PURDUE INNOVATES | Office of Technology Commercialization

Expressible HCV Nucleic Acid and Encoded Glycoprotein Antigens and Methods

A novel nucleic acid delivery system enhances the expression of viral surface proteins to create a more effective and commercially viable Hepatitis C virus vaccine.

There are more than 200,000 cases of Hepatitis C virus (HCV) every year in the U.S., and yet there is still no approved vaccine for HCV. This is because studying the virus is very difficult due to its genetic diversity and immune evasion techniques, and it is still unclear how the human immune system must respond to effectively destroy HCV. Current vaccine research focuses on invoking the B cell antibody response, but development of inactivated vaccines is hindered by poor in vitro virus titer load and heterogeneity of viral particles produced. Alternatively, HCV surface protein complex E1-E2 can be used in a vaccine formulation to bolster B cell antibody response, which researchers believe is the "gold standard" vaccine, but it is difficult to express full-length E1-E2. Researchers at Purdue University have addressed this problem by developing a nucleic acid delivery system to enhance HCV E1-E2 expression in vivo, thus increasing B cell antibody response and creating an effective and commercially feasible vaccine for HCV. More specifically, they deliver nucleic acids (DNA, RNA, artificial analogs) encoding genetic information to enhance the expression of E1-E2 on the cell surface of HCV, which will lead to a stronger and longer immune response. In addition to nucleic acid, the vaccine would contain a pharmaceutical carrier or excipient and be packaged for suitable storage and administration to subjects requiring vaccination. This technology can also be expanded to increase cell surface expression of other antigenic viral proteins or potentially proteins from any pathogenic source.

Technology Validation:

-Tested mutated E1-E2 nucleotide constructs using specialized "cell ELISA" assay

(Assay described in US Patent Application Serial No. 19/053,963, filed 02/14/2025) to confirm increased cell surface expression of E1-E2 protein complex

Technology ID

2025-KUHN-71090

Category

Biotechnology & Life Sciences/Synthetic Biology & Genetic Engineering
Biotechnology & Life Sciences/Bioinformatics & Computational Biology
Artificial Intelligence & Machine Learning/AI Model Optimization & Acceleration Tools
Pharmaceuticals/Drug Discovery & Development
Pharmaceuticals/Drug Delivery & Formulations
Pharmaceuticals/Other

Authors

Richard J Kuhn
Devika Sirohi

Further information

Joe Kasper
JRKasper@prf.org

Nathan Smith
nesmith@prf.org

View online

Advantages

-More effective than current vaccine research strategies at inducing B cell antibody response

Applications

-Increase cell surface expression of other antigenic proteins via the same vaccine delivery system

TRL: 2

Intellectual Property:

Provisional-Patent, 2025-03-11, United States

Keywords: Hepatitis C vaccine, HCV E1-E2 protein, nucleic acid delivery system, B cell antibody response, antigenic viral proteins, cell surface expression, E1-E2 expression, commercially feasible vaccine, vaccine formulation, genetic diversity