

# Epi Notes



North Carolina Department of Health and Human Services ♦ Division of Public Health

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## **Rabid Cat at a Fast Pitch Softball Tournament, South Carolina**

*Prepared by Carl Williams, DVM, DACVPM, Public Health Veterinarian, Occupational and Environmental Epidemiology Branch and Martha Salyers, MD, MPH, Team Leader, Public Health Regional Surveillance Team 6*



The South Carolina Department of Health and Environmental Control (SCDHEC) notified the Centers for Disease Control and Prevention (CDC) on July 24th that a kitten present during the South Atlantic Summer Showdown softball

tournament had been diagnosed as rabid by the North Carolina State Public Health Laboratory (SLPH). State health departments in South Carolina, North Carolina, Georgia and Tennessee began identifying softball team members that might have been exposed to the kitten and assessed individuals for rabies post exposure prophylaxis.

On July 14, a coach at the tournament found a gray kitten in a barrel style dumpster, which was located behind a dugout at the Boiling Springs Recreational Facility in Spartanburg County, South Carolina. The kitten was placed in a box and taken later that day to games at another sports complex. The kitten was taken home by the coach to Buncombe County the same day. It became ill and was euthanized on Sunday July 15th. The cat was submitted to the NC SLPH and tested positive for rabies virus antigens on July 20th. The rabies virus infecting the cat was characterized as a variant associated with raccoons. Rabies was not initially suspected as being the cause of illness in the cat. However, once it was revealed the cat had bitten someone prior to being euthanized it was promptly submitted for rabies diagnostic testing.

In NC the investigation to identify potentially exposed persons was led by PHRST 6. Rosters of teams playing at venues where the cat was known to be were obtained and interviews were conducted using a standardized tool developed by the four states. Any person who had a potential exposure listed below was referred to their health care provider for rabies post exposure prophylaxis:

- was bitten by the kitten described
- had contamination of a fresh open wound with saliva from the kitten

*(continued on page 2)*

(*Rabid Cat*, continued from page 1)

- had saliva from the kitten come in contact with eyes, nose, mouth or other mucous membranes or
- was scratched by the kitten

Fortunately, relatively few persons required rabies PEP. Overall about 60 softball teams from the four states participated in this tournament. However, not all 60 had contact with the cats. Here is a summary of the number of teams involved, and exposures:

- GA: 13 teams possibly exposed to rabid cat; 15 people received PEP
- NC: 10 teams possibly exposed to rabid cat; 10 people received PEP
- TN: one team possibly exposed to rabid cat; no one received PEP
- SC: 25 teams possibly exposed to rabid cat; one person received PEP

An extensive media campaign was also undertaken by the four states to notify any other people who might have been exposed to the rabid cat. Of greatest concern was identifying anyone who owned/abandoned the cat in South Carolina. To date no one has come forward with any knowledge of the cat prior to it being found during the softball tournament. Dogs and cats may shed the rabies virus in their saliva up to 10 days prior to the onset of clinical signs and therefore anyone who handled the cat prior to its illness onset may have been at risk of exposure to infectious material.

From January 1 through September 11 2007 there have been 15 rabid cats, four rabid dogs, five rabid cattle, two rabid goats and three rabid horses have been identified in North Carolina. All were infected with the raccoon strain of the rabies virus and represent “spillover” cases from our dominant terrestrial reservoir, the common raccoon. Domestic animals with rabies represent a unique problem because there are typically a large number of people exposed to these animals and thus a greater need for rabies PEP. One rabid dog in New Hanover County last year resulted in over 40 people requiring rabies PEP.

Dogs and cats are required by law to be vaccinated against rabies in North Carolina (130A-185) and USDA licensed vaccines are available for horses and cattle. Keeping pets currently vaccinated against rabies and not allowing them to roam at large are the most important factors in protecting people from rabies. Pets act as a buffer between humans and wildlife and it is therefore essential that citizens are aware of the law, understand its importance, and comply with the vaccination requirements.

For additional information please visit the [www.rabies.ncdhhs.gov](http://www.rabies.ncdhhs.gov). ♦

## **E.coli 0157 Outbreak Associated with a Rowan County Seafood Restaurant**

*Prepared by Zack S. Moore, MD, MPH, Epidemic Intelligence Service Officer, General Communicable Disease Control Branch*



### **Background**

*Escherichia coli* (*E. coli*) is an important cause of foodborne illness in the United States. Shiga toxin-producing *E. coli*, or STEC, can lead to serious complications and even death. Outbreaks of STEC are often associated with consumption of contaminated foods or with animal contact. Most STEC infections in the United States are due to *E. coli* O157:H7. Other strains of *E. coli* and even other types of bacteria can also produce Shiga toxin. The most feared complication of STEC infection is hemolytic-uremic syndrome (HUS), characterized by kidney failure and breakdown of red blood cells. HUS affects mainly young children and the elderly. Given the potential severity of STEC infections, public health authorities must rapidly investigate all reported cases in order to identify common exposures and implement control measures. This article describes the investigation of a recent STEC outbreak associated with a restaurant in Rowan County. Through this investigation we identified a previously unreported mechanism for transmission of *E. coli* in the restaurant setting.

