Open science efforts for PET imaging - From guidelines over BIDS PET to OpenNeuroPET

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Positron Emission Tomography controversies

NeuroImage 84 (2014) 1094–1100

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Comments and Controversie

PET Neuroimaging: T

Paul Cumming *

Department of Nuclear Medicine, University

NeuroImage 94 (2014) 408–410

Contents lists available at ScienceDirect

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Comments and Controversies

PET neuroimaging: The elep

Comment on Cumming: "PI

packs his trunk?"

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NeuroImage 84 (2014) 1104–1106

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Comments and Controversies

The white elephant revived: A new marriage between PET and MRI
Comment to Cumming: "PET Neuroimaging: The White Elephant Packs His Trunk?"

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[b] Division of Brain, Imaging and Behaviour – Systems Neuroscience, Toronto Western Research Institute, UHN, University of Toronto, Ontario, Canada
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[d] Department of Clinical Neurosciences, Cambridge University, Cambridge, UK
[e] Medical Research Council Cognition and Brain Sciences Unit, Cambridge, UK

Standard nomenclature

- PET is much more than clinical scans with [^{18}F]FDG
- PET can visualize and quantitatively measure the function of biological and cellular processes in vivo

Journal of Cerebral Blood Flow & Metabolism (2007) 27, 1533–1539

www.jcbfm.com

Review Article

Consensus nomenclature for *in vivo* imaging of reversibly binding radioligands

Robert B Innis[1], Vincent J Cunningham[2], Jacques Delforge[3], Masahiro Fujita[1], Albert Gjedde[4], Roger N Gunn[5], James Holden[6], Sylvain Houle[7], Sung-Cheng Huang[8], Masanori Ichise[9], Hidehiro Iida[10], Hiroshi Ito[11], Yuichi Kimura[12], Robert A Koeppe[13], Gitte M Knudsen[14], Juhani Knuuti[15], Adriaan A Lammertsma[16], Marc Laruelle[2], Jean Logan[17], Ralph Paul Maguire[18], Mark A Mintun[19], Evan D Morris[20], Ramin Parsey[9], Julie C Price[21], Mark Slifstein[9], Vesna Sossi[22], Tetsuya Suhara[11], John R Votaw[23], Dean F Wong[24] and Richard E Carson[25]

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Consensus on publishing PET experiments

- Replication in science can be improved with standards for reporting and sharing of primary research data

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Opinion

Guidelines for the content and format of PET brain data in publications and archives: A consensus paper

