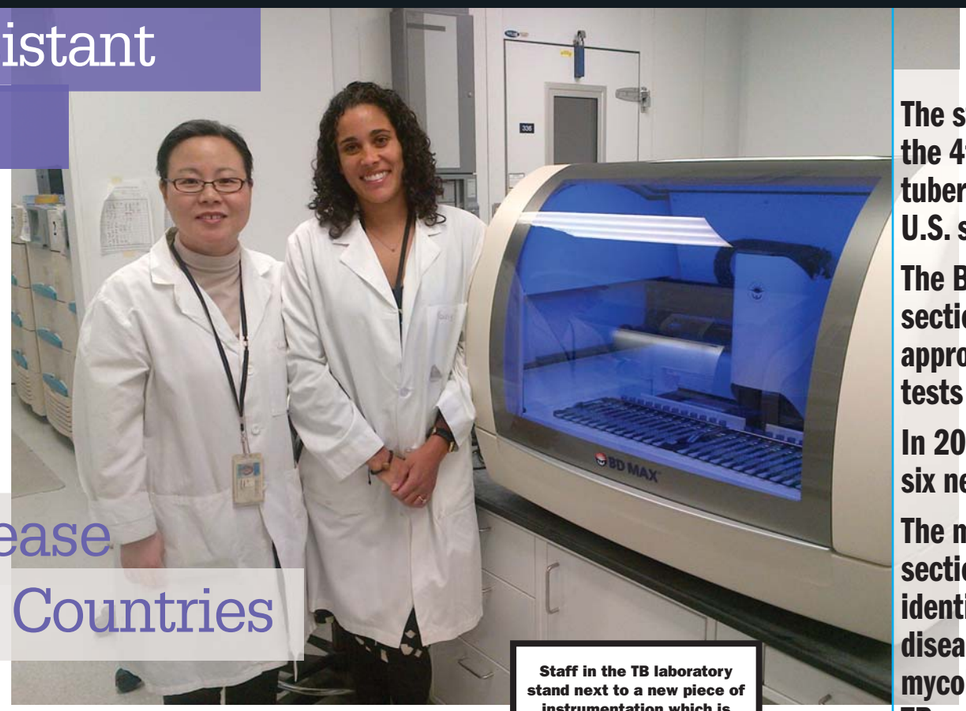


Several Norovirus outbreaks occurred including two which were confirmed by the surveillance program, CaliciNet, as Norovirus Type GII.4 Sydney AUS. This is a new norovirus variant that was first identified in Sydney, Australia and has now been identified in the U.S. These are the first confirmed cases in Florida.



2012 BPHL TIMELINE

Multi-drug Resistant Tuberculosis —Not Just a Disease in Foreign Countries



Staff in the TB laboratory stand next to a new piece of instrumentation which is used for a molecular test for TB and will reduce workload for staff and standardize our current procedure.

The state of Florida reports the 4th highest number of tuberculosis cases among U.S. states.

The BPHL mycobacteriology section performs approximately 30,000 TB tests a year.

In 2012 the state reported six new MDR-TB cases.

The mycobacteriology section performs tests to identify a wide range of disease causing mycobacteria in addition to TB.

It started with a dry cough, weight loss and a general feeling of tiredness. So when Anna* went for her annual physical exam, she thought she had better mention it to her doctor. The doctor knew that anyone with these symptoms could possibly have tuberculosis (TB). But when Anna told him she was originally from a former Soviet country in Eastern Europe, her doctor knew the risk was even greater. In Anna's home country there has been a resurgence of TB since the collapse of the Soviet Union. In fact, her country has one of the highest rates of TB in Europe and the number of cases is increasing at an alarming rate.

After her doctor told her he wanted to test her for TB, Anna started wondering how she could possibly have contracted it. Then she remembered that last year when her father was ill, she had returned to her home country for several weeks to take care of him. Her father was in an open hospital ward along with many other sick patients and Anna remembered hearing several patients coughing. An enclosed space is an ideal setting for the TB germ to spread, as it is transmitted through the air when TB-infected patients cough.