### **Investigation of the Rowan County Outbreak**

On June 5, 2007 the General Communicable Disease Control Branch learned that *E. coli* O157 had been isolated from stool cultures from three Rowan County residents with bloody diarrhea who had been admitted to a single hospital. Further investigation revealed that all three had eaten at the same restaurant (Restaurant X) on May 27, 2007. Local hospitals immediately began active surveillance for additional cases. Rowan County and NCDPH provided information about the outbreak and the link to Restaurant X to public health officials through the NC Health Alert Network (NCHAN) and the CDC’s Epidemic Information Exchange (*Epi-X*). Local health departments in Rowan and neighboring counties also provided information to healthcare providers and to local media. Rowan County Environmental Health (EH) staff inspected the restaurant and questioned the employees about any illness in themselves or family members during the two weeks prior to the outbreak. EH staff also collected samples from ground beef and selected environmental surfaces; all were negative for *E. coli*.

The Rowan County Health Department and NCDPH began an epidemiologic investigation to determine the scope of the outbreak, identify the source of infection, and prevent additional infections. We defined a case as isolation of *E. coli* O157 from a clinical specimen obtained from a person

(continued on page 3)

*(E.coli Outbreak Rowan County, continued from page 2)*

who ate at Restaurant X on or after May 15 and experienced acute onset of diarrhea (e<sup>3</sup> loose stools in a 24-hour period) beginning 2-10 days later. We defined a probable case as acute onset of diarrhea in a person who ate at Restaurant X on or after May 15 and experienced illness onset 2-10 days later but did not have E. coli O157 isolated from a clinical specimen. By June 26, we had identified nine confirmed and 12 probable cases with illness onset dates ranging from May 23–June 4 (May 29–June 4 for confirmed cases) (Figure 1). Eight people were hospitalized and one woman, aged 86 years, died in association with the outbreak.

In order to identify a specific source of infection, we conducted a case-control study with the assistance of Team Epi-Aid, an *ad hoc* group of volunteers from the UNC School of Public Health coordinated by the UNC Center for Public Health Preparedness. We matched each case-patient to three non-ill controls identified as having eaten at Restaurant X on the same dates. We collected a uniform set of demographic, clinical, and exposure information from all case-patients and controls, then calculated odds ratios for exposure to each specific menu item or category of items. Sixteen case-patients and 42 controls were included in the final analysis. Case-patients and controls did not differ significantly in age or sex. Three menu items had a statistically significant association with illness; however, none of these items was consumed by more than 25% of case-patients. The failure to implicate a specific food item suggests widespread contamination of the kitchen, or possibly contamination of multiple items by an ill food-handler. No food-handlers reported illness during the period when most case-patients were exposed.

During the course of the investigation, it was discovered that employees had slaughtered a goat in the restaurant kitchen on May 25. Goats are known carriers of E. coli O157. Based on this information, the NC Department of Agriculture and Consumer Services Meat and Poultry Division initiated an investigation in conjunction with the US Department of Agriculture’s Food Safety and Inspection Service. This investigation confirmed that the goat was slaughtered by the employees for personal consumption without the knowledge of the restaurant owners. This occurred two days before the meal date reported by 12 (67%) of 21 case-patients, and 2–6 days before the meal dates reported by all confirmed case-patients. Witnesses and the employees involved reported that restaurant utensils were used in the slaughter.

The timing of this incident suggests that the outbreak was caused by contamination resulting from this event. In order to confirm this hypothesis, NCDPH requested access to the farm from which the goat had been purchased in order to determine whether the outbreak strain could be detected in

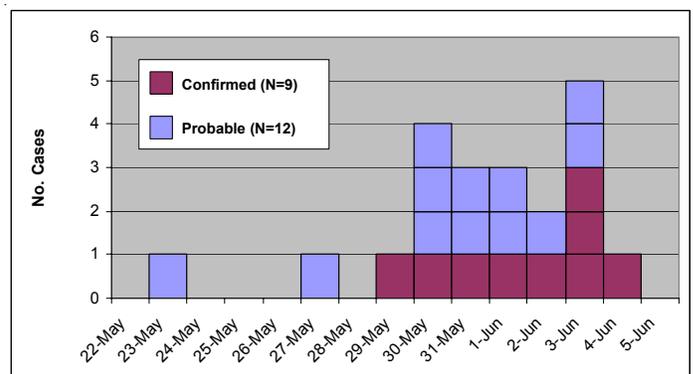
the environment. Access was eventually granted by the owner on August 3, 10 weeks after the goat was purchased. On August 8, NCDPH staff traveled to the farm to collect samples of soil and animal feces for testing at the USDA laboratories in Nebraska. E. coli O157 was not isolated from any of the 50 specimens submitted for testing.

**Conclusion**

Our investigation suggests that diffuse contamination of the Restaurant X kitchen resulted in an outbreak of E. coli. This contamination may have resulted from the slaughter of a goat in the restaurant kitchen, although we were unable to support this hypothesis by isolating the outbreak strain from the farm where the goat was purchased. If the outbreak strain had been present on the farm, our ability to isolate it might have been impeded by the 10-week lag between purchase and specimen collection and by the extremely hot, dry conditions present when the samples were collected. As a result of this investigation, the Rowan County Health Director and the owners of Restaurant X opted to close the restaurant indefinitely. The Rowan County Health Department also distributed information to other restaurant owners in the area reminding them of the need to follow safe food handling practices and to assure that employees are educated about safe food handling.

