

# Image Fusion Accuracy with Stereotactic CBCT

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## Products

Elements Image Fusion

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## Clinical Background

Frame-based stereotactic surgery requires 3D imaging the day of surgery after the frame is placed. This is typically performed in a radiology suite and can be time consuming. The Medtronic O-arm allows for intraoperative 3D imaging using cone-beam computed tomography (CBCT), but its limited soft-tissue contrast may impact the image fusion to preoperative MRIs. As the accuracy of this fusion is crucial for stereotactic surgery, some centers acquire an extra preoperative CT, resulting in additional radiation and costs.

## Study Objective

This study evaluated the necessity of a preoperative CT as a reference for accurate image fusion of intraoperative CBCT with preoperative MRIs for stereotactic surgery. Two commercial planning systems were evaluated (Brainlab Elements and Medtronic StealthStation S8).

N = 27, retrospective analysis

## Results

- Brainlab **Elements Image Fusion achieved acceptable stereotactic accuracy\* in 100% of cases** without the use of preoperative CT
- Medtronic StealthStation S8 image fusion achieved acceptable stereotactic accuracy\* in 52% of cases without the use of preoperative CT, and manual attempts were unable to improve this
- There was no correlation between fusion accuracy and MRI scan type, field strength, prior intracranial hardware, surgical date or diagnosis

\*No coordinate discrepancy in x, y and z axis >1 mm

## Summary

- Utilization of CBCT in frame-based stereotaxy for intraoperative stereotactic localization **can tremendously simplify the workflow on the day of surgery**
- However, caution should be exercised when CBCT images are directly fused to preoperative MRI without an additional preoperative CT scan as a reference set for image fusion
- **Elements Image Fusion, unlike Medtronic StealthStation S8, was able to fuse CBCT images directly to preoperative MRIs with 100% stereotactic accuracy, eliminating the need for preoperative CT scans and thus reducing radiation exposure and costs**