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HIV Vaccination Compositions

Despite the success of antiretroviral treatments, there are still millions of new cases of human immunodeficiency virus (HIV) every year, with a higher prevalence in areas of the world with limited healthcare access. Vaccine strategies have been extensively studied and even developed to try to prevent or limit the spread of the virus. Current vaccination strategies use non-replicating viral vectors targeting the gp120 protein and while they have been proven to be safe, they have had only modest and short-lived efficacy. Gp120 plays an important role during target-cell infection and as such has been a target of interest for HIV vaccine development. However, gp120 is also a highly mutable decoy with most of its functionally important immunogenic sites shielded by glycans.

Researchers at the Biodesign Institute of Arizona State University have developed a novel HIV vaccine using replicating but highly attenuated vaccinia virus vectors that express Gag and deconstructed-gp41 (dgp41) of HIV-1 in combination with plant-produced virus like particles (VLPs) for prime/boosting. Animal studies showed that these two vaccine components work in concert to elicit Gag-specific CD8 T cell responses and both systemic and mucosal antibodies, sufficient to confer immunity to HIV with little to no pathogenicity of the virus. These responses appear to be the result of the elicitation of antibodies that are directed at conformational epitopes at the gp120-gp41 binding interface as well as linear epitopes within a region of gp41 known as the membrane proximal external region (MPER). The deconstructed form of gp41 is better able to elicit anti-MPER antibodies which have been found to exhibit potent anti-HIV-1 activities.

Combining a safe live viral vector with plant-produced VLPs produces a very promising, cost-effective and scalable vaccine platform for immunization against HIV.

Potential Applications

- HIV vaccine

Benefits and Advantages

- Increased immunogenicity

- Robust Gag-specific CD8 T cell responses at 12.7% of CD8 T cells expressing IFN-γ
- Both systemic and mucosal antibody responses to Gag and dgp41 with a bias toward IgG1
- VLPs produced in plants are not contaminated by mammalian pathogens
- Cost-effective scale up
- Expression speed
- No weight loss in animals indicating little to no pathogenicity of the virus
- Highly attenuated strain shows enhanced immunogenicity without compromising safety

For more information about this opportunity, please see

Meador et al - Virology - 2017

Meador et al - PLOS One - 2016

For more information about the inventor(s) and their research, please see

Dr. Jacobs' departmental webpage

Dr. Mor's departmental webpage

Dr. Kibler's departmental webpage