Epi Notes

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

Volume 2002-2

June 2002 - August 2002

In This Issue:

Engel Named to State Epidemiology Post

Prepared Carol D. Schriber, Public Information Officer
Public Affairs Office

Dr. Jeffrey P. Engel began his new job as State Epidemiologist and head of the General Communicable Disease Control Branch in the Division of Public Health on July 15. He succeeds Dr. J.N. "Newt" MacCormack, a 36-year veteran of public health who retired in June 2001 and was called back after Sept. 11 until his replacement could be found.

Before coming to DHHS, Dr. Engel was chief of the division of infectious diseases in the Department of Internal Medicine at East Carolina University's Brody School of Medicine and medical director for hospital infection control at Pitt County Memorial Hospital. There, he did extensive work on such health and health policy issues as HIV/AIDS and other viral infections, medical ethics, microbial antibiotic resistance, and hospital infection control.

In his new position, Dr. Engel's primary responsibilities will be the ongoing surveillance and prevention of communicable diseases such as tuberculosis, hepatitis, insect-borne illnesses like West Nile virus, food-borne illnesses, and influenza. He will also be working closely with the bioterrorism coordinator, a new state position that is to be filled by summer's end. As state epidemiologist, he will be North Carolina's official contact with the Centers for Disease Control and Prevention (CDC) and an official representative to the Association of State and Territorial Health Officials (ASTHO).

"Dr. Engel is a highly regarded expert in infectious diseases," said Dr. Steve Cline, chief of the N.C. Epidemiology Section. "He also understands community health and local health departments, and is skilled at working with people in every level of public health. That's a rare combination. He will be an indispensable member of the state's public health team."

* * * * *

Detection of Primary HIV Infection in North Carolina's Counseling and Testing Sites

Prepared by Peter Leone, MD, Medical Director, HIV/STD Prevention and Care Branch

An estimated 40,000 new HIV infections occur annually in the U.S. and approximately 1,500 newly diagnosed HIV cases are reported in North Carolina. Very few of the reported cases are acute HIV infection, because standard HIV antibody testing cannot diagnose it. Acute HIV infection—characterized by high virus burden and evolving host immunity—is sometimes also accompanied by a self-limited, mononucleosis-like "acute retroviral syndrome" that is rarely diagnosed. It has been hypothesized that early antiretroviral treatment during this period may augment host immunity and improve long-term prognosis for treated patients. Acute HIV infection is therefore an attractive target for public health interventions, and early diagnosis is highly desirable.

Moreover, HIV transmission can occur readily during acute HIV infection and may, in fact, account for a disproportionate amount of HIV transmission as compared to transmission by individuals in later stages of infection. These observations agree well with mathematical models that predict elevated transmission probabilities due to higher shedding in semen during acute infection, and with an increased probability of sexual transmission with increasing blood viral load. Because preliminary evidence suggests that early short-course antiretroviral treatment may alter long-term prognosis in acute HIV infection, current USPHS/DHHS guidelines for treatment of HIV infection recommend that urgent treatment be considered for acute infection.

A University of North Carolina at Chapel Hill Center for AIDS Research/NC DHHS pilot study (Pilcher, McPherson, Leone, et al; July 10, 2002 JAMA) examined the prevalence of acute HIV infection in North Carolina's routine HIV counseling and testing population, using HIV nucleic acid screening of seronegative serum specimens. By first screening for HIV RNA in pools made from seronegative specimens and then deconstructing HIV RNA positive pools to determine individual positive specimens, it was possible to identify individuals who had possible acute HIV infection. HIV antibody negative/RNA positive patients were contacted by state Disease Intervention Specialists (DIS), and confirmatory testing was performed.

In the one-month initial pilot program, 8,194 consecutive at-risk subjects presenting for routine tests at 110 counseling and testing sites across the state were screened, of whom 39 were HIV antibody positive [chronic HIV infection prevalence: 47.6 per 10,000 at-risk persons (95% CI 33.8-65.0 per 10,000)]. Of 8,155 at-risk subjects with negative antibody tests, 5 were HIV RNA positive, of whom 4 had true positive acute infection [prevalence 4.9 per 10,000 (95% CI 1.3-12.5 per 10,000); because of pooling, overall specificity was excellent at 0.9999 (95% CI 0.9993-1.0000)]. Interestingly, 3 of 4 acute infections were asymptomatic at initial testing, but 2 subsequently developed a characteristic acute retroviral syndrome.

