Researchers Study Meth’s Impact on HIV Progression

Interdisciplinary research teams from the University of Miami Miller School of Medicine and Florida International University's Robert Stempel College of Public Health & Social Work have received a $3.01 million grant from the National Institute on Drug Abuse to study meth's impact on HIV progression in men who have sex with men.

Mario Stevenson, Ph.D.

The “Advancing Reservoir Eradication in People Who Use Stimulants” study will follow participants for six months testing their viral loads, immune responses, neuropsychiatric status and other markers to better understand how meth use influences HIV/AIDS.

“We want to look at people who are living with HIV, who are using or not using meth, and determine whether there are any differences in viral activity,” said principal investigator Mario Stevenson, Ph.D., professor of medicine and director of the HIV and Emerging Infectious Diseases Institute at the Miller School. “We want to find new ways to help this group of patients, but we also want to understand the disease better and drive towards a cure.”

While active retroviral therapies can control HIV for decades, HIV resists treatment by going into semi-hibernation. Since these therapies and the immune system target active infections, HIV’s reduced activity helps it evade destruction.
However, when therapies are discontinued, HIV wakes up and thrives. Dr. Stevenson has spent many years studying this process and is looking for ways to eradicate these hidden HIV reservoirs and ultimately find a cure.

Finding New Ways to Recruit Participants

The study will be co-led by Hansel Tookes, M.D., M.P.H., and Adam Carrico, Ph.D, a clinical psychologist at FIU. Dr. Tookes is associate professor of medicine and clinical director of the IDEA Exchange, the first official syringe exchange in Florida. The program was urgently needed: Dr. Tookes notes the HIV prevalence for men who have sex with men who inject stimulants is above 50%.

Hansel Tookes, M.D., M.P.H

Dr. Tookes received an earlier $2.3 grant, called the Avenir Award, to study how telehealth could be used to reach this vulnerable population and reduce the spread of HIV/AIDS. His expertise will support efforts to recruit 100 study participants.

“We will be identifying new ways to form a robust cohort," said Dr. Tookes. "We've had a tough time engaging this community, and the need only increases each year.”

In addition to helping recruit participants, Dr. Carrico will lead efforts to administer a comprehensive neuropsychological assessment.

“This study leverages data from our team that methamphetamine
and other stimulant use could exacerbate immune activation, which contributes to HIV persistence in immune cells,” said Dr. Carrico. “Understanding these neuroimmune mechanisms could elucidate novel pathways to target the persistent reservoir in people with HIV.”

Understanding the Changes in Gene Expression in HIV

Though activating HIV, even when the person is receiving active retroviral therapies, is bad for the patient’s health, it could possibly reveal an HIV vulnerability.

“It’s a two-edged sword,” said Dr. Stevenson. “On the one side, active HIV is not good for the health of the individual. However, if the virus is more awake, it might also be more visible to the immune system and antiretroviral agents.”

Dr. Stevenson, will also be working with Lishomwa Ndhlovu, M.D., Ph.D., an HIV epigenetics researcher at Cornell, who will be supporting efforts to understand changes in gene expression.

“Dr. Ndhlovu is interested in the interface between HIV and the host at the epigenetic level,” said Dr. Stevenson. “That allows us to get even greater insights into what meth might be doing at the DNA level. My lab has developed a number of approaches to conduct virologic analysis and understand what's happening to the virus and what's happening to the host as a consequence of viral activities.”

HIV is infamous for infecting CD4 T cells, which orchestrate the immune response and live for decades. However, HIV also infects myeloid cells, which clean up the mess the immune
system makes. Myeloid cells are particularly difficult to study because they do not circulate in the blood. However, Dr. Stevenson’s lab has developed a way to determine if viral particles originated from CD4 or myeloid cells, and how their abundance might be impacted by meth use.

One of the strengths of this collaboration is the diversity of its expertise.

“If there was ever a model for team science, this is it,” said Dr. Stevenson. “We’ve got a psychologist, an infectious disease physician scientist, a molecular virologist. And we need those different inputs. Biologically, these are tough questions, but I think we have the right people and research tools to answer them.”

Content Type Article