

# DEEP BRAIN STIMULATION: WHAT IS IT AND HOW CAN IT HELP PD?

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# DBS 101

- The following slides are not inclusive of all information regarding DBS
  - This is meant to be an overview
- Each medical center may have their own protocol
  - Information presented is based on protocol from Rush University Medical Center
- It is best to speak to your individual medical provider for specific questions regarding your care

# WHAT IS DBS?

- DBS = Deep Brain Stimulation
  - Involves the implantation of electrodes into the brain. These electrodes produce electrical impulses that regulate abnormal impulses.
- Treatment of Movement Disorders
  - Parkinson's Disease ←
  - Essential Tremor
  - Dystonia



# DBS FOR PD

- PD Symptoms Treated by DBS

- Tremor
- Dyskinesia
- Rigidity
- Dystonia
- Bradykinesia (slow movement)
- Motor Fluctuations (on/off)

- PD Symptoms NOT Treated by DBS

- Cognition
- Sleep/Fatigue
- Speech/Swallowing
- Mood
- Balance/Walking\*
- Any non-motor symptom
- Not for “getting ahead of it”

## GOOD CANDIDATES FOR DBS

- Symptoms respond to carbidopa/levodopa
  - Exception to this is tremor
- Less Cognitive Changes
  - Due to possible cognitive decline after surgery
- Age
- Less co-morbid conditions
- Stable mood
- To help with QoL when symptoms are moderate/severe

# PRE-DBS WORKUP

- OFF/ON Evaluation
  - Come to an appointment OFF carbidopa/levodopa and then take the medication in the office
- Neuropsychological testing
  - Evaluation of cognition and mood
- MRI brain
- Visit with Neurosurgeon
- Surgical clearance with primary care physician

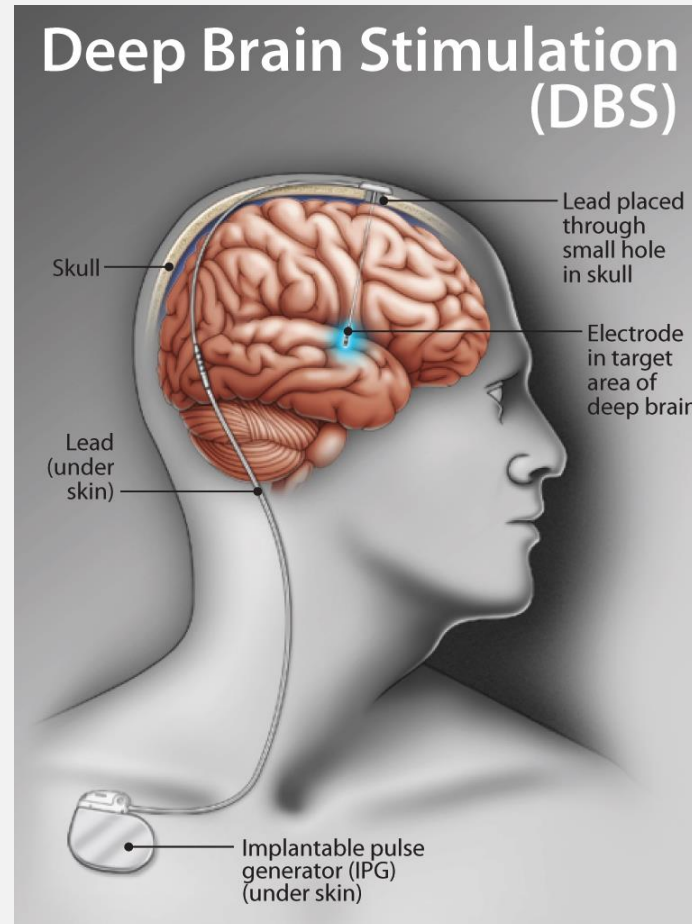
# SURGICAL PROCEDURE

- Once in the operating room
  - Small area of hair will be shaved and washed (some centers shave the entire head)
  - Numbing agent injected into the scalp
  - Skin on scalp is cut and a nickel-sized hole is drilled into skull
  - Wire implanted into brain and once in the best location it is secured to the skull by a small plastic cap
  - Extension wires are used to connect to a battery that is implanted in your chest
- Procedures repeated on both sides if having a bilateral procedure
  - Some centers only do one side at a time

