

University Hospital, Neurosurgery Department -  
Frankfurt, Germany

Professor Volker Seifert, MD, and team assess the  
Medtronic Navigation integrated OR suite including  
the PoleStar™ N20 intraoperative MRI with integrated  
StealthStation® navigation technology.



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ACTIVA® PARKINSON'S CONTROL THERAPY AND TREMOR CONTROL THERAPY:  
PRODUCT TECHNICAL MANUAL MUST BE REVIEWED PRIOR TO USE FOR DETAILED DISCLOSURE.

Indications:

The system is indicated as a therapy for patients with disabling tremor or symptoms  
of Parkinson's disease. Recent studies have shown that deep brain stimulation is  
effective in controlling Essential Tremor and the symptoms of Parkinson's disease  
which are not adequately controlled with medications. Additionally, deep brain  
stimulation is effective in controlling dyskinesias and fluctuations associated  
with medical therapy for Parkinson's disease.

Contraindications:

Contraindications include patients who will be exposed to MRI using a full body  
radio-frequency (RF) coil or a head transmit coil that extends over the chest area,  
patients for whom test stimulation is unsuccessful, or patients who are unable to  
properly operate the neurostimulator. Also, diathermy (e.g. shortwave diathermy,  
microwave diathermy or therapeutic ultrasound diathermy) is contraindicated  
because diathermy's energy can be transferred through the implanted system  
(or any of the separate implanted components), which can cause tissue damage  
and can result in severe injury or death. Diathermy can damage parts of the  
neurostimulation system.

Warnings/Precautions/Adverse Events:

There is a potential risk of tissue damage using stimulation parameter settings  
of high amplitudes and wide pulse widths. Extreme care should be used with  
lead implantation in patients with a heightened risk of intracranial hemorrhage.  
Physicians should consider underlying factors, such as previous neurological injury  
or prescribed medications (anticoagulants), that may predispose a patient to  
the risk of bleeding. Theft detectors and security screening devices may cause  
stimulation to switch ON or OFF, and may cause some patients to experience a  
momentary increase in perceived stimulation. Although some MRI procedures can  
be performed safely with an implanted Activa System, clinicians should carefully  
weigh the decision to use MRI in patients with an implanted Activa System. MRI  
can cause induced voltages in the neurostimulator and/or lead possibly causing  
uncomfortable, jolting, or shocking levels of stimulation. MRI image quality may  
be reduced for patients who require the neurostimulator to control tremor,  
because the tremor may return when the neurostimulator is turned off.

1. Hariz GM, Lindberg M, Bergenheim AT. Impact of thalamic deep brain  
stimulation on disability and health related quality of life in patients with  
essential tremor. *J Neurol Neurosurg Psychiatry* 2002; 72: 47-52
2. Martínez-Martín P, Valdeoriola F, Tolosa E et al. Bilateral subthalamic  
nucleus stimulation and quality of life in advanced Parkinson's disease.  
*Mov Disord* 2002; 17: 372-377
3. Rehnkrone S, Johnels B, Widner H, et al. Long-term efficacy of thalamic  
deep brain stimulation for tremor: double-blind assessments.  
*Mov Disord* 2003; 18: 163-170

