EXPERIMENTAL MODEL

Syrian hamsters as a small animal model for COVID-19 research

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Given that Syrian hamsters are susceptible to SARS-CoV infection, they were promising candidates in the search for an animal surrogate to model COVID-19, the disease caused by the related SARS-CoV-2 coronavirus. In a new study published in *PNAS*, investigators at the University of Wisconsin–Madison, the University of Tokyo and the Icahn School of Medicine at Mount Sinai confirm that Syrian hamsters are susceptible to SARS-CoV-2 infection and recapitulate key features of the human disease. These findings support the use of Syrian hamsters as a small animal model for understanding COVID-19 pathogenesis and for testing medical countermeasures.

The investigators infected two different age groups of Syrian hamsters (1 month old and 7–8 month old) with either a high dose or low dose of SARS-CoV-2, or with PBS (mock infection) via intranasal and ocular routes. In both groups, hamsters infected with the higher viral dose showed the most severe weight loss. High virus titers were detected in the respiratory track of all infected animals at day 3 post-infection (dpi); viral replication decreased at 6 dpi and could no longer be detected at 10 dpi in most organs of the infected hamsters.

Micro-CT imaging analysis was performed on lungs from the young group, which revealed lung abnormalities in all infected animals from 2 dpi, whereas the lungs of mock-infected control animals appeared normal. CT lung abnormalities progressed at 7–8 dpi to more severe injuries that shared characteristics with SARS-CoV-2–infected human lung, including severe, bilateral, peripherally distributed, multilobular ground glass opacity, and regions of lung consolidation.

Next, hamsters that had been infected with SARS-CoV-2 were rechallenged with virus 20 days after the primary infection. Whereas high virus titers were detected in the respiratory tracts of mock-infected control animals, no virus was detected in the previously infected hamsters. "These data support the concept that people who recover from COVID-19 would be protected from reinfection at least for a period of time while their immunity to SARS-CoV-2 lasted. These results serve as a rationale for the development of live attenuated SARS-CoV-2 vaccines and other vaccines that induce protective antibodies," say the investigators in their report.

The study also showed the protective effects of convalescent serum in the hamster model of SARS-CoV-2 infection. Altogether, the findings indicate that this animal model could facilitate the rapid evaluation of vaccine or antiviral therapy against SARS-CoV-2.

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