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CORONAVIRUS DISEASE 2019 UPDATE (56): ANIMAL, SARS-COV-2 DELTA VARIANT, CAT

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A ProMED-mail post

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[1]

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<https://www.news-medical.net/news/20220223/First-reported-case-of-a-cat-infected-with-SARS-CoV-2-Delta-AY3-variant.aspx>

First reported case of a cat infected with SARS-CoV-2 delta AY.3 variant

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is hurting our loved ones -- even those that walk on 4 legs. Researchers from the University of Pennsylvania documented the recovery of an 11-year old indoor housecat living in Delaware who first presented to the veterinary hospital after experiencing distressing gastrointestinal signs.

Doctors identified the 1st case of feline COVID-19 infection from the AY.3 delta variant through fecal samples. The variant had previously been reported in humans and 1 domestic dog. The cat's infection was traced back to exposure to an infected human. The study provides further evidence of how the delta variant is spreading to animals and the urgency to see how the virus potentially evolves while in a non-human host.

"Since domestic felines can support relatively efficient replication of SARS-CoV-2 viral genomes similar to those infecting humans, can transmit SARS-CoV-2 viruses to naïve conspecifics, and frequently have a high degree of contact with humans, they have the potential to become an enzootic reservoir for the virus," wrote the researchers. "This highlights the need to closely track SARS-CoV-2 variants of concern in domestic house cats to better understand the intertwined nature of animal and human health in this global pandemic."

A curious case of COVID in a cat

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An 11-year old indoor-only female cat arrived at the University of Pennsylvania School of Veterinary Medicine after several days of having anorexia, lethargy, soft stools, and vomiting. The cat was around an owner who had tested positive for SARS-CoV-2 1 week before the cat started showing signs but had promptly isolated from the cat and family members. The cat was isolated from the

owner for 11 days and cared for by another person who repeatedly tested negative for SARS-CoV-2.

The cat was immunocompromised with a prior history of presumptive chronic enteropathy and hypertrophic obstructive cardiomyopathy. The cat's condition was managed with a hydrolyzed protein diet and a beta-blocker called atenolol.

The vets found the cat's heart rate, respiratory rate, and temperature were normal. The cat's lungs also sounded normal. However, she showed discomfort with abdominal palpation.

The vets took a fecal sample and a throat swab to test for SARS-CoV-2. A separate fecal sample was used to test for pathogens involved in feline gastrointestinal disease, including Feline parvovirus, *Tritrichomonas foetus*, *Campylobacter jejuni*/coli, *Cryptosporidium* spp., *Cryptosporidium felis*, *Salmonella* spp., *Giardia* spp., *Clostridium difficile* toxin A/B, and *Clostridium perfringens* enterotoxin.

PCR testing confirmed SARS-CoV-2 infection in the cat.

A genetic analysis traced the virus infecting the cat to the delta variant lineage AY.3. The cat fecal samples showed a total of 45 mutations. While the AY.3 variant in the cat had similar mutations to the AY.3 genetic sequences in humans, some mutations were unique to the cat.

After sequencing more than 4200 human samples of the AY.3 variant living in the Delaware Valley in Pennsylvania, the researchers found 10 single nucleotide polymorphisms that appeared in only 5% of the samples. Additionally, 7 of the 10 single-nucleotide mutations were silent mutations. The 3 non-silent mutations included an I3731V mutation in the Nsp6 protein, the N2426T mutation in the Nsp16 protein, and a D80N mutation on the spike protein.

Compared to humans with the AY.3 sequence, the viral sequence in the cat had a difference of 4 to 14 single nucleotide polymorphisms.

The researchers point out at the time of their study, another cat living in Virginia had also become infected with the AY.3 delta variant but the findings had not been published yet. However, when comparing the genome of both cats, the team observed a difference of 4 SNPs.

Phylogenetic analysis confirmed the genetic sequence obtained from the cat in Pennsylvania and the cat in Virginia are divergent from human sequences of the AY.3 variant. Based on the findings, the researchers suggest the unique single nucleotide polymorphisms in cats is evidence the feline AY.3 variant is more distant on the phylogenetic tree. These mutations may be exclusive to cats but more research is needed to confirm this theory.

