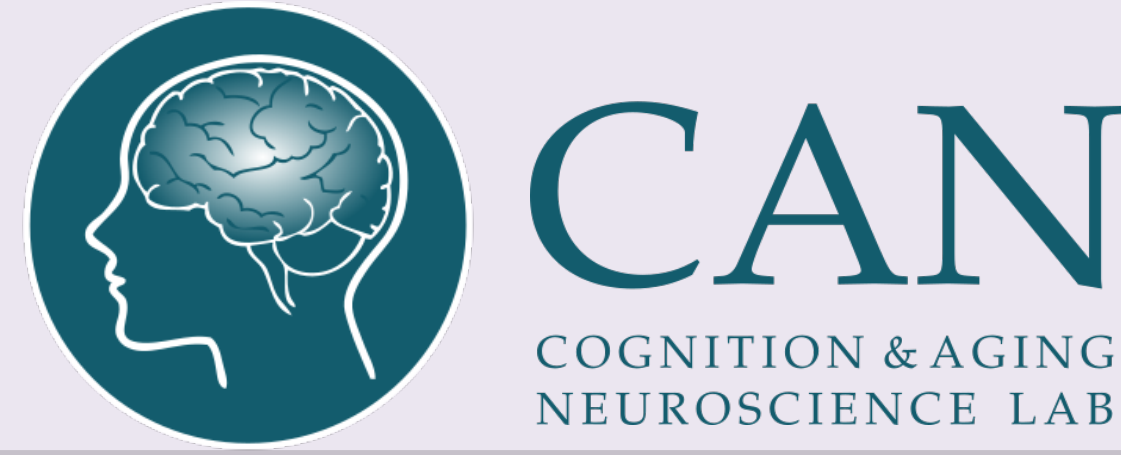
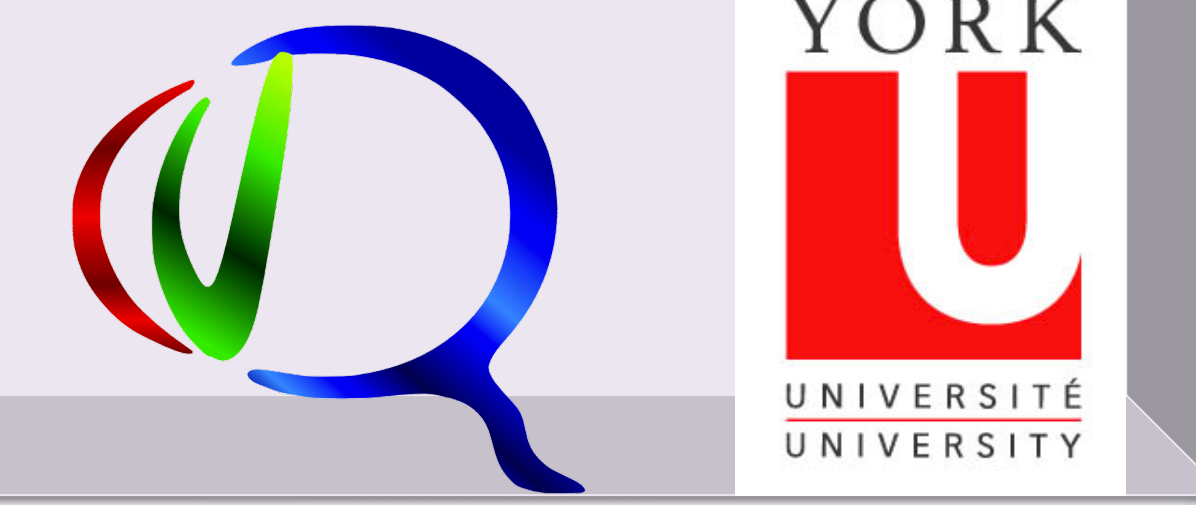