Communicable disease and environmental health staff should consider the possibility of contamination arising from the slaughter of animals when investigating foodborne outbreaks. It is not known how commonly slaughters occur in the restaurant setting; this has not previously been reported in association with foodborne disease outbreaks in NC. In this instance, the employees involved reported that this was not the first time they had slaughtered animals in the restaurant. They chose to use the restaurant because it was more convenient than slaughtering the animals at home. Education of restaurant workers regarding food safety should include information about the risks associated with bringing live or freshly slaughtered animals into food preparation areas. ♦

**Figure 1:** E. coli O157 Cases Associated with Restaurant X by Date of Illness Onset — Rowan County, 2007 (N=21)



## Living in Flood Hazard Zones and Hurricane Evacuation Behavior: Preliminary Results of a Pre-Hurricane Assessment in Carteret County, N.C.

*Prepared by various staff members of the Office of Public Health Preparedness and Response*

**Introduction:** The Carteret County Health Department, North Carolina Public Health Regional Surveillance Team 5, and the North Carolina Center for Public Health Preparedness conducted a pre-hurricane assessment of 251 Carteret County residents in April, 2007. Since 1993, Carteret County has suffered 20 fatalities and more than \$1.8 billion in property damage due to hurricanes and tropical storms. During this time, the county has also become increasingly urbanized with higher population densities and a corresponding increase in coastal property values. The growth in population and development, often in locations at higher risk of severe storm impact, leaves Carteret County at risk for repeated hurricane property damage and personal injury.

The Flood Insurance Rate Maps (FIRMs) for Carteret County were recently updated in response to inaccuracies exposed during Hurricane Floyd in 1999. Carteret County received updated flood maps for the county in November 2002 and they became effective in June 16, 2003. According to these updated maps, of Carteret County's 2,727 census blocks, 128 are in the flood zone categorized at VE (the flood insurance rate zone that corresponds to 1% annual chance coastal floodplains that have additional hazards associated with storm waves), 999 are categorized as AE (the flood insurance rate zone that corresponds to 1% annual chance floodplains), 349 are categorized as Shaded X (the zone that corresponds to 0.2% annual chance flood, including areas of 1% annual chance flood with average depths of less than one foot or with drainage areas less than one square mile), and 1244 are categorized as not in a flood zone.

**Methods:** To ensure representation from each flood zone area, census blocks were first stratified by flood zone. Census blocks were categorized by flood zone and were randomly selected. Within each census block, seven interview locations were randomly selected using ArcGIS. Using handheld computers, interview teams were routed to each location with a GPS map and electronic data collection occurred at the time of interview. A total of 251 interviews were completed in 36 census blocks.

Thirty-three percent of the interviews were conducted with households located in the highest risk flood zone (VE), which included low-lying property in the 100-year flood plain that was also vulnerable to waves. Approximately 22% of the

interviews were conducted in each of the other flood zone designations.

**Results:** While 82% (n=207) of those surveyed indicated that they were primarily responsible for their own food, water, and shelter for the three days following hurricane landfall, only 43% (n=109) had a disaster supply kit. Only 30% of those living in mobile homes, and 39% of those living in the worst flood zone had a disaster supply kit. Thirty-nine percent of all households with people over age 65 had a disaster supply kit, and only one-third of families with small children did.

Fifty-one percent of those surveyed indicated that they had an evacuation plan for their household, and more than 80% of these plans included the evacuation of a pet. Some residents at high risk, such as those living in mobile homes, were less likely to have an evacuation plan (45%). However, those living in the highest risk flood zone were slightly more prepared, with 57% having an evacuation plan for their household. Fifty percent of all households with people over age 65 had an evacuation plan, but only one-third of families with small children did.

Those who did not have a disaster supply kit were at increased risk of not having a plan. Households with a disaster supply kit were 54% more likely to have an evacuation plan. Households with an evacuation plan were 68% more likely to have a supply kit. Long-term residents are more likely to have a supply kit (51%) and about as likely to have an evacuation plan (49%).

Overall, 82% (207) of respondents indicated that they were responsible for their own food, water, and shelter in the three days following a hurricane. Approximately five percent of respondents indicated that the Red Cross (n= 11) or other family members (n=13) were responsible for providing them with food, water, and shelter in the three days following a hurricane.

Of those who would not evacuate during a **mandatory** evacuation order (29/241), 83% (n= 24) have lived in Carteret County for more than 10 years. Nearly half (n=12) of those who would not evacuate even under a mandatory evacuation order live in the AE flood zone (100 year flood plain), while 76% (n=22) live in a designated flood area. Eighty-six percent (n=25) of those who would not evacuate during a mandatory evacuation order felt that they were responsible for their own food, water, and shelter in the three days following a hurricane. Only two of twenty-nine would rely on the Red Cross, and one each for family and neighbors.

Of those who would not leave during a **voluntary** evacuation order (60/222), 76% (n=46) have lived in Carteret County  
*(continued on page 5)*

*(Pre-Hurricane Assessment in Carteret, cont'd from page 2)*

for more than 10 years. More than three-quarters (n=46) of those who would not evacuate under a voluntary evacuation order live in a designated flood zone, and nearly half (n=27) are two person households. Eighty-five percent (n=51) felt that they were responsible for their own food, water, and shelter in the three days following a hurricane with five relying on the Red Cross, and one each for state government, family, and neighbors.

Forty-six percent (n=63) of those who have never evacuated have lived in Carteret County for more than 10 years. A majority feel that state and local government (64%, n=84) are responsible for providing evacuation information, while most rely on television (85%, n=115) for information about hurricane hazards.