We estimate that 40 to 60 acute HIV infections may be identified annually through an expanded acute HIV screening program. These individuals currently could not be identified through HIV antibody testing procedures. All patients are currently counseled that antibody testing may not identify early HIV infection and that they should be retested in three months if they had a recent potential exposure to HIV. Still, many patients equate a negative HIV antibody test with not being infected with HIV and are lost to follow-up and potential diagnosis of HIV infection.

These results suggest that antibody-negative acute HIV infection may be unexpectedly prevalent and that routine screening for these infections is feasible. The results also provide a compelling public health reason to screen for acute HIV infection. The STAT (Screening and Tracing for Active HIV Transmission) program was therefore developed specifically to carry the concept forward and operationalize protocols for efficient acute HIV screening (using low cost, ultra-sensitive RNA detection technology and robotic pooling), rapid partner notification, and screening in the public health setting.

STAT protocols will be evaluated through a 12-month demonstration project scheduled to begin late this fall on all blood tested for HIV at the N.C. State Laboratory of Public Health. HIV/STD Disease Intervention Specialists will be trained to provide rapid follow-up and appropriate counseling to individuals testing HIV RNA positive. Staff in the Virology/ Serology Unit of the State Laboratory of Public Health and the DIS in the HIV/STD Prevention and Care Branch will play an important role in the evaluation of the STAT Project. HIV counseling and testing brochures are being revised, and a teleconference on PHTIN is planned for October 23, 2002 to discuss minor changes in pre-test counseling.

Contact Judy Owen-O'Dowd with questions at 919-733-9553 or e-mail her at judy.owen.odowd@ncmail.net.

* * * * *

Toe River District *Salmonella heidelberg* Outbreak

Prepared by Pam Jenkins, Ed.D; Foodborne Disease Nurse Epidemiologist and Jeffrey Engel, MD; Head, General Communicable Disease Control Branch

The Toe River District (Avery, Mitchell and Yancey Counties) was alerted by hospital healthcare providers on April 25, 2002, that an unusually large number of ill people were presenting at various regional medical facilities for evaluation and treatment of acute gastroenteritis. A common source was suspected and later identified as the Western Sizzlin restaurant in Spruce Pine in Mitchell County. The outbreak continued unabated, and on April 29 the manager voluntarily closed the restaurant. An epidemiologic study was conducted by the district local health department (LHD) in cooperation with the state General Communicable Disease Control Branch.

(continued on page 3)

(continued from page 2, Salmonella heidelberg Outbreak)

Methods

Epidemiologic Study

A case-control study using a standardized questionnaire was initiated on April 30. A case-patient was defined as any individual having nausea, vomiting and/or three or more diarrheal stools per day and who ate at the Western Sizzlin in Spruce Pine between April 18 and April 30. A toll-free phone hotline was set up and staffed during regular working hours (Monday - Friday) and on Saturday. In addition, a media point-person was identified and daily press releases were disseminated to keep the public informed about the investigation's progress.

Environmental Investigation

Before this outbreak, the LHD inspection of this restaurant had resulted in a 99% rating. On April 26, the health director and an environmental health (EH) specialist from the LHD inspected the restaurant and noted deficiencies. On April 29, the EH team collected food samples from an individual customer who had taken food home and sent them to the State Laboratory for Public Health (SLPH) for analysis. During the investigation, the owners of the restaurant noted that the public water was muddy on April 22 and queried whether this could have been the source of the outbreak. On April 30 and May 1, the LHD EH personnel obtained water, ice and food samples from the restaurant and sent those to the SLPH for culture. In an attempt to identify the exact cause of the outbreak, more food samples were taken on May 13. Also cultured was a pet snake of an employee who was asymptomatic but culture-positive.

