

Raquel Adaia Sandoval Ortega

PhD · Neuroscientist · Postdoctoral Researcher, University of Pennsylvania

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RESEARCH PROFILE

I investigate interactions between pain, sleep and cardiac physiology using multimodal recordings and quantitative analysis. My work combines in vivo electrophysiology, neural circuit methods and reproducible scientific software.

APPOINTMENTS & EDUCATION

2023–present | Postdoctoral Researcher

University of Pennsylvania, Department of Psychiatry · Mentor: Gregory Corder

Research on thalamocortical mechanisms of pain-related sleep disturbances. Develop experimental and analytical workflows integrating sleep electrophysiology, ECG, calcium imaging and behavioural tracking.

2018–2023 | PhD in Neuroscience

University of Bern, Faculty of Medicine · Supervisor: Thomas Nevian

Established surgical, recording, data-management and Python-analysis workflows for multisite electrophysiology to study pain and sleep.

2022 | Visiting Scholar

Donders Institute, Radboud University · Host: Michael X Cohen

Neural time-series analysis, supported by a University of Bern mobility grant.

2017–2018 | Research Internship

University of Zurich · Host: Bruno Weber

In vivo fluorescence lifetime imaging.

2014–2017 | Master's Thesis Research & Research Assistant

Brain Mind Institute, EPFL · Supervisor: Pierre Magistretti

Research on lactate, hippocampal neurogenesis and antidepressant-related mechanisms; imaging and automated quantification.

2014–2016 | Joint Master's Programme in Neuroscience

Universities of Strasbourg, Freiburg and Basel · Thesis at EPFL.

2008–2012 | Licenciatura in Biology

University of Barcelona · Erasmus study at Université Paris Diderot, 2010–2011.

SELECTED PEER-REVIEWED PUBLICATIONS

Heart rate and sleep history encode ultradian REM sleep timing

Hao L, Woolley J, Yin Z, Jin X, Stucynski J, Sandoval Ortega RA, Corder G, Chung S, Weber F.

Current Biology · 36, 1422–1434.e5 (2026). **Co-author.**

doi:10.1016/j.cub.2026.02.034

Mimicking opioid analgesia in cortical pain circuits

Oswell CS, Rogers SA, James JG et al., including Sandoval Ortega RA.

Nature · 649, 938–947 (2026). **Co-author.**

doi:10.1038/s41586-025-09908-w

A nociceptive amygdala-striatal pathway modulating affective-motivational pain

Wojcik JA et al., including Sandoval Ortega RA.

Science Advances · 11, eado2837 (2025). **Co-author.**

doi:10.1126/sciadv.ado2837

AxoDen: An Algorithm for the Automated Quantification of Axonal Density in Defined Brain Regions

Sandoval Ortega RA, Li E, Joseph O, Dufour PA, Corder G.

eNeuro · 12, ENEURO.0233-24.2025 (2025). **First author.**

doi:10.1523/ENEURO.0233-24.2025

VTA μ -Opioidergic Neurons Facilitate Low Sociability in Protracted Opioid Abstinence

Jo AY, Xie Y, Wooldridge LM, Rogers SA, Kimmey BA, Rodrigues A, Sandoval Ortega RA, Creasy KT, Beier KT, Blendy JA, Corder G.

Journal of Neuroscience · 45, e1154242025 (2025). **Co-author.**

doi:10.1523/JNEUROSCI.1154-24.2025

Interactive effects of pain and arousal state on heart rate and cortical activity in the mouse anterior cingulate and somatosensory cortices

Sandoval Ortega RA, Renard M, Cohen MX, Nevian T.

Neurobiology of Pain · 15, 100157 (2024). **First author.**

doi:10.1016/j.ynpai.2024.100157

RESEARCH SOFTWARE

AxoDen — Method development and first-author publication for automated quantification of labelled axonal density. Collaborative software project available as a web app, desktop interface and Python package.

github.com/raqueladaia/AxoDen · Documentation

FUNDING CONTRIBUTIONS & RECOGNITION

2026 · NIH R21NS145093. Conceptualised, designed and wrote “Deciphering Thalamocortical Circuit Dynamics Underlying Pain and Sleep Interactions.” Essential Personnel; PI: Gregory Corder. Award period: March 2026–February 2028.

2023 · Hemsley Fellowship Award, Cold Spring Harbor Laboratory Neural Data Analysis course. Best Data Blitz Presentation, Penn Chronobiology and Sleep Institute retreat.

2022 · University of Bern Doc.Mobility, supporting a six-month research stay at Radboud University.

TEACHING & MENTORING

Mentoring doctoral researchers, rotation students, technicians and undergraduates at Penn in experimental methods and data analysis. Supervised master’s student Margot Renard in Bern in electrophysiology, sleep analysis and data management.

2024 · Designed and taught *From Lost to Boss: Python for Beginners*, a seven-session workshop.

2023 · Teaching assistant, Michael X Cohen’s *Analyzing Neural Time Series Data* course.

2022 · Problem-based learning tutor, medical students, University of Bern.

2020–2021 · Co-examiner in neurophysiology, University of Bern.

SCIENTIFIC LEADERSHIP & PUBLIC ENGAGEMENT

2024–2026 · Co-chair, Gordon Research Seminar on Sleep, 2026 meeting.

2018–2022 · Founder and president, Neuro Meetups Bern; more than 20 seminars.

2019–2021 · President, young Swiss Society for Neuroscience; treasurer, 2021–2022.

2018–2020 · Doctoral and postdoctoral representative, Department of Physiology, Bern.

2019–2020 · City coordinator, Pint of Science Bern.

Since 2024 · Community and programme contributions, Ciencia con Acento.

METHODS & ADVANCED TRAINING

Methods: Multisite neural recordings, EEG/EMG sleep phenotyping, ECG, stereotaxic surgery, viral approaches, calcium imaging, behavioural analysis, fluorescence/confocal microscopy and image quantification. Python, MATLAB and reproducible analysis workflows.

Training: CSHL Neural Data Analysis (2023); Linear Algebra for Neuroscientists (2022); Analyzing Neural Time Series (2021); Sleep and Memory, Fribourg (2019); Sleep and Circadian Rhythms, Venice (2019).

Languages: Spanish, Catalan, English, French and German.