The BigMac dataset: interconnecting MR signals with microstructural profiles in the cortex

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win

* EQUAL CONTRIBUTION

In vivo MRI, postmortem MRI & microscopy in a whole macaque brain

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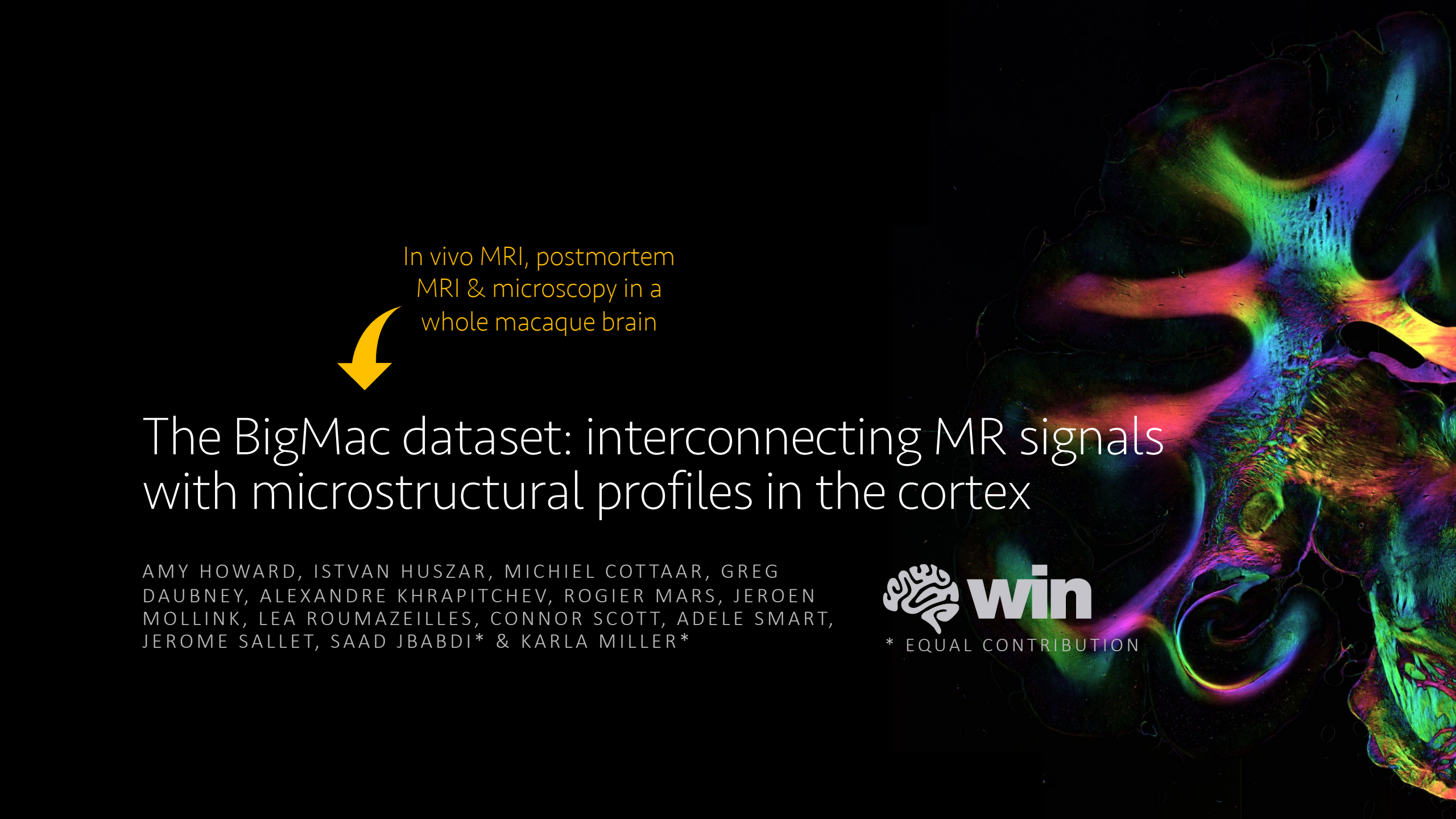