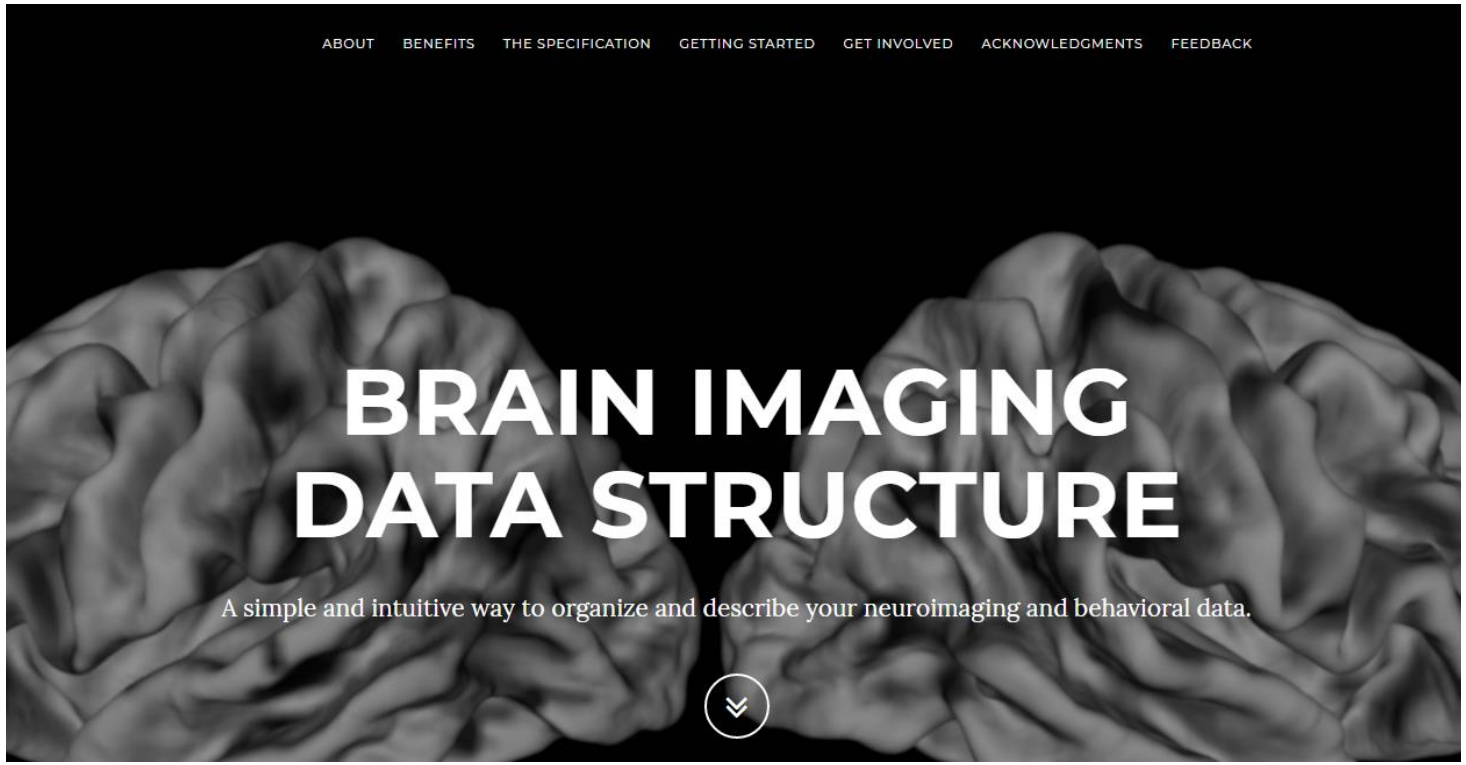
Gitte M Knudsen[1], Melanie Ganz[1], Stefan Appelhoff[2], Ronald Boellaard[3], Guy Bormans[4], Richard E Carson[5], Ciprian Catana[6], Doris Doudet[7], Antony D Gee[8], Douglas N Greve[6], Roger N Gunn[9], Christer Halldin[10], Peter Herscovitch[11], Henry Huang[5], Sune H Keller[12], Adriaan A Lammertsma[3], Rupert Lanzenberger[13], Jeih-San Liow[14], Talakad G Lohith[15], Mark Lubberink[16], Chul H Lyoo[17], J John Mann[18], Granville J Matheson[10], Thomas E Nichols[19], Martin Nørgaard[1], Todd Ogden[20], Ramin Parsey[21], Victor W Pike[14], Julie Price[6], Gaia Rizzo[9], Pedro Rosa-Neto[22,23], Martin Schain[20], Peter JH Scott[24], Graham Searle[9], Mark Slifstein[21], Tetsuya Suhara[25], Peter S Talbot[26], Adam Thomas[27], Mattia Veronese[28], Dean F Wong[29], Maqsood Yaqub[3], Francesca Zanderigo[30], Sami Zoghbi[14] and Robert B Innis[14]

Brain Imaging Data Structure (BIDS)

