

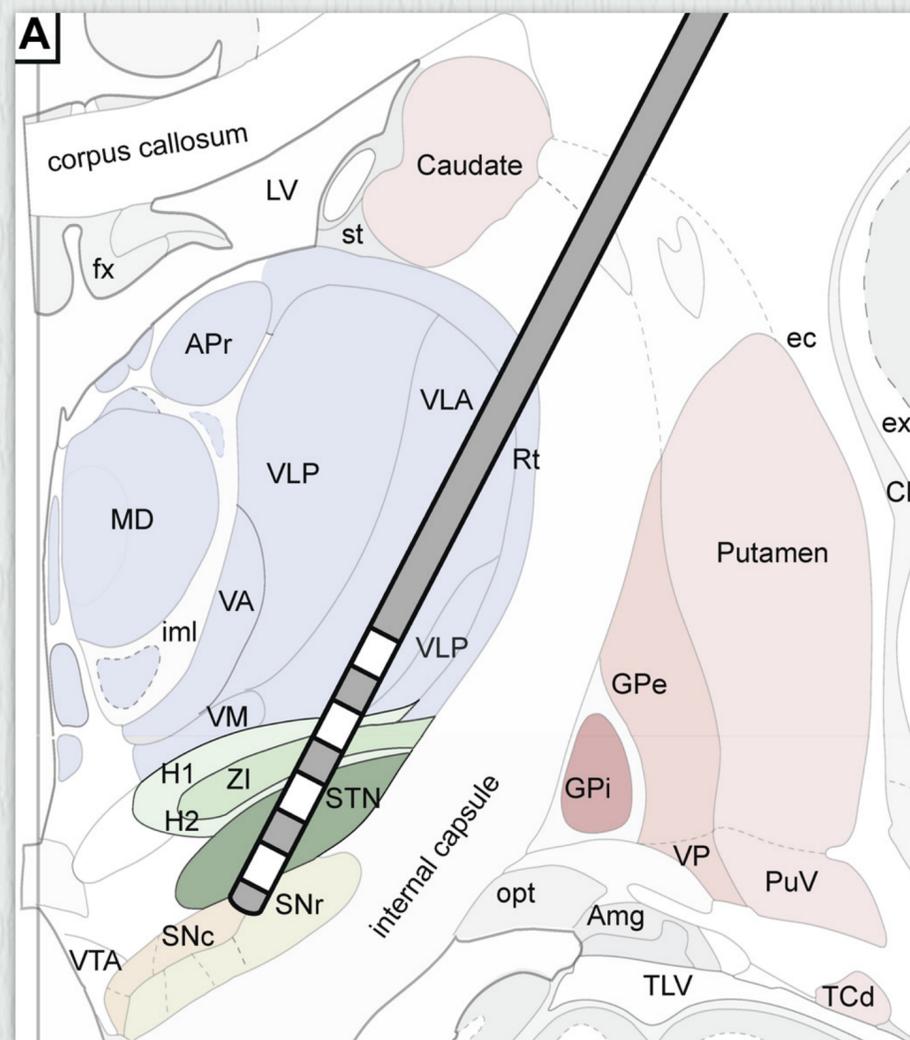


DEEP BRAIN STIMULATION FOR PARKINSON'S DISEASE

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(BRIEF) HISTORY OF DBS



- 1930s: Wilder Penfield mapped human brain with stimulation
- 1950s-70s: Small studies of electrical stimulation to treat pain, spasticity, epilepsy, multiple sclerosis and psychiatric disease
- 1950s-60s: Pallidotomy and thalamotomy in use for PD
- 1987: Alim Benabid demonstrates Vim DBS for PD & ET tremor
- 1994: STN DBS improves PD bradykinesia, rigidity and tremor
- 2010-2013: Two studies, GPi & STN DBS w/ similar benefit
- 2013-2014: Two studies, DBS beneficial in “early” PD
- 2015: Over 140,000 DBS implants worldwide

EXPANDING INDICATIONS



- Essential tremor
- Parkinson's Disease
- Dystonia
- Obsessive-Compulsive Disorder (HDE)
- Future:
 - Depression
 - Tourette Syndrome
 - Epilepsy
 - Appetitive Disorders

PARKINSON'S DISEASE SYMPTOMS



- Motor
 - Resting tremor (80% of patients)
 - Hypophonia
 - Micrographia
 - Rigidity
 - Bradykinesia
 - Shuffling gait
 - Balance difficulty

PARKINSON'S DISEASE SYMPTOMS



- Non-motor
 - Mood disturbance (depression, anxiety, apathy)
 - Cognitive
 - Frontal lobe dysfunction
 - Memory difficulty
 - Dementia
 - Sleep disturbance
 - Autonomic dysfunction
 - Sexual
 - Digestive
 - Orthostatic

PD PROGRESSION



- ~5 years after starting therapy
 - Dyskinesias (involuntary dance-like movements)
 - On-Off fluctuations
 - rapid loss of benefit from medications
 - reduced mobility, gait/balance difficulty, tremor and rigidity
 - Carbidopa-Levodopa resistance
 - motor, swallowing, cognitive