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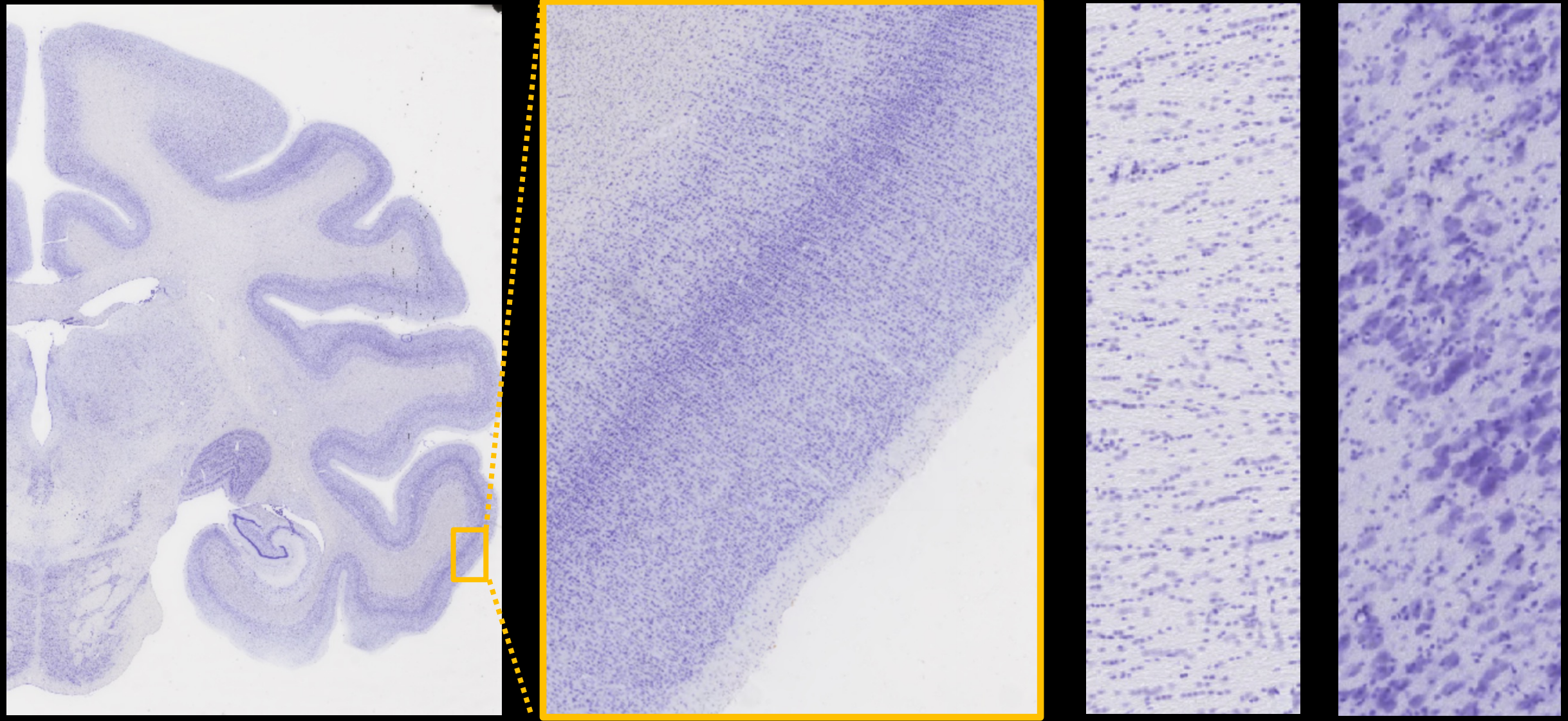