- It's a data structure ; nothing to do with format per se

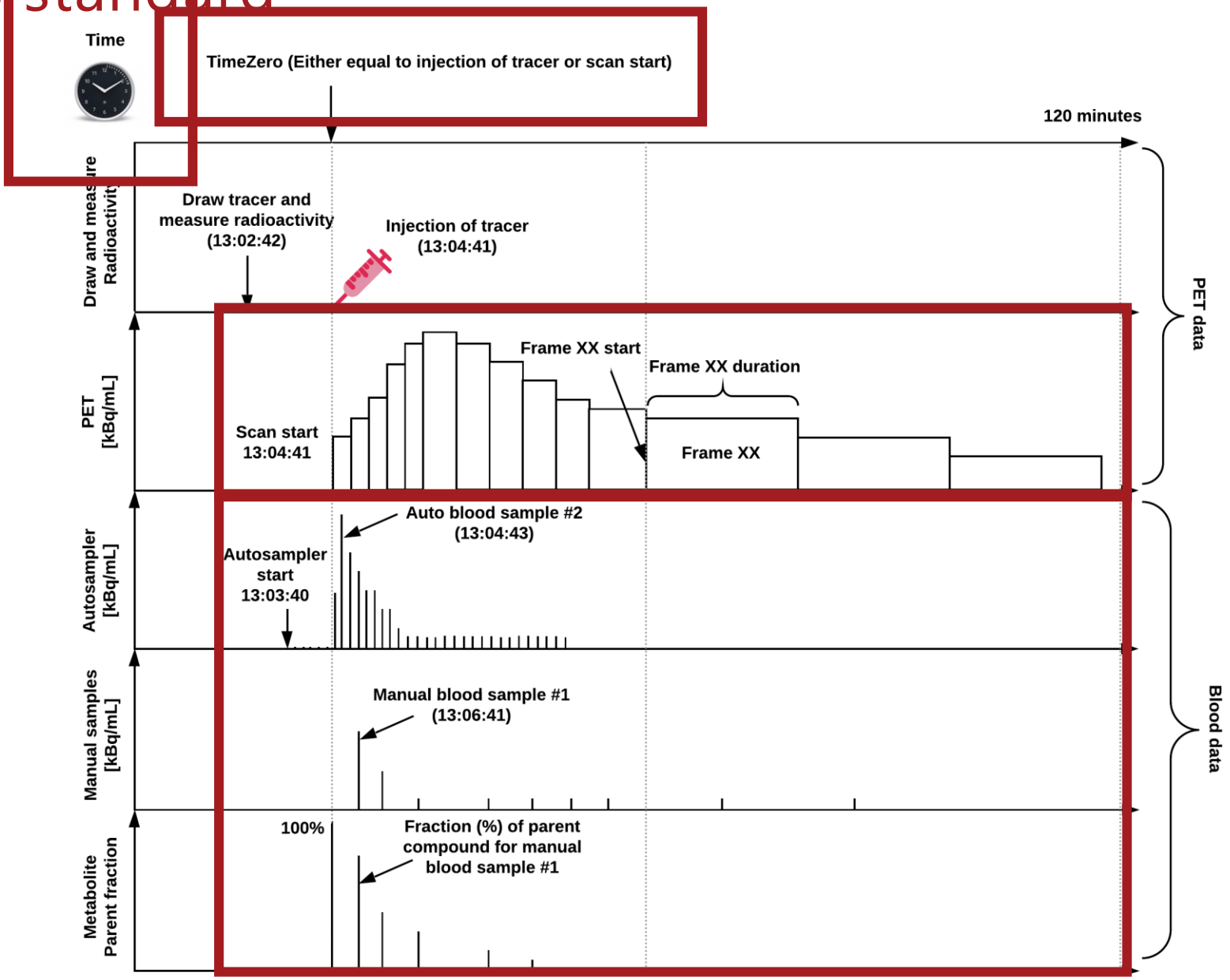
- It's about:

  - how you organize data
  - how you name files
  - how you document metadata
  - uses community standards