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[2]

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<https://www.mdpi.com/1999-4915/14/2/421/htm>

Citation: Lenz OC, Marques AD, Kelly BJ, Rodino KG, Cole SD, Perera RAPM, Weiss SR, Bushman FD, Lennon EM. SARS-CoV-2 Delta Variant (AY.3) in the Feces of a Domestic Cat. *Viruses*. 2022; 14(2):421

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Abstract

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections have spilled over from humans to companion and wild animals since the inception of the global COVID-19 pandemic. However, whole genome sequencing data of the viral genomes infecting non-human animal species have been scant. Here, we detected and sequenced a SARS-CoV-2 delta variant (AY.3) in fecal samples from an 11-year-old domestic house cat previously exposed to an owner who tested positive for SARS-CoV-2. Molecular testing of 2 fecal samples collected 7 days apart yielded relatively high levels of viral RNA. Sequencing of the feline-derived viral genomes showed the 2 to be identical, and differing by between 4 and 14 single nucleotide polymorphisms in pairwise comparisons to human-derived lineage AY.3 sequences collected in the same geographic area and time period. However, several mutations unique to the feline samples reveal their divergence from this cohort on phylogenetic analysis. These results demonstrate continued spillover infections of emerging SARS-CoV-2 variants threatening human and animal health, as well as highlight the importance of collecting fecal samples when testing for SARS-CoV-2 in animals. To the authors' knowledge, this is the first published case of a SARS-CoV-2 delta variant in a domestic cat in the United States.

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[ProMED thanks Mahmoud Orabi for these submissions.

While our pets seem to recover, it is incumbent upon owners to isolate themselves (the owners) when infected and protect their pets. Sadly, it is unlikely this will be the last variant to spill over into our domestic animals. - Mod.TG

ProMED map:

Delaware, United States: <https://promedmail.org/promed-post?place=8701639,211>]

## See Also

COVID-19 update (322): SARS-CoV-2-like virus origins, Laos, spillover rate, WHO 20210919.8687395

COVID-19 update (321): variants review, FDA booster approval, South Asia, WHO 20210918.8685750

COVID-19 update (320): spillover events, long COVID, mandatory vaccines, WHO 20210917.8679439

COVID-19 update (319): Israel booster doses, WHO 20210916.8674485

COVID-19 update (318): animal, Spain (GA) mink, OIE 20210915.8670441

COVID-19 update (317): COVID & flu dual threat, children, autoantibodies, WHO 20210915.8670656

COVID-19 update (316): nursing home infections, boosters, non-COVID deaths, WHO 20210914.8668802

COVID-19 update (315): animal, Mongolia, beaver, delta variant, 1st rep 20210914.8668125

COVID-19 update (314): vaccines vs variants, updates, seniors, WHO 20210913.8666135

COVID-19 update (313): animal, USA, zoo, gorilla 20210913.8665151

COVID-19 update (312): kidney disease, vent.-assoc. spread, USA (FL) deaths, WHO 20210912.8663533

COVID-19 update (311): vaccines, nursing homes, long COVID, eating disorders 20210911.8662043

COVID-19 update (310): impact on women & children, Africa, mRNA vaccines, Israel 20210910.8660335

COVID-19 update (309): USA, vaccines, mu variant, regional, WHO 20210909.8657658

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COVID-19 update (307): updates, long COVID, WHO 20210907.8652259

COVID-19 update (306): Moderna booster, mRNA vaccines, USA deaths, WHO 20210906.8649944

COVID-19 update (305): Norway, vaccine efficacy, vaccination for children, WHO 20210905.8647604

COVID-19 update (304): children and adolescents, delta and mu variants, WHO 20210904.8645927

COVID-19 update (303): post-vacc. infection risk, Europe boosters, immunity, WHO 20210903.8643830

COVID-19 update (302): animal, Sweden, mink, OIE 20210903.8643313  
COVID-19 update (301): long COVID, USA case surge, aspirin therapy, WHO 20210902.8641534  
COVID-19 update (300): Norway, myocarditis, schools, new variant C.1.2, WHO 20210901.8638460  
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COVID-19 update (280): new variant B.1.621, Canada, regional, WHO 20210814.8595594  
COVID-19 update (270): myocarditis, pericarditis, Australia, WHO 20210806.8575370  
COVID-19 update (260): animal, USA, wild deer, exposure, RFI 20210729.8554149  
COVID-19 update (250): caregiver loss, school buses, mRNA vaccines, WHO 20210722.8538296  
COVID-19 update (200): animal, China, origin 20210608.8433657  
COVID-19 update (100): antibodies, vaccine, Thailand, Cambodia, WHO, global 20210316.8250009  
COVID-19 update (50): UK vaccine study, Brazil reinfection, WHO 20210205.8167161  
COVID-19 update (01): variants, vaccine, Thailand, global, WHO 20210101.80629382020  
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COVID-19 update (562): viral load, UK vacc dose, ECDC, WHO 20201231.8061525  
COVID-19 update (01): China, global, EVZD, reporting criteria, WHO 20200213.6984084  
Novel coronavirus (42): China, global, COVID-19, SARS-CoV-2, WHO 20200211.6979942  
Novel coronavirus (01): China (HU) WHO, phylogenetic tree 20200112.6885385  
Undiagnosed pneumonia: China (HU) (10): genome available, Hong Kong surveill. 20200111.6883998  
Undiagnosed pneumonia: China (01): (HU) wildlife sales, market closed, RFI 20200102.6866757  
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