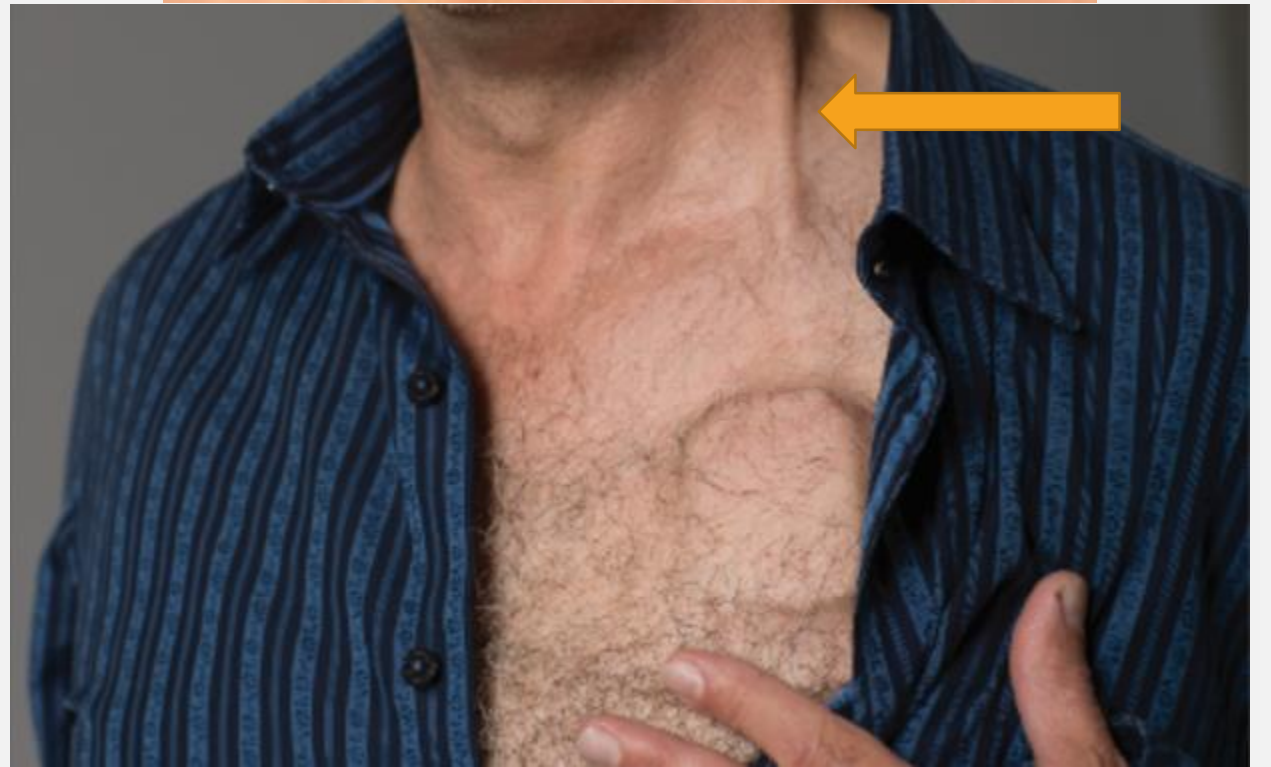


# SURGICAL PROCEDURE

- All wires are under the skin
- Incisions are made on top of skull, behind ear, and under collarbone/on the chest
- Will likely have a bump on the chest from the battery and on the skull from the plastic caps
- May also feel the wire on the side of the neck
  - May have pulling or discomfort







# POST-OP RECOVERY

- Typically stay one night in the hospital
  - Pain control
  - Some symptoms may improve immediately after surgery (tremor), but this effect wears off (called the lesion effect)
- Must complete all antibiotics (if given) and follow post-surgery instructions
- Follow up with neurosurgical team 1-2 weeks after surgery
  - Suture/staple removal and incision check
- Can return to normal activities ~4 weeks post-op
  - No driving, no bending over, no lifting >8lbs, no flying
  - Must follow up with medical team to be cleared to resume driving
- Cannot dye hair for ~8 weeks