STEALTHSTATION®  
Treatment Guidance System

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StealthMerge™, StealthNavigus™, StealthStation®, SureTrak™, Targetlock™,  
Touch-n-Go, TouchPad, TouchSite™, TRACER, TREON®,  
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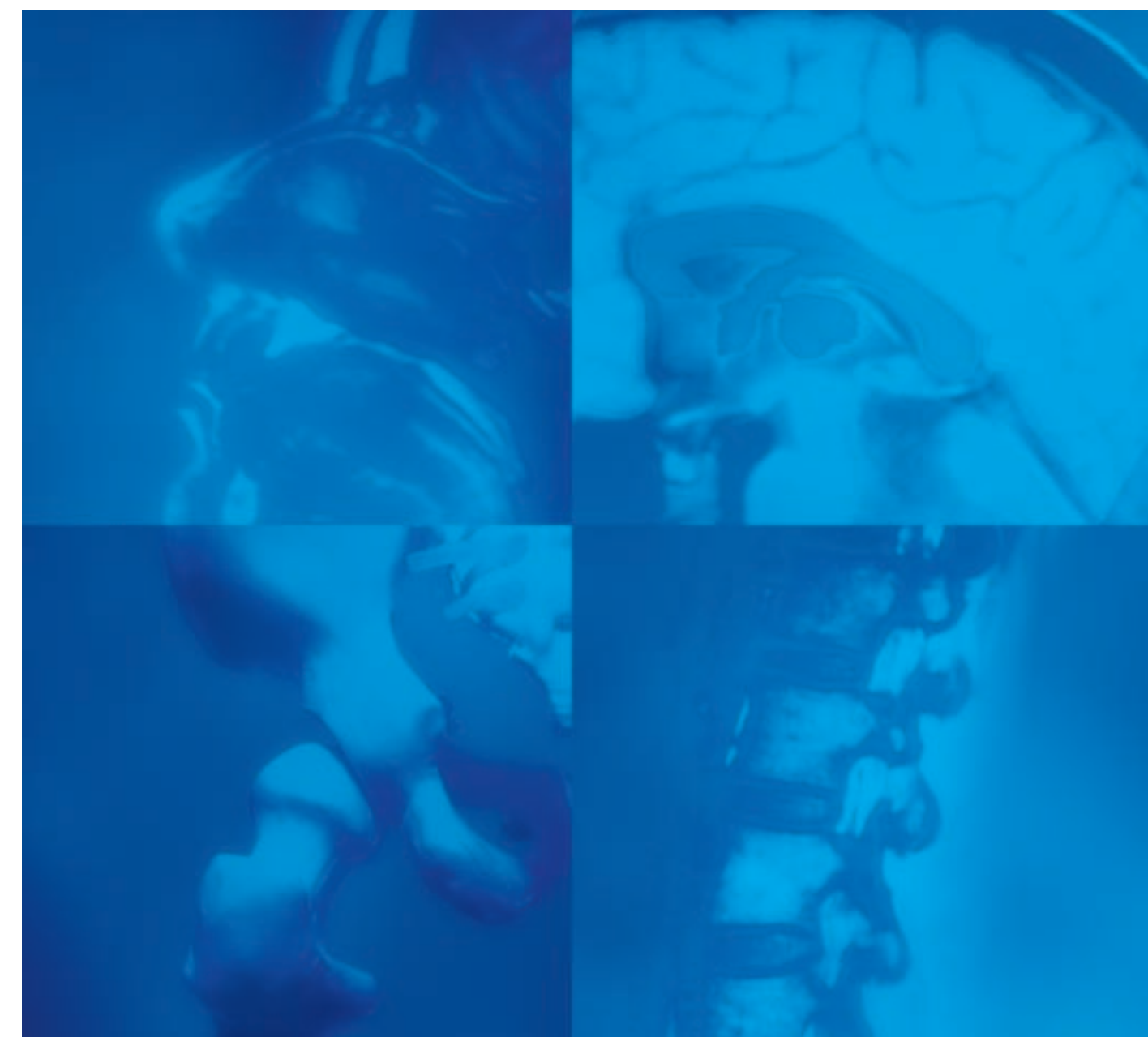
**Medtronic**  
When Life Depends on Medical Technology

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**Medtronic**

# Computer-Assisted Surgery



A complete review of the latest technological innovations  
in Computer-Assisted Surgery from Medtronic Navigation.

# Computer-Assisted Surgery Platforms

## StealthStation® TREON® *plus*

The award-winning StealthStation TREON *plus* is meticulously designed for accuracy, usability and flexibility. This innovative system was created specifically for the surgeon and staff and fits seamlessly into any operating room. The StealthStation TREON *plus* is expandable and upgradable to support additional features and applications now and in the future.

