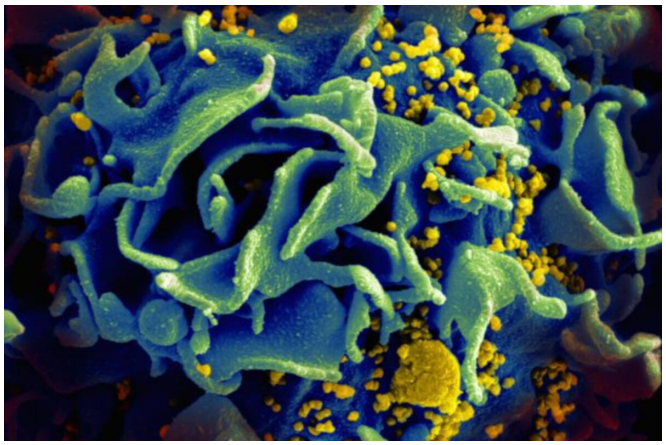
Study finds innate protein that restricts HIV replication by targeting lipid rafts

10 February 2020



Microscopic image of an HIV-infected T cell. Credit: NIAID

The human protein apolipoprotein A-I binding protein (AIBP) inhibits HIV replication by targeting lipid rafts and reducing virus-cell fusion, according to a new study published in the premier American Society for Microbiology journal *mBio* by researchers from the George Washington University. These results provide the first evidence suggesting that AIBP is an innate immunity factor that restricts HIV replication by modifying lipid rafts on cells targeted by HIV.

AIBP is involved in the regulation of lipid rafts and cholesterol efflux. It has been suggested to function as a protective factor under several conditions associated with an increased abundance of lipid rafts, including atherosclerosis and acute lung injury.

"Previous studies have suggested a protective and possibly therapeutic role of AIBP in human diseases associated with inflammation and impairment of cholesterol metabolism, particularly atherosclerosis," said Michael Bukrinsky, MD, Ph.D., professor of microbiology, immunology, and tropical medicine at the GW School of Medicine and Health Sciences and senior author on the study. "What we found in our study is that AIBP also exerts anti-HIV activity."

Host cell lipid rafts—subdomains of the plasma membrane that contain high concentrations of cholesterol and glycosphingolipids—are critically important for the biology of HIV and are involved in HIV-1 assembly and budding and the infection of target cells. Given the dependence HIV has on lipid rafts, and AIBP's ability to reduce them, the researchers hypothesized that AIBP could inhibit HIV replication.

The results of the study show that exogenously added AIBP reduced the abundance of lipid rafts and inhibited HIV replication in vitro and in vivo, while knockdown of AIBP native to the cells increased HIV replication. With these findings, the authors suggest that new therapeutic approaches aimed at inhibition of HIV infection and HIV-associated comorbidities via stimulation of AIBP production can be envisioned.

"Through this study, we identified a novel innate immunity factor that inhibits HIV infection by targeting lipid rafts," Bukrinsky said. "Further studies could possibly show AIBP may also protect against infection by other viruses and microbes."

The study, titled "Inhibition of HIV Replication by Apolipoprotein A-I Binding Protein Targeting the Lipid Rafts," is published in *mBio*.

More information: Larisa Dubrovsky et al, Inhibition of HIV Replication by Apolipoprotein A-I Binding Protein Targeting the Lipid Rafts, *mBio* (2020). DOI: 10.1128/mBio.02956-19

Provided by George Washington University