

Deep Brain Stimulation: What, When, Why, How

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DBS:What

A Pacemaker for the Brain

- ✓ Implanted electrode
- ✓ Connected to a pacemaker in the chest
- ✓ High-frequency electrical stimulation
- ✓ Deep structures involved in the control of movement
 - ✓ Subthalamic nucleus (STN)
 - ✓ Globus pallidus (GPi)
- ✓ Stimulation overrides abnormal neuronal activity to bring motor controlling circuits into a more normal state of function
- ✓ Reducing movement disorder symptoms



The components: Lead

✓ Two Types: Traditional Ring

spherical stimulation

increase energy = increase size of field

placement critical



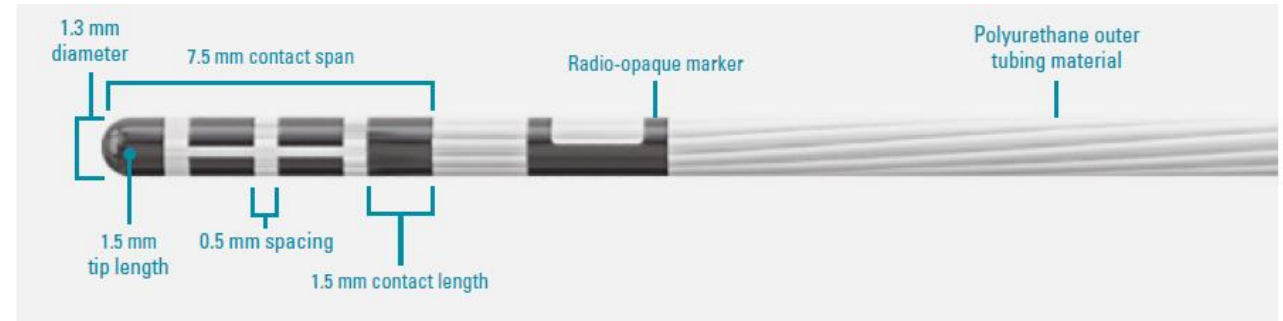
The Components: Lead

✓ Directional

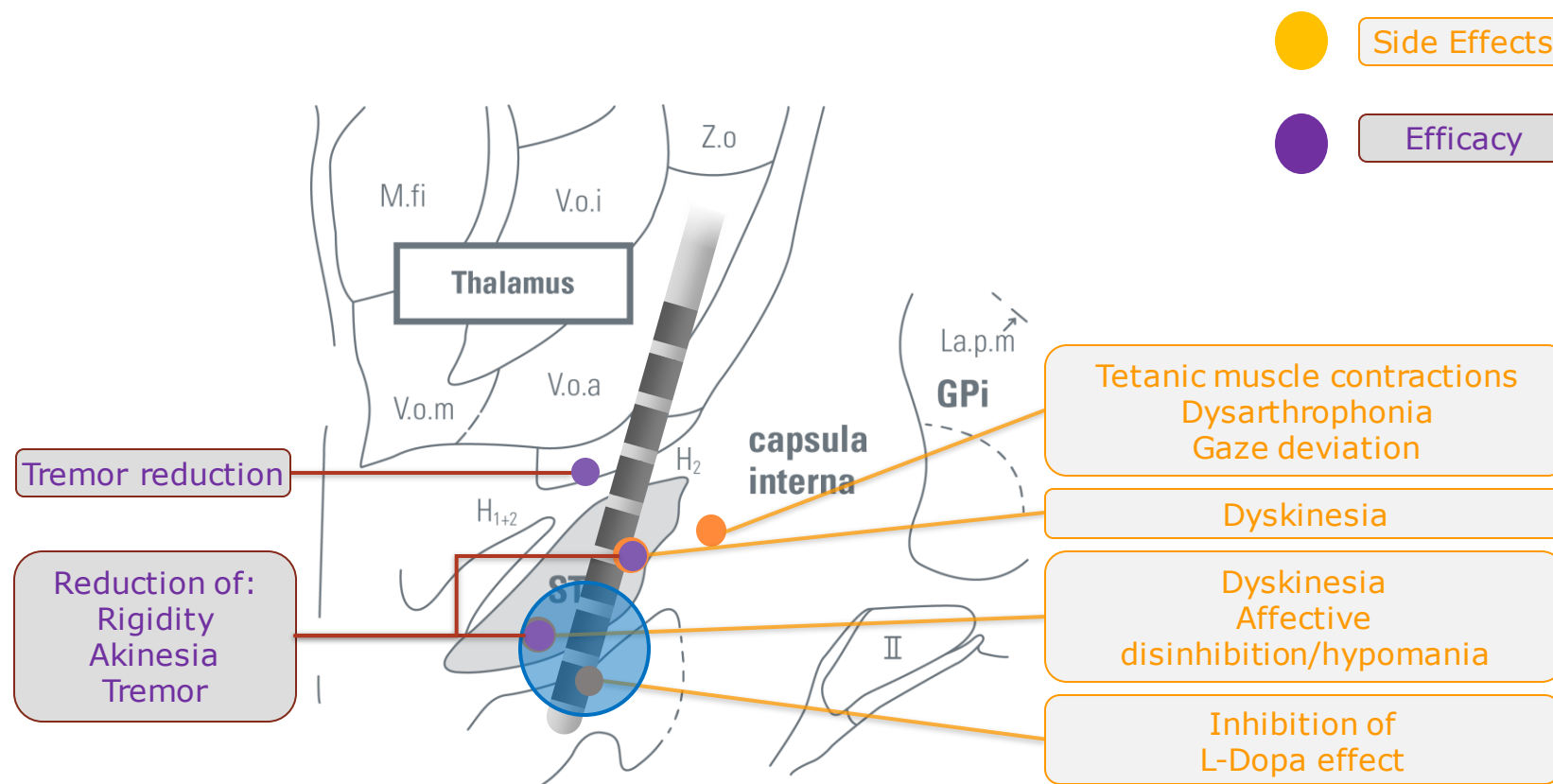
field shaping

fine tune stimulation to effect

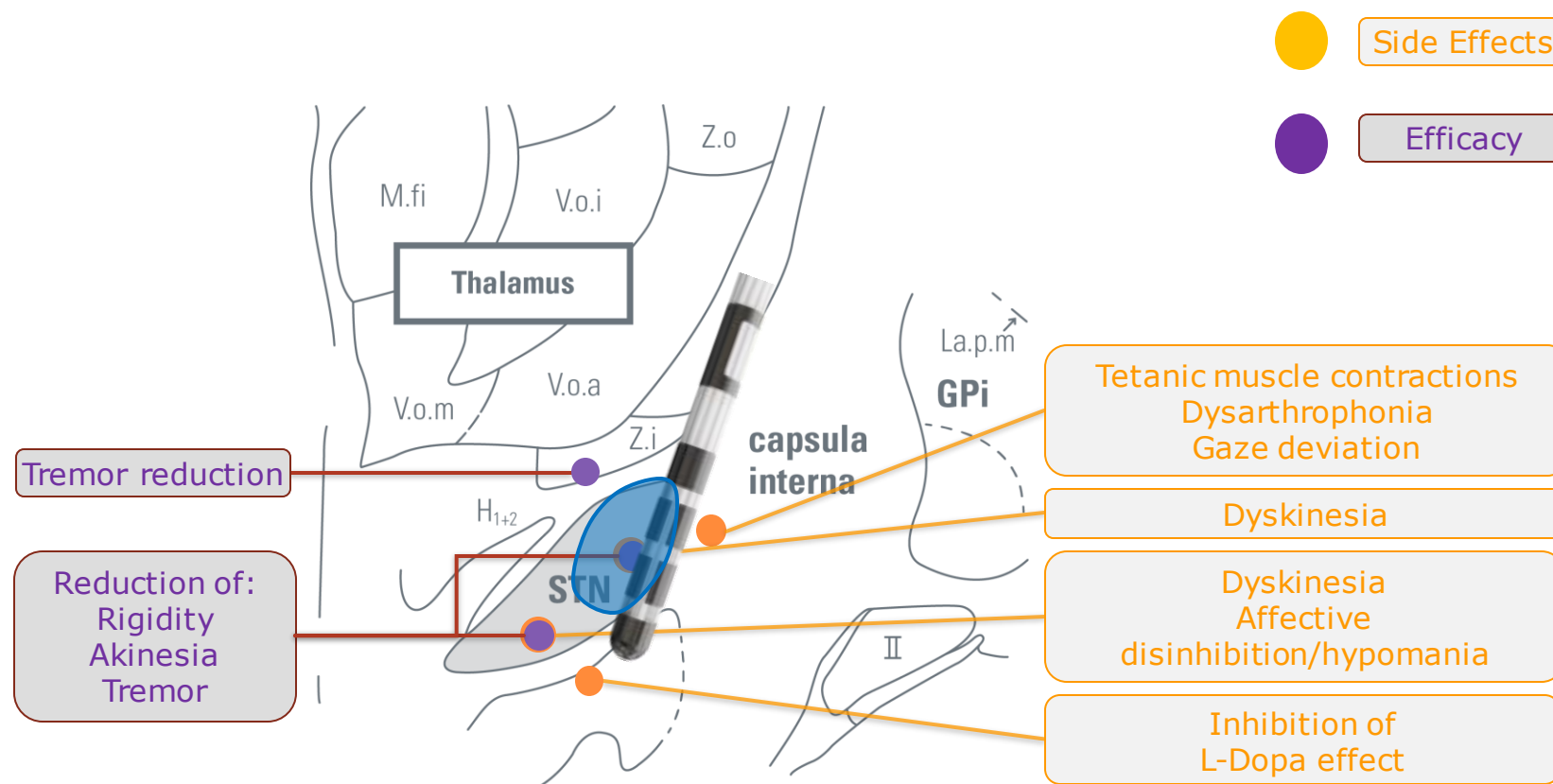
avoid side effects



Goal: Accurately target therapy and avoid unwanted effects



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The Generator: “Battery” and Programmer



Which Device?

- It depends...
- Anatomy
- Programmer comfort
- Patient preference

DBS: When

When?

⌘ As Parkinson's disease progresses, medications may fail to provide consistent and adequate symptom control

⌘ Medications used at levels required for symptom control may produce adverse effects

- ⌘ Motor complications, such as dyskinesia
- ⌘ Cognitive and psychiatric problems
- ⌘ Nausea, hypotension, and other systemic effects

⌘ When, despite optimized pharmacotherapy, you experience troubling motor symptoms:

- ⌘ Wearing off – Off periods that contain troubling bradykinesia, rigidity, tremor, and/or gait difficulty
- ⌘ Troubling dyskinesia
- ⌘ Motor fluctuations
- ⌘ Refractory tremor

The Window

- ❧ Atypical (non-idiopathic) parkinsonism
 - Multi System Atrophy, PSP
- ❧ Lack of response to levodopa
- ❧ Frank dementia, moderate to severe dementia



What is the process?

- On/Off testing
- Neuropsychological evaluation
- Neurosurgical evaluation
- Surgery
- Ongoing programming

