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Mosquito-Borne Viruses in Georgia, 2011

Rosmarie Kelly, PhD, MPH and Melissa Ivey, MPH

West Nile virus (WNV) is a mosquito-borne viral pathogen, or arbovirus (arthropod-borne virus), that was introduced into the United States in 1999. Within four years following its initial detection in New York, WNV was detected in states from the East and West coasts as well as in Mexico and Canada. The virus was first identified in Georgia in 2001. WNV is now considered endemic in most parts of the U.S., including Georgia.

WNV is maintained in birds and occasionally infects humans who are bitten by mosquitoes that have fed on birds. Most people (approximately 80%) infected with WNV do not develop symptoms. About 1 in 5 infected persons experiences a mild, non-neuroinvasive illness, often termed "West Nile Fever" (WNF), that is characterized by fever, headache, muscle weakness or myalgia, arthralgia, and sometimes rash. Less than 1% of persons infected with WNV develop neurologic or neuroinvasive illness ("West Nile Neurologic Disease" or WNND) which clinically manifests most commonly as meningitis, encephalitis, or acute flaccid paralysis. Approximately 3-15% of WNND cases are fatal. Risk of WNND is associated with increasing age and the presence of underlying medical conditions.[1]

WNV is only one of several mosquito-borne viruses that circulate in Georgia. Other identified arboviruses include Eastern Equine Encephalitis (EEE) and LaCrosse Encephalitis (LAC). WNV is the most commonly reported arbovirus in Georgia, although LAC infection is probably underreported because it usually causes only a mild clinical illness. EEE is the most severe of the arboviral infections, leading to death in approximately 33% of symptomatic cases and often leaving survivors permanently disabled.[2]

All acute arbovirus infections are reportable by law in Georgia, including those that are acquired internationally (http://health.state.ga.us/pdfs/epi/notifiable/ND%20Reporting%20Poster.pdf). The Georgia Department of Public Health (GDPH) requires that all acute arboviral infections be reported because species of mosquitoes thrive in Georgia that are competent vectors for exotic diseases such as dengue, chikungunya, and yellow fever. However, the majority of arboviral infections remain undetected if moderate or severe illness does not develop.

In addition to surveillance for human disease caused by arboviruses in Georgia, GDPH and its partners conduct surveillance for arboviruses in mosquitoes, birds, and horses in an effort to determine local risk of human disease.

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State Epi Corner

As State Epidemiologist, I'd like to take this opportunity to welcome readers to the new Georgia Epidemiology Report, introduce the Editors of our publication, and share my vision that epidemiologic science informs, supports, and guides all public health action in Georgia (with your ongoing help in disease surveillance!).

About our Editors

Editor-in-Chief: Melissa Ivey, MPH
Melissa received her Master of Public Health in Epidemiology from Saint Louis University School of Public Health in May 2009 and has been employed as the Vectorborne and Zoonotic Disease Epidemiologist at the Georgia Department of Public Health since 2009.

Managing Editor: Delmar Little, MPH
Delmar received his Master of Public Health in Epidemiology from Florida Agricultural and Mechanical University in 2008. He has been employed as an epidemiologist at the Georgia Department of Public Health since February 2010 and currently serves as the Respiratory Disease Surveillance Coordinator.

About Your Role in Disease Surveillance in Georgia

- All Georgia physicians, laboratories, and other health care providers are required by law (OCGA 31-12-2) to report patients with designated conditions to the Department of Public Health. Both lab-confirmed and clinical diagnoses are reportable within the time interval specified. Disease reporting enables appropriate public health follow-up for your patients, helps identify outbreaks, and provides a better understanding of disease trends in Georgia.
- Which conditions are reportable in Georgia? There are more than 70 conditions—for example, botulism, measles, Salmonella infection, HIV/AIDS, blood lead levels, pertussis, TB, birth defects, and cancer. Some conditions are designated as immediately reportable, some within 7 days of diagnosis, and some within 1 or 6 months of diagnosis. The entire list of notifiable conditions in Georgia and the required reporting timeframes can be found at http://health.state.ga.us/pdfs/epi/notifiable/ND%20Reporting%20Poster.pdf

