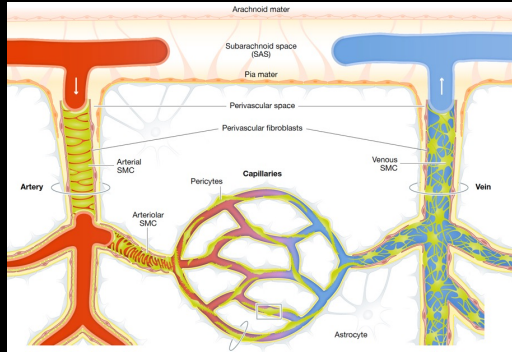
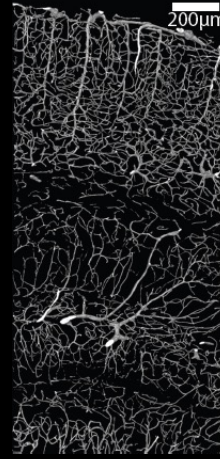


Neurovascular coupling is preserved in healthy, aged mice



Lendahl et al., *EMBO Rep*, 2019.



Wu*, Bennett*, et al., *Cell Reports*, 2022.

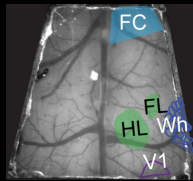
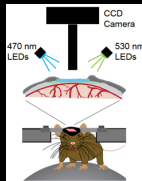
Qingguang Zhang

The Pennsylvania State University

1

Cellular architecture and functional imaging: Integrated approach for understanding cerebrovascular aging

Functional brain imaging



FC: frontal cortex
 FL/HL: forelimb/hindlimb
 Wh: vibrissae cortex



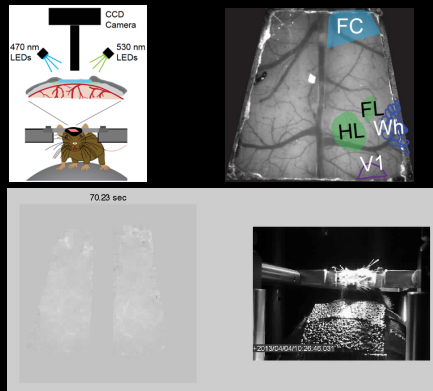
Not driven by cardiovascular factors,
 but driven by local neural activities.

Huo et al., *J Neurosci*, 2014.
 Huo et al., *Neuroimage*, 2015.
 Zhang et al., *Nature Communications*, 2019.
 Bergel et al., *Nature Communications*, 2019.
 Echagarruga et al., *eLife*, 2020.
 Zhang et al., *PLoS Biology*, 2021.
 Zhang et al., *Neurophotonics*, 2022.

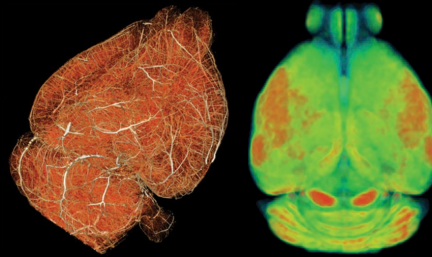
2

Cellular architecture and functional imaging: Integrated approach for understanding cerebrovascular aging

