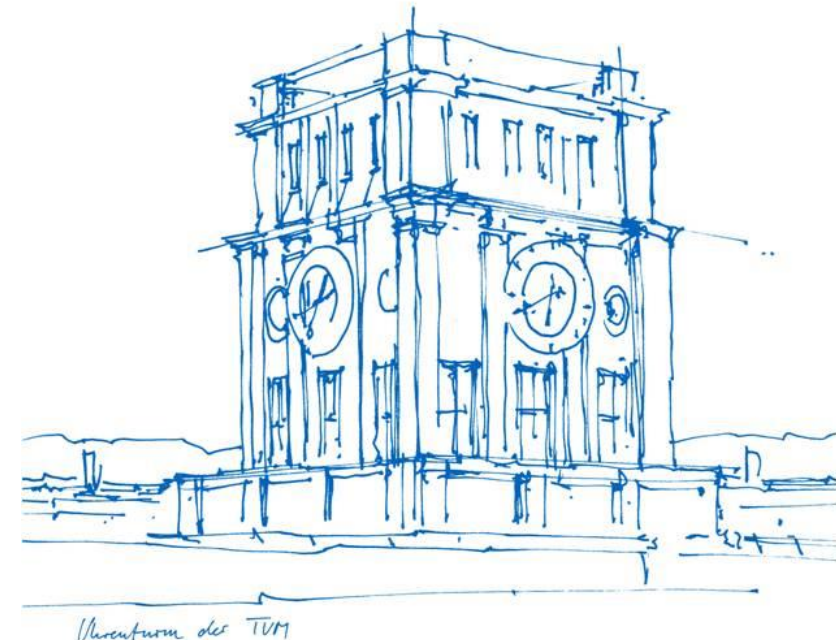


Neuronal activity can drive cerebrospinal fluid flux via brain blood volume

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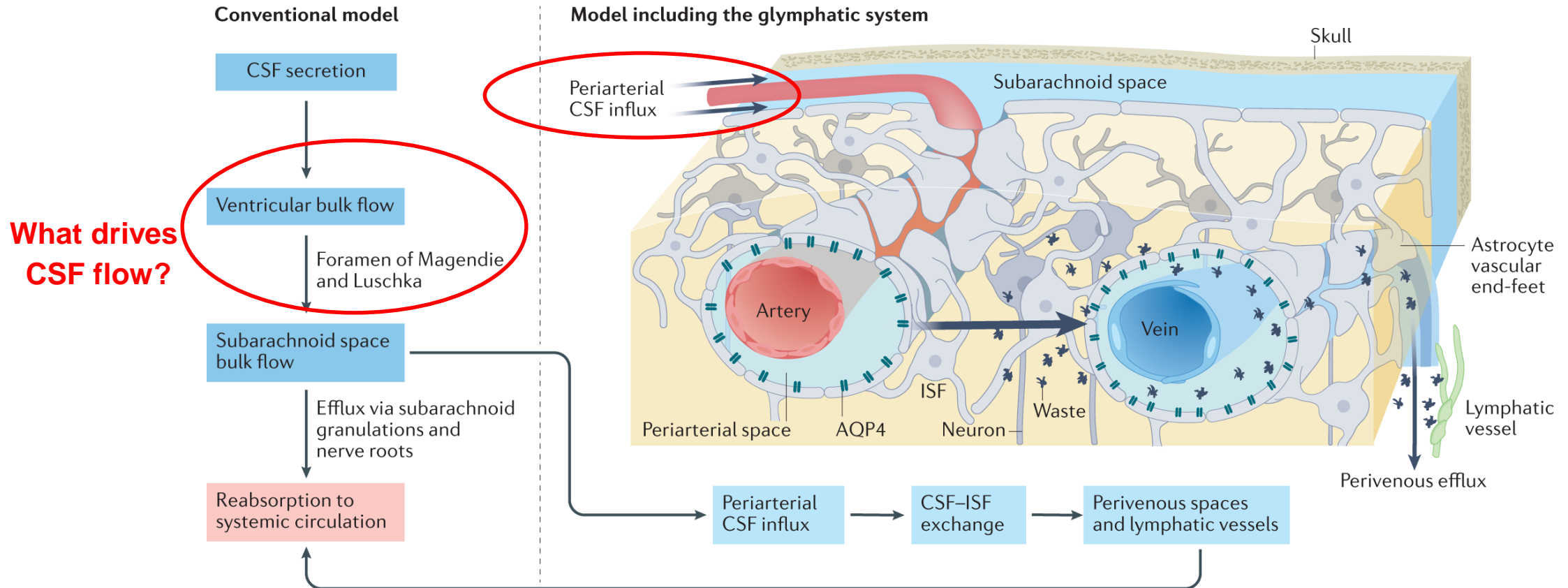
Declaration of Financial Interests or Relationships

Speaker Name: Benedikt Zott

I have no financial interests or relationships to disclose with regard to the subject matter of this presentation.

