Chapter 1: Background

- System Description
- Treatment Workflow
- Clinical Team Members

Chapter 2: Treatment Procedures

- Patient Preparation
- Patient Positioning
- Treatment Planning Images
- During the Treatment

Chapter 3: Post Treatment Procedures

- Immediate Evaluating Imaging
- Patient Recovery and Follow-up
System Description

ExAblate Neuro integrates high intensity Focused Ultrasound Surgery with continuous Magnetic Resonance imaging (MRI) to provide a non invasive, acoustic surgery platform for treating neurological disorders without ionizing radiation through an intact skull.

- Precise targeted ablation of deep seated brain tissue through an intact skull
- Immediate intraoperative MR imaging for therapy planning
- Real time feedback thermometry display
- Interactive tools to personalize treatment parameters
Transcranial System Concept
MRgFUS Advantages

- **Reduce Risks**
  - Minimize brain tissue damage caused by penetration
  - Avoid local bleeding and infraction risks
  - Benefits of non-invasive procedure [infection, open surgery, anesthesia]

- **Improve outcome**
  - Prevent intra-operative tissue displacements
  - Targeting accuracy (closed loop feedback and control)
  - Localize effect limited to target tissue

- **Better accessibility to targets**
  - No trajectory constraints (tissue loss and planning limitations)
ExAblate Neuro Workflow - Closed Loop Feedback

Courtesy of Sean Mckisic, University of Virginia
Clinical Team Members

- **Lead Neurosurgeon** - leading the surgery procedures and making the clinical decisions throughout the surgery.

- **ExAblate Specialist** - Physician or physicist trained on ExAblate technical and operational aspects required to execute clinical decisions and instructions of the lead neurosurgeon. Also, trained for preparing the ExAblate system before and after treatment.

Mainly trained on all ExAblate technical aspects
Clinical Team Members

**MR Operator** - Trained and certified on the MR operated in the ExAblate suite. Responsible for imaging related tasks (protocols, archive etc’), MR safety and patient management in the MR room during the procedure.

**Patient Nurse** - Trained nurse according to site requirements. Responsible for patient care, preparations for treatment and monitoring during treatment.

**Research Collaborators** - As defined in research protocol per site requirements (anesthesia, clinical coordinator, neuroradiologist etc.).

This role could be done by the ExAblate Specialist if trained and certified to operate the MR.
Chapter 1: Background

System Description
Treatment Workflow
Clinical Team Members

Chapter 2: Treatment Procedures

Patient Preparation
Patient Positioning
Treatment Planning Images
During the Treatment

Chapter 3: Post Treatment Procedures

Immediate Evaluating Imaging
Patient Recovery and Follow-up
# Patient Preparation

1. Remove all hair from scalp by **shaving** the head.

2. Attach the **Stereotactic Frame** to patient's head. At sites of attachment, use local numbing agent.

3. Place **Silicon membrane** on patient's head. The membrane will enable circulation of cool water to keep the patient's skin cool.

4. Other protocol requirements such as:
   - **Compression stockings**
   - Insert **IV line**

---

Make sure patient’s head fits tightly in membrane hole to avoid leakages. If needed, replace the membrane to another one with different hole’s size.
Patient Positioning

1. Position the patient on the table in a **Supine Head-First position**

2. Secure the frame to the **Frame Holder** attached to the table

3. Attach the **Membrane** to the transducer

4. Fill the transducer

5. Connect the **MR cable**

6. Attach **vital signs**
After the patient is positioned:

- Cover the patient with warming blankets
- Ensure the patient is comfortable
- Instruct the patient to remain as still as possible

- Ensure that the IV line and any other lines are free to move during table movement
- Set the landmark according to label
### Treatment Planning Images

- After positioning, **acquire planning images** in all 3 orientations
  - Images must be anatomically aligned
  - Target determination is done on these planning images

You can use the AC-PC feature on FUS or use the pre-defined protocol to acquire the planning images
Positioning Verification

After target determination on planning images, ensure transducer’s natural focus is in distance of less than 5mm from the target in all 3 orientations.
During the Treatment

After each sonication, the patient provides feedback about the treatment and its effect:

- Physical feeling during the sonication – mild headache, “tilting”, nausea, warmth in the head etc.
- Evaluation test – to examine the change in the symptoms (tremor/pain)
Chapter 1: Background
- System Description
- Treatment Workflow
- Clinical Team Members

Chapter 2: Treatment Procedures
- Patient Preparation
- Patient Positioning
- Treatment Planning Images
- During the Treatment

Chapter 3: Post Treatment Procedures
- Immediate Evaluating Imaging
- Patient Recovery and Follow-up
Immediate Evaluation

At the end of the treatment, T2w MR images are taken to evaluate the immediate treatment effect.
Patient Recovery and Follow up

- Patient is released from the bed by disconnecting the head frame and the membrane, and is moved out of MR suite to recover.
- Patient is kept for observation during the night.
- Usually, pain relief medication is all that is required.
- Patient may experience:
  - Nausea
  - Headaches
Thank you for your attention