

Diffusion MRI Reveals Differential White-Matter Degeneration across Frontotemporal Dementia Phenotypes

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INTRODUCTION

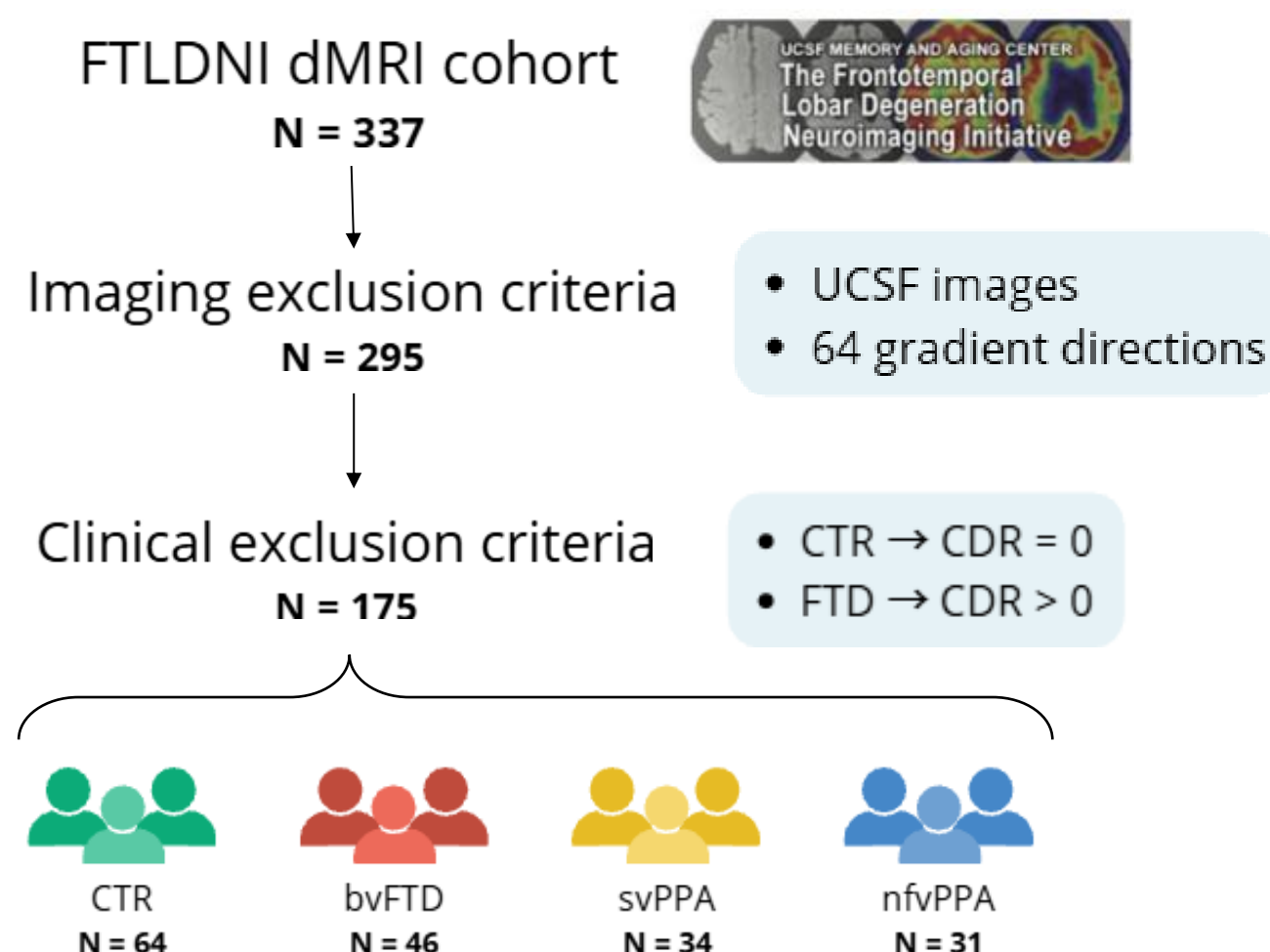
Alterations in white matter (WM) integrity have been recognized as a key pathological feature of frontotemporal dementia (FTD). **Diffusion MRI** (dMRI) offers sensitive markers of WM degeneration, such as **fractional anisotropy** (FA) and **mean diffusivity** (MD), enabling the characterization of distinct patterns across the main FTD phenotypes: behavioral variant (bvFTD), semantic variant (svPPA), and nonfluent variant (nfvPPA).

