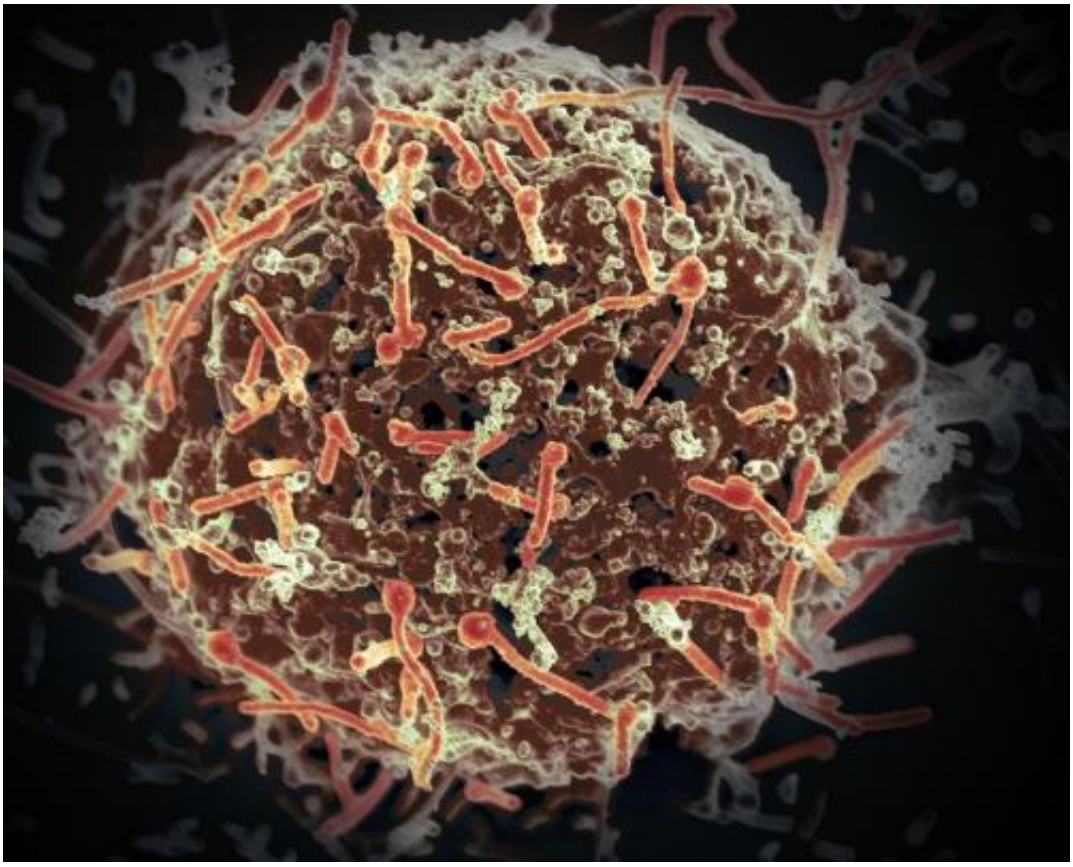
MedicalXpress

Researchers discover new interactions between Ebola virus and human proteins

December 13 2018



The Ebola virus, isolated in November 2014 from patient blood samples obtained in Mali. The virus was isolated on Vero cells in a BSL-4 suite at Rocky Mountain Laboratories. Credit: NIAID

Several new connections have been discovered between the proteins of the Ebola virus and human host cells, a finding that provides insight on

ways to prevent the deadly Ebola virus from reproducing and could lead to novel ways to fight these lethal viral infections, according to a study led by Georgia State University, the University of California, San Francisco, and the Gladstone Institutes.

One of these new interactions occurs when the Ebola virus protein VP30 binds to a host protein called RBBP6. This prevents two Ebola virus proteins, VP30 and nucleoprotein (NP), from interacting. The connection between VP30 and NP is critical for virus reproduction. This study shows that RBBP6's ability to bind to the same point on VP30 can disrupt the VP30-NP interaction and block growth of the virus.

The researchers propose that pharmaceutical products that mimic the interaction between RBBP6 and Ebola virus have therapeutic potential, and they also identified additional interactions between Ebola virus and other host proteins that could be leveraged for novel treatments. The findings are reported in the journal *Cell*.

Ebola virus is an enveloped RNA virus that has caused repeated outbreaks of severe, often deadly human disease over the past four decades. The largest outbreak occurred in West Africa between 2013 and 2016, causing about 28,000 infections and 11,000 deaths. However, Ebola virus remains a major global public health threat. On Aug. 1, the Ministry of Health of the Democratic Republic of the Congo declared a new outbreak of Ebola virus in North Kivu Province, according to the World Health Organization. The virus has now spread to Butembo, a major city in eastern Congo that has more than one million residents, becoming the second-largest Ebola outbreak in history. There are 423 confirmed cases and 225 confirmed deaths reported in northeastern Congo.

In November, the Centers for Disease Control and Prevention warned the outbreak may not be containable because that part of the Democratic

Republic of the Congo is a war zone, complicating the work of Ebola response teams and putting their security at risk. This could be the first time since the deadly virus was identified in 1976 that an outbreak resulted in the persistent presence of the disease. This would mean that public health officials have lost the ability to trace contacts, stop transmission chains and contain the outbreak. In previous outbreaks, which mostly took place in remote areas, the Ebola virus was contained before it spread widely.

"There are some promising experimental vaccines and drugs for Ebola virus—some which are being used on an emergency basis in people—but still nothing is officially approved for use in humans. There's still a need to explore potential new drugs for Ebola and related viruses," said Dr. Christopher Basler, professor in the Institute for Biomedical Sciences and director of the Center for Microbial Pathogenesis at Georgia State. "There's still much we don't know about how the virus grows, how it causes severe disease and how components of the host cell interact with the virus. In this study, we were trying to get a more comprehensive understanding of how the viral proteins interact with the host cell proteins to understand why the virus causes disease and to find new ways to block virus growth."

The researchers generated a map of the interactions between Ebola virus proteins and human host proteins using affinity tag-purification mass spectrometry. They also tested cells in cell culture.

"Viruses are parasites that rely on the cell they infect to reproduce," Basler said. "We have 194 human proteins that we've identified interacting with Ebola virus proteins. Some of these will help the virus grow. Many of these interactions haven't been previously implicated in facilitating the replication of Ebola virus or other viruses. That by itself is interesting. It means we've uncovered new ways in which the virus interacts with its host cell.

"We decided to first focus on one interaction in particular. The Ebola virus protein VP30 was found to interact with RBBP6. What we found was striking. Two parts of the virus, a protein called VP30 and another called nucleoprotein (NP), must interact for the virus to grow. Our cells make a protein, RBBP6, that prevents VP30 from finding NP. Instead, VP30 finds RBBP6. This reduces virus growth. If we can design a drug that would mimic what RBBP6 is doing, then we'd have a new way to suppress Ebola virus growth."

Provided by Georgia State University

Citation: Researchers discover new interactions between Ebola virus and human proteins (2018, December 13) retrieved 24 April 2024 from https://medicalxpress.com/news/2018-12-interactions-ebola-virus-human-proteins.html