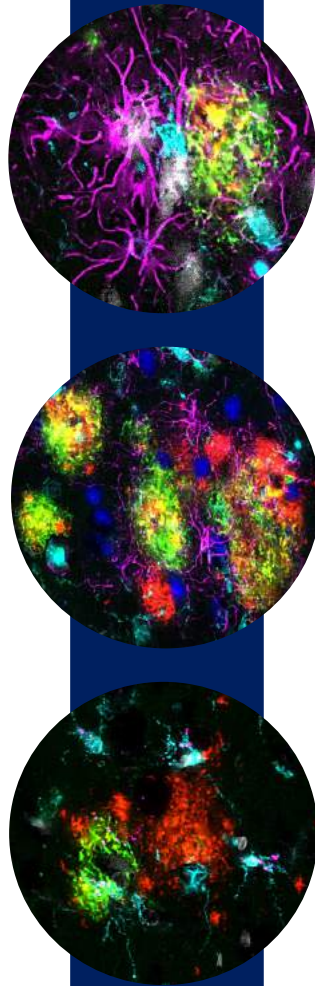


**Spatial phenotypic characterization of microglia via CODEX
Multiplexed Imaging reveals sub-population-level relationships with
pathogenic features in Alzheimer's Disease brains.**

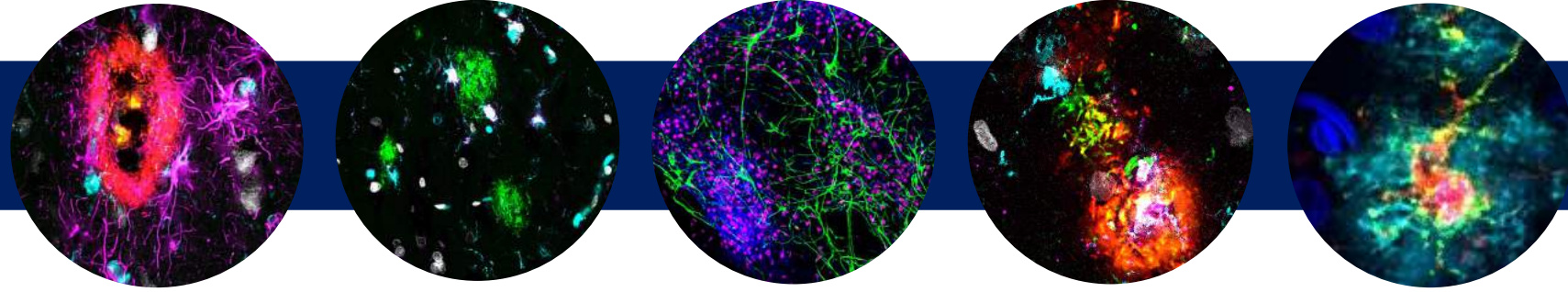
Alina Bogachuk

Ajami Lab

Oregon Health & Science University



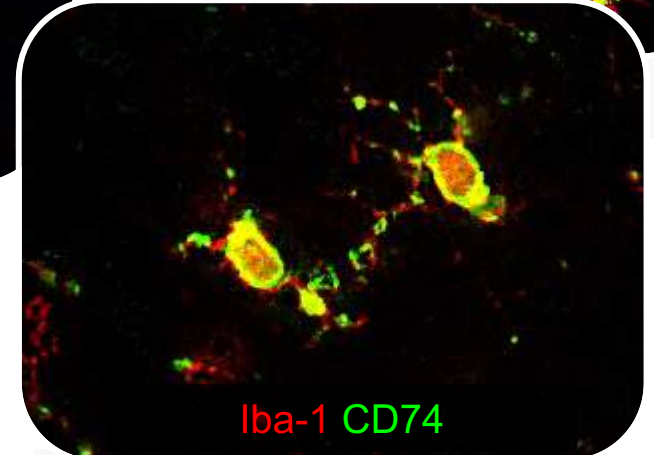
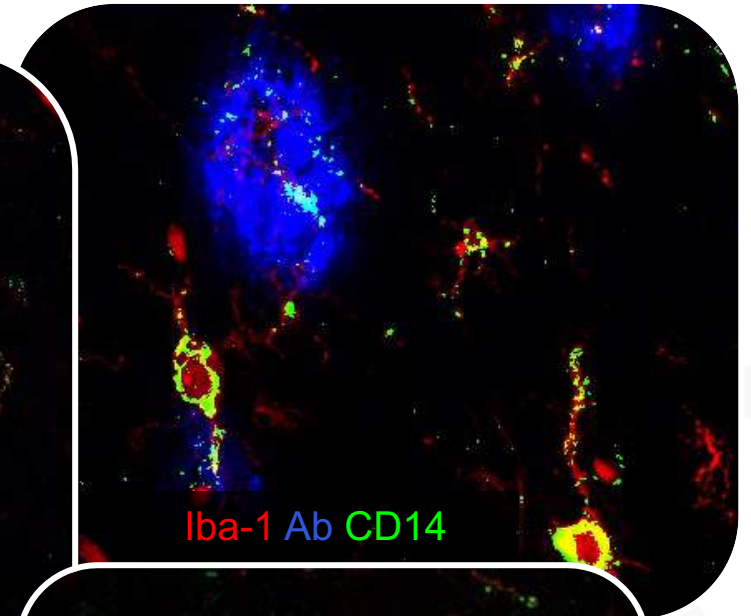
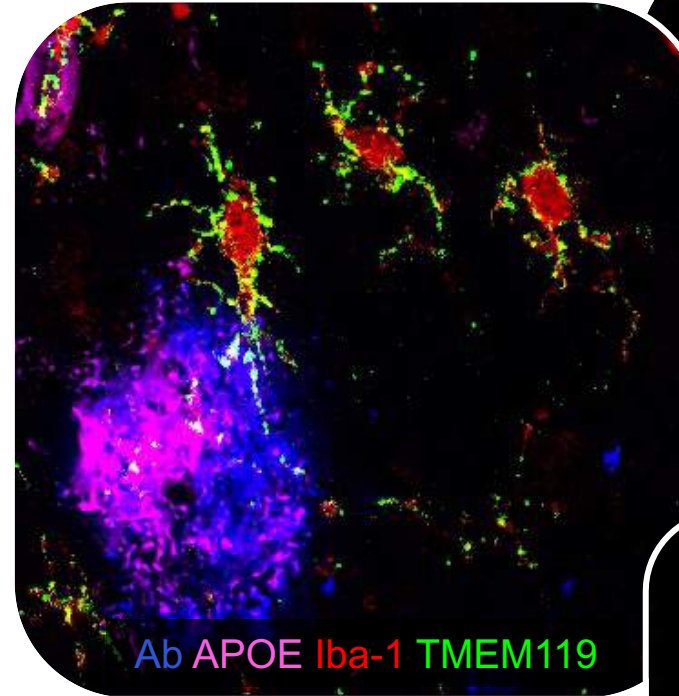
Intro & Aim



Intro: Microglia are important mediators of neurodegenerative disease, but their diverse phenotypes and functions are poorly understood.

