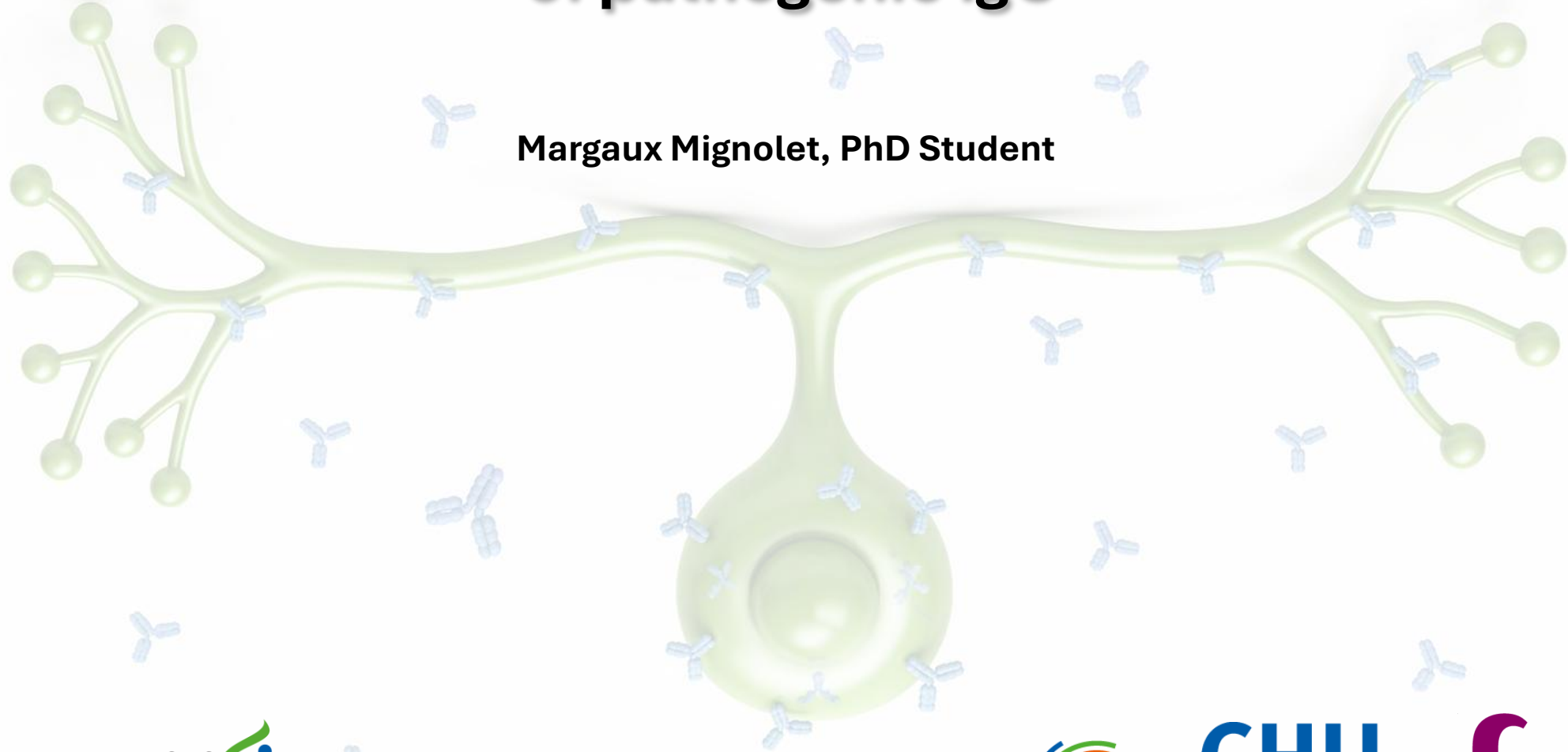


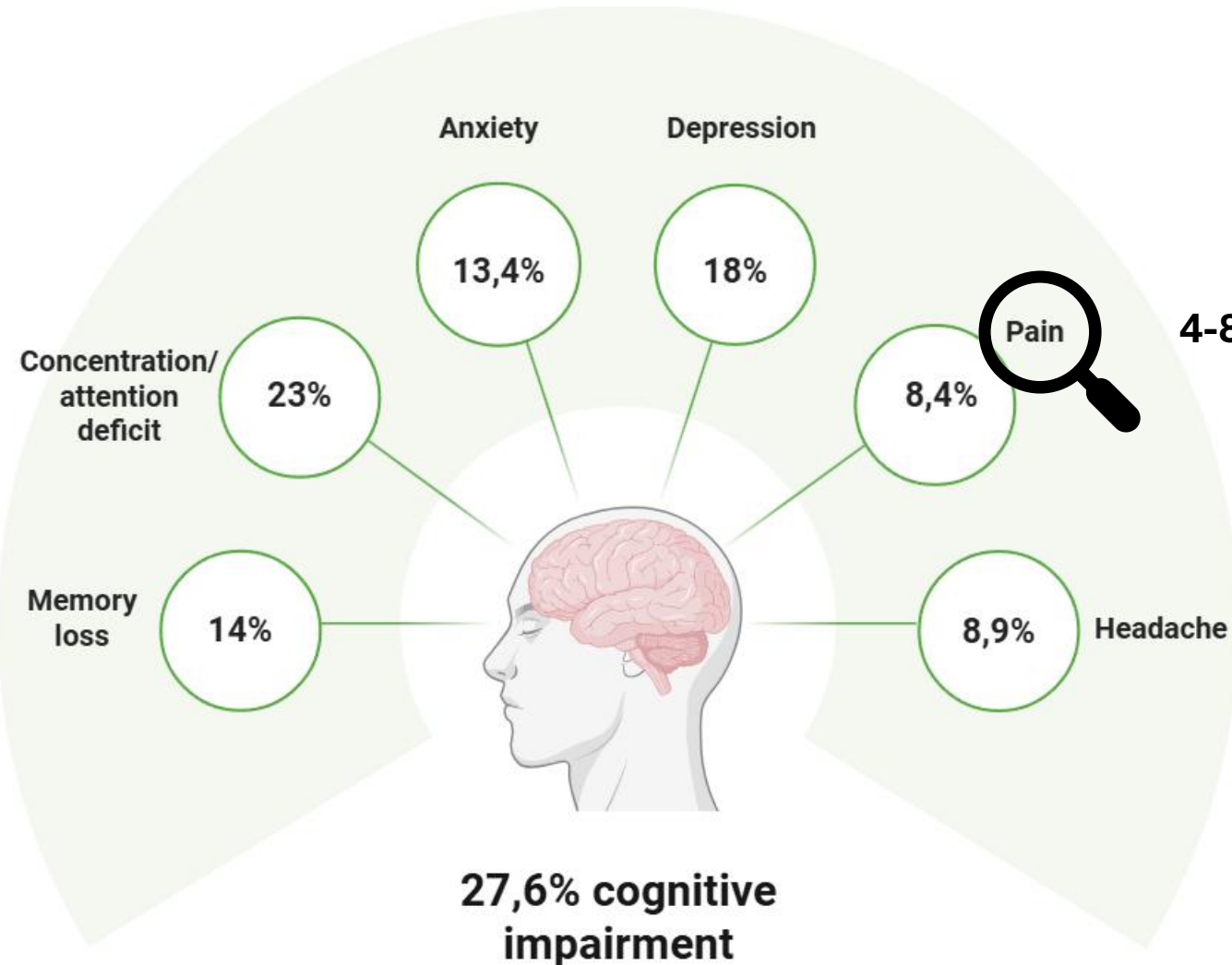
Decoding pain in long COVID : Sensory neurons as targets of pathogenic IgG

Margaux Mignolet, PhD Student



Introduction: definition and symptoms

±27% of long COVID patients experience neurological complications 2 years after the initial infection



4-8% experience neuropathic pain

Pain caused by a lesion or a disease of the peripheral nervous system

Introduction: IgG autoantibodies contribute to pain in several conditions

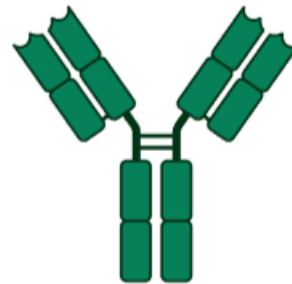
What about long COVID ??

