MRC Cognition and Brain Sciences Unit

UNIVERSITY OF CAMBRIDGE

DTI Group Analysis in FSL

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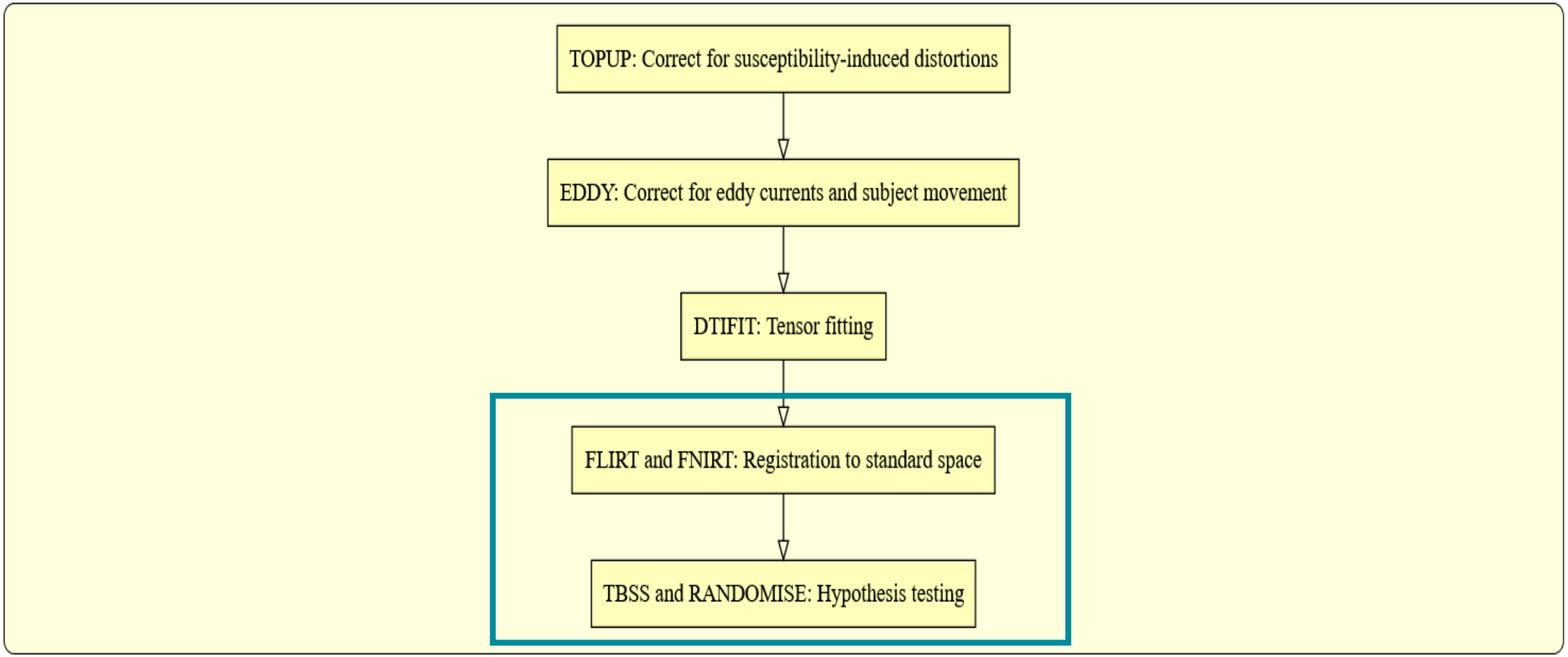
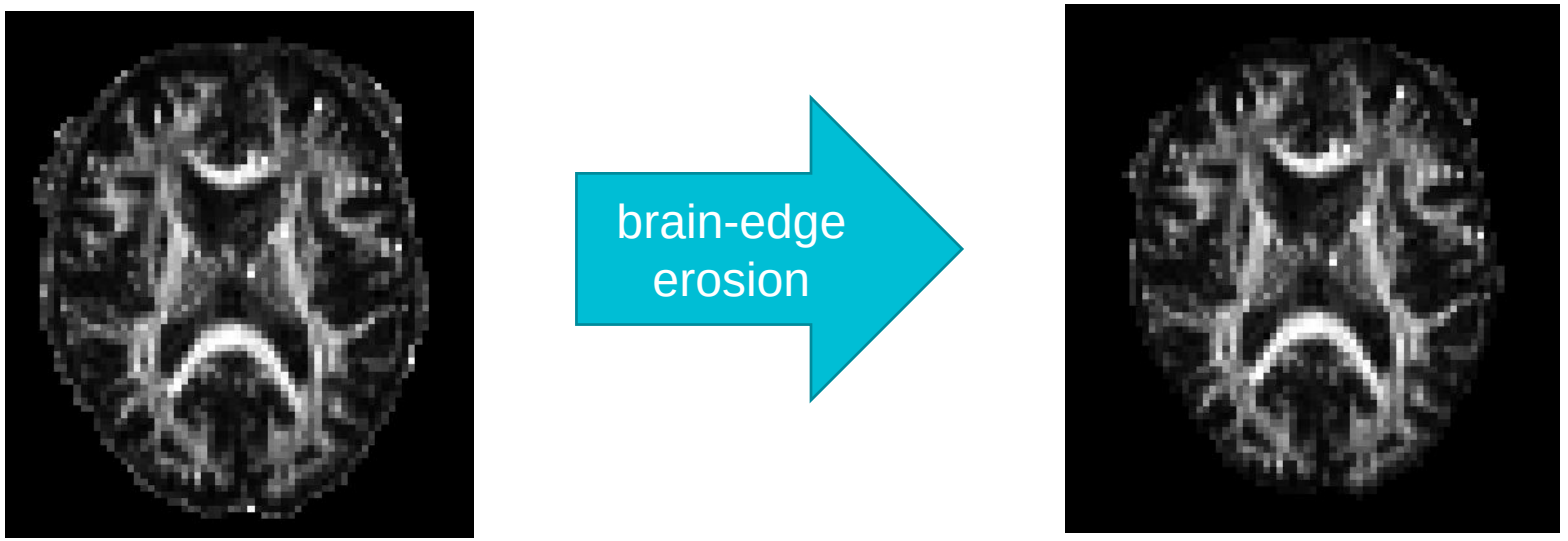
Overview of the FSL Diffusion Toolbox pipeline



