Improved Immunotherapeutic Compositions for Treatment, Diagnosis and Prevention of HIV

Technology Summary

Following HIV infection, most people make antibodies to the envelope glycoprotein, yet only a few make broadly neutralizing antibodies that target conserved antigenic sites on the envelope glycoprotein. Past research efforts to immunize with envelope glycoproteins failed because the vaccine glycoproteins failed to elicit broadly neutralizing antibodies. The resulting antibodies were specific for unique epitopes on the HIV strain of the vaccine glycoprotein protein, rather than conserved epitopes that can elicit broad protection against multiple HIV strains in circulation. HIV viruses evade antibodies by sterically concealing important neutralizing determinants such as, the CD4 binding site (CD4BS) on gp120. The induction of broadly neutralizing antibodies by immunization remains a major challenge of HIV vaccine research.

FDA researchers developed immunogenic gp120 polypeptides with targeted amino acid deletions to expose the CD4 binding site (CD4BS), reducing the conformational barrier to the CD4BS binding site. The variant immunogenic polypeptides enabled improved monoclonal antibody binding to CD4BS and elicited antibodies to the CD4BS. Modified forms of gp120, in which the CD4 binding site is more exposed and accessible to antibodies, may provide a novel epitope for eliciting broadly neutralizing antibodies to the CD4BS.

Potential Commercial Applications

- Diagnostic assays to identify HIV infection
- Vaccine candidates

Competitive Advantages

- Variant immunogens capable of inducing broadly neutralizing antibodies against HIV

Development Stage: immunogenicity studies in rhesus macaques

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Publications:

"Targeted deletion in the beta20-beta21 loop of HIV envelope glycoprotein gp120 exposes the CD4 binding site for antibody binding. *Virology* 2008 Aug 1;377(2):330-338. PMID: 18519142

Intellectual Property:

US Patent No. 8,628,782 issued 01.14.2014

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Product Area: Biologics, Vaccines, Diagnostics

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