

WHITE MATTER MICROSTRUCTURE IN PEDIATRIC CHRONIC PAIN

Alexandra G. Tremblay-McGaw¹, Inge Timmers^{1,2}, Emma E. Biggs¹, Lisa Bruckert³, Hui Zhang⁴, David Borsook⁵, & Laura E. Simons¹

¹Department of Anesthesiology, Perioperative, and Pain Medicine, Stanford University School of Medicine;

²Department of Medical and Clinical Psychology, Tilburg University; ³Department of Pediatrics, Stanford University School of Medicine;

⁴Department of Computer Science, University College London; ⁵Center for Pain and the Brain, Boston Children's Hospital

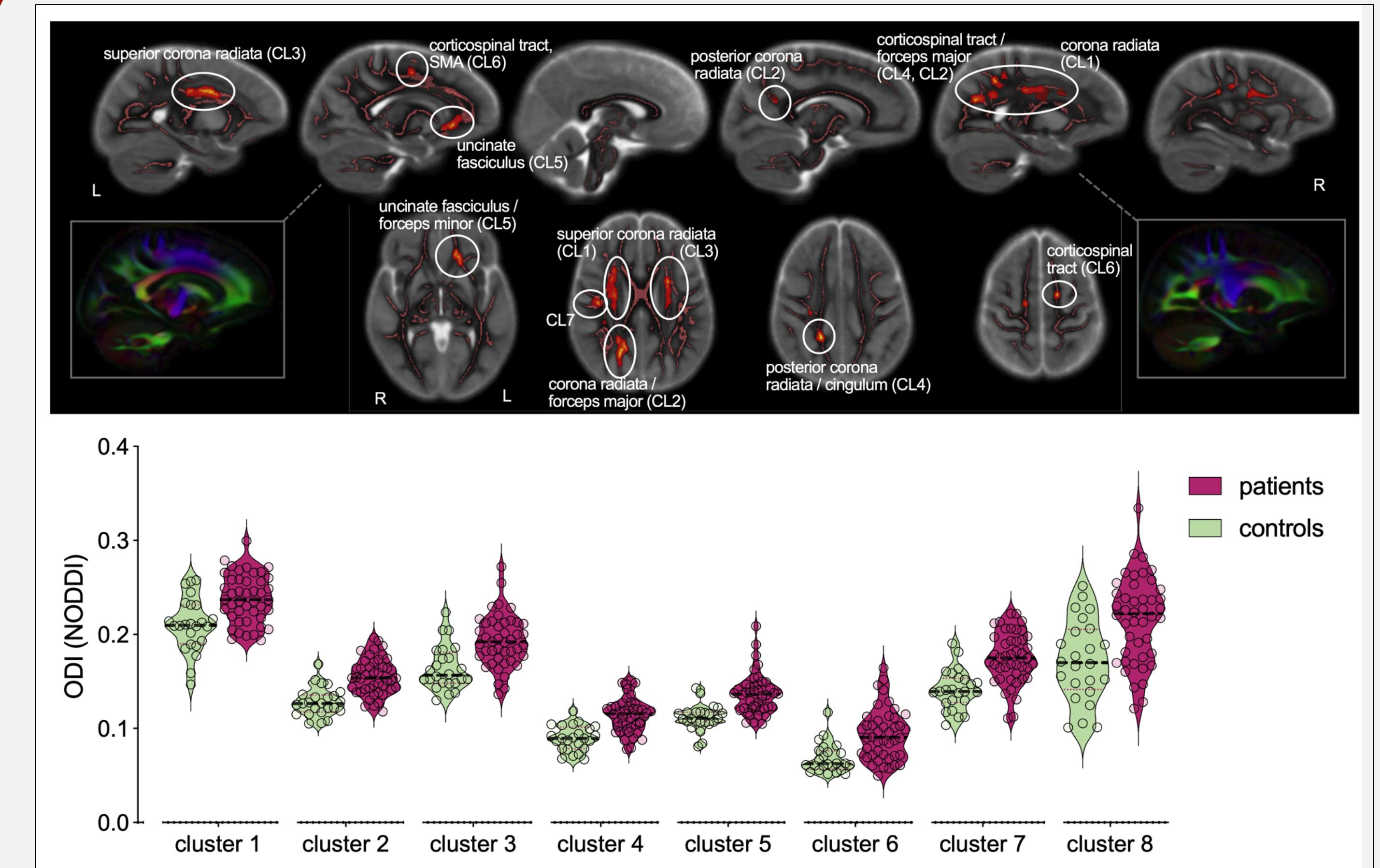


BACKGROUND

