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DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, HHS.

ACTION: Notice.

SUMMARY: The invention listed below is owned by an agency of the U.S. Government and is available for licensing to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

FOR FURTHER INFORMATION CONTACT:

Barry Buchbinder, Ph.D., 240-627-3678; barry.buchbinder@nih.gov. Licensing information and copies of the U.S. patent application listed below may be obtained by communicating with the indicated licensing contact at the Technology Transfer and Intellectual Property Office, National Institute of Allergy and Infectious Diseases, 5601 Fishers Lane, Rockville, MD, 20852; tel. 301-496-2644. A signed Confidential Disclosure Agreement will be required to receive copies of unpublished patent applications.

SUPPLEMENTARY INFORMATION: Technology description follows.

Self-assembling Insect Ferritin Nanoparticles for Display of Co-assembled Trimeric Antigens

Description of Technology:

Antigens on the surface of virus particles are displayed in a regular, repetitive pattern which facilitates B cell activation. Presenting trimeric antigens on engineered particles that mimic the geometric patterns observed for native viral proteins can lead to an improved host antibody response.

Self-assembling globular ferritin nanoparticles have previously been used to display multiple copies of a co-assembled trimeric antigen to the immune system. However, prior ferritin nanoparticle technologies only permit a random co-assembly of diverse trimeric antigens, and therefore cannot guarantee the pattern and ratio of diverse trimeric antigens on a single ferritin nanoparticle.

Researchers at the Vaccine Research Center (VRC) of the National Institute of Allergy and Infectious Diseases are developing novel recombinant ferritin nanoparticles that are based on insect ferritin proteins, and that have been engineered to display two different trimeric antigens in a defined ratio and geometric pattern. This system has been tested with antigens derived from HIV-1 envelope (Env) and influenza hemagglutinin (HA). Interestingly, when guinea pigs are immunized with ferritin nanoparticles displaying two different trimeric antigens, induced B cells could simultaneously recognize both trimeric antigens, thus leading to an immune response with improved neutralization breadth.

This technology can be used as a platform for multimerized display of trimeric antigens such as viral type I fusion glycoproteins, and may be applied to many high-priority vaccine targets, such as HIV-1, influenza, respiratory syncytial virus, parainfluenza viruses, and coronaviruses.

Potential Commercial Applications:

- Platform for multimerized immunogen presentation and vaccine design.
- Vaccines for pathogens that use genetic diversity to escape the immune response.

Competitive Advantages:

- Particles have equal fractions of two different antigens in a specific configuration on the nanoparticle surface (unlike regular ferritin used previously)
- Designed particles have a geometry that allows for attachment of trimeric antigens (unlike the native insect ferritin).

Development Stage: *In vivo* testing (rodents)

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Publications: Georgiev, Ivelin S., et al., ACS Infectious Diseases (2018) 4 (5), 788-796.

Intellectual Property: HHS Reference Number E-270-2015: U.S. Patent Application No. 62/355,212 filed 06/27/2016; PCT Application No. PCT/US2017/039595 filed 06/27/2017 (pending).

Related Intellectual Property: HHS Reference Number E-531-2013, E-293-2011, E-060-2015

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