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Mosquito-Borne Viruses in Georgia, 2011 (continued from page 1)

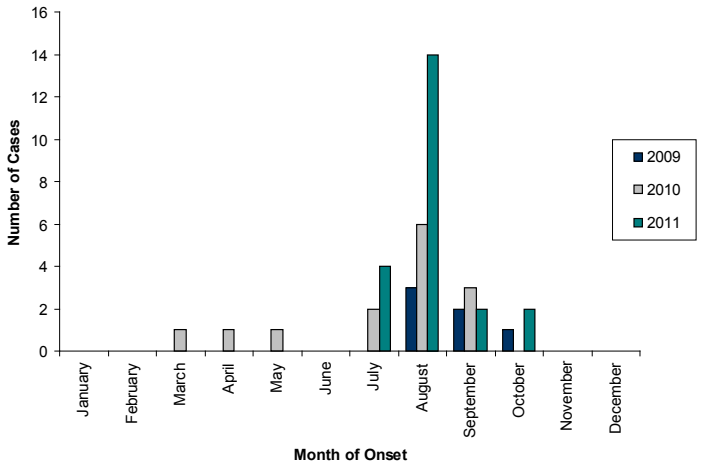
Arbovirus Surveillance in Humans

West Nile Virus

In 2011, 712 cases of WNV from across the United States were reported to the Centers for Disease Control and Prevention (CDC). Four hundred and eighty-six (68%) of these cases were reported as having neuroinvasive disease (WNND) and 226 cases (32%) were reported to have non-neuroinvasive disease (WNF). One hundred and thirty-seven WNV-presumptive viremic blood donors were also reported.

Georgia reported 8 laboratory-confirmed and 14 probable cases of human WNV infection in 2011. Fourteen (64%) of the 22 cases experienced WNND (i.e., altered mental status, encephalitis, and/or meningitis) and 8 cases (36%) were diagnosed with WNV fever (WNF). Two WNND cases and 1 WNF case were fatal. The average age of reported cases was 60 years (range 21-85 years), and the average age of those with WNND was 62 years (range 21-85 years). Twelve (55%) of the 22 cases were male. Unlike previous years, the majority of cases were reported in July and August, likely due to the early onset of warm weather in the spring of 2011 (Figure 1). Three WNV-positive viremic blood donors were also identified; all three remained asymptomatic. See Figure 2 for the counties of residence of each WNV case.

Figure 1. Human Cases of West Nile Virus Infection in Georgia by Month of Onset, 2009-2011



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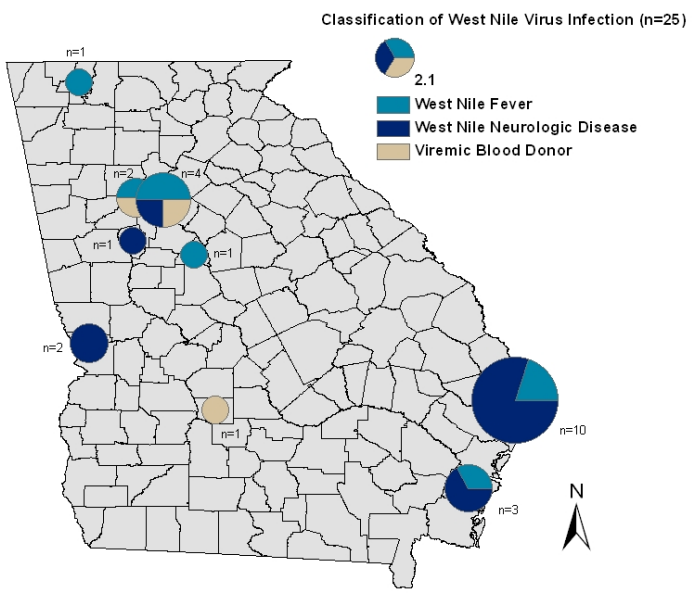
Mosquito-Borne Viruses in Georgia, 2011 (continued from page 2)