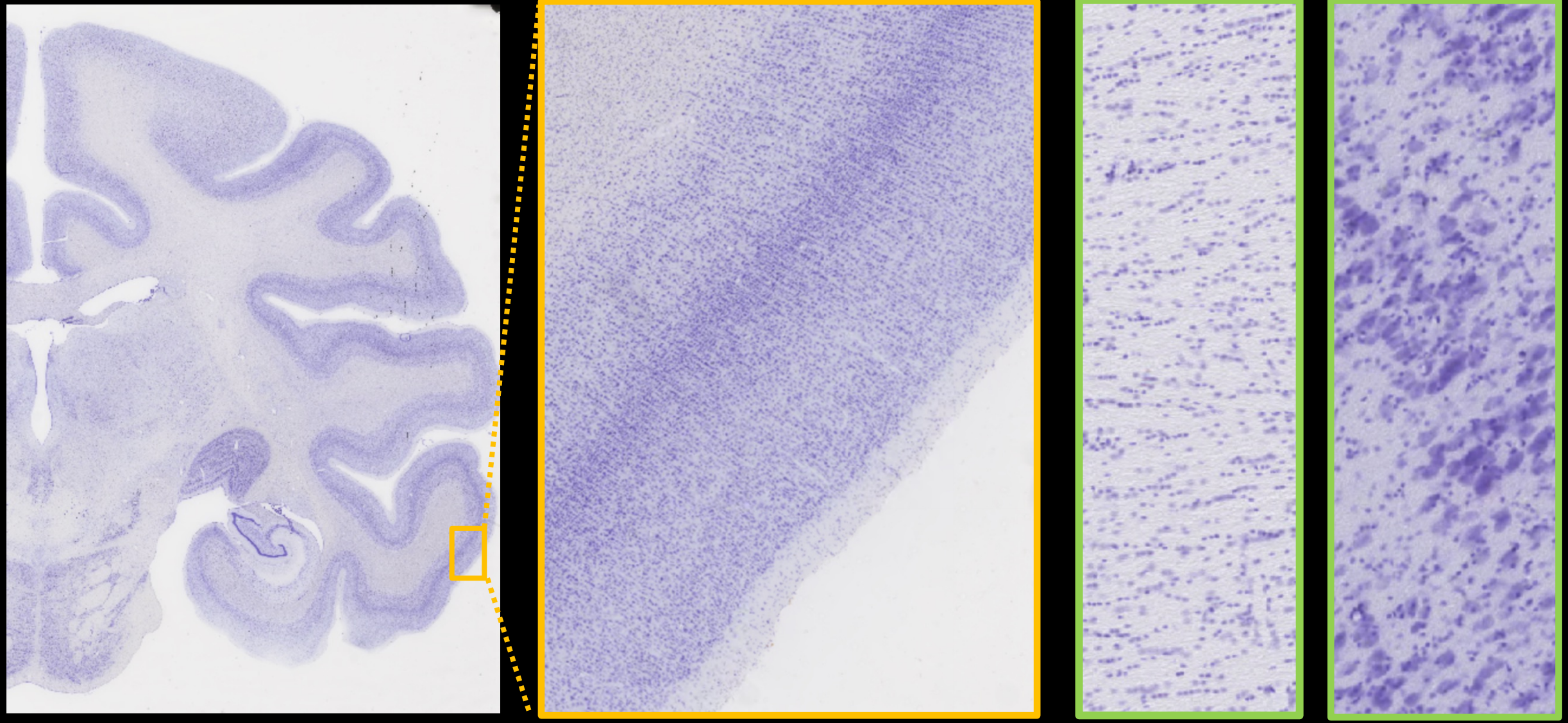
...coming soon to the Digital Brain Bank

