The StealthViz® application is a powerful 2D/3D surgical planning application with a streamlined workflow that makes advanced viewing and processing routine:

- Import multi-modality DICOM scans including MRA, CTA, fMRI, PET, MEG
- Visualize in 2D and with sophisticated, fast 3D volume renderings
- Multi-modality image fusion via StealthMerge® software
- Segmentation of critical anatomical structures with manual and semi-automatic tools
- Preparation of fMRI activation maps for display in a StealthStation® system as 3D objects
- Exploration and planning prior to entering the operating theater
- Export of results to a PACS or StealthStation® System for use in neurosurgery

Designed for neurosurgeons, neuroradiologists, and neuroscientists, the StealthViz® application enables better management and manipulation of the vast amount of information from numerous multi-modality datasets now being routinely ordered to better diagnose conditions and plan surgical procedures.
CASE 1. M/34, Ependymoma, headache, no neurologic deficit

34 year-old male patient, with complaint of headache. No neurologic deficit. MRI shows a large ependymoma located in the left temporal lobe.

DTI merged image shows corticospinal tract (yellow) is just medial to the mass. We were concerned about injuring the corticospinal tract and did a gross total resection with the aid of DTI navigation.

Post OP: GTR w/o neurologic deficit

Post OP MRI and DTI image shows no residual tumor and a well preserved corticospinal tract.

CASE 2. M/36, Anaplastic Astrocytoma, c/o seizure

36 year-old male patient with complaint of seizure. No neurologic deficit. MRI shows astrocytoma at dominant side insula area.

During resection of the superior part of mass adjacent to the arcuate fasciculus (red), naming aphasia suddenly developed, so we stopped further resection. We also decided to leave the posterior part of tumor just lateral to the corticospinal tract (yellow).

Post OP: STR w/o neurologic deficit

Although we had to leave some tumor portion adjacent to important fibers, the patient had no postoperative neurologic deficit and we confirmed the arcuate fasciculus on postoperative DTI.
CASE 3. F/18, Pilocytic Astrocytoma, c/o headache, visual field defect

18 year-old female patient with complaint of headache and visual field defect. MRI shows large cystic mass on the right occipital lobe.

**Navigation snapshot during surgery**

DTI merged navigation showing the optic radiation (blue) passing just lateral and inferior to the tumor.

**Post OP: GTR w/o neurologic deficit**

The tumor could be totally removed without further injury to optic radiation. After the operation, her preoperative visual field defect improved over 2 weeks.

CASE 4. M/46, Diffuse Astrocytoma, c/o seizure

We used DTI merged navigation for defining the target and trajectory during stereotactic biopsy. In this patient, one of the targets should be in the motor cortex. To avoid injury of the corticospinal tract (white), we used DTI navigation.

**Navigation snapshot during surgery**

“We don’t think that DTI merged navigation is the perfect tool for “Maximum safe resection” of brain tumors, because the limitations of each study itself still exists. Considering its simplicity and reliability, however, we think that DTI merged navigation is a very useful tool for brain tumor surgery, because it shows us the point at which we should pay attention.”

JongHee Chang, M.D.
JinMo Cho, M.D.
Sunho Kim, M.D.
StealthDTI® Module Powered by StealthViz® Application

Building on top of the StealthViz® engine, the StealthDTI® software module enables fast white-matter tractography. This is the processing of Diffusion-Weighted Imaging MRI scans, also known as gradients, into fiber tracts.

Functionality includes:

• Realignment of the diffusion-weighted gradients to correct for patient motion
• StealthMerge® Image Fusion software with anatomical and functional datasets acquired in separate imaging sessions
• Fast tensor calculations and optional output of other research-oriented calculations
• Interactive fiber-tracking with start, mid, and end regions-of-interest (ROIs), including arbitrarily shaped ROIs to filter the fibers displayed
• Tractography easily exported to a StealthStation® System for display in context at the time of surgery

Enhanced Information for Neurosurgical Decisions

An overall goal of neurosurgery is to maximize resection of a lesion while minimizing the collateral damage to eloquent areas of the brain. Sophisticated new imaging capabilities are leading to an overwhelming amount of data that needs to be reviewed in diagnosing a patient’s condition and planning and executing their surgery.

The StealthViz® application provides the means to fuse all the data together, extract the pertinent pieces of information from each, and prepare it for use with navigation in the operating theater.

The StealthDTI® module enables the fiber pathways to be identified and visualized during surgical planning and then in surgery. Surgeons can perform “what if” exploration to determine their optimal approach, plan the extent of resection, and execute the surgery with more refined information than ever before.

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