Researchers developing drug to combat west nile virus, other related viruses

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(Medical Xpress) -- Professors at Colorado State University and the University of Northern Colorado are developing a drug that can stop replication of West Nile, dengue and yellow fever viruses that continue to plague two-thirds of the world's population with no clinically useful antiviral drugs available.

The research of Brian Geiss, Assistant Professor in the Department of Microbiology, Immunology and Pathology and Susan Keenan, Associate Professor and Director of the School of Biological Sciences at the University of Northern Colorado, appears this week online in the peer-reviewed Journal of Virology.

West Nile and dengue fever are vector-borne viral diseases – pathogens that can be transferred from an insect to a human - in a family of viruses known as the flaviviruses. The National Institutes of Health considers a number of flaviviruses priority pathogens because they cause life-threatening illness with few drugs or vaccines available and have the potential to be used as biological weapons.

More than two billion people are at risk globally of infection by dengue virus, and West Nile virus is endemic in 47 of the 48 lower United States. Dengue virus has re-emerged in southern Florida and Hawaii over the past few years. Worldwide, as many as 50 million dengue infections occur each year causing roughly 20,000 to 30,000 deaths.

Geiss and Keenan are developing a drug that can bind to a protein

critical for viral replication and block the protein's function. The viral protein forms a structure on the genome called a "cap" that helps the virus make its replication proteins and protects the viral genome from being degraded in cells. Without this cap structure the virus can't make the proteins it needs to replicate and the viral genome will be destroyed by the cell.

The researchers screened large chemical libraries for molecules that inhibited this enzyme, then used computer modeling to identify molecules that were better able to bind the viral protein. One of the molecules they found was able to reduce virus replication in cells by more than 1,000-fold.

More work is ahead to improve the effectiveness of the drug now that they've confirmed it works in cells against several different viruses, Geiss said. Geiss and Keenan have filed a provisional patent with CSU Ventures to commercialize the technology.

"We're in the process of testing these drugs against a number of different flaviviruses and trying to improve how well it works in animal models, so there's a lot more work to get it to the point where it would be used as an investigational new drug," Geiss said. "However, this is an exciting new finding that has the potential to reduce the suffering caused by these serious pathogens."

Geiss' and Keenan's research is supported by the Rocky Mountain Regional Center of Excellence at Colorado State University – one of only 10 NIH supported centers nationwide aimed at developing novel therapeutics and diagnostics against emerging infectious diseases.

Provided by Colorado State University