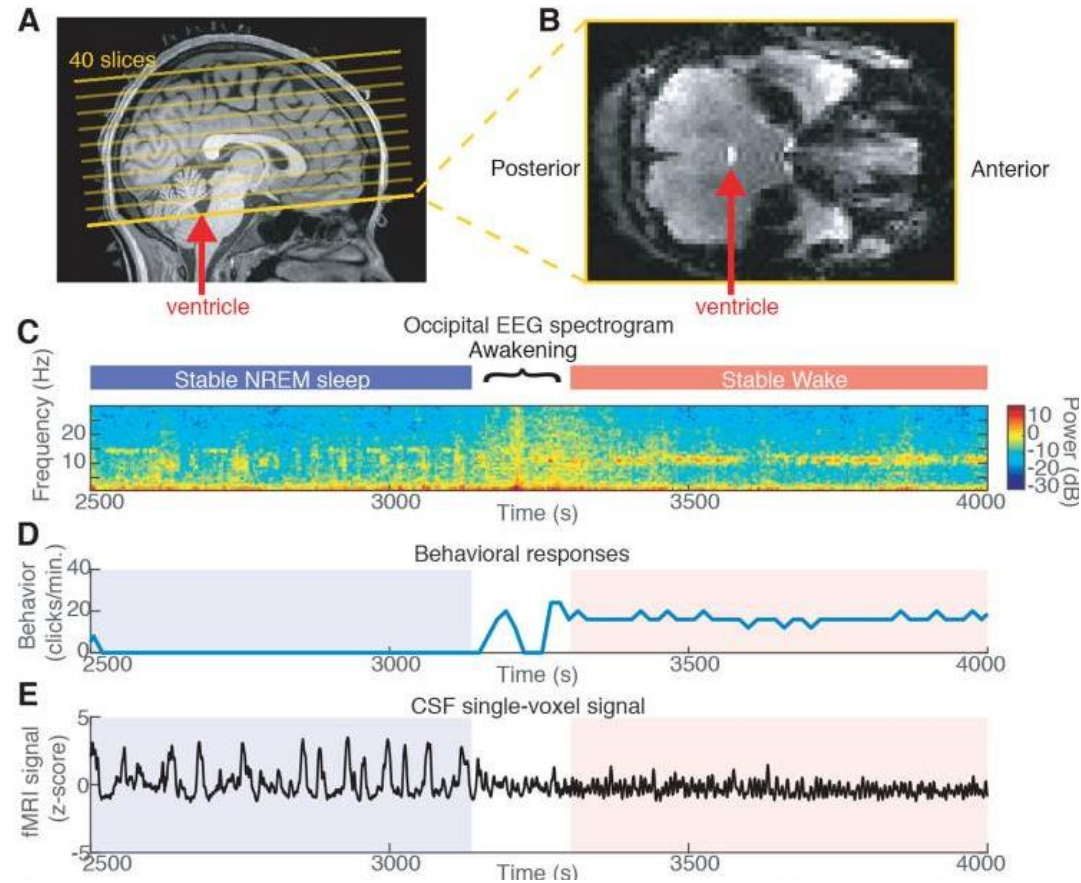


Motivation

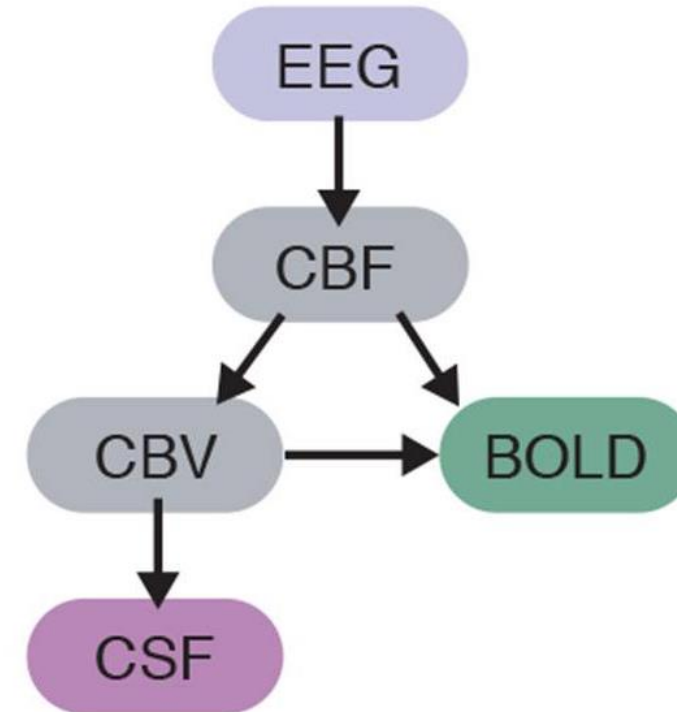


Jessen, Neurochem Res 2015

Motivation



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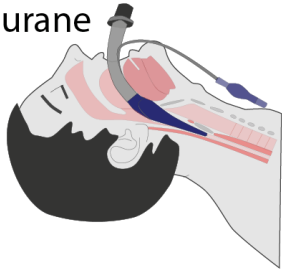


-> To investigate the relationship between global neuronal activity, global CBV and macroscopic CSF flow

Experiment #1: Neuronal activity drives the gGM-BOLD and CSF signals

Methodology

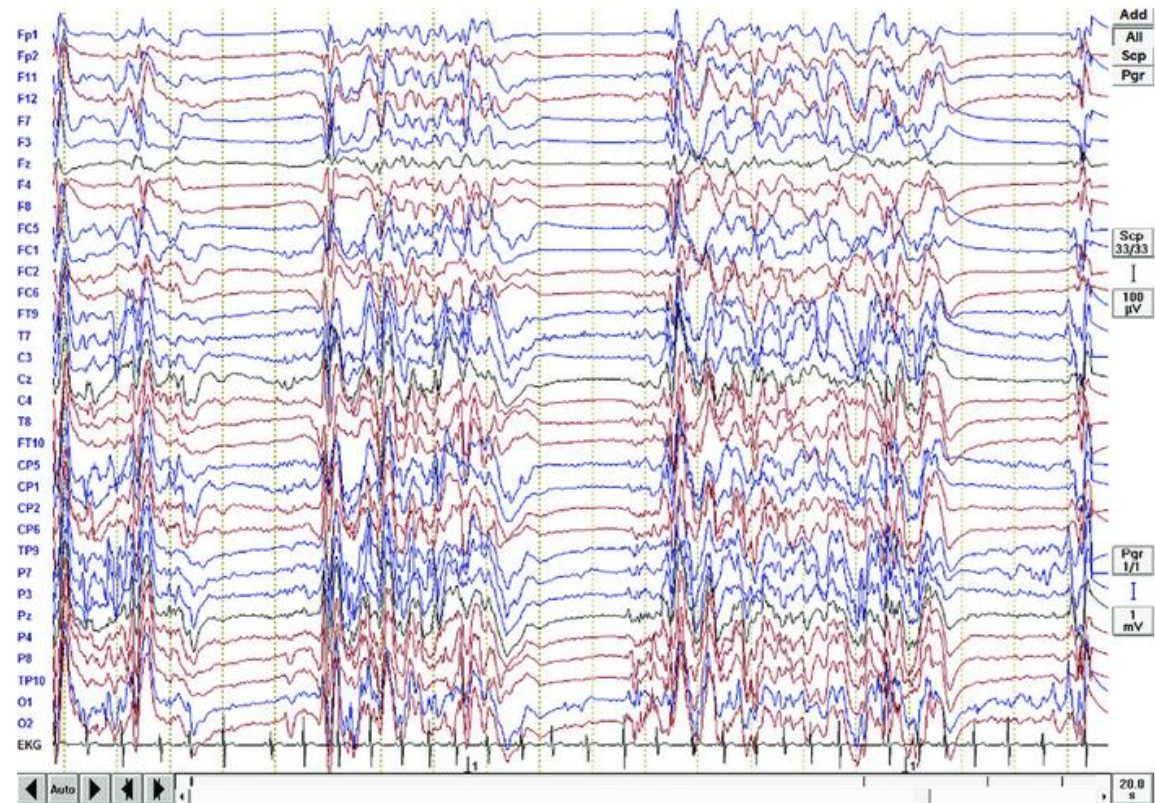
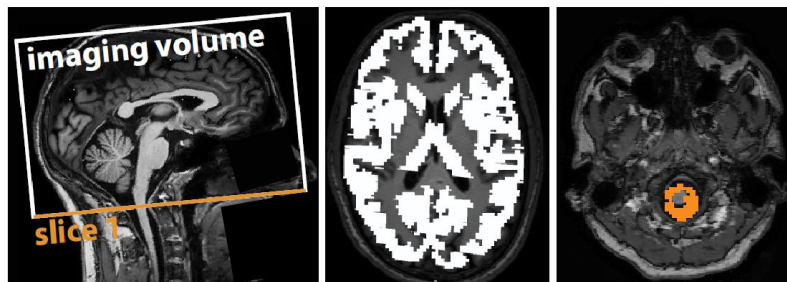
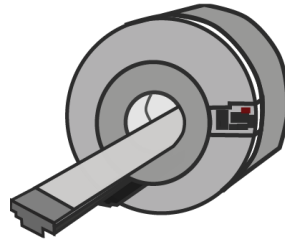
~4.3% sevoflurane