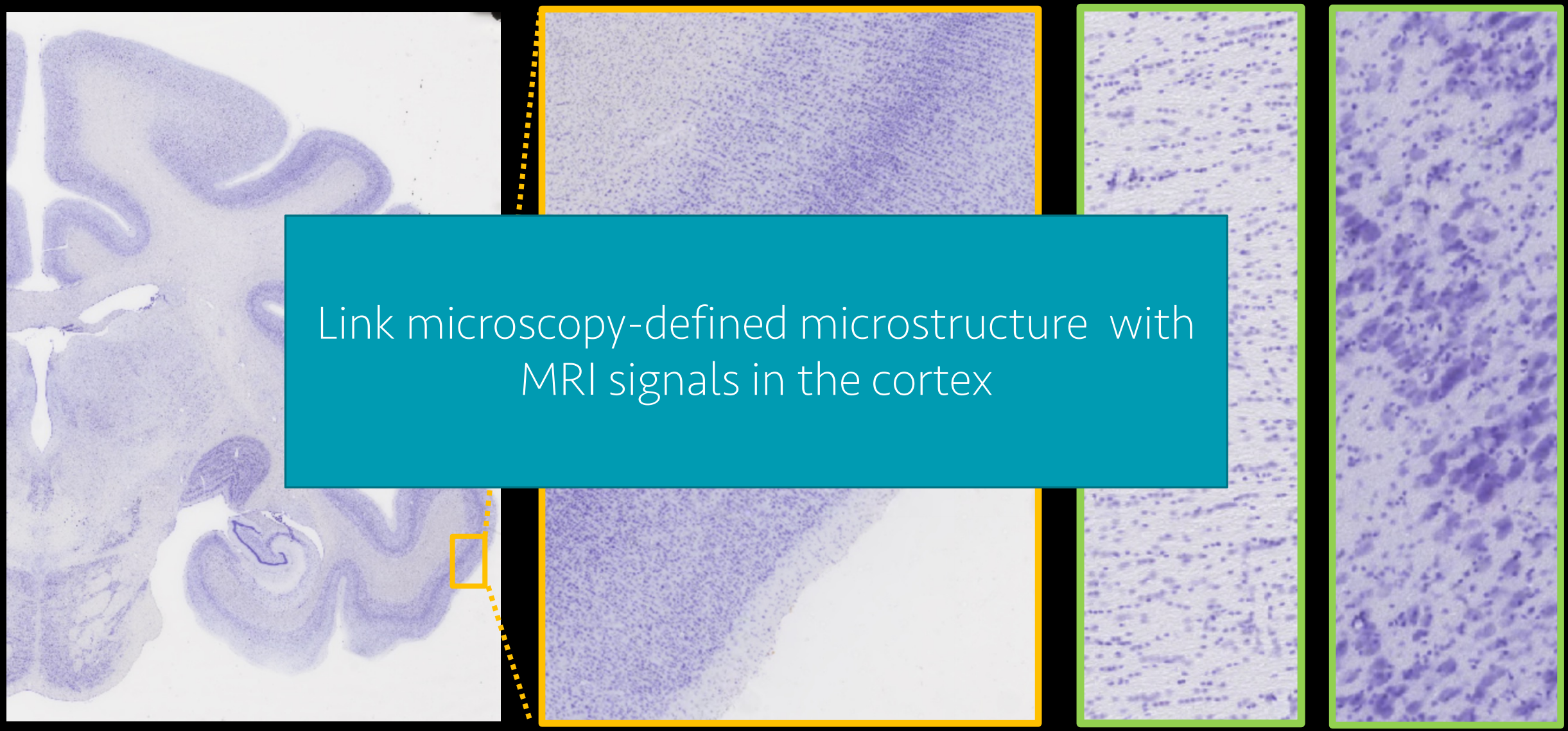
Cytoarchitecture in BigMac



Cytoarchitecture in BigMac



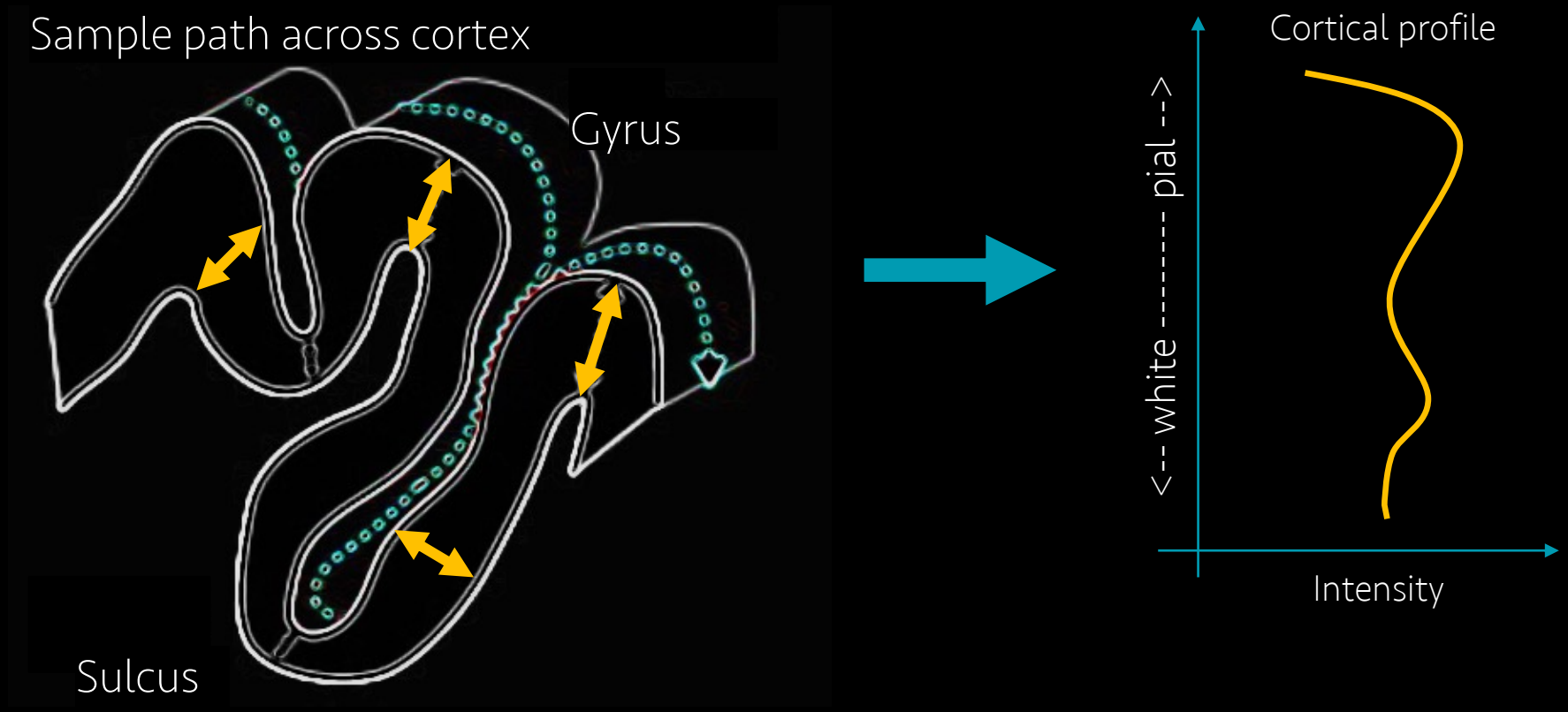
Cytoarchitecture in BigMac



Link microscopy-defined microstructure with MRI signals in the cortex