DBS: Why

Goal Attainment

⌘ DBS treats the cardinal symptoms of PD

- Tremor

- Rigidity

- Bradykinesia

- Some types of gait dysfunction

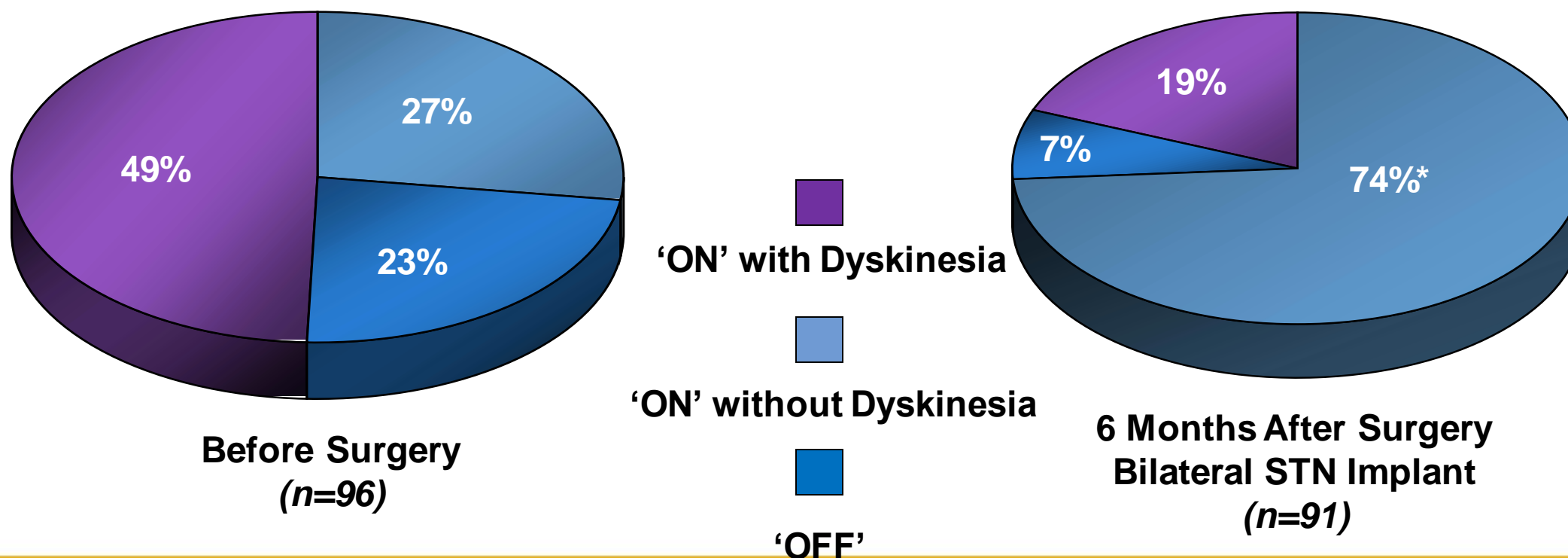
⌘ DBS does not treat cognitive impairment, psychiatric symptoms, axial gait dysfunction

⌘ DBS does not halt the progression of Parkinson's Disease

⌘ DBS is not a cure.