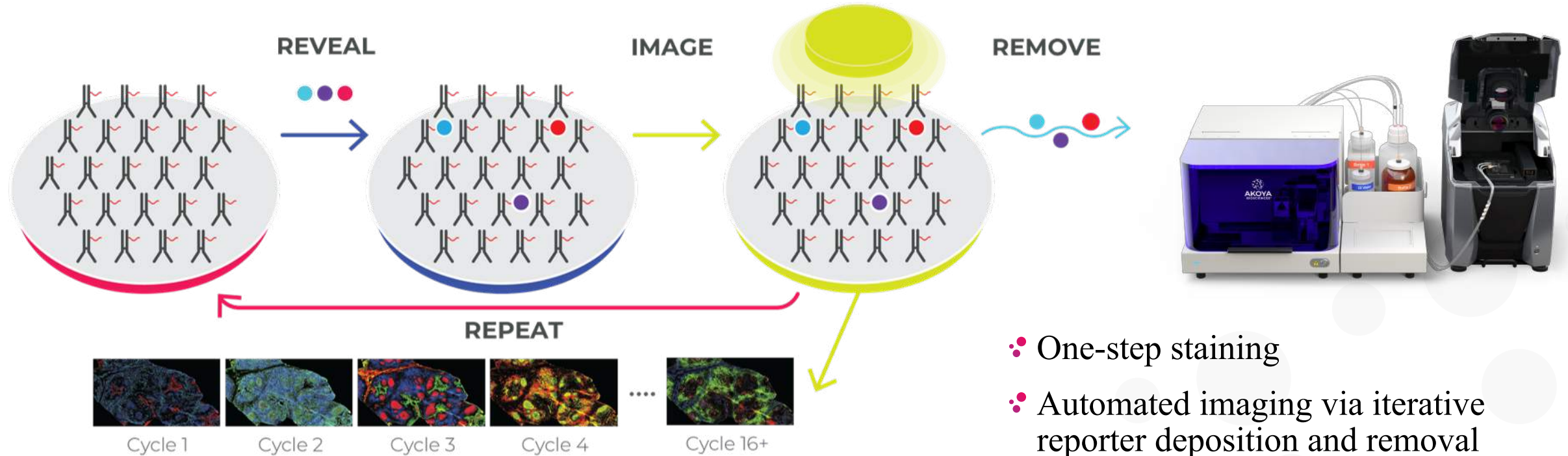
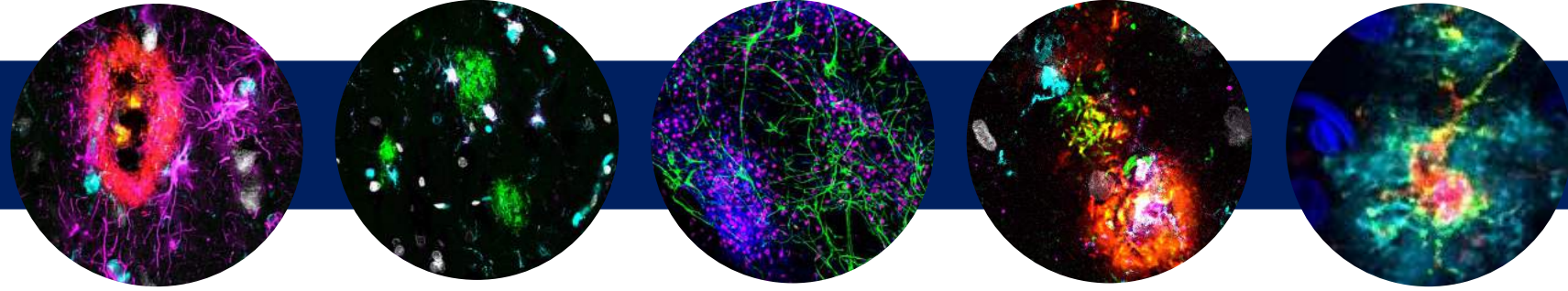
Aim: To characterize sub-populations of microglia *in-situ*

- 1) in the prefrontal cortex of brain samples from AD and control patients
- 2) in relation to AD pathogenic features such as amyloid plaques