Complex regional pain syndrome

- Pathogenic IgG
- Peripheral sensitization

Autoimmune neuropathy

- Anti-CASPR2 Ab
- Peripheral nerve hyperexcitability



Fibromyalgia

- Patient IgG (Passive transfer model)
 - Satellite glial cells (DRG)

Small fiber neuropathy

- Anti-FGFR3, TS-HDS, Plexin D1 Ab
- Sensory neurons, small fibers

Guillain-Barre syndrome

- Anti-ganglioside Ab
- Impaired nerve conduction

Introduction: IgG autoantibodies contribute to pain in several conditions

CLINICAL/SCIENTIFIC NOTE | April 17, 2024 | 

 Check for updates

Case-Control Study of Individuals With Small Fiber Neuropathy After COVID-19

Lindsay McAlpine, MD , Adeel S. Zubair, MD , Phillip Joseph, MD , and Serena Spudich, MD, MA | [AUTHORS INFO & AFFILIATIONS](#)

May 2024 issue • 11 (3) e200244 • <https://doi.org/10.1212/NXI.0000000000200244>

Research Article |  Full Access

Microneurography Reveals Unmyelinated Small Nerve Fiber Dysfunction in Long COVID

[Ana Ribeiro MSc](#), [Shahrazad Hadavi MD](#), [Nick Gall MD](#), [Robert D.M. Hadden MD](#), [Jordi Serra MD](#) 

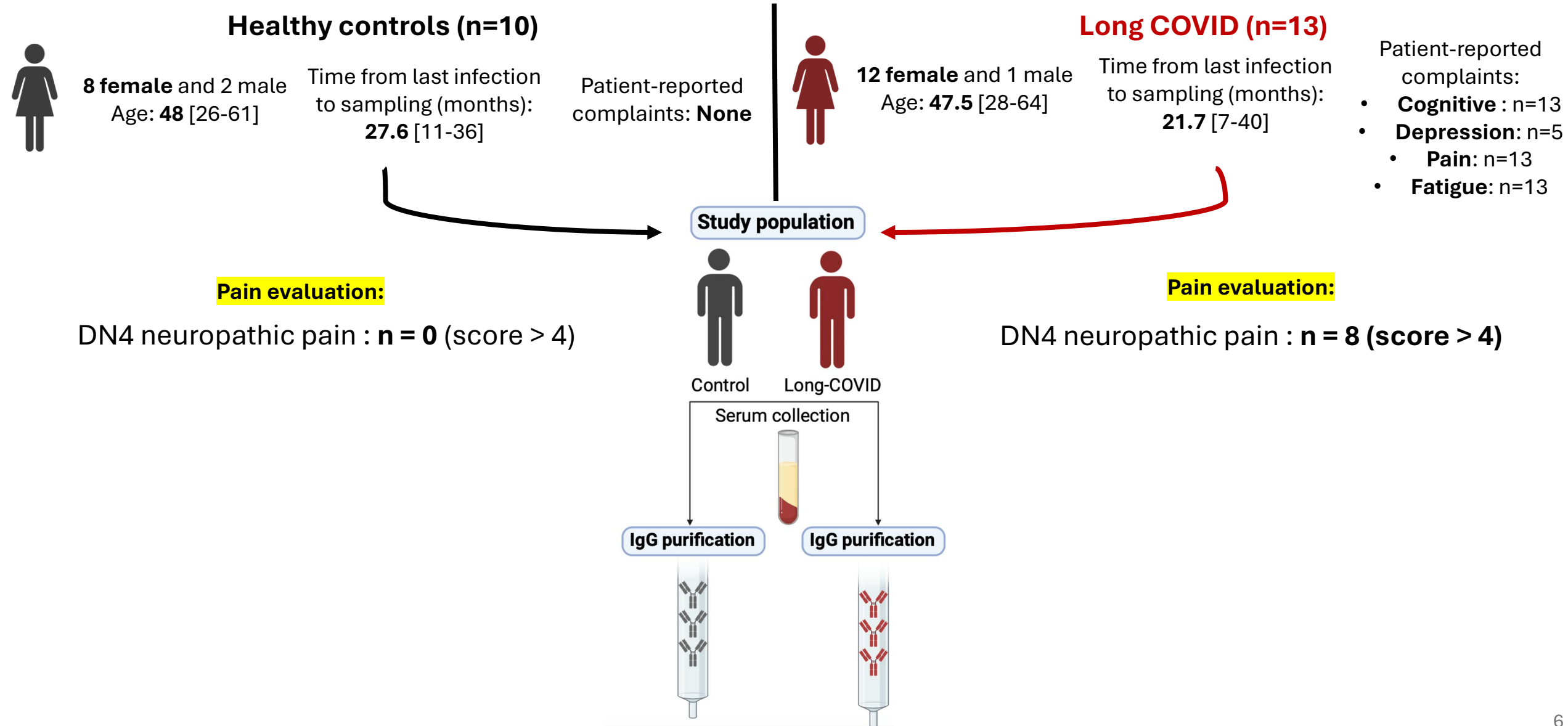
First published: 22 September 2025 | <https://doi.org/10.1002/ana.78045> | [VIEW METRICS](#)

Autoimmunity in long COVID patients with pain

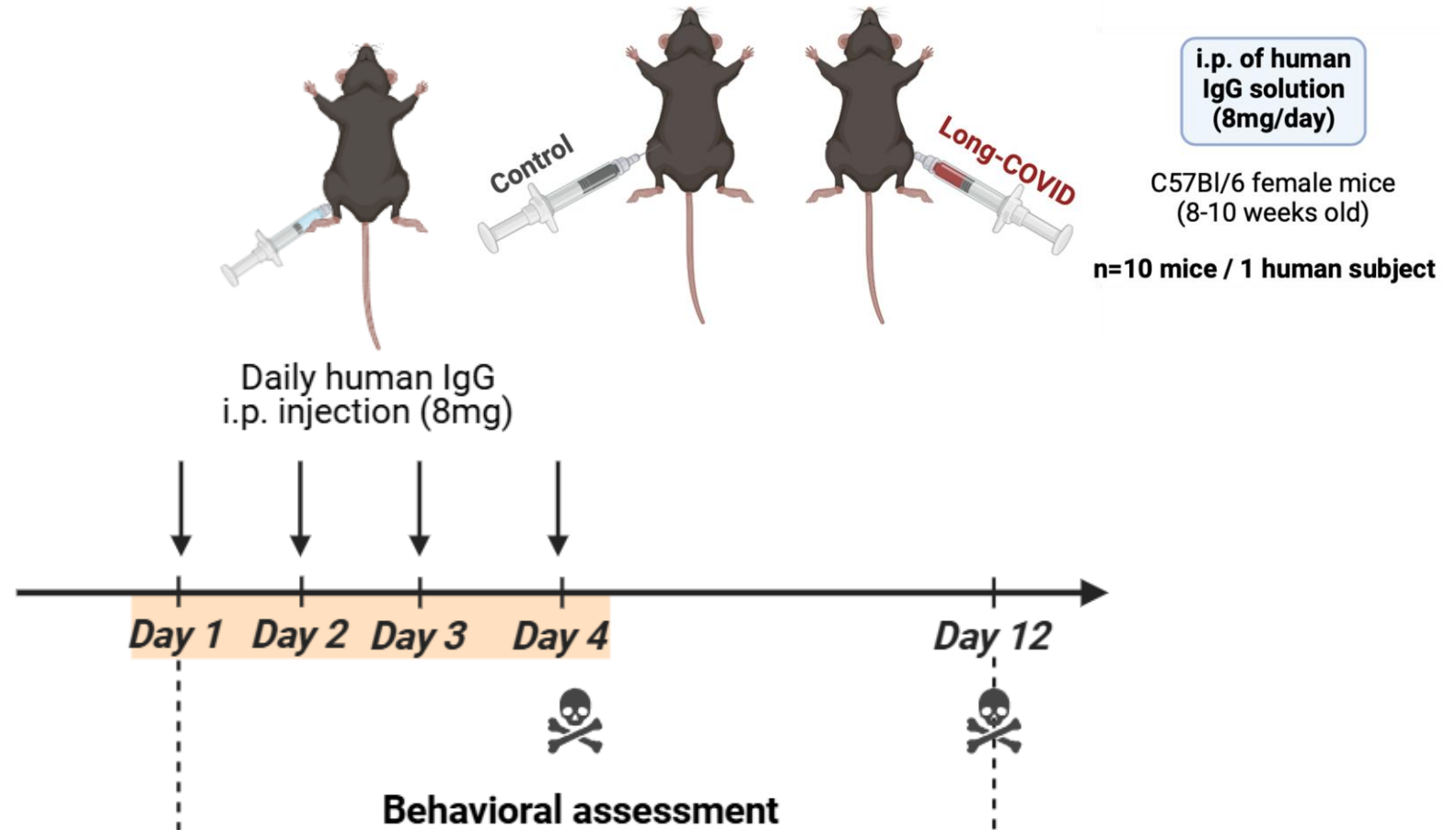
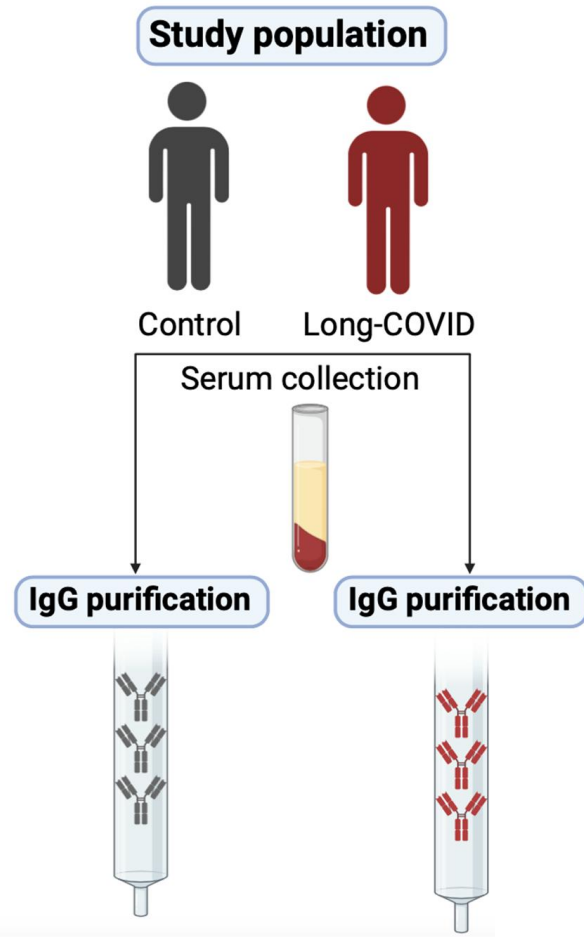
Autoantibodies pathogenicity

Are IgG autoantibodies from long COVID
able to bind to PNS** epitopes and
produce pain symptoms?

