

Sponsors

CDC

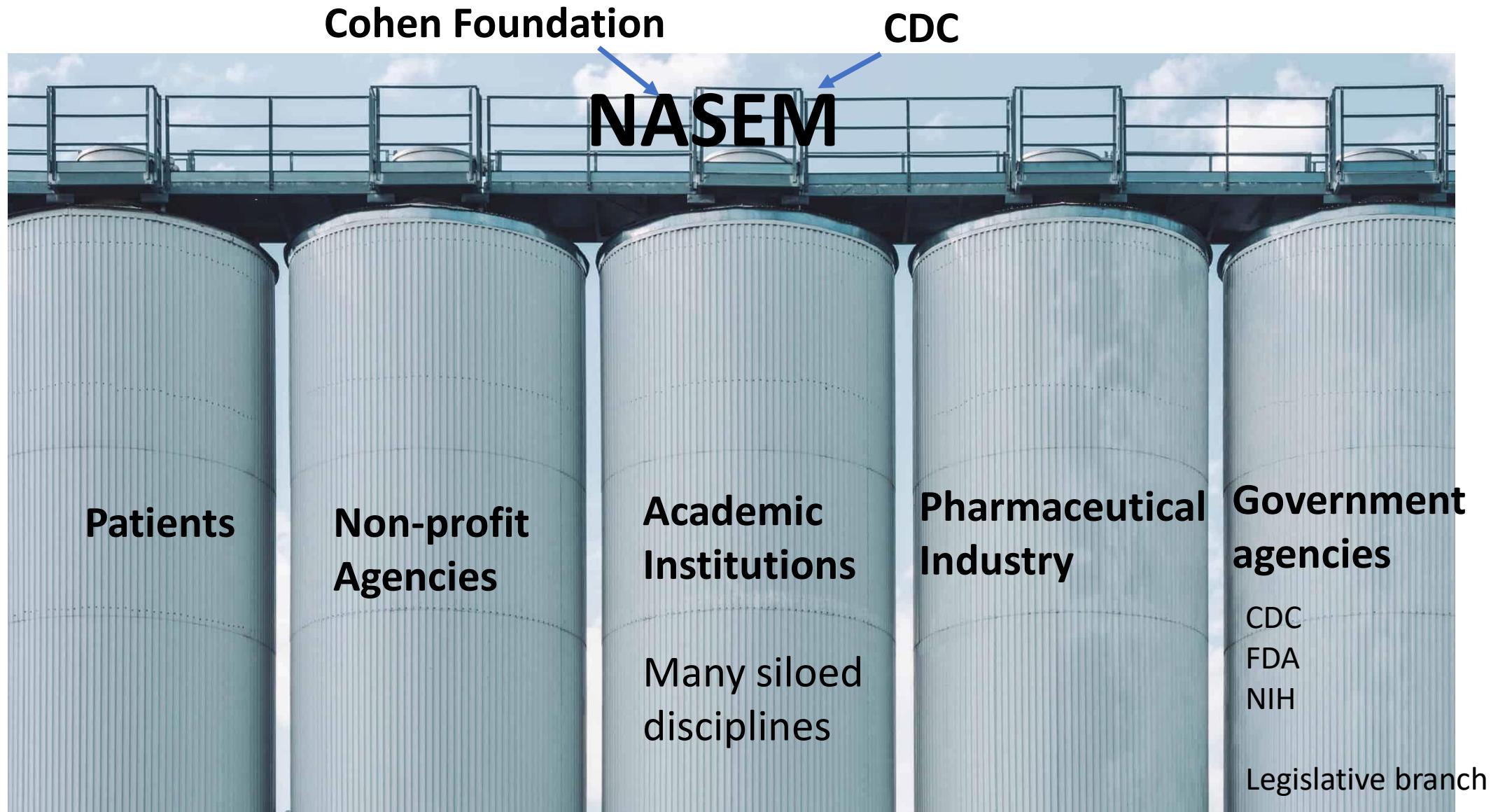
Cohen Foundation

“Humbled by the expertise and patient voices that are so powerful”

