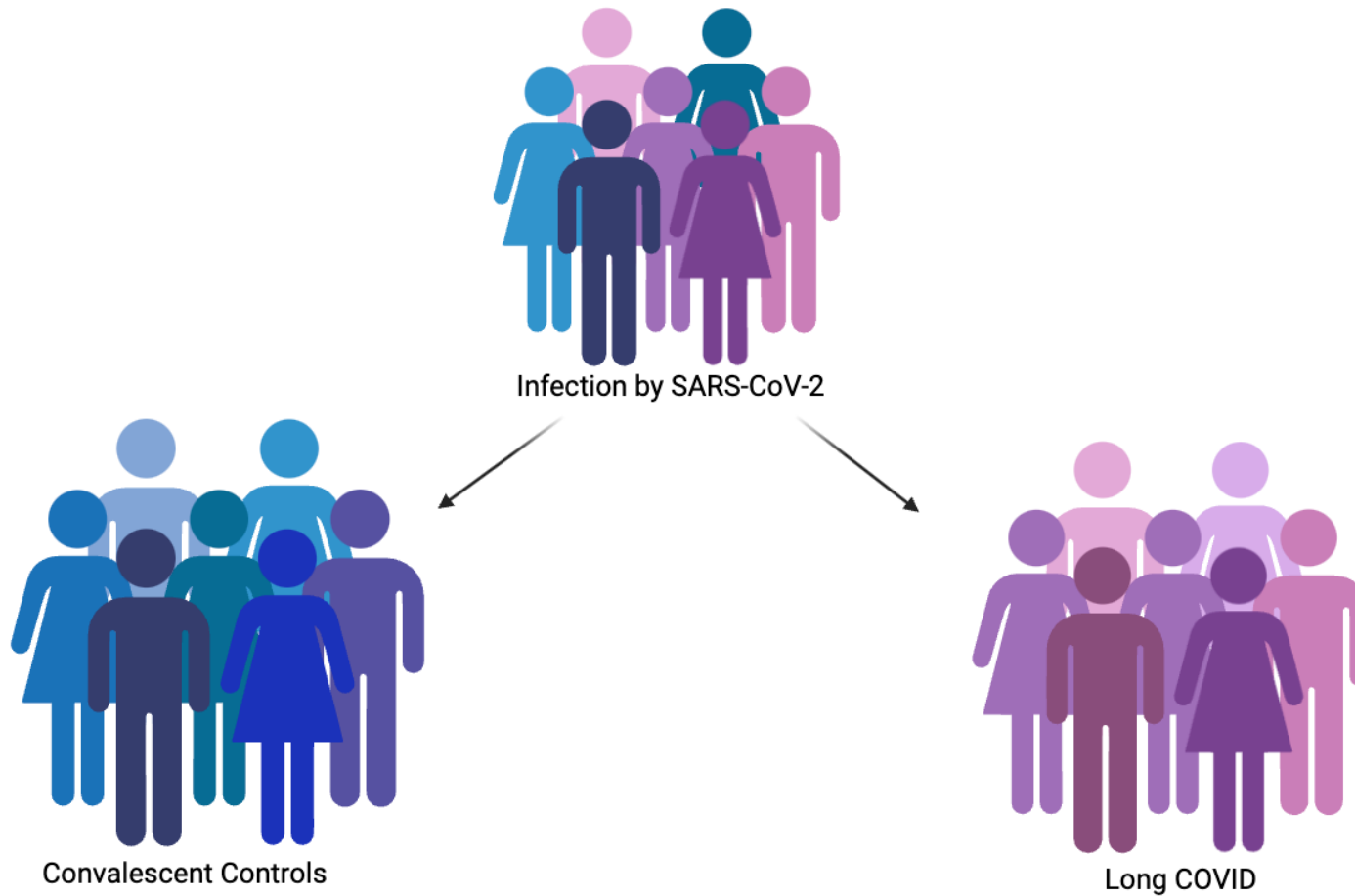


Autoantibodies Analysis in Long COVID and ME/CFS

Keyla Sá

Mentor: Akiko Iwasaki · Yale Department of Immunobiology

Can viral infections trigger autoimmune diseases?



