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University of Lethbridge researchers laying groundwork for the development of new antiviral treatments

Researchers in Dr. Trushar Patel's Laboratory of Medicinal Biophysics at the University of Lethbridge have revealed that certain viruses mediate RNA-RNA interactions and their findings lay a foundation for developing future antiviral treatments.

They studied a group of viruses known as Flaviviruses, which includes West Nile, Zika, Dengue and Japanese encephalitis. All of these viruses are spread by mosquitoes and, in most people, the illness is mild. However, in rare cases, West Nile can have serious neurological complications and Zika can cause birth defects and is linked to Guillain-Barré syndrome. The Japanese encephalitis virus is the leading cause of viral-caused encephalitis in Southeast Asia and the Western Pacific.

"Unlike humans who contain DNA as their genetic material, these viruses carry RNA as their genome and researchers hypothesize that one end of their genome needs to bind to the other end in order to replicate," says Patel. "While evidence of these RNA-RNA interactions is available for some of these viruses, for others, like Japanese encephalitis, no experimental evidence exists."

The ULethbridge researchers collaborated with the Wolfinger group at the University of Vienna in Vienna, Austria and the Demeler group at ULethbridge's Canadian Centre for Hydrodynamics. Using a variety of techniques, the researchers validated that a short fragment of the RNA genome is the primary driver of the RNA-RNA interaction that is critical for viral replication.

"Our work provides critical insights into the genomic interactions in this family of viruses," says Tyler Mrozowich (BSc '18), a PhD candidate in Patel's lab. "The integrated

data analysis approaches we used can be adapted to study various viral and human RNA-RNA interactions to help us learn more about the role of RNAs in human diseases and viral infections."

"As the RNA-RNA interactions are essential for the Flaviviral life cycle, this work lays the foundation for developing antivirals that would hinder the binding of one end of the viral RNA genome with the other end, thereby preventing their replication," says Patel.

Their study, titled *Investigating RNA-RNA interactions through computational and biophysical analysis*, was recently published in Nucleic Acids Research.

This news release can be found online.

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Our University's Blackfoot name is Iniskim, meaning Sacred Buffalo Stone. The University is located in traditional Blackfoot Confederacy territory. We honour the Blackfoot people and their traditional ways of knowing in caring for this land, as well as all Indigenous Peoples who have helped shape and continue to strengthen our University community.