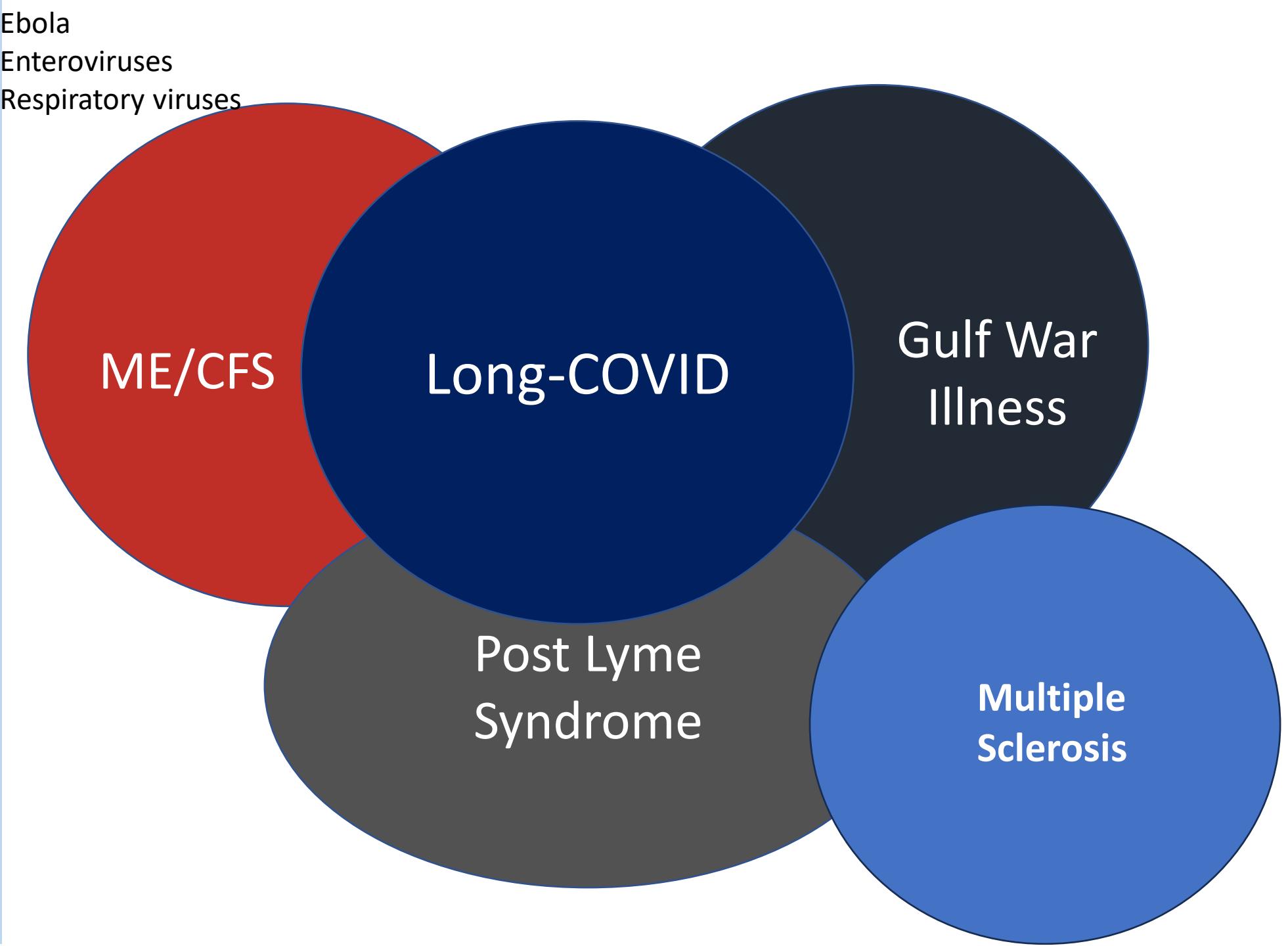
“Meet the challenges with tenacity, grace and wisdom”

“Partnership will last beyond the two days”



