Eradication of HIV by T cell immunotherapy

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Why We Did this Study

• The Problem: Antiretroviral therapy inhibits HIV replication and drives down the level of virus in the body, but does not cure infection.
• The Reason: HIV can persist in CD4+ T cells in a silent state, or in protected sites within the body, and escapes the host immune response.
• The Question: How can we help improve the immune response against HIV?
• The Idea: Create HIV-specific killer T cells (CD4+ and CD8+) capable of preventing HIV infection and destroying the infected cells.
What We Did

• We developed a cell-associated HIV inhibitor that can protect CD4+ T cells from infection
• Developed a method to expand HIV-specific killer T cells from infected individuals
• Used the inhibitor to genetically modify HIV-specific killer T cells
• Examined the ability of these killer cells to eradicate HIV infected cells
What We Found

1. Potent inhibition of HIV infection by a cell-anchored inhibitor

- Entry Inhibited
- Protects neighboring cells from infection
What We Found

II. Eradication of HIV-infected cells

1. Awaken HIV with a latency reversing agent

2. Sensitize virus producing cells to dying with an anti-cell survival drug

3. X5-AR modified HIV-specific T cells kill virus producing cells
What Our Results Mean and Why this Matters

• It is possible to overcome the resistance of HIV-producing cells to killer T cells by combining the activities of:
  • i) an anti-cancer drug that prevents cell survival, and primes HIV-producing cells to die
  • ii) genetically-modified HIV-killer T cells
• Immune restoration with genetically modified HIV-specific killer T cells may be a feasible way to eliminate infected cells, even in the absence of antiretroviral therapy.
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