# Caesarean-section birth is associated with atypical intrinsic functional connectivity of visual regions in adulthood



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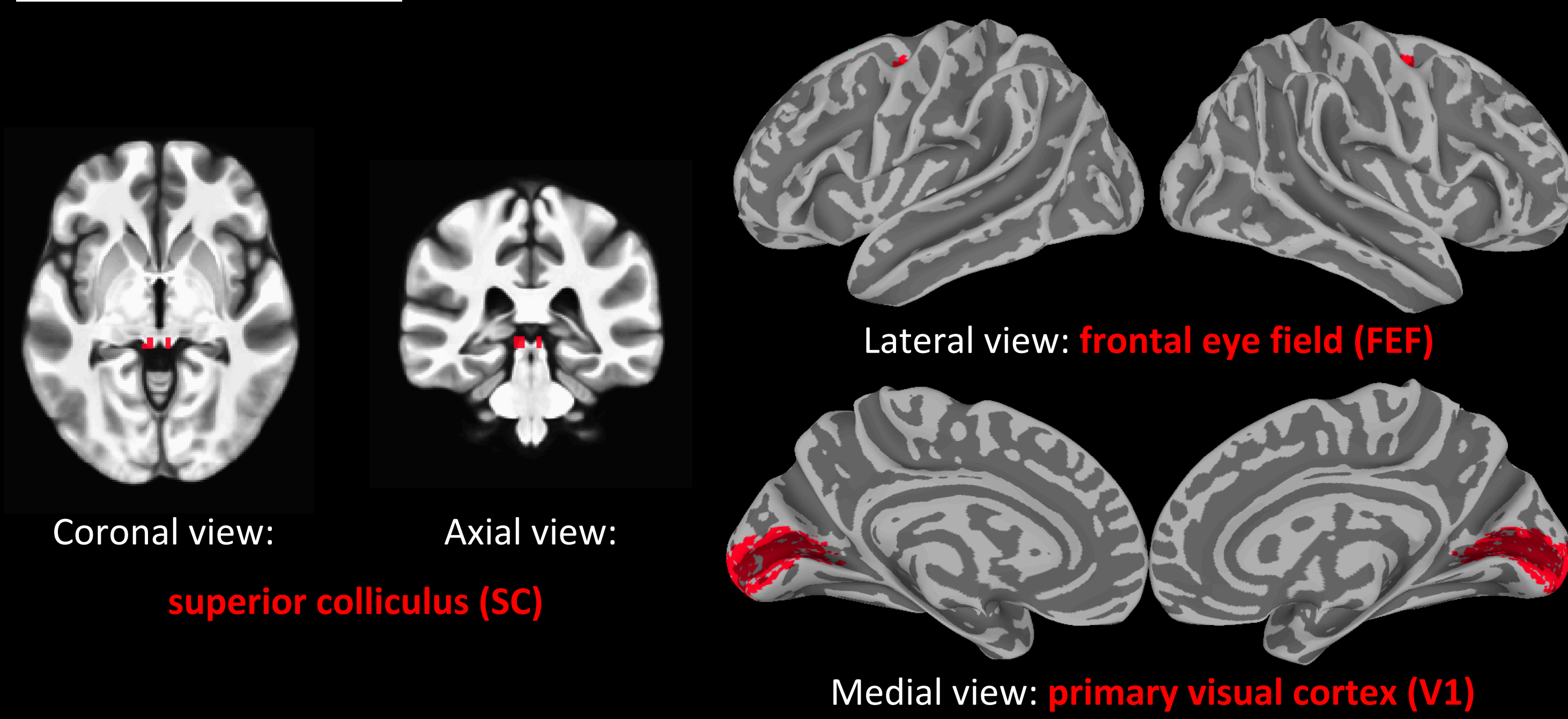
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## BACKGROUND

- Rate of caesarean-section (C-section) births has been steadily increasing worldwide since the 1990s
- Many studies show that a range of early birth factors affect cognitive development, but relatively few examine effects of delivery method
- Rat pups born via C-section may show differences in barrel cortex<sup>1</sup>
- Human infants born via C-section show impaired stimulus-driven reflexive visual attention with eye-tracking at 3-months of age<sup>2</sup>
- This stimulus-driven (i.e., bottom-up) reflexive visual attention deficit persists into adulthood<sup>3</sup>
- **Aim: Determine if visual deficits might be related to altered intrinsic functional network architecture of visual regions in the brain**