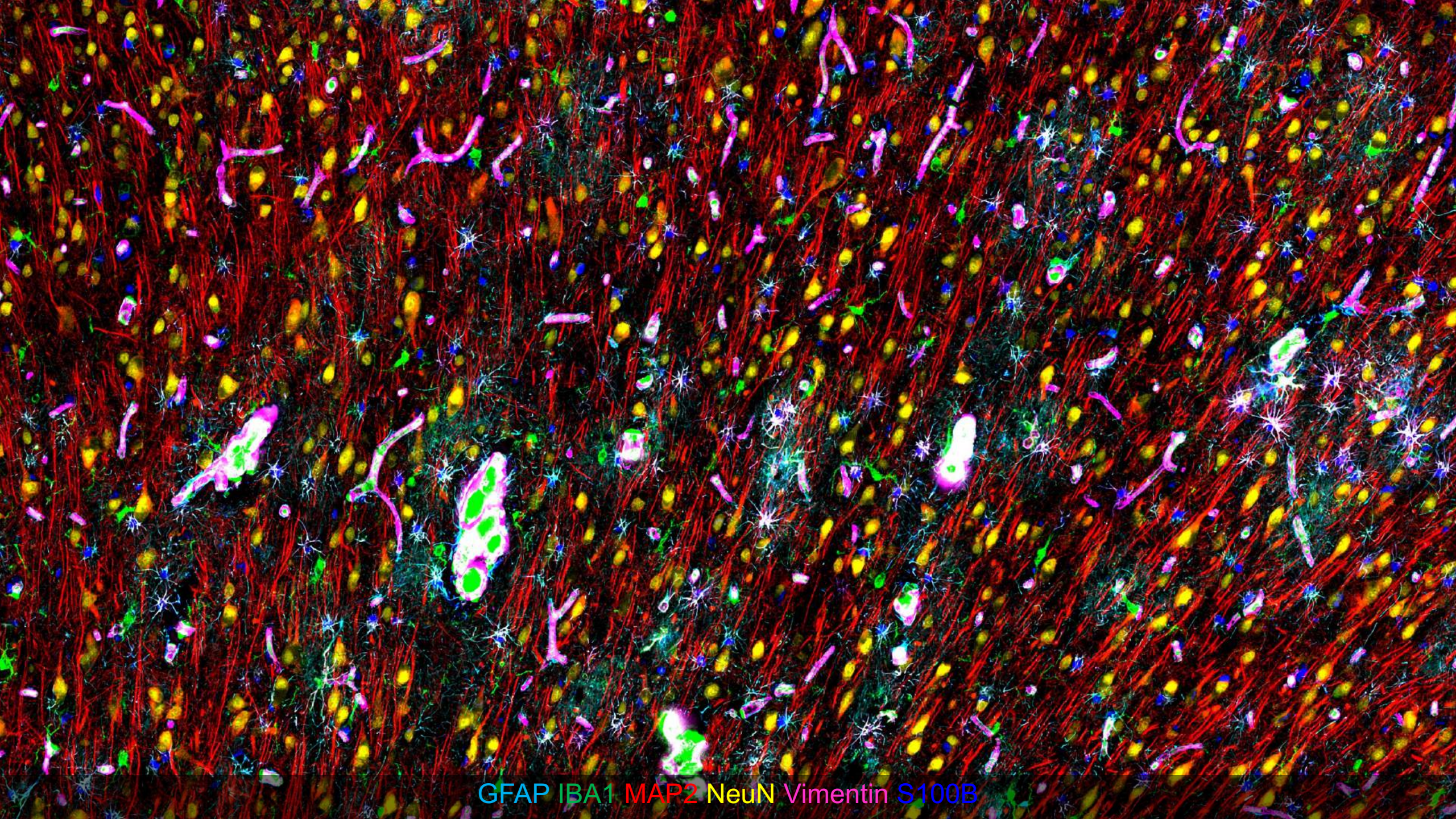


Conventional IHC is limited to 3-4 Biomarkers!

