

# NICARA™: Clinically feasible detection of structural connectivity changes in individual MS patients

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## Introduction

Previous research has shown that quantifying structural tract damage yields important information beyond individual lesions. However, it is currently not feasible to visualize such pathology in a clinical setting in individual patients. To tackle this issue, we propose NICARA™, a novel connectome software to run automated processing pipelines and reports for individual patients.

## Method

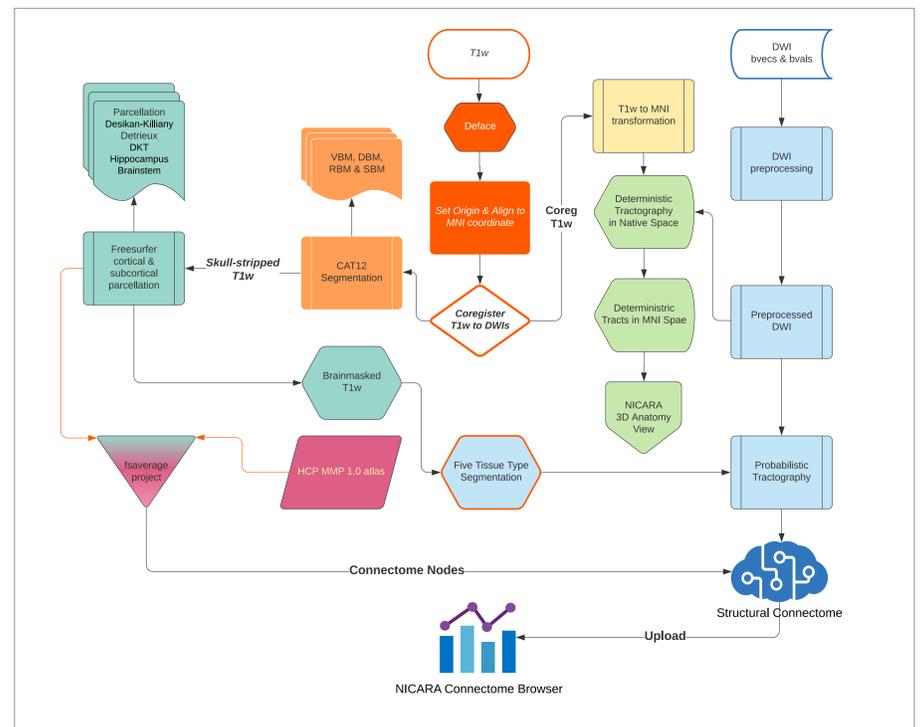
12 patients (with a wide range of disease durations and phenotypes) and 10 age matched healthy controls were included. All subjects underwent diffusion MRI as well as neuropsychological testing. NICARA™ (Biomax Informatics, <https://nicara.eu>) was used to assess structural connectomes running an automated processing pipeline depicted in the right figure.

## Results

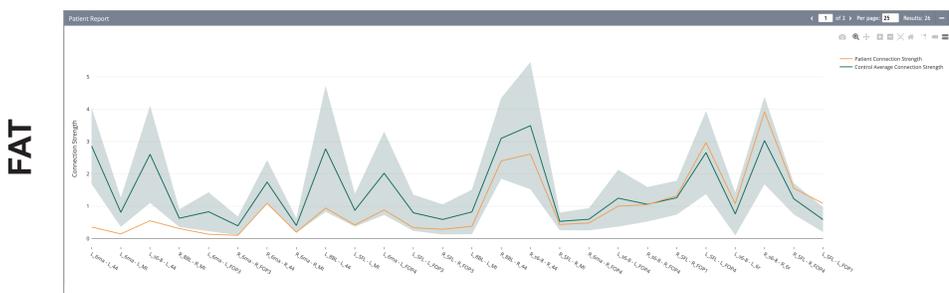
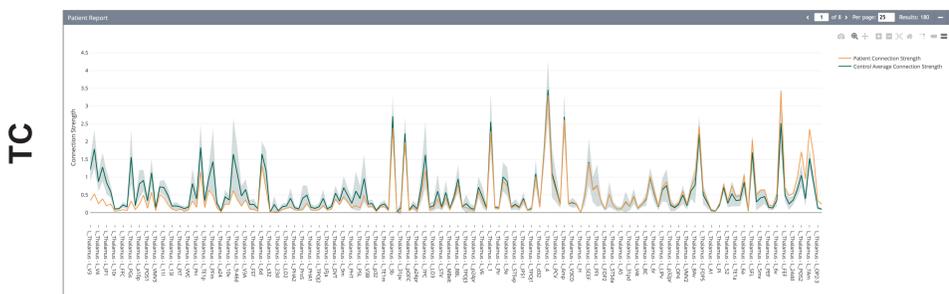
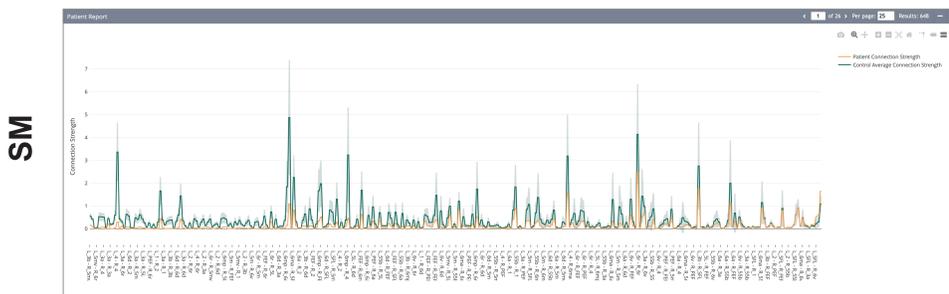
The full brain tractography pipeline detected reductions in connection strengths between ROIs of contralateral sensorimotor tracts (SM), ipsilateral thalamocortical tracts (TC) and frontal aslant tract (FAT) in all patients. Beneath, we show two patients with *long disease duration* (left column) and *short disease duration* (right column), respectively. The pipeline was uninformed about labeled WM lesions. Manual WM lesion labeling by neuroradiologists confirmed correctly detected reduction of connectivity in NICARA.