Laboratory and Statistical Analyses

Stool specimens were collected by the LHD, community hospitals and private doctors' offices on as many individuals meeting case definition as possible. Food items were collected by EH personnel. Isolates were sent to the SLPH for serotyping and pulsed-field gel electrophoresis (PFGE). Univariate and stratified analyses were done using Epi6. Stepwise logistic regression modeling was done using SAS.

Results

Epidemiologic Study

The epidemiologic curve was consistent with a continuous source outbreak pattern. A total of 7,151 diners ate at the Western Sizzlin from April 18 to 29. Two hundred thirty-nine individuals meeting the case definition and 371 controls were selected for the study. Of the cases, 44% (n=106) were male and 56% (n=132) female; 99% (n=234) were white; and the mean age was 38 years old. For controls, 45% (n=165) were male and 55% (n=199) female, 99% (n=361) were white, and the mean age was 42 years old.

Table 1 summarizes the symptoms of the cases. The univariate analysis of dietary histories is summarized in Table 2. Several food items were identified as risk factors for *Salmonella heidelberg* infection during this outbreak. Food items found significantly associated with illness in the univariate analysis were subsequently subjected to a stratified analysis. From these results, it still could not be determined which items were significant and which were confounders. Thus, a multivariate analysis was performed. In this analysis, only mashed potatoes, beef gravy, and roast beef with gravy were found to be risk factors for *Salmonella* infection.

Table 1. Signs and symptoms of cases

	Cases No.	Cases %
Fever	124	55
Cramps	179	79
Vomiting	98	44
Bloody Diarrhea	20	9.4
Non-bloody Diarrhea	158	72
Nausea	160	70
Watery Diarrhea	184	79
Headache	125	56
Cough	37	17
Dehydration	53	26
Sinus pain/pressure	48	23
Hospitalized	22	9.2

Summary Epidemiologic Curve

Figure 1 is an epidemiologic curve summarizing the outbreak by restaurant customer, timeline of events, daily significant food items, and the percent of cases who ate those items.

Laboratory Results

Table 3 summarizes the results of the food sample cultures sent to the SLPH. Eighty-eight stool specimens were collected by the LHD. Fifty stool cultures from customers and employees were confirmed positive for *Salmonella heidelberg;* two were asymptomatic employees of the restaurant who ate daily at the restaurant. The outbreak PFGE pattern A was seen in 6 cases, with an additional case having a PFGE pattern R, which differed from pattern A by only one band and was therefore considered to be the same as pattern A. No further PFGE patterns were determined after these seven cases, as the molecular epidemiology link had been well established.