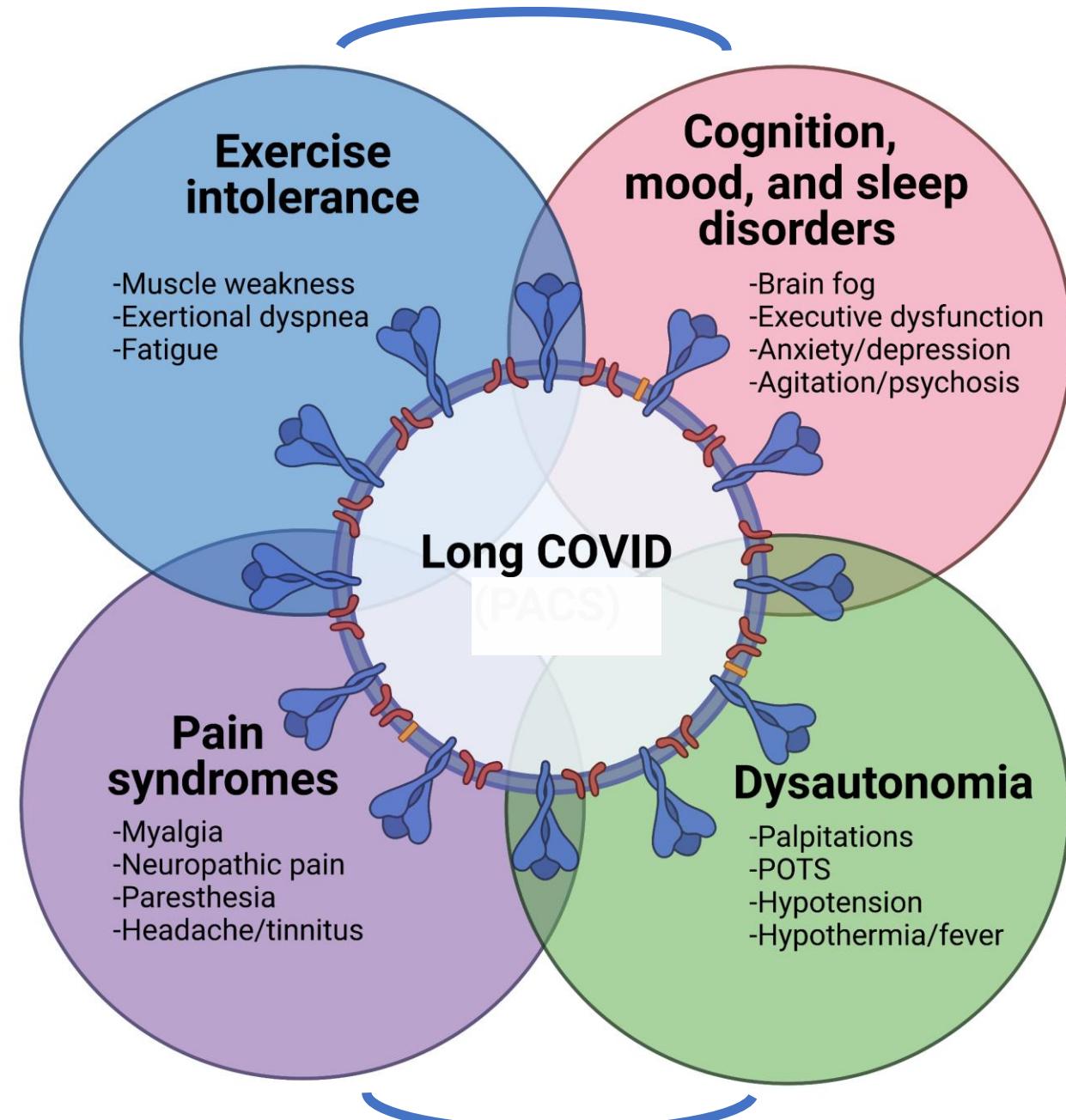


Biggest Mysteries of Medicine



Heterogeneity of Symptoms

(splitters and lumpers)



Challenges

- Epidemiology not clear
- No diagnostic tests (even documentation of infection)
- No treatment for altering disease course
- Gap in understanding of pathogenesis
- Lack of resources

Longitudinal analysis reveals high prevalence of Epstein-Barr virus associated with multiple sclerosis

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Clonally expanded B cells in multiple sclerosis bind EBV EBNA1 and GlialCAM

<https://doi.org/10.1038/s41586-022-04432-7>

Received: 6 August 2021

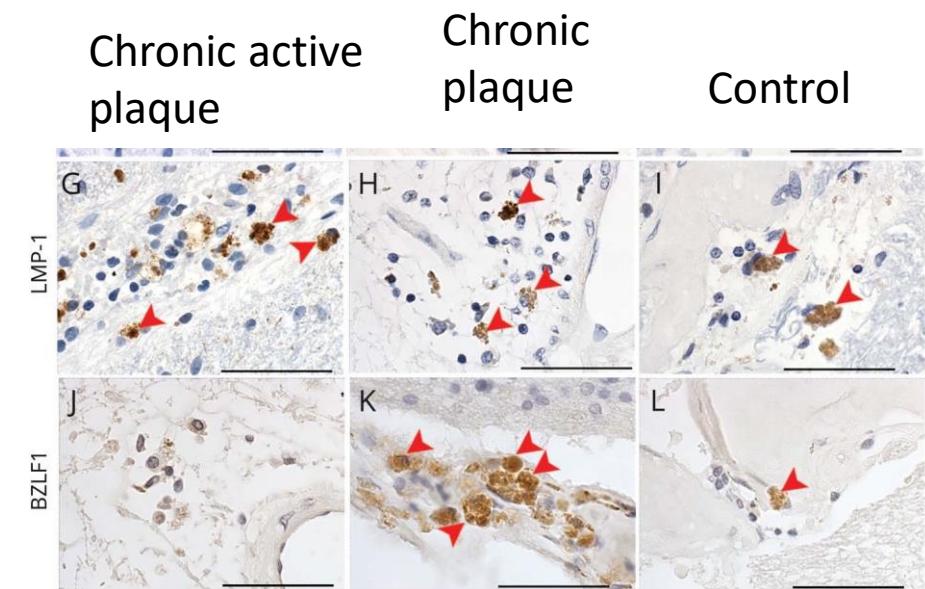
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Check for updates