COVID-19 significantly increases risk of autoimmune disease

>6M

individuals across
4 independent cohort
studies

↑ Risk

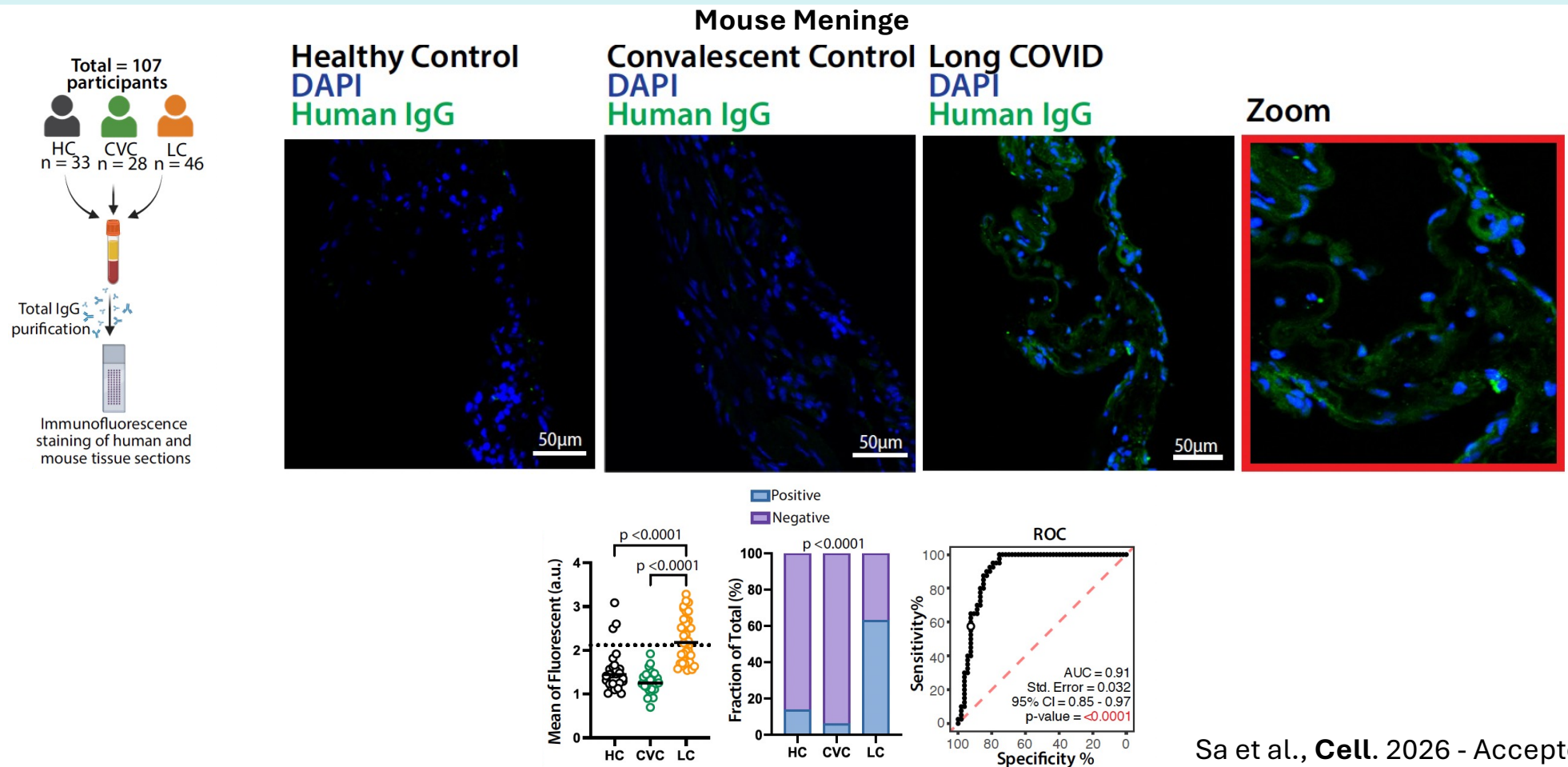
of autoimmune disease
following SARS-CoV-2
infection

Global

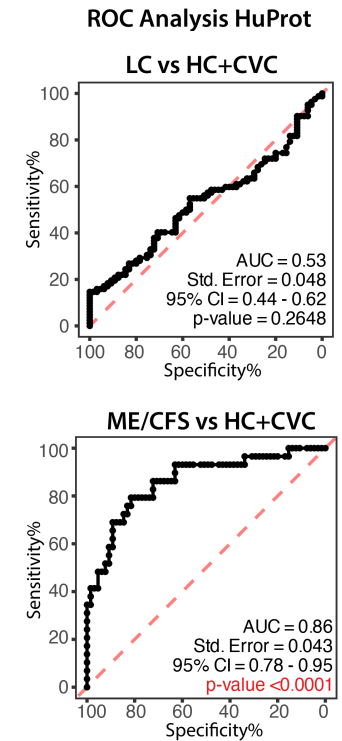
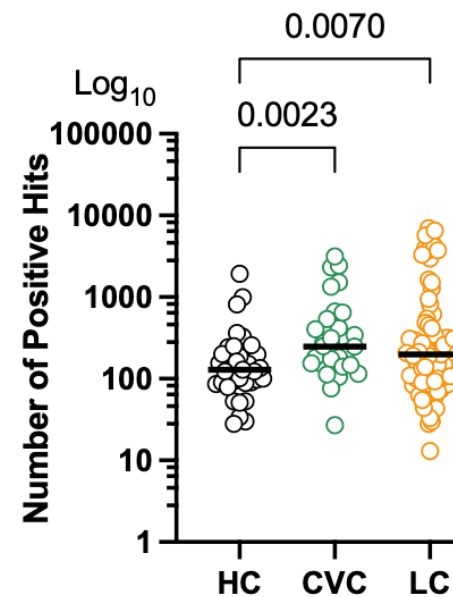
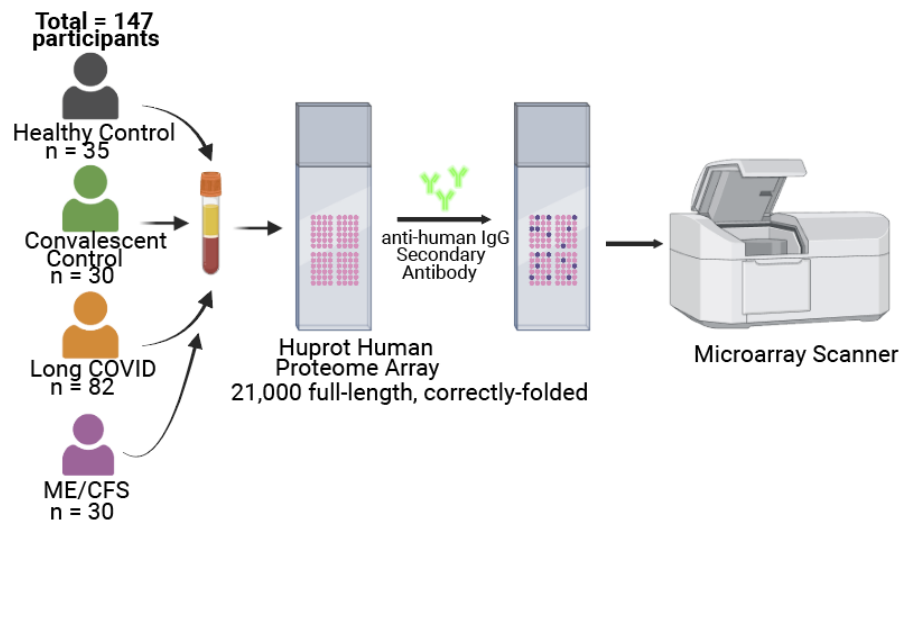
evidence from UK, Taiwan,
Germany & US populations

