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Spreading of SARS-CoV-2 from hamsters to humans



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During the past 2 years, SARS-CoV-2 has spread globally through human-to-human transmission causing a devastating pandemic. Since its emergence, SARS-CoV-2 has displayed considerable host plasticity, with an expanding list of wildlife, pets, livestock, and laboratory animals shown to be susceptible to SARS-CoV-2 infection both experimentally and naturally.¹ Indeed, large outbreaks in mink farms occurred as early as April, 2020.^{2,3} Given the fact that these outbreaks led to spill back to other animals and humans, and because the virus accumulated mutations during continued passage through mink (potentially affecting vaccine efficacy) large-scale culling of mink was enforced in the Netherlands in June, 2020, and in Denmark in November, 2020. Many different countries subsequently reported infections on mink farms. These outbreaks are reminiscent of an animal spillover of SARS-CoV at the end of 2003, a few months after SARS-CoV was controlled in humans in affected countries. New introductions of SARS-CoV to humans in this case were linked to a restaurant serving farm-raised civet cats,⁴ which led to the mass culling of civet cats in China. In January, 2021, free-ranging white-tailed deer have been reported susceptible to infection with SARS-CoV-2 and capable of sustaining transmission in nature.⁵ Consideration of the potential formation of a non-human reservoir from where the viruses could be reintroduced to humans, including among pet animals bred at farms, is therefore of major importance.

The Article in *The Lancet* by Hui-Ling Yen and colleagues⁶ now adds another species to the list, providing evidence that pet hamsters can be naturally infected with SARS-CoV-2 and cause human infections. Both the genetic and epidemiological results reported here strongly suggest that there were several hamster-to-human transmission events, followed by onward human transmission. The authors report that Syrian hamsters at a warehouse and two pet shops supplied by this warehouse in Hong Kong had evidence of SARS-CoV-2 infection. Two patients were infected with SARS-CoV-2 directly from infected hamsters in one of the pet shops. Based on the genetic and phylogenetic analysis of the viruses, local transmission of SARS-CoV-2 leading to infection of hamsters in the warehouse seemed unlikely. Importation of SARS-CoV-2-infected hamsters on the other hand, from the Czech Republic via the Netherlands

to Hong Kong, was a likely source of this outbreak, say the authors. However, further in-depth outbreak investigation would be needed to find out whether the hamsters were infected during transport or at the animal facilities. Reported separately, a second strain was found in some animals in the warehouse, showing that the infection of the hamsters was not a one-off incident.⁷ This zoonotic transmission of SARS-CoV-2 from hamsters is consistent with experimental observations of efficient hamster-to-hamster transmission via different routes.⁸

Zoonotic transmission of viruses from pet rodents to humans has been witnessed on many occasions. Several examples of human cowpox and Seoul virus infections caused by contact with pet rats have been described.^{9,10} Additionally, in 2003, introduction of exotic rodents from Africa through a multispecies animal trading facility caused a serious public health threat, whereby pet prairie dogs in the facility became infected with monkeypox virus and were subsequently shipped causing several human cases across the USA.¹¹ Trace back surveys related to some of these outbreaks have shown how complex the pet rodent trade is, with poorly regulated large-scale and multispecies breeding facilities. The documented presence of more than one strain of SARS-CoV-2 with more genomic diversity than would be expected from a recent introduction in the hamsters seized in Hong Kong suggests that the virus might be circulating in such a breeding facility.⁷ Thus, SARS-CoV-2 should be included in the range of pathogens that can be transmitted from pet animals to humans.



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These studies again highlight the urgent need to establish One Health programmes to monitor wildlife, livestock, and pets and their trade routes to track the virus in animal populations more closely. Although the earlier mink outbreaks revealed the need to monitor the fur industry, there is apparently a broader view needed to monitor risks of SARS-CoV-2 zoonotic transmission. Additionally, physicians should be aware of the zoonotic potential of these pathogens and include questions about pet ownership to investigate patients who are suspected of having a zoonotic infectious disease. The concept of One Health is not new, but as more people are living in close contact with wild and domestic animals, successful public health interventions require the cooperation of the human, veterinary, and environmental health communities.

We declare no competing interests.

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End the use of “excited delirium” as a cause of death in police custody



Black men in the USA are at least 2.5 times more likely than white men to be killed by police.¹ The killings of George Floyd, Daniel Prude, and Elijah McClain are among many that have stirred public outrage at systemic police violence against Black people. These men are also among the documented 166 people—43% of whom were Black—whose deaths in US police custody between 2010 and 2020 were attributed to “excited delirium” by death investigators, medical examiners, expert witnesses, lawyers, law enforcement, or first responders.² This number is likely to be an underestimate because previous studies have highlighted under-reporting of police killings.³

“Excited delirium” has also been used to explain in-custody deaths in Australia, Canada, and the UK, among other countries. The term delirium describes symptoms and signs that are caused by an underlying disease process. However, “excited delirium” as a diagnosis or syndrome is not listed in the *International Classification of Diseases* or the *Diagnostic and Statistical Manual*

of *Mental Disorders*. Medical associations in multiple countries have challenged the validity of “excited delirium” as a cause of death, including the Royal College of Pathologists in the UK, the American Medical Association, and the American Psychiatric Association.^{4–6}

How has “excited delirium” come to be accepted by members of the medical, legal, and law enforcement communities? A new report from Physicians for Human Rights (PHR), “Excited Delirium” and Deaths in Police Custody: *The Deadly Impact of a Baseless Diagnosis*,⁷ published on March 2, 2022, to which we contributed, traces the genesis of “excited delirium”, presents an evaluation of the relevant medical literature, and explores current views and applications of this concept. In the PHR report we show that “excited delirium” has racist origins and that its use was promoted by a small group of physicians with ties to law enforcement and weapons manufacturing.⁷

The PHR report⁷ highlights how this term was coined in case reports by physicians Charles Wetli

Published Online
March 2, 2022
[https://doi.org/10.1016/S0140-6736\(22\)00410-X](https://doi.org/10.1016/S0140-6736(22)00410-X)