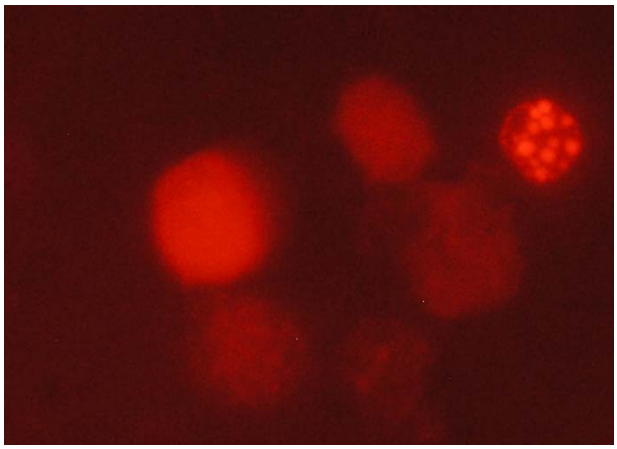
TATRC Highlighted Research News Article:
"Emerging Arbovirus Surveillance Strategies"

Combating the Threat of West Nile and Other Emerging Viruses



Dr. Murray's newest test enables researchers to visualize virus infecting cells present in the urine of their human subjects. Shown is 100x magnification of cells infected with West Nile virus.

Image courtesy of Kristy Murray, DVM, Ph.D.

Arboviruses—viruses transmitted to humans and other mammals by mosquitoes or ticks—are emerging into new areas and causing threats to military and public health. However, extensive biosurveillance efforts are hampered by cost, and improved testing is needed to rapidly detect emerging viruses.

A university effort supported by the U.S. Army Medical Research and Materiel Command's Telemedicine and Advanced Technology Research Center (TATRC) is making inroads in both areas.

A group led by Dr. Kristy Murray at the University of Texas Health Science Center at Houston has developed improved diagnostic tests for West Nile virus and dengue fever—and made the startling discovery that West Nile can continue to infect the kidneys long term.

Murray explains, "Until we published our results this year in the *Journal of Infectious Disease*s, the medical community had been certain that patients completely cleared the virus from their systems after exposure. It was thought that kidney disease was an unfortunate residual effect that struck some individuals; but it could be that persistent viral infection is causing the kidney damage." The group found evidence of kidney disease in 65 percent of the individuals in their study who tested positive for continued West Nile infection, with 13 percent showing signs of renal failure.

The team is continuing work on new testing techniques and hopes to develop approved screening to detect persistent infections.

Says TATRC director COL Karl Friedl, “TATRC has been supporting this project since 2007. Their findings could be very important if they help us save lives and medical costs by preventing a possible cause of kidney failure.”

The team is also expanding a novel sentinel biosurveillance system that uses young dogs to detect virus activity in a region before any human cases appear. Says Murray, “Dogs develop antibodies two months before we see human cases. And it costs less than 38 cents per test as compared to millions of dollars needed for mosquito surveillance.”

The system has proven successful in detecting the West Nile virus in Houston, and preliminary results along the Texas/Mexico border are also positive. According to Murray, West Nile is moving south into Mexico, while dengue fever is moving north into Texas. This system successfully allows researchers to track the spread of West Nile in areas where dengue is widespread.

In addition, 17 percent of the dogs also tested positive for exposure to Rocky Mountain spotted fever, a tick-borne disease that hadn’t been seen so far south before. Murray says, “This shows the system allows researchers to track other important mosquito and tick-borne diseases that can affect human health.”

Knowing of a viral threat in a region and taking measures to reduce exposure or provide early treatment can protect soldiers from illness and potentially serious complications. West Nile virus causes short-term fever and weakness in up to 20 percent of those infected, with a few developing severe illness due to encephalitis or meningitis (inflammation of the brain or the membrane around the spinal cord). It is now found throughout the United States and in many other parts of the world. Dengue virus is a significant cause of illness and death in the tropics and subtropics. It causes high fever and severe pain, with fatality rates as high as 10 percent.

TATRC Disaster Preparedness Portfolio Manager Dr. Kevin Montgomery notes, “Dr. Murray has been doing great work on a small budget. Her efforts are part of the multimodal approach we’ve been taking in this research portfolio. Looking at animals as early warning sentinels can help us make better decisions in human biosurveillance.”

For more on TATRC efforts related to biosurveillance and disaster preparedness, visit www.tatrc.org.