Multiple data transfer options

Two-piece modular design

- Allows ease of positioning
- Flexibility to use for viewing and/or navigation



Laser Targetlock™ enables fast, accurate setup

Ultimate in surgeon control with TouchSite™ TouchScreen



The StealthStation TREON *plus* is modular in design and compatible with the latest in AXIEM™ technology.

Easy docking mechanism for single-unit storage, movement, and use





# Tracking Technology

## Optical Technology

### Satellite Navigation

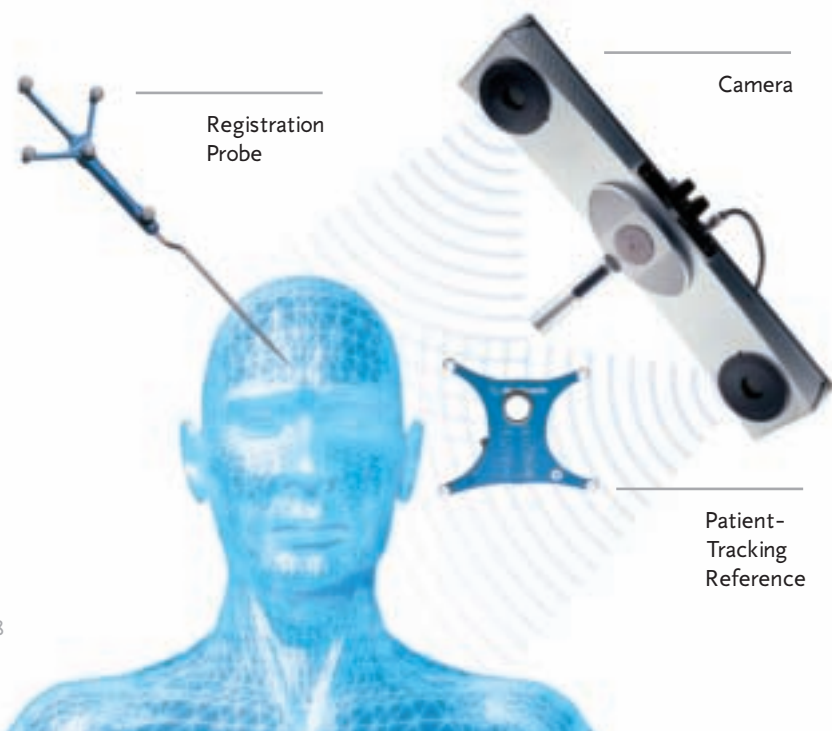
- Satellites emit time signals.
- Target receives multiple signals with varying delays. Position is triangulated.
- Target receives visual indicator of position.
- Target moves freely under continual detection.



### Computer-Assisted Surgery

CAS systems perform similarly to satellite navigation.

- Camera emits infrared signal that is reflected off the spheres on the moving instruments.
- Camera analyzes the stereo views of the instrument to triangulate its position.
- Computer receives signal and position is visually illustrated on the system monitor.



## Hybrid Instrumentation

Hybrid instrumentation tracking options, unique to the StealthStation® platforms, provide enhanced accuracy in procedure-specific applications.

Wired LED instrument design ensures the best possible option for use with draped surgical equipment.