## Seed Regions: bilateral V1, SC, & FEF

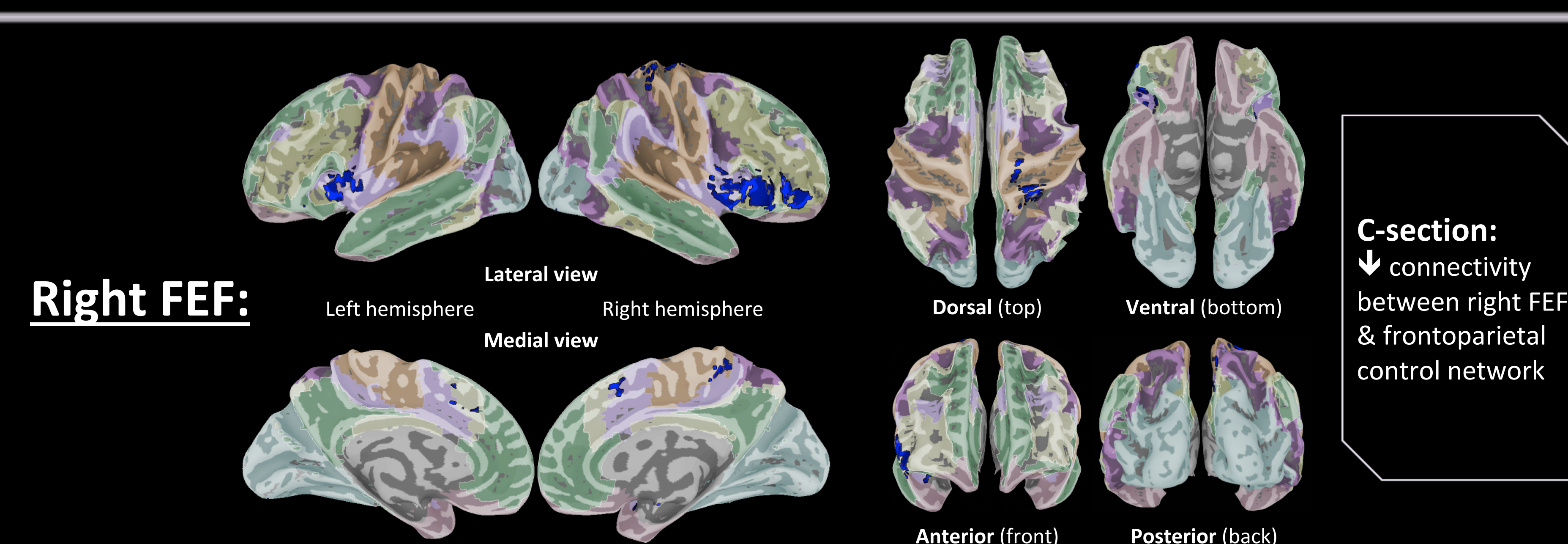