Functional brain imaging



Vascular tracing and cell type mapping

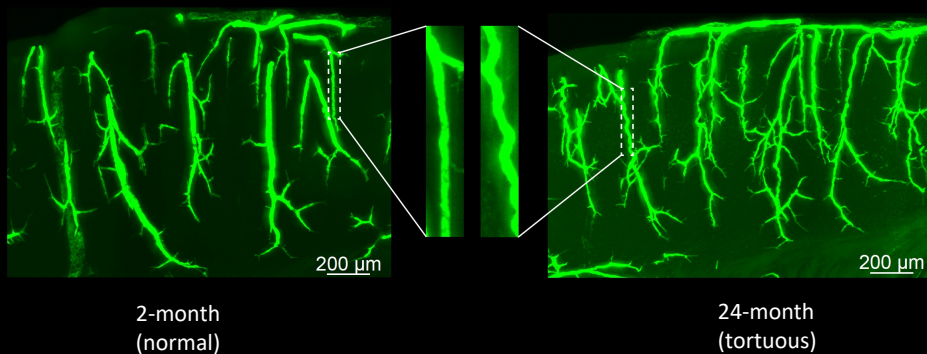


Huo et al., *J Neurosci.*, 2014.
 Huo et al., *Neuroimage*, 2015.
 Zhang et al., *Nature Communications*, 2019.
 Bergel et al., *Nature Communications*, 2019.
 Echagarruga et al., *eLife*, 2020.
 Zhang et al., *PLoS Biology*, 2021.
 Zhang et al., *Neurophotonics*, 2022.

Wu*, Bennett*, et al., *Cell Reports*, 2022.

3

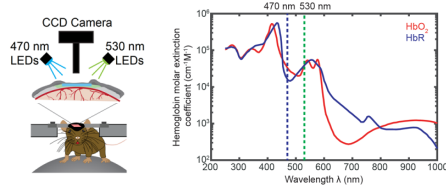
Healthy aging changes the brain vasculature morphology



Hannah Bennett:
 "Structural and morphological remodeling of the mural and vascular network in the aged mouse brain."

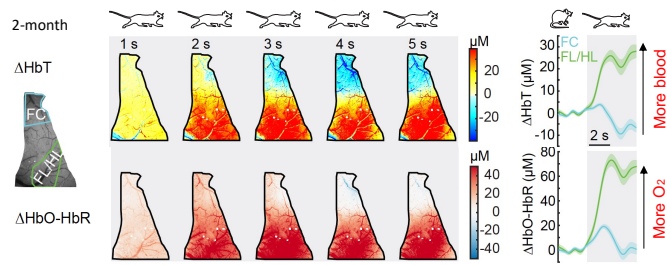
4

Voluntary locomotion induces region-specific cerebral blood volume increase and global increase of oxygenation



Ma et al., *Philos Trans R Soc Lond B*, 2016.

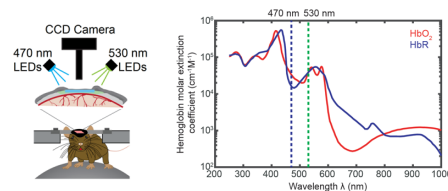
HbT: total hemoglobin, an index for cerebral blood volume
 HbO-HbR: an index for tissue oxygenation



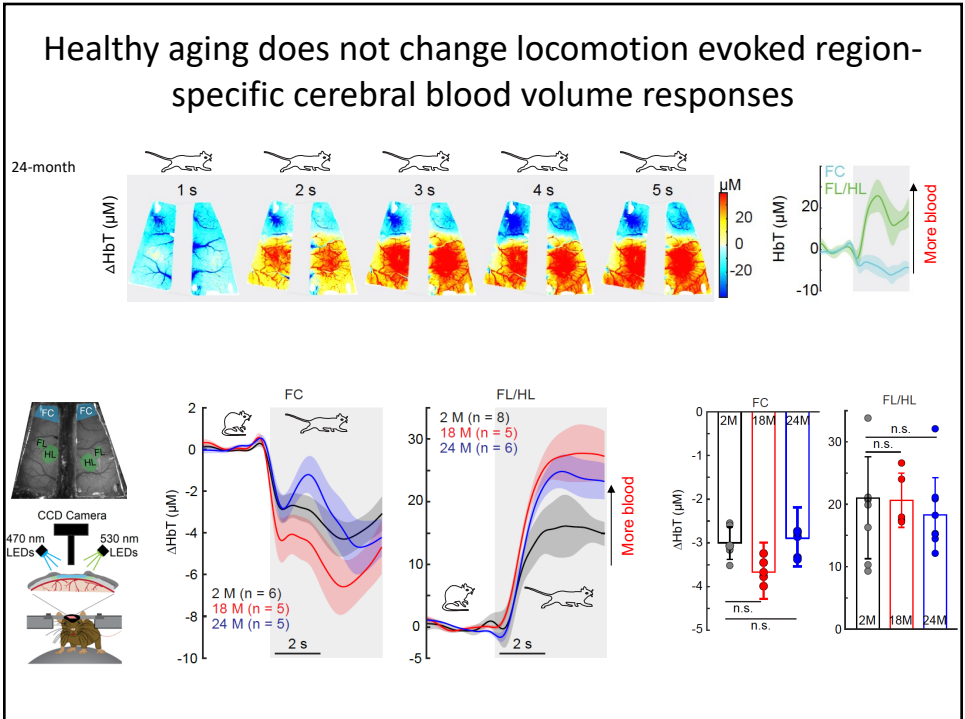
Zhang et al., *Nature Communications*, 2019.
 see also Bergel et al., *Nature Communications*, 2019.