- Peng K, et al. Risk of autoimmune diseases following COVID-19 and the potential protective effect from vaccination: a population-based cohort study. *EClinicalMedicine*. 2023 Aug 16;63:102154.
- Chang R, et al. Risk of autoimmune diseases in patients with COVID-19: A retrospective cohort study. *EClinicalMedicine*. 2023 Feb;56:101783.
- Tesch F, et al. Incident autoimmune diseases in association with SARS-CoV-2 infection: a matched cohort study. *Clin Rheumatol*. 2023 Oct;42(10):2905-2914.
- Syed U, et al. Incidence of immune-mediated inflammatory diseases following COVID-19: a matched cohort study in UK primary care. *BMC Med*. 2023 Sep 21;21(1):363.

Long COVID patients have autoantibodies against neurological tissues



Long COVID patients have diverse, private autoantibodies

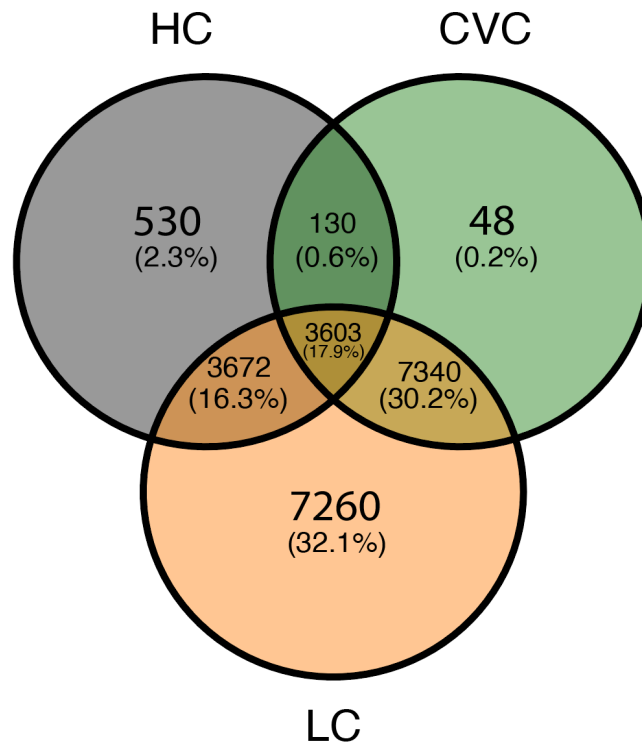


Autoantibodies are Increased in LC and ME/CFS

ME/CFS data - Unpublished

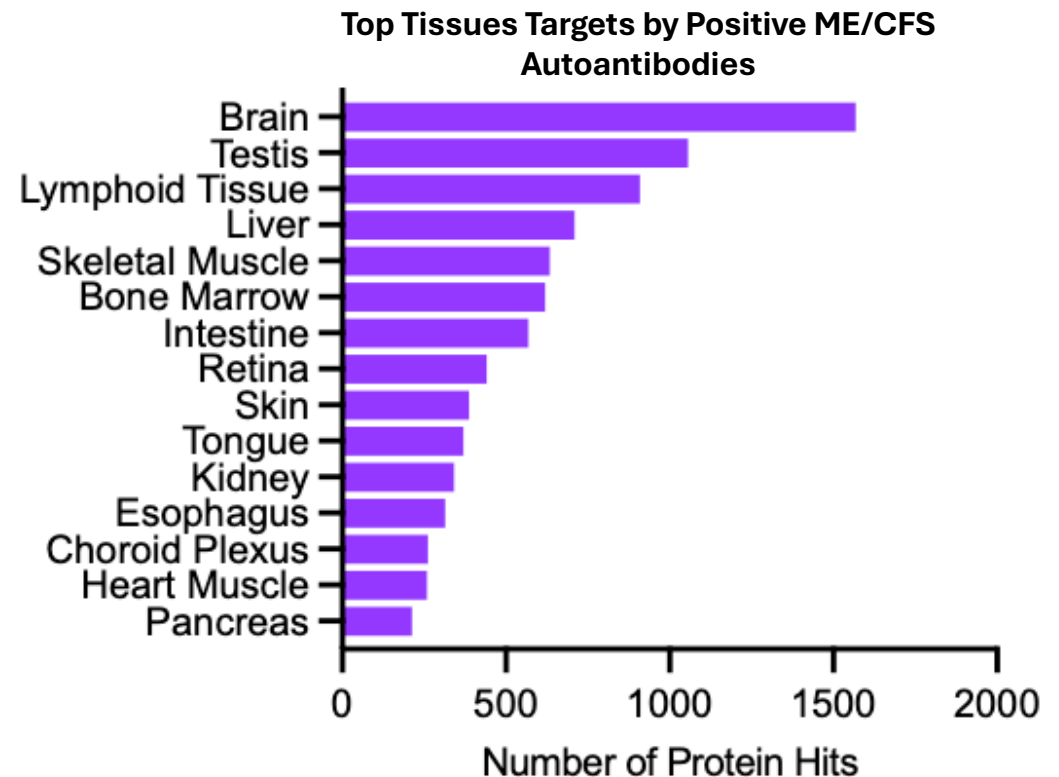
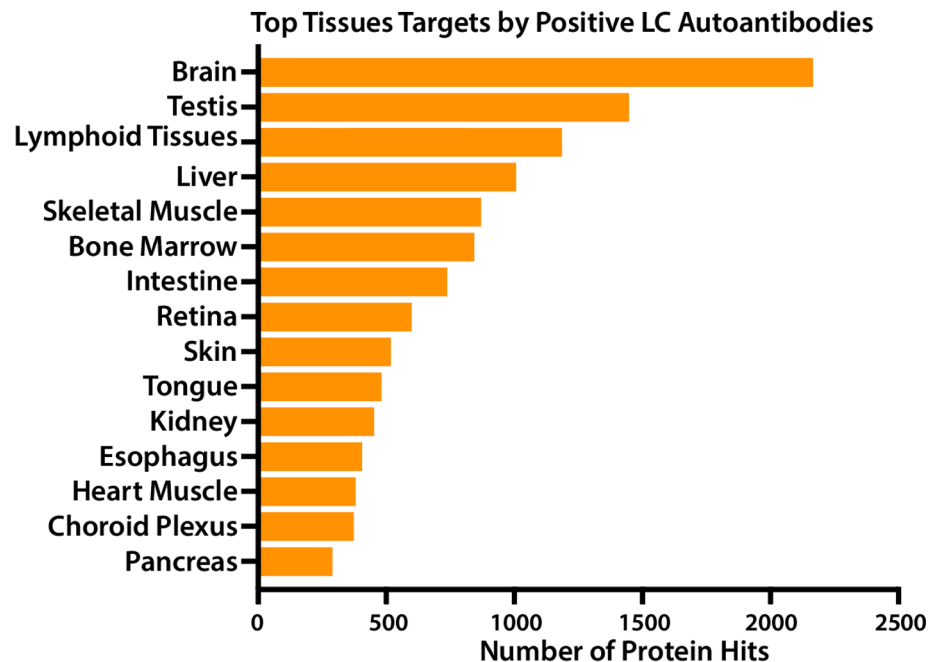
LC data - Sa et al., **Cell**. 2026 - Accepted