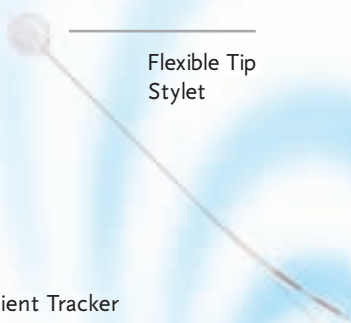
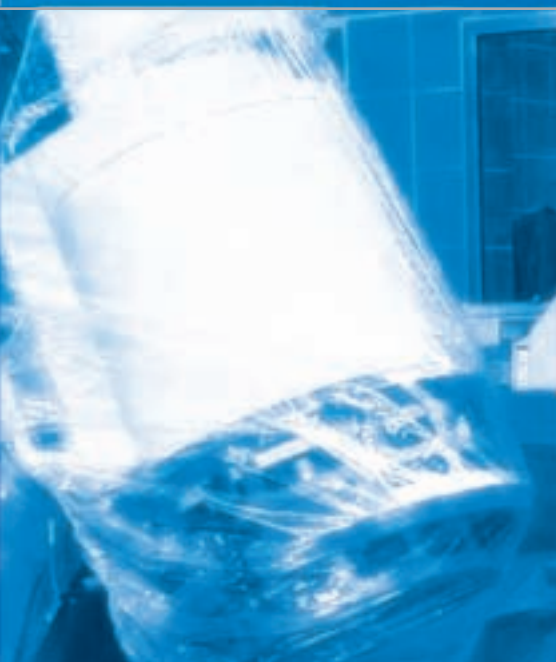


Active and passive  
instrumentation

## AXIEM™ Technology

StealthStation® AXIEM™ is the proprietary electromagnetic (EM) tracking technology developed by Medtronic Navigation. AXIEM uses unique single-coil navigation to provide tip-tracking for the navigation of flexible instruments.

- The modular design of the StealthStation® TREON® allows for immediate integration with AXIEM.
- AXIEM integrates seamlessly into the OR with a table-mounted localizer.
- Miniature hollow-core sensors enable:
  - Tracking of instruments such as suctions, stylets, biopsy needles and endoscopes
  - Tip-tracking of cannulae for injection/aspiration procedures



Flexible Tip  
Stylet

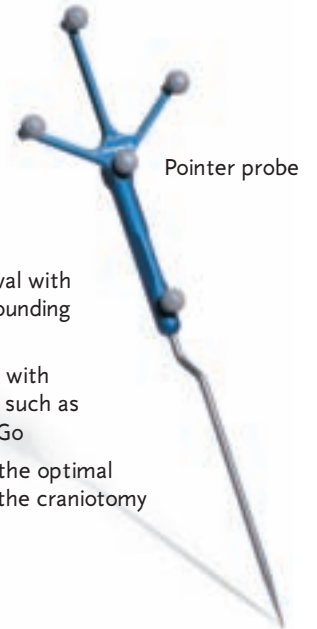
Patient Tracker  
Non-invasive  
Patient-  
Tracking  
Reference

AXIEM  
Integrated  
Localizer



## Capability without Complexity

Innovative technology, combined with the clinical expertise of our neurosurgical partners, has produced a broad array of powerful, yet intuitive, procedural solutions for cranial neurosurgery. This extensive suite of powerful tools provides neurosurgeons with capabilities never before available, from one-touch segmentation of anatomy to techniques that automatically register the patient.

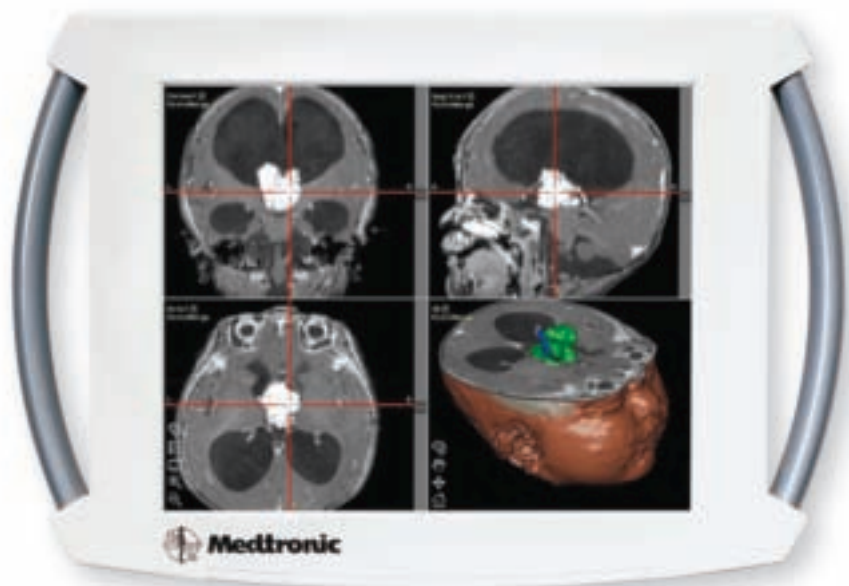


### Tumor Resection

- Facilitates tumor removal with minimal impact to surrounding structures
- Streamlines clinical use with registration techniques such as TRACER and Touch-n-Go
- Assists in determining the optimal placement and size of the craniotomy

