



West Nile Virus Strain – New York 1999

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How does this strain compare to its Old World siblings?

At this time, research indicates that the strain of West Nile virus identified in the New York 1999 outbreak is consistent with Old World West Nile virus strains, from the perspective of human or animal illness.

Human Illness: The New York City human outbreak closely mirrored the Romanian outbreak in 1996. Based on the Queens population-based survey of blood samples, the incidence of infection and ratios of inapparent to apparent disease were very similar. Clinical manifestations were also similar. Originally it was thought that the flaccid paralysis seen in patients in New York City was unique; however, there were anecdotal reports of similar cases in Romania. Classical West Nile fever typically includes a rash. However, few rash symptoms were observed in either the Romanian epidemic of 1996 or the New York outbreak of 1999.

Bird Illness: Similarly, there is experimental evidence in the literature of West Nile virus being lethal to hooded crows. There are many bird species, including crows in the Middle East, that survive West Nile virus infection as evidenced by the presence of live, seropositive birds. Why the crow population was so drastically affected in New York City is not known; however, one theory is that the dry summer stressed the crows and made them more susceptible to infection. Controlled laboratory experimentation to determine differences in virulence between West Nile virus isolates will be needed to fully answer these questions.

Genetic analysis:

- The West Nile-NY99 virus has been circulating in Israel since 1997 and has caused both bird deaths and human infections.
- The 1999 U.S. West Nile epidemic and epizootic was caused by a single virus.
- The other close relatives to the West Nile-NY99 virus were isolated in Italy (1998), Morocco (1996), Romania (1996), and Africa (1989, 1993, 1998). While these viruses are closely related to West Nile-NY99, they are not identical to each other or to West Nile-NY99. The Israel 1998 virus is virtually identical to the West Nile-NY99.
- The West Nile-NY99 virus is not Kunjin virus, found previously in Australia and suspected early on by some as the virus in the New York outbreak.
- The West Nile-NY99 virus is not the Eg101 West Nile virus that was sent to Iraq years ago as a diagnostic reagent.

- Besides the West Nile-NY99 virus from the flamingo, CDC has finished the complete genome sequences on a West Nile-NY99 equine isolate, the Italy1998 virus, the Romania 1996 virus and the prototype Eg101 virus. There are a number of amino acid differences among and between these viruses. What these changes mean is not known at this time.

Current Tasks:

- Complete the genome sequence of the Israel 1998 West Nile virus. This is being pursued by CDC collaborator Dr. Vincent Deubel at the Institute Pasteur, France. These results will tell us the absolute relatedness of the West Nile-NY99 and Israel 1998 West Nile viruses.
- Define changes in the West Nile–NY 99 strain to help explain its virulence, ability to cause illness in birds and mammals. Researchers must construct a full-length, infectious cDNA clone of West Nile-NY99 virus and perform mutagenesis studies to assign virulence properties to each of the defined amino acid changes between West Nile viruses.
- Continue molecular epidemiology studies to better define the geographic distribution of the West Nile-NY99 virus beyond the United States and Israel.