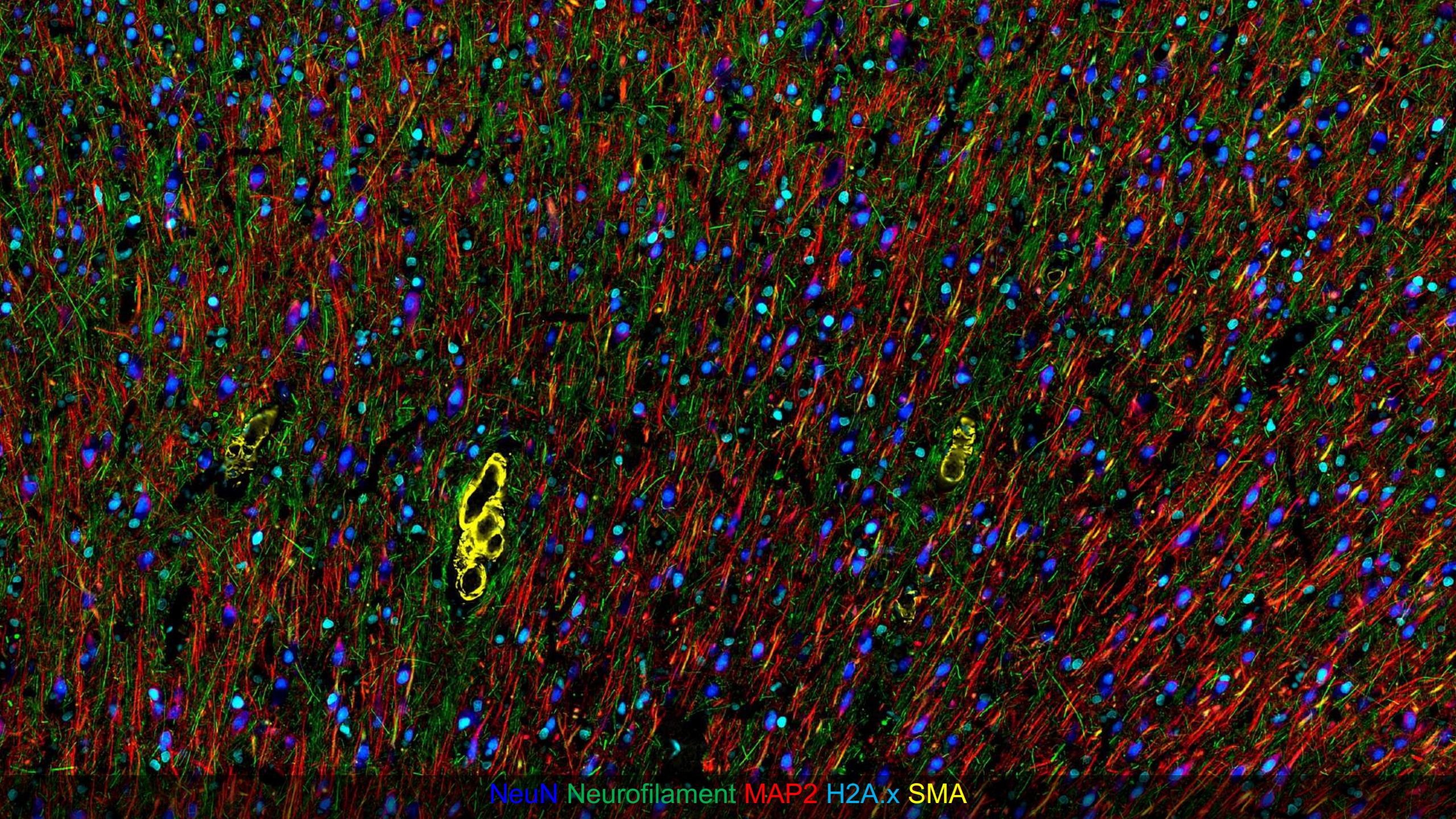
CODEx®



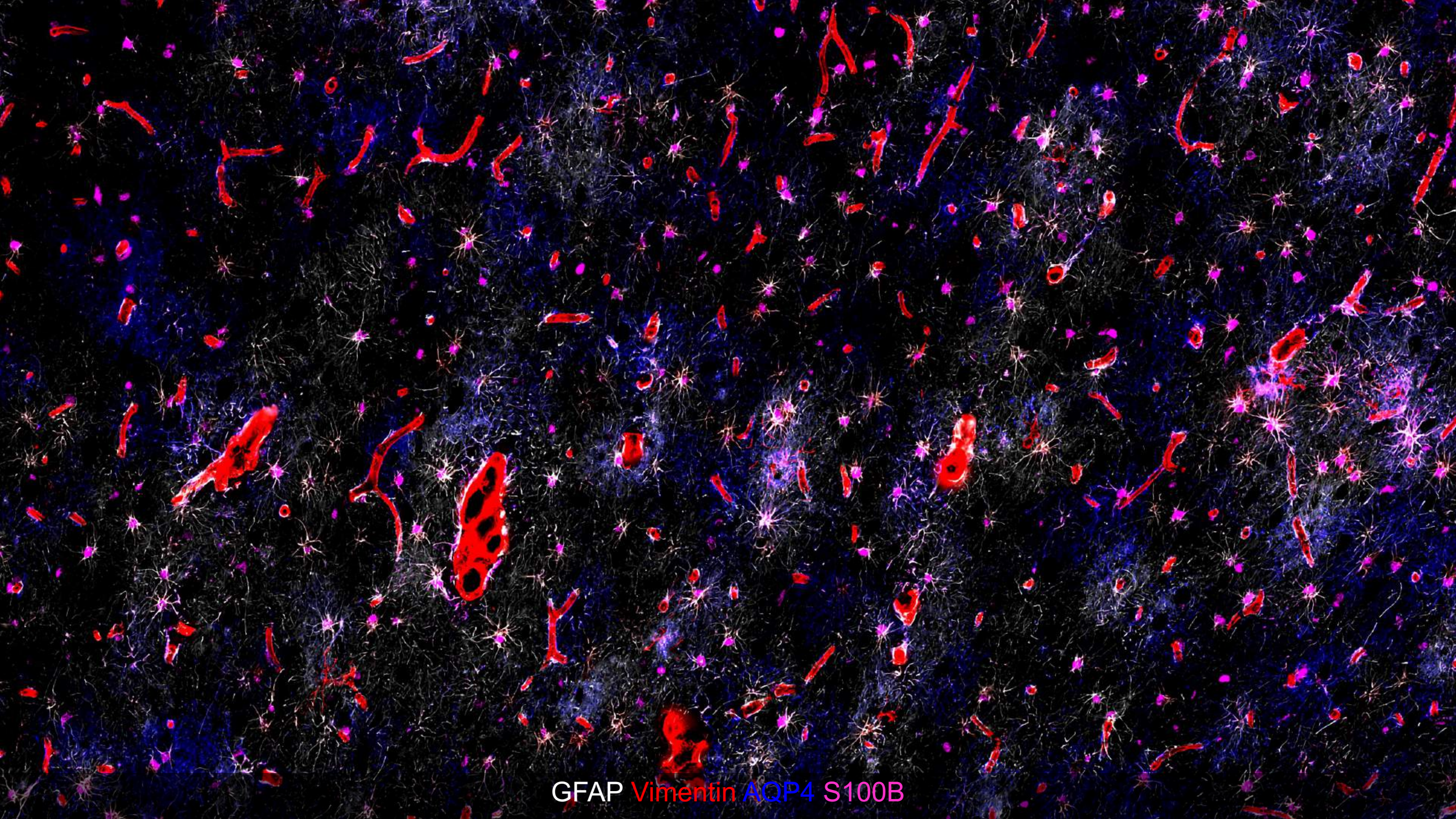
- ❖ One-step staining
- ❖ Automated imaging via iterative reporter deposition and removal
- ❖ No stripping, isothermal
- ❖ Compatible with optical microscopy
- ❖ Whole tissue imaging with single cell resolution