### Shunt Placement

- Facilitates optimal catheter placement
- Semi-rigid tip supports virtually any catheter or shunt
- Navigation with minimal tissue displacement





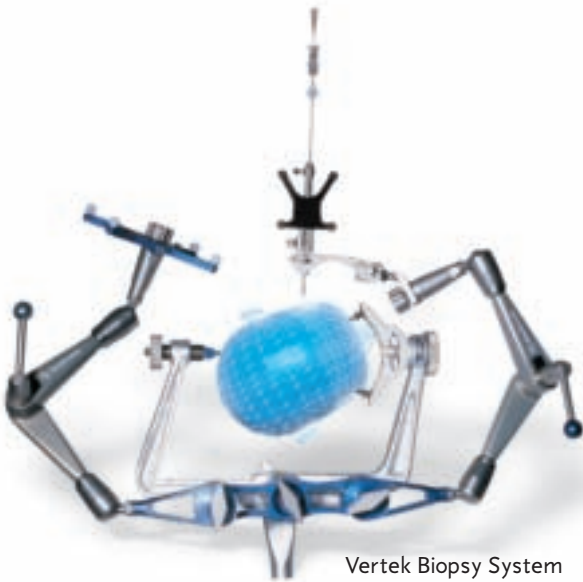
## Biopsy Solutions

The StealthStation® offers the most comprehensive solution for frameless biopsy. Its unique guidance view facilitates precise alignment with pre-surgical planning, and the system's exclusive guided needle provides real-time depth tracking.

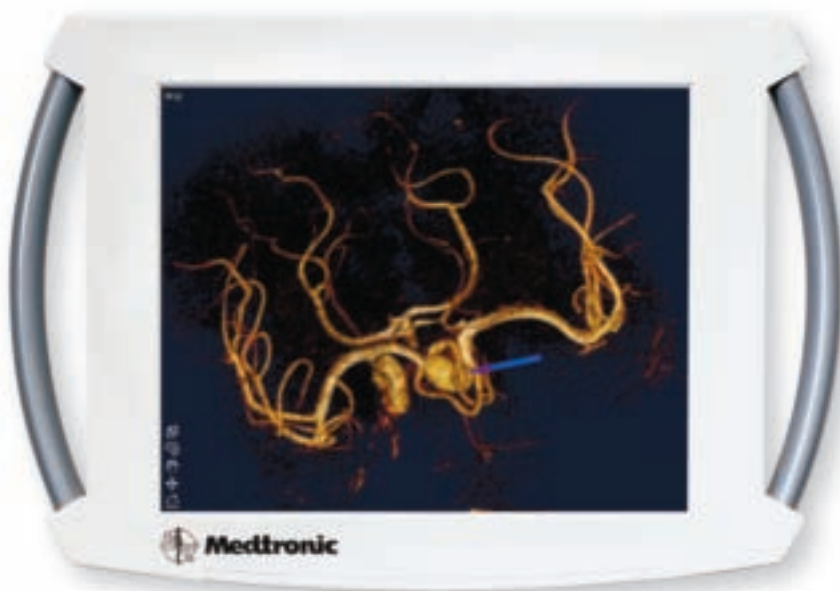
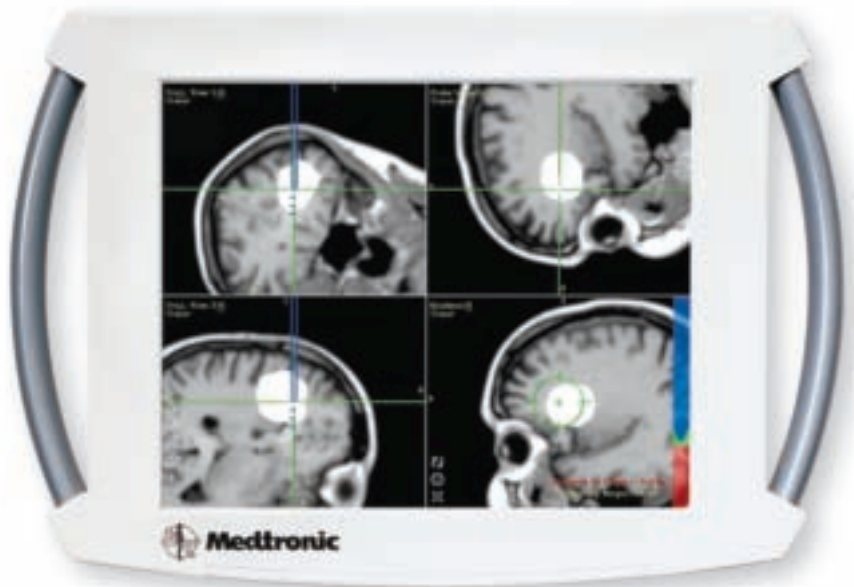
- Packaged pre-sterilized for your convenience, the StealthNavigus™ provides a cost-effective, single-use solution
- The Vertek® Biopsy System provides a versatile, externally mounted option