WHEN TO SEEK REFERRAL



- When you and (or) your doctor feel like you:
 - have troublesome medication side effects (dyskinesia)
 - develop refractory tremor (not improving with medications)
 - **want to learn more about DBS**

SURGICAL OPTIONS

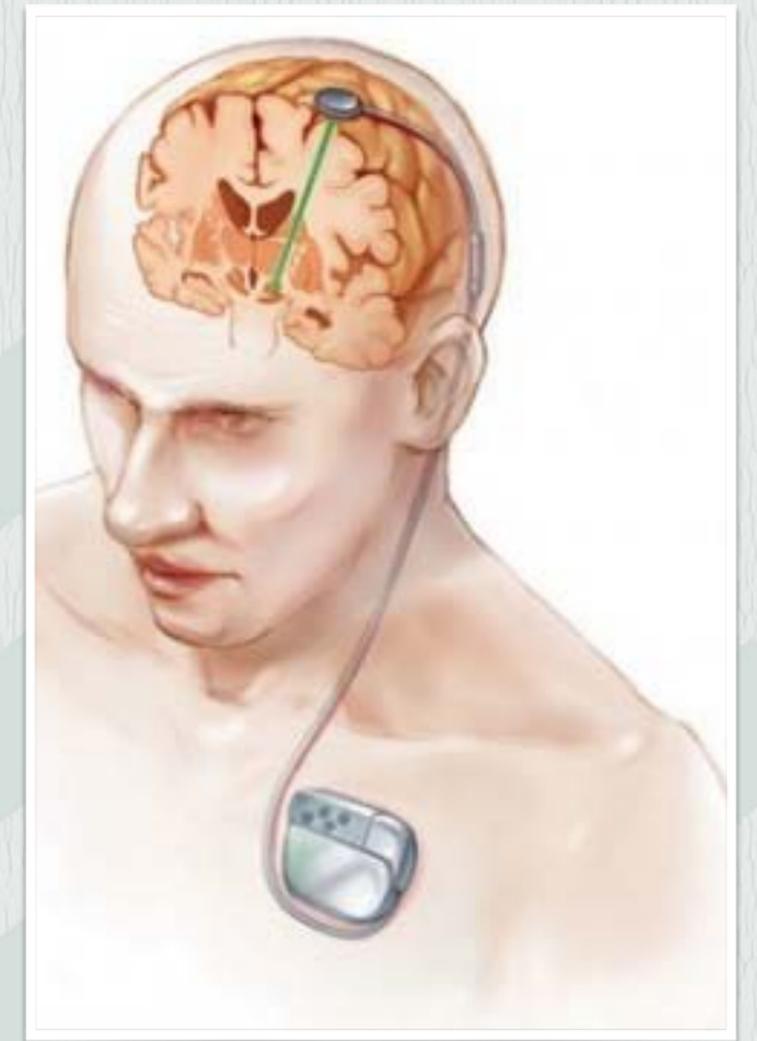
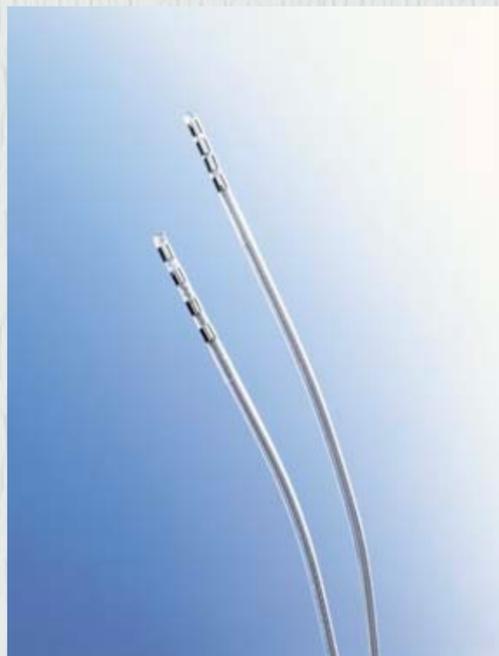


- Lesion Surgery - destruction of a particular area of brain
 - Thalamotomy (VIM)
 - reduce tremor
 - Pallidotomy & Subthalamotomy
 - reduce tremor, rigidity, and bradykinesia (slowness)
- Not reversible, high complication rate
- Fallen out of favor in DBS era

SURGICAL OPTIONS



- Deep Brain Stimulation (DBS)
 - Electrodes (metal contacts and wires) implanted in specific brain regions
 - Pulse generator and battery implanted in chest



DBS SYMPTOM RESPONSE



Improves a lot	Improves some	Does not improve or worsens
Tremor		
Rigidity		Dementia
Bradykinesia	Speech	Atypical Parkinsonism
Dyskinesias	Balance	Psychosis
Dystonia	Freezing of gait	Autonomic symptoms
Levodopa-related motor fluctuations		

DBS EXTENDS “ON” PERIOD