Anna was directed to her local hospital to have "sputum" specimens collected. Sputum samples are needed since the organism that causes TB, Mycobacterium tuberculosis, is found deep in the lungs. All of her sputum specimens were negative by the initial test for acid fast bacteria, or "AFB." In addition to the sputum specimens, they performed a tuberculin skin test (TST or "PPD") which looks for a reaction on the skin indicating possible exposure to the TB organism. Anna's skin test was positive, but since many people vaccinated against TB (with BCG vaccine) often have a positive skin test reaction, Anna received a chest X-ray.

The X-ray clearly showed there was something going on in Anna's lungs. Normal X-rays should reveal lungs that are completely clear; however, Anna's X-ray revealed a "lesion" in one of her lungs. Based on Anna's symptoms, the X-ray, and her risk factors, her doctor decided that she probably had TB; however, he still needed definite laboratory confirmation. A specimen from the actual lesion on her lung was obtained by a "fine needle aspirate" and immediately sent to the Bureau of Public Health Laboratories (BPHL) in Jacksonville for analysis.

BPHL laboratory technologists detected mycobacteria on the AFB smear. Next, they inoculated the specimen onto culture media to grow the organism so that additional tests could be performed. Simultaneously, they also performed a rapid molecular test directly on the specimen. This very specific and sensitive test is able to detect the mycobacteria that cause TB within a few hours. In Anna's case, the rapid test was positive and the doctor was alerted immediately. The following day Anna was given four different drugs to start fighting her TB infection.

But this does not complete all the testing required to confirm the presence of the TB organism; it is merely the start! When the rapid test is positive, another molecular test is automatically performed to look at whether there are any markers for resistance to two of the most commonly used "first-line drugs," rifampin and isoniazid.

This test takes a few days to run but is much quicker than waiting for the mycobacteria to grow on the culture. The test came back with frightening results: Anna's TB was resistant to the first-line drugs, a condition known as multi-drug resistant tuberculosis (MDR-TB).

Within five days of receiving the specimen the BPHL lab had a) identified mycobacteria in the specimen, b) confirmed it as being Mycobacterium tuberculosis, the causative agent of TB, and c) detected resistance to two of the most important drugs for treatment, rifampin and isoniazid. An immediate call to the doctor meant that Anna's drugs could be changed, because two of the four drugs she was taking were not going to be effective. It was more than four weeks later, after the cultures grew out, that the organism was determined to be resistant to several drugs, indicating that her drug regimen needed to be carefully monitored.

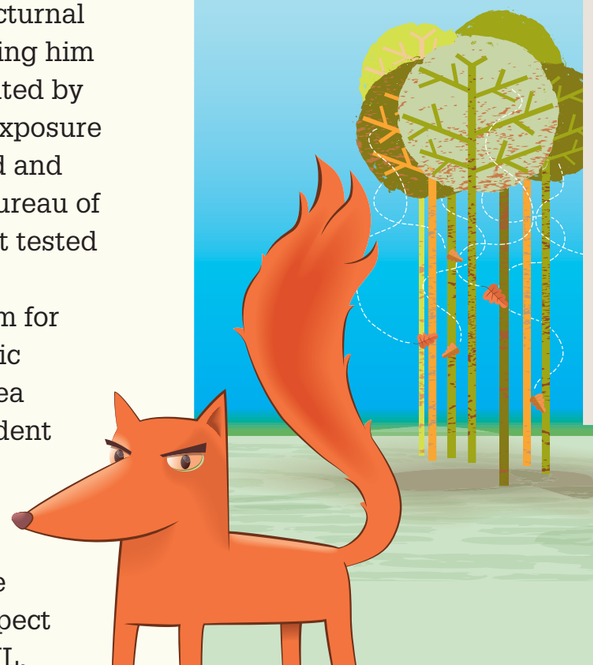
Although an MDR-TB diagnosis is serious, it is a treatable disease e. Anna will need a total of 19 months of drug therapy to completely cure her TB. The good news is that everyone worked together to ensure the right steps were taken at the right time. From the hospital, to the TB Physicians' Network, to the Florida Department of Health TB Control Section, to the Bureau of Public Health Laboratory's Mycobacteriology Section, good communication was key. Timely and accurate diagnosis and drug susceptibility testing for TB was an essential component in this effort and meant that Anna's doctor was able to administer the correct medication as soon as possible. Florida is one of the few states in the country that performs molecular screening for drug resistance on all first-time patients that are positive for TB. The conventional method is to culture the organism and then test against various drugs but this takes several weeks. The molecular test meant that the doctor knew the TB was resistant to two drugs very early on. This not only contributed to a good outcome for the patient, it also decreased the risk of spread of her drug-resistant strain of TB to other people.