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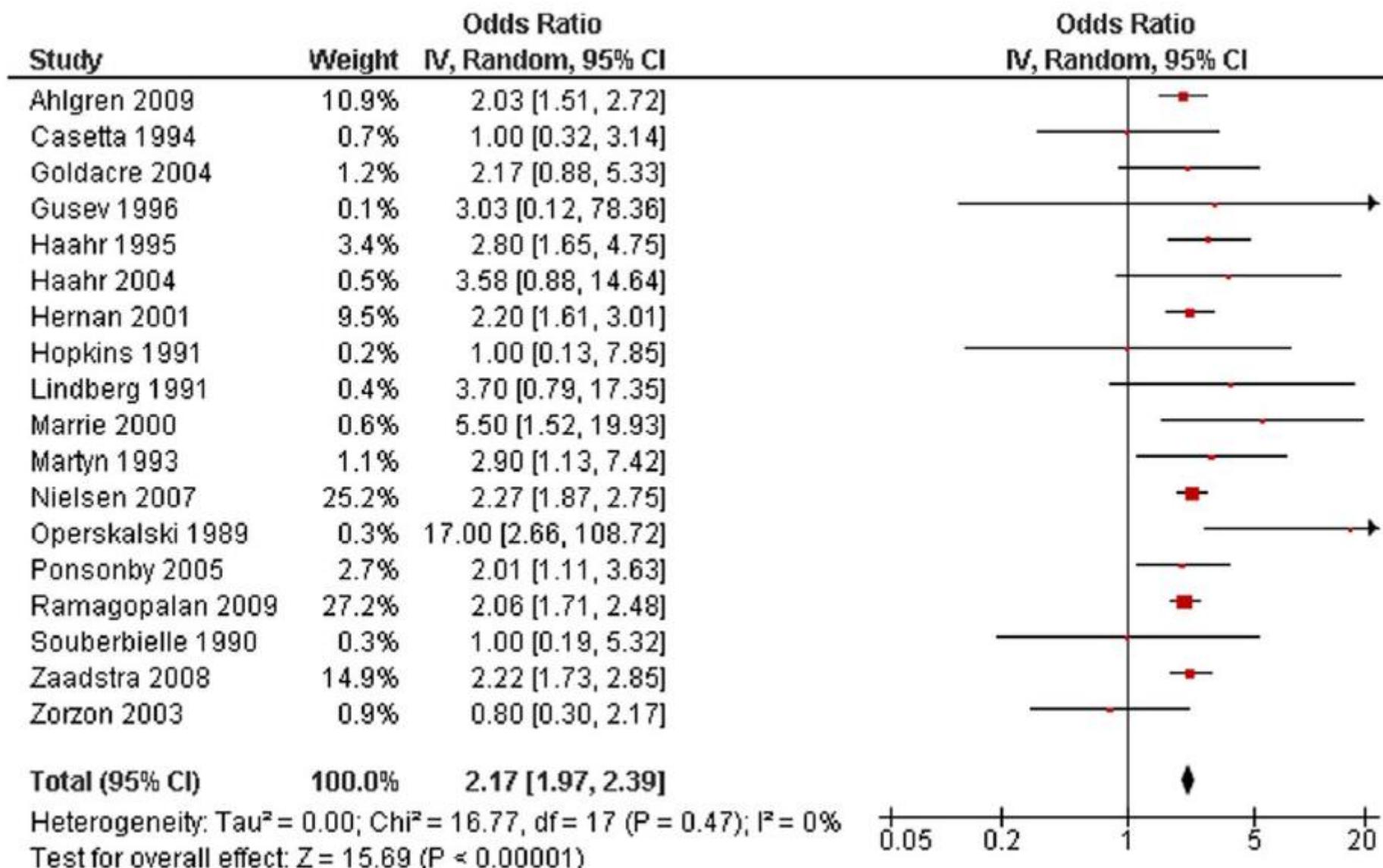
Persistent EBV in brain



Moreno MA, et al., 2018

Sefarini 2013, 2014, 2017, 2019
Veroni et al., 2018
Tzartos et al., 2012
Hassini et al., 2018