Long COVID patients have diverse, private autoantibodies



LC and ME/CFS Share the Same Autoantibodies

Long COVID patients have diverse, private autoantibodies

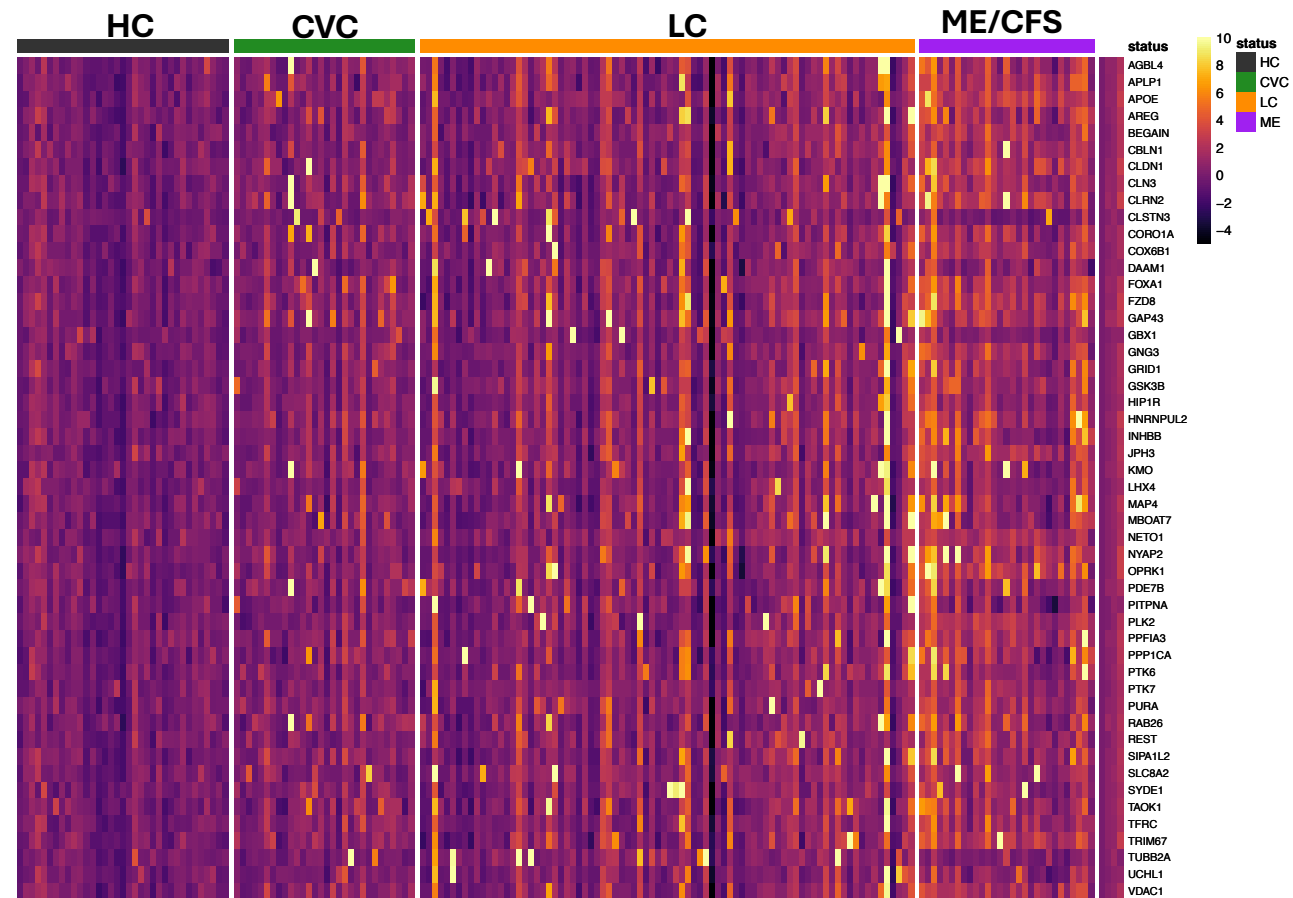


