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Vaccinia Virus Vectors and Methods to Prevent the Pathology Caused by Infectious Agents

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Inventors

Bertram Jacobs
Professor
The Biodesign Institute
Arizona State University

Jeffrey Langland
Associate Research Professor
The Biodesign Institute
Arizona State University

Sangeetha Vijaysri
Graduate Research Associate
The Biodesign Institute
Arizona State University

Teresa Brandt
Graduate Research Assistant
The Biodesign Institute
Arizona State University

Alexander Rich
Professor
Massachusetts Institute of Technology

Invention Description

The vaccinia virus, when used for various clinical applications, is quite versatile and potentially very beneficial to human health. In addition to its utilization as a smallpox vaccine, the vaccinia virus is extensively used as an effective expression vector since it is easy to isolate, can accommodate vast amounts of exogenous DNA and has a wide host range. Foreign genetic material, which is incorporated into the vaccinia genome, may encode for antigens and other useful molecules, including anticancer agents. Unfortunately, while the vaccinia virus has many potentially valuable applications, the form of the vaccinia virus currently in use poses certain dangers to human health including the risk of a life-threatening vaccinia infection.

Researchers at the Biodesign Institute of Arizona State University and their collaborators at the Massachusetts Institute of Technology have developed a form of vaccinia virus with genetic modifications that decrease the risk of recipient viral infection. These genetic modifications allow for the virus to be recombined with and used to deliver foreign genetic material for the purposes of immunization or other useful molecule delivery or it can be used in its given form to elicit an immune response in mammals that will protect against the smallpox disease.

The modified vaccinia virus, with its low virulence but increased efficacy, has numerous applications especially owing to the wide variety of foreign DNA that can be recombined with the virus.

Potential Applications

- Gene therapy vector
- Delivery of anticancer agents and other medically useful molecules
- Immunization against various diseases in mammals
- Smallpox vaccine

Benefits and Advantages

- Reduced Pathogenicity – reduced pathogenicity decreases the chance of side effects such as host infection and excessive host immune response
- Increased Effectiveness – the reduced pathogenicity of the modified virus has the potential to allow the virus to live longer in the infected host and thus produce a more robust immune response or, in the case of a gene therapy vector, allow for the production of higher levels of the protein encoded for delivery

Intellectual Property Status:

US 6,750,043 B2
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Contact

Yash Vaishnav, PhD, MBA

Vice President

Business Development, Life Sciences

Arizona Technology Enterprises, LLC (AzTE)

P: 480.884.1648

F: 847.971.2871

YASH@AZTE.COM

HEALTHSCIENCES@AZTE.COM