Conclusions

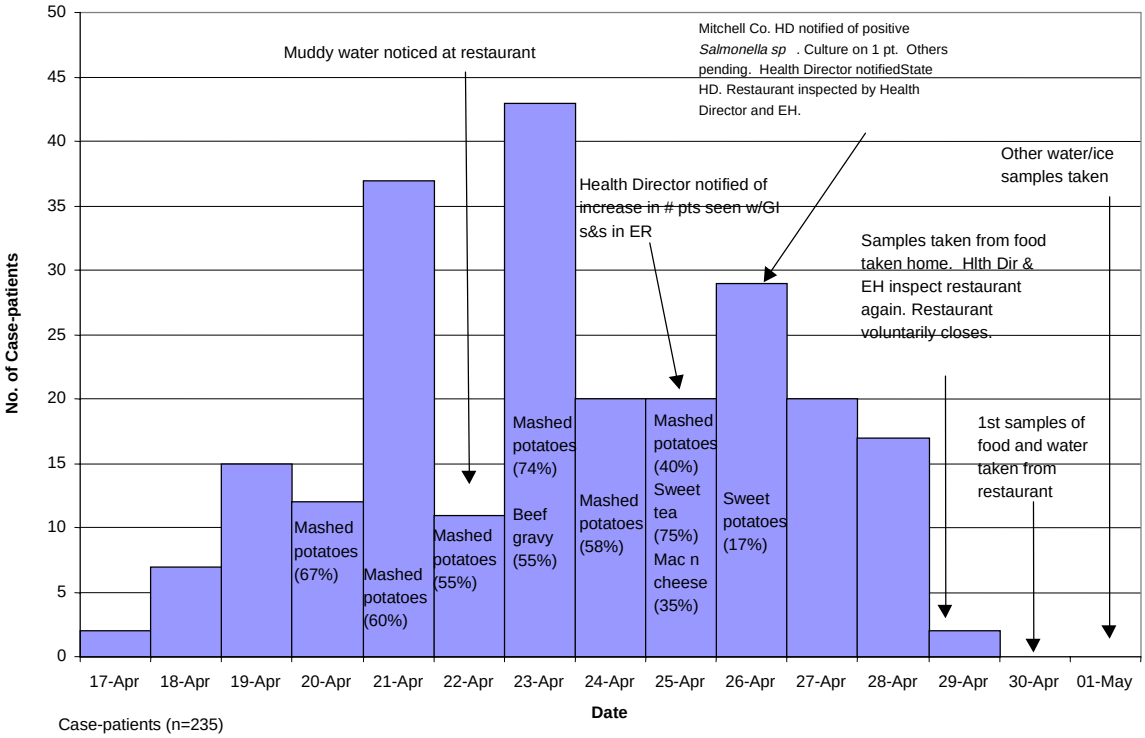
An outbreak of salmonellosis affecting several hundred people occurred in western North Carolina during spring, 2002. The Toe River Health District reacted as soon as the outbreak was identified and quickly determined that it was associated with dining at one restaurant in Spruce Pine. Clinical and laboratory investigation revealed a single strain of *Salmonella heidelberg* as the causative agent. Voluntary closure of the restaurant resulted in prompt cessation of the outbreak.

The epidemiologic study strongly associated certain food items with the outbreak. Mashed potatoes, beef gravy, and roast beef with gravy were all statistically associated with illness in the multivariate analysis. Multiple food items stored at a

(continued on page 4)

Figure 1

Date Ate at Restaurant and Timeline of Events with Foods Implicated in Outbreak (% of ill who ate)



Case-patients (n=235)

(continued from page 3, Salmonella heidelberg Outbreak)

customer's home were culture-positive, and two food handlers were found to be asymptomatic carriers. Interestingly, the items found to be significant in the daily analysis (i.e., mashed potatoes, beef gravy, sweet tea, macaroni and cheese, and sweet potatoes) differed from those found to be significant over the whole outbreak period. The muddy water noted by the manager did not contribute to the outbreak.

The original source of contamination was not found. Although the mashed potatoes were strongly implicated, food samples taken of the dried mashed potato mix, as well as samples taken from prepared mashed potatoes in the restaurant, failed to show any *Salmonella* growth. Food samples often do not grow the organism of interest, even if it is present. Only a small sample was taken from a large tray of mashed potatoes, and the "hot spot" of contamination may have been missed.

While two employees tested positive for *Salmonella heidelberg*, it could not be determined whether they got their infection from eating at the restaurant or infected the food at the restaurant. Because reptiles are known *Salmonella* carriers, the pet snake of one of these employees was cultured; however, it did not harbor the implicated bacterium. Based on previous outbreaks in restaurants, and from these data, it is likely that poor food handling practices contributed to cross-contamination from the original source to several food items over the course of this outbreak.

Control measures included restaurant closure, disinfection, and management and employee education about proper food handling, including cross-contamination prevention. As has been shown in previous outbreaks, the historical LHD inspection grade was not predictive of the subsequent outbreak.

* * * * *

Recent Trends in Laboratory Testing for Rabies

Prepared by J. Todd McPherson, Head, Virology/Serology Unit N.C. State Laboratory of Public Health

The mid-Atlantic raccoon strain of rabies was first detected in North Carolina on June 18, 1991 and has continued to expand throughout the state. This epizootic has created an unprecedented demand upon the State Laboratory of Public Health for rabies testing, as it is the sole-source laboratory providing rabies diagnostic testing for the State of North Carolina (see graph).

The mid-Atlantic raccoon strain of rabies is the predominate strain of the five antigenically distinct strains found in terrestrial animals within the U.S. The other four strains are the North Central skunk, the South Central skunk, the Arctic/red fox, and the gray fox strains.