Autoantibodies in LC and ME/CFS Bind Neurological Tissues

LC data - Sa et al., **Cell**. 2026 - Accepted

ME/CFS data - Unpublished

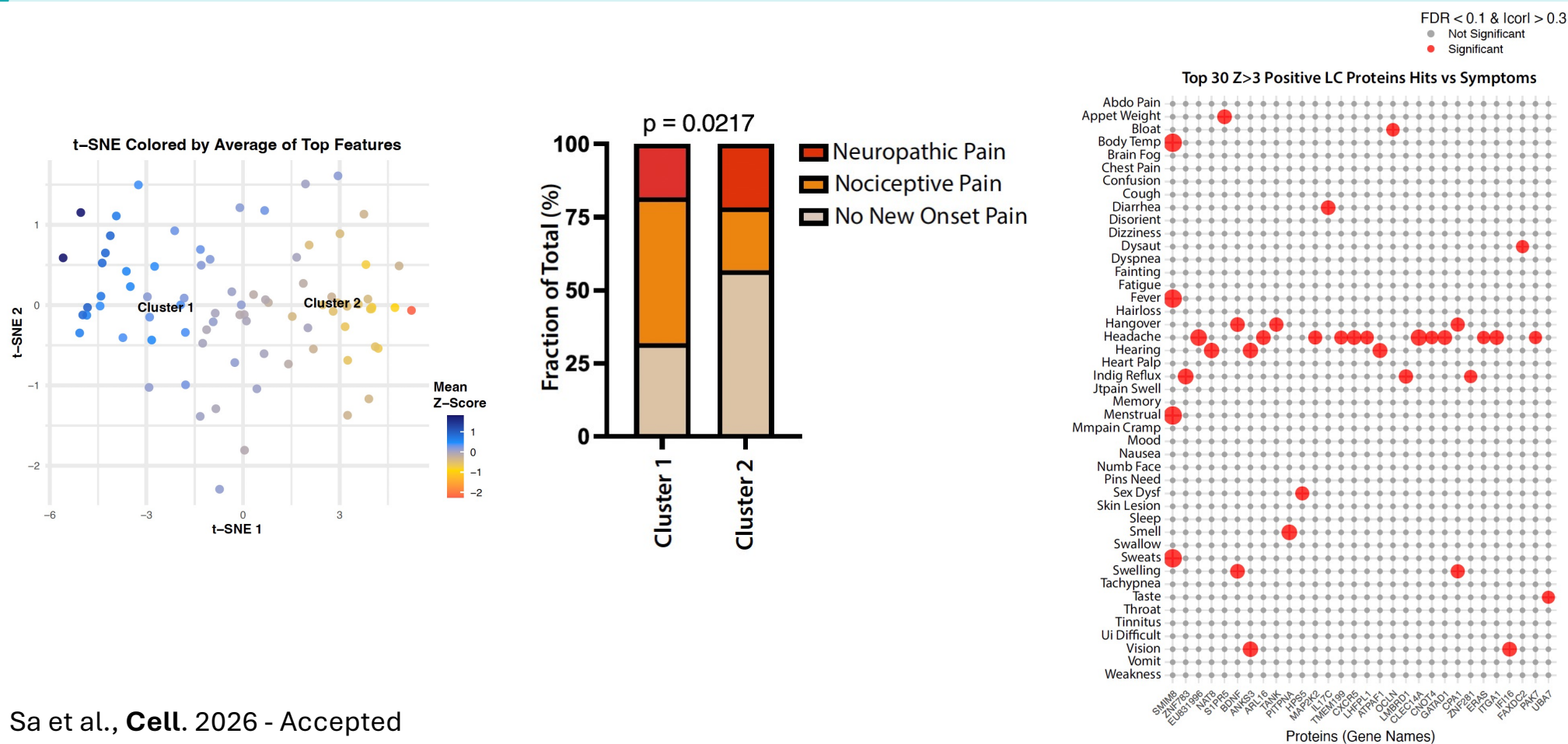
Long COVID patients have diverse, private autoantibodies



