



# ***Deep Brain Stimulation Who, When, Why?***

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Disclosures - clinical advisory board Medtronic Inc.



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# *Deep Brain Stimulation for movement disorders*



Frame based or frameless stereotaxy  
accurately targets deep brain  
structures

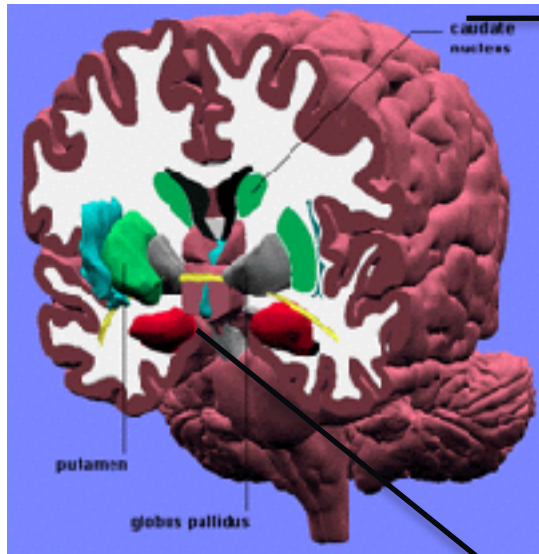


Microelectrode recording  
defines the region  
of interest

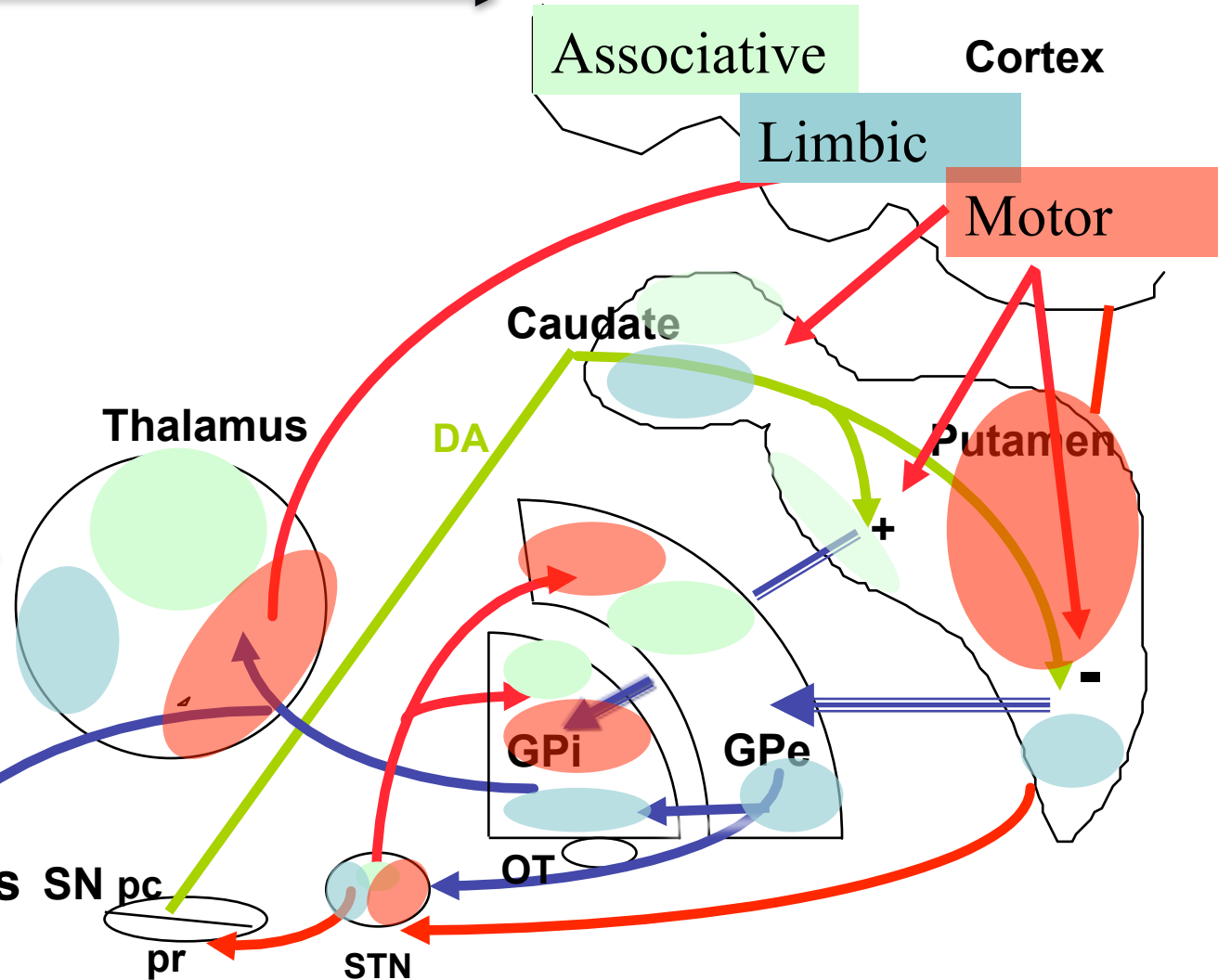
The first generation of brain pacemakers