Figure 2. Human West Nile Virus Cases by County of Residence, Georgia, 2011



Other Arboviruses

In addition to the 22 cases of WNV reported in Georgia during 2011, 2 laboratory-confirmed cases of LAC were documented. No human cases of EEE were identified. Seven internationally-acquired cases of dengue fever were also reported (Table 1).

Table 1. Reported Human Cases of Dengue Fever in Georgia (n=7) by Month of Onset and Country of Origin, 2011

Month of Onset	Country of Origin
February	Dutch Caribbean/Curacao
May	India
June	India
July	Puerto Rico
August	Bahamas
October	India
December	Mexico
TOTAL	**7**

Testing for WNV and other Arboviral Infection in Humans

Tests to detect WNV and other arbovirus antibodies are readily available at most commercial laboratories. During 2012, GDPH recommends that diagnostic testing for human arbovirus infections be performed at commercial laboratories. The Georgia Public Health Laboratory (GPHL) can perform testing for serologic evidence of infection with each of the arboviruses that circulate in Georgia. However, specimens should only be submitted to GPHL when they meet the criteria listed in Figure 3. Please consult GDPH Epidemiology (404-657-2588) or the appropriate District Health Office before submitting specimens for arboviral testing at GPHL. Specimens not meeting these criteria will not be tested.

Figure 3. Georgia Public Health Laboratory Arbovirus Testing Criteria for 2012

Adults: To qualify for arbovirus testing at GPHL, persons must be 18 years or older and meet at least one of the following clinical criteria:

- Meningitis, OR
- Encephalitis, OR
- Acute onset of profound muscle weakness or acute flaccid paralysis (including Guillian-Barre syndrome), OR
- Fever (greater than 100.4^{0}F) and at least 2 of the following:
  - Headache
  - Malaise
  - Arthralgia
  - Fatigue
  - Eye Pain

Children: To qualify for testing at GPHL, persons must be 17 years or younger and meet at least one of the following clinical criteria:

- Fever (greater than 100.4^{0}F) with ataxia or extrapyramidal signs, OR
- New onset seizures or increased seizure activity in children with pre-existing seizure disorders, OR
- Encephalitis, OR
- Acute onset of profound muscle weakness or acute flaccid paralysis (including Guillian-Barre syndrome)

Note: Because meningitis due to other causes is rather frequent among children during arbovirus transmission season, children with meningitis will not be tested unless they meet additional criteria described above, or after other bacterial and viral causes have been ruled out.

Arbovirus Surveillance in Sentinel Species

Surveillance for arboviruses in mosquitoes, birds, and horses was also conducted by GDPH and its partners in 2011. Due to decreased funding, this program will be significantly reduced in 2012.

Mosquito Surveillance

Mosquito surveillance is conducted to detect the presence of arboviruses in potential vectors and to help guide and evaluate mosquito control programs. Mosquito surveillance was conducted in 18 counties across Georgia in 2011, with WNV-positive mosquitoes detected in 7 of these counties (Chatham, Clayton, Cobb, DeKalb, Fulton, Glynn, and Lowndes). Most WNV-positive mosquitoes were identified as *Culex quinquefasciatus*; positive *Aedes albopictus* and *Culex restuans*

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Mosquito-Borne Viruses in Georgia, 2011 (continued from page 3)

were also identified. The first WNV-positive mosquitoes were detected in metro Atlanta and coastal Georgia in late June, and the latest positive pools were collected in metro Atlanta and coastal Georgia in October, with peaks in numbers of positive pools occurring in July and August. In 2011, onset of WNV detection in mosquito pools was earlier than in previous years. Additionally, the amount of virus found in mosquitoes was more than three times that found in previous years, most likely due to the early onset of warm weather in the spring of 2011.