OBJECTIVE

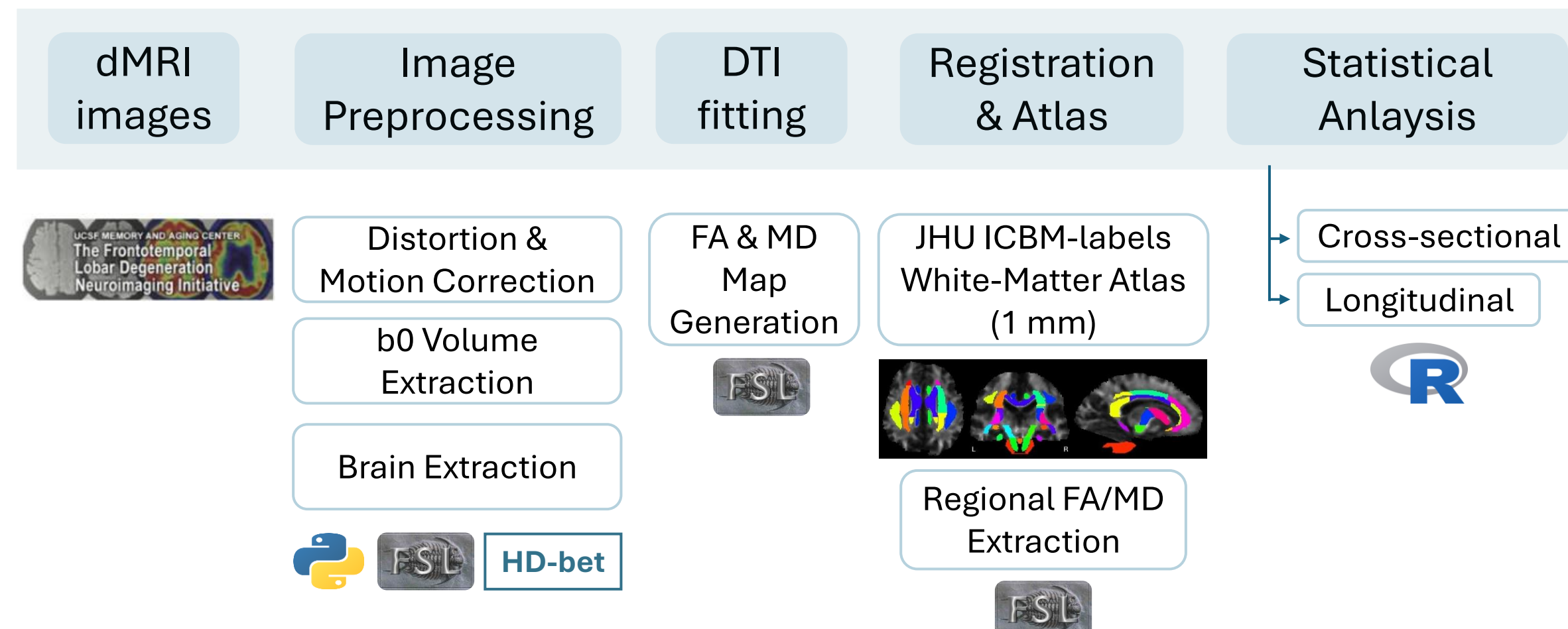
To **characterize** DTI signatures across **FTD phenotypes**.