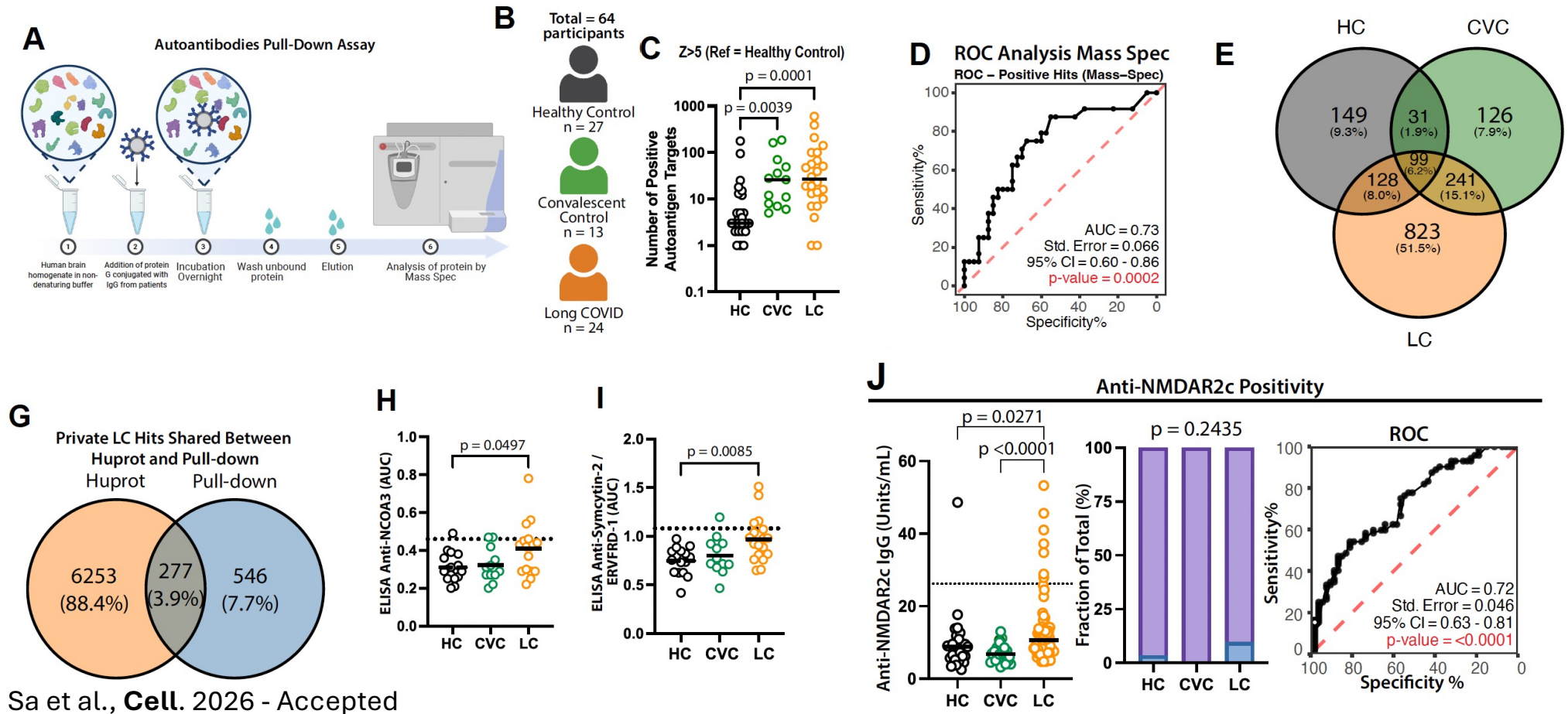
LC data - Sa et al., **Cell**. 2026 - Accepted

