Fusion Protein for Prevention of HIV-1 Infection

Technology #2435

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Preventing Human HIV infection or Lessening the Effects After Infection

Approximately 0.6% of the world’s population is infected with HIV. Many of those infected will develop AIDS within 10 years. Current antiretroviral therapy can prolong life, but cannot cure AIDS. There exists a great need for an agent that can prevent HIV infection or ameliorate its effects following infection. Owl monkeys are naturally resistant to HIV. Infection in owl monkeys is blocked by capsid-specific restriction factors, however similar restriction factors are inhibited in humans because of capsid-cyclophilin A binding. This technology consists of a gene that encodes a fusion protein that makes use of cyclophilin A’s capsid binding ability to target a retroviral restriction enzyme to the HIV capsid.

Inhibiting HIV-1 Using the Binding Ability of Cyclophilin A Capsid

This technology describes a way of inhibiting HIV-1 at the pre-integration, pre-reverse transcription and capsid uncoating steps in the HIV life-cycle. The technology entails a nucleic acid sequence encoding a polypeptide, TRIMCyp, having both TRIM (a retrovirus restriction enzyme) and cyclophilin (a protein that binds capsids) activity. Human cells expressing TRIMCyp were highly resistant to HIV-1 infection, demonstrating that TRIMCyp can restrict HIV-1. The invention further details ways of producing the polypeptide, including using vectors or liposomes to introduce the nucleic acid that encodes the polypeptide into cells. This fusion protein can be delivered into non-differentiated immune cells in vitro using a lentiviral vector and, after re-introduction into the patient, the immune system will be repopulated with HIV-1 resistant immune cells.

Applications:
– TRIMCyp may be used to treat or prevent HIV-1, among other viral infections

Advantages:
– Can be used as monotherapy: cost-effective, easier adherence strategy, less side-effects
– Does not generate drug-resistant viruses
– No apparent detrimental effect to normal CD4+ T-cells
– Low antigenic potential will avoid rejection of the transfected cells by the human immune system
– The polynucleotide encoding the TRIM-Cyp fusion protein may be introduced into a cell in a variety of ways, including transduction, transfection, viral- and liposome-mediated introduction


Licensing Status: Available for Licensing and Sponsored Research Support


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