Bird Surveillance

The number of birds being submitted for WNV testing has continued to decrease since WNV was first discovered in Georgia in 2001. Dead bird surveillance appears to be less useful as a surveillance tool, particularly in areas where mosquito surveillance is conducted. In areas where no mosquito surveillance occurs, bird surveillance can be useful in predicting increased risk of human disease, although the usefulness of dead bird surveillance has diminished over time as birds become immune to the virus. Bird surveillance and the detection of infected birds can also provide a trigger for public health messages concerning personal protection measures that may lower the risk of mosquito-borne diseases.

In 2011, 6 birds were submitted for testing from 3 Georgia counties; 1 bird submitted by DeKalb County tested positive for WNV.

Horse Surveillance

Like humans, horses are incidental hosts for WNV and other arboviral infections. Reports of infected horses in an area indicate increased human risk because mammal-biting mosquitoes are transmitting virus. Horse surveillance has been useful in rural counties where mosquito and bird surveillance resources are limited. However, reduced disease reporting for horses due to increased immunity, increased vaccination, and decreased interest in testing makes this surveillance system less useful as a sentinel for determining increased human disease risk.

In 2011, 3 horses tested positive for WNV in Georgia (2 from Richmond County and 1 from Camden County). No horses were reported to be infected with EEE.

Conclusions

WNV is considered to be endemic throughout Georgia. However, the mosquito season of 2011 highlights the need for ongoing mosquito surveillance and testing to reduce the impact of arboviral diseases. More than three times the number of WNV-positive mosquitoes was detected in 2011 compared to previous years. A majority of these were collected in Chatham County, where no virus transmission had been detected since 2007. Information obtained from these surveillance efforts should lead to responsible and informed decisions about mosquito control as well as public education about reducing mosquito breeding in yards and neighborhoods and the prevention of mosquito bites.

Culex quinquefasciatus, the primary WNV vector in Georgia, is a container-breeding mosquito that flies only a short distance from its breeding site when searching for a blood meal. Personal protection measures are ways in which the public can help reduce the risk of WNV for themselves and their community. Such measures include:

- wearing repellent;
- dumping out standing water at least once a week;
- keeping grass cut, leaves raked, and vegetation trimmed;
- applying larvicide to areas of standing water that cannot be dumped out or drained;
- keeping gutters clear of debris;
- picking up trash in yards and neighborhoods;
- removing saucers from under outdoor potted plants;
- keeping window screens repaired; and
- removing or covering all containers that may hold water.

For more information regarding arbovirus activity in Georgia and ways to protect yourself, please visit http://health.state.ga.us/epi/vbd/mosquito.asp.

References

1. Centers for Disease Control and Prevention. West Nile virus: Questions and answers. Updated February 25, 2010 [cited 2012 May 21]. http://www.cdc.gov/ncidod/dvbid/ westnile/qa/symptoms.htm
2. Centers for Disease Control and Prevention. Eastern equine encephalitis. Updated August 16, 2010 [cited 2012 May 21]. http://www.cdc.gov/EasternEquine Encephalitis/

Nonuse of Contraception Among Georgia Teens who Experienced an Unplanned Pregnancy Resulting in a Live Birth: PRAMS, 2004-2010