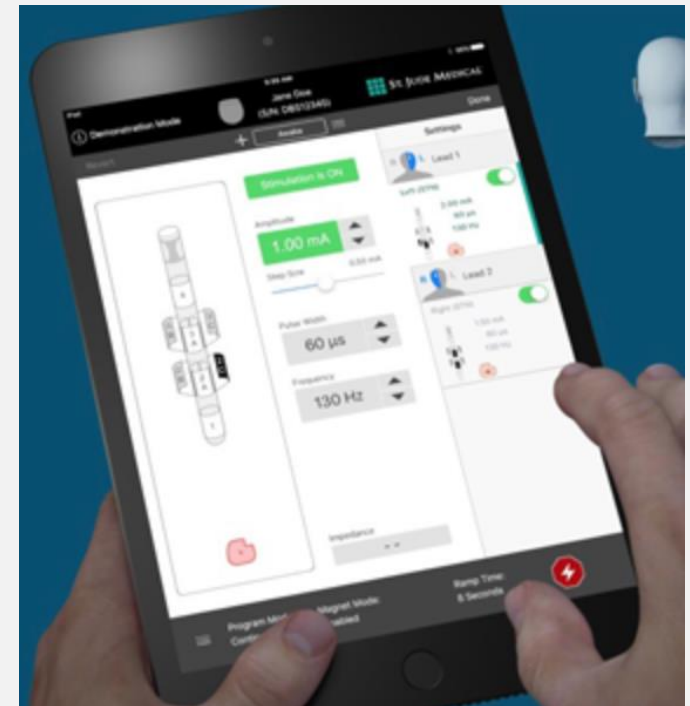
# SURGICAL COMPLICATIONS

- Overall, relatively low risk brain surgery
- Completing pre-op evaluation helps determine individual risk
- Risks <3% but can vary between centers:
  - Hemorrhagic Stroke
  - Infection
  - Walking/Balance Changes
  - Seizures
- Common risks associated with brain surgery:
  - Pain/Fatigue/Weakness ~one week after surgery
- Electrodes may not be in optimal location and revision surgery may be needed in the future

\*This is not a complete list of possible complications. Please talk to your neurosurgery team.

# DBS PROGRAMMING

- System is OFF for one month after surgery and you continue PD medications
- Initial programming visit is ~one month after surgery
  - 2-hour appointment
  - Arrive to appointment OFF PD meds (no PD meds for ~8 hours)
- Follow up 2-6 weeks after initial visit
- Finding best settings can take time
  - Optimal settings are NOT usually found at the first visit
  - 6 months or longer
- Will need adjustments as disease progresses
  - Ongoing follow up 3-4 times a year



## Medtronic



# DBS PROGRAMMING

- Three companies have DBS hardware: Medtronic, Abbott, and Boston Scientific
- Each company provides a remote to patients to adjust their own settings
  - Medical professional will create parameters for adjustments that are safe to do at home and give instructions
- While DBS adjustments are being made medications are also adjusted
  - Medication reduction typically ranges from 10-50%
  - Stopping all PD medications is not the main goal of DBS



Boston



Abbott

# DBS RELATED COMPLICATIONS

- Skin Erosion (~0.3%)
- Wound Separation (~0.5%)
- Mechanical Complications
  - Lead Fracture (~2.5%)
  - Lead Migration (~0.3%)
- Stimulation induced side effects (not a complete list)
  - Speech changes
  - Muscle contractions
  - Mood changes
  - Dizziness
  - Balance changes
  - \*These can resolve with adjustments to stimulation.

# OUTCOMES AND EXPECTATIONS

- DBS is NOT a cure
  - PD will continue to progress and increases in medications will be necessary
  - New symptoms may occur that do not respond to DBS (ex. falls, dementia)
- At some point changes in DBS may be limited due to side effects
- DBS will continue to provide benefit and is not removed
  - More disability will occur the longer somebody lives with PD

## FACTS TO KNOW

- For an MRI your DBS may need to be checked by a medical professional or put into MRI mode (depends on the device implanted)
  - Must notify your medical provider if you have an MRI scheduled
  - May need to have MRI at a specific center
- DBS should be turned off during surgical procedures
- CT scans, ultrasounds, and x-rays don't require any special precautions and DBS can remain on during these procedures
- DBS should be turned off during EKGs



# CONCLUSION

- DBS is a good treatment for motor symptoms of PD
  - Tremor, dyskinesia, slowness, rigidity, and motor fluctuations
- DBS is not a cure and PD will still progress
- Pre-op testing will help determine if you are a candidate and individual risk
- Programming DBS takes times and adjustments are made as PD progresses

QUESTIONS?