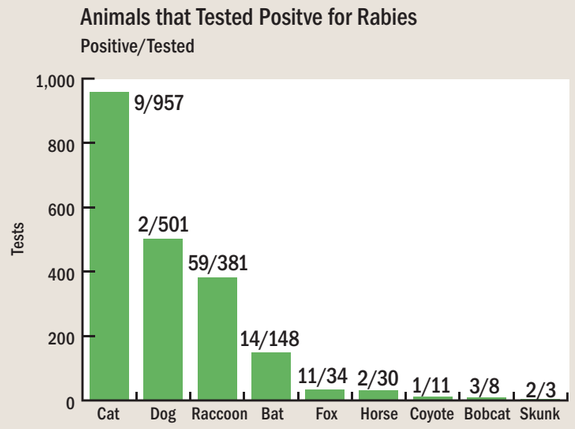
Chest CT of TB patient showing right upper lung mass with cavitation.

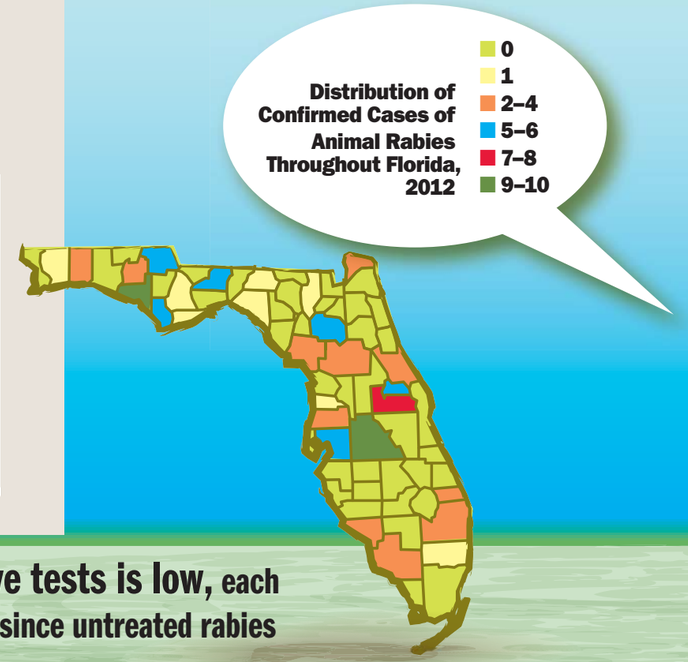
*Patient name changed

Learn more about tuberculosis: www.cdc.gov/tb/publications/factsheets/statistics/TBTrends.htm

A man was helping his neighbor repair a car and startled a fox that was hiding beneath it. In broad daylight the usually timid and nocturnal creature chased and attacked the man, biting him multiple times. The incident was investigated by the local county health department, post-exposure prophylaxis to the bite victim was initiated and the animal's brain was forwarded to the Bureau of Public Health Laboratories (BPHL) where it tested positive for the rabies virus. In light of the positive test results, treatment of the victim for rabies exposure was continued and a public health warning was issued for the local area where the attack occurred. In another incident during 2012, a pet monkey, housed outdoors, viciously attacked and bit its owner. The monkey's aggressive behavior and potential exposure to wildlife (raccoons, bats, etc.) led authorities to suspect rabies. This animal, also forwarded to BPHL, tested negative for rabies averting the need for further treatment of the victim.







