Drug Discovery & Development

Recombinant Influenza Viruses for Vaccines and Gene Therapy

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WARF: P99264US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to efficiently generate fully constructed, artificial influenza virus.

Overview

Influenza viruses show strong potential as vaccine and gene delivery vectors: they do not replicate through DNA intermediates (which may incorporate into the host genome); they elicit strong immune responses; and they exist in a wide range of antigenic variants, allowing repeated immunization and long-term use. However, influenza viruses have proven difficult to manipulate in the laboratory. As negative strand RNA viruses with viral RNA (vRNA) *complementary* to messenger RNA (mRNA), their replication requires a complex unit composed of viral polymerase and other proteins, which both replicates vRNA and transcribes it into mRNA for protein synthesis by the host cell. To generate genetically modified influenza virus, engineered vRNA must be assembled into these replication units, a process that is both laborious and inefficient.

The Invention

UW-Madison researchers have now developed a method to efficiently generate fully constructed, artificial influenza virus. The method involves transforming a host cell with 10 DNA plasmids, each containing a DNA copy of a segment from the influenza viral genome. Nine of the plasmids express proteins needed for viral replication and assembly, while the tenth contains a transgene inserted between an RNA pol I promoter and a terminator, for gene expression.

Applications

- More rapidly generating and studying lethal mutations in viral processes, such as formation, packaging, binding and fusion, which may be useful targets for vaccines
- Should allow development of improved gene therapy vectors because the researchers have also shown they can deliver a transgene without generating active virus in the recipient cell

Key Benefits

- Allows manipulation of the influenza viral genome as DNA, which is more stable and easier to handle than RNA
- System is highly efficient, both in the infection of host cells and the yield of genetically modified virus particles (>10^4 infectious particles/milliliter).
- Potentially applicable to other viruses, such as paramyxoviruses and rhabdoviruses

Stage of Development

The researchers have demonstrated expression of the reporter gene GFP using this system.

Additional Information

Related Technologies

- This technology is currently available for licensing for non-human uses only.

Related Intellectual Property

- View Continuation Patent in PDF format.
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Tech Fields

- Drug Discovery & Development : Drug production & design

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854