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Mouse model for studying SARS-CoV-2

A gene replacement mouse model incorporating human ACE2 and TMPRSS2 genes for authentic SARS-CoV-2 replication and virus entry studies.

IP Status: Not Applicable; Research Tool

Applications

- Vaccine Development
- Therapeutic Testing
- Research Tool

Key Benefits & Differentiators

- **Accurate Disease Modeling:** By replacing mouse genes with their human counterparts (ACE2 and TMPRSS2), this model accurately mimics human physiological responses to SARS-CoV-2, offering a closer approximation of human disease progression and response.
- **Enhanced Research Utility:** Facilitates more reliable testing of treatments and vaccines due to its closer genetic alignment with human virus targets.
- **Rapid Deployment:** Created in partnership with Jackson Laboratories to ensure quick availability and distribution for research needs.

Technology Overview

Amidst the global COVID-19 pandemic, the scientific community faces a pressing need to advance our understanding of the virus's behavior, transmission dynamics, and potential therapeutic interventions. Traditional mouse models, while valuable in many research contexts, have revealed significant limitations in studying SARS-CoV-2 due to disparities in receptor binding affinity. Specifically, the inability of the virus to effectively engage with the mouse ACE2 receptor has hindered accurate replication of human infection patterns. This crucial disparity underscores the necessity for innovative approaches to bridge the gap between existing animal models and the complexities of human viral pathogenesis.

Researchers at the University have developed a mouse model host for SARS-CoV-2 by strategically replacing the entire genomic regions of the mouse ACE2 and TMPRSS2 genes with their human counterparts. This precise genomic alteration ensures the expression of human proteins in spatial, temporal, and dynamically regulated patterns, closely resembling those found in human tissues. Through comprehensive full-genome next-generation sequencing (NGS) analysis, the successful integration and functionality of the human sequences have been confirmed. This innovative mouse model not only facilitates detailed studies on virus behavior, transmission dynamics, and therapeutic efficacy but also serves as a versatile platform for advancing research into future zoonotic diseases. By providing a realistic biological setting for experimentation, this technology represents a significant leap forward in disease modeling.

Phase of Development

TRL: 3-4
This mouse model has been generated and characterized.

Technology ID
2021-068

Category
Life Sciences/Human Health
Life Sciences/Research Tools

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Researchers

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