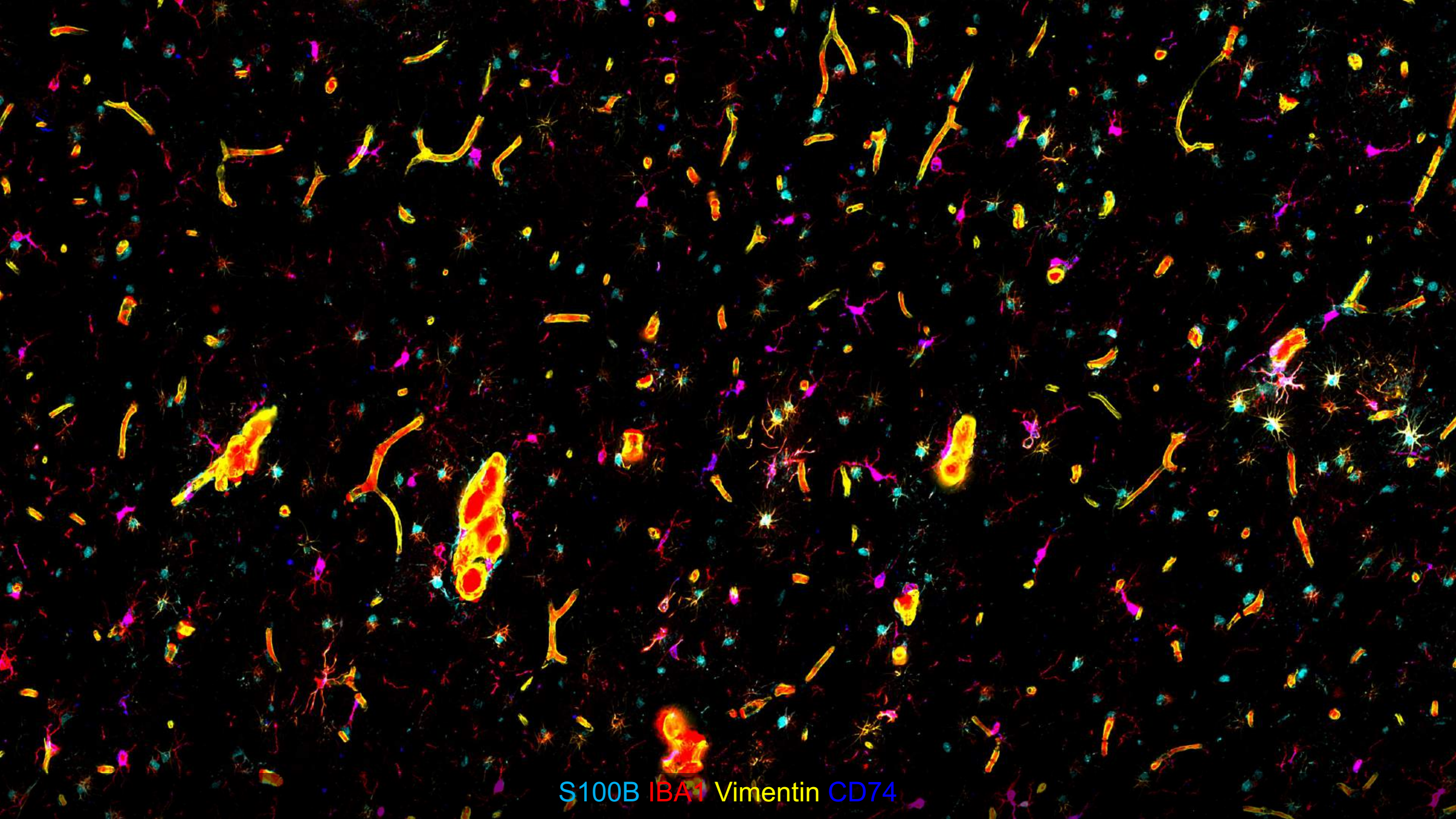
GFAP IBA1 MAP2 NeuN Vimentin S100B



NeuN Neurofilament MAP2 H2A.x SMA

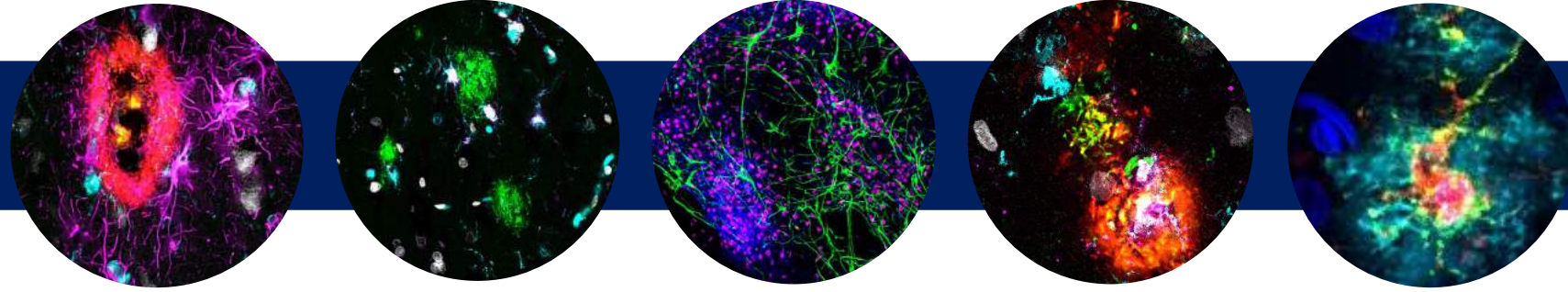


GFAP Vimentin AQP4 S100B

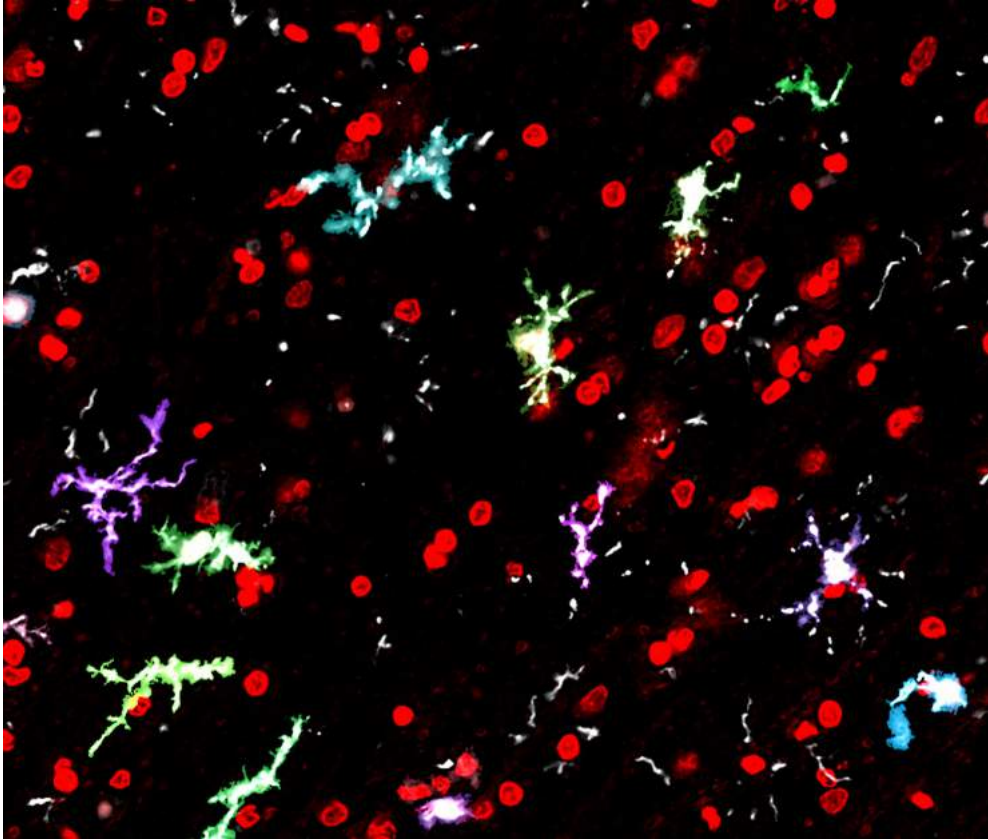


S100B IBA1 Vimentin CD74