Methods: Patient cohort



Methods: Passive transfer model



Passive transfer of long COVID patients IgG to mice induces pain hypersensitivity

Acta Neuropathologica (2026) 151:50
<https://doi.org/10.1007/s00401-026-03019-0>



ORIGINAL PAPER



Pathogenic IgG from long COVID patients with neurological sequelae triggers sensitive but not cognitive impairments upon transfer into mice

Margaux Mignolet¹ · Catherine Deroux² · Thomas Florkin¹ · Valéry Bielarz¹ · Kathleen De Swert¹ · Nicolas Halloin¹ · Lindsay Sprimont¹ · Aurélie Ladang³ · Fabienne George^{4,5} · Jacques Gilloteaux^{1,6} · Laurence Abeloos⁷ · Pierre Garin^{8,9} · Johan Van Weyenbergh¹⁰ · Marc Jamoulle¹¹ · Claire Diederich¹² · Nicolas Albert Gillet¹² · Pierre Bulpa^{5,13} · Charles Nicaise¹

ARTICLE · Volume 7, Issue 4, 102693, April 21, 2026 · *Open Access*

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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 Bos¹ · Judith Prado² · W. Ashwin Mak¹ · Noa Keijzer¹ · Patricia Silva Santos Ribeiro² · Sara Vieira Goncalves² · Sabine Versteeg² · Chiara E. Geyer¹ · Mads Larsen³ · Eline Schüchner¹ · Marije K. Bomers⁵ · Ayesha H.A. Lavell⁵ · Amsterdam UMC COVID-19 biobank · Braeden Charlton⁴ · Rob Wüst⁴ · W. Joost Wiersinga¹ · Michèle van Vugt¹ · Gestur Vidarsson³ · Niels Eijkelkamp^{2,6,7,8} · Jeroen den Dunnen^{1,6,7} [Show less](#)

ARTICLE · Volume 189, Issue 11, P3214-3235.E37, May 28, 2026

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A causal link between autoantibodies and neurological symptoms in long COVID

Keyla Santos Guedes de Sá^{1,2,12} · Julio Silva^{1,2,12} · Rafael Bayarri-Olmos^{1,2,12} · Christopher A. Baker^{1,2} · Zhenni Lu^{1,2} · Wilson Gipson^{1,2} · Daxiang Na³ · Bandy Chen³ · Li Wenxue^{2,4} · Delyar Khosroabadi^{2,4} · Ryan Brinda^{1,2} · Robert Alec Rath Constable^{1,2} · Britney Omene^{1,2} · Patricia A. Colom Díaz^{1,2} · Dong-il Kwon^{1,2,5} · Gisele Rodrigues^{1,2} · Harald Heidecke⁶ · Kai Schulze-Forster⁶ · Amanda Gross⁷ · Tom Shneer⁷ · Amanda Clarke⁷ · Thomas Linnekin⁷ · Ashley Brate⁷ · Lev Brown⁷ · Henry Buda⁷ · Shashi Jatiani⁷ · Lenny Moise⁷ · Kerrie Greene^{1,2} · Sachin Bhagchandani^{1,2} · Bornali Bhattacharjee^{1,2} · Jeffrey Gehlhausen^{1,2} · Jamie Wood⁸ · Laura Tabacof⁸ · Carmen Scheibenbogen⁹ · Yansheng Liu^{2,4} · Leying Guan^{2,10} · Marc Schneeberger Pane³ · David Putrino⁸ · Tamas L. Horvath^{2,11} · Akiko Iwasaki^{1,2,5,13} [Show less](#)



Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Autoantibodies mediate pain and sensory dysfunction in post-COVID syndrome



Stuart Bevan

stuart.bevan@kcl.ac.uk

Passive transfer of long COVID patients IgG to mice induces pain hypersensitivity

Saturday 29th

Acta Neuropathologica (2026) 151:50
<https://doi.org/10.1007/s00401-026-03010-0>

ORIGINAL

Pathogen
triggers
into mice

Margaux Mi
Lindsay Spr
Pierre Garin
Pierre Bulpa

ARTICLE · Vo

Transf
in mice

Hung-Jen Ch
Noa Keijzer¹
Eline Schüch
Rob Wüst⁴
Jeroen den C

Sat 29 Aug

11:48



10 min

Abstract #7

Auditorium

BIOMEDICAL
TRACK

Pathogenic IgG from long COVID patients with neurological sequelae triggers sensitive but not cognitive impairments upon transfer into mice

Can autoantibodies drive neurological symptoms in Long COVID? This presentation explores evidence that IgG autoantibodies from patients with neurological Long COVID bind to peripheral sensory neurons and induce pain-related symptoms in a mouse model. The findings provide new mechanistic insight into the potential role of autoimmune processes in the pathophysiology of neurological Long COVID.

Charles Nicaise | Professor of Cell Biology & Histology Faculty of Medicine

University of Namur, Namur, Belgium



[Jenni Lu](#)^{1,2}

[drigues](#)^{1,2}

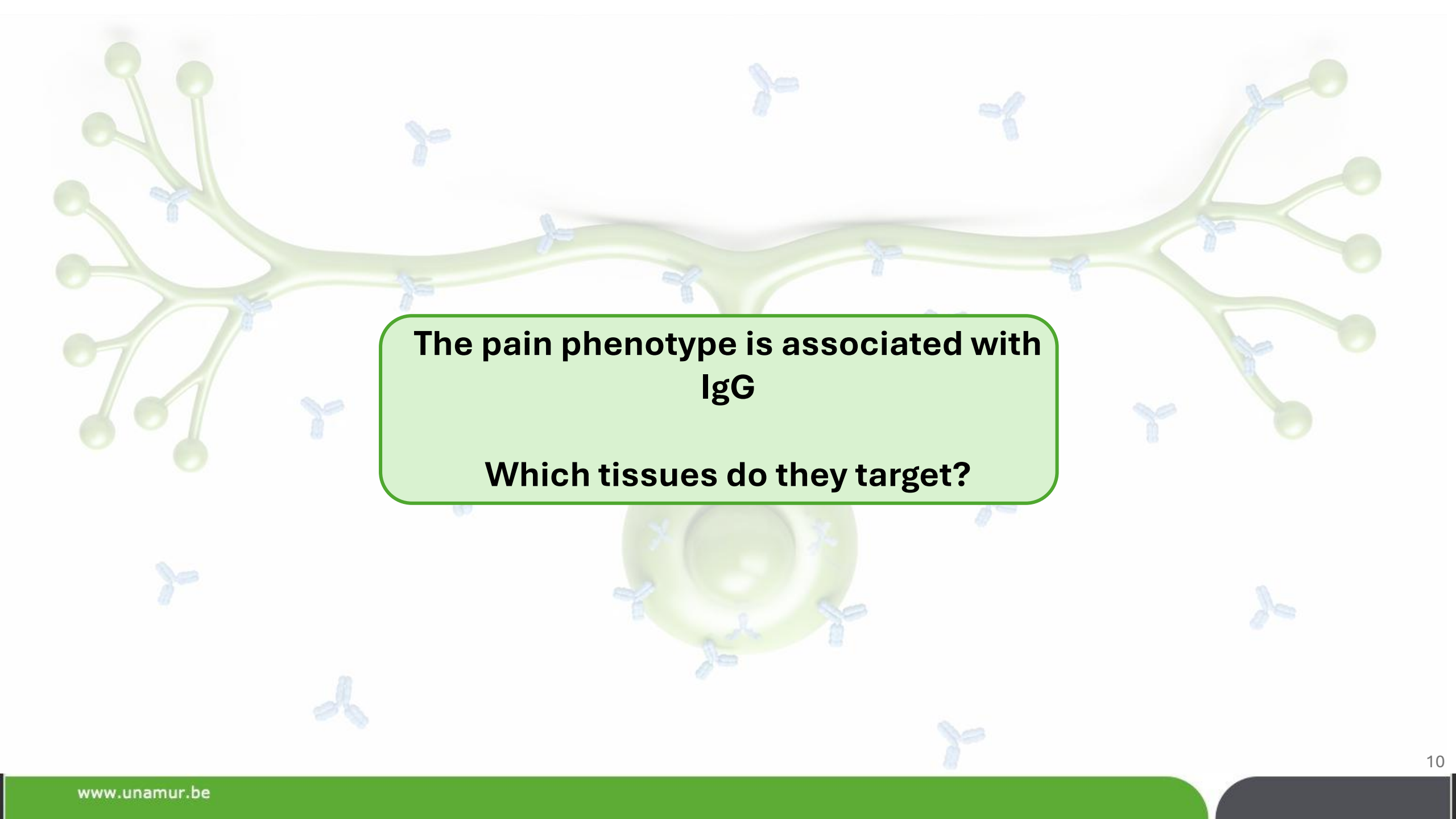
[akin](#)⁷

[gchandani](#)^{1,2}

¹ · [Yansheng Liu](#)^{2,4}

[aki](#)^{1,2,5,13} [✉](#)