StealthNavigus Biopsy System



Vertek Biopsy System



## Vascular

Powerful volume rendering engine developed exclusively in conjunction with Vital Images® allows the surgeon to:

- Utilize MRA and CTA to identify vascular structures relative to surrounding anatomy or pathology
- Visualize vascular structures with the touch of a button
- Other applications of volume rendering include:
  - Cortical surface rendering for epilepsy treatment or cortical stimulation
  - One-touch segmentation of bony anatomy for skullbase procedures

# Cranial

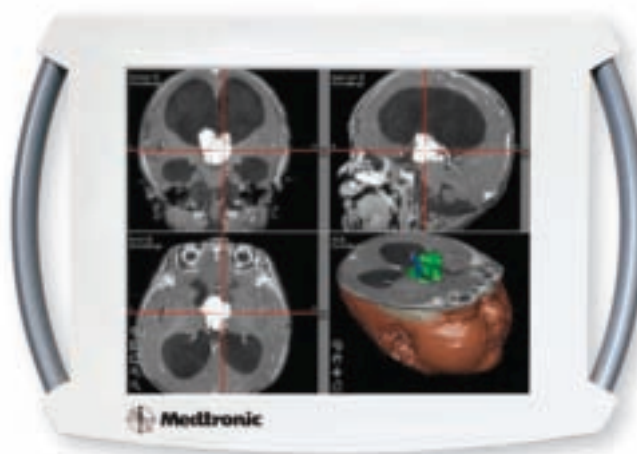


AxiEM™ Technology Platform

## AxiEM™ Technology

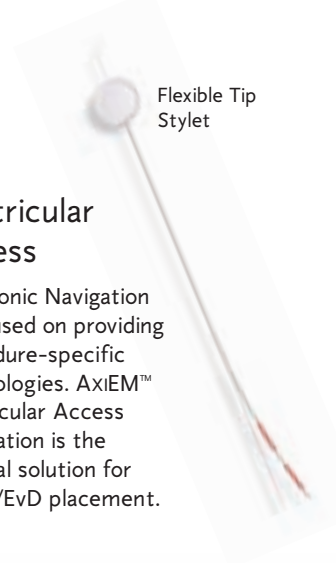
Providing optimal solutions for ventricular access and tumor resection

StealthStation® TREON® *plus* with AxiEM™ tracking technology is the proprietary electromagnetic tracking solution developed by Medtronic Navigation. AxiEM uses unique single-coil navigation and provides tip tracking for the navigation of flexible instruments.