5

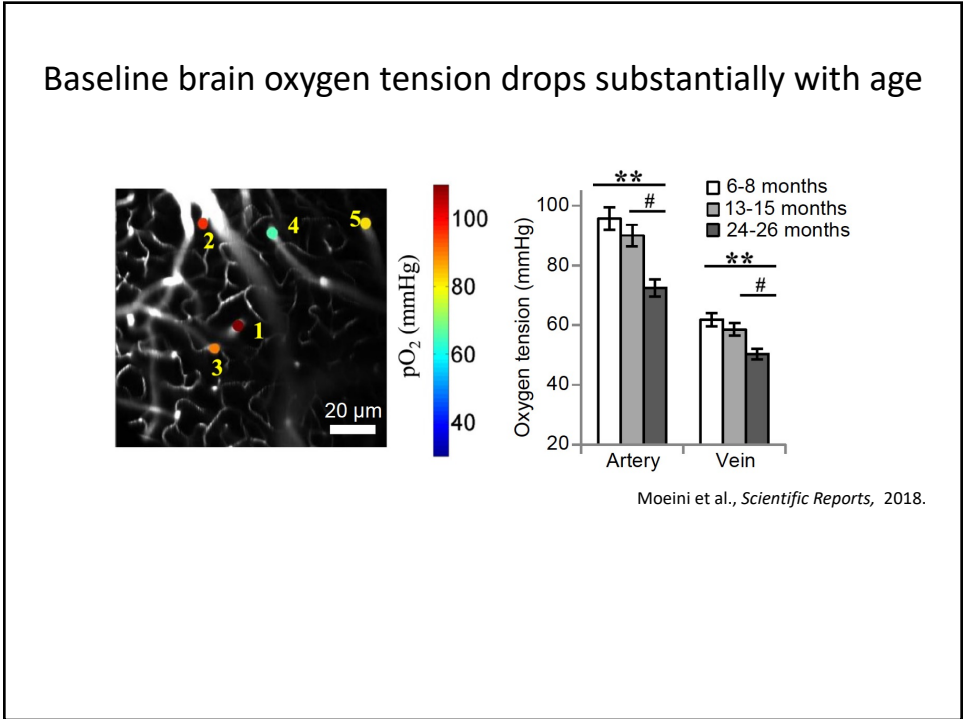
How does advanced age affect the voluntary locomotion evoked brain hemodynamic responses?