Though the proportion of positive tests is low, each exposure represents a true emergency since untreated rabies is virtually always fatal to the victim.

Raccoons, Bats and Cats. . .

While the majority of incidents leading to the request for rabies testing do not involve dramatic animal attacks or exotic pets, these examples underscore the ongoing need for timely and accurate laboratory reporting that allows clinicians and other public health partner agencies to carry out their own related responsibilities.

Rabies is a viral zoonotic disease with worldwide distribution. Though less common in the United States, the particularly lethal nature of this neurologic infection makes diagnosis and monitoring of rabies a priority of the Centers for Disease Control and Prevention (CDC) as well as the Florida Department of Health. News headlines such as "Rabid Raccoon Attack Prompts New Rabies Alert In Suwannee County" and "Experts warn Brevard: Rabies out there, be wary of wild animals" demonstrate the level of media awareness and attention focused toward prevention of this disease in both humans and animals throughout Florida.

BPHL performs all of the rabies testing for the state of Florida. In 2012, the BPHL tested 2,168 domestic and wild animals for rabies. Most requests for rabies testing followed an exposure of humans and domestic animals to the rabies virus via bites and scratches from suspect animals. Following recent historical trends, the majority of positive results occurred among the wildlife rabies vector species, most notably raccoons, foxes and bats. Distribution of the virus is statewide.

Dogs and cats account for the majority of animals tested. Generally regarded as pets, these animals often have close contact with wildlife and people; both are factors leading to an increased risk of rabies transmission to humans. Cats also make up a significant proportion of the "positives" since a significant population of feral cats can be found statewide.

Though the proportion of positive tests is low, each exposure represents a true emergency since untreated rabies is virtually always fatal to the victim. While the vast majority of suspect animals test negative for rabies, the value of these results must not be overlooked. Given the lack of reliable ante mortem test procedures for rabies, bite victims cannot be accurately tested for true exposure to or infection by rabies virus. Negative animal test results offer the only viable diagnostic indicator that a bite victim has not been exposed to the virus. Negative results help to guide treatment, reduce healthcare costs and prevent further discomfort to the victim.

The BPHL values its role and responsibilities as a partner in the integrated efforts of state, county and community agencies to the control this potentially fatal disease. While domestic animals continue to fight with raccoons, feral cats continue to thrive, and children find fascination with dead bats, BPHL will remain available 24/7 as the sole provider of rabies diagnostic testing within Florida.

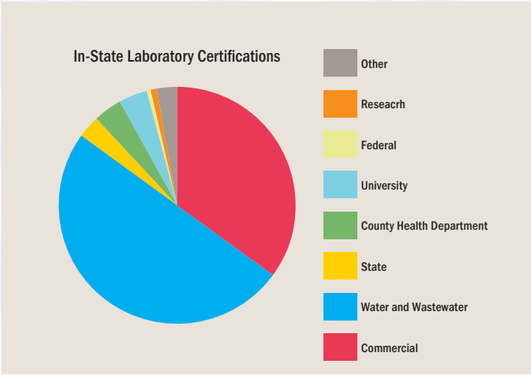
Karen Chaires of the BPHL Jacksonville virology department displays a common Florida species, the Northern Yellow bat (Lasiurus intermedius) prior to testing for rabies infection.

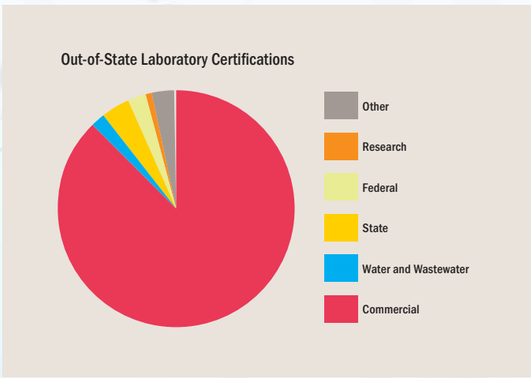
Oh, My!