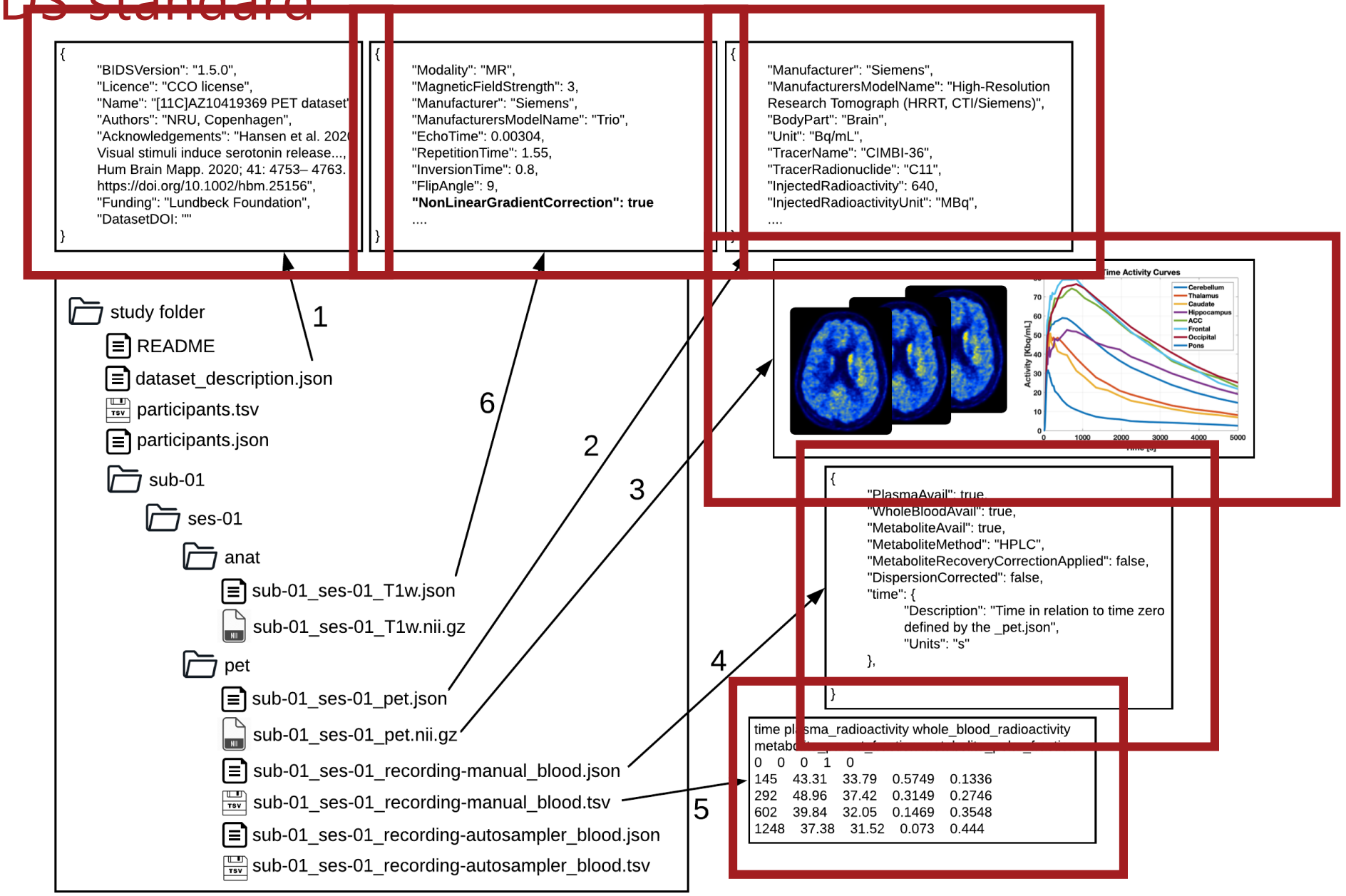


bids.neuroimaging.io

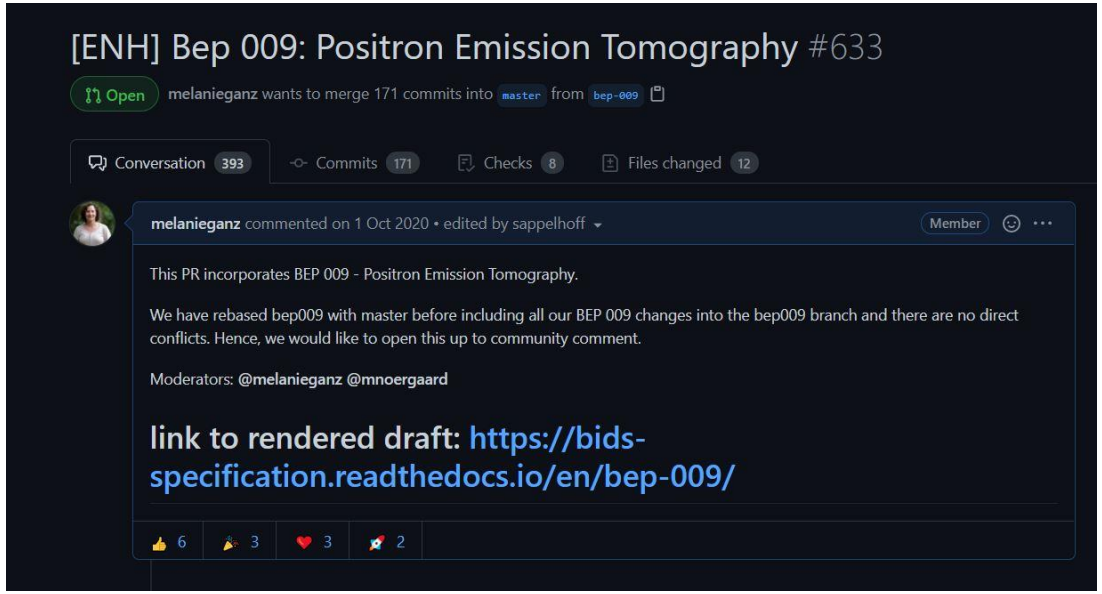
PET-BIDS ~~standard~~



PET-BIDS standard



PET-BIDS standard

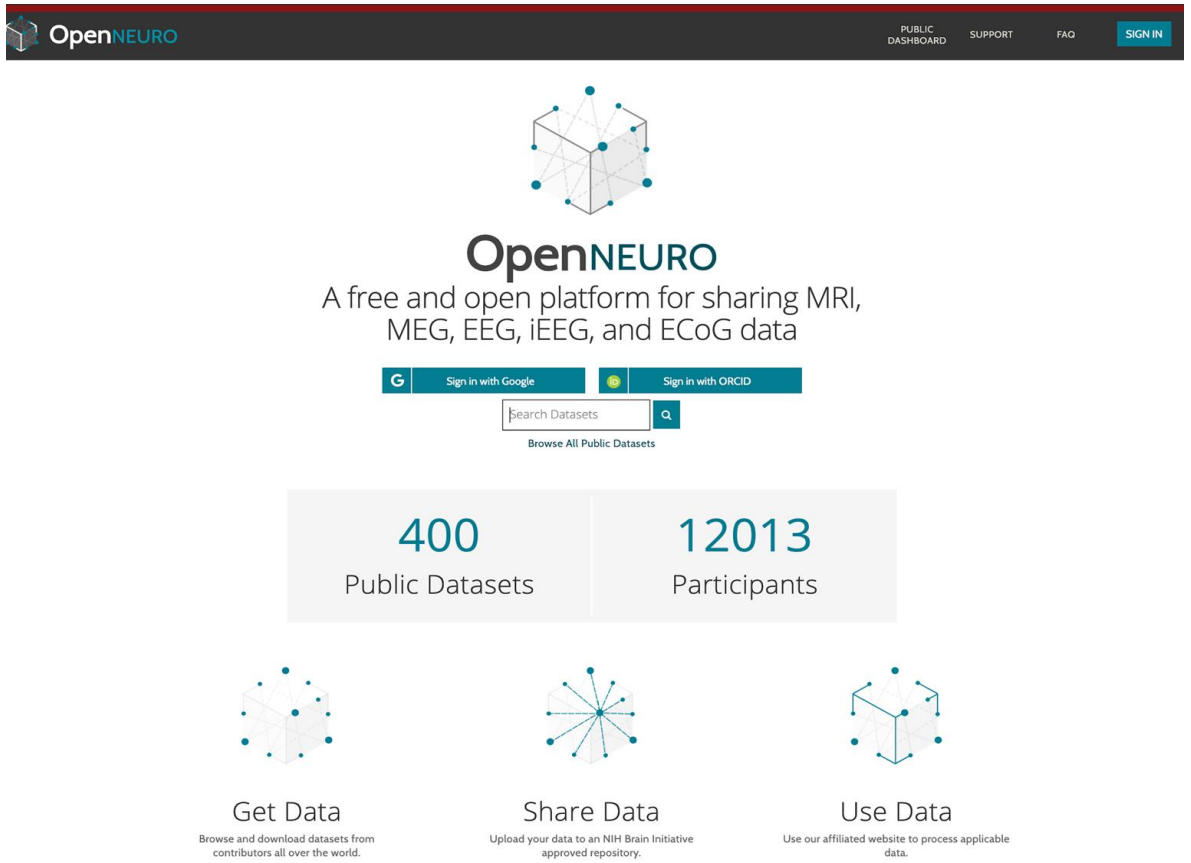


PET-BIDS, an extension to the brain imaging data structure for positron emission tomography

Martin Norgaard[1,2], Granville J. Matheson[3,4], Hanne D. Hansen[1,5], Adam Thomas[6], Douglas N. Greve[5], Graham Searle[7], Gaia Rizzo[7], Mattia Veronese[8], Alessio Giacomel[8], Maqsood Yaqub[12], Matteo Tonietto , Thomas Funck , Ashley Gillman , Hugo Boniface , Arnaud Marcoux , Pamela Lamontagne , Alexandre Routier , Jelle Dalenberg , Tobey Betthauser , Franklin Feingold[2], Chris Markiewicz[2], Chris Gorgolewski[2], Ross W. Blair[2], Stefan Appelhoff[2,11], Remi Gau , Taylor Salo , Kris Thielemann , Guimar Niso , Cyril Pernet , Christophe Phillips , Robert Oostenveld , Richard E. Carson[9], Gitte M. Knudsen[1], Robert B. Innis[10], and Melanie Ganz[1,*]