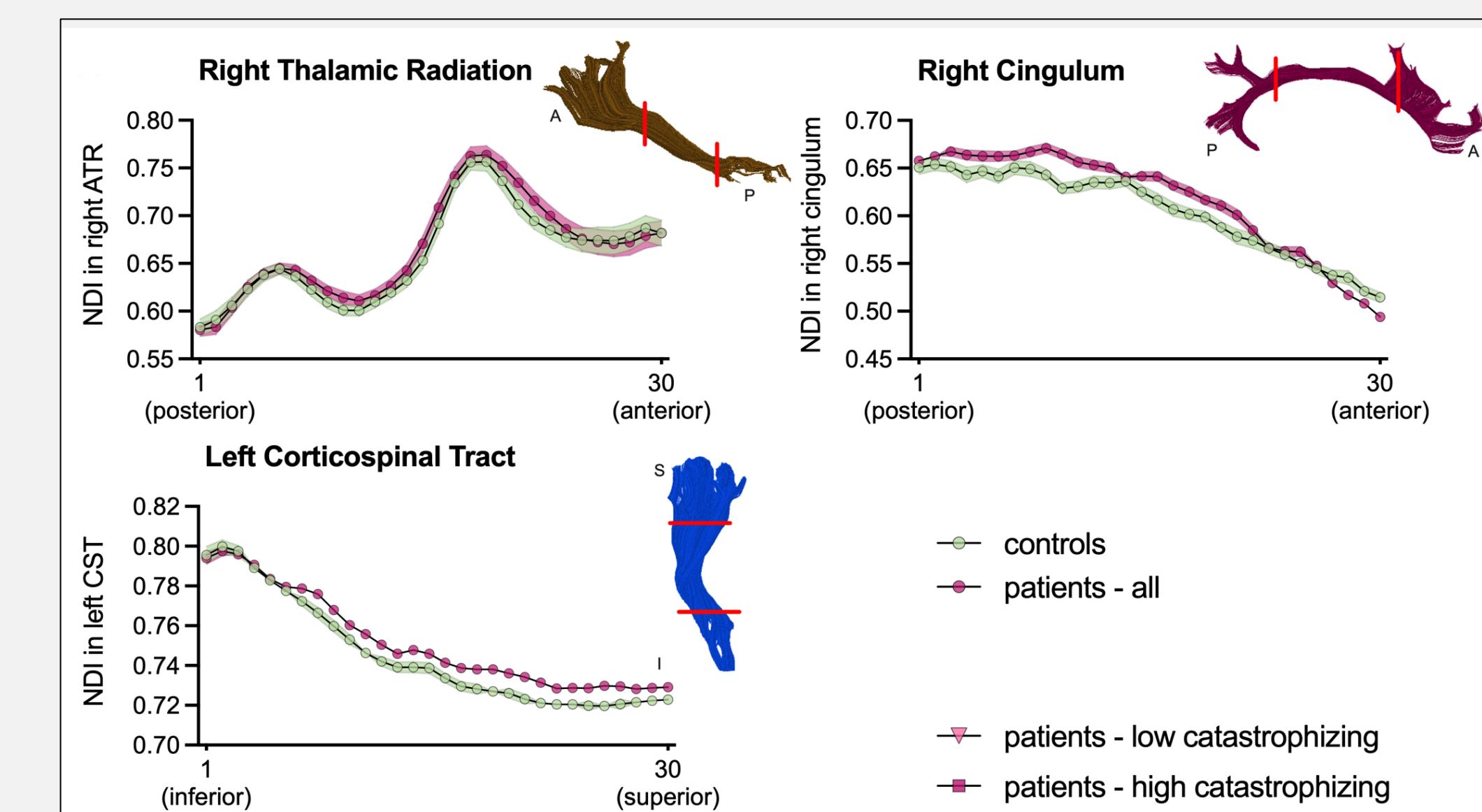
- Chronic pain is common in young people and can have a major impact across life domains.
- Mechanisms underlying the development of chronic pain and its persistence are still poorly understood.
- Neuroimaging studies have illustrated the complexity of the pain experience and the importance of corticolimbic circuitry in encompassing individual differences in pain.
- Due to the development of the adolescent brain, findings from the adult literature do not easily generalize.
- White matter (WM) connectivity has remained unexplored in pediatric chronic pain.