### Ventricular Access

Medtronic Navigation is focused on providing procedure-specific technologies. AxiEM™ Ventricular Access application is the optimal solution for shunt/EvD placement.



Flexible Tip Stylet

## AxiEM Peripherals



The standard patient-tracking reference is a bone-fixation device utilized for high-accuracy cases. A small incision is made in the skin.

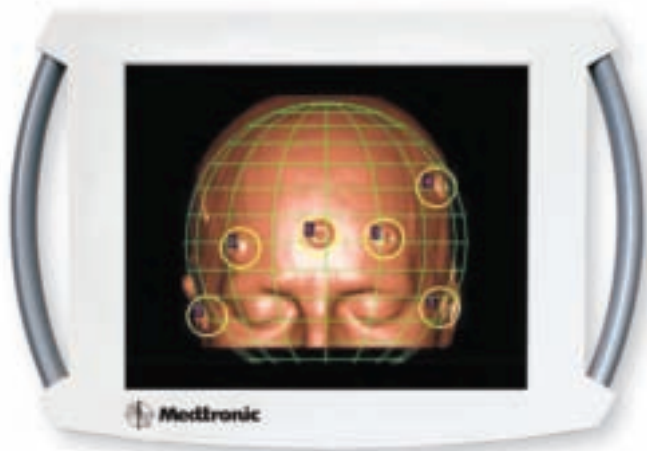


The Click and Point converts the standard AxiEM registration wand into a conventional bayoneted pointer probe for use in TRACER registration or tumor resection.



The Patient Tracker, a non-invasive patient-tracking reference, adheres directly to the patient's skin. No additional incision is required.

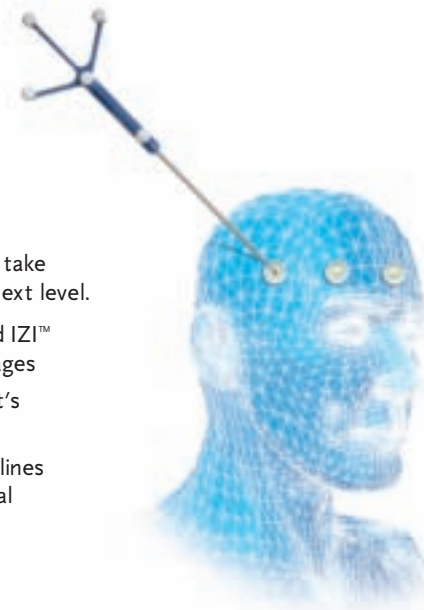
# Registration Redefined



## Touch-n-Go

Powerful, sophisticated algorithms take fiducial-based registration to the next level.

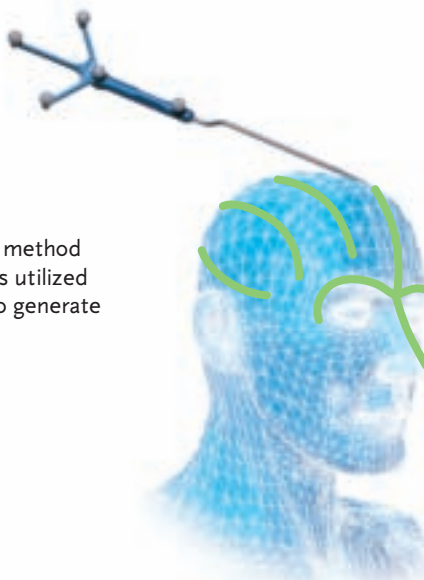
- Automatic detection of standard IZI™ fiducials within the patient's images
- Allows localization of the patient's fiducials in any order
- Unique ball-tipped probe streamlines precise localization of the fiducial



## TRACER

A simple and efficient registration method where the StealthStation's probe is utilized to "trace" the patient's anatomy to generate a registration.

