

New evidence of brain damage from West Nile virus, scientists say

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Experts who work on the mosquito-borne [West Nile virus](#) have long known that it can cause serious neurological symptoms, such as memory problems and tremors, when it invades the brain and spinal cord.

Now researchers have found physical evidence of [brain damage](#) in patients years after their original infection, the first such documentation using magnetic resonance imaging, or MRI.

Brain scans revealed damage or shrinkage in different parts of the cerebral cortex, the outer part of the brain that handles higher-level abilities such as memory, attention and language.

“Those areas correlated exactly with what we were seeing on the neurological exams,” said Kristy Murray, an associate professor of pediatric tropical medicine at Texas Children’s Hospital and Baylor College of Medicine and lead author of the study. “The thought is that the virus enters the brain and certain parts are more susceptible, and where those susceptibilities are is where we see the shrinkage occurring.”

Results of the study, which has not yet been published, were presented Tuesday at the annual meeting of the American Society of Tropical Medicine and Hygiene. The 10-year study of 262 West Nile patients is one of the largest assessments studying the [long-term health problems](#) associated with West Nile infections.

Most people who are infected do not develop symptoms. About 20 percent will develop fever, and [less than 1 percent](#) have the most severe type of infection that causes inflammation of the brain or surrounding tissues.

Researchers at Baylor tracked the patients from 2002 to 2012. Some had experienced only mild or no symptoms. But over time, “we were surprised at how many [patients] we saw who had gotten worse, or had new neurological problems,” Murray said.

Of those patients, 117 were tested more extensively; nearly half were determined to be suffering from some kind of neurological abnormality. The most common physical problems involved muscle weakness, abnormal reflexes and tremors. Several patients also showed signs of cognitive

deterioration, such as short- and long-term memory loss beyond what normally would be expected for their age.

Researchers conducted MRIs of the brain in 30 of those patients and found the damage or thinning in different parts of the cerebral cortex. They also found that people whose initial infection had become “neuroinvasive,” meaning the virus had gotten into the spinal cord or brain to cause encephalitis or other brain ailments, showed signs of degeneration in several parts of the brain. These included the cerebellum, where damage can affect movement and balance, and the brain stem, which controls functions such as breathing, speech and sleep cycles.

Murray said these neuroinvasive cases can create “so much swelling that you end up having that shrinking . . . and it leaves a permanent mark on the brain,” she said.

The findings help quantify the extent and nature of brain injuries related to West Nile infections, said Greg Ebel, a West Nile virus expert at Colorado State University who was not involved in the research.

“Most of us in the field aren’t surprised to know that there are these long-term neurological cognitive problems,” he said. But measuring those problems typically depends on asking patients how they feel or what activities they are able to perform.

Brain imaging gives researchers much more specific information about how the brain is affected. “MRI shows you where the damage is and what parts, and you’re looking at the whole organ,” he said, not a section of the brain. “That, I think, is powerful in this case.”

But noting the small sample size, Ebel said additional studies should be done to validate the findings.

Researchers said they hope the new information will spur faster development of a vaccine.

The disease “doesn’t get much attention,” said Murray, who was part of the CDC team that investigated [West Nile](#) when it arrived in the United States in 1999.

“We really don’t focus on what happens to people over the long-term,” she said, and those consequences of infection can be severe.

The virus is widespread in the United States, and Texas was [hit hard in 2012](#) with one of the largest outbreaks since the virus landed in this country. West Nile is found in every state except Alaska and Hawaii. One impact of climate change and warmer temperatures is expected to be [a greater numbers of insect-borne disease](#), such as West Nile, which is transmitted to people by mosquitoes.

The West Nile virus, first described in Uganda in 1937, arrived in New York City in 1999, killing eight people in the city. Infected birds transmit the virus to mosquitoes, which then infect people, who cannot infect one another.

Between 1999 and 2016, [more than 2,000 people](#) died of the disease, according to the CDC. Of more than 46,000 reported illnesses during that period, nearly half were the more dangerous neuroinvasive type of infection.