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CORONAVIRUS DISEASE 2019 UPDATE (227): ANIMAL, CAT, DOG, RESEARCH, EXPERIMENTAL INFECTION

A ProMED-mail post

<http://www.promedmail.org>

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Source: bioRxiv preprint, not peer reviewed [edited]

<https://www.biorxiv.org/content/10.1101/2020.05.28.120998v1.full.pdf>

Reference: Angela M. Bosco-Lauth, Airn E. Hartwig, Stephanie M. Porter, Paul W. Gordy et al. Pathogenesis, transmission and response to re-exposure of SARS-CoV-2 in domestic cats. bioRxiv preprint doi: <https://doi.org/10.1101/2020.05.28.120998> [this version posted 29 May 2020].

Abstract

The pandemic caused by SARS-CoV-2 has reached nearly every country in the world with extraordinary person-to-person transmission. The most likely original source of the virus was spillover from an animal reservoir and subsequent adaptation to humans sometime during the winter of 2019 in Wuhan Province, China. Because of its genetic similarity to SARS-CoV-1, it is likely that this novel virus has a similar host range and receptor specificity. Due to concern for human-pet transmission, we investigated the susceptibility of domestic cats and dogs to infection and potential for infected cats to transmit to naïve cats. We report that cats are highly susceptible to subclinical infection, with a prolonged period of oral and nasal viral shedding that is not accompanied by clinical signs and are capable of direct contact transmission to other cats.

These studies confirm that cats are susceptible to productive SARS-CoV-2 infection but are unlikely to develop clinical disease. Further, we document that cats develop a robust neutralizing antibody response that prevented re-infection to a second viral challenge. Conversely, we found that dogs do not shed virus following infection but do mount an anti-viral neutralizing antibody response.

There is currently no evidence that cats or dogs play a significant role in human exposure; however, reverse zoonosis is possible if infected owners expose their domestic pets during acute infection. Resistance to re-exposure holds promise that a vaccine strategy may protect cats, and by extension humans, to disease susceptibility.

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Communicated by:
Herve Bercovier
Prof. (Emeritus) of Microbiology
The Faculty of Medicine
Hebrew University of Jerusalem
<hb@cc.huji.ac.il>

[The described experiments, which involved 7 adult cats and 3 adult dogs, expand upon existing work by providing shedding kinetics in cats over time. Virus neutralization, seroconversion, and exploring transmission are assessed; furthermore, the results are indicative of established protective immunity against SAR-CoV-2 following repeated exposure.

The authors conclude that cats may "serve as a suitable animal model for studying SARS-2 infection, furthering the development of vaccines and therapeutics for use in both animals and humans." They also confirm an earlier report that dogs do not replicate virus locally.

The role of cats in zoonotic transmission remains an open question, but relatively short duration of shedding and resistance to re-exposure "suggests risk of this is very low, particularly when cats are kept indoors."

In a recent interview, the director of China's Center for Disease Control and Prevention (CDC), Gao Fu, told reporters that he went "in early January 2020" to the Huanan seafood market in Wuhan, Hubei Province, at that time suspected to be the source of the epidemic, "to collect samples for COVID-19 researchers, but no viruses were detected in the animal samples. Viruses were only found in environmental samples, including sewage;" (<https://www.globaltimes.cn/content/1189506.shtml>).

China's initial information on the event indicated that the Huanan market was closed on Wed 1 Jan 2020. Since no information became available on the composition of the animal population kept on the market or their test results, ProMED-mail published an RFI on 10 Feb 2020, which included the following questions, still pending (20200210.6972104):

1. Which (domestic/wildlife) animal species are known to have been present in the market on 31 Dec 2019 and/or 1 Jan 2020?
2. What was the fate of the animals above? In case killed, details on the mode of disposal and quantitative data are requested.
3. Was sampling of (any of) the market's animals, in vivo/in vitro, performed?
4. In case sampled, which lab tests have been applied? If affirmed, results, per species, negative included, are requested.
5. Were the (state/local) Veterinary Services involved throughout the procedures above?