- Comparable precision to other surface-based methods
- May eliminate the need for additional pre-operative scans
- Greater capabilities than laser-based methods



# Patient Registration

In addition to the TRACER and Touch-n-Go, Medtronic Navigation provides these five patient registration techniques to facilitate computer-assisted surgery.

- Implantable fiducials
- Adhesive fiducials
- Anatomical landmarks
- FAZER® – laser registration
- Automatic registration

Not only has Medtronic Navigation streamlined the manual registration process, but it's also focused on automatic registration techniques including FluoroNav®, StealthStation® Siemens Iso-C<sup>3D</sup> interface software application, and PoleStar™ intraoperative MRI.





# Cranial

## Instruments and Accessories



### SonoNav™

An intraoperative imaging system for brain shift compensation, tumor delineation and resection.

- Automatic reformatting of the pre-operative exam
- Blending of ultrasound to pre-operative exam
- Measuring and detection of brain shift
- Side-by-side localization on pre-operative exam and ultrasound image



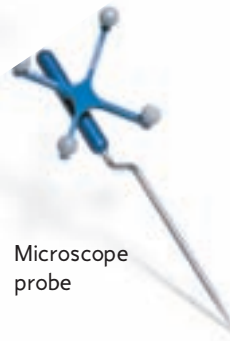
SureTrak™ II  
Universal  
Instrument  
Adapter



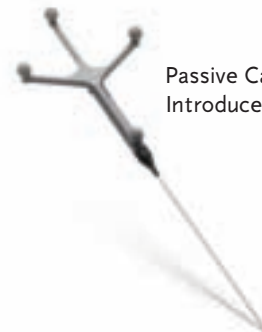
Passive  
SonoNav  
probe



Cranial Reference



Microscope  
probe



Passive Catheter  
Introducer

## Microscope Navigation



Medtronic enables microscope navigation for Zeiss®, Leica®, Möller® and Olympus® platforms.

- Seamless integration of operating microscope with StealthStation® System
- Track focal plane, focal point and trajectory
- Unique tumor silhouette feature for rapid flap planning and identification of tumor boundaries at probe tip
- Injection of StealthStation screen into ocular
- Optional verification for easier case set-up

# Functional Neurosurgery

Activa® Parkinson's Therapies are innovative and proven<sup>1-3</sup> technologies from Medtronic that significantly improve motor function and reduce disability in patients suffering from the debilitating effects of Parkinson's disease. Today, more than 20,000 patients worldwide are leading more active lives thanks to Activa® Therapy and the dedication of their physicians.

With an entire global business unit dedicated to Functional Neurosurgery, Medtronic is uniquely positioned in the industry to facilitate the complete solution for delivering Activa Therapy for treatment of movement disorders.

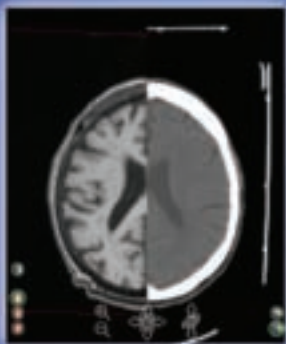
## The DBS™ Solution by Medtronic\*

\*Currently available through the ACTIVA therapy consultant.



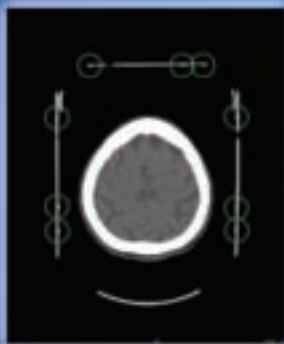
## FrameLink™ and StealthMerge™

Market-leading planning and image fusion application suite. **Now Enhanced.**



**Merge**

Patient-associated surgical plans. Plan and merge any image, any time.



**Auto Detect**

Automatic frame detection and registration. Register fast and hassle-free.



**Frameless**

Clinically validated capability with the NEXFRAME™ by IGN. Maximize procedure efficiency.

## Planning Station

\* Available outside the United States

