Contribution ID : **18** Type : **Poster**

MASH: a method for scalable cytoarchitectonic characterization of large optically cleared human neocortex samples in 3D

With the introduction of optical clearing in neuroscience, considerable advances in tissue clearing and large volume microscopy have been made1-4. However, volume imaging and cytoarchitectonic characterization of large human brain samples, scalable in terms of time and cost to cover a significant portion of a cortical area, has so far remained challenging. This is especially true for adult formalin-fixed tissue. We recently reported on MASH (Multiscale Architectonic Staining of Human cortex)5: a scalable nuclear and cytoplasmic labelling and optical clearing approach suitable for 5 mm thick archival, adult human cortex samples. Here we show results of MASH processed brain tissue from the level of visual areas down to the single cell. We also present an economic solution to further scale up this approach for robust and rapid histological processing of an entire human occipital lobe. To this end we build a custom-made cutting device to acquire consistent 5 mm thick coronal slices of an agarose-embedded occipital lobe. Clearing and labelling could be robustly performed in a glass jar with Teflon spacing elements under constant stirring. This is an important step for mapping and cytoarchitectural characterization of entire sub-systems of the human brain in 3D.

References:
1 Liebmann, T. et al. (2016) Three-Dimensional Study of Alzheimer's Disease Hallmarks Using the iDISCO Clearing Method.
2 Murakami, T. C. et al. (2018) A three-dimensional single-cell-resolution whole-brain atlas using CUBIC-X expansion microscopy and tissue clearing.
3 Renier, N. et al. (2016) Mapping of Brain Activity by Automated Volume Analysis of Immediate Early Genes.
4 Ye, L. et al. (2016) Wiring and Molecular Features of Prefrontal Ensembles Representing Distinct Experiences.
5 Hildebrand, S., Schueth, A., Herrler, A., Galuske, R. & Roebroeck, A. Scalable cytoarchitectonic characterization of large intact human neocortex samples. bioRxiv (2018).

Affiliation

Department of Cognitive Neuroscience, Maastricht University, the Netherlands

Terms and Conditions

Yes

Primary author(s) : Mr HILDEBRAND, Sven (Department of Cognitive Neuroscience, Maastricht Brain Imaging Centre (MBIC), Faculty of Psychology & Neuroscience, Maastricht University, the Netherlands); Dr SCHUETH, Anna (Department of Cognitive Neuroscience, Maastricht Brain Imaging Centre (MBIC), Faculty of Psychology & Neuroscience, Maastricht University, the Netherlands)

Co-author(s) : Dr HERRLER, Andreas (Department of Anatomy & Embryology, Faculty of Health, Medicine & Life Science, Maastricht University, the Netherlands); Prof. GALUSKE, Ralf (Systems Neurophysiology, Department of Biology, Technische Universität Darmstadt, Germany); Dr ROEBROECK, Alard (Department of Cognitive Neuroscience, Maastricht Brain Imaging Centre (MBIC), Faculty of Psychology & Neuroscience, Maastricht University, the Netherlands)

Presenter(s) : Mr HILDEBRAND, Sven (Department of Cognitive Neuroscience, Maastricht Brain Imaging Centre (MBIC), Faculty of Psychology & Neuroscience, Maastricht University, the Netherlands)

Session Classification : Posters