Do adolescents with chronic pain differ in white matter integrity compared to pain free controls?

RESULTS

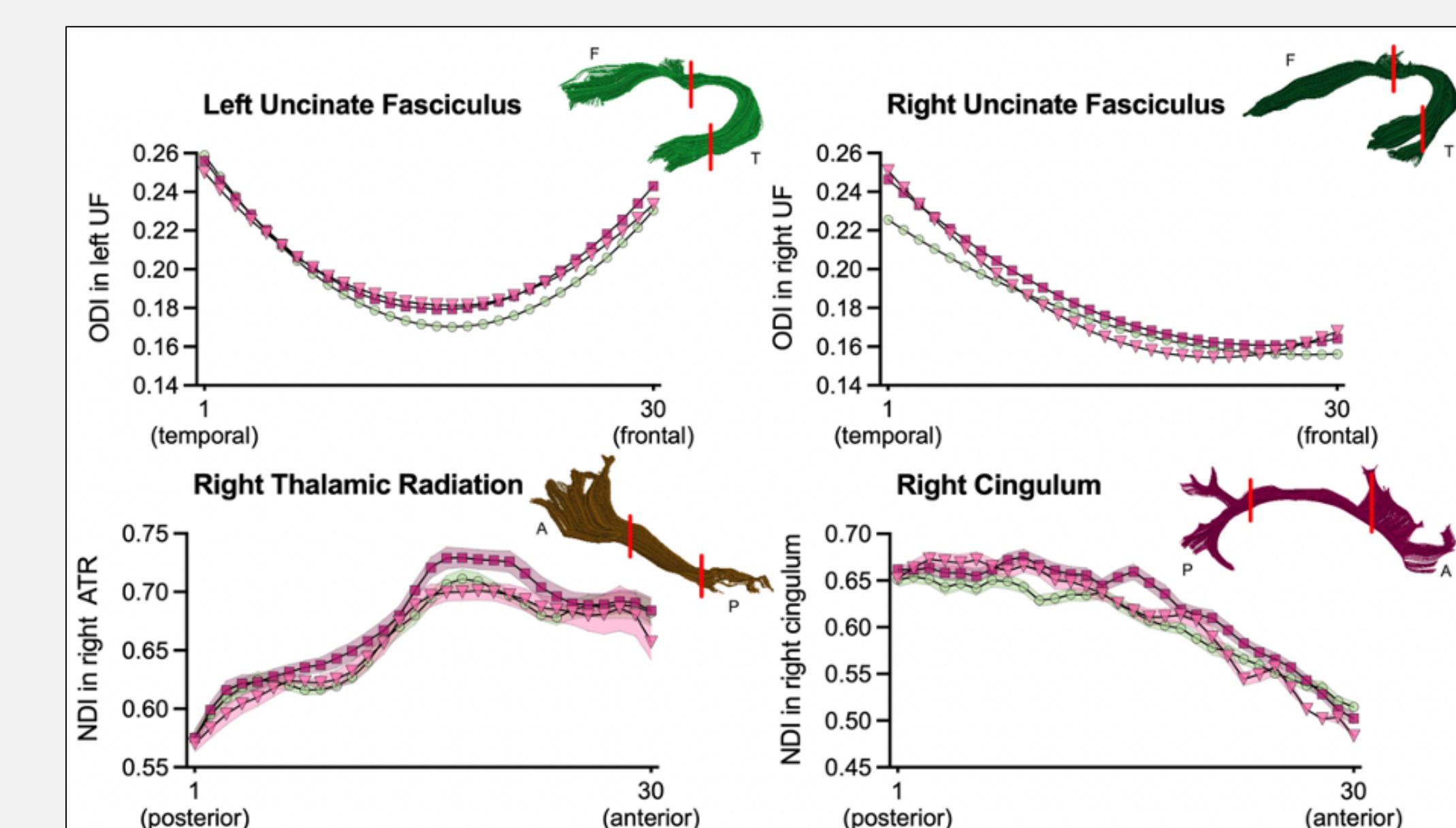
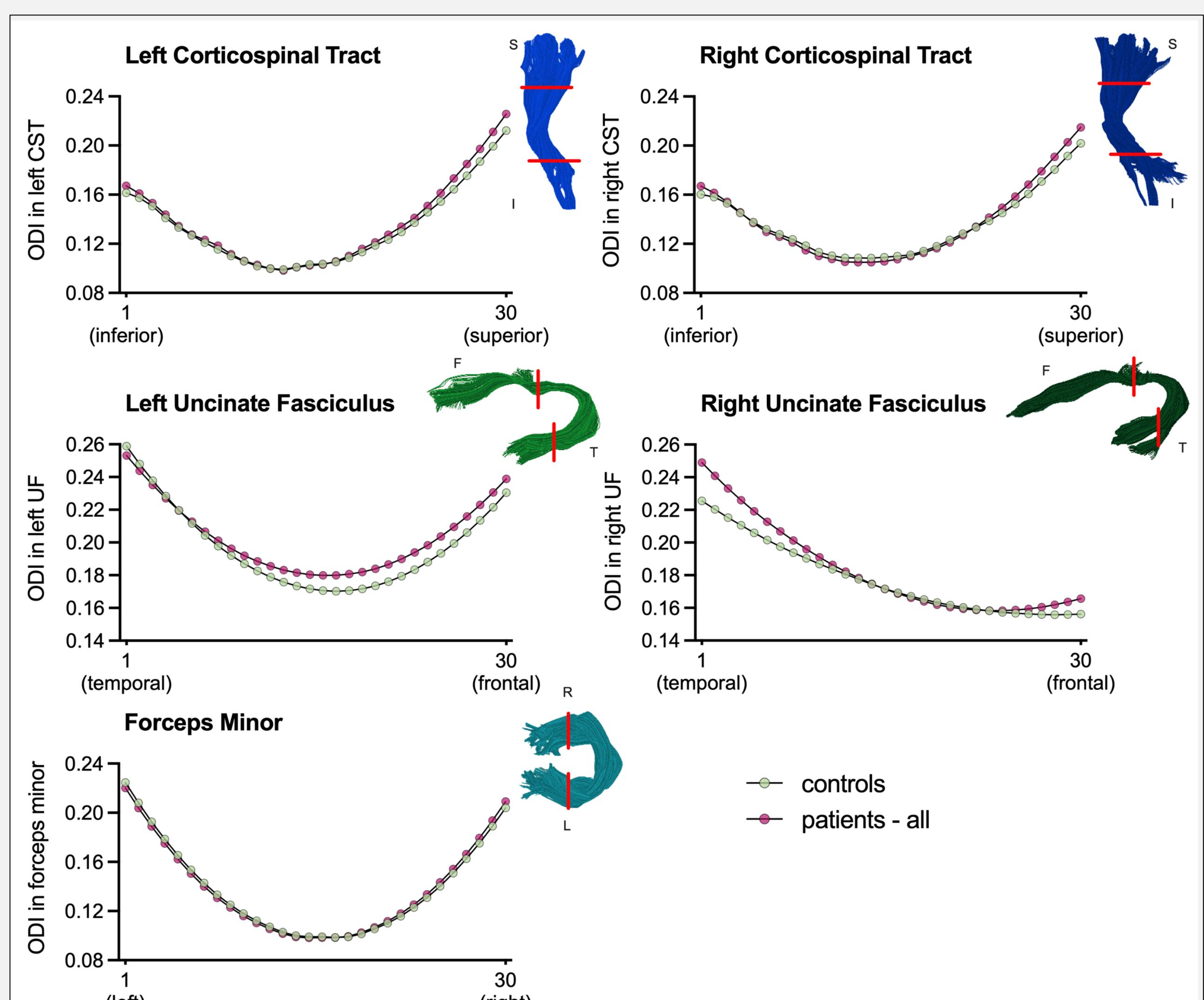


RESULTS



Youth with chronic pain showed signs of neurite density alterations, in tracts-of-interest including the corticospinal tract, cingulum and anterior thalamic radiation, with mainly higher density levels in youth with chronic pain compared to pain-free peers.