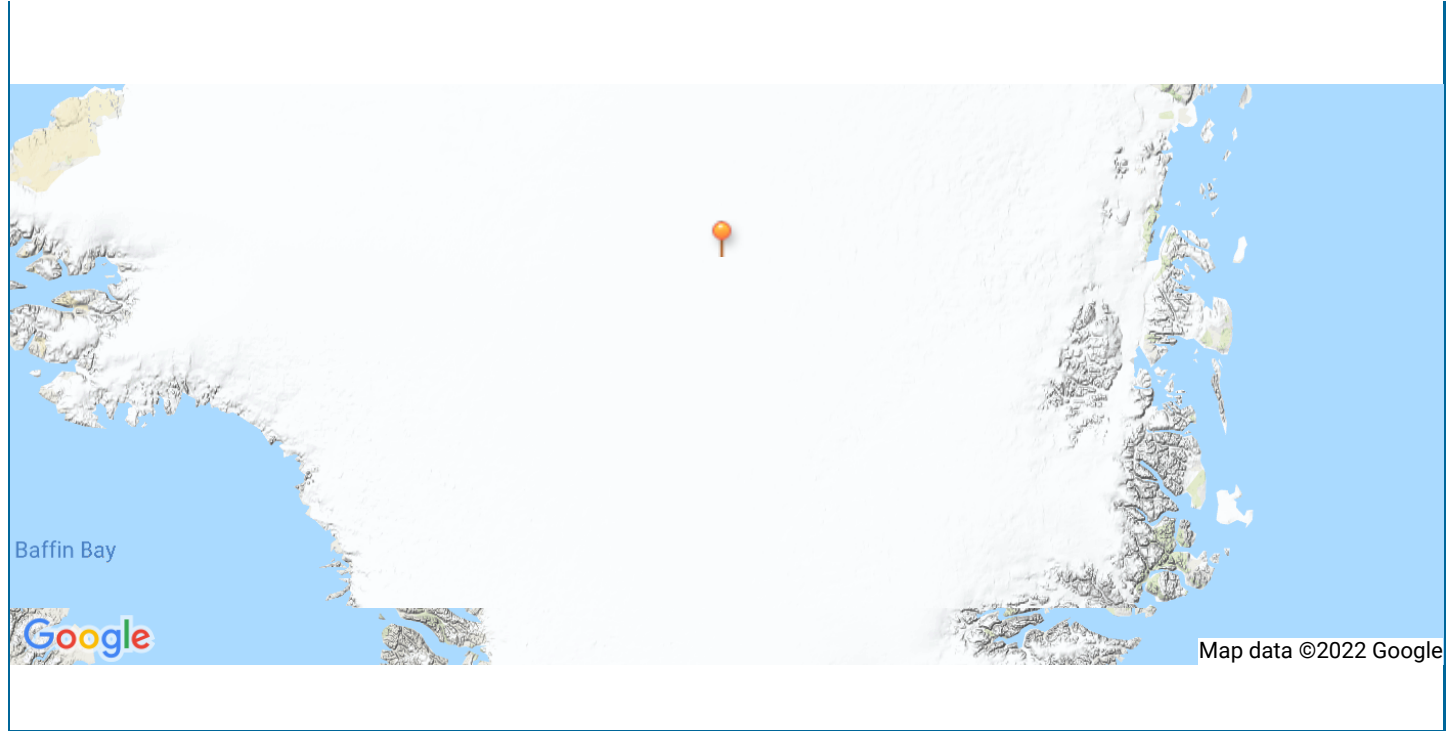
Most likely, the Huanan seafood market included a considerable (stray) cat population. Their test results are becoming of particular interest. - Mod.AS]

See Also

COVID-19 update (215): Netherlands (NB) animal, mink-to-human, epidem., control 20200527.7385049
COVID-19 update (212): Russia (Moskva) animal, cat, OIE 20200526.7379578
COVID-19 update (209): Netherlands (NB) farmed mink, animal-to-human, cat, epid 20200525.7375359
COVID-19 update (198): Netherlands (NB) farmed mink, animal-to-human infect susp 20200520.7359976
COVID-19 update (189): Netherlands (NB) animal, farmed mink, research, cat, dog 20200517.7344274
COVID-19 update (183): Japan/USA, animal, research, cat, experimental infection 20200514.7337185
COVID-19 update (181): Germany (BY), France (AC), cat, OIE animal case definition 20200513.7332909
COVID-19 update (177): Netherlands (NB) animal, farmed mink, Spain (CT) cat susp 20200512.732858
COVID-19 update (174): Netherlands (NB) animal, farmed mink, comment 20200511.7323845
COVID-19 update (169): Netherlands (NB) animal, farmed mink, spread, rabbit susp 20200509.7316646
COVID-19 update (154): Netherlands (NB) animal, farmed mink, research 20200503.7294846