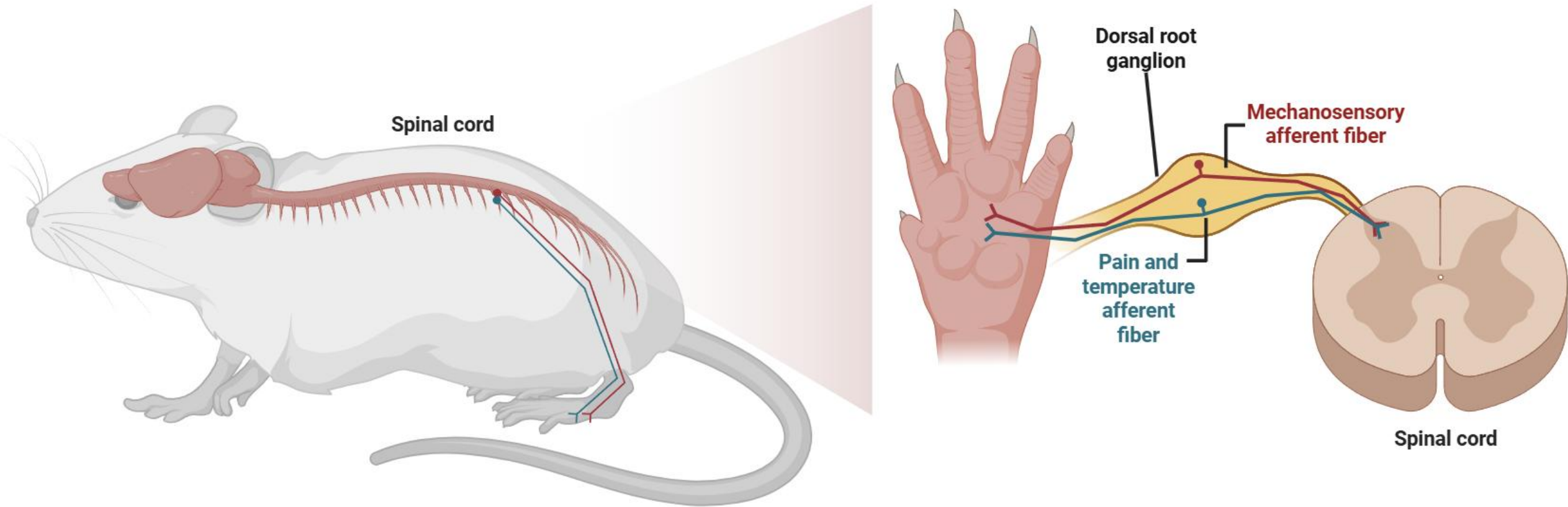
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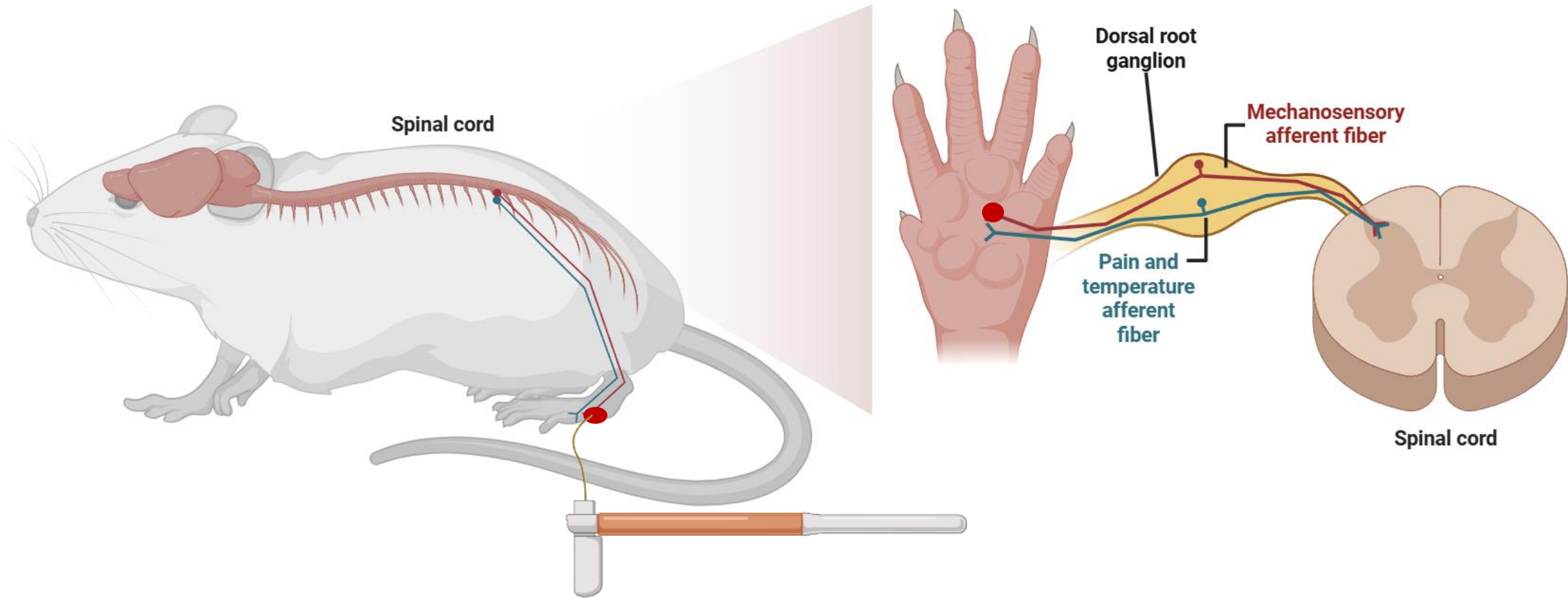
**The pain phenotype is associated with
IgG**

Which tissues do they target?

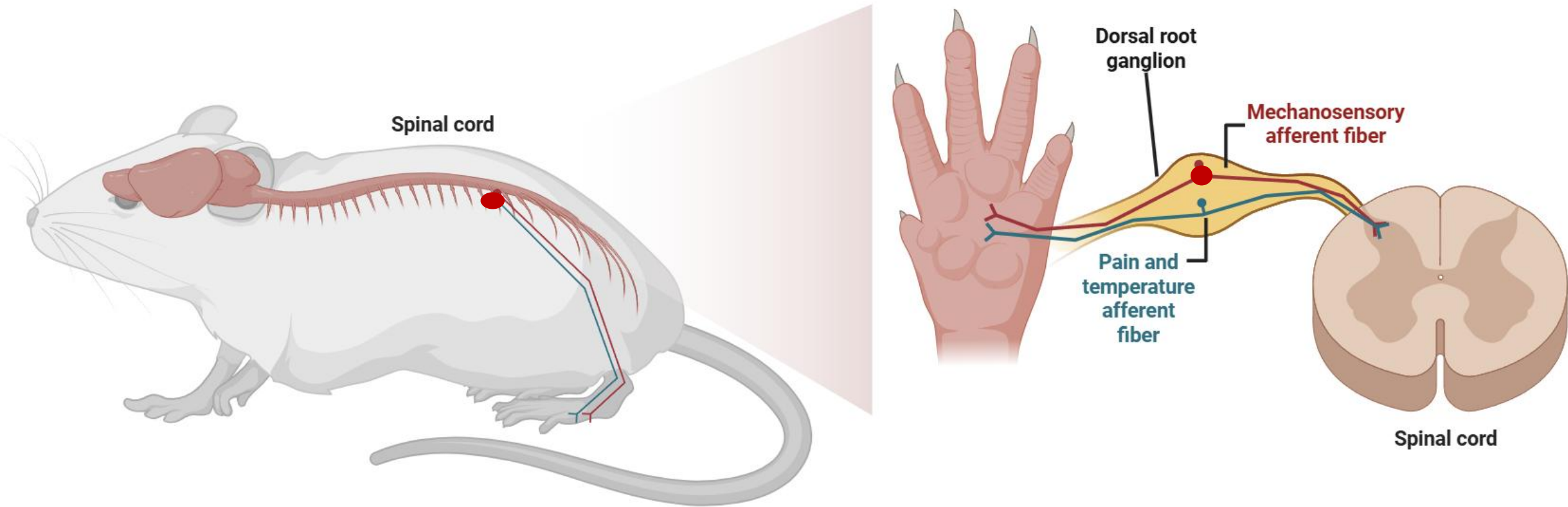
Results



Results

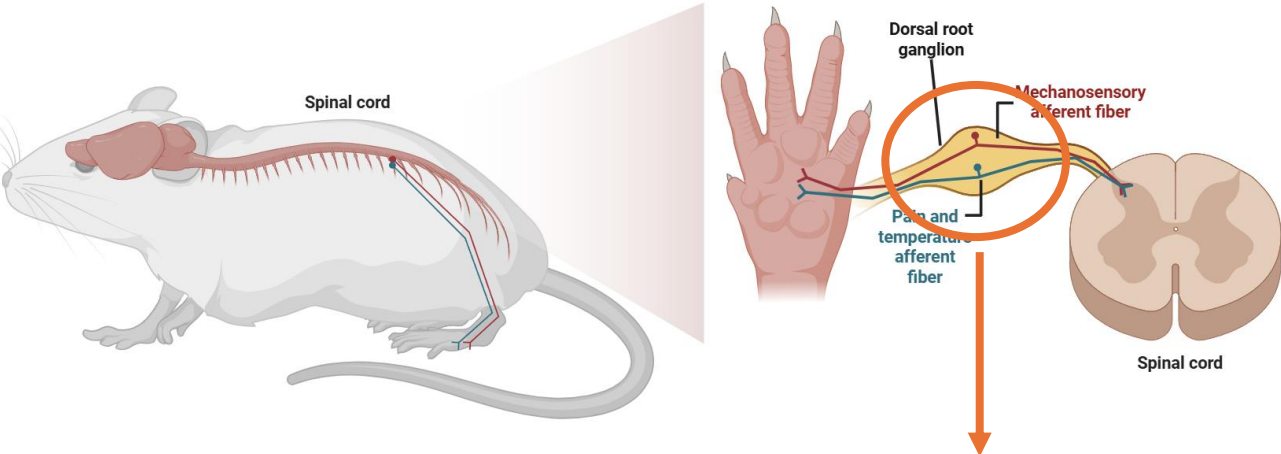
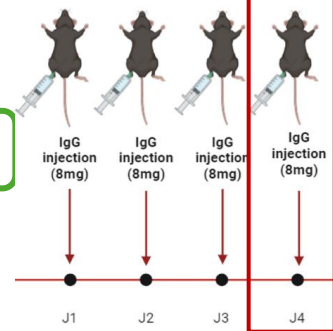