# Functional organization of the basal ganglia

*Allows accurate placement of DBS leads in Dopaminergic Sensorimotor Circuitry*



**Anatomical segregation of different networks allows safe and precise targeting for DBS for motor versus mood versus cognitive impairment**



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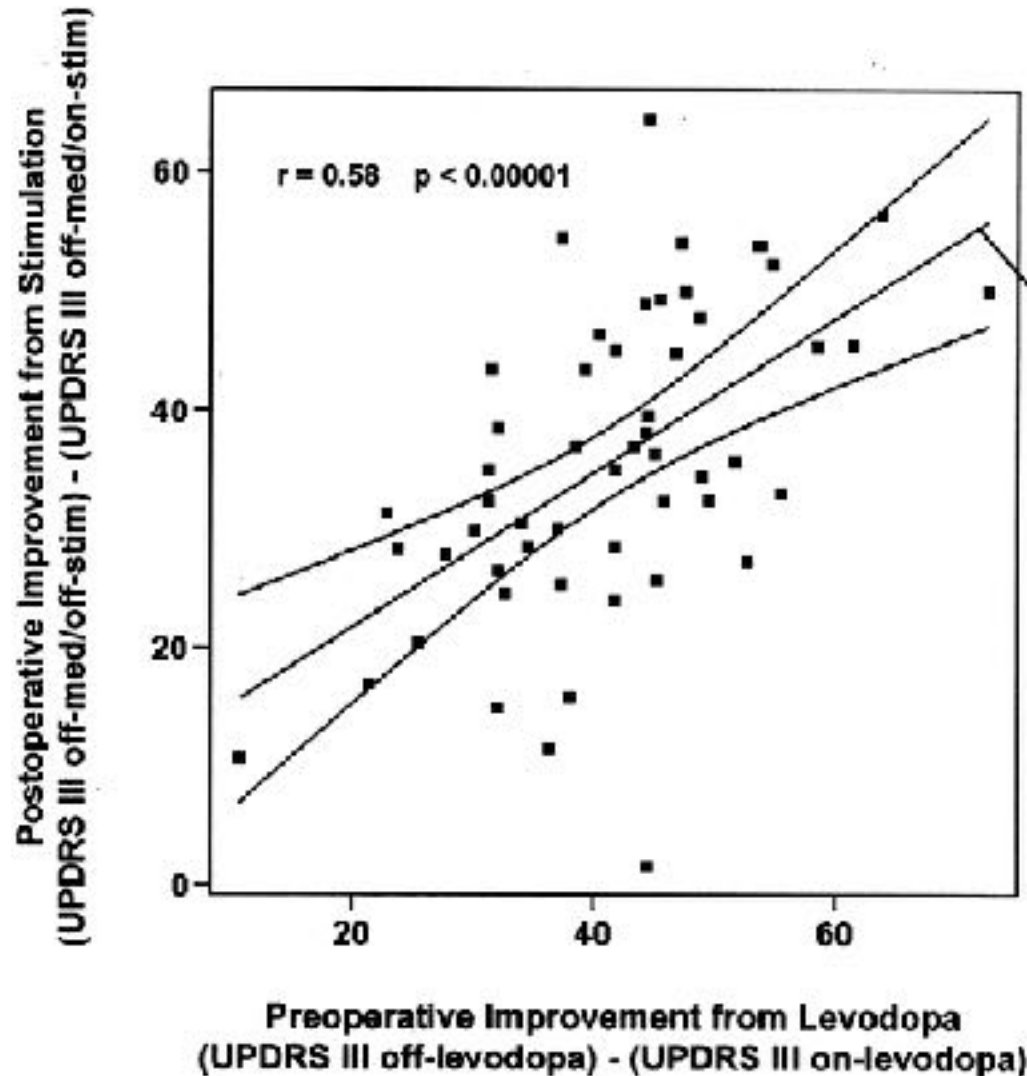
# Predictive Criteria for DBS for PD