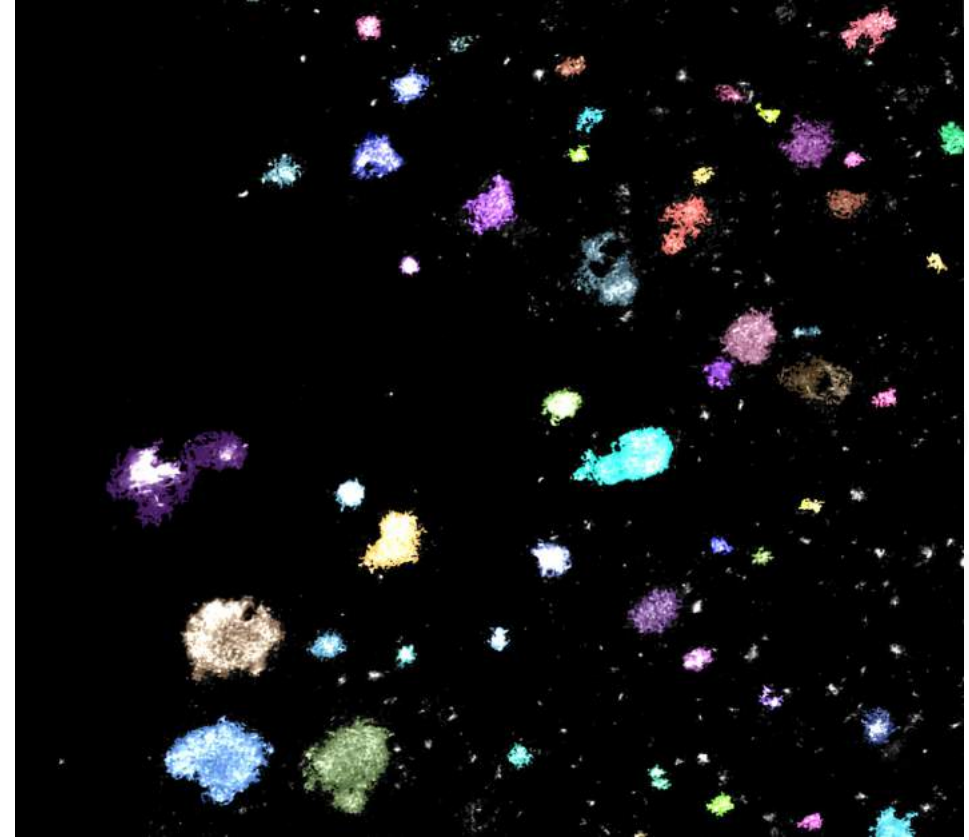
Segmentation



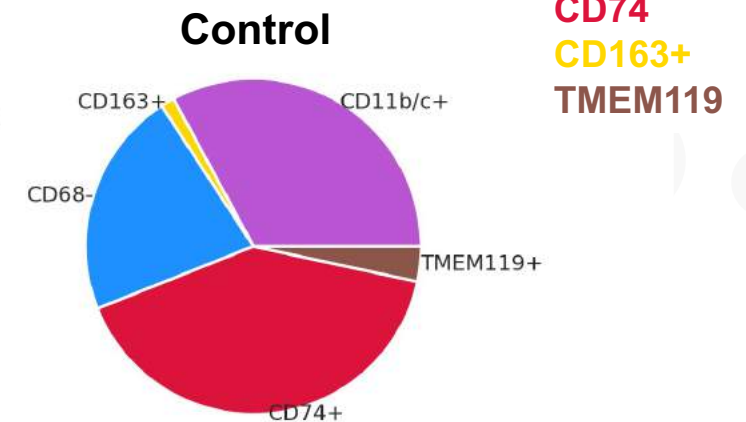
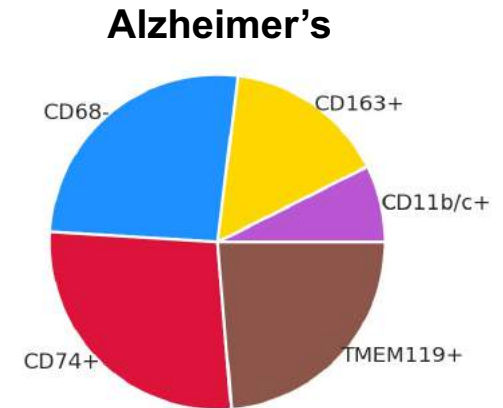
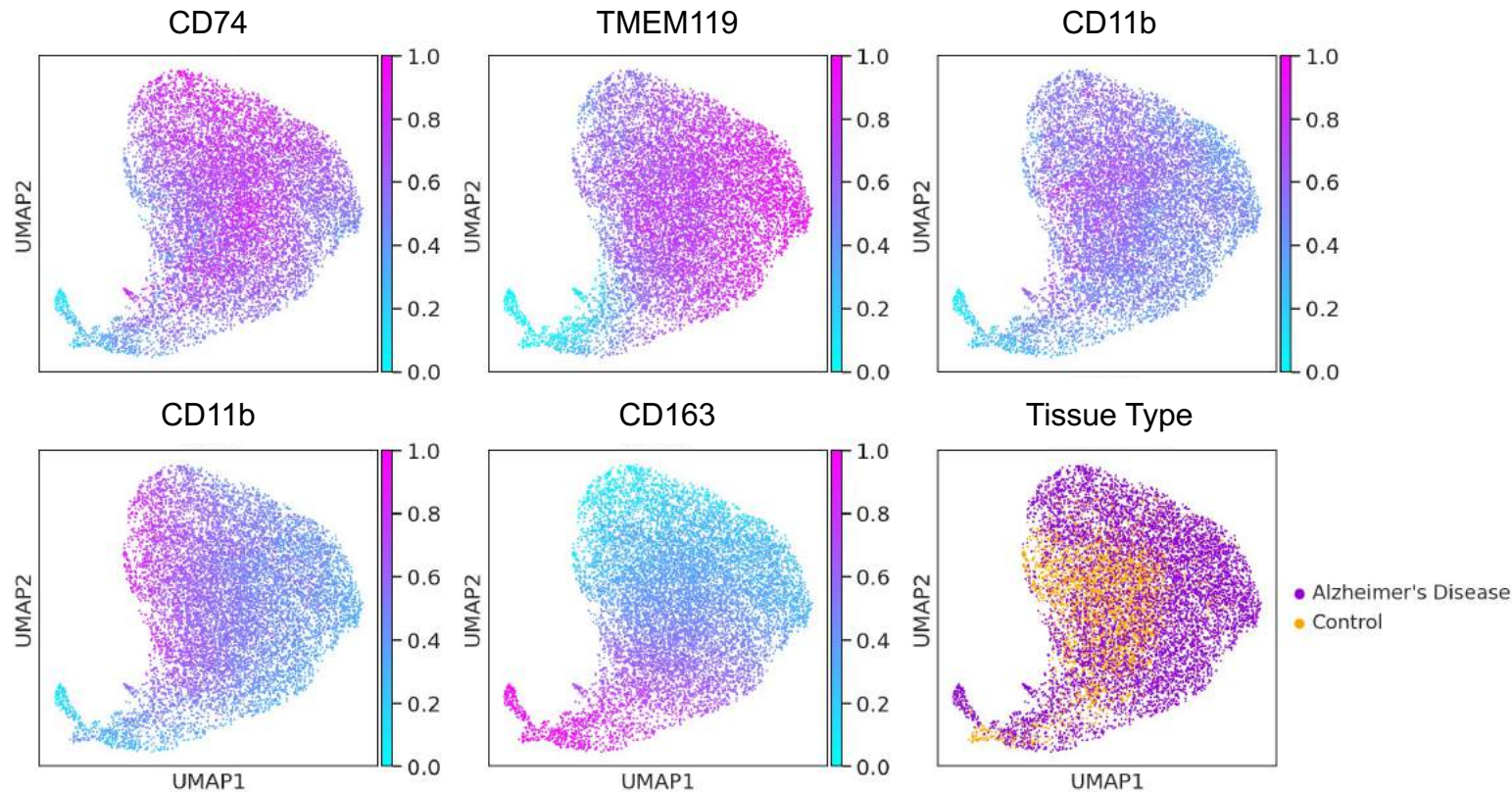
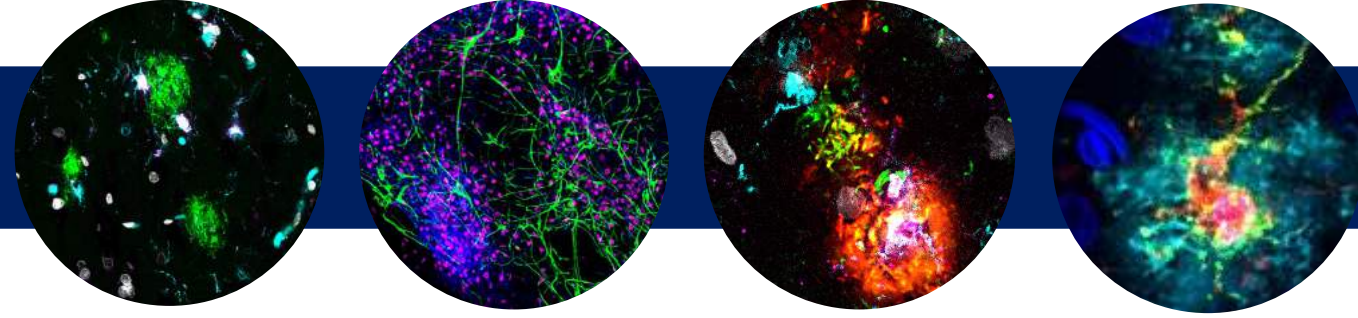
Iba-1 segmentation masks



