



## West Nile Virus in Utah

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### What You Should Know

- West Nile Virus was first detected in North America in 1999 and is a relatively new concern in Utah.
- West Nile Virus is transmitted by mosquitoes.
- Horses, humans and some birds are particularly sensitive to developing West Nile Virus symptoms compared to other mammals.
- While most people infected with West Nile Virus never show symptoms, some people can develop serious complications or die.

West Nile Virus (WNV) was first detected in Uganda in 1937. For several years, WNV remained relatively contained in Africa, Europe and the Middle East. Eventually, WNV was detected in North America in 1999 with the first cases in New York City. Since 1999, WNV spread to all the lower 48 U.S. states by 2004 (Fig. 1). WNV has also been detected in Canada, Mexico, Puerto Rico, Jamaica, Guadeloupe, El Salvador, and the Dominican Republic. More than 15,000 people have been infected with WNV in the U.S. since 1999. Unfortunately, more than 500 people in the U.S. have died as a result of secondary complications with WNV.



Fig. 1. Spread of West Nile Virus in the United States since first detected in 1999.

### Mosquito Life Cycle

All mosquitoes go through complete metamorphosis (Fig. 2) and have multiple generations per year. Male mosquitoes feed on plant nectar, but females need a blood meal before laying eggs. Mated females lay a raft of 40-400 eggs on the surface of the water or moist soil. Females are especially attracted to stagnant or slow-moving water because it provides nutritious organic matter for larvae. Within a week, eggs hatch into larvae, sometimes called “wrigglers,” and breathe air through an anal tube. Larvae go through four instars before changing into a non-feeding pupal stage. Pupae, sometimes called “tumblers,” are less active than larvae in the water and breathe through siphons on their backs. Pupae are developing reproductive organs, mouthparts and wings. Adults emerge from pupal cases at the surface of the water and are able to fly once their wings are hardened (Fig. 2).

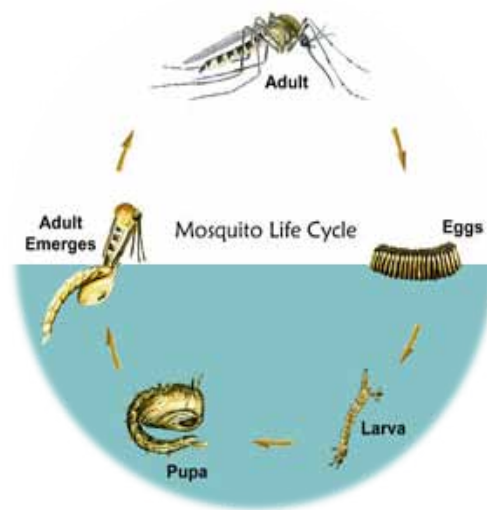


Fig. 2. Typical mosquito life cycle.<sup>1</sup>

The time it takes to complete one mosquito generation is dependant on temperature. Warmer temperatures will accelerate development and cooler temperatures will slow development. For example, *Culex tarsalis* might go through its life cycle in 14 days at 70°F, but only take 10 days at 80°F.

## More about the Reservoir Hosts

Birds are the preferred host for mosquitoes and help keep WNV viable over the winter. Birds are considered "reservoir hosts" because they amplify the virus in the wild and infect new emerging mosquitoes (Fig. 3). Infected birds will either die from WNV or develop lifelong immunity. In the meantime, birds will sustain viable virus particles in their blood for 1 to 4 days. This incubation period is the ideal time for mosquitoes to get infected with WNV and vector the disease. Humans and horses can never build up sufficient viral levels in the blood to infect new mosquitoes and are considered "dead end" hosts (Fig. 3).

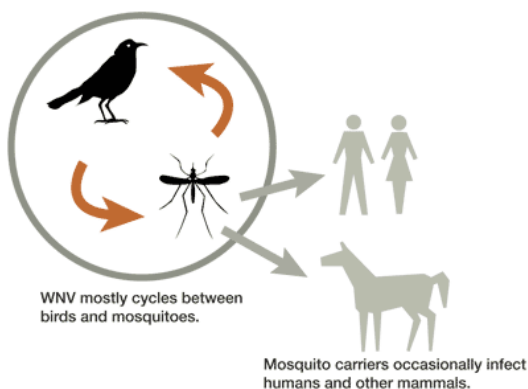


Fig. 3. The transmission cycle of West Nile Virus.