- Well characterized patients
  - response of cardinal Motor Signs to DA medication
  - is this true for all motor symptoms?
  - non-motor symptoms
  - age
  - goals aligned
- Stage of Disease
- Quality of Life data
- Well Placed Lead
  - Target/Node Identification and Approach
- Neurostimulation parameters targeted to underlying pathophysiology



# DBS for PD- Who?

- Response to dopaminergic medication



## Caveats:

Tremor may not respond to dopaminergic medication but does respond to DBS

If there are medication induced side effects such as dyskinesias or orthostatic hypotension the patient may be sub-therapeutic and so the off-on medication improvement will be artificially low

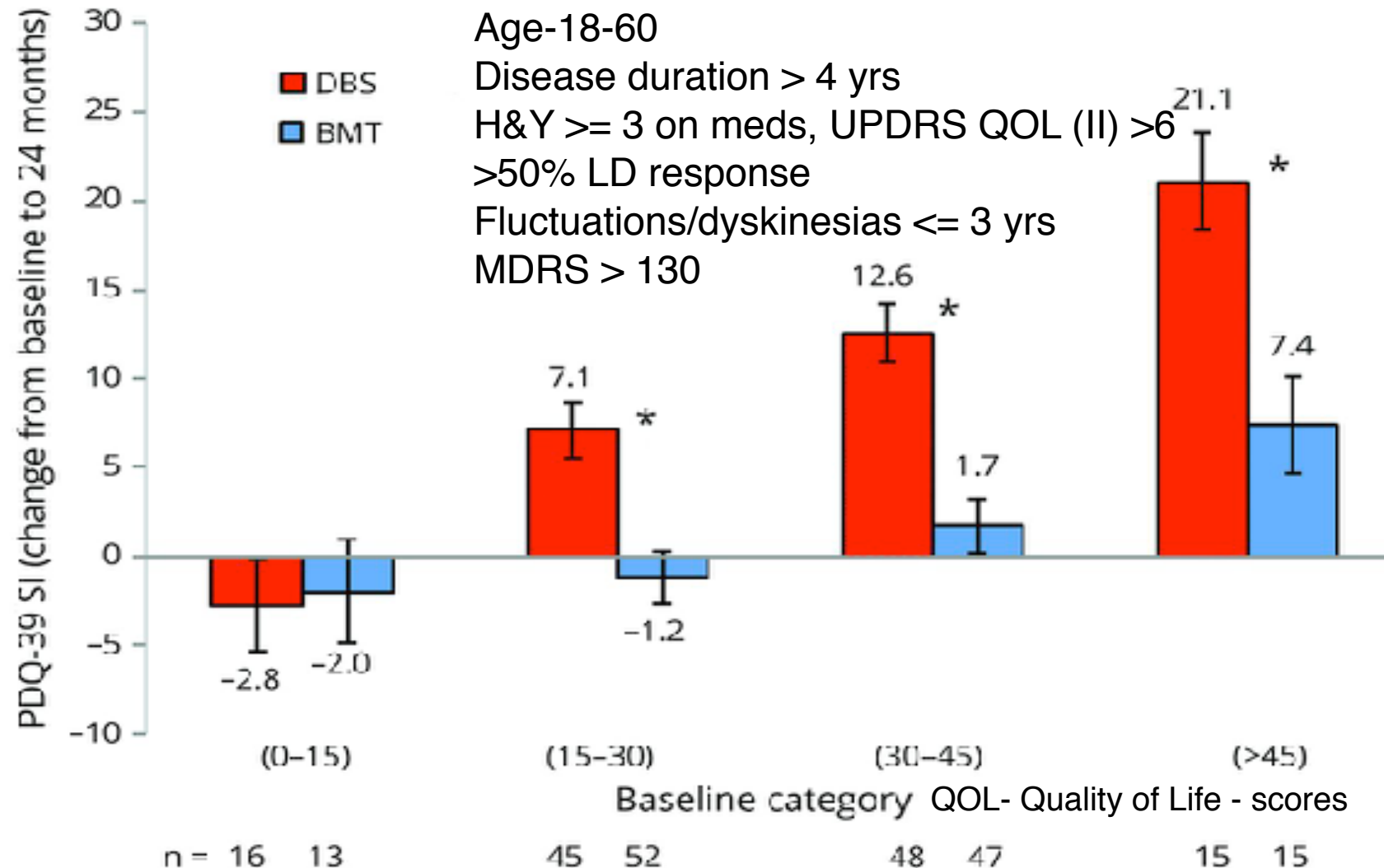
Adapted from Charles et al 2002



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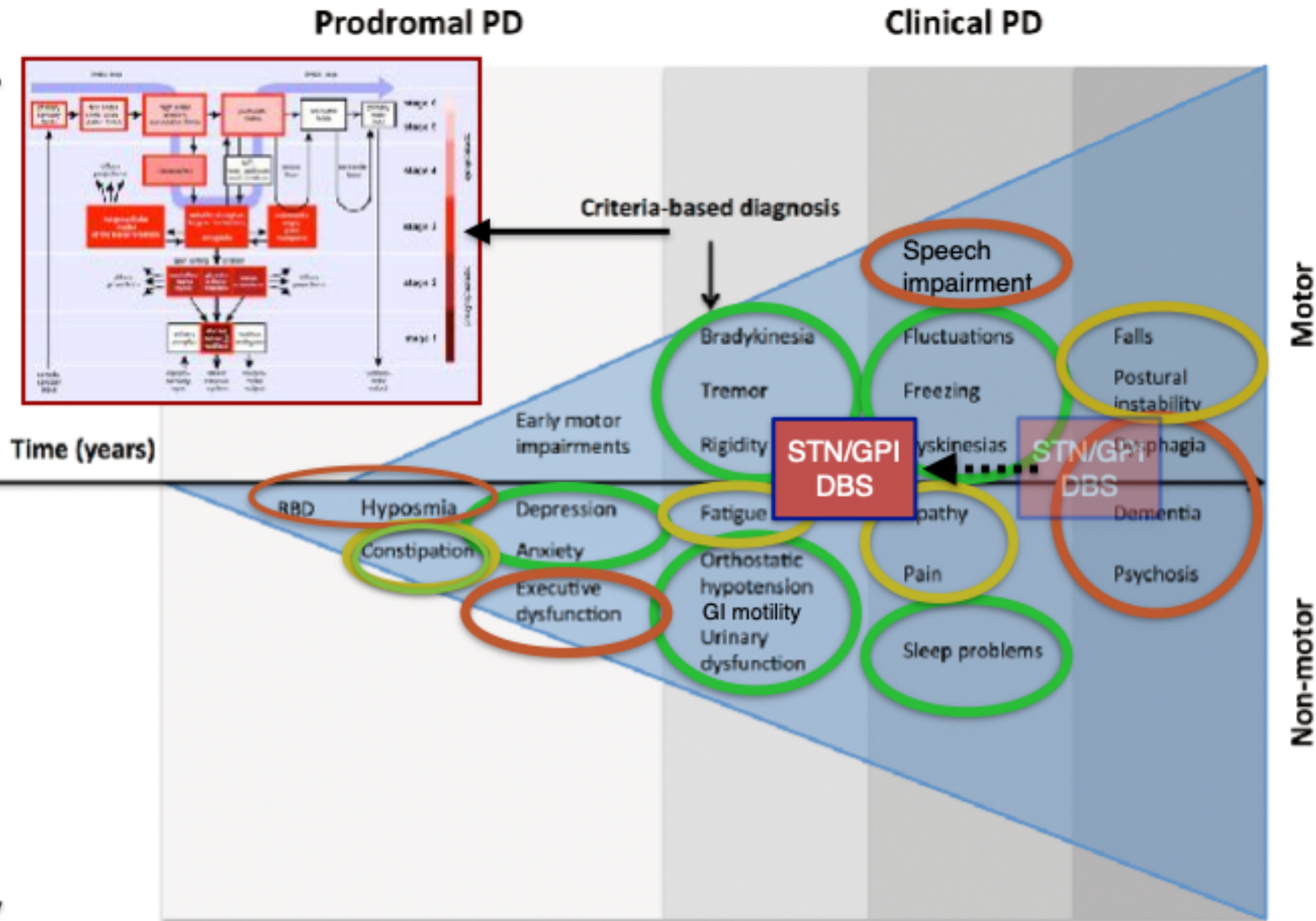
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# DBS in Early Stage PD - QOL Predicted Better Outcome from DBS than medication - from the EARLYSTIM cohort