COVID-19 update (146): Netherlands (NB) animal, farmed mink, epidemiology 20200501.7286113
COVID-19 update (135): Netherlands (NB) animal, farmed mink 20200427.7272289
COVID-19 update (146): Netherlands (NB) animal, farmed mink, epidemiology 20200501.7286113
COVID-19 update (143): USA (NY) animal, zoo, tiger, lion, tests 20200430.7284183
COVID-19 update (141): India, animal, wild tiger, susp, clarification, RFI 20200430.7281768
COVID-19 update (138): India, animal, wild tiger, fatal 20200428.7275765
COVID-19 update (135): Netherlands (NB) animal, farmed mink 20200427.7272289
COVID-19 update (130): USA (NY) animal, zoo, tiger, lion, new cases 20200425.7266556
COVID-19 update (124): USA (NY) animal, cat, lion, OIE 20200423.7259119
COVID-19 update (123): USA (NY) animal, cat, conf 20200422.7256272
COVID-19 update (113): USA (NY) cat, animal, susp, RFI 20200418.7240811
COVID-19 update (88): Germany, animal, research, pig, chicken, bat, ferret 20200407.7196506
COVID-19 update (85): USA (NY) animal, tiger, OIE 20200406.7191480
COVID-19 update (84): USA animal, tiger 20200406.7191352
COVID-19 update (76): China (HU) animal, cat, owned, stray, seropositive 20200403.7179946
COVID-19 update (75): China (Hong Kong) animal, cat, OIE 20200403.7179945
COVID-19 update (70): China (Hong Kong) animal, cat, pets & stock 20200402.7173286
COVID-19 update (58): Belgium, animal, cat, clinical case, RFI 20200327.7151215
COVID-19 update (56): China (Hong Kong) animal, dog, final serology positive 20200326.7146438
COVID-19 update (50): China (Hong Kong) animal, dog, 2nd case PCR positive, OIE 20200323.7129951
COVID-19 update (45): China (Hong Kong) animal, dog, 2nd case PCR positive 20200319.7112693
COVID-19 update (37): China (Hong Kong) animal, dog, prelim. serology negative 20200312.7081842
COVID-19 update (30): China (Hong Kong) animal, dog, susp, serology pending 20200306.7057595
COVID-19 update (25): China (Hong Kong) animal, dog, susp, OIE 20200302.7040373
COVID-19 update (22): companion animal, dog susp, RFI 20200229.7036661
COVID-19 update (17): China, animal reservoir, wildlife trade & consumption 20200225.7024245
COVID-19 update (11): animal reservoir, intermediate hosts, pangolin susp 20200220.7009213
COVID-19 update (08): companion animal, RFI 20200218.7002276
COVID-19 update (06): animal reservoir, intermediate hosts 20200217.6997782
Novel coronavirus (40): animal reservoir, pangolin poss intermediate host, RFI 20200210.6972104
Novel coronavirus (28): China (HU) animal reservoir 20200201.6943858
Novel coronavirus (22): reservoir suggested, bats 20200129.6930718
Novel coronavirus (20): China, wildlife trade ban 20200127.6922060
Novel coronavirus (18): China (HU) animal reservoir 20200125.6915411
Novel coronavirus (15): China (HU) wild animal sources 20200123.6909913
Novel coronavirus (03): China (HU) animal reservoir suggested, RFI 20200114.6887480
Novel coronavirus (01): China (HU) WHO, phylogenetic tree 20200112.6885385
Undiagnosed pneumonia - China (HU) (07): official confirmation of novel coronavirus 20200108.6878869
Undiagnosed pneumonia - China (05): (HU) novel coronavirus identified 20200108.6877694
Undiagnosed pneumonia - China (03): (HU) updates, SARS, MERS ruled out, WHO, RFI 20200105.6872267
Undiagnosed pneumonia - China (01): (HU) wildlife sales, market closed, RFI 20200102.6866757
2019

Undiagnosed pneumonia - China: (HU) RFI 20191230.6864153
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