Ensuring the Quality of Environmental Laboratory Testing

The Environmental Laboratory Certification Program was established in 1979 to ensure laboratory quality and capacity to perform testing of drinking water regulated under the Florida Safe Drinking Water Act.

The legislature expanded the scope of the program in 1986 to cover domestic wastewater testing conducted under the Clean Water Act as well as certification for other types of environmental testing. Early on, the Florida program took an active role in establishing the National Environmental Laboratory Accreditation Conference (NELAC) and Program (NELAP), becoming one of the first of 13 Accreditation Bodies in the U.S. recognized under the program in 1999. Today the Environmental Laboratory Certification Program continues to be active in the development and adoption of national consensus accreditation standards through the work of The NELAC Institute (TNI). Applying these quality standards, the Environmental Laboratory Certification Program certifies laboratories to use chemical and biological techniques in testing a wide variety of matrices, including drinking water, non-potable water, solid and chemical materials, biological tissue, and air. Through periodic proficiency testing and on-site assessments, certified laboratories must demonstrate that they have the capability to produce high quality testing results in the interests of protecting the health and environment of Florida's citizens.

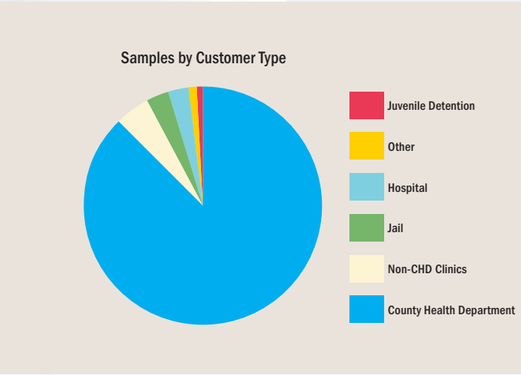


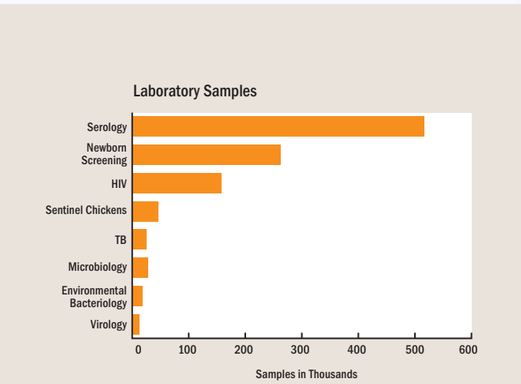


TRAINING TYPE	TOTAL NUMBER OF PARTICIPANTS
County Health Department Staff	23
EIS Program (DOH)	10
Emerging Infectious Disease Fellows (APHL)	2
First Responder—Response to Suspicious Samples	701
High School Students	12
"HIV 101" HIV Training for Healthcare Personnel	200
Infectious Disease Fellows (Shands)	2
International Visitors/Residents	10 Turkey, Ukraine, Mexico, Costa Rica
Med Tech Students	5
Packaging and Shipping of Infectious Agents	505
Sentinel Laboratory Biological Defense	83
Teleconferences/Webinars for DOH Staff (CEUs)	132 Programs not participants
Undergraduate/Graduate/ Medical Students	52 UNF, FSCJ, USF, FIU, UM

BPHL by the Numbers

The BPHL tested over 1,000,000 samples in 2012 with the majority submitted by county health departments.





Note: Less than 1% of testing was submitted by Reference Laboratories; Physicians; Public Health Laboratories; Community Based Health Centers; School Based Wellness Centers; Prisons; Law Enforcement; and HazMat.

Work Published in National Scientific Journals and Publications in 2012

DePasquale JM, Freeman K, Amin MM, Park S, Rivers S, Hopkins R, Cannon MJ, Dy B, Dollard SC: ***Efficient linking of birth certificate and newborn screening databases for laboratory investigation of congenital cytomegalovirus infection and preterm birth: Florida, 2008.*** Maternal Child Health J. 2012 16:486–94.

