Joey Garcia
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$3 Million Grant Awarded to Study Links between COVID and HIV

A collaborative five-year study between the University of Miami Miller School of Medicine and the University of Florida (UF) has been awarded more than $3 million by the National Institutes of Allergy and Infectious Diseases to investigate evolving SARS-CoV-2 virus variants of concern in people with both COVID-19 and HIV.

The study, titled "A Phylodynamic Artificial Intelligence framework to Predict the Evolution of SARS-CoV-2 Variants of Concern in Immunocompromised Persons with HIV," will be led at the Miller School by Maria Luisa Alcaide, M.D., professor of infectious diseases/medicine and director of the Miami Center for AIDS Research (CFAR) clinical core, and Deborah Jones Weiss, Ph.D., professor of psychiatry and behavioral sciences and co-director of the Center for HIV and Research in Mental Health (CHARM).

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Maria Luisa Alcaide, M.D., professor of infectious diseases/medicine and director of the Miami Center for AIDS Research (CFAR) clinical core

During the earlier phases of the pandemic, Drs. Alcaide and Weiss learned that people with HIV are more susceptible to COVID-19, and that the SARS-CoV-2 virus tends to take a more severe toll on their bodies. They further learned about new SARS-CoV-2 variant development and how patients with HIV or other immune suppression, such as those undergoing chemotherapy, are likely to develop new respiratory virus variants and SARS-CoV-2 more rapidly.

Both will also address the mental and physical struggles faced by those with HIV.

"We collected the preliminary data for this study early in the

pandemic, with support from the Miami CFAR and CHARM," Dr. Jones Weiss said. "This new study will utilize a multidisciplinary approach to evaluate the development of SARS-CoV-2 mutations among people with HIV and predict the development of new variants of concern."

Deborah Jones Weiss, Ph.D., professor of psychiatry and behavioral sciences and co-director of the Center for HIV and Research in Mental Health (CHARM)

Strong Collaborations

Collaborators at UF include Marcos Salemi, Ph.D., professor of experimental pathology in the Department of Pathology,

Immunology, and Laboratory Medicine, and Mattia Prosperi, M.Eng., Ph.D., professor and college coordinator of artificial intelligence in the Department of Epidemiology. Like Drs. Alcaide and Weiss when they performed their early research, Drs. Salemi and Prosperi ran studies in populations with and without HIV to get a bigger picture of how both groups responded when contracting SARS-CoV-2, and sought to detect mutations of the virus faster.

"In this study, our goal is to stay ahead of the curve by not just providing a snapshot but following these people over time to see how these variants of concern and illnesses develop," Dr. Alcaide said. "Because Miami is an epicenter for both HIV and COVID-19, we are working on recruiting participants who have both viruses, and assessing the psychological and clinical aspects underlying both HIV and COVID-19. UF will use the data and samples collected in Miami to evaluate how SARS-CoV-2 evolves."

The researchers hypothesize that people with HIV and COVID-19 can develop evolved viral variants that can be efficiently tracked by phylodynamic analysis, then used to predict variants of concern by artificial intelligence algorithms.

Novel Approach

To test its hypothesis, the Miller School will work on recruiting 120 participants of all ages – most older than 50 – who have both HIV and early stages of COVID-19, and another 120 who have COVID-19 but not HIV. Both blood and saliva will be collected from participants. Drs. Alcaide and Weiss will use several approaches to garner participants, such as social media, community recruitment, and going out to clinics, testing sites, and hospitals.

The next phase will investigate how the collected samples from both groups evolve and whether viral variants are found. The final aim of the study will be to develop an artificial intelligence algorithm that can predict the likelihood of new variants becoming viral. Doing so will result in better planned and implemented public health measures before transmission occurs in the general population.

"We just started this study, but if our findings reveal that new viral variants can be detected, the findings can be used for other respiratory viruses," Dr. Weiss said. "Working with other investigators in COVID and HIV in these ongoing studies has allowed us to maximize our clinical research and focus on predicting the evolution of COVID outcomes in patients."

"Every great discovery requires lots of patience," Dr. Alcaide added. "It was very exciting to see what we did earlier on with very little money, when we did not know anything about the virus that caused COVID-19. With this award, it is nice to see how it is all coming together to advance the science and contribute to predicting the future of the pandemic."

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