At least 138 bird species are susceptible to WNV and can die from an infection. In general, crows, ravens and jays are particularly sensitive to WNV and are the most commonly seen dead birds (Fig. 4). There is no evidence people can get WNV from handling live or dead birds infected with the virus. However, persons should avoid bare-handed contact when handling any dead animals, and use gloves when collecting dead birds in plastic garbage bags. Otherwise, contact local health department for guidance or bird removal.



Fig. 4. Ravens are common in Utah and are more susceptible to West Nile Virus than other birds.

## FAQ's about West Nile Virus

*What should you do if you think you have WNV?* People with mild WNV illness do not necessarily need seek medical attention. If you develop severe symptoms of WNV, such as intense headaches or confusion, seek medical help immediately. Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms similar to WNV.

*How do you know if you have WNV?* The only way to confirm WNV is through a blood test. Infected people will test positive for WNV antibodies. Consult a doctor if you experience prolonged WNV symptoms.

*How soon do infected people get sick?* People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito.

*How is WNV treated?* As with other viral infections, there is no specific treatment for WNV. People with mild, flu-like symptoms should get plenty of rest and extra fluids for a few days. People with severe symptoms often need intensive medical support for an extended period of time.

*Is there a vaccine available?* Unfortunately, there is not a human vaccine available yet. Expect a human WNV vaccine in a few years. But there is a vaccine for horses, another mammal that is susceptible to severe symptoms from WNV. Talk with your veterinarian for more information on horse vaccine recommendations.

*Who is at the most risk of getting sick from WNV?* People over 50 or anyone with compromised immune systems are at higher risk to get severe illness. Risk through medical procedures is very low. All donated blood is checked for WNV before being used. The risk of getting WNV through organ transplants and transfusions is very small, and should not prevent people who need surgery from having it.

*Is WNV related to other mosquito-vectored diseases?* WNV is a flavivirus in the family Flaviviridae, and is most related to Alfuy, Cacipacore, Japanese encephalitis, Koutango, Kunjin, Murray Valley encephalitis, St. Louis encephalitis, Rocio, Usutu, Stratford, and Yaounde viruses.

*Can dogs and cats get WNV?* Although dogs and cats can acquire WNV through mosquito bites, they do not display symptoms. Other animals, such as bats, chipmunks, skunks, squirrels, and domestic rabbits, also do not display WNV symptoms.

## Ways to Protect Your Family

- *Avoid getting bitten by mosquitoes:* it sounds obvious, but stay away from areas with biting mosquitoes to reduce your risk of acquiring the virus.
- *Wear appropriate clothing:* long-sleeved shirts and pants will make it more difficult for female mosquitoes to pierce your skin and transmit disease while feeding.
- *Stay indoors during peak flight activity:* mosquitoes that transmit WNV are most actively feeding from dawn through dusk.
- *Use an effective repellent:* when you have to be outside during peak feeding times, repellents can discourage biting mosquitoes.



Fig. 5. Typical female mosquito feeding.<sup>2</sup>

## How Does West Nile Virus Spread?

- *Infected Mosquitoes:* in most cases, WNV is spread when infected mosquitoes bite birds, humans or other animals; mosquitoes acquire the virus when they feed on infected birds. Female mosquitoes are able to pass on the virus for the remainder of their lives.
- *Transfusions, Transplants, and Mother-to-Child:* in a very small number of cases, WNV has been spread through blood transfusions, organ transplants, breast-feeding and even during pregnancy from mother to baby.
- *NOT THROUGH TOUCHING:* WNV is not spread through casual contact, such as touching or kissing a person with the virus, or touching animals with the virus.