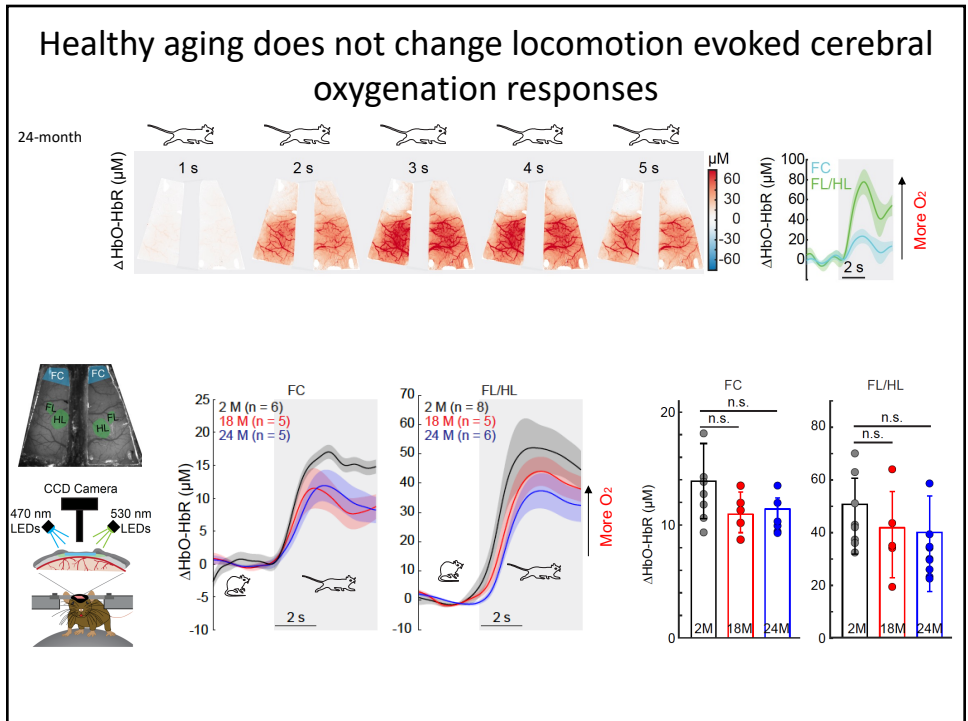
6



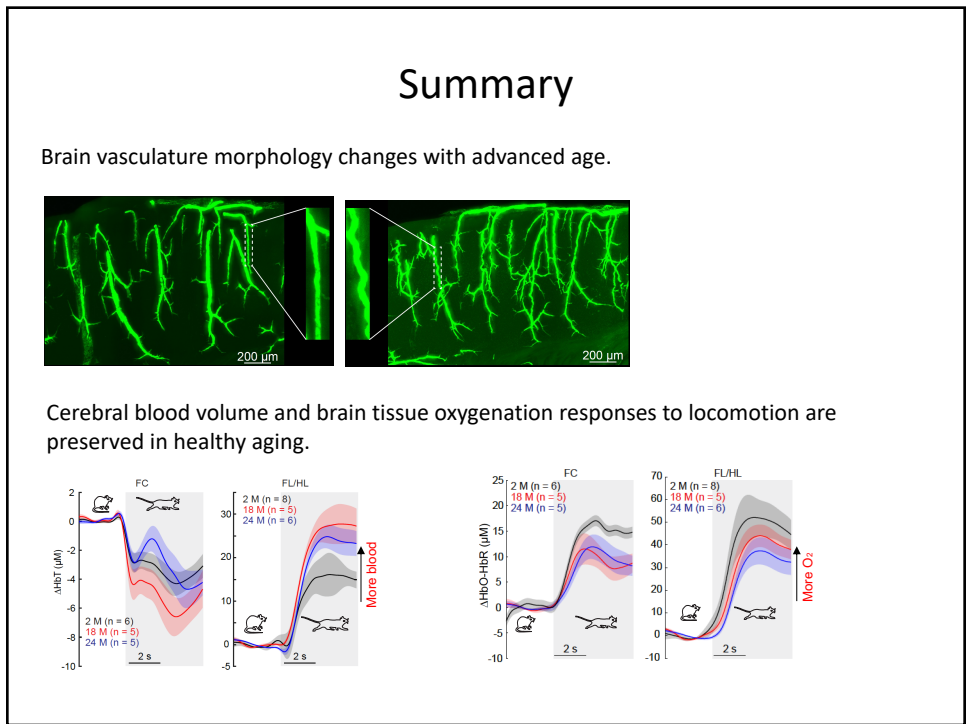
7



8



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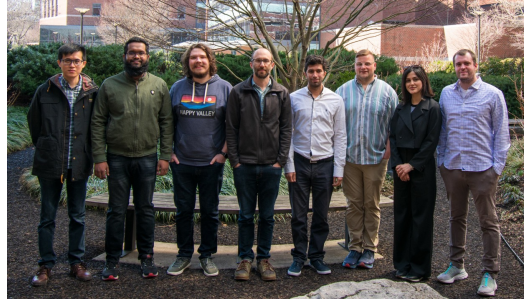


10

Acknowledgements



Kim Lab



Drew Lab