Results

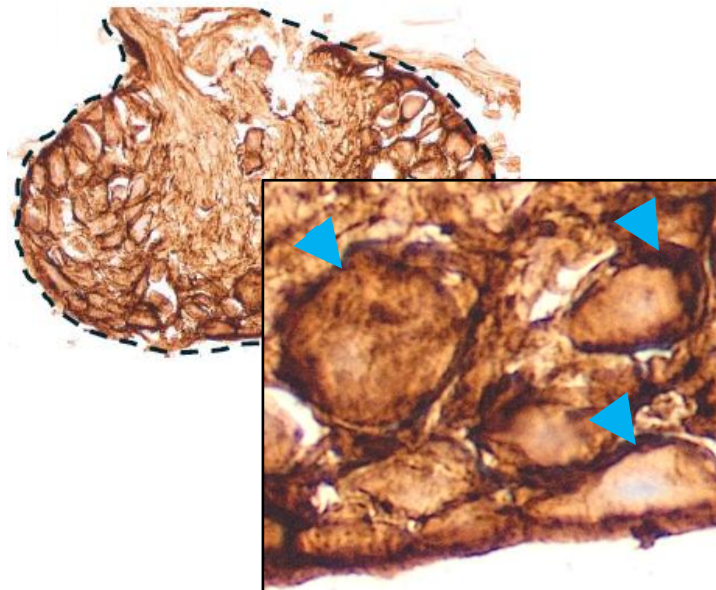


Results

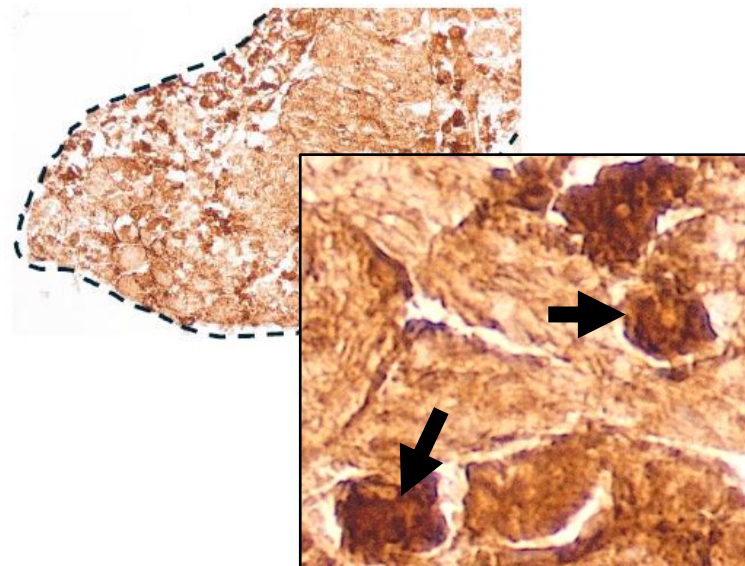
Human IgG were detected by IHC in dorsal root ganglia after passive transfer to mice



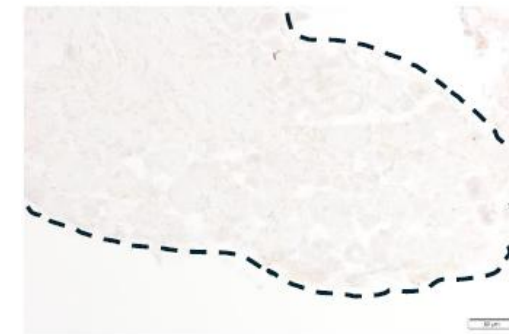
Healthy control



Long-COVID

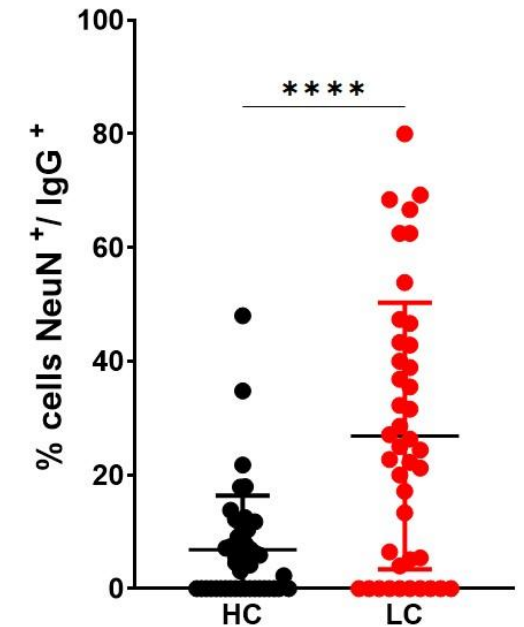
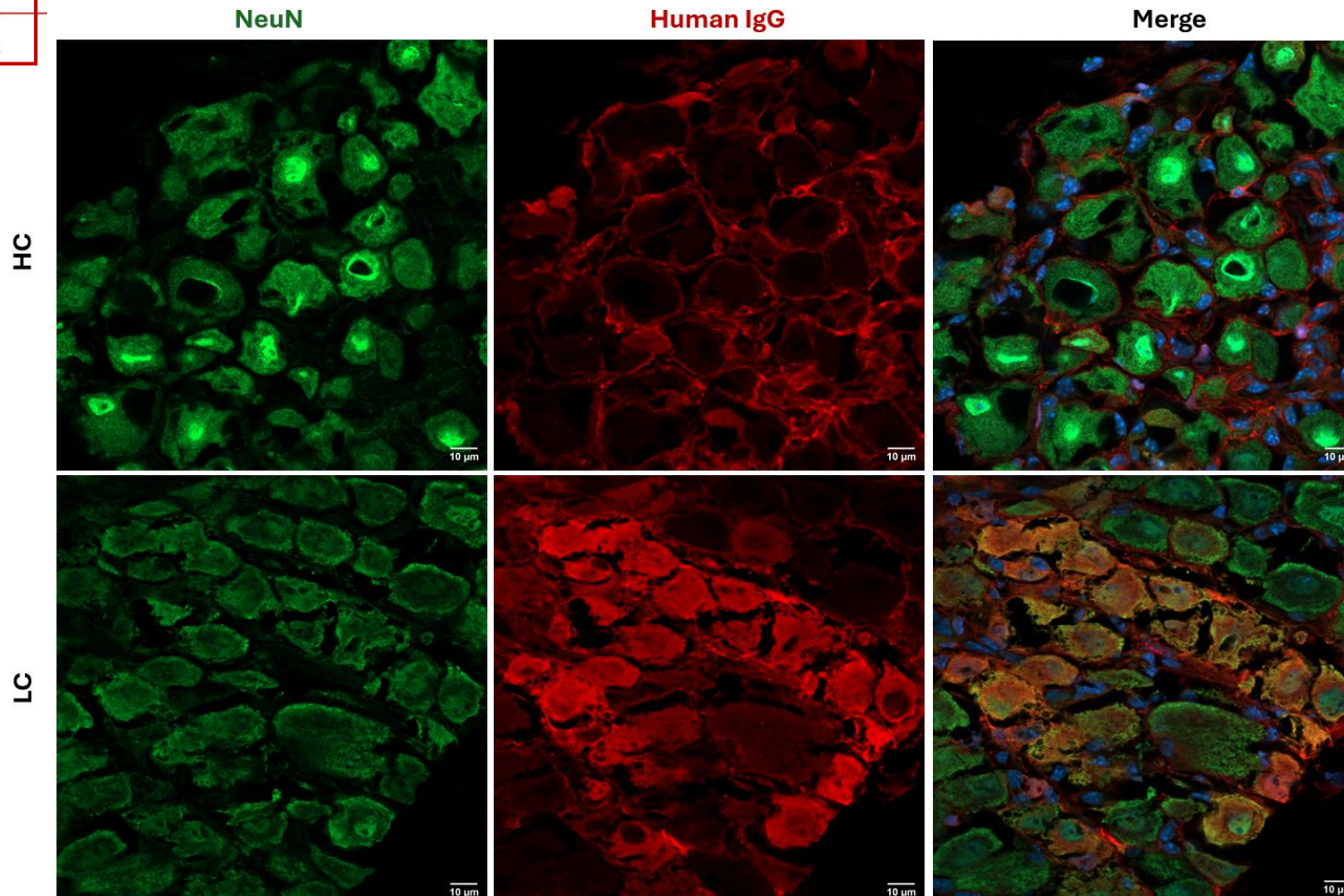
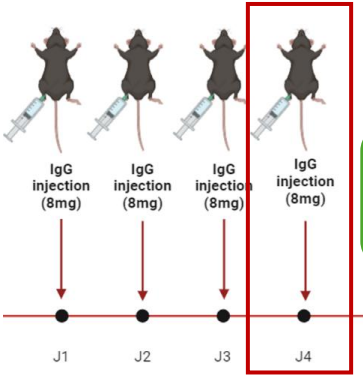


Naive



Results

Human IgG colocalized with neurons in dorsal root ganglia after passive transfer to mice



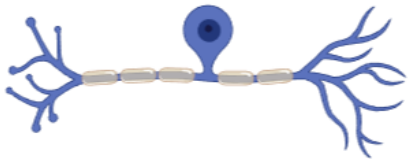
Results

Human IgG colocalized mainly with A-fibers neurons and, in a lesser extent, to C-fibers neurons in dorsal root ganglia after passive transfer to mice

Fibers types:



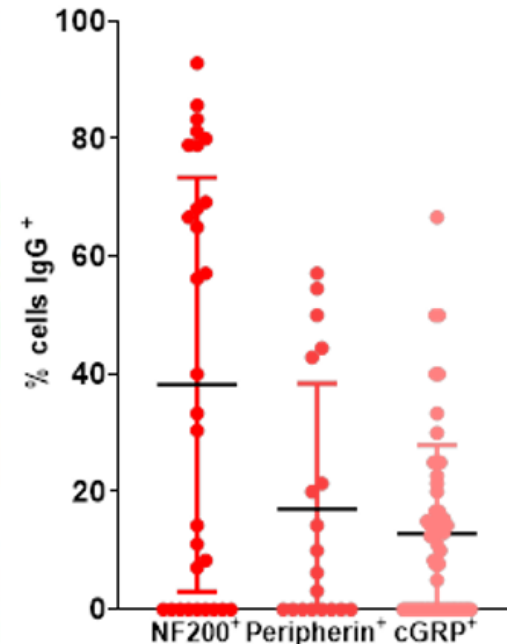
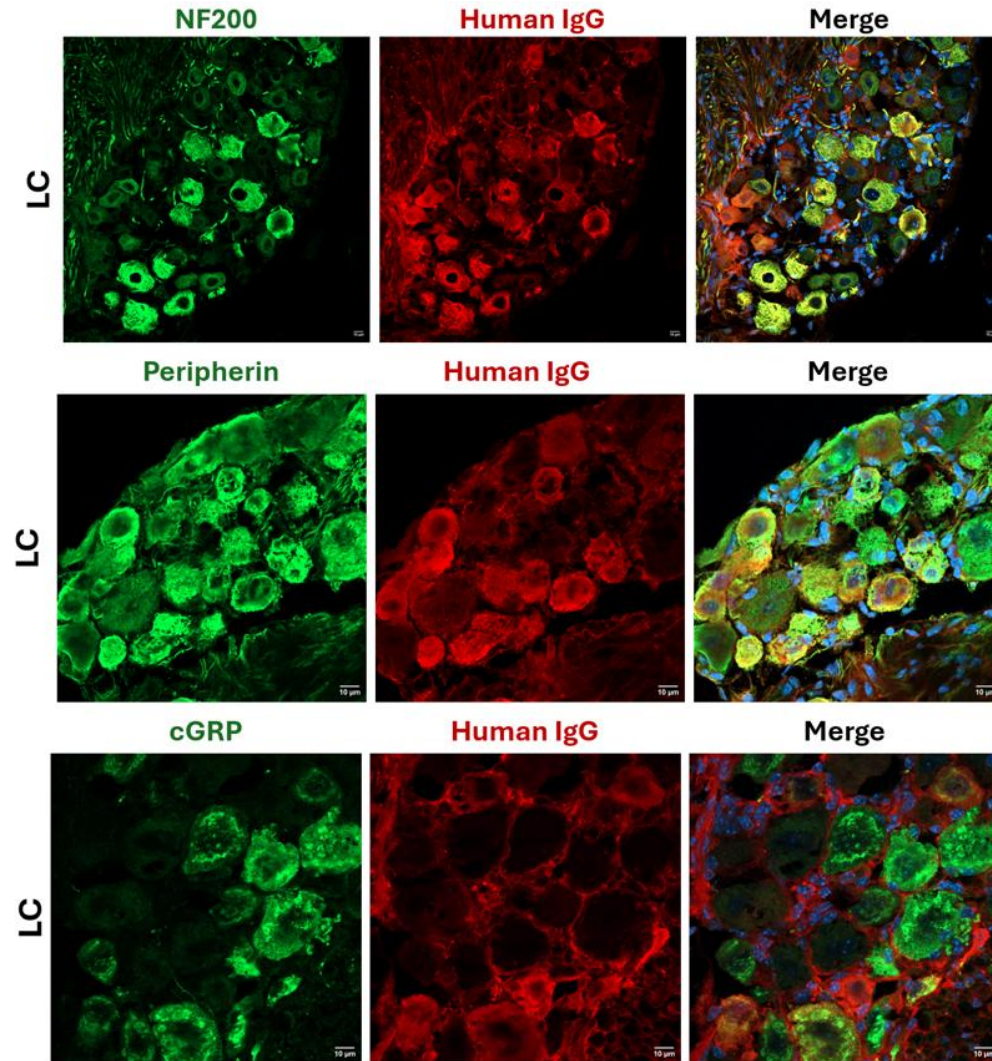
A β fibers – NF200
Light touch, pressure,
proprioception
Non-noxious
mechanical stimulation

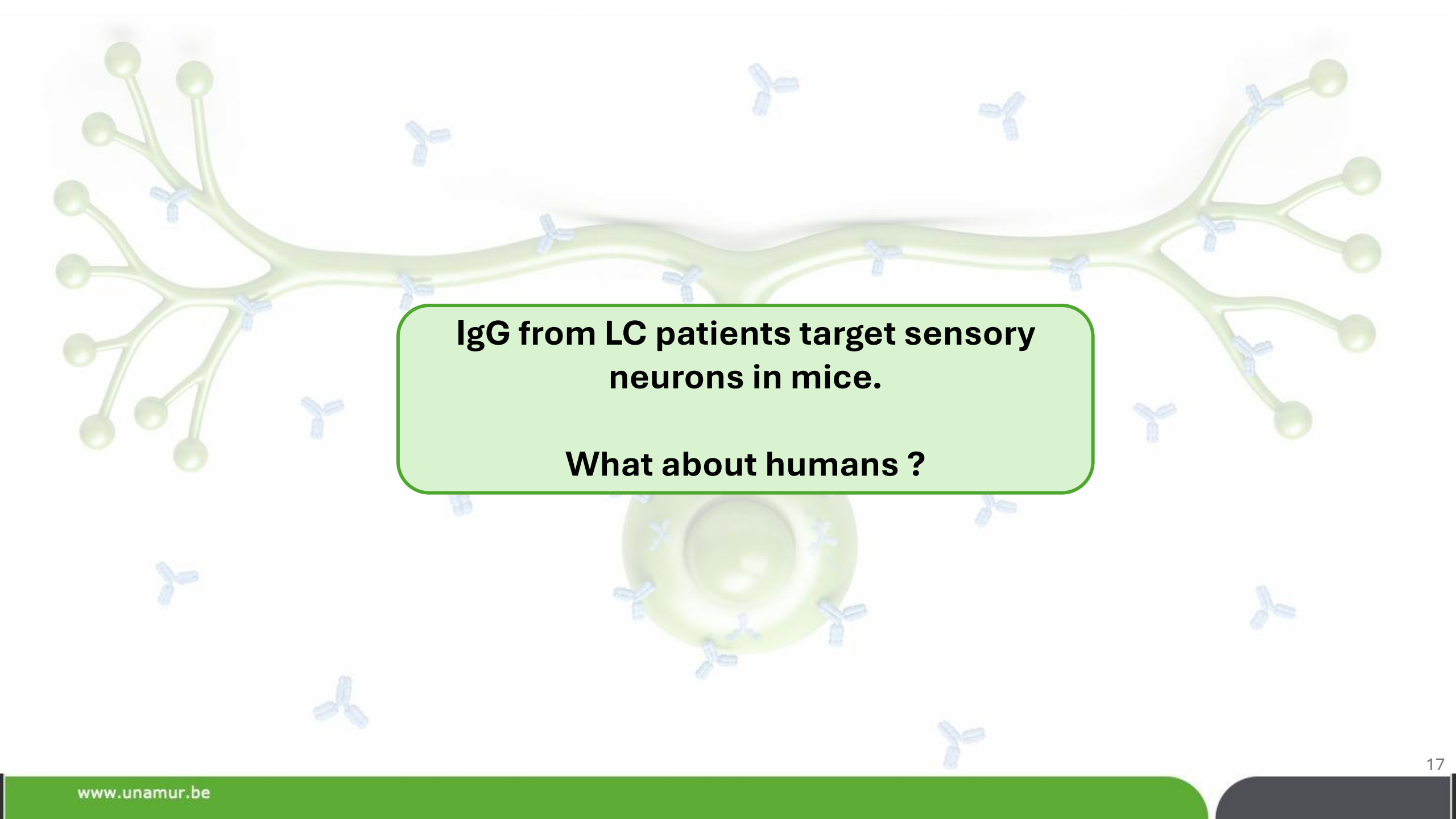


A δ fibers – NF200, cGRP
Fast pain
Thermal and mechanical
nociceptive stimuli



C fibers – Peripherin, cGRP
Slow and chronic pain
Thermal and mechanical
nociceptive stimuli





