

The Global Mouse Models for COVID-19 Consortium – GMMCC

Mouse model resources and facilities to study SARS-CoV-2

COVID-19 is an infectious disease caused by a new coronavirus, SARS-CoV-2. As of June 2020, the World Health Organization (WHO) reported infections in over 11 million people worldwide causing over 500,000 deaths. Developing and deploying preventative vaccines, reduced opportunistic infection strategies, and clinical therapeutics is benefiting from worldwide cooperation of the biomedical research and translational communities in both academia and industry.

The mouse is a valuable tool as an experimental model organism to improve our understanding of SARS-CoV-2 infection, colonization, pathogenesis, and host response mechanisms. The mouse can also be used to assess potential preventative, disease modifying, and therapeutic approaches. During the SARS outbreak in 2003 caused by the SARS-CoV-1 virus, the development of a strain of mice carrying a human *ACE2* gene (the receptor for Coronavirus) which was susceptible to SARS-CoV-1 proved valuable in the study of SARS. This strain will also be vital for studies of SARS-CoV-2.

Research into coronaviruses has also identified several other genes that are either involved in infection, colonization, host response, and disease pathogenesis. Mouse strains carrying mutations in these genes will also be an important part of the toolkit for studying SARS-CoV-2 and potentially revealing new preventative, disease-modifying, or therapeutic approaches.

Using the mouse as a model system, employing its comparative genetics to humans and its facile genetic engineering, provides the research community with a model system that can provide valuable insights into SARS-CoV-2 and a platform for infection, colonization, and therapeutic studies.

Aims of The Global Mouse Models for COVID-19 Consortium

Mouse genetics, genomics, and functional assessment centres and repositories around the world have come together to form a consortium to underpin global research into SARS-CoV-2 by the efficient delivery of relevant mouse strains, mouse genetics expertise, and robust outcome and therapeutic effect and safety testing platforms.

Specific aims of the GMMCC:

- 1. Provide up-to-date information and details of the availability and accessibility of mutant mouse strains relevant to SARS-CoV2;**
- 2. Provide information on current projects that are designing and generating new mutant mouse strains for infection, colonization, and disease-relevant host genes; and**
- 3. Provide information on facilities and expertise that are available to support and enhance COVID-19 research (e.g. biological containment mouse facilities) and validated SARS-CoV2 infectious challenge model systems and testing platforms.**

The Global Mouse Models for COVID-19 Consortium – A Global Partnership of Mouse Genetics, Genomics, and Functional Assessment Centres

The GMMCC is comprised of 24 institutes and centres that represent a formidable collection of resources and expertise in mouse genetics, genomics, and response to pathogen research that are able to serve worldwide research into SARS-CoV2.

The GMMCC includes a number of well-established public mouse genetics consortia that provide design, production, and functional analysis of genetic mutation (IMPC, INFRAFRONTIER) and archiving and distribution of mutant mouse strains and resources of mouse for biomedical research (AMMRA based in Asia, INFRAFRONTIER-EMMA based in Europe, the MMRRRC in the US, and the CMMR in Canada; see Table 1).

The Global Mouse Models for COVID-19 Consortium – Mouse Resources for Coronavirus Research

Links to current mouse strains available from some of our members. These summaries are updated regularly.

Mouse Genome Informatics, US

Mouse Models for Coronavirus Research:

<http://www.informatics.jax.org/mgihome/other/coronavirus.shtml#mouse>

International Mouse Phenotype Consortium

Mouse Mutants for Coronavirus Research

<https://www.mousephenotype.org/understand/covid-19/>

Mutant Mouse Resource and Research Centers, US

MMRRRC Mouse Models for COVID-19 Research

https://www.mmrrc.org/catalog/covid_models.php

INFRAFRONTIER Research Infrastructure, Europe

INFRAFRONTIER COVID-19 Resources and Measures

<https://www.infrafrontier.eu/knowledgebase/therapeutic-area/covid-19-resources-and-measures>