## Discussion

- NICARA: First product to detect connectivity changes in **individual patients**
- Preliminary analysis: **Individual and group level** connectome alterations
- Close relation to clinical profiles: NICARA could contribute to **clinical assessment**

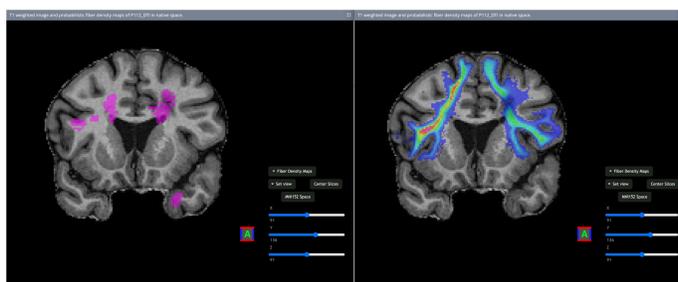


## Long Disease Duration

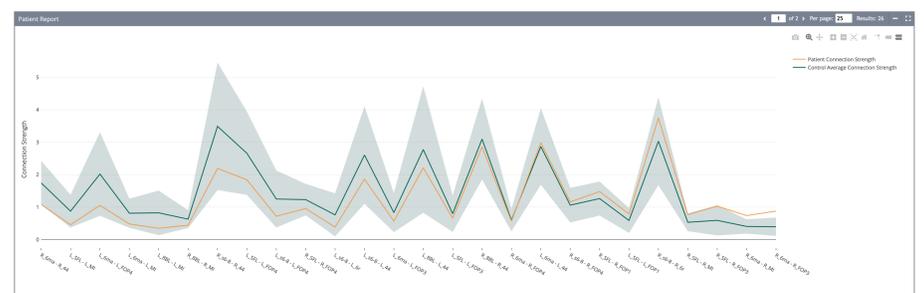
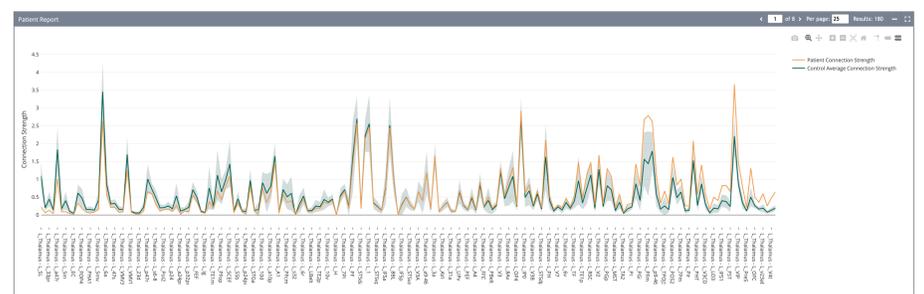
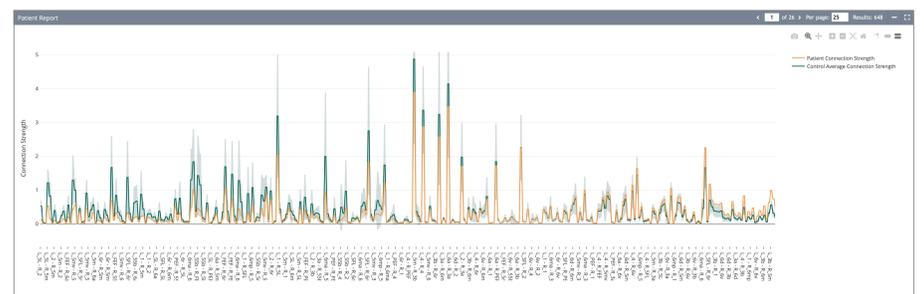


**P112**  
Disease duration:  
26.43yrs

Lesion load:  
38856 mm<sup>3</sup>  
2,5 EDSS  
49 SDMT

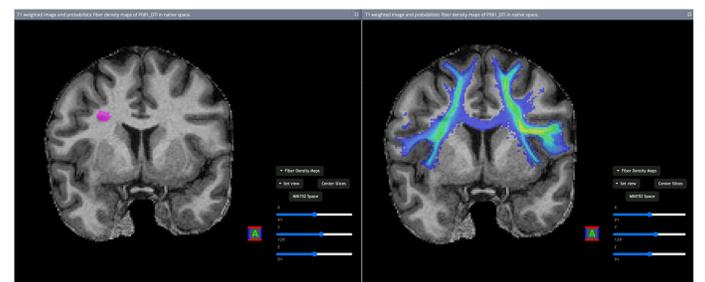


## Short Disease Duration



**P081**  
Disease duration:  
0.37yrs

Lesion load:  
1301 mm<sup>3</sup>  
0 EDSS  
67 SDMT



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