Forest plot for risk of MS after EBV infection (Handel et al., 2010)



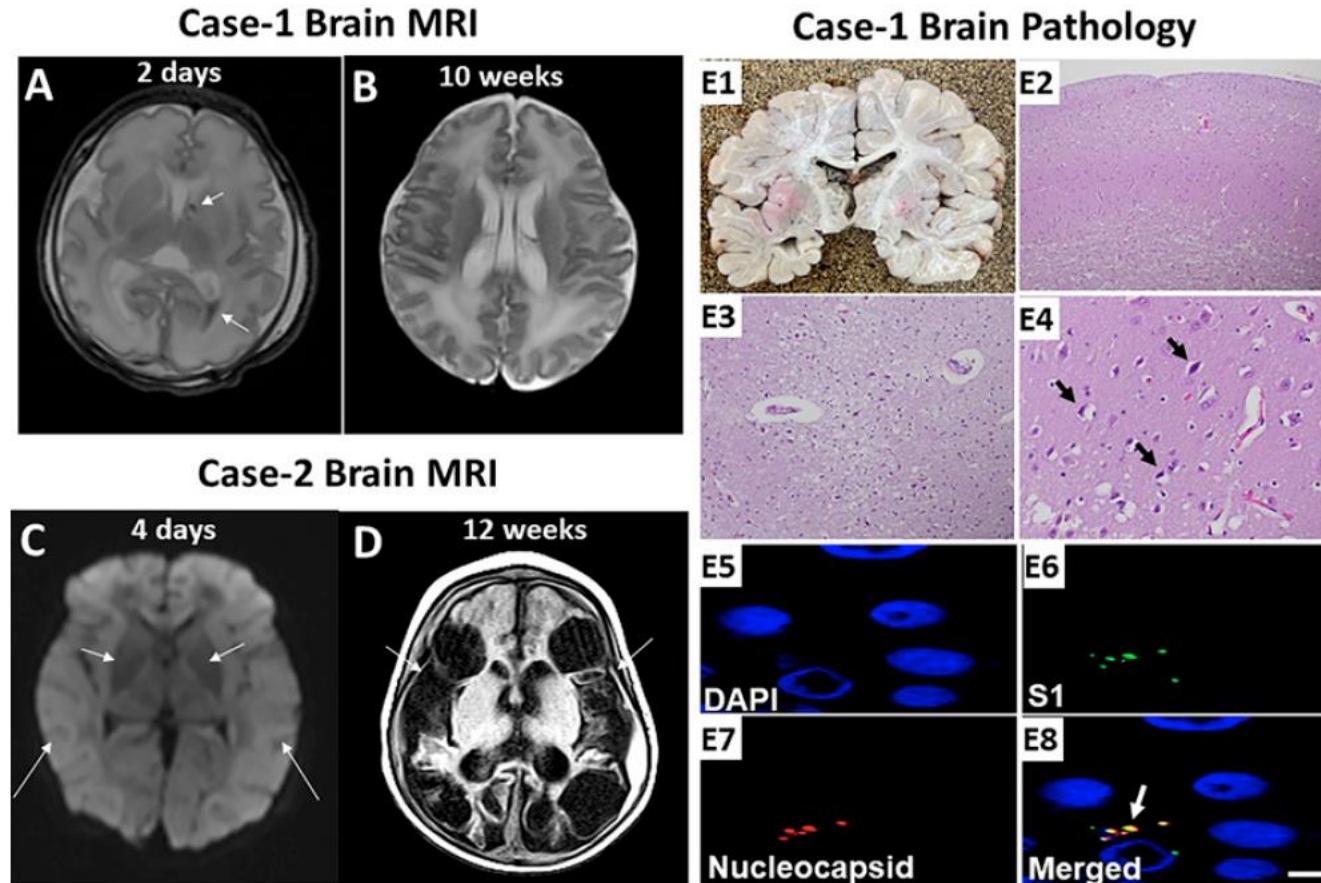
Viral/microbial etiology

- Persistent infection
- Defective virus/ viral products
- Reactivation of latent viruses/co-infection
- Microbiome