EEG

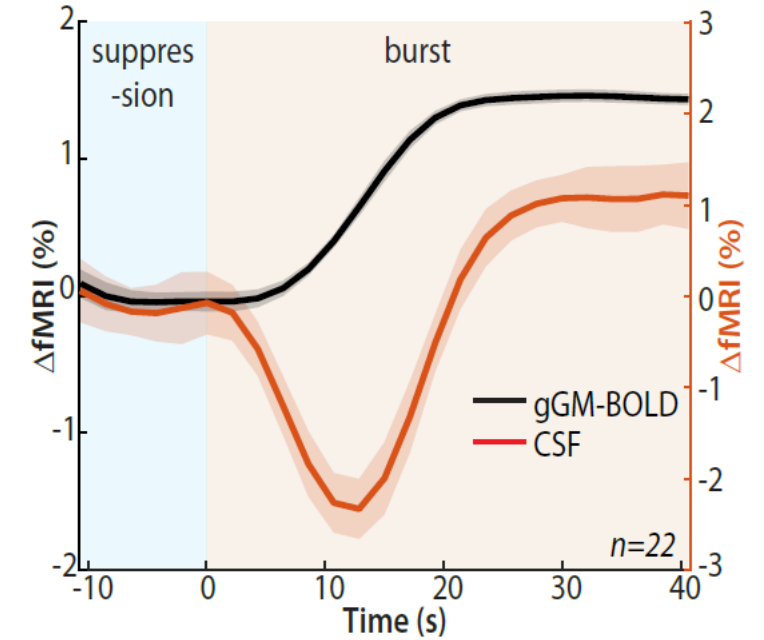
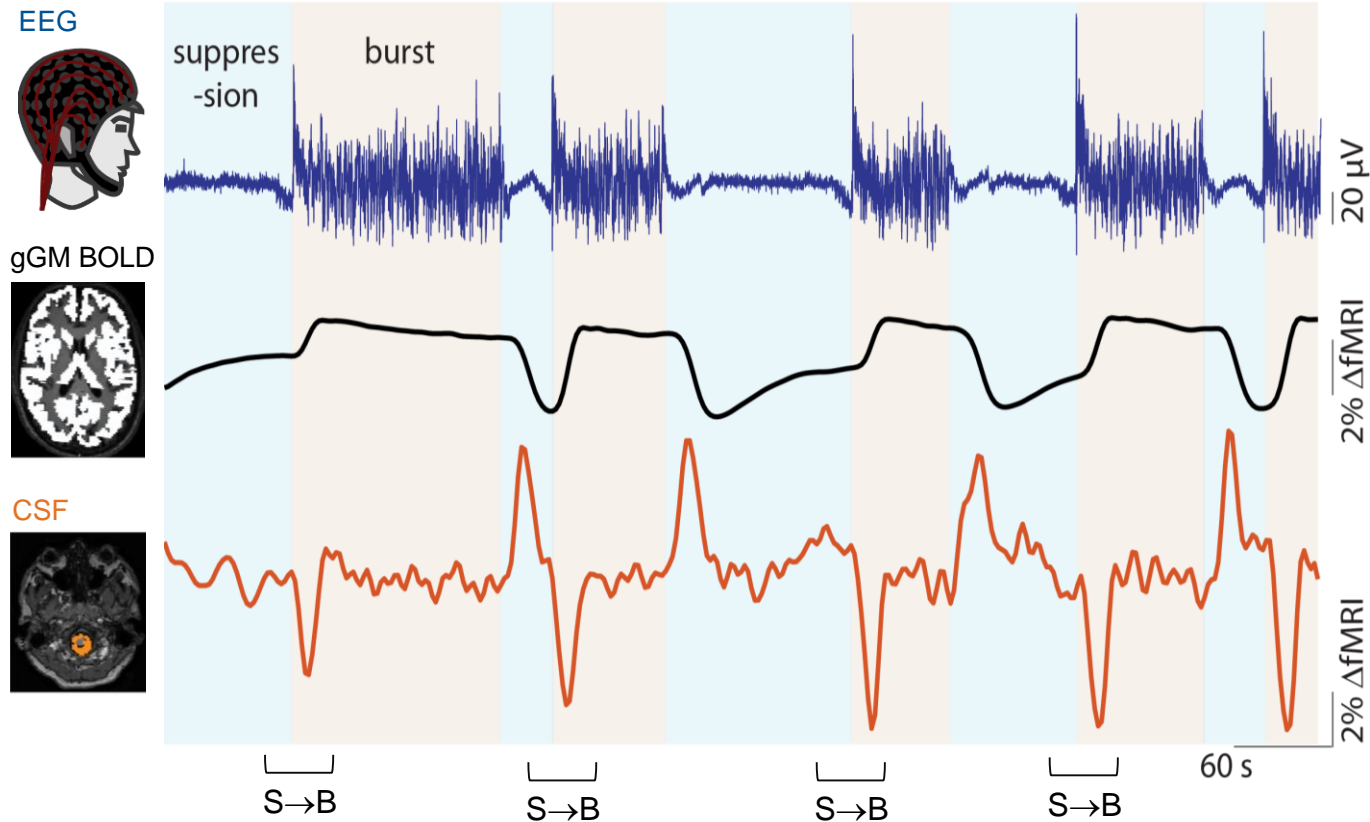


