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Glasser parcellated 3d model

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Matthew F. Glasser, Timothy S. Coalson, Emma C. Robinson, Carl D. Hacker, John Harwell, Essa Yacoub, Kamil Ugurbil, Jesper Andersson, Christian F. Beckmann, Mark Jenkinson, Stephen M. Smith and David C. Van Essen, "A multi-modal parcellation of human cerebral cortex" Nature, 2016.
doi:10.1038/nature18933

Pathways Visualisations

The underlying data is created with usage of databases SCAIView (https://academia.scaiview.com) and NeuroMMSIg (https://neurommsig.scai.fraunhofer.de). These are based on the following works:

Dörpinghaus, Jens, Jürgen Klein, Johannes Darms, Sumit Madan, and Marc Jacobs. "Scaiview-a Semantic Search Engine for Biomedical Research Utilizing a Microservice Architecture." Paper presented at the SEMANTICS Posters&Demos, 2018.

Domingo-Fernández, Daniel, Alpha Tom Kodamullil, Anandhi Iyappan, Mufassra Naz, Mohammad Asif Emon, Tamara Raschka, Reagon Karki*, et al.* "Multimodal Mechanistic Signatures for Neurodegenerative Diseases (Neurommsig): A Web Server for Mechanism Enrichment." *Bioinformatics* 33, no. 22 (2017): 3679-81.
[https://doi.org/10.1093/bioinformatics/btx399.](https://doi.org/10.1093/bioinformatics/btx399)
https://doi.org/10.1093/bioinformatics/btx399

The methods will be described here:
Stefanovski. L, K. Bülau, L. Martin, J. Courtiol, M. Diaz-Cortes, C. Langford, J. Palmer, P. Triebkorn, A. T. Kodamullil, M. Hoffmann-Apitius, and P. Ritter (1,4); for the Alzheimer’s Disease Neuroimaging Database. Mapping of Alzheimer’s Disease in The Virtual Brain (unpublished)

Braak Visualisations

The Braak stages correspond to the depositions stages of Amyloid-beta and Tau protein as described in Braak and Braak 1991, Braak and Braak 1997, and Braak et al. 2006.

Braak, Heiko, and Eva Braak. "Neuropathological Stageing of Alzheimer-Related Changes." *Acta neuropathologica* 82, no. 4 (1991): 239-59.

Braak, H., and E. Braak. "Frequency of Stages of Alzheimer-Related Lesions in Different Age Categories." *Neurobiol Aging* 18, no. 4 (Jul-Aug 1997): 351-7.
http://www.ncbi.nlm.nih.gov/pubmed/9330961

Braak, H., I. Alafuzoff, T. Arzberger, H. Kretzschmar, and K. Del Tredici. "Staging of Alzheimer Disease-Associated Neurofibrillary Pathology Using Paraffin Sections and Immunocytochemistry." [In eng]. *Acta Neuropathol* 112, no. 4 (Oct 2006): 389-404.
https://doi.org/10.1007/s00401-006-0127-z
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3906709/pdf/401_2006_Article_127.pdf.

Receptor Visualisations

The receptor densities displayed in this atlas are taken from autoradiographic data of the Julich Cytoarchtictectonic Atlas (JuBrain) project. It has been made available via the EBRAINS platform of the Human Brain project.
Original publication for JuBrain: Amunts, Katrin, Hartmut Mohlberg, Sebastian Bludau, and Karl Zilles. "Julich-Brain: A 3d Probabilistic Atlas of the Human Brain's Cytoarchitecture." *Science* 369, no. 6506 (2020): 988-92.
https://doi.org/10.1126/science.abb4588.
https://science.sciencemag.org/content/sci/369/6506/988.full.pdf.
Dataset: DOI: 10.25493/TAKY-64D

The receptor density data is available here:
https://search.kg.ebrains.eu/instances/Project/6c8349cc7260ae62e3b1396831a8398f

We acknowledge K. Zilles and N. Palomero-Gallagher for the publication of the data in EBRAINS.Original publication of the data: Zilles, K., Bacha-Trams, M., Palomero-Gallagher, N., Amunts, K., & Friederici, A. D. (2015). Common molecular basis of the sentence comprehension network revealed by neurotransmitter receptor fingerprints. Cortex, 63, 79–89.