β -amyloid segmentation masks



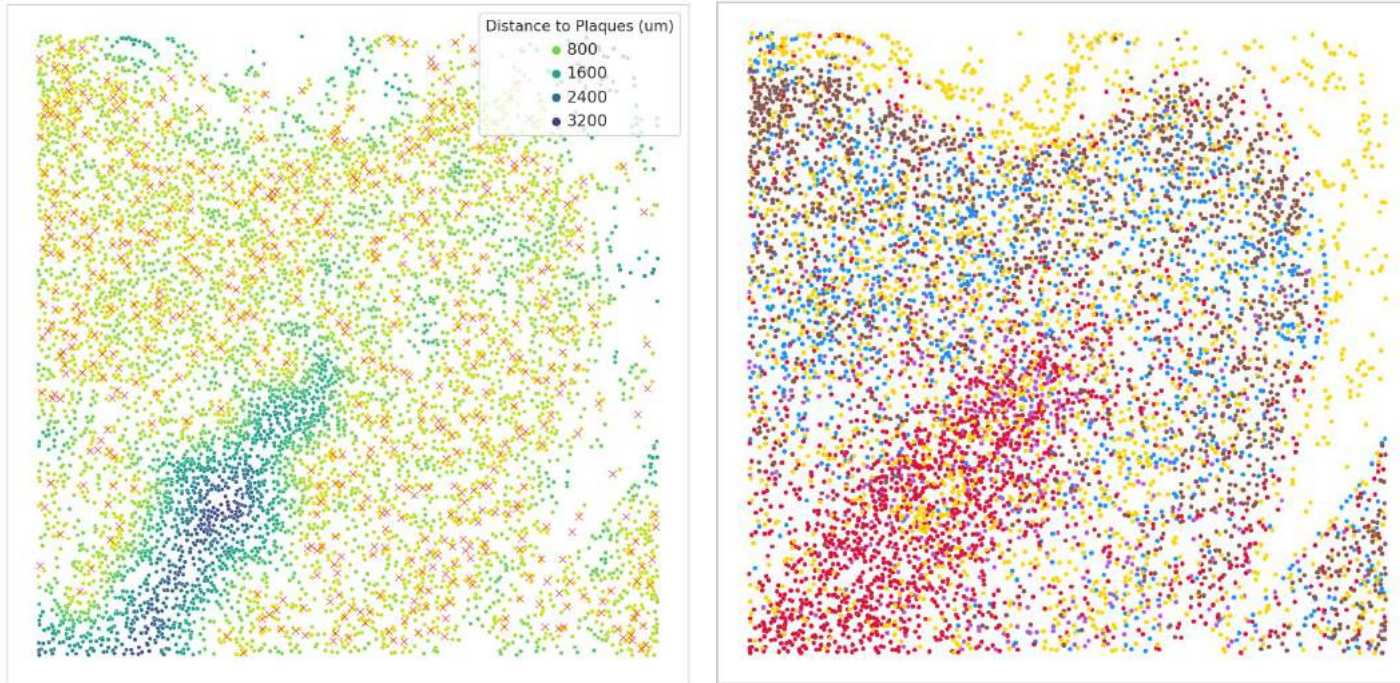
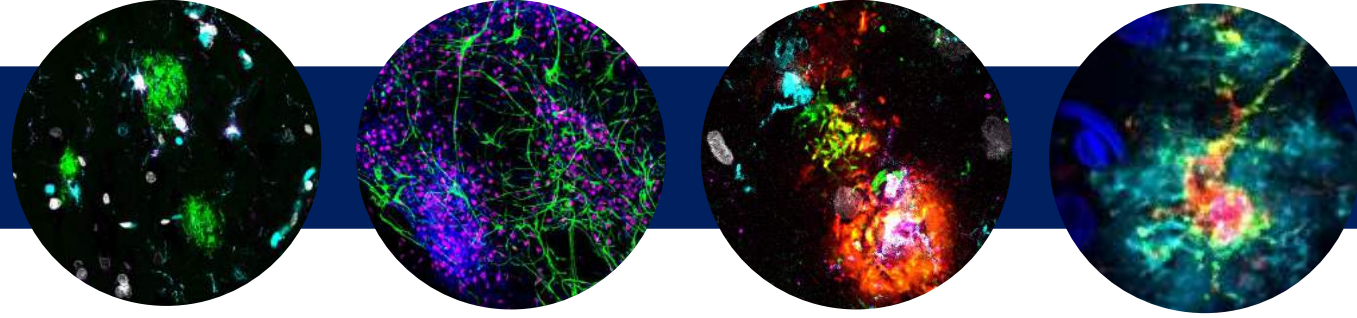
Iba-1 Phenotyping



