PART 0: BONE ANCHOR PLACEMENT

- High resolution MRI obtained in the CSI (45 minutes)
- Brought next door to CT scanner
- Four bone anchor locations marked
- 1/2 inch areas of hair clipped
- Local anesthetic injected
- Four bone anchors inserted
- Skin closed with stitches at each of the 4 sites
- Skin glue placed over sites
- CT scan obtained
- Discharged home - Total visit 2 hours

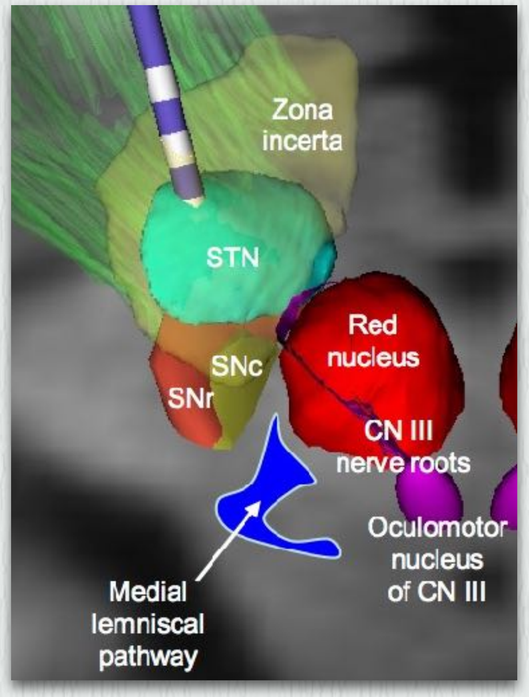
PART 1: DBS ELECTRODE PLACEMENT

- About one week after Part 0
- Arrive at hospital 6 AM
- Do **NOT** take morning PD medications
  - May want to stay locally - hotel discounts available
- Brought to OR and anesthesia team will administer sedation as needed
- Local anesthetic used to numb skin
- Clear plastic drapes keep head sterile but let you see forward

PART 1: DBS ELECTRODE PLACEMENT

- 3-D printed frame placed
- Arch incision made in skin on top of head
- 1/2 inch hole drilled on each side
  (like a dentist drill, not painful, but can feel vibrations)
- Three recording electrodes inserted - improves targeting
  - Neuromonitoring team (Dr. Erik Kobylarz) assist for recording neural activity with and without movement (kinetic cells, tremor cells)
  - May test stimulation with these micro electrodes
    - Evaluate tremor, rigidity, and side effects

