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Ferret Models of COVID-19

Ferrets are among the many animal models playing an important role in the fight against the current coronavirus pandemic. Ferrets are considered the gold standard model for assessing efficacy of new vaccines and therapies for viral respiratory diseases such as influenza, and ferret models have been helping to evaluate treatments and vaccines for severe acute respiratory syndrome (SARS) since the emergence of the initial SARS Coronavirus (SARS-CoV) in 2002 (Enkirch & vonMessling, 2015).

Ferrets are susceptible to experimental infection by SARS-CoV-2, the new coronavirus causing Coronavirus Disease 2019 (abbreviated as COVID-19). They are capable of replicating the virus and transmitting the virus to other non-infected animals. Studies have demonstrated that SARS-CoV-2, like other human respiratory coronaviruses, binds to angiotensin-converting enzyme 2 (ACE2) in the airway epithelia and lung alveoli in humans. Ferret ACE2 has a similar genetic structure to ACE2 in humans where the virus binds with the receptor (Shi et al., 2020; Zamoto et al., 2006).

Therefore, ferrets are a valuable model for better understanding transmission and pathogenesis of COVID-19, and for developing vaccines and antiviral therapies for SARS-CoV-2 (Kim et al., 2020; Shi et al., 2020).

Previous studies utilizing ferret models to evaluate the immune response and potential vaccines against SARS-CoV provide useful information about potential therapeutic interventions for SARS-CoV-2. Some laboratories have already publicly announced that they are testing the efficacy of vaccines for SARS-CoV-2 in ferrets, including the Commonwealth Scientific and Industrial Research Organization (CSIRO), the Vaccine and Infectious Disease Organization-International Vaccine Centre (VIDO-InterVac), and Public Health England.



Domestic Cat Models of COVID-19

Domestic cats are susceptible to both natural and experimental infection with SARS-CoV-2, and experimental transmission from infected to non-infected cats has been observed (Shi et al, 2020; Zhang et al., 2020). The structure of ACE2 at the binding locations of both SARS-CoV and SARS-CoV-2 in domestic cats is very similar to humans, thus making domestic cats a valuable animal model for screening antiviral drugs or vaccines as well (Guo et al. 2008; Shen et al., 2020; Sun et al., 2020). Domestic cats also produce neutralizing antibodies against SARS-CoV-2 (Zhang et al., 2020).

Previous veterinary research with domestic cats has provided valuable insight for possible treatments for COVID-19. Studying coronaviruses in other animals helps researchers determine possible treatments and predict how antivirals and vaccines for COVID-19 may affect patients. A coronavirus in cats called feline infectious peritonitis virus (FIPV) has been studied for decades. This virus can cause an immune reaction in cats similar to a reaction experienced by some human COVID-19 patients known as cytokine storm syndrome. Data from treatments developed for FIPV in cats have helped researchers evaluate similar potential treatments for COVID-19 in humans (Cao, et al., 2020; Decaro et al., 2020).

Marshall has over 80 years supporting researchers around the world developing vaccines and lifesaving cures, and will continue to do so throughout the current pandemic. Marshall is providing ferrets and domestic cats to researchers working on COVID-19 vaccines and cures, and has taken several steps to protect employees, animals, and business continuity.

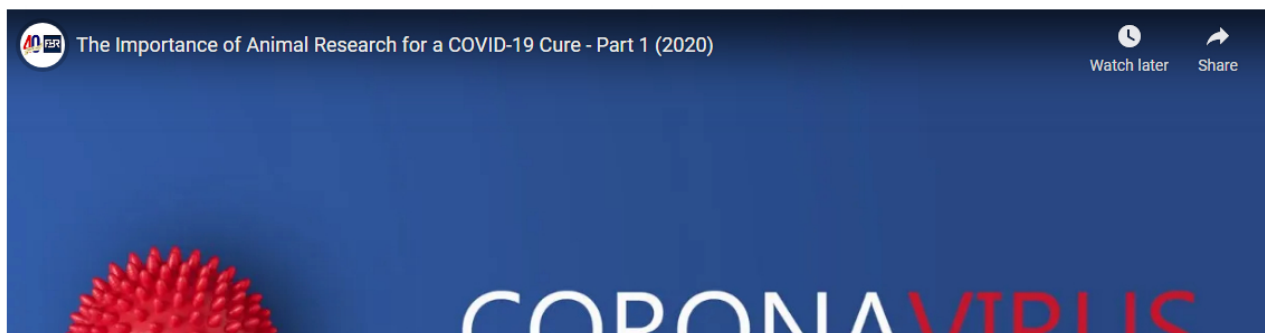
The Value of Animal Models for COVID-19

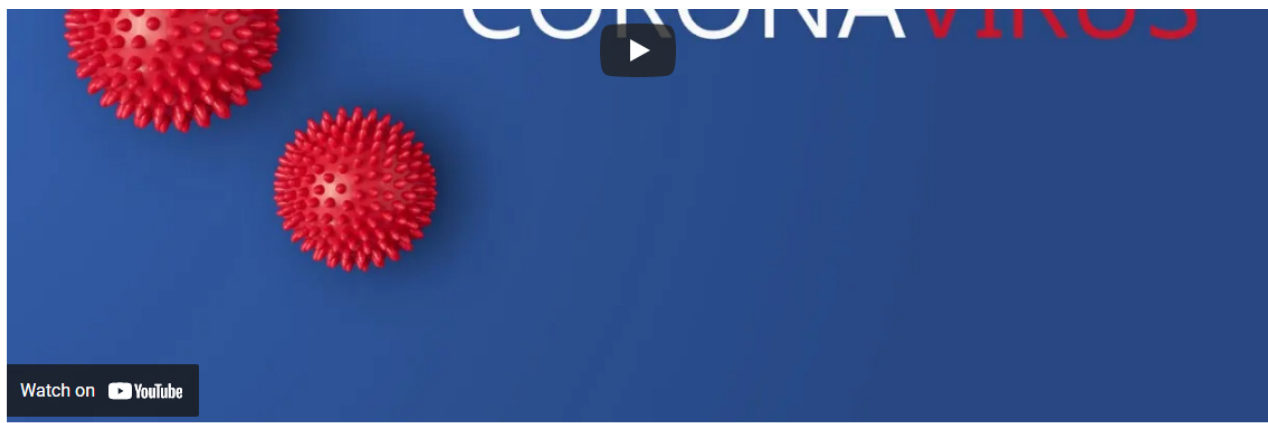
Animal models are providing important information about the transmission and pathogenesis of the new SARS-CoV-2.

The Foundation for Biomedical Research (FBR) has established a COVID-19 Resources page with important information about the value of animal models with this pandemic.

The European Animal Research Association has established an interactive map to track biomedical research aimed at finding a cure for COVID-19.

The following video by FBR describes three important animal models contributing to COVID-19 research.





The video below by Americans for Medical Progress describes how animal research is combating the COVID-19 pandemic.



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