

Monkeys resist infection by closing gates that SIV, HIV use to get into cells

June 26 2011

Sooty mangabeys, a type of African monkey, have intrigued scientists for years because they can survive infection by SIV, a relative of HIV, and not succumb to AIDS.

Researchers have identified a way some of sooty mangabeys' immune cells resist infection: they close the gates that [SIV](#) and [HIV](#) use to get into the cell. The findings may lead to strategies to help HIV-infected individuals cope better with infection.

The results are published online in the journal Nature Medicine.

“We have shown sooty mangabeys can prevent SIV from infecting a very important part of the immune system,” says first author Mirko Paiardini, PhD, senior research scientist at Yerkes National Primate Research Center, Emory University. “This protection from infection comes from reducing the levels on the cell surface of a molecule that SIV uses to enter the cell.”

Co-first author is postdoctoral fellow Barbara Cervasi. The senior author is Guido Silvestri, MD, chief of microbiology and immunology at Yerkes National Primate Research Center, Emory University. Collaborators included investigators from NIH, University of Pennsylvania, University of Pittsburgh and University Hospital Ulm.

To infect a cell, HIV and SIV need to find two molecules on the cell's surface. Scientists call these molecules co-receptors, and they can be

thought of as gates. One of the co-receptors is CD4, which appears on immune cells called T cells. The other is called CCR5. Stimulating a T cell usually increases the level of CCR5, facilitating infection.

Paiardini, Cervasi and their colleagues found that in sooty mangabeys, a type of T cell called a central memory T cell doesn't turn on CCR5. This means that even when a sooty mangabey is infected with SIV, some T cells can mostly avoid being killed by the virus.

Memory T cells help the immune system respond to an infection faster and stronger the second time around. Central memory T cells are long-lived and found in lymph nodes, in contrast to effector memory T cells, which have shorter life spans and are found mostly in tissues, such as the intestines, Paiardini says.

“Not all T cells are created equal,” he says. “Some appear to be more important than others for keeping the [immune system](#) up and running. This is why having central memory T cells resistant to infection is so valuable. By protecting central memory T cells, sooty mangabeys avoid the loss of T cells and the chronic immune activation that are the hallmarks of [AIDS](#) in humans.”

Scientists have identified several differences in the pattern of infection between sooty mangabeys and both humans and rhesus macaques, a monkey that is susceptible to SIV [infection](#).

“For several years, we and others thought lack of chronic immune activation was the main factor protecting sooty mangabeys from AIDS,” Paiardini says. “This study changes this working model and proposes that lack of [immune activation](#) in sooty mangabey is secondary, deriving from their ability to protect and maintain their central memory T [cells](#).”

Paiardini continues, “We would have not been able to perform such

complex comparative studies without the presence of the large colony of sooty mangabeys at the Yerkes National Primate Research Center.”

More information: Low levels of SIV infection in sooty mangabey central memory CD4+ T cells are associated with limited CCR5 expression, *Nature Medicine* (2011) [doi:10.1038/nm.2395](https://doi.org/10.1038/nm.2395)

Abstract

Naturally simian immunodeficiency virus (SIV)-infected sooty mangabeys do not progress to AIDS despite high-level virus replication. We previously showed that the fraction of CD4+CCR5+ T cells is lower in sooty mangabeys compared to humans and macaques. Here we found that, after in vitro stimulation, sooty mangabey CD4+ T cells fail to upregulate CCR5 and that this phenomenon is more pronounced in CD4+ central memory T cells (TCM cells). CD4+ T cell activation was similarly uncoupled from CCR5 expression in sooty mangabeys in vivo during acute SIV infection and the homeostatic proliferation that follows antibody-mediated CD4+ T cell depletion. Sooty mangabey CD4+ TCM cells that express low amounts of CCR5 showed reduced susceptibility to SIV infection both in vivo and in vitro when compared to CD4+ TCM cells of rhesus macaques. These data suggest that low CCR5 expression on sooty mangabey CD4+ T cells favors the preservation of CD4+ T cell homeostasis and promotes an AIDS-free status by protecting CD4+ TCM cells from direct virus infection.

Provided by Emory University

Citation: Monkeys resist infection by closing gates that SIV, HIV use to get into cells (2011, June 26) retrieved 10 April 2024 from <https://medicalxpress.com/news/2011-06-monkeys-resist-infection-gates-siv.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.