Eleven percent of survey respondents (n=25) indicated a special need or health condition that would require special assistance during an evacuation. Only three individuals surveyed had registered for the county's evacuation assistance program, two of whom lived alone.

**Discussion:** These results indicate some clear areas for intervention by the local health department and emergency management officials. Those with vacation homes and renters, while typically likely to evacuate, should be provided with information about the importance of a disaster supply kit by rental agencies if evacuation is not possible.

Cost may be a barrier to having a disaster supply kit. Plans to build a disaster supply kit over a period of weeks, such as those suggested by the American Red Cross, and partnerships with local merchants to offer disaster supply kit supplies at reduced prices, could increase the percentage of residents who have kits.

Providing for pets during an evacuation is clearly a high-priority for Carteret County residents. The 2006 Pets Evacuation and Transportation Standards (PETS) law require FEMA to ensure state and local disaster preparedness plans "take into account the needs of individuals with household pets and service animals prior to, during, and following a major disaster or emergency."

The majority of respondents feel that they are responsible for their food, water, and shelter following a storm. This includes a majority of those who would refuse to evacuate under either a voluntary or mandatory evacuation order.

Between one-third and one-half of those who felt that storm surge and flooding were the greatest causes of injury or death live in the areas of the county most vulnerable to flooding. Increased awareness of personal vulnerability to storm surge and flooding is needed. ♦

## The HIV SPAP (State Pharmaceutical Assistance Program) - NC's Response to a Confounding Situation

*Prepared by Steve Sherman, NC ADAP Coordinator,  
HIV/STD Prevention and Care Branch*



The North Carolina AIDS Drug Assistance Program (ADAP) uses a combination of federal and state funds to provide low-income residents of the State that are living with HIV disease assistance in obtaining essential, life-sustaining medications to fight their HIV/AIDS and the opportunistic infections which often accompany the disease. Some of the individuals that qualify for the ADAP Program also qualify for Medicare Part D – the pharmaceutical benefit added to Medicare effective January 1, 2006. A significant number of these “dually-eligible” individuals had been served by the ADAP Program prior to the implementation date of the Medicare pharmacy benefit. And, although ideally all of these individuals would be transferred out of the ADAP Program and into Medicare Part D, the reality is/was that some of these individuals needed – and have continued – to be served by ADAP during 2006 and 2007.

Under Medicare Part D, many of these “dually-eligible” individuals have significant out-of-pocket obligations (referred to as “TrOOP”, or “true out-of-pocket” costs). Medicare Part D requires most clients to pay monthly premiums, deductibles and co-pays, as well as to bear the full cost of their medication while they are in the coverage gap, or what has been termed “the doughnut hole”. Covering medications while in the doughnut hole currently translates into a \$3,850 out-of-pocket expenditure – above the cost of the monthly premiums and initial co-pays – that the client must make before Medicare coverage/support resumes. Many low-income Medicare clients, e.g., those that qualify for ADAP, are not able to pay these required out-of-pocket obligations. For those unable to make these out-of-pocket payments, continued access to their HIV medications may be impossible.

Not only does this do harm to individuals, but it is contrary to sound public health practice. It has been shown that HIV+ individuals who remain on their HIV medications have a lower viral load (i.e., the amount of virus in their blood), and are therefore less likely to transmit the virus to others. Additionally, individuals that remain on their medication tend to have a more positive relationship with their medical care providers, and are more likely to receive regular counseling and reduce risky behaviors. They are also more likely to remain healthier, and to be able to work and care for their families. Failure to remain on HIV medications contributes to increased viral mutation, making the treating of the disease

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*(HIV SPAP, continued from page 2)*

more difficult – and more expensive – to the individual and the community.

North Carolina's Proposed Solution - The only alternative to the client paying their required out-of-pocket expenditures and having it "count" within the Medicare Part D framework is to have an entity approved by the Center for Medicare & Medicaid Services (CMS) pay the TrOOP on the client's behalf. The NC ADAP Program is working on establishing a special HIV State Pharmaceutical Assistance Program (SPAP) that will assist low-income "dually-eligible" (i.e., eligible for ADAP and Medicare Part D) individuals by paying some of their out-of-pocket costs associated with Medicare Part D. This action would enable a significant number of individuals to be transferred from ADAP to the combined Medicare Part D/HIV SPAP, allowing those individuals to take fuller advantage of the Federal Medicare benefit, and making ADAP funds available to serve individuals that were not eligible for Medicare Part D.

The rationale for establishing a NC HIV SPAP is that expenditures/payments made by an approved SPAP count towards meeting the dually-eligible individuals' "TrOOP", while expenditures/payments made by an ADAP or other non-approved entity Program do not. Serving clients through an HIV SPAP instead of through ADAP would limit the State expenditures on behalf of these individuals while continuing to assure their access to their HIV medications. It costs the ADAP Program approximately \$11,000 to serve an average client for a full year; it would cost the HIV SPAP approximately \$4,500 (perhaps less), or about 40% of the full ADAP cost, to serve that same client for a full year. So, for every two "dually-eligible" clients moved into and served under the HIV SPAP, almost one additional client without access to Medicare or other third-party payers could be served by ADAP.

