

TRC research focuses on West Nile virus vaccine

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To paraphrase Louis Pasteur, chance favors only the prepared mind. So it was with The Raptor Center's entrée into research on a West Nile virus vaccine.

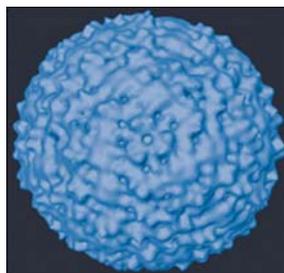
When this disease broke in raptors in 2002, TRC had been in operation for 28 years. We had an enviable track record in clinical care of raptors and had developed most of the medical techniques now used worldwide in the medical care of raptors. Operating out of the Gabbert Raptor Center, a state-of-the-art facility with clinical and research laboratories suited for conducting research, our staff included some of the finest people in the raptor medical and research field. So TRC was ideally poised to grasp the opportunity to become involved in testing and licensing a vaccine for West Nile virus when it was presented by the Centers for Disease Control and Prevention (CDC) and the American Bird Conservancy. So began our now two-year foray into an exciting, valuable, and, we hope, successful endeavor.

Believed to be of European or Middle Eastern origins, West Nile virus was mysteriously introduced into the United States in New York in 1999. The mosquito-transmitted disease – which affects hundreds of species of birds and a few mammals, including horses and humans – began to threaten raptors in 2002. The reasons for an apparent change in the virus's targets are unclear. The hundreds of great horned owls and red-tailed hawks appearing in rehabilitation centers across the country gave rise to concerns about threatened and endangered species of raptors and other birds in captivity, as

well as for the raptors used for educational programs and falconry.

Attempts to protect birds by housing them indoors or screening their outdoor housing were futile at best. The need for a vaccine was clear. The only available product – a killed-virus vaccine released for use in horses – came to be used, but without any testing for safety or effectiveness.

Researchers Mike Bunning, Jeffrey Chang, and Nick Komar of the CDC in Fort Collins, Colorado, had conducted extensive research on West Nile and related viruses, delving into the genome and extracting gene sequences that coded for proteins on the surface of the virus against which a host body would make antibodies. Using cutting-edge technology, they spliced these gene sequences into E.coli organisms, which could amplify the genetic material and forge it into a vaccine. To test the effectiveness of this product, they chose to inoculate the species of animal that was more susceptible to West Nile virus than any other: the crow. To their great pleasure, crows so vaccinated developed a protective immunity that withstood artificial challenge with massive doses of live West Nile virus.



The West Nile virus

Raptors were next. That's when the researchers approached us with the proposition of testing and developing this vaccine into a licensed product that could be made available to those responsible for the care of birds at risk.

With funding generously donated by TRC members, the North American Falconers Association, and many state falconry clubs, we launched our first trial in 20 permanently disabled red-tailed hawks in October 2003. After six weeks of vaccinating and collecting blood samples to assess antibody responses, the birds were transferred to Louisiana State University in Baton Rouge for challenge with live



virus. The virus challenge was successfully met by the vaccinated birds, none of which showed any signs of clinical illness and exhibited only low and short-lived amounts of virus in their bloodstream when sampled on days subsequent to the challenge.

While promising, these results are not sufficient to obtain U.S. Department of Agriculture (USDA) licensing, which would allow a commercial manufacturer to ramp up production. Hence, we are in the process of developing a vaccine-challenge model in a common laboratory bird, the Japanese (coturnix) quail. Many questions need to be answered: Does the vaccine protect against challenge? How long does the protection last? Are there any side effects? Do antibodies formed in a hen following vaccination pass to her egg, so as to protect newly hatched young? How many times does an animal need to be vaccinated? Is there an interval at which the vaccination needs to be repeated? We are presently mid-stride in conducting experiments to answer these questions. The issue of transfer of antibodies from hens to eggs is the subject of a master's degree project being pursued by TRC resident Miguel Saggese. (See article on page 4.)

West Nile virus vaccine is currently The Raptor Center's major research thrust. Had we not had a history and a reputation to give us the necessary operational and scientific capacity, this opportunity to contribute significantly to the health of raptors would not have been granted us. It is with great thanks and appreciation that I acknowledge the terrific long-standing support of our many members for helping position us to do this important and exciting work.

