Genome-Wide Identification Of Immune Evasion Functions In A Virus

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SUMMARY

UCLA researchers in the Department of Pharmacology have discovered a novel approach toward generating live attenuated influenza vaccines with improved immune response *in vivo*.

BACKGROUND

The market for human influenza vaccines is expected to reach $4.4 billion by 2021. The majority of these vaccines focus on inactivated or killed viruses, but attenuated vaccines are beneficial in that they stimulate a broader immune response, do not require booster shots, and often require less antigen. However, recent formulations of live attenuated influenza vaccines (LAIVs) have not been efficacious. Further improvement of LAIVs by improving their immune response would fulfill a significant need in new vaccine development.

INNOVATION

Professor Sun and coworkers have discovered novel functions in influenza viruses which allow viruses to evade the host innate immune response. By eliminating this evasion function, interferon-sensitive LAIVs can be developed with improved innate and adaptive immune responses. This recombinant vaccine is easy to produce in vero cells. *In vivo*, vaccination with the interferon-sensitive virus resulted in protection against homologous and heterologous viruses with a robust antibody and T cell response. The interferon-sensitive virus resulted in a 1000x decrease of viral load after challenge infection, a more significant decrease than that observed after vaccination with a phenotype analogous to FluMist.

APPLICATIONS

- Influenza vaccine
- Herpesvirus vaccine
- Zika virus vaccine
- Chikugunya vaccine
- Cancer imunotherapy

ADVANTAGES

- Recombinant vaccine is easy to produce in vero cells
- Reduces viral replication in mice 2-3 orders of magnitude after vaccination
- Protects against homologous and heterologous virus
- Generates a robust antibody and T cell response *in vivo*

STATE OF DEVELOPMENT

In vivo studies have shown that interferon-sensitive virus is attenuated *in vivo* and results in a strong immune response with productive of specific antibodies and T cells. Vaccination efficacy was compared to a control with phenotype analogous to FluMist and shown to be more effective.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,944,679	04/02/2024	2017-515
European Patent Office	Published Application	3596202A	01/22/2020	2017-515

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Live attenuated influenza vaccine, influenza, vaccine, herpesvirus, zika, chikungunya, immunotherapy

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Materials & Chemicals**
  - Biological
- **Medical**
  - Disease: Cancer
  - Disease: Infectious Diseases
  - Vaccines

RELATED CASES

2017-515-0

RELATED MATERIALS

▶ Du, Xin, Shi, Zhang, Wu, Dai, Gong, Brar, Shu, Luo, Reiley, Tseng, Bai, Wu, Wang, Shu, Sun. Genome-wide identification of interferon-sensitive mutations enables influenza vaccine design. Science. 2018.

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