The administrative authority for this activity is provided under 10A NCAC, Chapter 45 – General Procedures for Public Health Programs, Subchapter 45A - Payment Programs. Support for this initiative has been provided by the Governor's Office. Funds are being made available by redirecting previously-appropriated State funds for this purpose. The ADAP Program's central dispensing pharmacy (PharmaCare) will be handling the day-to-day operation of this initiative, and will provide the necessary coordination with CMS and the 50+ Medicare Part D plans currently available in the state. The ADAP Program is working with CMS and PharmaCare to finalize the requirements and details of implementing the HIV SPAP, and will be communicating with and providing essential information to NC's HIV community and dually-eligible (i.e., ADAP and Medicare) clients as soon as appropriate. ♦

## **Update on the NC Electronic Disease Surveillance System (NC EDSS)**

*Prepared by Allison M. Connolly, M.A., M.P.H.,  
Epidemiology Section*

Nine local health departments (LHDs) started using NC EDSS for tuberculosis (TB) in September. They join the original five pilot counties, which have now been using the system for a year. Based on data from the past five years, approximately 60 percent of North Carolina's TB cases are now entered, investigated and reported by the 14 LHDs using NC EDSS. The LHDs not using NC EDSS still report their cases on paper, and the Division's TB Registrar enters these data into NC EDSS.

A total of 66 LHD staff were trained for the TB rollout. A second day of training was added this year, which gave students ample time to work on TB case scenarios in NC EDSS. Attendees were much better prepared to use NC EDSS on the day the system went live in their respective counties, as compared to last year. Nevertheless, it was necessary for the Division to send staff to each county for 2-3 days to provide assistance in implementation.

NC EDSS is now receiving TB test results from the State Laboratory of Public Health (SLPH) via Electronic Laboratory Reporting (ELR). The next two milestones are for SLPH to send all communicable disease data to NC EDSS via ELR, and for LabCorp to use ELR for all of its TB and communicable disease reporting. These milestones should be completed by the end of 2007. ELR continues to be a major technical challenge, and it will likely take several years before all of the state's major hospital and commercial laboratories are reporting electronically.

The schedule for the next phase of piloting, which includes general communicable diseases, STD and vaccine-preventable diseases, has been pushed back slightly. Instead of starting five LHDs as pilot sites in November and December, only one LHD will start in 2007. Testing will take place at this LHD for one month before any of the next four LHDs begin their pilot testing. As a result of these schedule changes, the statewide rollout is now anticipated to start in spring 2008.

If you have any questions about the NC EDSS Project, please contact [Allison.Connolly@ncmail.net](mailto:Allison.Connolly@ncmail.net), [Judy.Owen.Odowd@ncmail.net](mailto:Judy.Owen.Odowd@ncmail.net), or [Del.Williams@ncmail.net](mailto:Del.Williams@ncmail.net). ♦

## Emerging Infectious Disease Laboratory Project at NCSLPH: Molecular Detection of Fungal Pathogens

Prepared by Rachel Gast, CDC/APHL Emerging Infectious Disease Fellow and Dr. Shermalyn Greene, Public Health Scientist, NC Laboratory of Public Health



Currently, the NCSLPH Microbiology Unit uses a series of conventional methods to identify fungal pathogens in clinical and reference samples. These methods include microscopic examination as well as biochemical assays. Final organism identification by such conventional methods can take up to several weeks and occasionally the organism can only be identified to the genus level. Fungal infections have been increasing in immunocompromised patients because any mold or yeast is able to invade human tissue in patients with weakened immune systems. Early administration of antifungal therapy is crucial in reducing the high mortality rate in these compromised hosts.

The EID Fellow Rachel Gast's CDC/APHL training project was to find a rapid, universal method for identifying fungal pathogens. In recent years, scientists have been able to develop some molecular assays in order to identify fungal pathogens more quickly and accurately. Several techniques have been attempted including real-time PCR, DNA sequencing, and molecular probes. However, there is no standard molecular test in place for identification of the thousands of potential fungal pathogens. A sequencing protocol that focuses on the 18S rDNA region of the genome was developed. The genomes of all eukaryotic organisms contain a highly conserved region known as the ribosomal 18S region. The 18S region comprises the nuclear small ribosomal DNA gene subunit. In fungal organisms the 18S rDNA region is approximately 1.8 kb in length. The variability of this region is unique and specific to each individual species. Four forward and four reverse primers were utilized to ensure double stranded sequence along the entire length of the 18S region. The sequencing results were compared to those available in the National Center for Biotechnology Information database (<http://www.ncbi.nlm.nih.gov/BLAST>) to determine identification. Using the 18s rDNA sequence data generated in this study, a real-time PCR assay is in development. This assay would provide an additional means to rapidly identify fungal pathogens.

This study demonstrated that the 18S rDNA sequencing method is accurate when compared to conventional methodologies for identifying fungal samples. The 18S rDNA sequencing method has a very high accuracy of identification of fungal specimens from at least two major genera, *Candida*

and *Aspergillus*. At the NCSLPH, *Aspergillus* species comprise the greatest component of any mold genera (126 samples out of 798 tested for 2005) and *Candida* species comprise the greatest component of the yeast genera (211 samples out of 228 tested for 2005). In the future, the sequencing techniques can be optimized to assay for other important genera commonly identified at the NCSLPH. Performing the 18S rDNA sequencing analysis does require extensive knowledge of molecular techniques; however, it has the advantage of a faster turn around time of a few days versus several weeks for conventional methodologies. This work was presented as a poster at the American Society for Microbiology General Meeting in May 2007. ♦