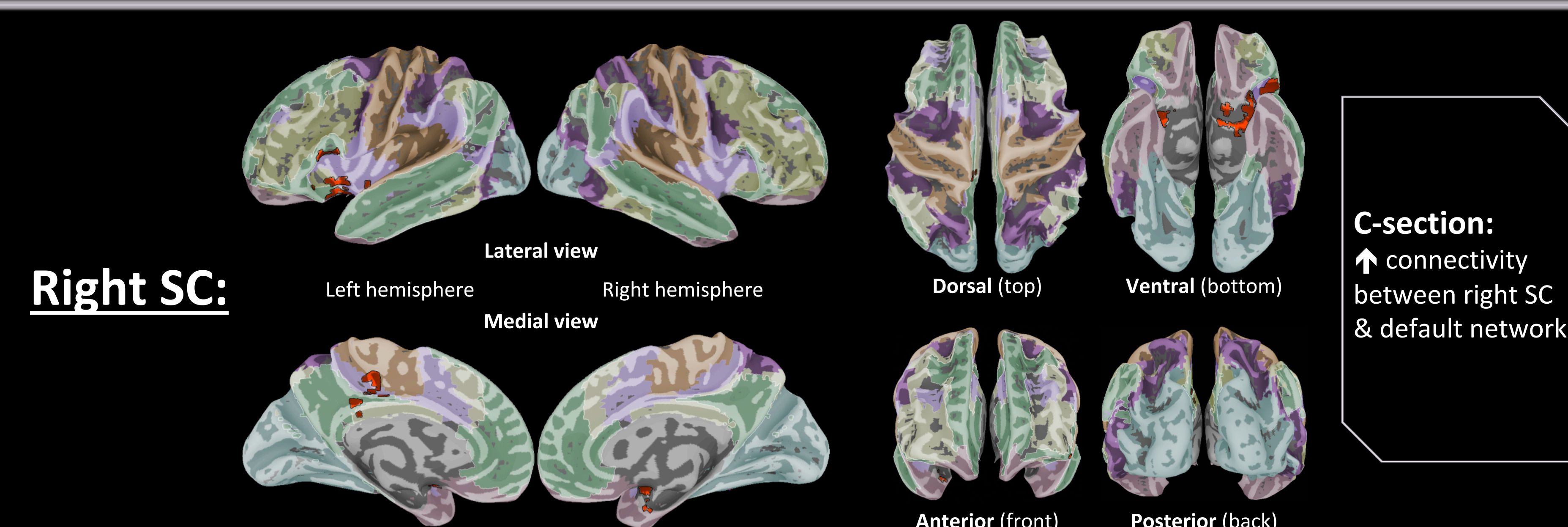