fMRI



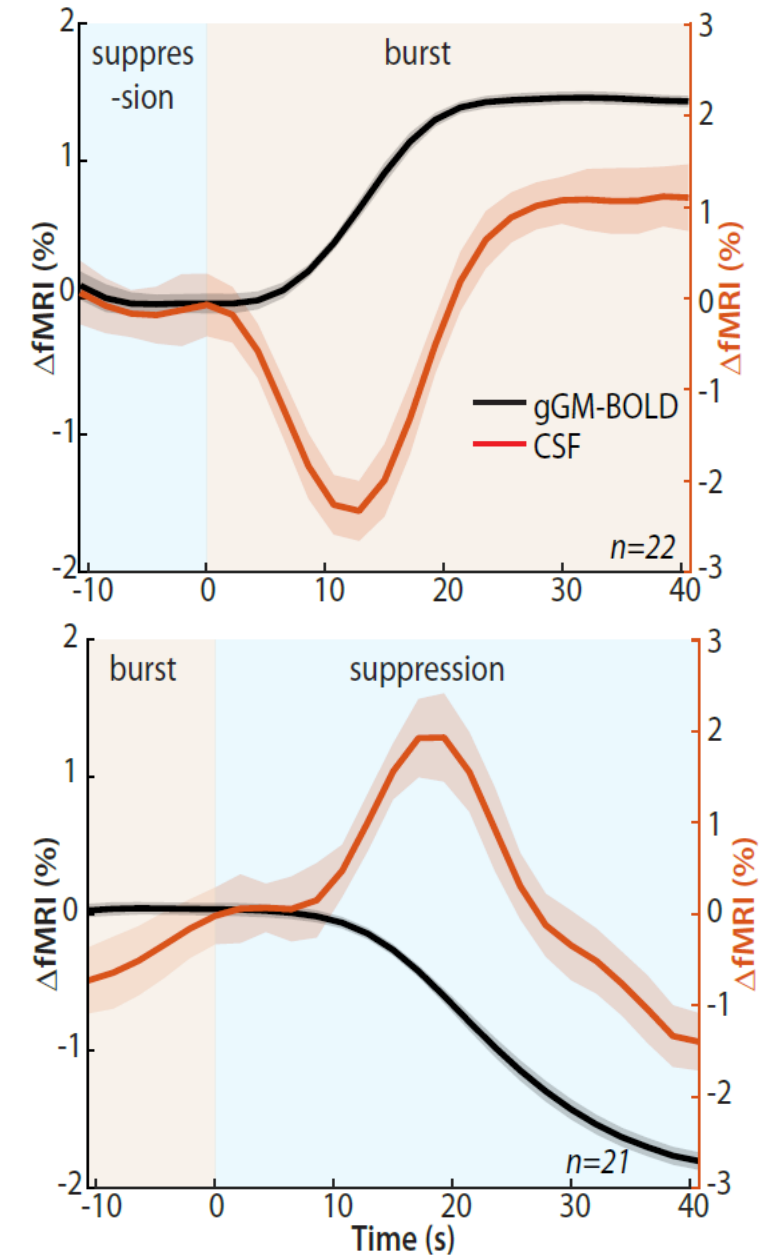
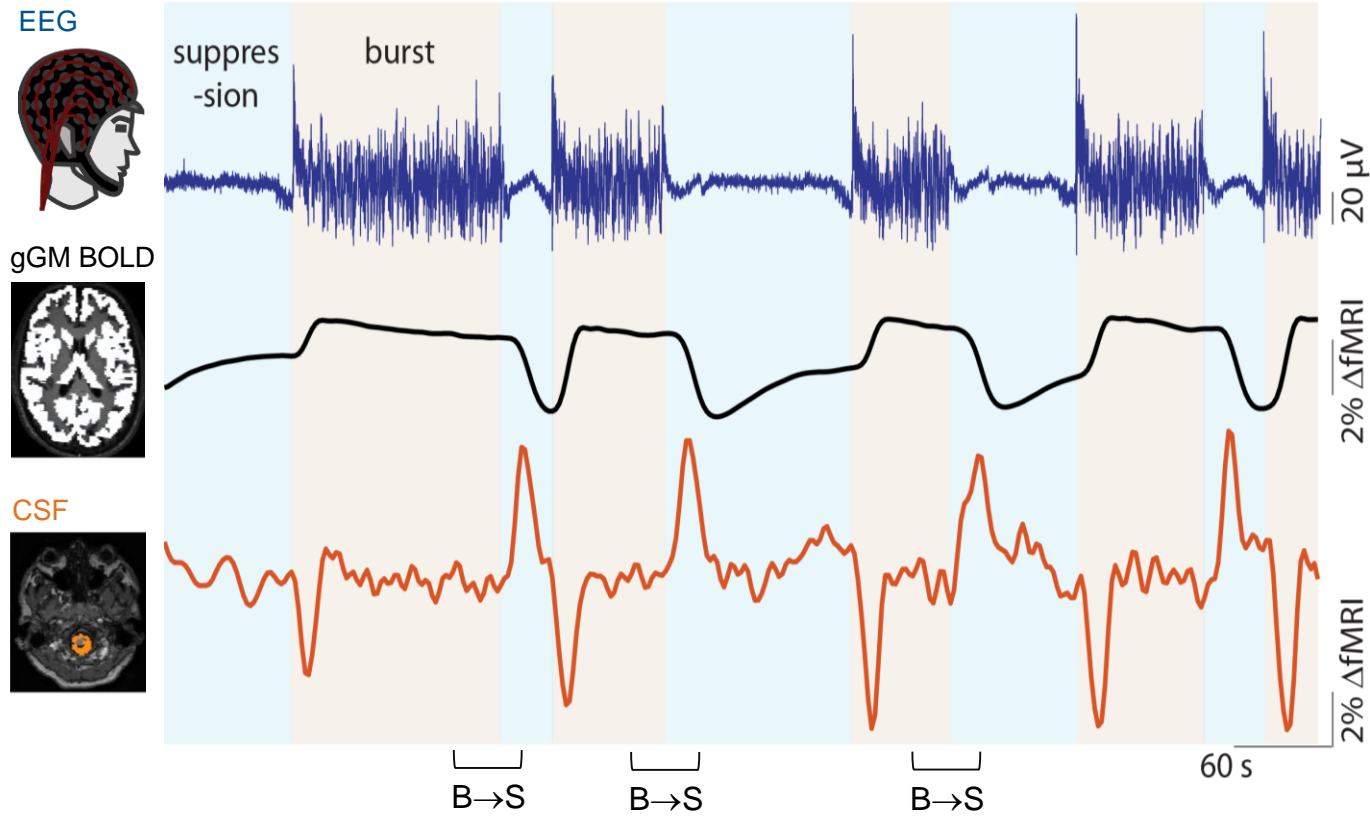
Experiment #1: Neuronal activity drives the gGM-BOLD and CSF signals