## Emerging Infectious Disease Laboratory Project at NCSLPH: Epidemiological Survey of Common Parasites Among Migrant and Seasonal Farm Workers in North Carolina

Prepared by Mindi Russell, MS., MPH, CDC/APHL Emerging Infectious Disease Training Fellow, Dr. Julie Ann Kase, PhD, North Carolina State Laboratory of Public Health, and Dr. Maria Correa, PhD, North Carolina State University



The Office of Migrant Health reports that there are an estimated 4.2 million migrant and seasonal farm workers in the United States. Farm workers are a critical component in providing the necessary labor to produce and harvest the agricultural commodities demanded by consumers. In 2002, North Carolina was the fifth largest state of total farm worker population with counts of approximately 108,900 migrant, seasonally, year-round, and H-2A workers<sup>1</sup>. The majority of migrant and seasonal farm workers are foreign-born with seventy-seven percent born in Mexico<sup>2</sup>.

Many diseases that are uncommon in the United States are endemic in areas of Mexico and Latin America. Studies have found that migrant and seasonal farm workers have poorer physical health and more complex health problems than compared to the general population. Annually, federally supported community migrant health centers provide services to approximately 500,000 (12% of the 4.2 million) migrant and seasonal farm workers<sup>3</sup>. Farm workers are at increased public health risks due to occupational hazards and inadequate living conditions. In 1992, a population-based study reported that migrant and seasonal farm workers in North Carolina had parasite prevalence rates of 20 – 80percent<sup>4</sup>. The authors found that intestinal parasite infections were an occupational hazard to farm workers and stressed the need

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(Survey: *Parasites Among Workers*, continued from page 7)  
for improved working and living conditions. Over a decade later, there are limited reports available on the prevalence of intestinal parasitism among migrant and seasonal farm workers in North Carolina.

The purpose of the study was to conduct an epidemiological survey of the prevalence of common intestinal parasites (e.g. tapeworms, *Ascaris*, *Trichuris trichiura*, and *Giardia*) in migrant and seasonal farm workers in Eastern North Carolina during the 2007 planting/harvesting season. Study participants were recruited on a voluntary basis through collaborating North Carolina Community Health Center Migrant and Farmworker Programs. A questionnaire was verbally administered in Spanish to each subject addressing demographics, medical history, working conditions, and lifestyle. If willing, subjects were then asked to submit a stool specimen for parasitic screening.

To date, about 70 migrant, seasonal, and H2A farm workers from approximately 25 camp sites in Johnston, Wilson, Sampson, Greene and Lenoir counties have been surveyed. Although the study is ongoing, most workers reported access at work to an onsite portable toilet but no running water for hand-washing. All people surveyed were of Mexican ethnicity. No one reported a current parasitic infection; however, some reported self-medication for parasites in Mexico prior to entry into the United States. Final laboratory analysis of collected specimens is pending but at least one stool specimen was found to contain parasites.

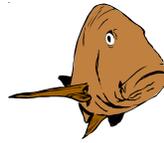
The data obtained will provide an updated picture of intestinal parasitism among Hispanic migrant and seasonal farm worker populations, as well as provide migrant health and public health officials' guidance in making evidence-based decisions regarding the health status of this targeted population. The investigation will also address a significant public health concern, food safety. Dietary habits have steadily shifted toward the increased consumption of fresh fruits and vegetables, many of which are eaten raw or undercooked. According to the US Food and Drug Administration, good health and hygiene of agricultural workers is an essential part of food safety. This study will help close a significant gap of knowledge. ♦

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## Marine Algal Toxins & Fish Poisonings

Prepared by Mina Shehee, PhD, HAB and HACE Program Coordinator, Occupational and Environmental Epidemiology Branch; Patti Fowler, BS, Assistant Section Chief, Shellfish and Sanitation and Recreational Water Quality; and David Bergmire-Sweat, MPH, Foodborne Disease Epidemiologist, General Communicable Disease and Control Branch



Illnesses associated with algal toxins in fin fish or shellfish include ciguatera fish poisoning (CFP), paralytic shellfish poisoning (PSP), neurotoxic shellfish poisoning (NSP), amnesic shellfish poisoning (ASP), and diarrhetic shellfish poisoning (DSP). Scombroid, another type of fish poisoning, is not associated with algal toxins.

Ciguatera is the most commonly reported algal toxin-associated fin fish poisoning in the United States. The actual number of human case-reports of food poisoning caused by ciguatera is unknown. However, it is conservatively estimated that over one million people worldwide are affected each year by CFP. Most observed cases generally occur around the world between 35° North and South latitude. Cases of ciguatera poisoning are rarely reported in North Carolina. It is important to note that these cases can occur in locations well-removed from the coasts due to globalization and rapid distribution of food commodities such as fin fish.

The toxin (ciguatoxin) responsible for ciguatera poisoning is produced by an algal dinoflagellate called *Gambierdiscus toxicus*. This dinoflagellate proliferates in warm coral reefs located in the Caribbean, south Pacific, and the Indian Ocean. *Gambierdiscus* lives benthically (bottom of the sea) on substrates such as coral rubble or epiphytically (attaches to other aquatic plants) on the surfaces of macroalgae (i.e. sea weed). *G. toxicus* can reach large numbers after a natural or anthropogenic disturbance of a coral reef. For example, coral bleaching is a disturbance in the colony whereby the coral polyps jettison their algal symbionts (zooxanthellae) due to increasing sea temperatures, pollution, sedimentation, changes in salinity, or ocean acidification. The coral polyps die and provide substrate for macroalgae to attach and their associated epiphytic *Gambierdiscus* to thrive. Increases in the number of CFP cases have been documented after hurricanes.

