Deep Brain Stimulation Procedure
ROSA ONE® BRAIN
BRAIN APPLICATION

ROSA One Brain Application provides an accurate\textsuperscript{1-6} and versatile platform for placement of Deep Brain Stimulation (DBS) leads. ROSA One is intended to guide a DBS Microdrive to the planned trajectory and hold it firmly at the correct position and orientation while the Microdrive advances electrodes.
**Accurate Lead Placement**

ROSA One’s rigid robotic arm and secure patient fixation provide high accuracy in lead placement, as demonstrated by numerous clinical publications.

**Mean Error in DBS Lead Placement Reported in the Literature**

<table>
<thead>
<tr>
<th>Date</th>
<th>Authors</th>
<th># of Leads</th>
<th>Mean Error (mm)</th>
<th>Measurement Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug-2014</td>
<td>Lefranc et. al.¹</td>
<td>52</td>
<td>0.81±0.39</td>
<td>Radial Error</td>
</tr>
<tr>
<td>Oct-2018</td>
<td>Neudorfer et. al.²</td>
<td>80</td>
<td>0.76±0.37</td>
<td>Lateral Deviation</td>
</tr>
<tr>
<td>Jul-2019</td>
<td>Liu et. al.³</td>
<td>192</td>
<td>0.75±0.04</td>
<td>Radial Error</td>
</tr>
<tr>
<td>Aug-2019</td>
<td>Paff et. al.⁴</td>
<td>36</td>
<td>1.59±0.82</td>
<td>Vector Error</td>
</tr>
<tr>
<td>Mar-2020</td>
<td>Faraji et. al.⁵</td>
<td>20</td>
<td>1.46±0.19 (First 10) 0.86±0.09 (Second 10)</td>
<td>Radial Error</td>
</tr>
<tr>
<td>Oct-2020</td>
<td>Jin et. al.⁶</td>
<td>306</td>
<td>0.71±0.25 (Asleep) 0.76±0.23 (Awake)</td>
<td>X-Y Vector Error</td>
</tr>
</tbody>
</table>
**Versatile Workflow and Compatibility**

ROSA ONE Brain DBS module is designed to integrate seamlessly with your existing workflow and instrumentation: ROSA One is compatible with most common Microdrives, head frames, and workflows, making the switch to a ROSA-based DBS simple.

### Options Supported by ROSA DBS

<table>
<thead>
<tr>
<th>Registration</th>
<th>Microdrives</th>
<th>Head Fixation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Bone Fiducials</td>
<td>- FHC</td>
<td>- Leksell</td>
</tr>
<tr>
<td>- Leksell Frame Registration</td>
<td>- Alpha Omega</td>
<td>- CRW</td>
</tr>
<tr>
<td></td>
<td>- Inomed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lead verification</th>
<th>Access</th>
<th>Anesthesia®</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Microelectrode Recordings (MER)</td>
<td>- Burr Hole</td>
<td>- Asleep</td>
</tr>
<tr>
<td>- Intra-Operative CT</td>
<td>- Twist Drill</td>
<td>- Awake</td>
</tr>
</tbody>
</table>
DBS Workflow

Below is one option of a standard bilateral workflow for an asleep, burr-hole approach using an intra-operative CT scanner for registration and post-operative verification.

1. Load MRI Images into ROSA
2. Define AC/PC Anatomical Points
3. Plan Trajectories
4. Pin and Position Patient with Leksell or CRW frame
5. Prepare Patient for Registration
6. Position Intraoperative Scanner
7. Scan Patient
8. Perform Robot Registration
9. Mark Scalp Entry Points with Pointer Probe (non-sterile)
10. Place Sterile Drapes
11. Create Incisions, Re-mark Entry Points on Skull with Microdrive Holder
12. Create Burr Holes
13. Drive Robot Arm to Trajectories
14. Place Electrodes to Targets
15. Intraoperative Spin and Image Merge to Verify Placement
## Efficient Operating Times

Streamlined robotic workflow may lead to reduced operation times when compared to traditional frame-based DBS implantation.\(^2\)

## Advantages of ROSA DBS

<table>
<thead>
<tr>
<th>Eliminates need to change/check manual frame coordinates</th>
<th>No frame assembly or moving parts to adjust before or during the procedure</th>
<th>Rapid switching between right and left sides for bilateral approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy for surgeon and assistant to work simultaneously</td>
<td>No expensive per-case disposable cost</td>
<td>Rigid support arm prevents head movement during the procedure</td>
</tr>
</tbody>
</table>
Simple and Intuitive Planning

Quickly create the surgical plan using the MRI and CT imaging of your choice and AC/PC coordinates. Easily adjust or modify your plan intraoperatively without cumbersome calculations or manual hardware adjustments.
Standard ROSA DBS Setup with Intra-Operative CT Scanner.
Required Equipment

ROSA One Brain Device

ROSA Frame Adapter

Registration Method
- Bone Fiducials
- ROSA Leksell Frame Registration Module

ROSA Pointer Probe

ROSA Microdrive Holder

External Equipment

Microdrive
- Alpha Omega
- FHC
- INOMED

Head Holder*
- Leksell Frame Base
- CRW Frame Base

Intra-operative CT scanner (optional)

*3-point fixation head-holders are compatible but not recommended for maximum accuracy.
ROSA ONE Brain
CURRENT ROSA USERS

Contact your local ROSA clinical representative for more information.

FUTURE ROSA USERS

Connect with your local ROSA sales representative by contacting 866-ROSA-BOT.
For more information on ROSA ONE® Brain and other Robotic Technologies, please contact us at:

BIOMET MICROFIXATION GLOBAL HEADQUARTERS
1520 Tradeport Drive • Jacksonville, FL 32218-2480 • Tel 904.741.4400 • Toll-Free 800.874.7711
Fax 904.741.4500 • Order Fax 904.741.3059 • www.zimmerbiomet.com

MEDTECH S.A.
ZAC Eurêka
900, rue du Mas de Verchant • 34000 Montpellier, France

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