Degree of impairment in daily functioning

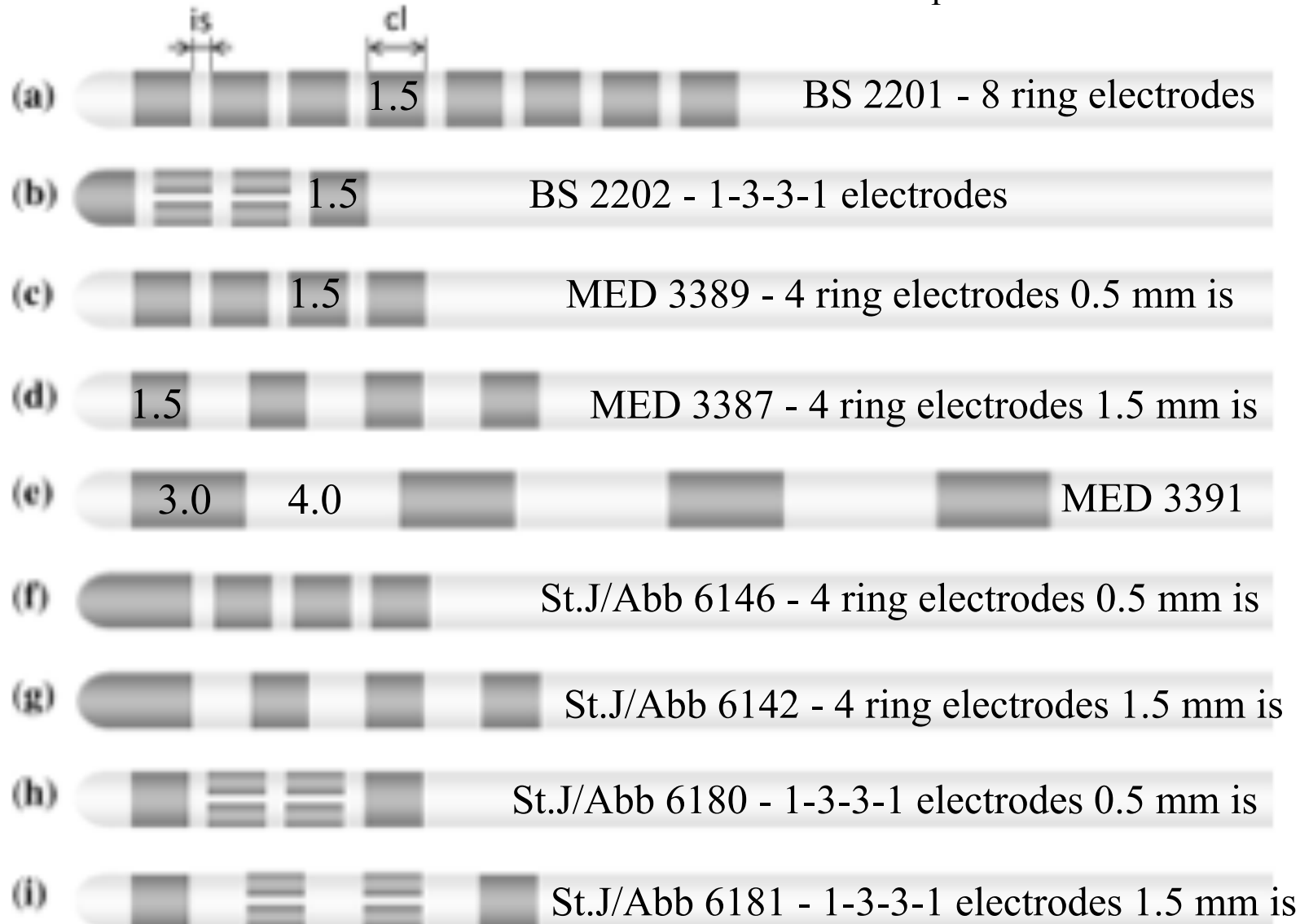


Breen *et al.*, 2017 <https://doi.org/10.1093/brain/aww32>



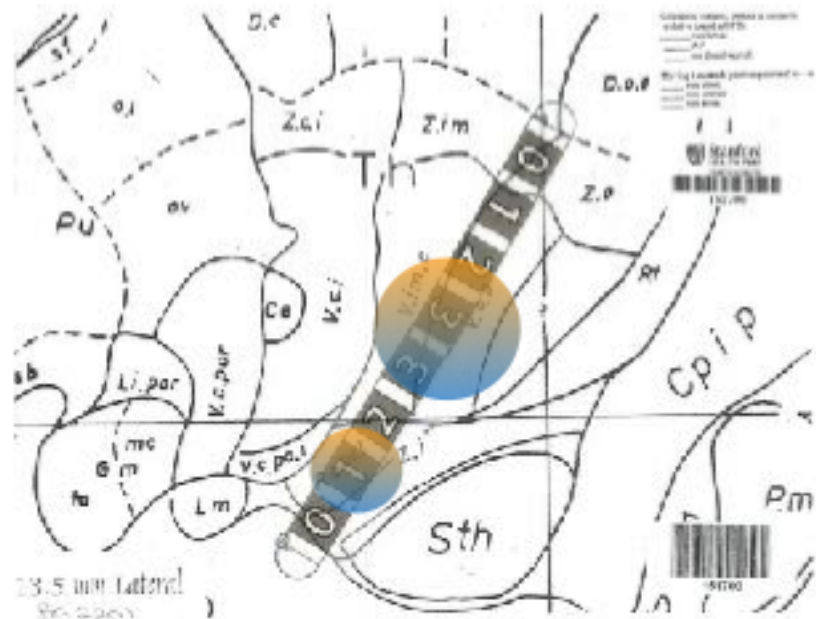
# Different DBS lead Configurations

adapted from Arnon 2017



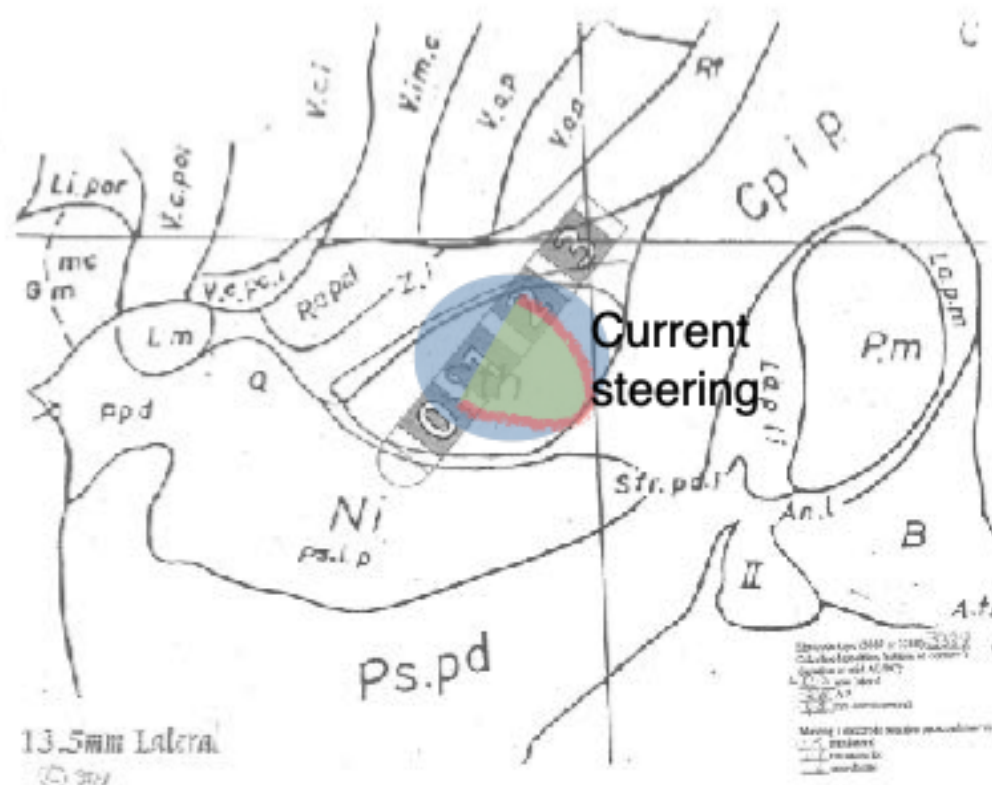
BS- Boston Scientific; MED- Medtronic. St.J/Abb- Saint Jude/Abbot

# Improving the Therapeutic Window



Segmented DBS leads and current steering to avoid side effects

Example of the BS 2201- eight electrode lead bridging the thalamus and posterior subthalamic area to treat postural/action Tremor



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