Rabies is compartmentalized in nature and predominates in the particular animal species to which it originally adapted. Recent North Carolina experience with the mid-Atlantic raccoon strain of rabies has shown this virus readily crosses the species barrier.

(continued on page 6)

Table 2. Univariate analysis of overall dietary histories

Food Item	Case Patients No.	%	Total	Controls No.	%	Total	Odds Ratio	95% Confidence Interval
Fresh sauerkraut	8	3.5	228	1	.29	349	12.65	1.58, 276.22
Penne Primo	6	2.7	226	2	.57	352	9.57	1.12, 216.04
Beef gravy	69	30	231	28	7.9	354	4.96	2.99, 8.27
(Roast beef) with gravy	28	12	232	10	2.9	350	4.67	2.10, 10.59
Mashed potatoes	114	49	232	74	21	357	3.69	2.52, 5.42
Salisbury steak	20	8.6	232	13	3.7	352	2.46	1.12, 5.40
Sweet potatoes	21	9	232	15	4.2	354	2.25	1.07, 4.74
Fresh cicken	44	19	232	34	9.7	352	2.19	1.13, 3.66
Au jus gravy	24	10	231	18	5.1	350	2.14	1.08, 4.25
Macaroni and cheese	51	22	231	49	14	351	1.75	1.10, 2.77
Green beans	57	25	232	56	16	354	1.73	1.12, 2.69
Yeast rolls	132	57	230	169	47	358	1.51	1.06, 2.14
Sweet tea*	87	40	217	146	42	352	0.94	0.66, 1.36

*Not significant in overall totals but does reach significance in daily totals.

Table 3. Food culture results.

Individual's Home (April 29th)	Result	PFGE	Restaurant (April 30th & May 1st)	Result	Restaurant (May 13th)	Result
Hamburger steak with gravy	Positive for *S. heidelberg*	**A**	Leftover prepared gravy	Negative	Pet snake	Negative
Hamburger steak without gravy	Negative		Leftover prepared mashed potatoes	Negative	Fresh chicken	Negative
Fried Chicken	Positive for *S. heidelberg*	**A**	Unopened dry mashed potatoes	Negative	Ham	Negative
Ham	Positive for *S. heidelberg*	**A**	Unopened dry gravy mix	Negative	Strawberries	Negative
Applicator stick marked "gravy"	Positive for *S. heidelberg*	**A**	All water samples	no coliforms	Cantaloupe	Negative
					Cooked roast beef	Negative
					Raw roast beef	Negative
					Raw hamburger	Negative
					Hard boiled eggs	Negative
					Filet mignon with bacon	Negative
					Sirloin steak	Negative
					NY strip steak	Negative

(continued from page 4, Rabies)

It has now been detected in thirteen different animal species besides raccoons – the fox, skunk, bobcat, groundhog, coyote, deer, beaver, horse, cow, goat, dog, cat, and the domestic rabbit. The wide diversity of animal species associated with rabies is an indicator of how broadly entrenched this virus has become within our state in the past decade.

The increasing zoonotic reservoir species may also signal an increasing public health threat. Of particular concern are the rapidly increasing cases of rabies in domestic animals, especially dogs and cats. This observation underscores the need to keep pets' rabies vaccinations current. No human deaths have ever been reported in the U.S. from rabies transmitted via raccoons; however, there were numerous cases of fatal human rabies in North Carolina prior to 1955 attributed to transmission by dogs or possibly cats. Historically, cases of rabid dogs or cats are associated with an annual average of at least eight people exposed to the virus in the state, while cases of rabies in wild animals are associated with an average of slightly less than two exposed individuals. Furthermore, people may be more inclined to minimize the clinical significance of a bite from a family pet than they would some wild animal.