Multimodal comparison of cortical profiles

Inspired by recent work in humans using BigBrain



Paquola et al PLOS Bio 2019
Wagstyl et al. PLOS Bio 2020

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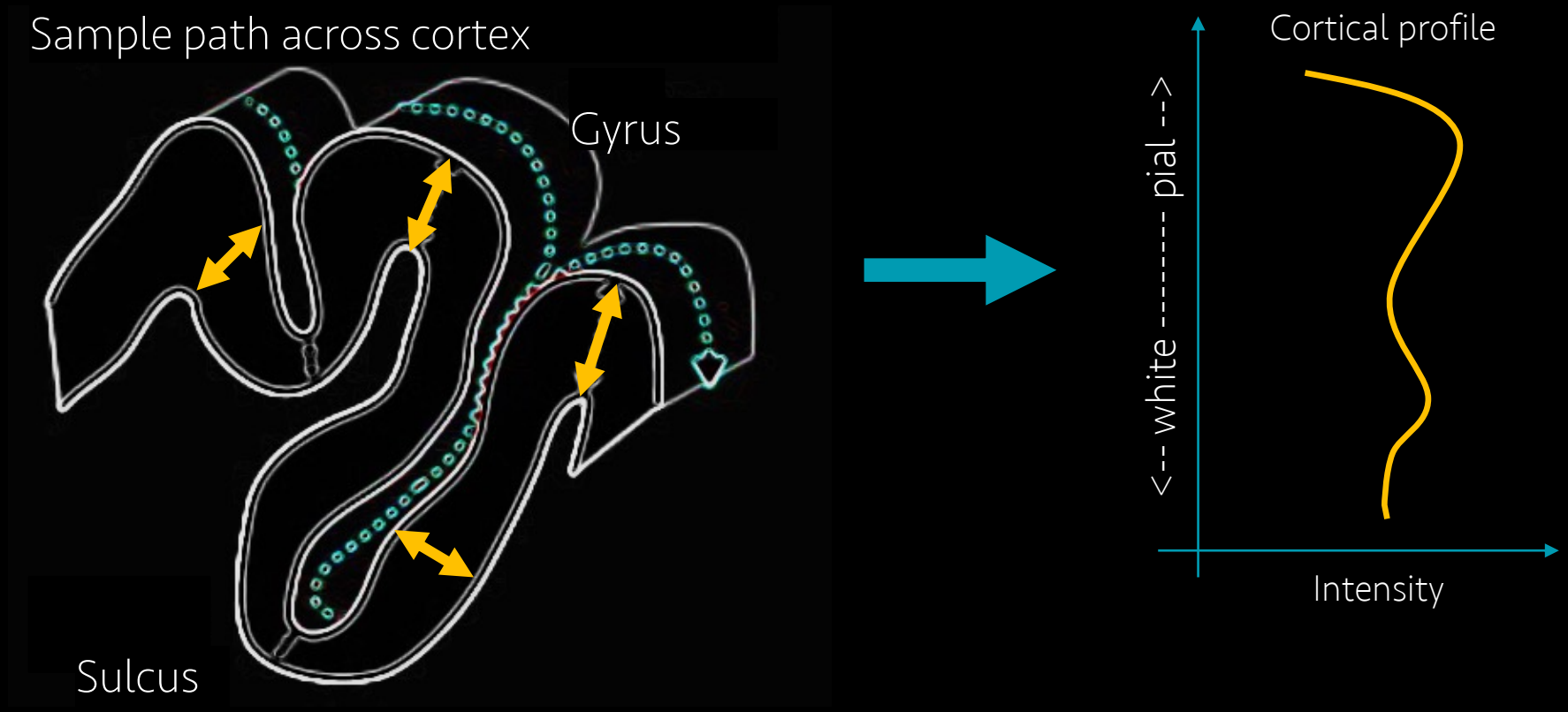