## Things You Can Do Around the Home

- *Eliminate standing water:* because mosquito eggs are deposited in standing water, anything you can do to reduce breeding sites will decrease the number of adult mosquitoes. This includes improving landscaping to minimize pooling water in ditches and other low spots in the yard that can hold standing water for days.
- *Keep containers clean and dry:* clean and empty watering cans, flower pots or other potential sources of standing water when not in use.
- *Drill holes to allow drainage:* garbage cans and recycling bins can hold rain water for days.
- *Maintain pools with fresh water:* frequently change the water you want around the property, including fish or ornamental ponds, bird baths, and pet bowls.
- *Properly chlorinate other water:* swimming pools and hot tubs should be chlorinated to discourage female mosquitoes from laying eggs.
- *Prevent mosquitoes from entering the home:* keep windows and doors closed, repair any torn screens, insulate window fans or air conditioners, and close fireplaces when not in use.



Figs. 6-9. Examples of places around the home where stagnant water could be prime mosquito breeding areas, including clogged gutters, bird baths, wheelbarrows, and garbage receptacles.

## Symptoms of West Nile Virus

### No symptoms in most people

Almost 80% of people infected with West Nile Virus will never show any symptoms. Most people have healthy immune systems that produce antibodies that fight against infection.

### Mild symptoms in some people

Up to 20% of people infected with West Nile Virus will display mild symptoms similar to the flu, including: headache, fever, body aches, nausea, vomiting, swollen lymph glands and a skin rash. Symptoms typically last a few days and treatments include fluids and rest.

### Severe symptoms in a few people

About one in 150 people infected with West Nile Virus will develop serious illness and require hospitalization. Severe symptoms include: high fever, intense headache, stiffness, tremors, disorientation, and vision loss. Sometimes patients will also experience other serious complications, such as coma, paralysis, encephalitis (swelling of the brain) or meningitis (swelling of the spinal cord). Symptoms can last for a few weeks, be permanent or fatal. Treatments include minimizing secondary complications, fever and brain swelling.

## For More Information

General West Nile Virus questions 888.246.2675

Utah Department of Health 801.538.6191

To report dead birds in Utah 801.476.2470

[www.health.utah.gov](http://www.health.utah.gov)

[www.cdc.gov/ncidod/dvbid/westnile/index.htm](http://www.cdc.gov/ncidod/dvbid/westnile/index.htm)

## What Repellent Is Best?

There are many different types of mosquito repellent products. The best choice depends on how long you are outside, your location and the level of outdoor activity. Some people have skin sensitivities to some mosquito repellents and should be aware of alternative products.

Be sure to carefully read product labels for instructions and restrictions. Only use repellents approved by the EPA (Environmental Protection Agency). Choose a repellent you are likely to use consistently and that provides sufficient protection against mosquito bites. Some repellents can be applied directly to the skin, while others must only be applied to clothing and other fabrics. Use caution when applying repellents to the face and never allow children to apply products themselves. Only use as much repellent as required for the outdoor activity. Wash exposed skin with soap when returning indoors.

**DEET** is a very effective mosquito repellent available in several concentrations; products containing DEET have a relatively low risk to humans and the environment.

**Picaridin** is an alternative for people with sensitivities to DEET-based products; picaridin is effective, almost odorless and can be applied directly to the skin.

**Permethrin** is a highly effective repellent; products containing permethrin can be applied to clothing, shoes and camping gear.

**Oil of eucalyptus** is a plant-based repellent, having about the same effect as low concentrations of DEET.

<sup>1</sup> Image courtesy of Environmental Protection Agency (<http://www.epa.gov/pesticides/health/mosquitoes/moslifecycle.jpg>).

<sup>2</sup> Image courtesy of Michigan Department of Environmental Quality ([www.michigan.gov/images/mosquito\\_65147\\_7.jpg](http://www.michigan.gov/images/mosquito_65147_7.jpg)).

**Precautionary Statement:** All pesticides have benefits and risks, however following the label will maximize the benefits and reduce risks. Pay attention to the directions for use and follow precautionary statements. Pesticide labels are considered legal documents containing instructions and limitations. Inconsistent use of the product or disregarding the label is a violation of both federal and state laws. The pesticide applicator is legally responsible for proper use.

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