METHODS

Participants



Pipeline



RESULTS

Demographics table

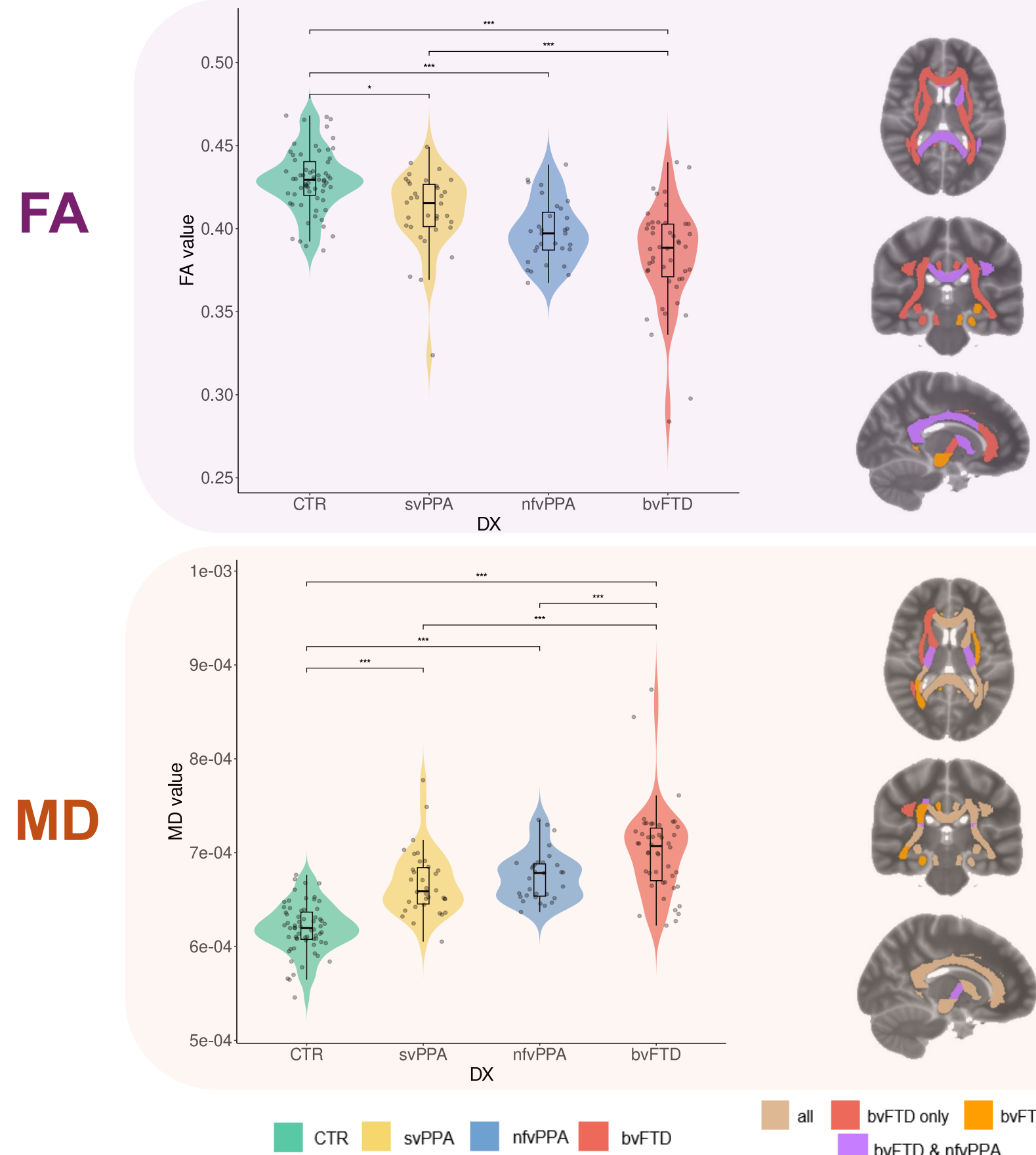
	CTR	bvFTD	svPPA	nfvPPA	p-value
Age at first visit, years	65.7±5.7	60.7±6.7	62.8±6.3	68.6±7.6	< 0.001
Sex, Male/Female	31/33	30/16	20/14	14/17	0.22
Education, years	21.3±17.5	17.2±12.6	18.8±14.4	15.9±2.6	0.28

Cross-sectional analyses: Violin plots show whole-brain mean FA and MD values in CTR, svPPA, nfvPPA and bvFTD. Brain maps highlight regions with significant differences between CTR and each phenotype.

