Endogenous Human Protein Nanoparticle-Based Immune-Focusing Antiviral Vaccine

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OTHER INFORMATION

KEYWORDS

vaccine, nanoparticle, HIV-1, common cold, CTL response, vaccination, mouse model, antiviral, viruses

CATEGORIZED AS

- **Medical**
  - Delivery Systems
  - Disease: Infectious Diseases
  - Vaccines

RELATED CASES

2016-299-0

SUMMARY

UCLA researchers in the Department of Biological Chemistry have developed a novel nanoparticle based antiviral vaccine capable of targeting many viruses.

BACKGROUND

There is a current rise in the incidence of viral originating diseases (i.e. HIV-1). A current movement to combat this rise in incidence is through the use of antiviral vaccines. However, there are two main barriers to the wide spread use of the vaccines: generation of cellular immunity through major histocompatibility complex class 1 cytoplasmic antigen-processing pathway for CD8+ T-cell (CTL) responses, and the coping of viral sequence variability. The overcoming of these pitfall in the design of antiviral vaccines could lead to reasonable widespread use to prevent greater incidence of viral disease. Therefore, the development of an antiviral vaccine that is not susceptible to an “acquired” immunity through CTL response could lead to the major reduction in the incidence of several viruses.

INNOVATION

Dr. Rome at UCLA has developed a novel human protein nanoparticle-based antiviral vaccine that can be potentially targeted against several viruses; though the proof of concept has been initially surveyed for HIV-1. The invention capitalizes on four major pitfalls of previous attempts at antiviral vaccines: interference with developing immune responses against delivered HIV-1 antigens due to competition by immune responses against the vector, poorly delivered HIV-1 antigens, the inability to generate CTL responses at mucosal surfaces where HIV-1 transmission occurs, and mutational escape of HIV-1 from the CTL responses generated by the vaccine. The current invention addresses all these pitfalls with recombinant human “vaults” as vaccine vectors. This proof of concept is not solely limited to HIV-1 and could in theory be targeted at other viruses. Therefore, this invention could revolutionize the current treatment strategy for viruses, leading to substantially lower incidences of occurrence.

APPLICATIONS

- The use of this invention could be used as a virus treatment (i.e. HIV-1, or the common cold)

ADVANTAGES

- This system for vaccine design is widely applicable to other viruses with variable sequences

STATE OF DEVELOPMENT

The technique has been shown to vaccinate mice for HIV-1 successfully in-vivo. The use of this “vault” system has also been shown to vaccinate successfully for the common flu virus in mice.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,821,190	11/03/2020	2016-299

RELATED MATERIALS

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ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Covalent Bi-Specific Monoclonal Antibodies that Expand Selective T Cell Subsets
- Method to Enrich for Cells Transduced with Chimeric Antigen Receptors
- Novel Non-Antibody-Based Chimeric Antigen Receptor Against HIV That Also Protects Cells From Infection

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