Researchers Unravel Mystery of How Ebola and Marburg Kill

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Researchers in the Greene Infectious Disease Laboratory at Columbia University's Mailman School of Public Health, the Centers for Disease Control and Prevention, and the Caribbean Primate Research Center have discovered a key mechanism by which the Filoviruses, Ebola and Marburg, cause disease.

The identification of an amino acid sequence in Filoviruses that results in the rapid depression of immunological response is described in the December 2006 issue of *The FASEB Journal*. Using this information, researchers can begin to develop new drugs to stop these devastating diseases.

Filoviruses, named for their threadlike appearance in electron microscopy (filo= thread in Latin), are associated with outbreaks of fatal hemorrhagic fever in sub-Saharan Africa. Viral hemorrhagic fevers are of specific concern because they are associated with high morbidity and mortality (up to 80% mortality rates) and the potential for rapid dissemination through human-to-human transmission. The term "viral hemorrhagic fever" characterizes a severe multisystem syndrome associated with fever, shock, and bleeding caused by infection with one of a number of viruses, including the Filoviruses Ebola and Marburg.

Both humans and apes are susceptible to viral hemorrhagic fevers, and it is speculated that filovirus infections account at least in part for the recent decline in the gorilla and chimpanzee population in central Africa. There is no cure or approved vaccine for either Marburg or Ebola virus.

Immunosuppression occurs early after infection and allows the viruses to reproduce rapidly and cause disease.

“Currently, there is no way to treat most viral hemorrhagic fever outbreaks, and increased international travel, trafficking in wildlife, political instability, and terrorism have made emerging infectious diseases a global concern,” stated W. Ian Lipkin, MD, director of the Greene Infectious Disease Laboratory at the Mailman School’s Department of Epidemiology and professor of Epidemiology, Neurology, and Pathology at Columbia University. “The identification of this new mechanism for immunosuppression is anticipated to lead to new drugs for intervention in filoviral hemorrhagic fevers of humans and apes.”

In the study, researchers describe a series of amino acids in Ebola and Marburg viruses that resemble proteins in retroviruses known to suppress the immune system. By targeting these amino acids, new drugs could disrupt the ability of these viruses to shut down immune systems and make them vulnerable to the body’s natural defenses.

“This brilliant study shows that many viruses, including HIV, use a similar mechanism to disarm their victims,” said Gerald Weissmann, MD, Editor-in-Chief of The FASEB Journal. “The Columbia study has shown us new ways to fight against deadly viruses the world over.”

The method for discovering this protein underscores the power of bioinformatics for addressing the challenges of emerging infectious diseases. The investigators are currently exploring whether insights derived from understanding the potency of these immunosuppressive peptides can be exploited to treat autoimmune diseases.

Source: Columbia University