STN MICROELECTRODE RECORDINGS

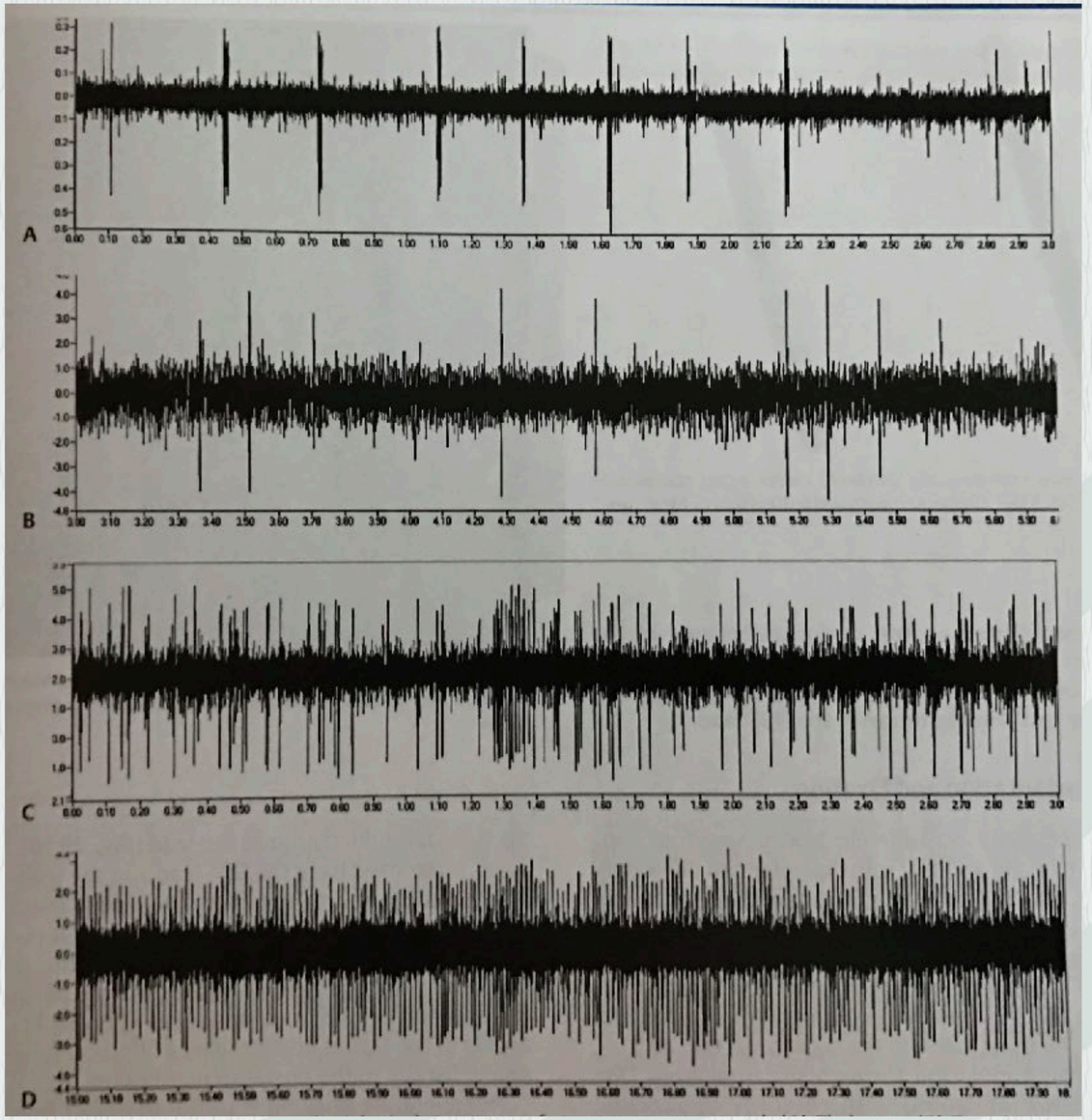


Thalamus

ZI

STN

SNr



PART 1: DBS ELECTRODE PLACEMENT

- Once trajectory chosen, permanent electrode placed
- Repeated for right side (left body)
- Once completed, electrodes are tucked under the scalp just above the ear
- CT scan obtained in the OR to confirm position
- Then transferred to ICU
- Surgery duration 3-4 hours

PART 2: EXTENSION TUNNELING AND BATTERY PLACEMENT

- One week after Part 1, return for Part 2
- General anesthesia
- Small incision in scalp
- 2 inch incision below collar bone
- Extension leads tunneled from head to chest
- Wires connected
- Battery (= pulse generator = IPG) inserted and connected
- Awakened from surgery and can go home later that day
- Surgery duration 90 minutes

DBS PROGRAMMING

- Two weeks after surgery, return to clinic for programming with Carissa Thurston, RN
- In about a one hour appointment, multiple settings will be tested
- You will have a patient programmer to change your settings
- Over multiple sessions every few weeks stimulation settings will be adjusted to maximize benefit and minimize side effects
- We work with you and your neurologist to adjust medications

TIMELINE

8-12 weeks

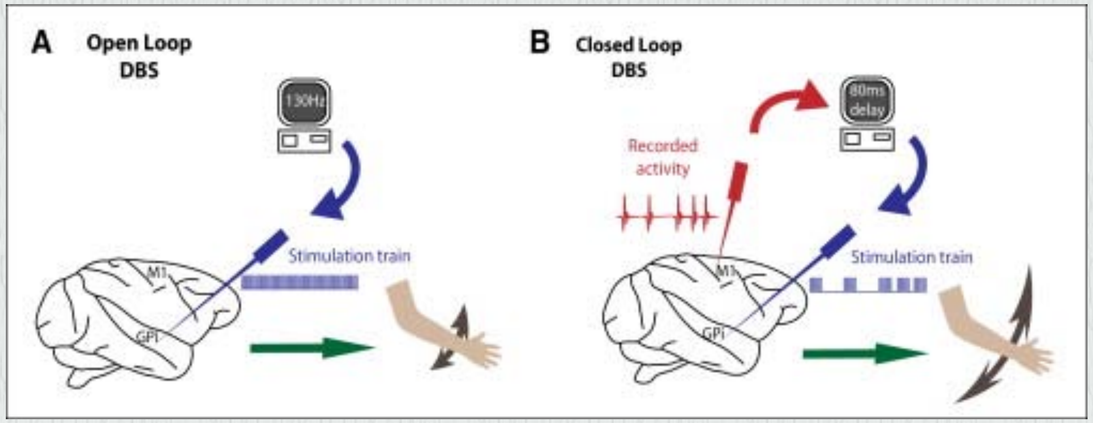
- Clinic evaluation
- On/Off testing and neuropsych testing

5 weeks

- Part 0
- Part 1
- Part 2
- Programming

FUTURE INNOVATIONS

- Current research efforts focused on "closed loop" DBS
  - stimulation turns on and off based on neural signals



- Segmented electrodes to better target stimulation and reduce side effects

QUESTIONS?

Dartmouth-Hitchcock

Neurosurgery

Appointments (603) 650-5109

Clinic DHMC-Lebanon 3C