Results



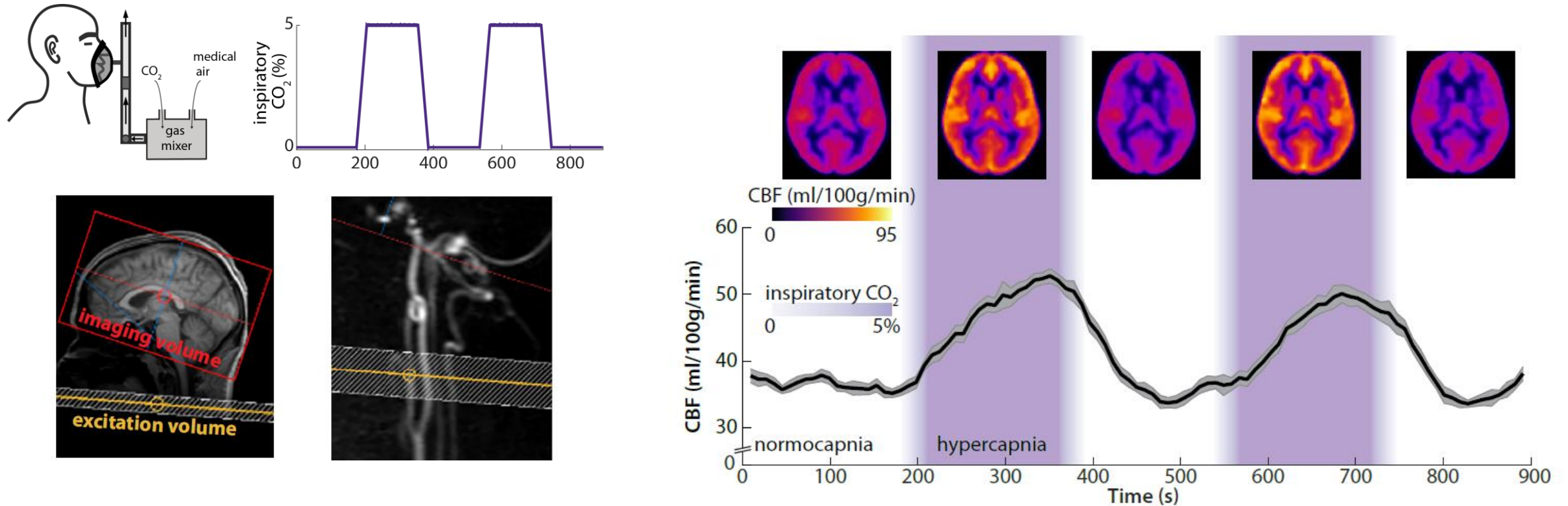
Experiment #1: Neuronal activity drives the gGM-BOLD and CSF signals

