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Potential development of inactivated HIV-1 transmitted/founder virus (T/F) vaccine

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Background: Nearly 80% sexually transmitted HIV infections are established by a single transmitted/founder virus (T/F). T/F viruses evoke neutralizing antibodies (NAbs) of germline or unmutated common ancestors Abs (UCAs). We inactivate HIV by a targeted photo-inactivation of HIV reverse transcriptase (RT).

Methods: An azido (-N3) group introduced into a diarylpyrimidine (DAPY) creates a photo active DAPY analog (PA-DAPYa). When incubated with HIV-1 particles and exposed to non-microbicidal UV light, there is irreversible cross-link of the PA-DAPYa to the HIV-1 RT. A suspension of cell-free, HIV SF162 particles were mixed and incubated with 5, 50, 100, 200 and 500 nM of PA-DAPYa or of the C-DAPYa (control) and UV light irradiated for 5, 10, 20, 30, 40 and 60 minutes. Control and test suspensions were used to infect PBMCs and incubated up to 21 days. Supernatant was tested for p24 levels by ELISA at 7, 14 and 21.

Results: UV light was the control at 10, 30, 40 and 60 min. HIV virus without treatment replicated after 40 minutes. C-DAPYa inhibited replication with variable effectiveness even at 500 nM. In contrast, at all UV exposure times, 500 nM of PA-DAPYa totally inactivated HIV. HIV p24 was not detected in the supernatant of inactivated HIV cultured in PBMCs. This experiment was repeated with different viral stocks and PBMC donor pools.

Conclusions: Incubating a suspension of HIV SF162 with PA-DAPYa followed by UV light exposure completely and irreversibly inactivates HIV-1. This inactivation methodology can lead to a T/F virus preventive HIV vaccine.

Biography

Adan Rios has been trained in Internal Medicine from the Gorgas U.S. Army Hospital in Panama. His training in Medical Oncology was completed at The MD Anderson Cancer Center. He is the recipient of the MD Anderson Distinguished Alumnus Award and George Washington University Presidential Medal. He is also a Chief Scientific Officer and Chairman of Photo Immune Biotechnology Inc., an HIV Vaccine Company based on IP developed.

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