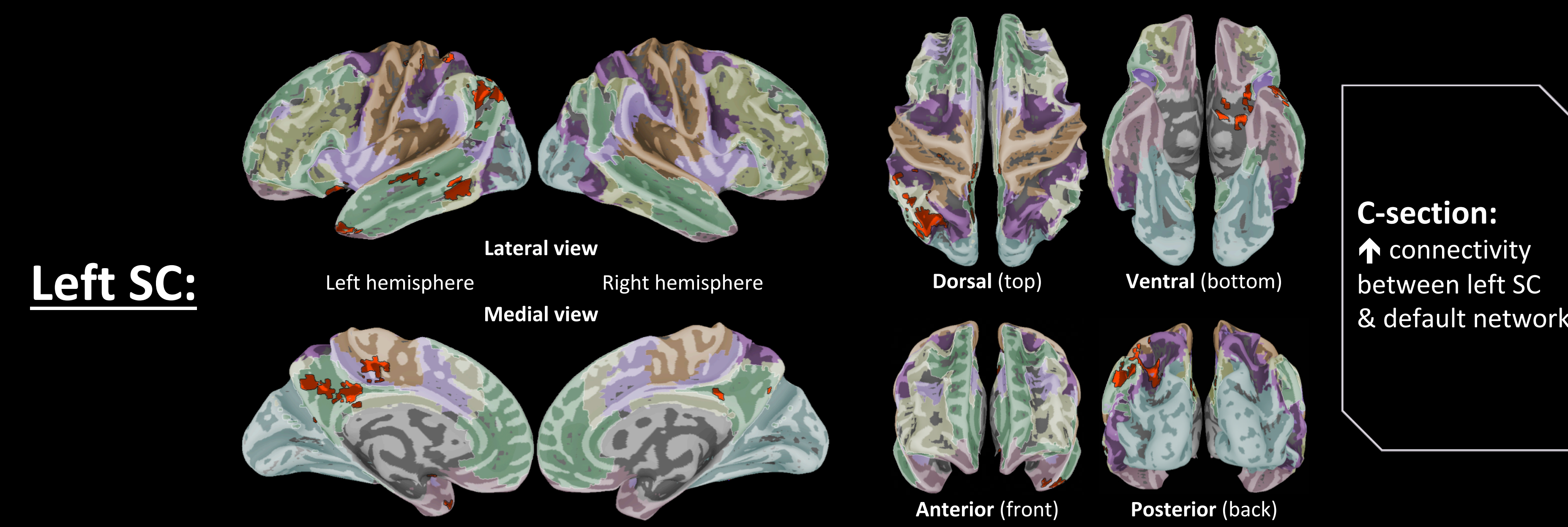
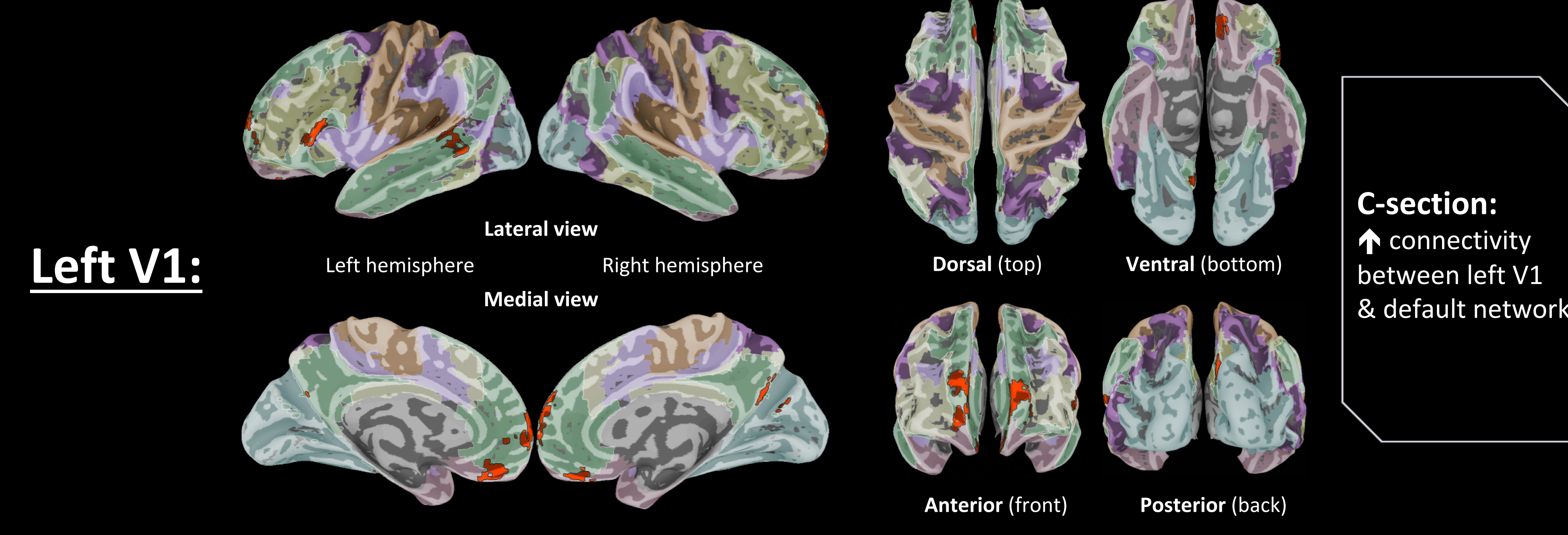


