Novel Peptides for Development of HIV Vaccine and Therapy

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BACKGROUND

Human Immunodeficiency Virus (HIV) has evolved a number of mechanisms of evading the human immune system. One way is through a high level of mutation, which makes it difficult to develop a vaccine that stimulates protective immunity against all of the different HIV variants. Therefore, scientists are searching for a general surrogate marker that could be used to target any HIV-infected cell regardless of its mutational status.

In this regard, scientists have recently turned their attention to the APOBEC machinery in HIV cells. APOBEC proteins are human proteins that modify genetic material of viruses so that they are unable to produce proteins essential for viral survival. Remarkably, HIV evades the APOBEC defense by making a protein called Vif that re-routes APOBEC proteins to proteosomes for destruction thereby reducing APOBEC's protective functions. However, this activity also increases the presentation of APOBEC antigens or peptides on the cell's surface.

APOBEC peptides may be good candidates for surrogate HIV markers simply because they are present on the surface of *all* HIV-infected cells. In addition, in order for HIV-infected cells to stop displaying APOBEC peptides on their surface, the virus would need to evolve mutations in the region coding for the Vif protein that re-routes the APOBEC proteins. This would make the virus vulnerable to the defenses mediated by the functional APOBEC proteins. This phenomenon should result in dual pressure on the virus that should slow or prevent the evolution of viral resistance to these T-cell responses.

TECHNOLOGY DESCRIPTION

UCSF investigators have designed a set of immunogenic peptides based on the structure of APOBEC proteins. The peptides were designed by avoiding regions of homology with HIV proteins to prevent broad cross-reactivity. They found that HIV-positive patients (n=153) exhibited a specific T-cell response to the immunogenic peptides whereas no such response was mediated by CD8 positive T cells. UCSF investigators also identified sequence polymorphisms within the human population in the amino acid

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OTHER INFORMATION

KEYWORDS

HIV, T cells

CATEGORIZED AS

- Medical
  - Disease: Autoimmune and Inflammation
  - Therapeutics
  - Vaccines
- Research Tools
  - Protein Synthesis

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sequence of the APOBEC peptides, which will make it possible to improve the antigens by tailoring them to an individual's APOBEC sequence.

This work suggests that these APOBEC peptides could be useful candidates for development of an effective HIV vaccine that could target any HIV-infected cell. Future work will involve expanding the group of HIV-positive patients and determining the correlation between T-cell responses against APOBEC proteins and HIV viral load.

APPLICATIONS

- HIV vaccine
- HIV therapeutic
- Treatment can be individually tailored to the patient
- Treatments could be combined with other approaches to increase efficacy

ADVANTAGES

- Overcomes the problem with HIV genetic mutations

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,572,873	02/21/2017	2008-149
United States Of America	Issued Patent	9,084,762	07/21/2015	2008-149

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