Ciguatera toxin (or ciguatoxin) biomagnifies in marine food webs. Herbaceous fish graze on the macroalgae (along with the associated *Gambierdiscus*). The toxin contained in the *Gambierdiscus* bioaccumulates in the fish tissue. These herbaceous fish are then eaten by predatory fish. The toxin is not acquired equitably by the fish. Variations in toxin concentration occur between different species of fish and among individuals of the same species. Scientists at the National Oceanic and Atmospheric Administration (NOAA) Center for Coastal Fisheries and Habitat Research located in

(continued on page 9)

(*Marine Algal Toxins & Fish Poisonings, cont'd from page 8*)

Beaufort, North Carolina are studying the molecular ecology and toxin production of *Gambierdiscus* in the Caribbean and the western Atlantic Ocean.

The route of human exposure to ciguatera is ingestion of predatory tropical and subtropical reef fish including barracuda, snapper, amberjack, and grouper. The fish will smell, look, and taste normal. Ciguatera is heat-stable and lipid soluble. Cooking or freezing will not reduce its toxicity. Onset of illness can occur hours after consuming a ciguateric fish. Initially, gastrointestinal symptoms (nausea, vomiting and diarrhea) occur followed by cardiovascular and/or neurological symptoms. As with NSP, hot-cold reversal sensations (hot surfaces feel cold, cold surfaces feel hot) can occur with CFP. In some instances, the symptoms are manifested only after several previous ciguatera exposures. The toxin accumulates in humans - alcohol, caffeine, and nuts can also trigger a relapse. Moreover, symptoms can last for days, weeks, or months, and may recur years later. Due to their size, children are at an increased risk of illness. Treatment includes intravenous (IV) mannitol and supportive care.

Suspected cases of fish and shellfish poisoning should be reported to the local health department. For 24/7 information regarding foodborne illnesses, please contact the General Communicable Disease Control Branch at (919) 733-3419. For information about harmful algal blooms (HAB) and toxins, contact the HAB program toll-free at (888) 823-6915. For information regarding shellfish and safety contact Shellfish Sanitation at (252) 726-6827. A poster is being developed for health care providers and local health department regarding CFP, scombroid, and ASP and should be available through the HAB program in early 2008. ♦

Further Reading:

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Ciguatera Fish Poisoning
Ciguatera toxin is produced by <i>Gambierdiscus toxicus</i> (a marine dinoflagellate)
Toxin bioaccumulates in marine food webs
Humans are exposed by ingestion of ciguateric reef fish
Gastrointestinal, cardiovascular, and neurological symptoms
Treatment with IV mannitol

## Prevention for Positives...A New Look at Reducing HIV Transmission

Prepared by Debra Bost, BS, CHES, Program Consultant, HIV/STD Prevention and Care Branch



Ten agencies are taking a new approach to HIV/AIDS care through the “Prevention for Positives” program, which integrates prevention and care for people living with HIV/AIDS (PLWHA). The HIV/STD Prevention and Care Branch issued a request for assistance (RFA) for the program in November 2006. Specific goals of the Prevention for Positives project are to provide comprehensive risk counseling and support services, link PLWHA into consistent care, and locate and re-engage HIV positive persons who have lapsed medical care to encourage them to get back into care.

Funded agencies include: Alliance of AIDS Services, Carolina (Raleigh), AIDS Care Service, Inc. (Winston Salem), Duke University (Durham), East Carolina HIV/AIDS Partnership, Inc. (Rocky Mount), Fayetteville Area Health Education Foundation, Inc., Glory to Glory Ministries House of Refuge (Raleigh), Mecklenburg County Health Department, the Maria Parham Northern Outreach Clinic (Oxford), and Western North Carolina AIDS Consortia (Asheville). Special populations targeted by these projects include homeless women, Hispanics, Native Americans, and African Americans.

These projects will address the medical and psychosocial needs of PLWHA. Many agencies responded with innovative ideas combining medical care and promoting risk reduction strategies. Most of the agencies plan to use CDC’s Comprehensive Risk Counseling and Services (CRCS) model, which provides one-on-one risk reduction counseling to help the client to accept and to sustain risk reduction behavior. CRCS counselors provide much-needed stability and support for clients as they address high-risk sexual behaviors, make healthier choices, and receive consistent medical care. Some agencies will blend CRCS with group-level interventions that address dimensions of wellness including nutrition, physical exercise, substance abuse, and mental health. Client focus will be on understanding drug therapies available to them and the importance of compliance with those therapies. Prevention for Positives project staff will help clients to understand and use their laboratory results (viral load, CD4 count) as indicators for improved medical outcomes. Clients will be seen by medical providers on a regular basis and receive appropriate referrals to other providers. Each program will collect data and track client progress using CAREWare software. With this level of support offered to HIV + persons by the Prevention for Positives projects, it is expected that medical outcomes of clients will improve and incidence of HIV will decrease. ♦