TBSS: Group Analysis of DTI data

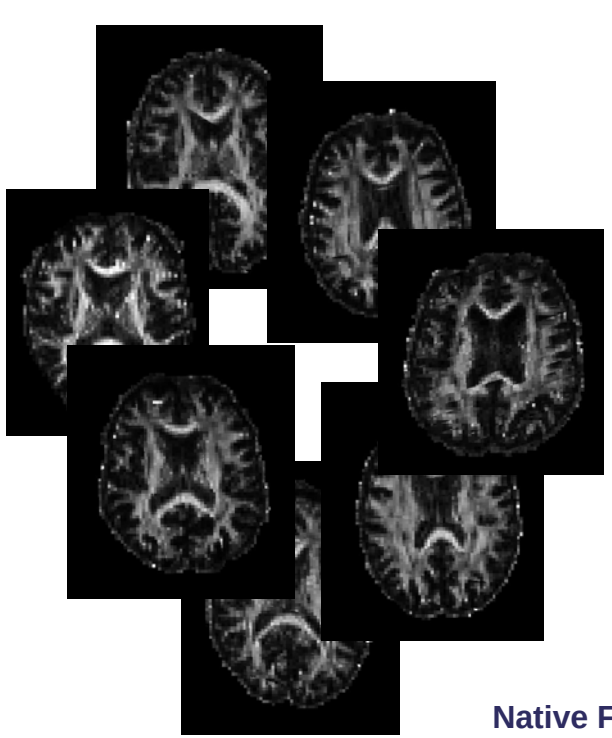
1. Preparing FA data for TBSS:
   - Rename files
   - New folder structure
   - Erode FA images to reduce brain-edge artefacts