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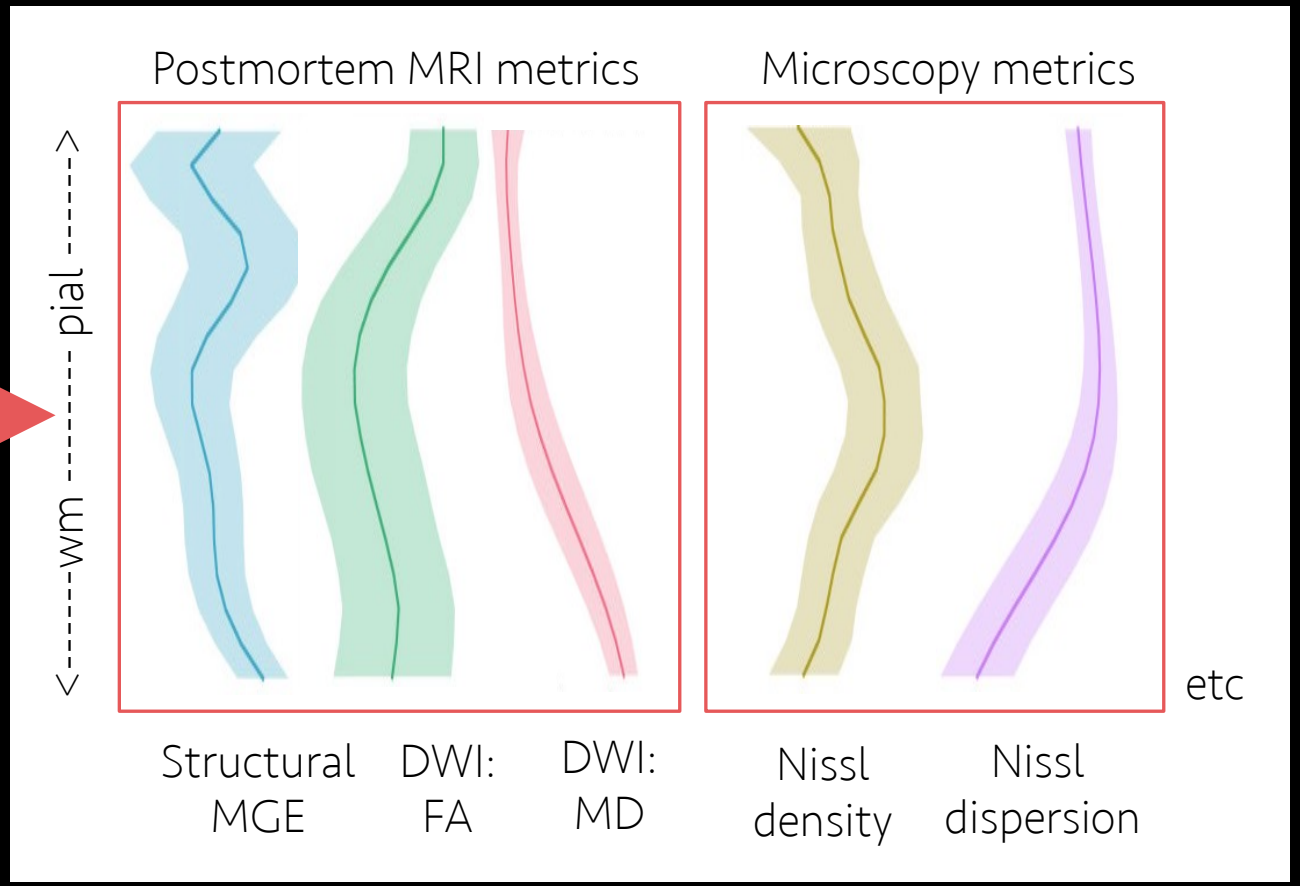
Rich description of data, common axis for MRI-microscopy comparisons

