

### Introduction

Stereotactic radiosurgical (SRS) lesioning of the anterior limb of the internal capsule remains a treatment option for patients with treatment-resistant obsessive-compulsive disorder (OCD). However, mechanisms behind response remain unclear. To probe whether lesions placed in specific white-matter tracts were related to response, we determined the connectivity profile of responsive vs non-responsive lesions.

### Methods

Bilateral lesions from 16 OCD patients who underwent SRS ventral capsulotomy were hand-traced and then warped to MNI space. Individual patient volumes were labeled "responder" or "nonresponder" based on Yale-Brown Obsessive Compulsive Scale (YBOCS) change from baseline. Composite lesion volumes were created from voxels where >50% of lesion overlap occurred.

As only post-surgical scans were available for lesion tracing, a separate cohort of 7 OCD patients was used for tractography analysis. Probabilistic tractography was performed between all Freesurfer-segmented anatomical ROIs and

### Results

The YBOCS change of responders ( $-23.6 \pm 7.2$ ) and nonresponders ( $-9.8 \pm 3.5$ ) differed significantly ( $p < 0.001$ ). The responder composite centroid was lateral to the midline (Left: 15.2 mm, Right: 13.9 mm), anterior to the anterior commissure (L: 12.7 mm, R: 12.8 mm), and inferior to the AC-PC plane (L: 5.3 mm, R: 5.2 mm).

Compared to nonresponders, left responder composite volumes had significantly greater connectivity to the ipsilateral caudate ( $p = 0.011$ ) and medial orbitofrontal sulcus ( $p = 0.029$ ). Right responder volumes had significantly greater connectivity to the ipsilateral putamen ( $p = 0.009$ ), and nonsignificantly greater connectivity to the ipsilateral gyrus rectus ( $p = 0.311$ ).

### Conclusions

Preliminary tractography analysis of SRS capsulotomy lesions suggests that more clinically effective lesions are located within medial orbitofrontal-striatal loops, whose altered connectivity has been thought to underlie OCD symptoms. These results can help optimize lesion placement in future studies.

### Learning Objectives

By the conclusion of this session, participants should be able to 1) recognize the use of diffusion-tensor imaging to understand surgical outcomes, 2) learn which white-matter tracts are more associated with better surgical outcomes for stereotactic radiosurgical lesioning of the internal capsule, and 3) discuss how imaging-based methods may be applied prospectively to obsessive-compulsive disorder patients undergoing stereotactic radiosurgery.

### References