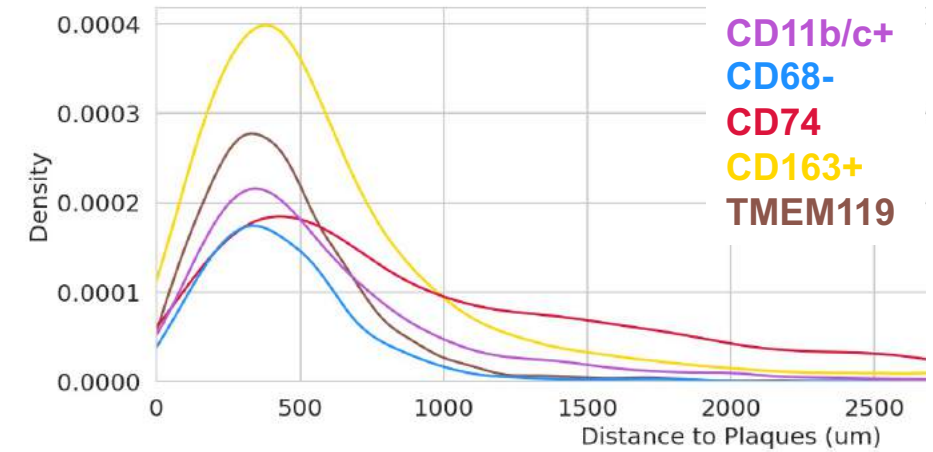
CD11b/c+
CD68-
CD74
CD163+
TMEM119

❖ Unsupervised clustering of microglial phenotypes reveals multiple subtypes

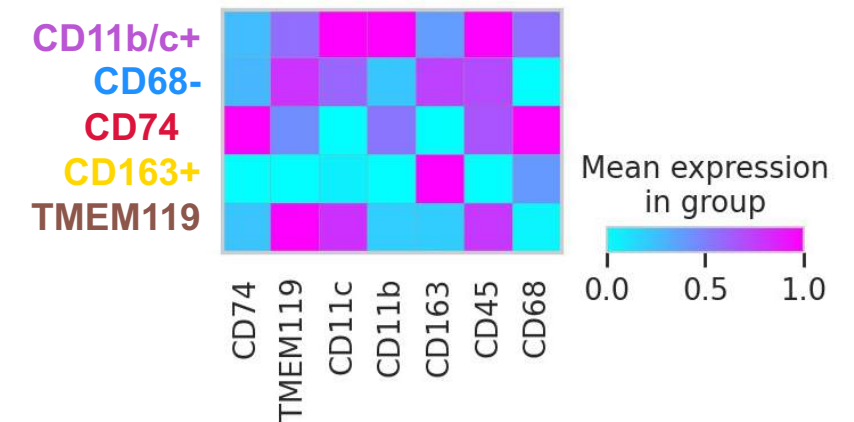
Spatial Phenotyping



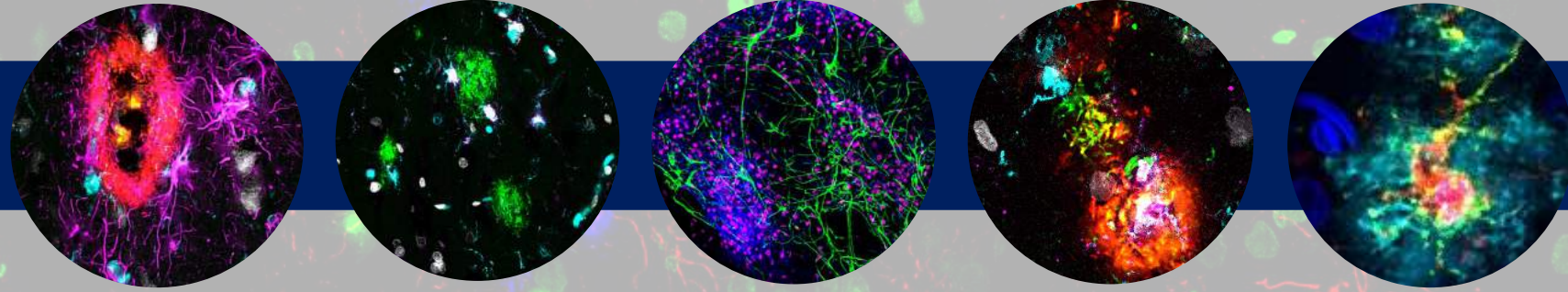
Alzheimer's



Microglial subtypes localize distinctly around amyloid plaques

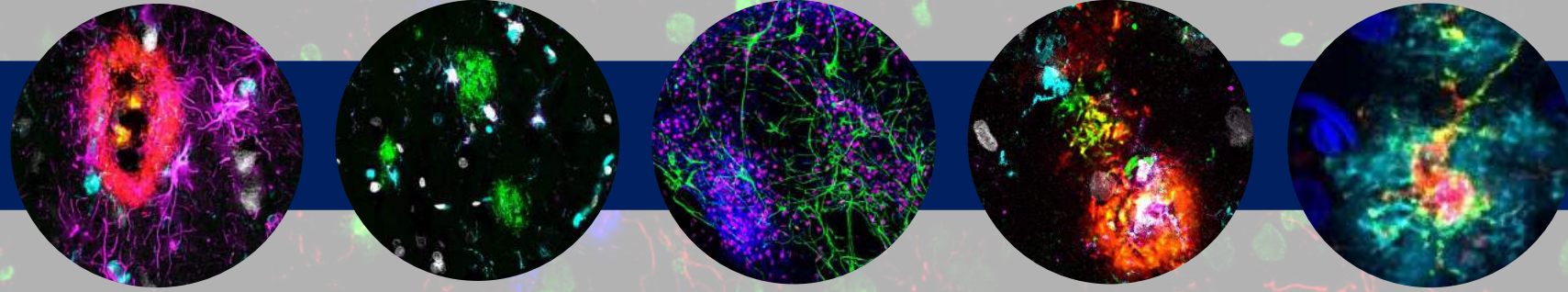


Conclusion



- We utilized CODEX[®] to conduct ultra-high multiplex immunofluorescence in human FFPE brain tissues from Alzheimer's patients
- The spatial distributions of microglia relate distinctly and locally to the degree of amyloidosis and globally to patient condition
- Our study will contribute to knowledge required to improve and develop new therapeutic strategies and to identify clinical biomarkers for AD

Contributors



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Dr. Oliver Braubach