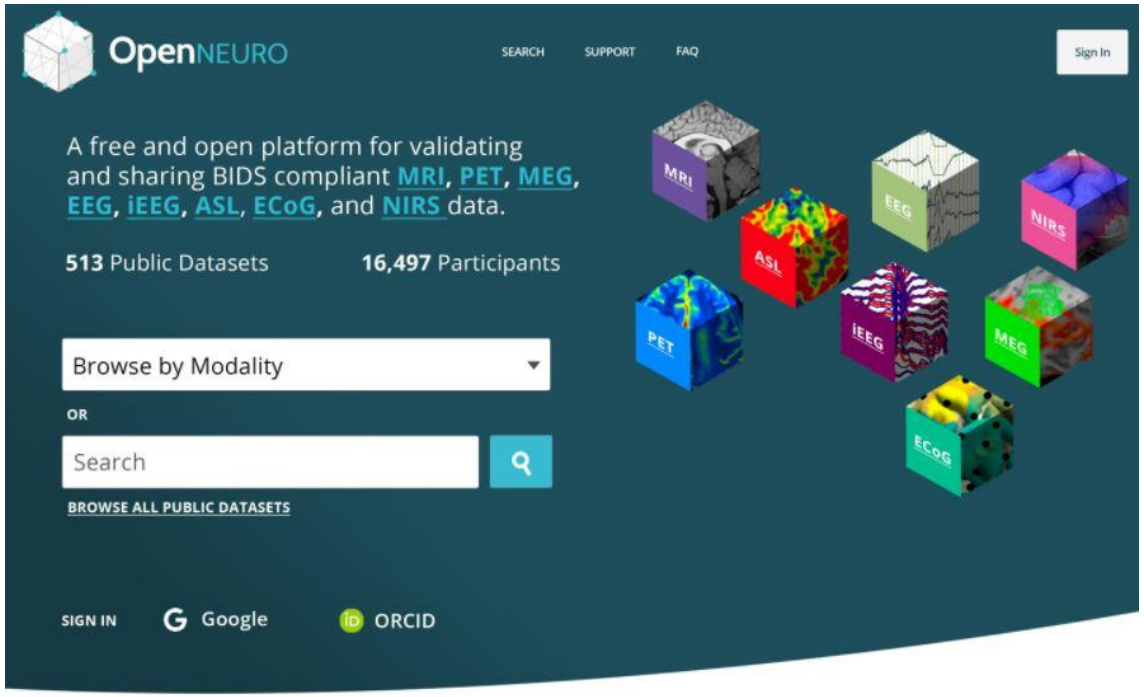
From OpenNeuro …

- Official repository for BRAIN Initiative (funded through 2023)
- Part of the Amazon Public Datasets project
- 400 public datasets
- 12,013 subjects / ~16 TB
- 10-20 new dataset uploads per month
- Serving 1000 + downloads/month (almost 20TB of data)
- Over 8K users/month



...to OpenNeuroPET

- Establish PET archive as an extension of OpenNeuro
  - Standard format and content
  - "Best Practices" for pipelines and QC checks
- Educate and seek feedback from the PET user community
- Establish average images of receptor density, connecting to larger fMRI community



OpenNeuroPET setup

PI: Robert Innis

Funding: NIMH via BRAIN Initiative (Brain Research through Advancing Innovative Neurotechnologies)

Duration: Oct 2020 – Sept 2025

Funds: $4.4 M

Collaborator: NRU, Rigshospital; MGH

Consultant: Russell Poldrack (Stanford)

NIH National Institute of Mental Health

PI: Gitte Moos Knudsen

Funding: Novo Nordisk Foudation (Research Infrastructure program)

Duration: Jan 2021 – Dec 2025

Funds: $1.5 M

Collaborator: NIMH; MGH

Consultant: Russell Poldrack (Stanford)

Thank you!

novo nordisk fonden

NIH National Institute of Mental Health

Athinoula A. Martinos Center For Biomedical Imaging

Harvard–MIT Health Sciences & Technology

MASSACHUSETTS GENERAL HOSPITAL

Stanford University

REGION H Rigshospitalet