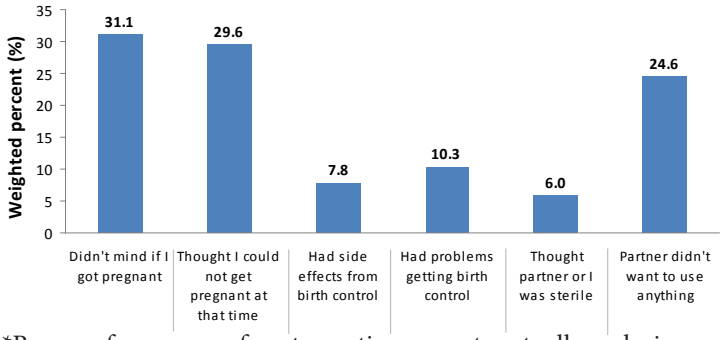
Katherine Kahn, MPH

The birth rate among Georgia teens aged 15-19 years declined 22.7% between 2004 and 2010, from 53.3 per 1,000 teen women in 2004 to 41.2 in 2010. Despite this decline, there were 14,285 births to teens in 2010, accounting for 10.7% of all births in Georgia. In addition, Georgia recently ranked 13th -highest in the United States for teen births. High birth rates among teens are a public health concern because teen mothers and their infants are at increased risk for poor health and social outcomes, such as low birth weight and decreased educational attainment.

The Georgia Pregnancy Risk Assessment Monitoring System (PRAMS) is a statewide, ongoing, population-based survey that collects information on women who give birth in Georgia, usually between two to six months postpartum. To investigate why teens who want to avoid pregnancy become pregnant, a descriptive study was conducted using 2004-2010 Georgia PRAMS data. Weighted frequencies were calculated for females aged 15-19 years who delivered a live infant and reported that their pregnancy was unintended (n=885).

During 2004-2010, 76.5% (95% C.I. 72.0%, 80.4%) of Georgia teen mothers reported that their pregnancy was unintended. Of these women, 47.9% (95% C.I. 42.1%, 53.7%) reported taking no action to prevent pregnancy. The most commonly reported reasons for nonuse of contraception included the following: 31.1% (95% C.I. 23.8%, 39.5%) did not mind if they became pregnant, 29.6% (95% C.I. 22.5%, 37.9%) thought they could not get pregnant and 24.6% (95% C.I. 18.7%, 31.8%) reported that their partner did not want to use anything (Figure 1).

Figure 1. Self-reported reasons for not using contraception at the time of an unintended pregnancy among teen mothers aged 15-19 who experienced a live birth, Georgia PRAMS, 2004-2010*



*Reasons for nonuse of contraception are not mutually exclusive.

In conclusion, the majority of teen births are the result of an unintended pregnancy. A lack of contraception is prevalent and may be the result of ambivalence about becoming pregnant, misconceptions about fertility, and partner control. This information may be useful in developing effective activities to impact teen pregnancy, such as outreach to and education of teenagers around fertility and the risks of conceiving during the teenage years.

Emergence of *Cryptococcus gattii* in Georgia

Melissa Tobin-D'Angelo, MD, MPH and Matthew Crist, MD, MPH

Cryptococcus gattii (C. gattii) is a fungal pathogen of the same genus as *C. neoformans* but, unlike *C. neoformans*, the majority of infections do not occur in HIV-infected persons. It is hypothesized that exposure to an environmental source of *C. gattii* is a risk factor for illness. Although *C. gattii* has been isolated from trees, soil and water, no definitive environmental source has yet been identified. Historically, human *C. gattii* infections (causing severe central nervous system disease) were limited to tropical and subtropical regions of the world but emerged in British Columbia in 1999. The first reported outbreak of *C. gattii* infections in the United States occurred in the Pacific Northwest (PNW) during 2004. In this outbreak, unique epidemiologic patterns were evident, including geographic location (temperate versus tropical areas), occurrence (clustered versus sporadic infections), clinical presentation (pneumonia versus meningitis), risk factors for *C. gattii* infection (immunocompromised), and *C. gattii* genotype (VGII versus VGI and VGIII).[1]

During the period from 2004-2011, *C. gatti* cases were reported to the Centers for Disease Control and Prevention (CDC) from 9 states outside of WA and OR (GA, NC, HI, MI, CA, ID, AK, NM, MT). In 2011, CDC published a case series comparing the *C. gattii* cases from the PNW to those from other areas of the country. The cases from outside the PNW more closely resembled cases reported from tropical and subtropical areas in terms of the serotypes, clinical presentation, and immunocompetency of the infected individuals.[2]

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In addition, ALL clusters of illness and/or outbreaks (even prior to laboratory confirmation of etiology) are immediately reportable.