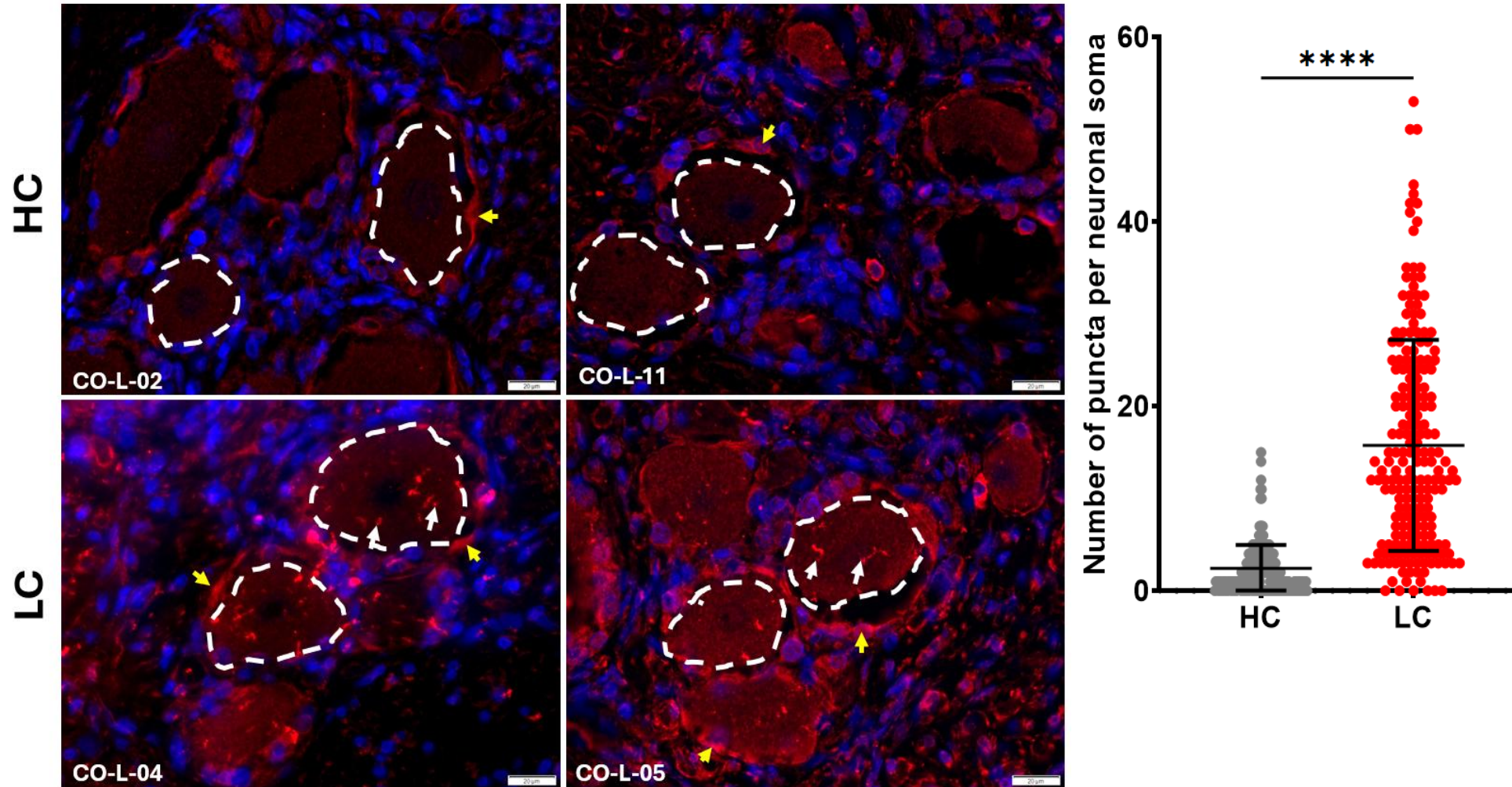
IgG from LC patients target sensory neurons in mice.

What about humans ?

Results

Human IgG bind to sensory neurons from a human dorsal root ganglia

Human IgG / Hoechst





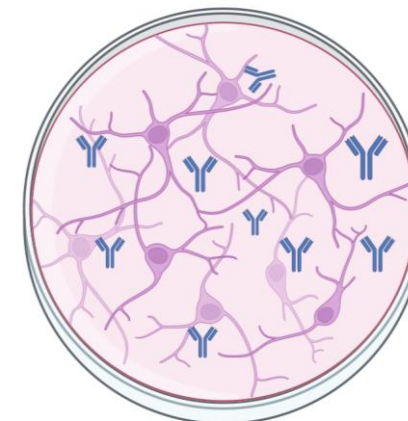
Can IgG autoantibodies from patients promote pain phenotypes after passive transfer to mice? What do these IgG target in the nervous system ?

- Passive transfer of IgG from long COVID patients to mice induces transient **significant increased sensitivity**.
- **Human IgG colocalize with sensory neurons** in dorsal root ganglia after passive transfer to mice.
- Human IgG colocalize with sensory neurons in a human dorsal root ganglia



Perspectives

- Investigation of LC patient effects on human iPSCs-derived sensory neurons
- Identification of antigens targeted by human IgG from long COVID patients



LNR team:

- Charles Nicaise, PhD
- Nicolas Halloin
- Lindsay Sprimont
- Kathleen De Swert
- Valéry Bielarz
- Thomas Florkin
- Gaylor Servais

URVI team:

- Nicolas Gillet, PhD
- Claire Diederich
- Kévin Willemart

Laboratory of anatomy:

Pierre Garin, MD
Florine Barthelemy



CHU-UCL Namur:

- Pierre Bulpa, MD
- Catherine Deroux
- Fabienne George

Uliège:

Marc Jamoulle, MD

KU Leuven:

Johan Van Weyenbergh, PhD

Long-COVID patients
and healthy donors

OUR LATEST PAPER

Acta Neuropathologica (2026) 151:50
<https://doi.org/10.1007/s00401-026-03019-0>

ORIGINAL PAPER



Pathogenic IgG from long COVID patients with neurological sequelae triggers sensitive but not cognitive impairments upon transfer into mice

Margaux Mignolet¹ · Catherine Deroux² · Thomas Florkin¹ · Valéry Bielarz¹ · Kathleen De Swert¹ · Nicolas Halloin¹ · Lindsay Sprimont¹ · Aurélie Ladang³ · Fabienne George^{4,5} · Jacques Gilloteaux^{1,6} · Laurence Abeloos⁷ · Pierre Garin^{8,9} · Johan Van Weyenbergh¹⁰ · Marc Jamoulle¹¹ · Claire Diederich¹² · Nicolas Albert Gillet¹² · Pierre Bulpa^{5,13} · Charles Nicaise¹



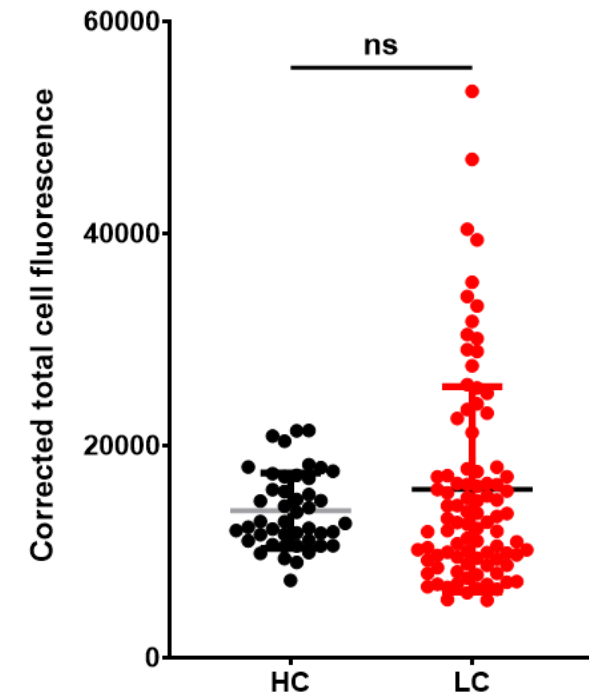
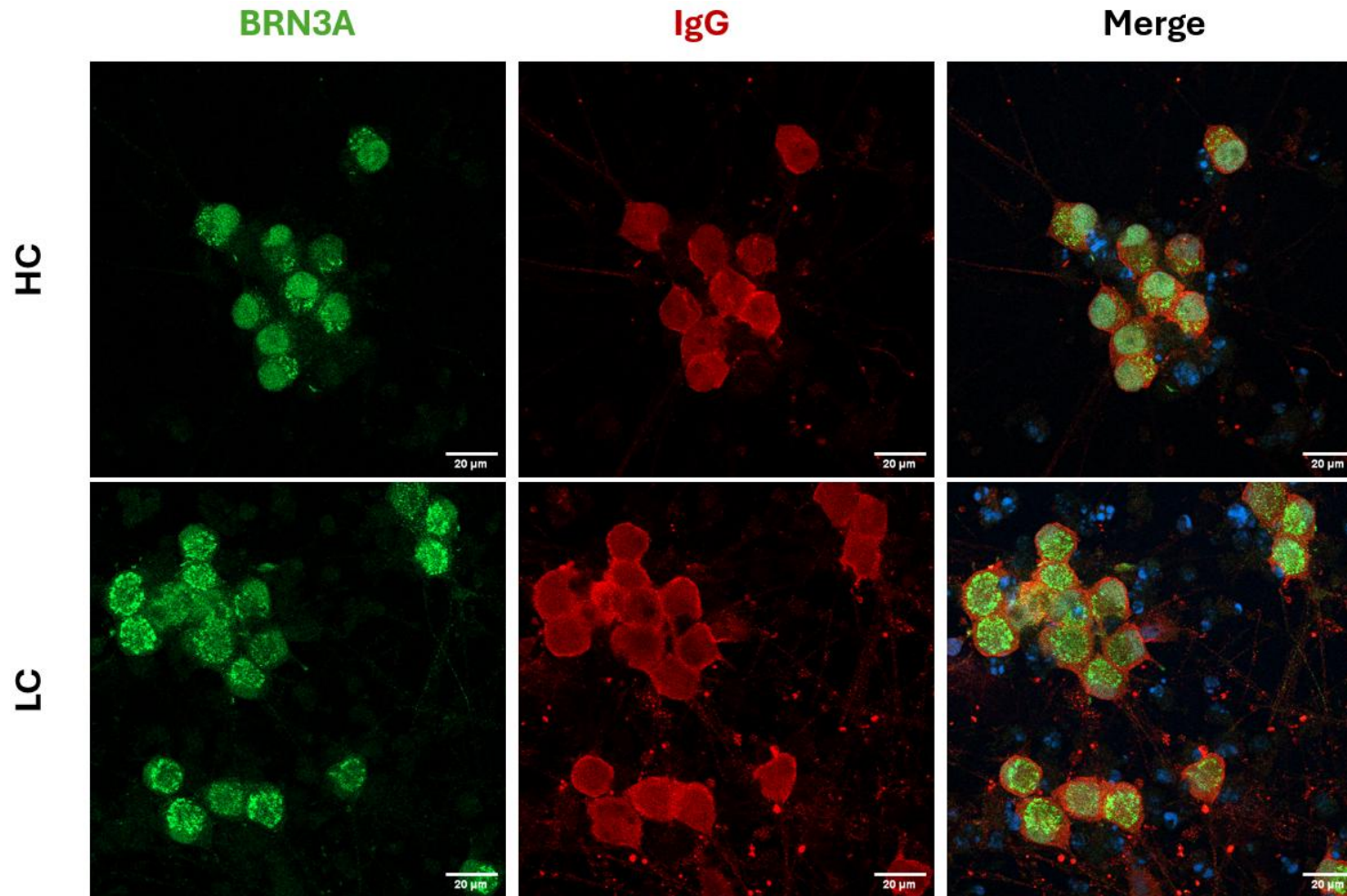
LET'S CONNECT