Results



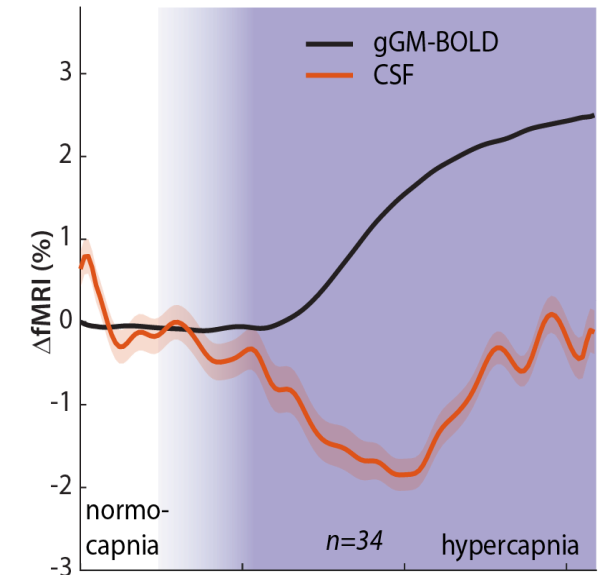
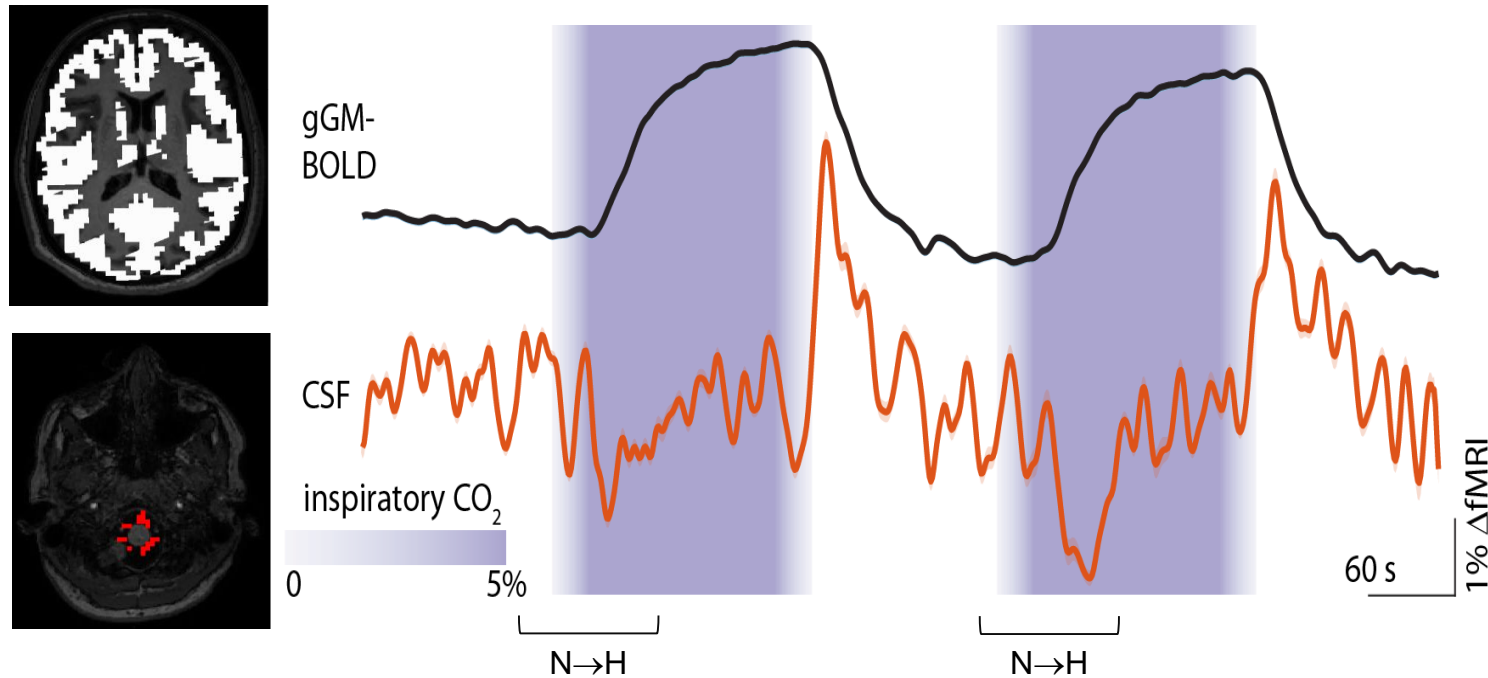
Experiment #2: Experimentally induced CBV changes drive the CSF signal

Methodology and confirmation of the hemodynamic effects of a hypercapnic challenge



