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WEST NILE VIRUS AND THE BLOOD SUPPLY: 2003

About a year ago, the first reports of human organ transplant-transmitted West Nile Virus (WNV) infection appeared in the American press. The organ donor who transmitted the virus appeared to have been infected not from a mosquito—the usual route—but by blood transfusion. Within weeks, several cases of transfusion-transmitted disease were recognized and confirmed. One year later, we are on the verge of effectively dealing with this threat to transfusion safety through the introduction of a new test to detect the genetic material of the virus in donated blood, and the implementation of enhanced blood donor history screening. The following is an overview of West Nile Virus and its impact on the transfusion support of patients.

OVERVIEW

WNV is a mosquito-borne virus that was associated with recognized illness (mostly with meningitis and encephalitis) in over 4,000 individuals in 39 states in 2002. The risk of human WNV infection is expected to vary from one mosquito season to another, by time of the year, and by geographic region. The risk in any particular part of the US in 2003 is impossible to predict, but cases are expected to occur from early summer through the fall. During 2002, WNV transmission by transfusion was identified in at least 21 cases, transmitted by blood components from 14 donors. Red blood cells, platelets, and fresh frozen plasma have been implicated in transfusion-transmitted disease. During the WNV epidemic last year, it is estimated that between 3 and 4 donors per 100,000 were infected with WNV. In the most severely affected communities at the peak of the epidemic, the infection rate in donors may have approached 20 per 10,000.¹

Tests for the presence of the genetic material of WNV in donated blood are under development and are expected to be implemented by July 1, 2003. The following strategies have been developed to reduce the risk of future transfusion-transmitted WNV infection.

1) Many blood centers have stockpiled frozen blood products (fresh frozen plasma and cryoprecipitated AHF) during WNV-free months. These blood products will be

used for transfusions in areas where human cases of WNV are identified prior to WNV test implementation.

2). Blood centers have reemphasized their policies and procedures that already are in effect to prevent blood donations from donors who have fever or who are not feeling well. In anticipation of more WNV activity this summer, they will make these criteria more stringent by deferring donations by individuals with a recent history of fever with headache.²

3). Blood centers have expanded their policies and procedures for withdrawal of blood that already has been released for transfusion, when post-donation information is obtained about donors suspected or shown to be infected with WNV.

4). Educational materials (including this bulletin) are being distributed to hospitals and physicians, discussing recommendations on how to limit transfusion-transmitted WNV infection before test implementation.

DESCRIPTION OF THE VIRUS

WNV belongs to a family of viruses called Flaviviruses. In the same family are the viruses that cause St. Louis encephalitis, dengue, and Japanese encephalitis. WNV is an enveloped virus of about 40-60 nm. in diameter. Its genetic material consists of a single-stranded RNA of approximately 10,000-11,000 bases.

WNV is an arthropod-borne virus that is transmitted between susceptible hosts by blood-feeding mosquitoes. Birds and mammals can become infected when an infected mosquito bites them to take a blood meal. Although humans can be infected and can become ill from the virus, they are a "dead end" host since they normally do not participate in the life cycle of the virus. WNV cannot be spread from one human to another by casual contact.

Methods to control the spread of the virus to humans involve the use of personal protective measures to reduce exposure to potentially-infected mosquitoes (appropriate clothing and repellants), public health measures to reduce the population of mosquitoes in areas where the virus is prevalent, and implementation of routine testing of the blood supply to limit transfusion transmitted disease.

(continued on reverse)

WNV INFECTION

Some people may become ill 3 to 15 days after the bite of an infected mosquito. Only about 20% of those infected have any symptoms at all, usually a mild illness, with fever, headache, body aches, and sometimes skin rash and swollen glands. There are no known long-term effects due to mild illness.³

About one in 150 people who are infected with WNV will develop the more severe symptoms of meningitis or encephalitis. Patients with encephalitis often present with headache, high fever, stiff neck, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. A small number of cases have been fatal. There is no specific treatment for WNV infection. Supportive care, such as hospitalization, IV fluids, respiratory support, and aggressive treatment of secondary infections often is required for encephalitis patients.

Up to this point in the epidemic, the most severe outcomes have been seen in immunocompromised patients (particularly organ and stem cell transplant recipients, patients receiving immunosuppressive medications, and patients with hematologic malignancies, myelodysplasia, and other advanced malignancies). People who are over age 65 or women who are pregnant (or immediately postpartum) also may be at increased risk. During a human WNV outbreak in a community, physicians should take into consideration the risk to these patients of transmission of the infection by transfusion.

TESTING FOR WNV

A blood donor-screening test using nucleic acid technology (NAT) is under development and is projected to be available for routine use in screening the blood supply around July 1, 2003, before extensive human infection is expected. NAT detects minute amounts of the genetic material (RNA or DNA) of the virus itself in a person's blood. NAT tests for HIV/AIDS and for Hepatitis C are approved by the Food and Drug Administration (FDA) for routine use in screening the blood supply for these viruses. With extraordinary effort, the NAT manufacturers have developed a new assay for WNV in a matter of months, a process that usually takes years. Because of the urgent need for the tests, they will be implemented across the United States this summer under research IND protocols approved by the FDA. NAT testing for HIV and HCV has reduced the risks to transfusion recipients from those viruses to 1 in 1.5 - 2 million. In this regard, it is anticipated that WNV NAT will reduce the risk of transfusion-associated WNV.

RECOMMENDATIONS FOR PHYSICIANS AND HOSPITALS

The national blood banking organizations are taking steps to educate physicians and hospitals about the risks

associated with WNV through transfusion. If human infections occur in an area of the country *prior* to the onset of testing, the following should be considered:

Ongoing assessments of risk can be obtained by contacting state and local public health departments. Updates to hospitals' consents for transfusion should be considered to reflect the most current information on risk. Current information on WNV activity in different geographical areas is available from the Centers for Disease Control and Prevention at www.cdc.gov/ncidod/dybid/westnile/city_states.htm. WNV data from state health departments (by county) is available at www.npic.orst.edu/wnv/statelinks.htm.

Immediate reporting to the transfusion service, blood center, and public health officials of all cases of WNV infection occurring within 28 days of transfusion is essential.

Until the availability of WNV NAT, if the risk of transfusion-transmitted WNV is considered significant in a particular area of the country, physicians may suggest to patients the following measures to limit non-urgent transfusions:

- Offer patients the opportunity to delay elective surgery.
- Offer patients the opportunity to delay elective medical transfusions.
- Offer autologous transfusions where appropriate.
- Transfuse only when the benefits outweigh the risks.

At the same time, it is critical to recognize that the lifesaving benefits of medically necessary transfusions will outweigh the risks of transfusion-transmitted WNV infection in essentially all cases. It is also critical to recognize that blood is a lifesaving medication and currently is in short supply. Donating blood is safe, and should be encouraged.

REFERENCES

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