ME/CFS data - Unpublished

Autoantibody reactivities associate with Long COVID symptoms

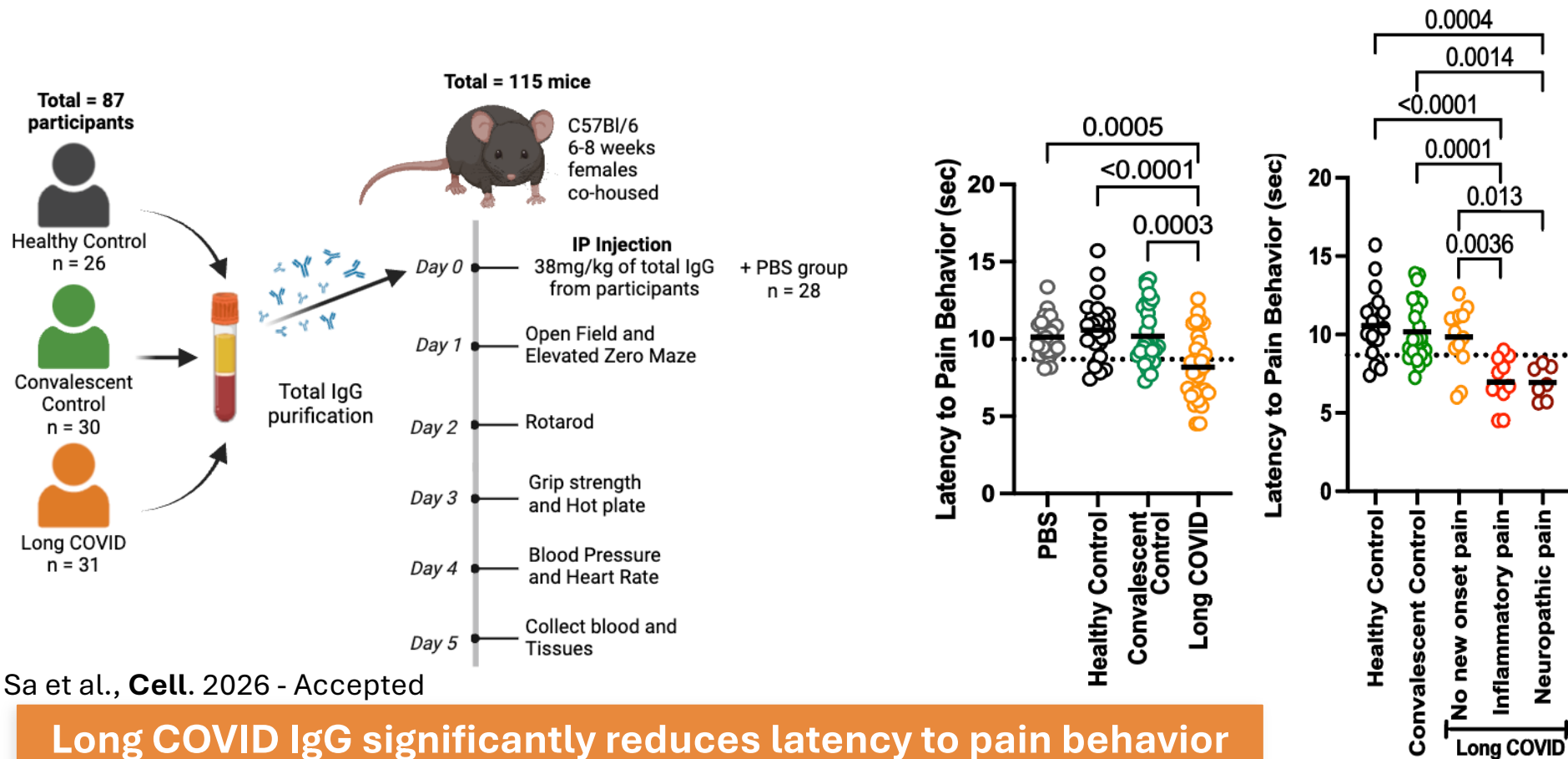


Autoantibodies validation



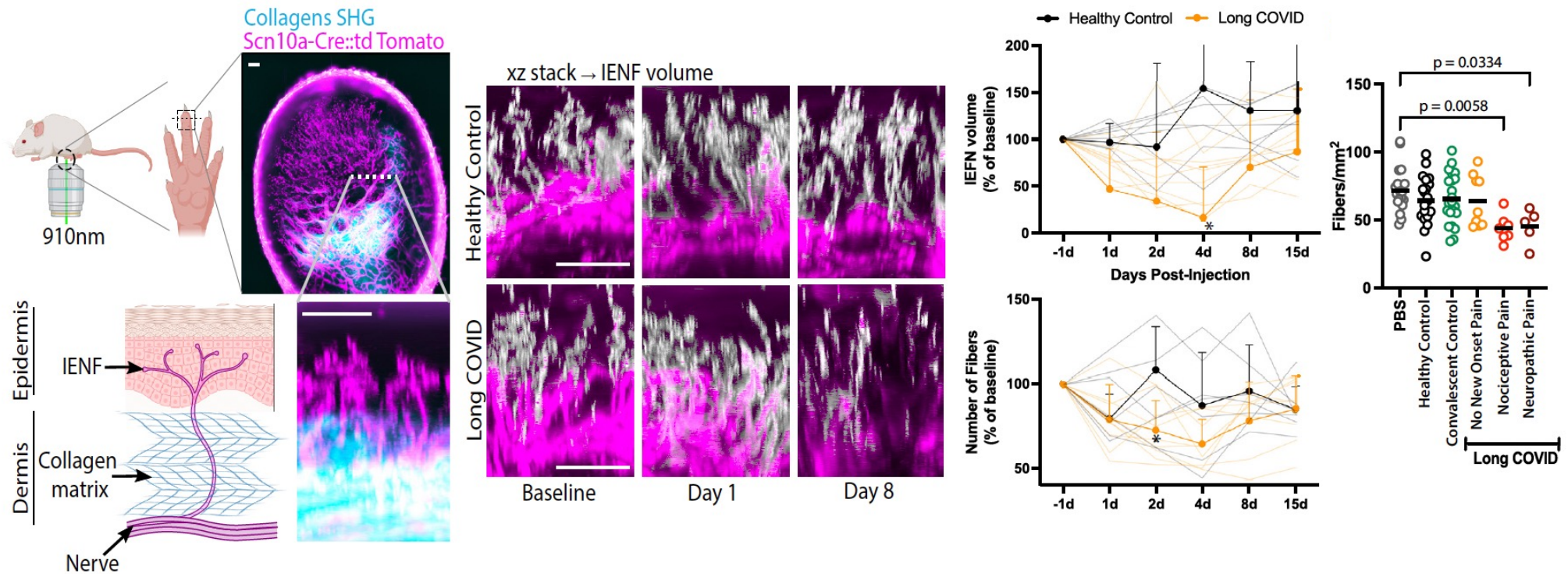
Are those autoantibodies
pathogenic?