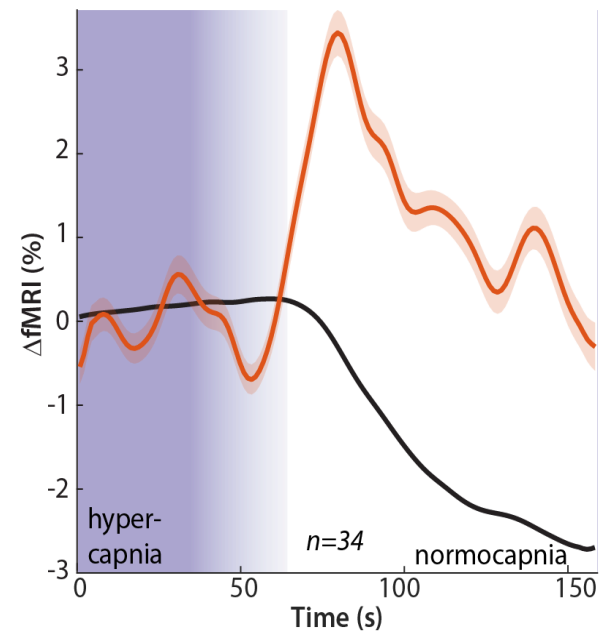
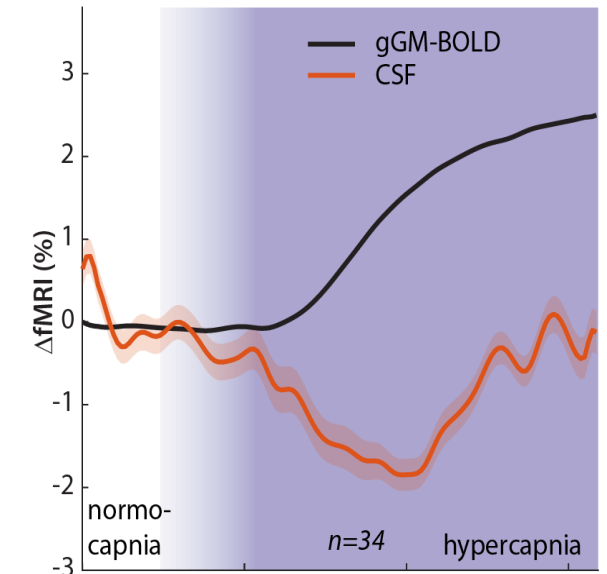
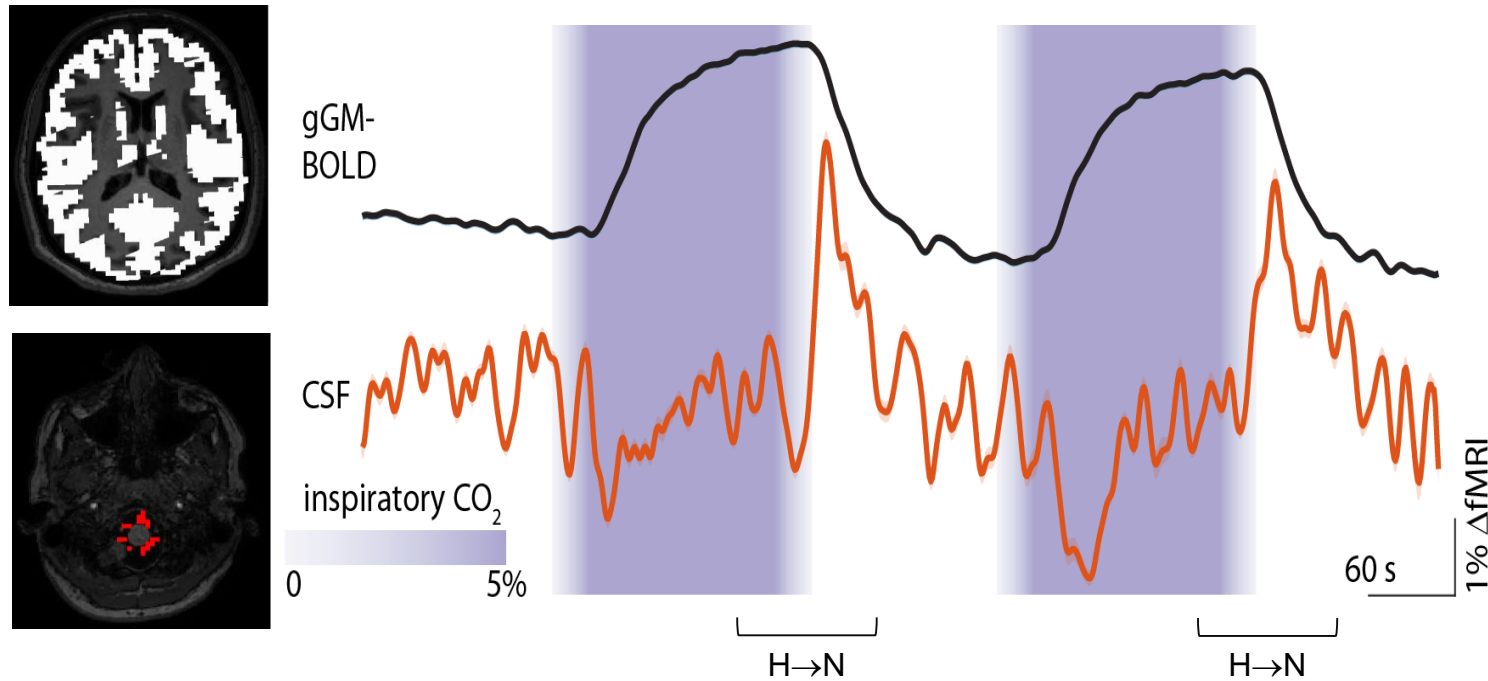
Experiment #2: Experimentally induced CBV changes drive the CSF signal