Samuel V, Benjamin C, Renwick O, Hilliard A, Arnwine S, Spike D, Zabala J, McConnell K, Salfinger M, Mitruka K, Gardner T, Johns E, Luo R, Beau de Rochars M, Dantes R: ***Tuberculosis cluster associated with homelessness—Duval County, Florida, 2004–2012.*** Morbidity Mortality Weekly Report July 20, 2012/Vol. 61(28):539–540

Somoskovi A, Parsons LM, Gutierrez C, Lee E, Salfinger M: ***Line probe and automated real-time PCR TB assays warrant adherence to strict quality assurance measures.*** Int J Tuberc Lung Dis 16:705–706 (2012).

Patel P, Bennett B, Sullivan T, Parker M, Heffelfinger J, Sullivan P: ***Rapid HIV Screening—Missed Opportunities for HIV Diagnosis and Prevention.*** J Clin Virol 51:42–47 (2012).

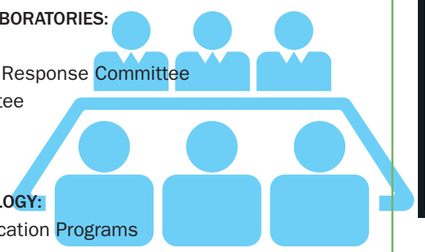
Samuel V, Benjamin C, Renwick O, Hilliard A, Arnwine S, Spike D, Zabala J, McConnell K, Salfinger M, Mitruka K, Gardner T, Johns E, Luo R, Beau de Rochars M, Dantes R: ***Tuberculosis cluster associated with homelessness—Duval County, Florida, 2004–2012.*** Morbidity Mortality Weekly Report July 20, 2012/Vol. 61(28):539-540

Tatavarthy A, Sanderson R, Peak K, Scilabro G, Davenhill P, Cannons A, Amuso P: ***Molecular Typing and Resistance Analysis of Travel-Associated Salmonella enterica Serotype Typhi.*** J Clin Microbiol 50:2631–8 (2012).

Marquardt G, Currier R, McHugh DM, Gavrilov D, Magera MJ, Matern D, Oglesbee D, Raymond K, Rinaldo P, Smith EH, Tortorelli S, Turgeon CT, Lorey F, Wilcken B, Wiley V, Greed LC, Lewis B, Boemer F, Schoos R, Marie S, Vincent MF, Sica YC, Domingos MT, Al-Thihli K, Sinclair G, Al-Dirbashi OY, Chakraborty P, Dymerski M, Porter C, Manning A, Seashore MR, Quesada J, Reuben A, Chrastina P, Hornik P, Atef Mandour I, Atty Sharaf SA, Bodamer O, Dy B, Torres J and 89 co-authors: ***Enhanced interpretation of newborn screening results without analyte cutoff values.*** Genet Med 14:648–55 (2012).

COMMITTEES

BPHL staff provides important input on several committees.



ASSOCIATION OF PUBLIC HEALTH LABORATORIES:

- Informatics Committee
- Public Health Preparedness and Response Committee
- Workforce Development Committee
- Infectious Diseases Committee
- HIV Sub-committee

AMERICAN SOCIETY FOR MICROBIOLOGY:

- Committee on Post-doctoral Education Programs

National Meetings & Presentations

In 2012, staff from the Bureau of Public Health Laboratories attended national meetings and presented their work by giving talks or presenting posters. More than 20 staff attended national/ international meetings and over 10 presentations were given to these national and international audiences.