Datasets used for the maps of this interactive atlas:

Area	Reference
Area hOc1 (V1, 17, CalcS)	DOI: 10.25493/P8SD-JMH
Anterior Thalamic nucleus	DOI: 10.25493/KKTT-1TK
Area 3b (PostCG)	DOI: 10.25493/TZBY-96W
Area 45 (IFG)	DOI: 10.25493/QFSY-YWC
Area 46	DOI: 10.25493/JHA2-ACG
Area 47	DOI: 10.25493/4M1R-KCP
Area 4p (PreCG)	DOI: 10.25493/J5JR-YH0
Area 7A (SPL)	DOI: 10.25493/DQJ7-KC8
Area 9	DOI: 10.25493/97BA-87Y
Area FG1 (FusG)	DOI: 10.25493/QN6K-CHN
Area FG2 (FusG)	DOI: 10.25493/VFCW-HXZ
Area PF (IPL)	DOI: 10.25493/VSFY-EYF
Area PFcm (IPL)	DOI: 10.25493/5QDP-ARH
Area PFm (IPL)	DOI: 10.25493/FS3T-2R8
Area PFop (IPL)	DOI: 10.25493/9G1P-02S
Area PFt (IPL)	DOI: 10.25493/E7PM-FDC
Area PGa (IPL)	DOI: 10.25493/62W8-RYF
Area PGp (IPL)	DOI: 10.25493/X71T-HZ
Area TE 1.0 (HESCHL)	DOI: 10.25493/AHX0-9PU

Area TE 2.1 (STG)	DOI: 10.25493/C279-428
CA1 (Hippocampus)	DOI: 10.25493/Y7YV-6Q6
CA2 (Hippocampus)	DOI: 10.25493/4F4S-W5A
CA3 (Hippocampus)	DOI: 10.25493/XFHR-X41
DG (Hippocampus)	DOI: 10.25493/M8PK-C82
Dorsal part of Area 44 (IFG)	DOI: 10.25493/YQCR-1DQ
Dorsal part of Area hOc2 (V2, 18)	DOI: 10.25493/ZJ7E-KXZ
Dorsal part of Area hOc3 (Cuneus)	DOI: 10.25493/4ETW-9XB
Globus pallidus	DOI: 10.25493/TPRG-5VH
Mediodorsal part of the thalamic nucleus	DOI: 10.25493/GKY8-NZR
Putamen	DOI: 10.25493/4GZ1-SHH
stratum cellulare of CA (Hippocampus)	DOI: 10.25493/9DDZ-SJP
stratum moleculare of CA (Hippocampus)	DOI: 10.25493/KYZ2-4GM
ventral part of Area hOc2 (V2, 18)	DOI: 10.25493/2E5C-PVM
ventral part of Area hOc3 (LingG)	DOI: 10.25493/TBMX-BZ9
Ventral part of rea 44 (IFG)	DOI: 10.25493/P82M-PVM

Methods are described in:

- Scheperjans, F., Palomero-Gallagher, N., Grefkes, C., Schleicher, A., & Zilles, K. (2005). Transmitter receptors reveal segregation of cortical areas in the human superior parietal cortex: Relations to visual and somatosensory regions. NeuroImage, 28(2), 362–379. DOI: 10.1016/j.neuroimage.2005.06.028

- Eickhoff, S. B., Schleicher, A., Scheperjans, F., Palomero-Gallagher, N., & Zilles, K. (2007). Analysis of neurotransmitter receptor distribution patterns in the cerebral cortex. NeuroImage, 34(4), 1317–1330. DOI: 10.1016/j.neuroimage.2006.11.016
- Caspers, J., Palomero-Gallagher, N., Caspers, S., Schleicher, A., Amunts, K., & Zilles, K. (2013). Receptor architecture of visual areas in the face and word-form recognition region of the posterior fusiform gyrus. Brain Structure and Function, 220(1), 205–219. DOI: 10.1007/s00429-013-0646-z
- Amunts, K., Lenzen, M., Friederici, A. D., Schleicher, A., Morosan, P., Palomero-Gallagher, N., & Zilles, K. (2010). Broca's Region: Novel Organizational Principles and Multiple Receptor Mapping. PLoS Biology, 8(9), e1000489. DOI: 10.1371/journal.pbio.1000489
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- Caspers, S., Schleicher, A., Bacha-Trams, M., Palomero-Gallagher, N., Amunts, K., & Zilles, K. (2012). Organization of the Human Inferior Parietal Lobule Based on Receptor Architectonics. Cerebral Cortex, 23(3), 615–628. DOI: 10.1093/cercor/bhs048
- Zilles, K. and Palomero-Gallagher, N. (2017). 2.12 - Comparative Analysis of Receptor Types That Identify Primary Cortical Sensory Areas. In *Evolution of Nervous Systems* (Second Edition), pp.225-245. DOI: 10.1016/B978-0-12-804042-3.00043-9

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