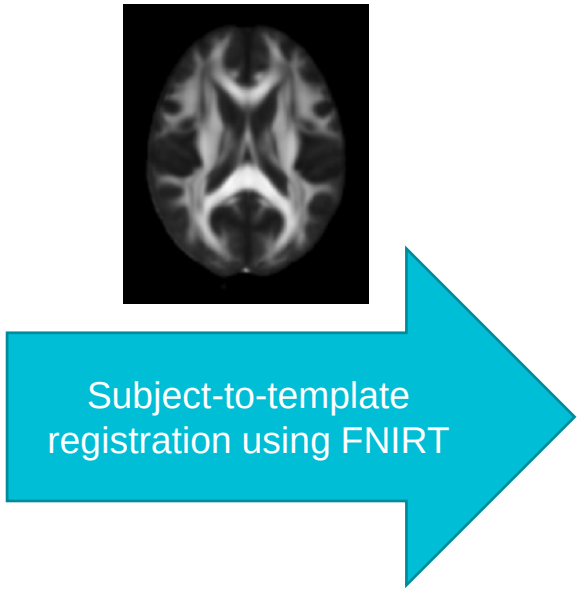
TBSS: Group Analysis of DTI data

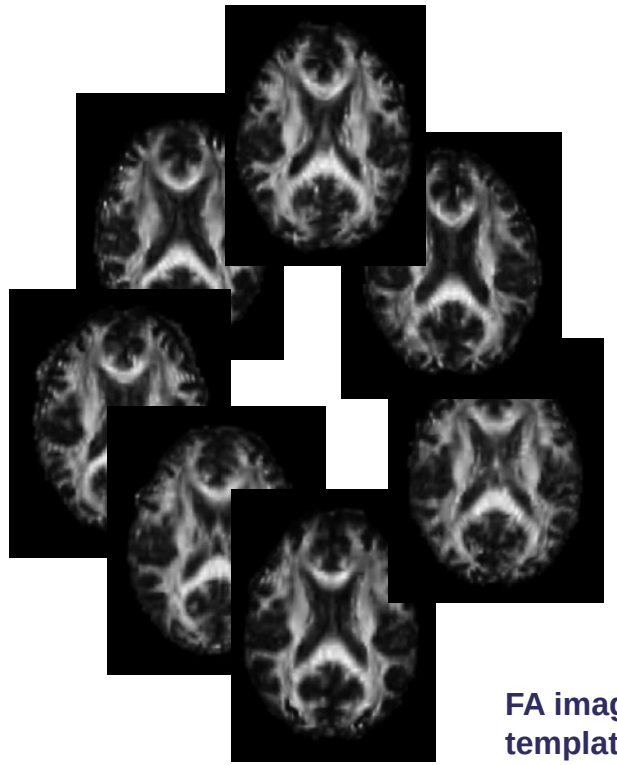
2. Registering the FA data:

- Register FA images to the FMRIB58_FA template using non-linear registration (FNIRT)