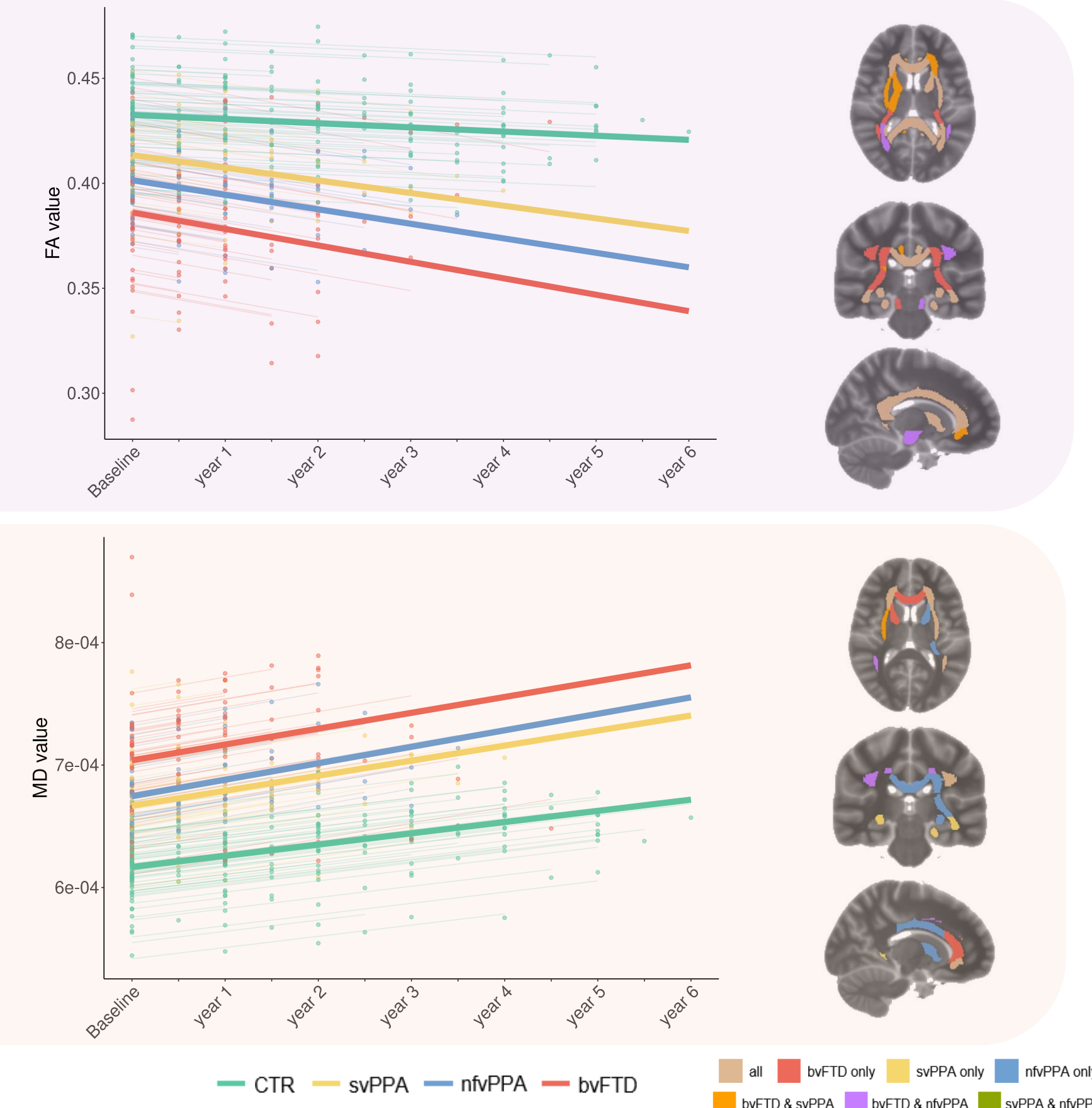
Longitudinal analyses: Spaghetti plots show individual and group-level trajectories of FA and MD over time. Brain maps display regions with significant longitudinal changes, with values representing rates of change over time.

At baseline, FA better captured variant-specific degeneration, whereas MD was more sensitive to overall WM damage and thus less phenotype-specific. Longitudinally, FA showed broader changes over time, while MD reflected a more variant-specific pattern of progression.

CROSS-SECTIONAL



LONGITUDINAL



CONCLUSIONS

FA and MD revealed distinct cross-sectional and longitudinal white-matter alterations across FTD, with complementary sensitivity to phenotype. This may support differential diagnosis and monitoring disease progression.

ACKNOWLEDGEMENTS

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