**Reported Communicable Diseases, North Carolina, January-September 2007 (by date of report)\***

Disease	Year-to-Date (Third Quarter)			3rdQuarter 2007	Comments / Note
	2007	2006	Mean (2002-2006)		
Brucellosis	6	2	1	3	
Campylobacter	452	653	551	186	
Chlamydia, laboratory reports	22,576	24,907	21,762	7,952	
Creutzfeldt-Jakob Disease	5	1	1	2	Notes 1 and 2
Cryptosporidiosis	68	71	53	29	
Cyclosporiasis	3	1	1	2	
Dengue	5	2	4	3	
E. coli Shiga Toxin-producing	114	83	42	77	Note 3
Ehrlichiosis, Granulocytic	1	1	2	1	
Ehrlichiosis, Monocytic	39	40	21	23	
Ehrlichiosis, Other	1	1	1	1	
Encephalitis, California Group	2	4	7	1	
Foodborne, C. Perfringens	3	8	3	1	
Foodborne, Other	62	108	158	17	
Foodborne, Staphylococcal	1		16	0	
Gonorrhea	10,080	12,998	11,894	3,038	
Haemophilus Influenzae	45	46	45	7	
Hemolytic Uremic Syndrome	8	3	2	3	
Hepatitis A	44	66	92	24	
Hepatitis B	96	123	135	26	
Hepatitis B Carrier	713	652	675	265	
Hepatitis B Perinatal	1	2	2	0	
Hepatitis C, Acute	13	12	14	5	
HIV/AIDS	1,225	1,666	1,398	288	Note 4
Legionellosis	37	29	24	16	
Listeriosis	22	19	15	15	
Lyme Disease	39	24	67	20	
Malaria	17	24	21	5	
Measles	3	1	0	0	
Meningococcal Invasive	15	24	27	4	
Menigitis, Pneumococcal	36	32	28	5	
Mumps	25	30	9	1	
Q Fever	4	3	3	0	
Rabies	383	397	486	132	
RMSF	491	663	350	309	
Salmonellosis	1141	1146	1100	578	
Shigellosis	67	125	322	34	
Strep A, Invasive	140	138	108	45	
Syphilis, Total	413	448	391	115	Note 5
Toxic Shock Synd., Strep	7	10	4	1	
TSS	6	6	3	4	
Tuberculosis	222	230	229	79	
Tularemia	1	1	1	1	
Typhoid, Acute	3	3	4	1	
Typhus Epidemic	1	2	0	0	
Vibrio Vulnificus	1	4	3	1	
Vibrio, Other	7	11	8	5	
Whooping Cough	227	154	87	57	

\* Preliminary data, as of 3/31/2007. Quarters defined as 13 weeks periods. Diseases reported in 2007 define those listed in this table. Notes: 1. “-”=Not reportable, or not reportable as such over this entire time period; 2. Became reportable 2/2003; 3. “E. coli O157:H7” was disease name until 2/15/2003; 4. Earliest report with HIV infection or AIDS diagnosis; 5. Includes primary, secondary and early latent syphilis.

## Two New Leadership Positions Filled

*Prepared by Dr. Jeffrey Engel, Chief, Epidemiology Section and State Epidemiologist*

Over the summer of 2007, the Epidemiology Section filled two leadership positions left vacant by a transfer and retirement.

The new Section Operations Manager is James (Mac) Kemer (pronounced kemmer). Mac joins us from Maine, with 25 years of healthcare management experience in a variety of service settings, including two years with the City of Portland Public Health Division and three years with Kennebec Valley Regional Health Agency. The remainder of his experience covers for-profit and not-for-profit medical service delivery, including hospital-based ancillary, emergency, urgent care, primary care, psychiatric and long term care services, and stand-alone walk-in treatment.

Fred Jamison is the new General Communicable Disease Control Branch Operations Manager. Fred comes to us from Washington state, with 20 years of healthcare management experience also in a variety of settings, including eleven years as the public health administrator of a two-county health district, three years with Kadlec Medical Center; and he helped establish and manage a community-based rehabilitative program for Alzheimer's and stroke patients. Fred is certified as a Management Trainer, holds a Master's degree in Education, and has taught as a substitute teacher and elementary school reading instructor. His wife, Cathy, is a special education teacher at Lead Mine Elementary School in Raleigh. ♦

## Employee Recognition: Allison Connolly Employee of the Quarter

*Prepared by Patsy West, Administrative Assistant, Epidemiology Section*



Allison Connolly has received the Epidemiology Section's Employee Recognition Award for the third quarter of 2007. Connolly was nominated in the category of Leadership.

Connolly began work with the Epidemiology Section as a Public Health Epidemiologist in the General Communicable Disease Control Branch in February 2004.

Connolly is the Division of Public Health's Training Lead for the NC Electronic Disease Surveillance System (NC EDSS) and is the primary day-to-day representative of NC EDSS end-users to the Division of Public Health Information Technology Branch and the NC EDSS contractor. Connolly provides technical expertise to these parties concerning surveillance, investigation and reporting for all program areas involved in the NC EDSS. Connolly also works with staff from other states' NEDSS programs, the CDC and commercial hospital laboratories.

The breadth of the system is impressive. It extends to close to 100 adverse health conditions under surveillance, necessitating input from a large number of professionals, in a manner carefully orchestrated to fit into a complex, tight and detailed project schedule. Connolly's leadership is one of the pivotal elements in ensuring continued progress and success in this project.

In addition to receiving the Epidemiology Section's Employee Recognition Award, she was presented with a gift certificate to a local restaurant from the Epidemiology Section Management Team. ♦

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