

Evidence suggests SARS-CoV-2 virus attacks brain endothelial cells

October 25 2021, by Bob Yirka

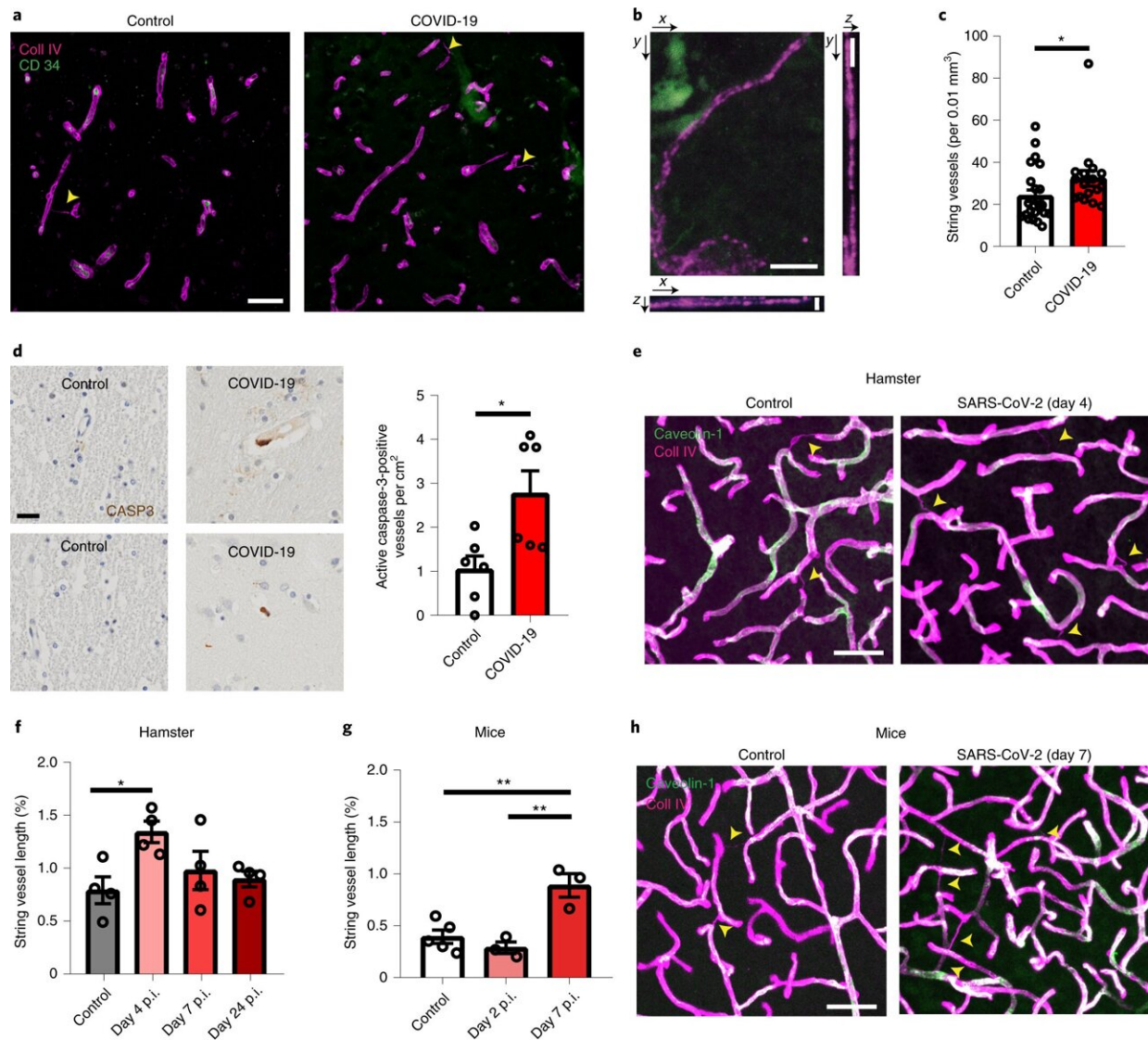


Fig. 1: SARS-CoV-2 infection is associated with increased string vessels in the brain. a–c, In the brains of SARS-CoV-2-infected patients, empty basement

membrane tubes, also known as string vessels (arrowheads), were increased in the frontal cortex. Sections were stained for the basement membrane marker collagen IV (coll IV) and the endothelial marker CD34. Representative images in a and b were obtained from the dataset in c. a, Scale bar, 50 μm . b, Magnified maximal projection of a z-stack of a string vessel with orthogonal views to exclude that these are partial sections of capillaries. Scale bars, 3 μm . c, Quantification of string vessels per image volume. $N = 23$ control patients, $N = 17$ COVID-19 patients. d, Immunostaining revealed a higher number of active caspase-3-positive vessels in cortical sections of SARS-CoV-2-infected patients ($N = 6$) than in controls ($N = 6$). Representative images and quantification are shown. Scale bar, 20 μm . e,f, SARS-CoV-2-infected hamsters developed an increased number of string vessels as shown by co-staining for coll IV and the endothelial marker caveolin-1. e, Representative images of coll IV and caveolin-1 in the cortex of hamsters 4 d post infection (p.i.) with SARS-CoV-2 and of uninfected hamsters. Scale bar, 50 μm . f, Quantification of string vessel lengths as a percentage of total vessel length in SARS-CoV-2-infected hamsters at 4, 7 and 24 d p.i. and in uninfected controls ($N = 4$ hamsters per group). g,h, SARS-CoV-2-infected K18-hACE2 mice developed an increase in string vessels as shown by co-staining for coll IV and caveolin-1. g, Quantification of string vessel lengths as a percentage of total vessel length in SARS-CoV-2-infected K18-hACE2 mice 2 d p.i. ($N = 3$ mice) and 7 d p.i. ($N = 3$ mice) and in uninfected controls ($N = 5$ mice). h, Representative images of coll IV and caveolin-1 in the cortex of K18-hACE2 mice 7 d p.i. and of uninfected K18-hACE2 animals. Scale bar, 50 μm . *P

Citation: Evidence suggests SARS-CoV-2 virus attacks brain endothelial cells (2021, October 25) retrieved 23 April 2024 from <https://medicalxpress.com/news/2021-10-evidence-sars-cov-virus-brain-endothelial.html>

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