## METHODS

- Multi-echo resting-state fMRI
- 81 right-handed young adults:
  - 20 C-section (11 female, 22.8 ± 3 yrs) & 61 vaginally delivered (41 female, 23.1 ± 4 yrs)
- MEICA preprocessing to remove non-BOLD signal noise components (e.g. motion)
- Transformed to standard space (MNI) and compared at the group level
- **Seed regions of interest (ROIs):**
  - V1 → analogous to rat barrel cortex (ROI from Freesurfer cortical segmentation)
  - SC → bottom-up attention (r = 3mm sphere around peak literature coordinates<sup>4</sup>)
  - FEF → top-down attention (r = 6mm sphere around peak literature coordinates<sup>5</sup>)
- Mean residual denoised timeseries extracted from each ROI for each participant and its whole-brain connectivity was compared across groups (AFNI: 3dttest++)
- Voxelwise threshold of  $p < .001$  and cluster threshold of  $p < .05$  (-Clustsim)

## Differences in Intrinsic Functional Connectivity with Seed Regions

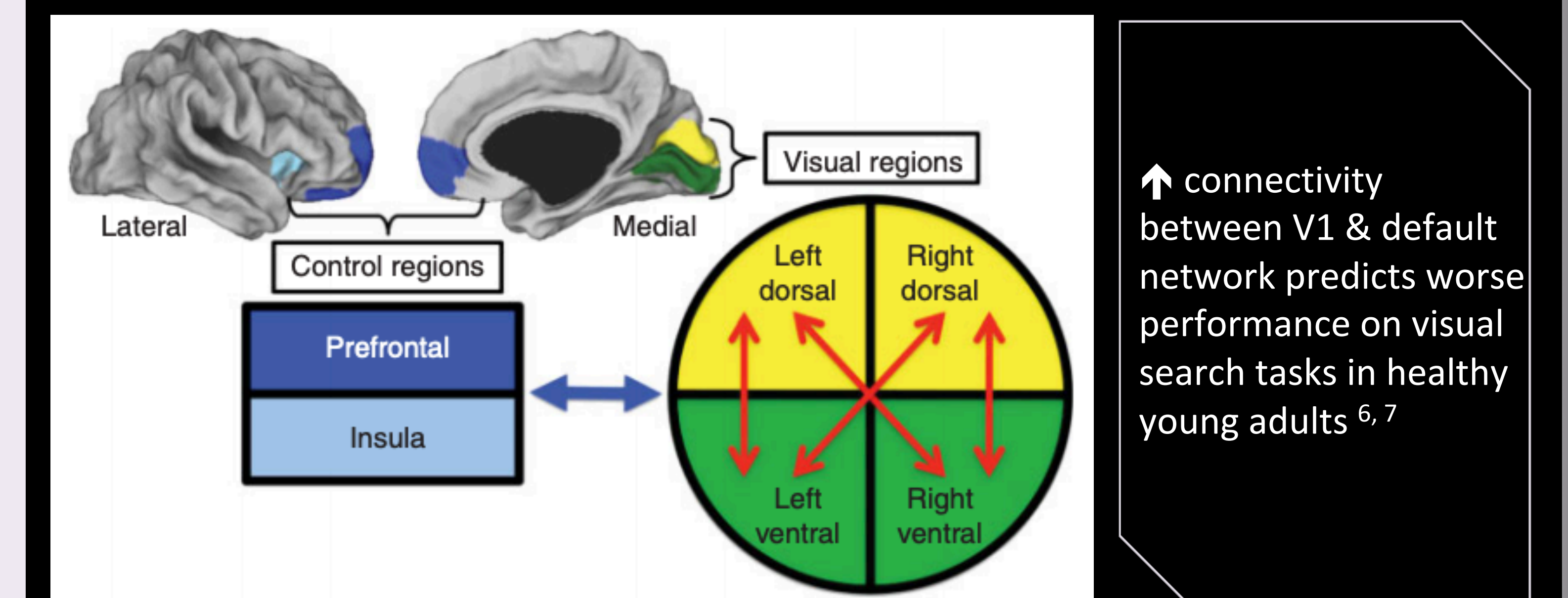
[C-section – vaginal delivery]



**7-Network<sup>6</sup> Legend:**  
1. Visual 2. Somatomotor 3. Dorsal Attention 4. Ventral Attention 5. Limbic 6. Frontoparietal 7. Default

## SUMMARY & CONCLUSIONS

- **C-section group:**
  - Left V1 more connected with default network
  - Bilateral SC more connected with default network
  - Right FEF less connected with frontoparietal control network
- Previous work shows that stronger connectivity between V1 and the default network predicts worse performance on visual search tasks<sup>6,7</sup>
- Stronger connectivity between default network and both the left V1 and bilateral SC could be related to bottom-up visual attention deficits<sup>2,3</sup>
- No connectivity differences between the FEF and default network regions, and no top-down visual attention deficits previously reported<sup>2,3</sup>
- Cognitive/perceptual deficits resulting from C-section birth have profound implications, given the rising prevalence of this procedure



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