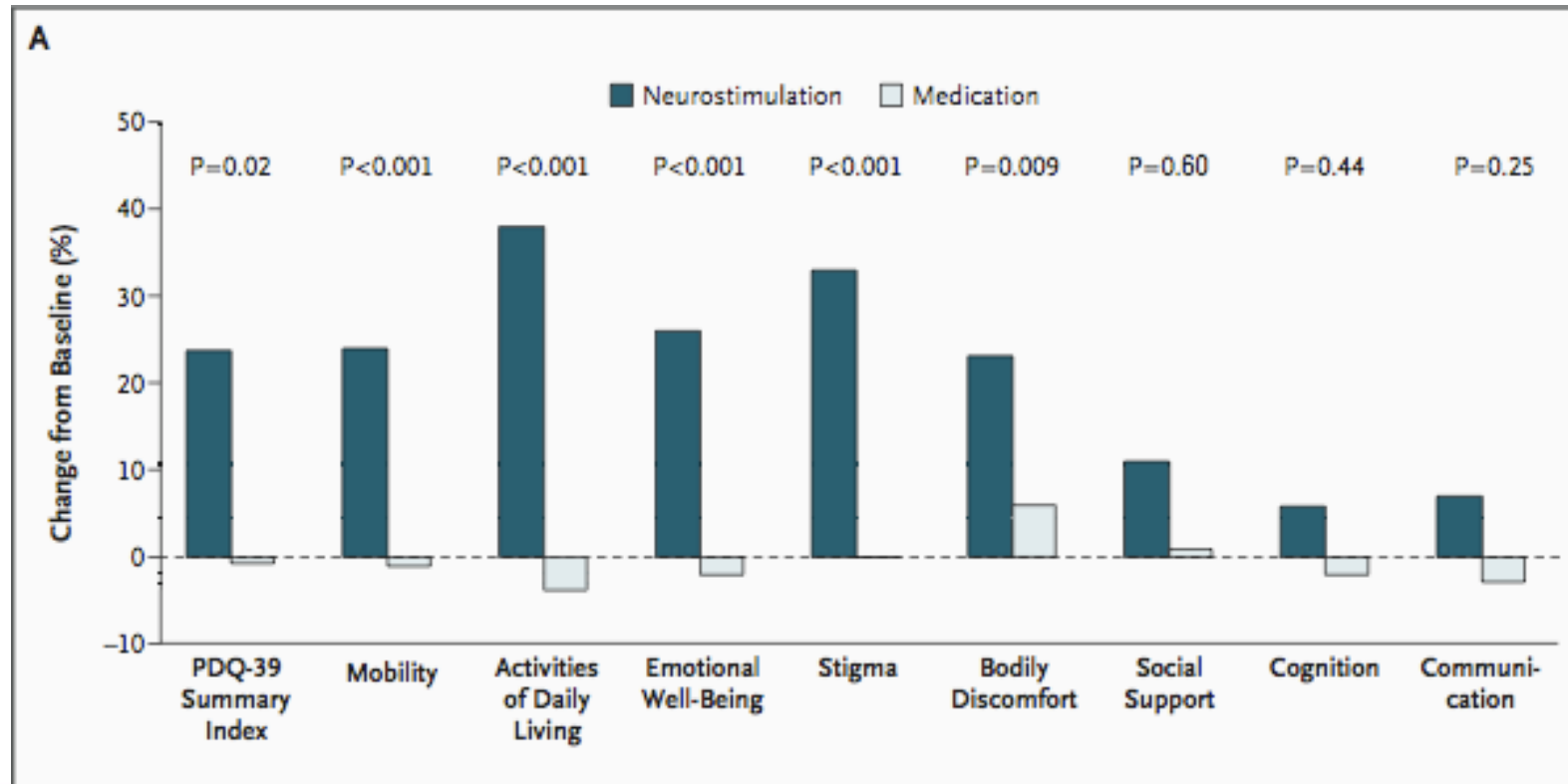
⌘ There is a window for DBS and PD!!!

“ON” Time Without Dyskinesias Improves from 27% to 74% of a Patient’s Waking Day*



* The Deep-Brain Stimulation for Parkinson's Disease Study Group. Deep-brain stimulation of the subthalamic nucleus for the pars interna of the globus pallidus in Parkinson's disease. *N Eng J Med.* 2001;345:956-63.

DBS and Quality of Life

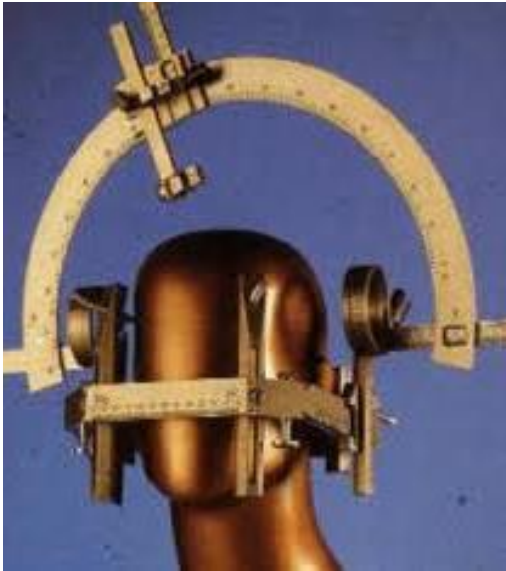


DBS:How

The Team

- Fellowship Trained Functional Neurosurgeon
- Movement Disorder Neurologist
- Neuropsychologist
- +/- Neurophysiologist

Frame vs Frameless



Asleep vs Awake