Hypercapnia-induced changes in the gGM-BOLD and CSF signals

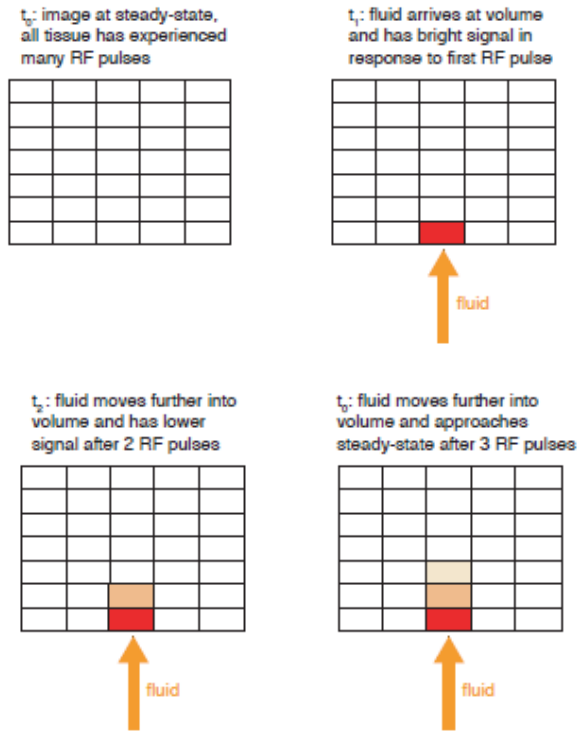


Experiment #2: Experimentally induced CBV changes drive the CSF signal

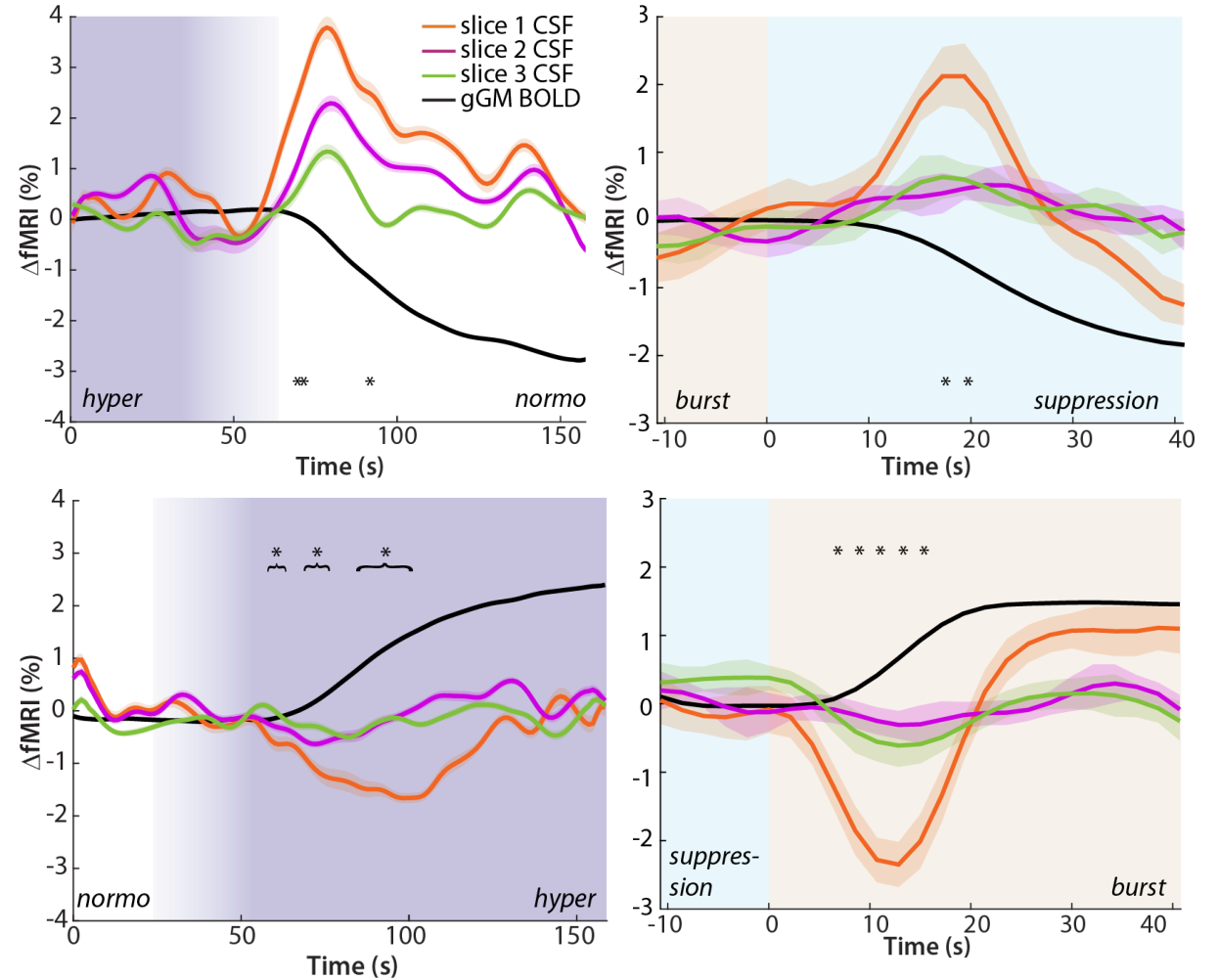
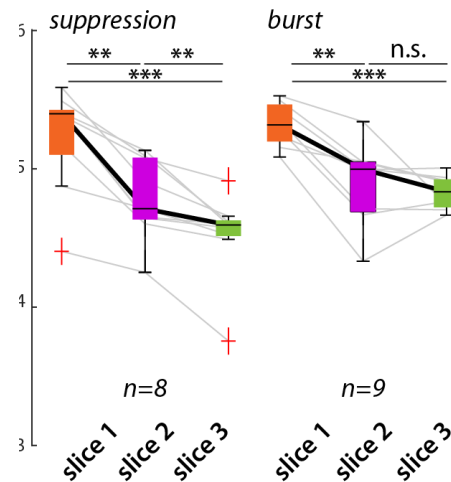
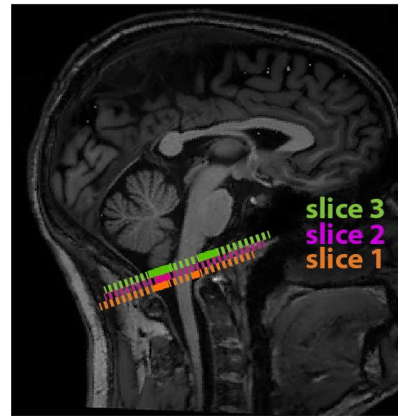
Hypercapnia-induced changes in the gGM-BOLD and CSF signals



Changes in global brain blood volume mediate CSF in- and outflux

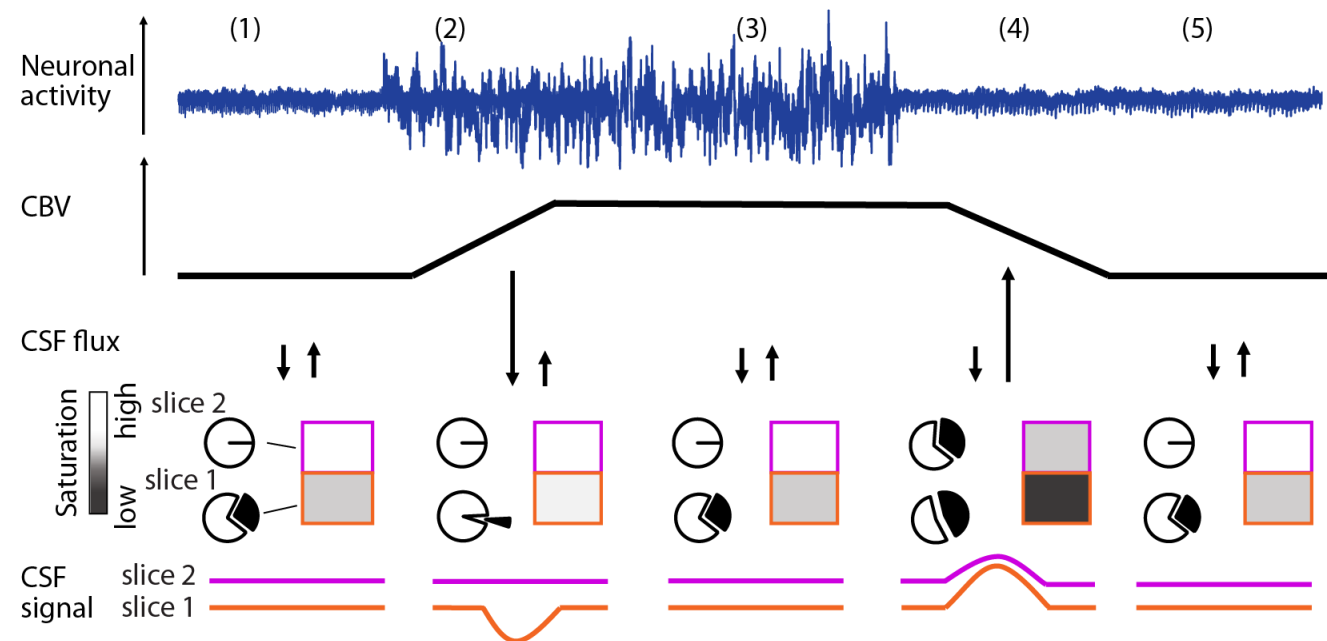


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Conclusions

- In burst-suppression anesthesia, neuronal-activity driven changes in gGM-BOLD are associated with CSF in-and outflow across the basal cisterna
- Experimental modulation of brain CBV by a hypercapnic challenge drives CSF in-and outflow across the basal cisterna
- Our experiments provide direct evidence for tight mechanistic coupling between global neuronal activity, brain blood flow and volume, and macroscopic CSF flux



Preprint (Zimmermann et al):