margaux.mignolet@unamur.be

**Open to postdoctoral
opportunities**

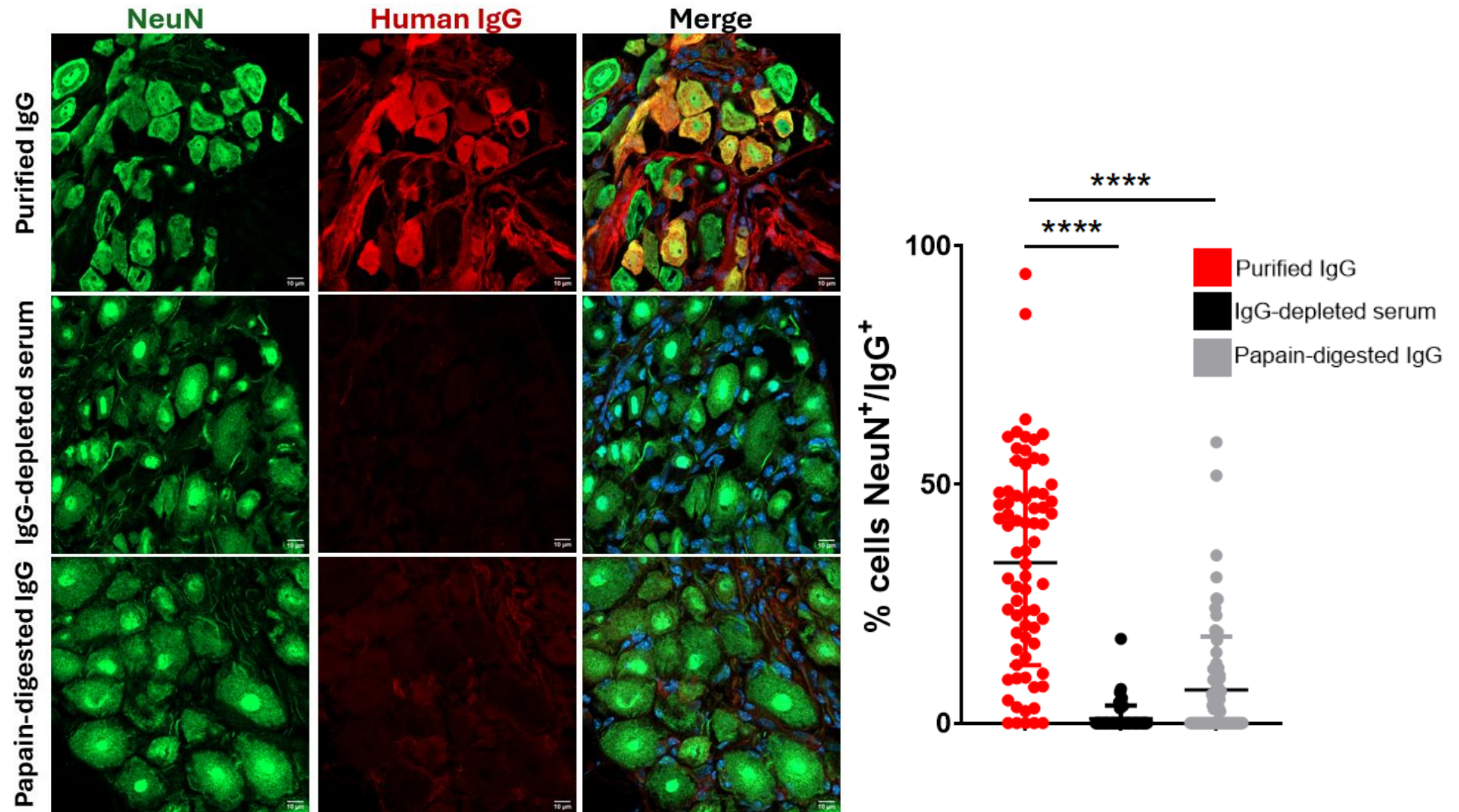
Preliminary data : Human IgG from both HC and LC bind to sensory neurons derived from hiPSCs



Mann-Withney U Test. Mean $\pm$ SD

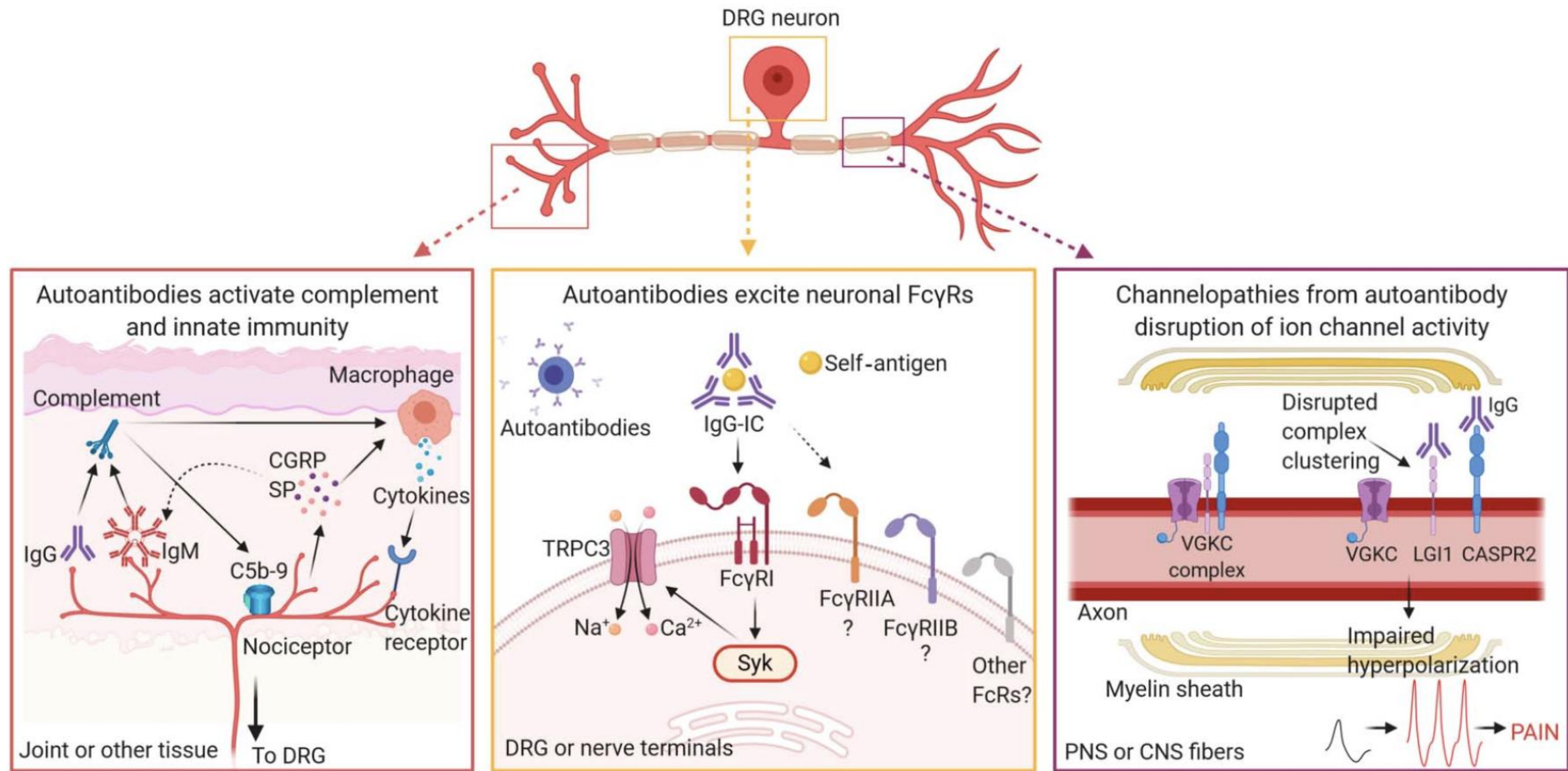
Results

Human IgG colocalized with neurons in dorsal root ganglia after passive transfer to mice



Kruskal-Wallis. Mean $\pm$ SD

Autoantibodies can cause nociceptor hyperexcitability and pain through multiple mechanisms across the neuraxis, leading to chronic pain



Lacagnina, M., Autoimmune regulation of chronic pain (2021)