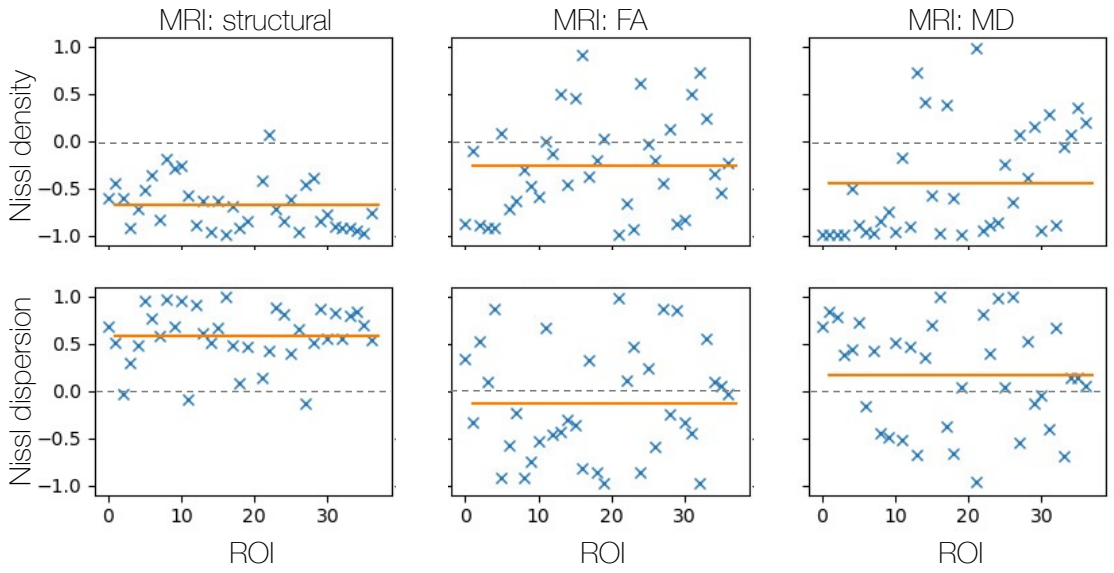
Cortical profile extraction

using Freesurfer and TIRL

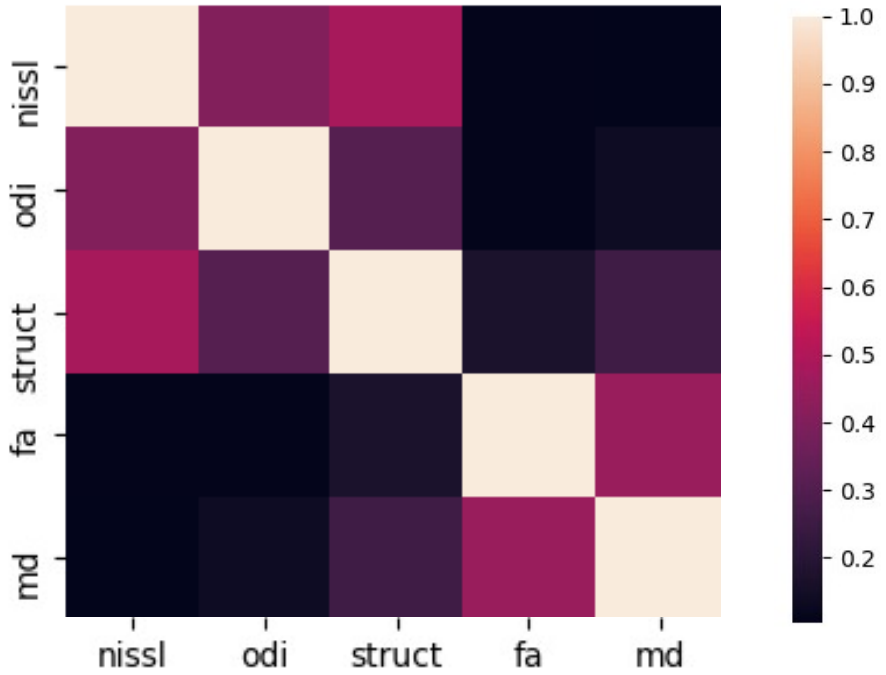


Left hemisphere, whole AP/IS coverage, >280,000 profiles per contrast

Correlating cortical profiles on a ROI basis

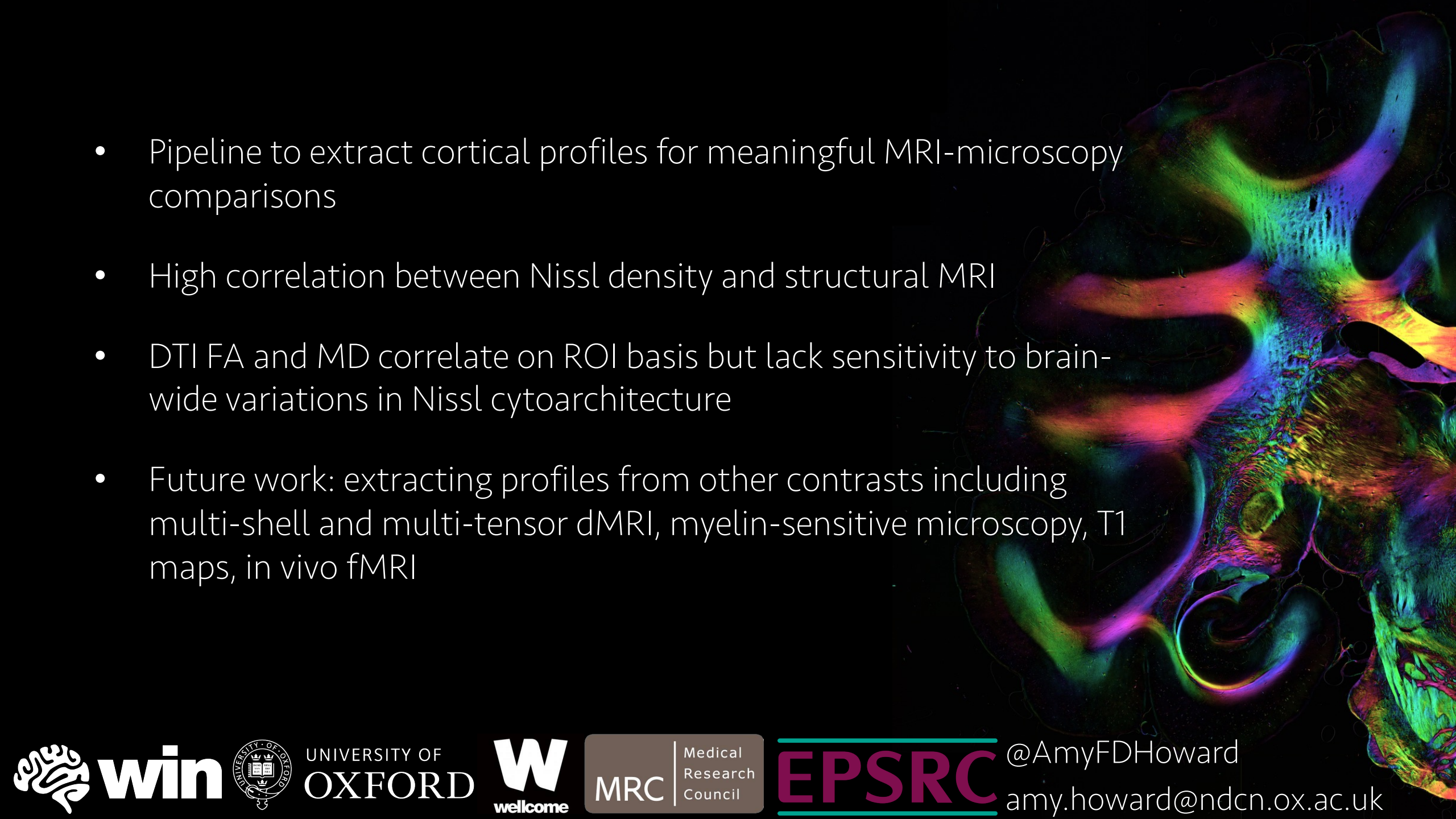


CCA: common modes of cortical variation



Brain-wide patterns with structural but not DTI

- Pipeline to extract cortical profiles for meaningful MRI-microscopy comparisons
- High correlation between Nissl density and structural MRI
- DTI FA and MD correlate on ROI basis but lack sensitivity to brain-wide variations in Nissl cytoarchitecture
- Future work: extracting profiles from other contrasts including multi-shell and multi-tensor dMRI, myelin-sensitive microscopy, T1 maps, in vivo fMRI



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