- How do I report these conditions?
  - **To report immediately, please phone your District Health Office (http://health.state.ga.us/searchregional/districtsearch.aspx) or 1-866-PUB-HLTH (1-866-782-4584), 24 hours/day, 7 days/week.**
  - To report within 7 days, report cases electronically through the State Electronic Notifiable Disease Surveillance System at http://sendss.state.ga.us
- Why is disease reporting important? Who benefits?
  - Disease reporting enables appropriate public health follow-up for your patients, helps identify outbreaks, and provides a better understanding of disease trends in Georgia.
  - Disease reporting ensures that appropriate, often time-sensitive, follow up and control measures can be initiated. For example, after you phone the health department to report a patient with Hepatitis A infection, epidemiologists immediately begin an investigation to identify case contacts and offer preventative immune globulin. In addition, clusters of disease (individuals with similar symptoms linked in space and time) are also considered reportable to the health department, even prior to having a laboratory-confirmed diagnosis. This allows rapid epidemiologic investigation to determine common exposures and to identify the potential source so that further spread can be stopped.

Your work in reporting conditions to the Department of Public Health is essential to what we do in protecting and promoting the health and safety of Georgians, and I thank you.

Cherie L. Drenzek, DVM, MS, State Epidemiologist

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http://health.state.ga.us/epi/manuals/ger

Emergence of Cryptococcus gattii in Georgia (continued from page 5)

Prior to 2011, only one *C. gattii* infection had been reported in Georgia. However, since February 2011, six cases of *C. gattii* infection have been reported in Georgia. Of the four cases for whom we obtained detailed information, 3 were male; median age was 42 years (range 18-70 years), and all lived in southeastern and southwestern Georgia. Two cases died from their infections and one surviving case required surgery for hydrocephalus. None of the cases were HIV-infected; two were previously healthy, one had sarcoidosis (without immunosuppressive treatment), and one had previously been diagnosed with COPD, aortic stenosis, and diabetes. None had recently traveled outside of Georgia. Two cases worked outdoors during the period before illness. All four cases were infected with genotypes of *C. gattii* distinct from those associated with the outbreak in the PNW (3 VGI, 1 VGIII). Combined with the lack of travel history among these cases, these data suggest a possible environmental source of *C. gattii* in Georgia.

The Georgia Department of Public Health (GDPH) and CDC are now conducting surveillance for *C. gattii* in Georgia. Distinguishing between *C. gattii* and *C. neoformans* requires special agar and molecular sequencing not available in most laboratories. Clinicians who suspect *C. gattii* infection, especially when *Cryptococcus* is isolated on culture from patients who are not HIV-infected, are encouraged to submit the isolates to the Georgia Public Health Laboratory at the address below only after consulting with GDPH Epidemiology (404-657-2588). The isolate should be accompanied by a CDC DASH form: (http://www.cdc.gov/ncidod/dvbid/westnile/resources/cdc_form5034.pdf). To protect patient confidentiality, GDPH will provide a lab identification number to be included with the information for CDC tracking purposes. If the isolate is identified as *C. gattii*, GDPH will ask you to complete a case report form upon laboratory confirmation (http://www.cdc.gov/fungal/cryptococcosis-gattii/).

Georgia Public Health Laboratory
Attn. TB Unit
1749 Clairmont Rd.
Decatur, GA 30033

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2. Harris JR, Lockhart SE, Debess E, Marsden-Haug N, Goldoft M, et al. Cryptococcus gattii in the United States: Clinical aspects of infection with an emerging pathogen. Clin Infect Dis 2011;53(12):1188-95.