The table that follows shows the increasing rates of rabies in dogs and cats submitted to the State Laboratory of Public Health for testing within the past four years:

N.C. Rabies Rates in Dogs & Cats

Year:	Dog	Cat
1999	0.54%*	0.94%
2000	0.42%	0.58%
2001	0.62%	1.02%
2002**	2.00%	3.20%

** number of pos. dogs/total dogs tested*
***Partial-year data through June, 2002*

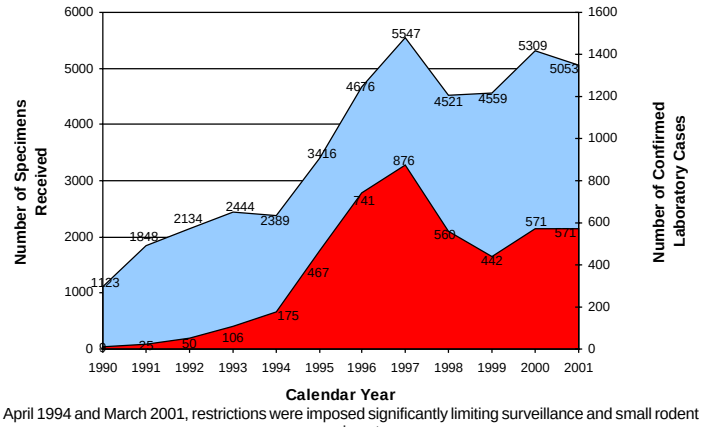
The State Laboratory of Public Health rabies laboratory provides same-day testing for specimens received Monday through Friday (7:30 a.m. to 4:00 p.m.). Saturday or holiday testing coverage is restricted to emergency situations only and is accessible via an "on-call" beeper system that can be reached at 919-310-5620. Tested specimens are reported as either *positive*, *negative*, or *unsatisfactory*.

The summer months are traditionally the period of greatest rabies testing activity for the laboratory. These are also the months when laboratory reports of *unsatisfactory* specimens reach their highest rates. Specimens submitted for rabies testing should be properly packaged according to the instructions provided on the test submission form and/or the laboratory web site (*http://slph.state.nc.us/*). During the summer months, extra care should be taken to protect the specimen from heat and provide sufficient ice packs to preserve and protect it during transit to the laboratory. Trauma to the animal head is also a significant cause for a specimen being rendered *unsatisfactory* for testing. Care must be exercised when euthanizing the animal to avoid damaging the head and brain. If the brain is decomposed or damaged, the probability of the specimen being reported as *unsatisfactory* greatly increases. If the *unsatisfactory* animal was involved in a significant exposure to a human, rabies post-exposure prophylaxis (PEP) will usually be considered since the laboratory was unable to rule out the presence of rabies virus. This increases the demand for the limited quantities of rabies PEP biologics and also results in PEP administration to some people who should otherwise not be treated.

For more information regarding rabies, see the N.C. Division of Public Health's webpages at *www.schs.state.nc.us/epi/rabies/* and *http://slph.state.nc.us/*. For specific laboratory questions, call the Virology Serology Unit at (919) 733-7544.

* * * * *

Rabies Workload & Lab Confirmed Cases: Calendar Years 1990-2001



April 1994 and March 2001, restrictions were imposed significantly limiting surveillance and small rodent speciments.

Employee Recognition: Donna Goodmond Employee of the Quarter

Prepared by Patsy West, Administrative Assistant

Ms. Donna Goodmond has received the Epidemiology Section's Employee Recognition Award for the summer quarter of 2002. Ms. Goodmond was nominated in the category of "Significant Contribution to Morale or Effectiveness of Their Work Unit."

Ms. Goodmond began working with the State Laboratory of Public Health of the Epidemiology Section May 1, 2000 after serving in the U.S. Air Force for many years. Donna is Administrative Secretary to Dr. Lou Turner, Director of the State Laboratory of Public Health.

In addition to the many administrative duties required in her position, Donna has taken on duties not found in a position description. She is the "Welcome Wagon," "Meals on Wheels" and "Social Director" of the State Laboratory of Public Health. She has a talent for making everyone feel valued, important and special. Creativity is another of Donna's many talents. At a recent retirement party, Donna transformed an ordinary classroom into a tropical paradise complete with tropical plants, waterfalls and background tropical sounds. When you think of warm and friendly, you think of Donna. She is a great person to work with and to call your friend.

In addition to receiving the Epidemiology Section's Employee Recognition Award, Donna will be presented with a gift certificate from the Section Management Team.

