

# DRT Rendition with Elements Fibertracking

Coenen et al. (2021), in *Acta Neurochirurgica*

## Products

Elements Fibertracking, Elements Segmentation Basal Ganglia, Elements Image Fusion

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## Clinical Background

There is emerging evidence that the dentato-rubro-thalamic tract (DRT) may be an effective target for treating tremors with deep brain stimulation (DBS). While it can be depicted using standard diffusion weighted imaging (dMRI), the trueness of reconstructed streamlines on a single case basis can only be done via qualitative assessment. Furthermore, deterministic tractography approaches that are typically used in surgical planning software because of their speed can have trouble resolving kissing, branching, and crossing fibers. Given their manual nature, they can also be prone to subjective bias.

## Study Objective

This study compared the 2-tensor deterministic approach in Elements Fibertracking with two state-of-the-art tracking approaches used in research: a probabilistic method (PT) and a global one (GT). The rendition of both the uncrossed and crossed DRT (DRTu/DRTx) was analyzed for congruence, reproducibility and anatomical validity.

N = 9 patients, 15 dMRI datasets, retrospective study

## Results

- **Method congruence:**  
All three methods showed high congruence for DRTu but differences for DRTx. The observed deviations were largest between Elements Fibertracking and PT, with GT in between the two
- **Reproducibility:**  
For DRTu, Elements Fibertracking outperformed the other approaches. For DRTx, reproducibility was insufficient for all three
- **Anatomical validity:**  
When considering anatomical waypoint structures, the results were excellent for DRTu with all approaches but best for Elements Fibertracking. For DRTx, the results were erratic for all approaches

## Summary

- For DRTu, Elements Fibertracking showed high congruence with GT as well as the best reproducibility and anatomical validity of all approaches. It therefore seems **suited for surgical planning at the single subject level when targeting DRTu**
- However, an uncertainty of 2 mm for its center of gravity should be taken into account
- **None of the evaluated approaches could reliably reconstruct the DRTx at the single subject level**
- Elements Fibertracking is **particularly useful due to its manual editing capabilities for cutting out erroneous fibers and thus refining results**