HIV-specific Immunity Derived From Chimeric Antigen Receptor-engineered Stem Cells.

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Funding Grants: Stem Cell Programming With Chimeric Antigen Receptors to Eradicate HIV Infection

Public Summary:
Immune response to the human immunodeficiency virus (HIV) is critical in controlling HIV infection. Since the immune response does not eliminate HIV, it would be beneficial to develop ways to enhance the HIV-specific immune response to allow long-term viral suppression or clearance. Here, we report the use of a protective chimeric antigen receptor (CAR) in a stem cell-based approach to engineer HIV immunity. We determined stem cells that are genetically modified with CAR differentiate into functional immune cells such as T cells and natural killer (NK) cells in vivo in humanized mice. These cells are resistant to HIV infection and suppress HIV replication. These results strongly suggest that stem cell-based gene therapy with a CAR may be feasible and effective in treating chronic HIV infection and other morbidities.

Scientific Abstract:
The human immunodeficiency virus (HIV)-specific cytotoxic T lymphocyte (CTL) response is critical in controlling HIV infection. Since the immune response does not eliminate HIV, it would be beneficial to develop ways to enhance the HIV-specific CTL response to allow long-term viral suppression or clearance. Here, we report the use of a protective chimeric antigen receptor (CAR) in a hematopoietic stem/progenitor cell (HSPC)-based approach to engineer HIV immunity. We determined that CAR-modified HSPCs differentiate into functional T cells as well as natural killer (NK) cells in vivo in humanized mice and these cells are resistant to HIV infection and suppress HIV replication. These results strongly suggest that stem cell-based gene therapy with a CAR may be feasible and effective in treating chronic HIV infection and other morbidities.