Passive transfer of Long COVID IgG induces pain behavior in mice



Sa et al., *Cell*. 2026 - Accepted

Long COVID IgG damages intraepidermal nociceptors in vivo



Conclusions

Autoantibodies from Long COVID and ME/CFS individuals target the nervous system

AAB reactivities map onto symptoms (neuropathic pain, headache and others)

Long COVID IgG is pathogenic in mice

Read More:

A causal link between autoantibodies and neurological symptoms in long COVID

 Keyla Santos Guedes de Sa,  Julio Silva,  Rafael Bayarri-Olmos, Ryan Brinda, Robert Alec Rath Constable, Patricia A. Colom Diaz, Dong-il Kwon, Gisele Rodrigues, Li Wenxue, Christopher Baker,  Bornali Bhattacharjee, Jamie Wood,  Laura Tabacof,  Yansheng Liu,  David Putrino, Tamas L. Horvath,  Akiko Iwasaki

doi: <https://doi.org/10.1101/2024.06.18.24309100>



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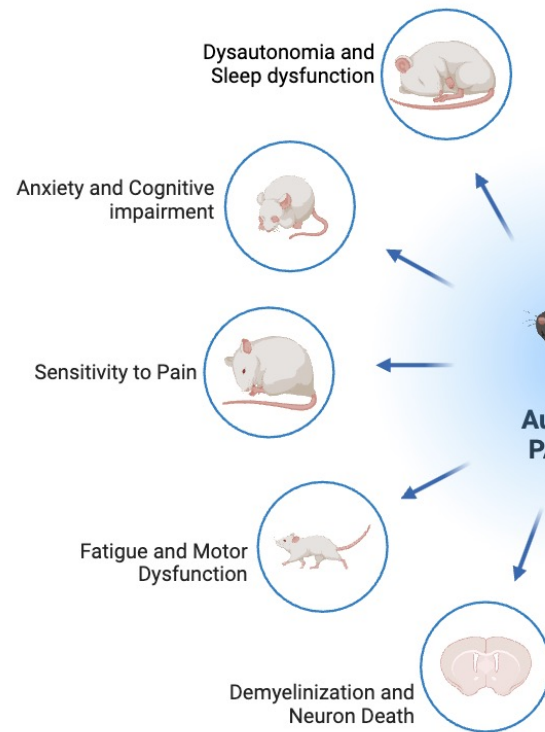
Article

Transfer of IgG from long COVID patients induces symptomology in mice

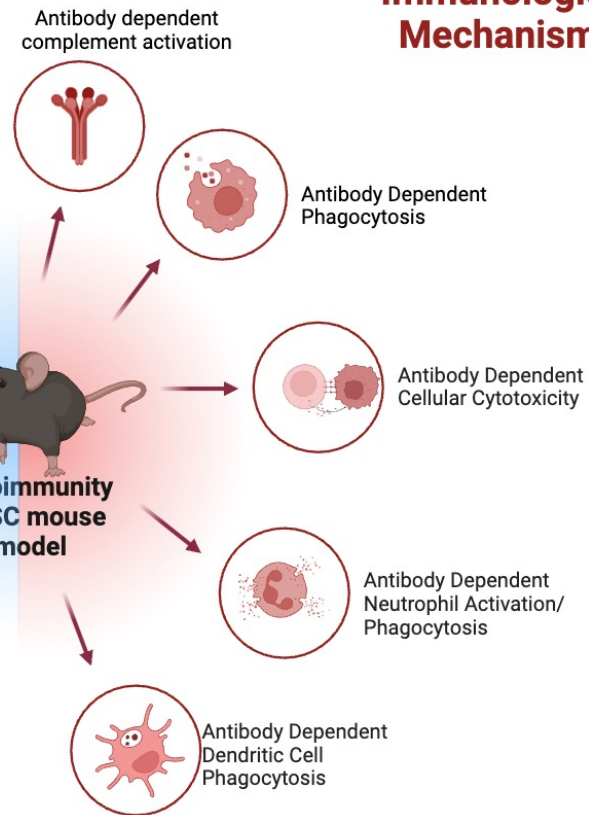
Hung-Jen Chen,^{1,6} Brent Appelman,^{1,6} Hanneke L.D.M. Willemen,^{2,6} Amelie Bos,¹ Judith Prado,² W. Ashwin Mak,¹ Noa Keijzer,¹ Patrícia Silva Santos Ribeiro,² Sara Vieira Goncalves,² Sabine Versteeg,² Chiara E. Geyer,¹ Mads Larsen,³ Eline Schüchner,¹ Marije K. Bomers,⁵ Ayesha H.A. Lavell,⁵ Amsterdam UMC COVID-19 biobank, Braeden Charlton,⁴ Rob Wüst,⁴ W. Joost Wiersinga,¹ Michèle van Vugt,¹ Gestur Vidarsson,³ Niels Eijkelkamp,^{2,6,7,8,*} and Jeroen den Dunnen^{1,6,7}

Next steps...

Neurological Symptoms Evaluation



Immunological Mechanisms



Thank you!

Yale



hhmi
Howard Hughes
Medical Institute

Study participants and patients with Long COVID
and ME/CFS

