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Powassan virus: an emerging tick-borne threat

Dr. MacDonald is Research Associate Professor in the Laboratory of Virology and Infectious Disease at The Rockefeller University in New York. Dr. MacDonald investigates the complex interactions between disease-causing viruses and their hosts. She and her colleagues study three mosquito-transmitted RNA viruses, Sindbis, a virus that causes arthritis, yellow fever, a virus that causes liver failure, and Zika, a virus associated with congenital microcephaly. Dr. MacDonald also studies Powassan virus, an emerging tick-borne pathogen that causes encephalitis. Dr. MacDonald obtained her B.S. in Microbiology from Oregon State University and then attended Washington University in St. Louis where in 1990 she obtained her M.D. and Ph.D. degrees. Dr. MacDonald completed a residency in Pediatrics at St. Louis Children's hospital, followed by a Pediatric Infectious Disease Fellowship at Washington University School of Medicine in St. Louis. After her fellowship research on murine cytomegalovirus with Herbert "Skip" Virgin, she joined the faculty in the Department of Pediatrics, Washington University School of Medicine. In 2000 she left St. Louis to join the Rockefeller University's Laboratory of Virology and Infectious Disease in New York City, where she has focused on unraveling various aspects of

virus-host interactions.

Conference Lecture Summary

Viruses in the Flavivirus genus of the Flaviviridae Family, including West Nile, tick-borne encephalitis, yellow fever, dengue and Zika viruses cause significant human disease and are global health threats. These arthropod-borne viruses, or Arboviruses, cycle between vertebrate hosts and insect vectors, most frequently mosquitoes or ticks. Powassan virus is a newly emerging tick-borne virus that infects ticks of the Ixodes genus, including Ixodes scapularis, the same tick that transmits Lyme disease. Powassan virus was originally isolated from the brain of a young child from Powassan, Ontario who died from encephalitis. Since then human cases have occurred in Canada, the Northeast and Great Lakes areas of the USA and Far Eastern Russia. Recently cases of encephalitis due to Powassan infection have been increasing in the USA and global warming may be contributing to the expansion of the tick's geographic range. Diagnosis can be difficult since viremia is transient, and there is significant cross-reactivity of antibody responses to other flaviviruses. There is no vaccine and no specific treatment available other than supportive care. Prevention involves avoiding wooded areas, wearing protective clothing, using tick repellent, and carefully inspecting for ticks after potential exposure. Current and future research efforts are important to gain a better understanding of the epidemiology of the enzootic cycle and the prevalence of human infection, to develop improved diagnostic approaches, preventative methods and treatment options, and to explore the potential role in human disease of co-infection with multiple tick-borne pathogens.