* * * * *

Reported Communicable Diseases, North Carolina, January-June 2002

(by date of report)*

Disease	Year-to-Date (Second Quarter)			2nd Quarter 2002	Comments / Note
	2002	2001	Mean (97-2001)		
Campylobacter	**239**	197	219	141	
Chlamydia, laboratory reports	**12073**	11275	1053	6750	
Cryptosporidiosis	**21**	15	-	8	Note 1 & 2
Dengue	**1**	0	1	1	
E. coli O157:H7	**16**	25	19	10	Note 3
Ehrlichiosis, Monocytic	**1**	1	-	0	Note 1 & 2
Encephalitis, California group	**1**	0	-	0	Note 1 & 4
Foodborne, other	**3**	4	22	1	
Foodborne, staphylococcal	**57**	0	8	53	
Gonorrhea	**7988**	8721	8806	4139	
Haemophilus influenzae	**21**	29	20	10	
Hepatitis A	**128**	64	75	38	
Hepatitis B, acute	**132**	109	119	86	
Hepatitis B, chronic	**477**	300	334	291	
Hepatitis C, acute	**14**	9	-	8	Note 1 & 4
HUS-TTP	**2**	0	-	0	Note 1 & 2
HIV/AIDS	**765**	827	805	373	Note 5
Legionellosis	**5**	5	7	2	
Listeriosis	**3**	-	-	2	Note 8
Lyme disease	**46**	7	14	35	
Malaria	**9**	2	8	3	
Meningococcal disease	**17**	50	41	6	
Meningitis, pneumococcal	**31**	33	33	10	
Mumps	**1**	1	5	0	
Q Fever	**1**	0	0	1	
Rabies, animal	**329**	299	320	197	
Rocky Mountain Spotted Fever	**92**	23	25	62	
Salmonellosis	**495**	461	425	272	
Shigellosis	**145**	190	124	80	
Strepto. A, invasive	**89**	90	35	39	Note 2
Syphilis, total	**332**	488	669	166	Note 6
Toxoplasmosis, congenital	**1**	0	-	0	
Toxic Shock Syndrome	**2**	3	1	0	
Tuberculosis	**159**	173	191	110	
Tularemia	**1**	1	1	0	
Vibrio, other	**4**	4	1	0	Note 2
Vanco. Resistant Enterococci	**312**	332	136	155	Note 2
Whooping cough	**20**	40	48	9	

* Preliminary data, as of 7/29/2002. Quarters are defined as 13-week periods. Only diseases reported in 2002 are listed in this table. For a complete list of reportable diseases, go to http://www.epi.state.nc.us/epi/gcdc.html.

Notes: 1. Not reportable in this entire time period; 2. Became reportable 8/1/1998; 3. Became reportable 10/1/1994; 4. Became reportable as such 8/1/1998; previously within other category ("Encephalitis"; and "Hepatitis, non A-non B"); 5. Earliest report with HIV infection or AIDS diagnosis; 6. Primary, secondary and early latent syphilis; 7. Became reportable 7/1/1997; 8. Became reportable 7/2001.

Source: N.C. Department of Health and Human Services – Division of Public Health July 29, 2002

State of North Carolina • Michael F. Easley, Governor
Department of Health and Human Services • Division of Public Health
Epidemiology Section • www.epi.state.nc.us/epi/

Dr. J. Steven Cline, Epidemiology Section Chief
Managing Editor, J. Steven Cline
Layout and Typesetting, Angela Green

Epidemiology Section Office (919) 733-3421
General Communicable Disease Control Branch (919) 733-3419
HIV/STD Prevention and Care Branch (919) 733-7301
Occupational and Environmental Epidemiology Branch (919) 733-3410
Rabies Emergency Number - Nights, Weekends, Holidays (919) 733-3419
EMERGENCY NUMBER - Nights, Weekends, Holidays (919) 733-3419

500 copies of this public document were printed at a cost of $100 or $.20 per copy using non-state funds. 8/02

State of North Carolina
Division of Public Health
Epidemiology Section
1902 Mail Service Center
Raleigh, NC 27699-1902