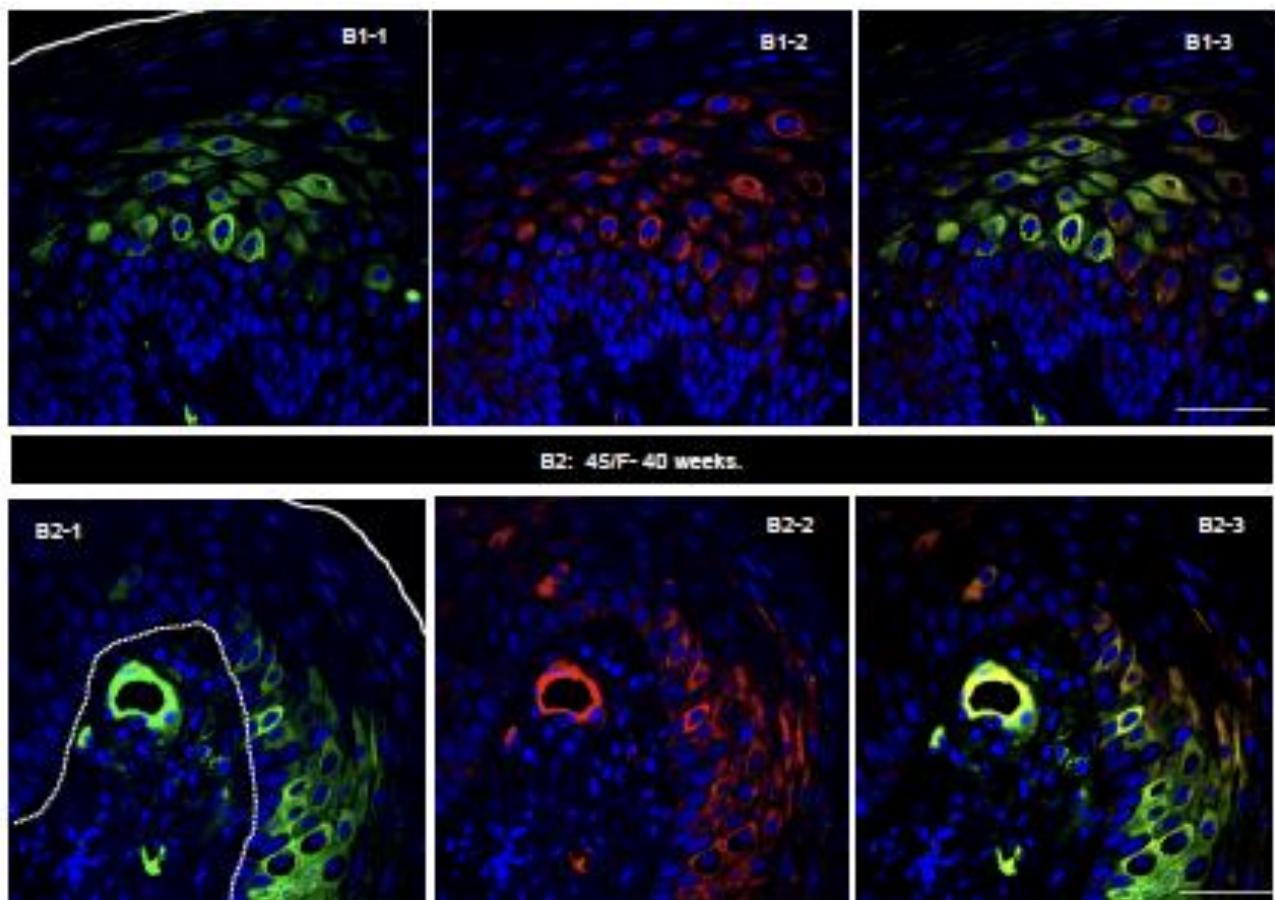
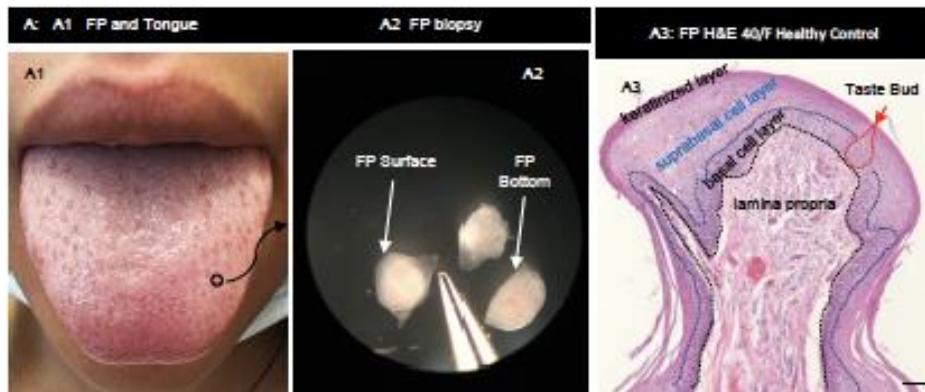
Maternal SARS-CoV-2, Placental Changes and Brain Injury in 2 Neonates