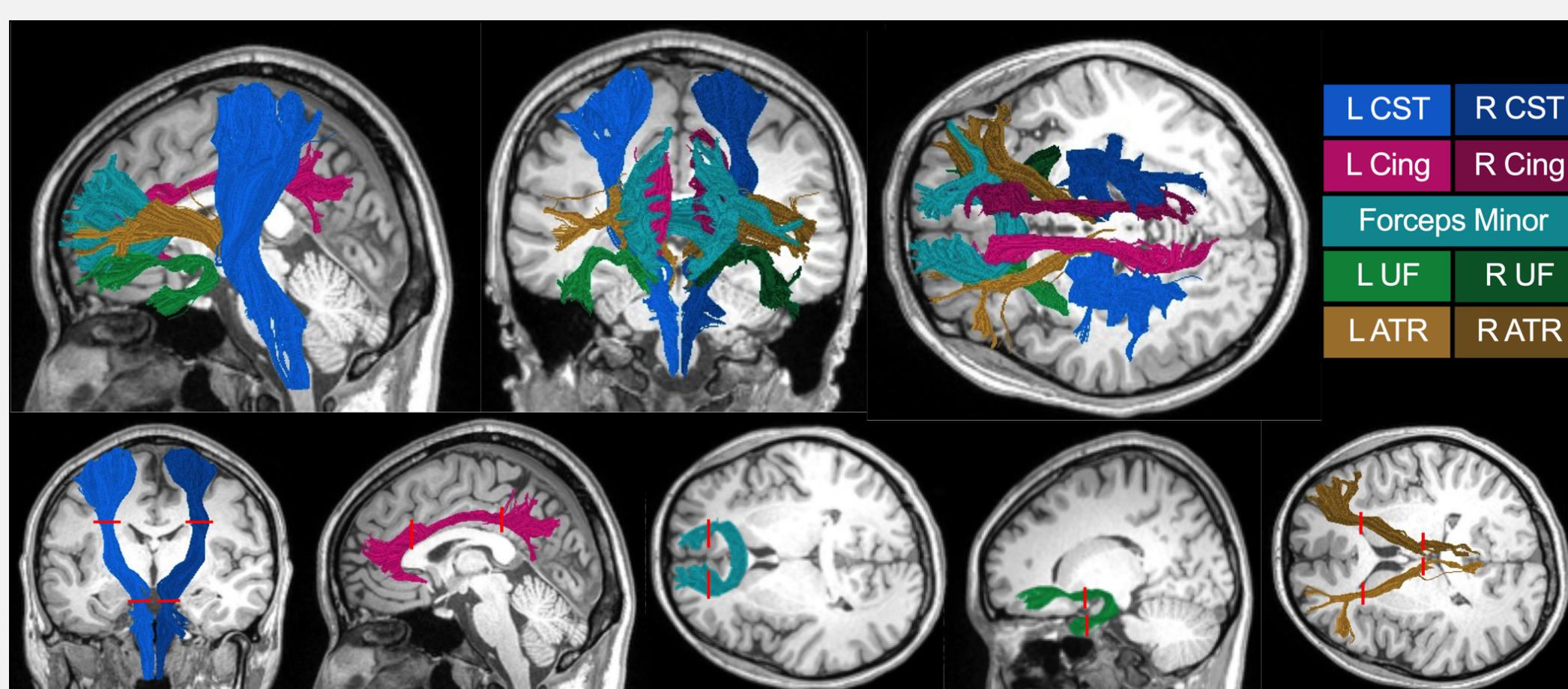
Youth with chronic pain showed widespread elevated orientation dispersion compared to pain-free peers at the voxel level and in tracts including the corona radiata, corticospinal and uncinate fasciculus, indicative of less coherence in those WM tracts.



Several WM microstructural alterations were associated with levels of pain catastrophizing in the chronic pain group.

CONCLUSIONS

By identifying alterations in the biologically informative WM microstructural metrics orientation dispersion and neurite density, our findings provide important and novel mechanistic insights for understanding the pathophysiology underlying chronic pain. While it is unclear whether the identified alterations reverse with treatment or are categorically different with the severity of catastrophizing, the data support alterations in fiber organization as a key characteristic, contributing process to the chronic pain state.



Contact Information

atrembla@stanford.edu
 @TremblaA

Funding

Supported by The National Institutes of Health (No. R01HD083270 to LES)

Scan me!

