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Vaccinia virus strain LC16m8 : Next-Generation Vaccine Platform

Researcher Information

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Research Concept & Core Technology

Research Uniqueness & Superiority: Our platform integrates vaccinia virus strain **LC16m8 (m8)**—Japan's proprietary, approved, and highly attenuated 3rd generation smallpox vaccine strain—with our uniquely established **Bacterial Artificial Chromosome (BAC)** system.

- **Agile Engineering Platform:** The BAC system enables precise manipulation of the ~190 kb m8 genome within *E. coli*. This facilitates accurate antigen insertion and rapid reverse genetics, significantly accelerating vaccine development cycles.
- **High Coding Capacity:** By leveraging the large genome size of the vaccinia virus, which far exceeds the capacity of other viral vectors, we can develop robust multivalent vaccines targeting multiple priority pathogens within a single platform.

Key Achievements

- **m8-BAC Infrastructure:** The entire m8 genome has been successfully established as a BAC clone, providing a streamlined system for accelerated genetic manipulation. *(Yoshikawa et al., PLOS ONE, 2018. PMID: 29474493)*
- **Proven Efficacy (SFTSV):** A vaccine candidate developed using this platform demonstrated **100% protective efficacy** against lethal viral challenges in mouse models. *(Yoshikawa et al., PLOS Pathogens, 2021. PMID: 33534867)*

Future Outlook & Strategic Roadmap

We aim to accelerate the development of next-generation vaccines for priority pathogens by harmonizing strategic attenuation and multivalency, leveraging global collaborations to maximize R&D velocity for pandemic preparedness and response.

Background & Challenges to be Solved

Significance: "Priority Pathogens," such as Smallpox and Viral Hemorrhagic Fevers, pose critical threats to global public health and biosecurity due to their high fatality rates.

Current Challenges & Unmet Medical Needs:

- **Absence of Approved Vaccines:** Most priority diseases lack approved vaccines that effectively balance safety and efficacy; treatments is often limited to supportive care.
- **Requirement for Enhanced Safety:** Despite LC16m8 being a highly attenuated strain, minimizing the risk of adverse reactions is critical. Strategic attenuation via genetic modification is essential for further safety optimization.
- **Demand for Multivalent Vaccines:** There is an urgent need for highly efficient, safe next-generation platforms capable of targeting multiple pathogens with a single vaccine vector.

Research Schematic

Recombinant m8 expressing SFTSV antigens confers 100% protection against lethal SFTSV challenge in mice.