Merline Benny, MD,^a Emmalee S. Bandstra, MD,^a Ali G. Saad, MD,^b Roberto Lopez-Alberola, MD,^c Gaurav Saigal, MD,^d Michael J. Paidas, MD,^e Arumugam R. Jayakumar, PhD,^e Shahnaz Duara, MD^a

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SARS-CoV-2 in taste papillae

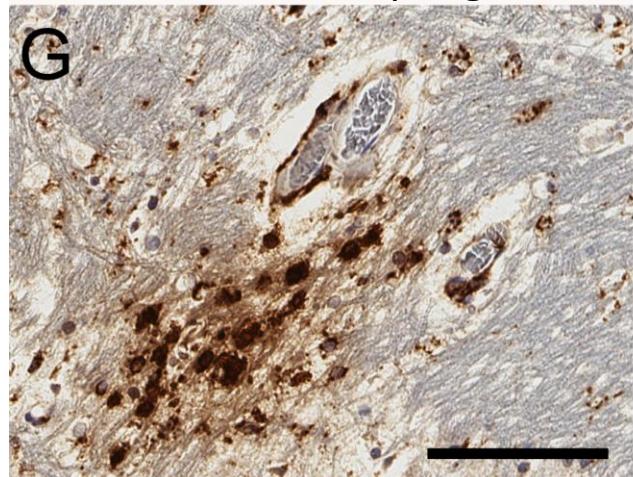


Yao Q,---Egan JM. NEJM
Evidence in press

Persistent Immune activation

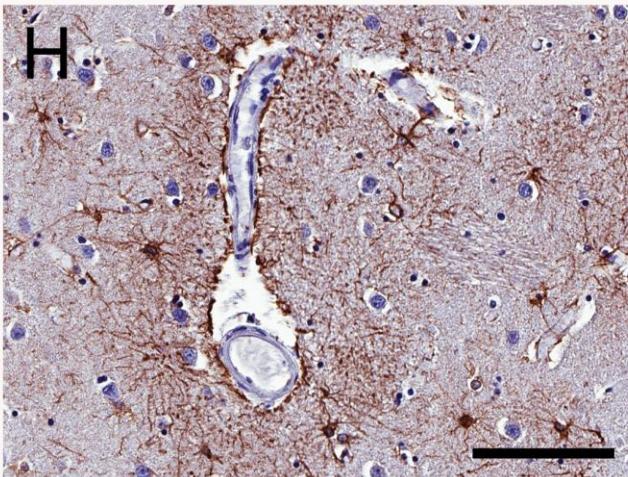
- Innate immune activation
- Autoimmune antibodies
- Immune exhaustion
- ?Genetic factors