Native FA images



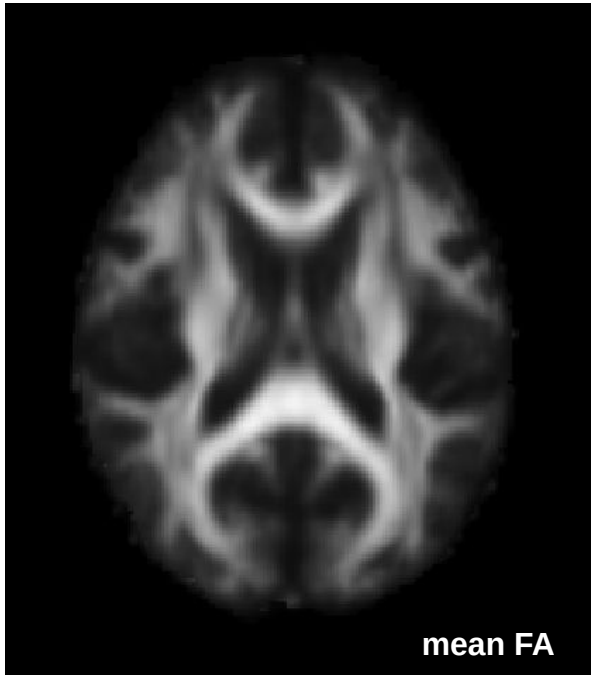


FA images in
template space

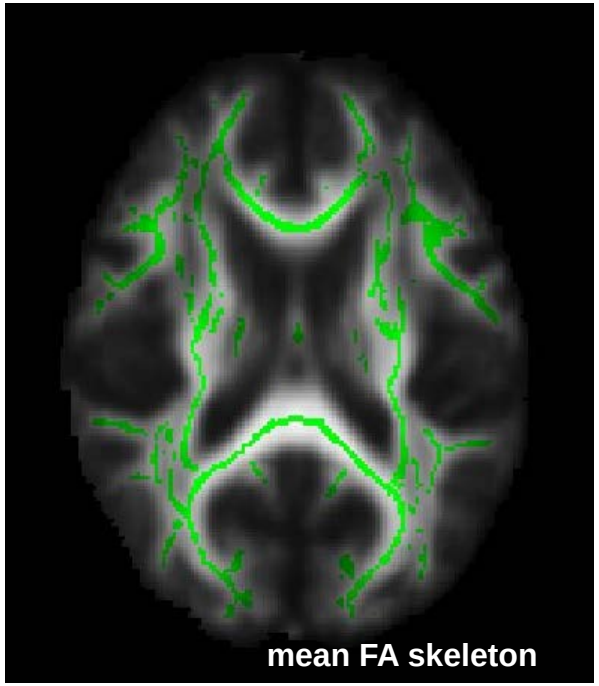
TBSS: Group Analysis of DTI data

3. Post-registration processing:

- Average all registered FA images
- Create the mean FA skeleton

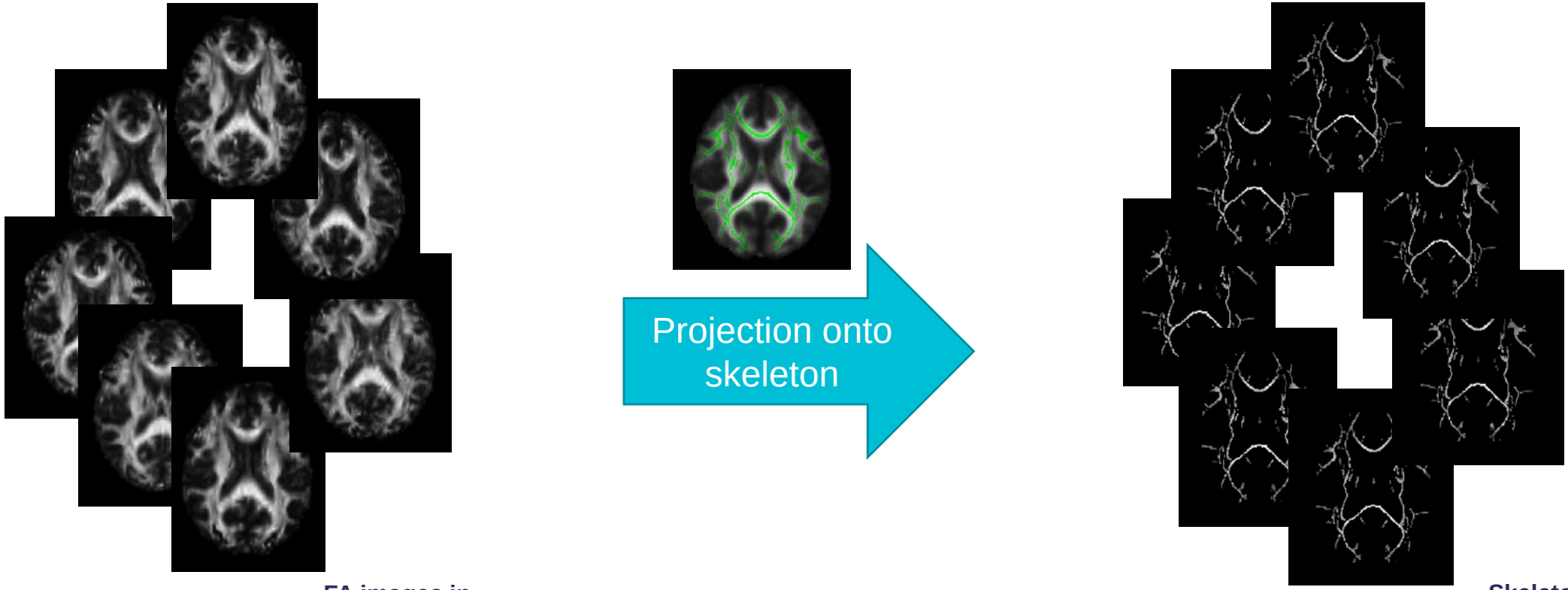


FA skeletonisation



TBSS: Group Analysis of DTI data

4. Projecting each subject's FA map onto the skeleton:



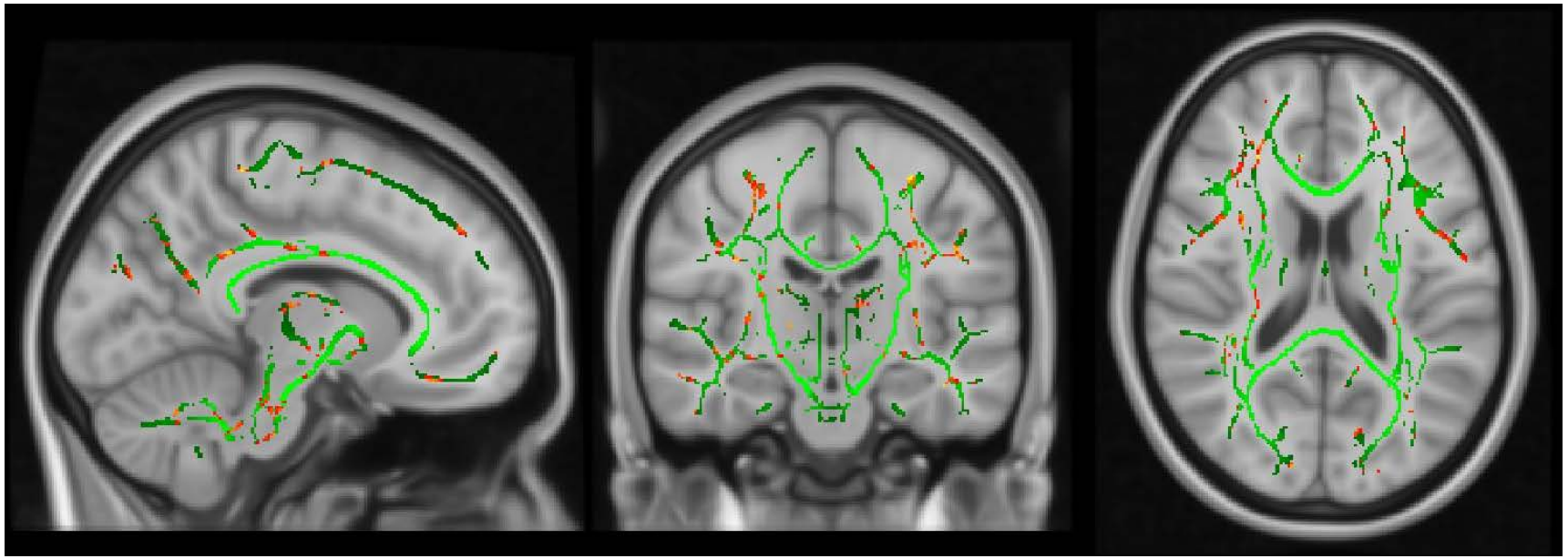
FA images in template space

Skeletonised FA images

VBM using FSL tools

5. Statistical analysis:

- Create the design matrix
- Use **randomise** for non-parametric inference



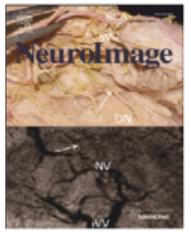
Interpretation of results

- FA skeleton does not represent the center of a specific WM tract.
- Significance maps should be interpreted with care: post-registration misalignments and voxel misassignments may confound the FA values from structures in close proximity.
- Choice of parameters, e.g. the registration target, can lead to large variation in the FA skeleton and subsequently the statistical results.

Contents lists available at ScienceDirect

NeuroImage

journal homepage: www.elsevier.com/locate/ynimg



Methodological considerations on tract-based spatial statistics (TBSS)

Michael Bach [a,b], Frederik B. Laun [a,b], Alexander Leemans [c], Chantal M.W. Tax [c], Geert J. Biessels [d], Bram Stieltjes [a], Klaus H. Maier-Hein [a,e,*]

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Thank you