MEETINGS INCLUDED:

- Forum on Laboratory Accreditation of The National Environmental Laboratory Accreditation Conference (NELAC) Institute (TNI)
- Public Health Preparedness Summit
- American Society for Microbiology (ASM) General Meeting
- Clinical Virology Symposium
- Association of Public Health Laboratories (APHL) Annual Meeting
- International AIDS Conference
- Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC)
- Laboratory Response Network National Meeting
- Newborn Screening Emergency Planning Meeting
- National Bio-monitoring Meeting
- HIV Diagnostics Conference

REGIONAL & STATE MEETINGS INCLUDED:

- First Coast Infectious Disease/Clinical Microbiology Annual Conference
- Florida Public Health Association Annual Meeting

Forty years of dedication to the Bureau of Public Health Laboratories. Dr. Lillian Stark worked within the Florida Public Health Laboratory System for 40 years. She began her career in Florida at the Epidemiology Research Center (ERC) as a laboratory technician in viral serology in June 1972 and continued when ERC merged with BPHL-Tampa in 1992. Over the years, she advanced through the ranks and at the time of her retirement she was the Director of the Virology Section of BPHL-Tampa. In addition to her role as the Director of the Virology section, Dr. Stark also served as the lead virologist for the entire BPHL and worked closely with the Bureau of Epidemiology. She is also an Adjunct Faculty at the University of South Florida, College of Public Health in the Department of Global Health.

Stark

Amuso

Associate Bureau Chief Retires. Dr. Philip Amuso retired after 37 years in the Public Health Laboratory System. He initially worked at the Epidemiology Research Center in Tampa then moved to the Tampa BPHL. Dr. Amuso became Laboratory Director in 2000 and then BPHL Associate Bureau Chief. Dr. Amuso oversaw the bureau-wide staff responsible for laboratory safety, human resources, finances, information technology, and preparedness. He was the BPHL preparedness liaison for the Florida DOH and a Co-Principal Investigator for a Department of Defense funded biological defense contract along with the University of South Florida (USF). Dr. Amuso provided invaluable contributions and received several state and national awards; the Award of Excellence as a Laboratory Director (2010), presented by U.S. Department of Homeland Security; and the Gold Standard for Public Health Laboratory Excellence Award (2005), presented by APHL.

Salfinger

Farewell to the chief. In 2012, the BPHL also said goodbye to the Bureau Chief, Dr. Max Salfinger. Dr. Salfinger joined BPHL in December 2006 and during his 5 ½ years with the Bureau provided great leadership, advocacy and direction to the laboratories. Dr. Salfinger has moved to National Jewish Health in Denver where he is the Laboratory Director of the Mycobacteriology and Pharmacokinetics Laboratory.

THANK YOU FOR YOUR SERVICE!

The Bureau of Public Health Laboratories is staffed by a team of highly qualified and dedicated individuals. In 2012, several long term staff retired and we thank them for their many years of service protecting the health of Florida's residents and visitors.

40
Dr. Lillian Stark, Tampa

37
Dr. Dean Willis, Jacksonville

37
Dr. Phil Amuso, Tampa

34
Annette White, Pensacola

33
Hilda Moore, Jacksonville

24
Aurora Garcia, Miami

24
Susan Dean, Jacksonville

21
Dr. Jack Perman, Tampa

21
Beverly Butler, Pensacola

20
Sarah Terry, Jacksonville

19
Justina Rosario, Jacksonville

awards

Laboratory Response Network On October 10, 2012, Florida Department of Health, Division of Emergency Preparedness and Community Support, Bureau of Public Health Laboratories Chemical Threat Preparedness Program received the "Outstanding Outreach to Poison Control Centers or Hospitals" award. The Outstanding Outreach award is given to a group that has been involved in sustained outreach to Poison Control Centers and/or Hospitals, by pursuing training opportunities and striving to make ongoing improvements to training and exercise programs. These outreach efforts help strengthen the public health infrastructure.

2012 ASTHO Vision Award—Achieving Excellence in Public Health Through Innovation Florida Department of Health received First Place for its MDR TB Screening Program. Since July 2009, BPHL—Jacksonville has performed a molecular rapid test (Hain) automatically on all initial sputum AFB smear and nucleic acid amplification test positive specimens (i.e., highly infectious patients). By conventional methods, drug susceptibility results are available within 4-to-8 weeks. The early detection of multidrug-resistant tuberculosis (MDR TB) cases allows for patients to be placed on appropriate anti-TB therapy much sooner and results in cost savings for the public health system in Florida.

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