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mRNA Delivered Cell-surface Targeted and Epitope-focused Glycoprotein Antigens for HCV Vaccine

First therapeutic strategy restoring OCRL1 enzyme activity in rare genetic disease.

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Pharmaceuticals/Drug Discovery & Development

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Researchers at Purdue University have developed a method for harnessing Hepatitis C Virus (HCV) glycoproteins as immunogens for an mRNA vaccine. HCV causes 1.5 million new infections each year globally and is the leading cause for liver transplantations in the U.S. Despite the availability of direct-acting, antiviral medications that are more than 95% effective against HCV, a vaccine is still urgently needed. To combat HCV, prophylaxis via vaccination, point of care diagnostics, and accessibility to treatment are required in tandem. However, HCV's genetic diversity and robust immune evasion tactics have impeded the development of a successful vaccine thus far.

The method described here will help pharmaceutical companies and government bodies develop and market a mRNA-based HCV vaccine by artificially redirecting major HCV surface protein to the plasma membrane for higher efficiency recognition by the immune system. The method circumvents the arduous process of large-scale production in bioreactors and avoids the standard practice of utilizing protein-based vaccine approaches that are challenging to manufacture and scale. Leveraging the power of mRNA vaccinology with engineered HCV antigens, Purdue University researchers have taken a critical step towards the development of an efficacious HCV vaccine which represents an unmet need of high priority and a lucrative market opportunity.

Technology Validation:

Cell culture data clearly demonstrated enhanced surface expression and intact reactivity of the engineered antigen to a wide panel of broadly neutralizing HCV antibodies, corroborating its promise as a preclinical vaccine candidate. Immunogenicity assessments in mice and guinea pigs are in progress to assess the antibody response against the mRNA encoded

surface antigen which will be followed by non-human primate studies.

Advantages:

-Circumvents onerous large-scale production of HCV proteins in bioreactors, which have been shown to be challenging to purify as a homogenous species

-Utilizes engineered surface-displayed antigen amenable to mRNA technology

Applications:

-Pharmaceutical companies

-US Government

TRL: Pharmaceuticals

Intellectual Property:

Provisional-Gov. Funding, 2024-02-19, United States

Utility-Gov. Funding, 2025-02-14, United States

Keywords: broadly neutralizing epitopes, glycoprotein surface expression, hepatitis C virus, Medical/Health, mRNA vaccine, Pharmaceuticals, Vaccine