CD68: Macrophages



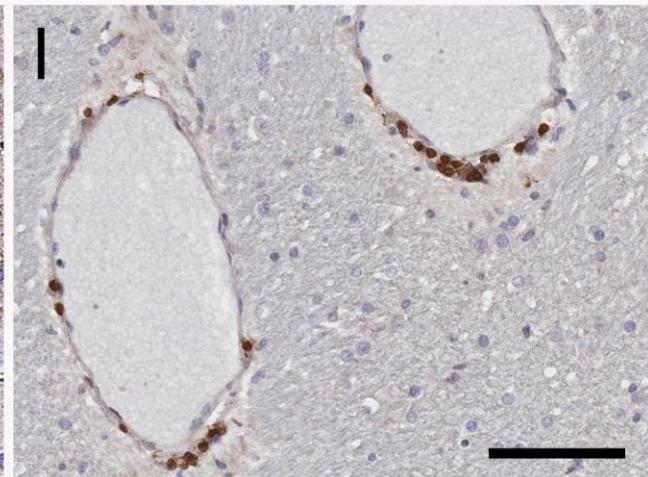
G

GFAP: Astrocytes



H

CD3 T cells



I

CD61: Activated platelets



50 µm

Perivascular activated macrophages

Perivascular activated astrocytes

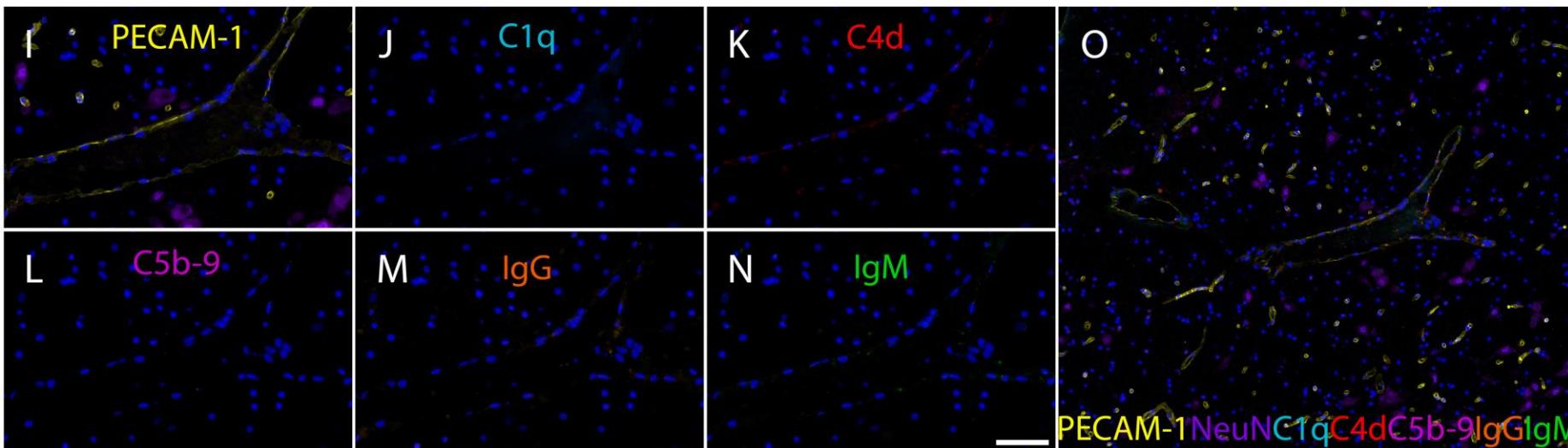
Very few T cells and confined to the blood vessels

Platelets are sticking to endothelial cells and forming clots

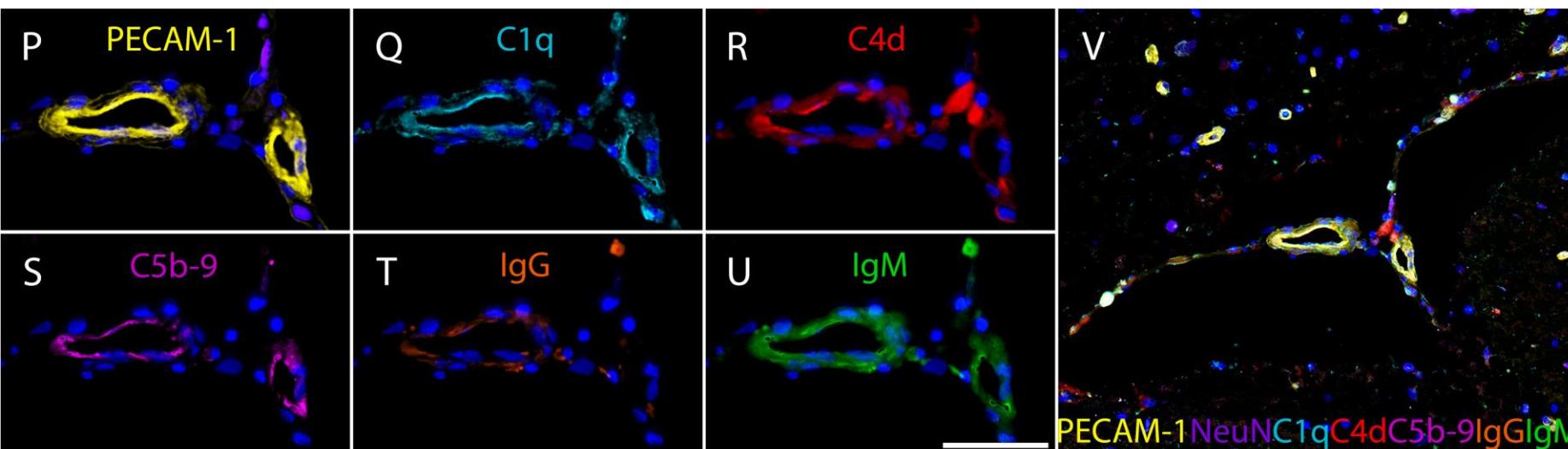
Lee et al. Brain 2022

Lee et al., NEJM 2021

Control



COVID-19



Activation of endothelial cells (PECAM-1)

Deposition of complement

Deposition of IgG and IgM

Suggestions

Infection associated chronic illnesses: An entity

Patient engagement at every step of research process

Development of diagnostics/ biomarkers

In vitro organoids or in vivo animal models

Multidisciplinary clinics

Study pathogenesis in the context of clinical trials

Innovative design of clinical trials

Keystone Symposia
Long-COVID
Aug 27-30, 2023

