

# Deep Brain Stimulator Recharging Vest for Parkinson's Disease Patients

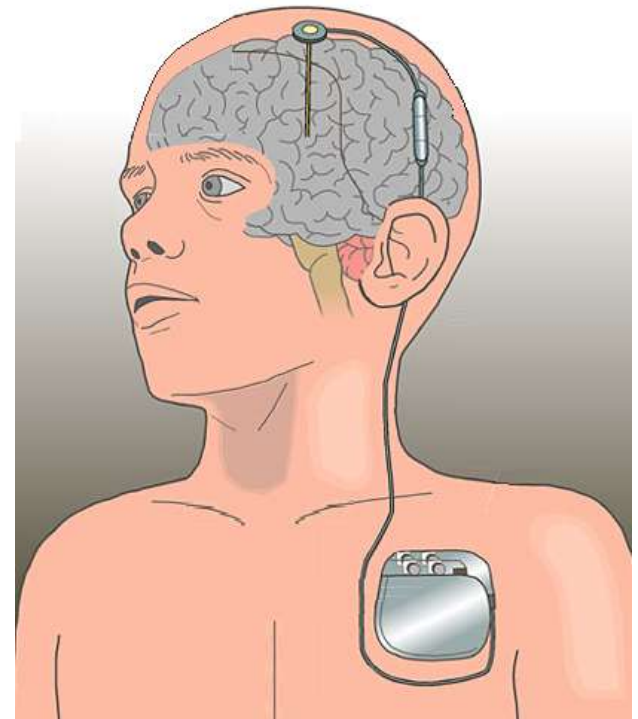
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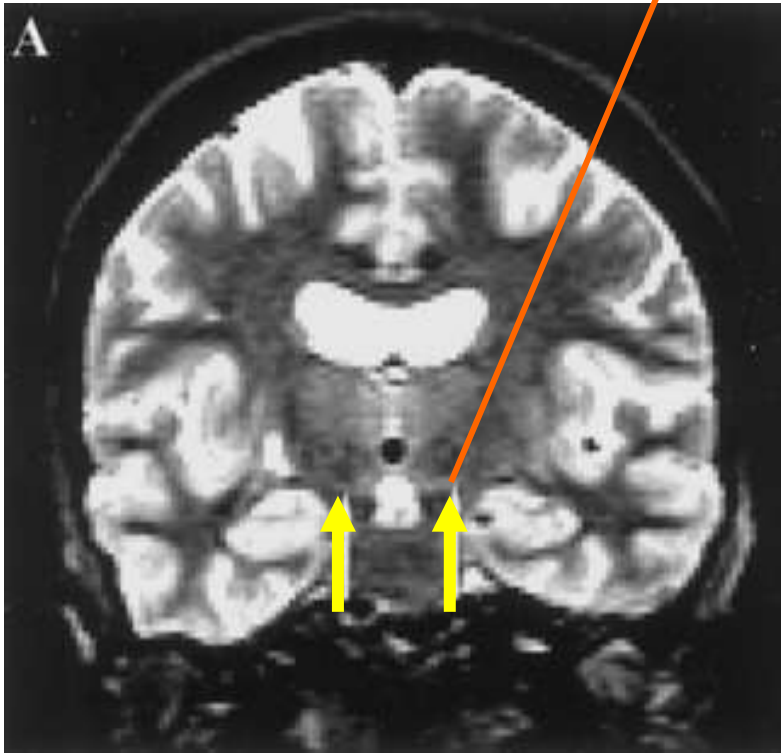
# Why Deep Brain Stimulation?

Symptomatic treatment when medication is ineffective for:

- **Parkinson's Disease**
- **Tremor syndromes**
- Pain syndromes
- **Dystonia**
- **Tardive dyskinesia**
- **Tourette's Syndrome**
- Neuropsychiatric disorders



# DBS surgery requires sub-millimeter accuracy

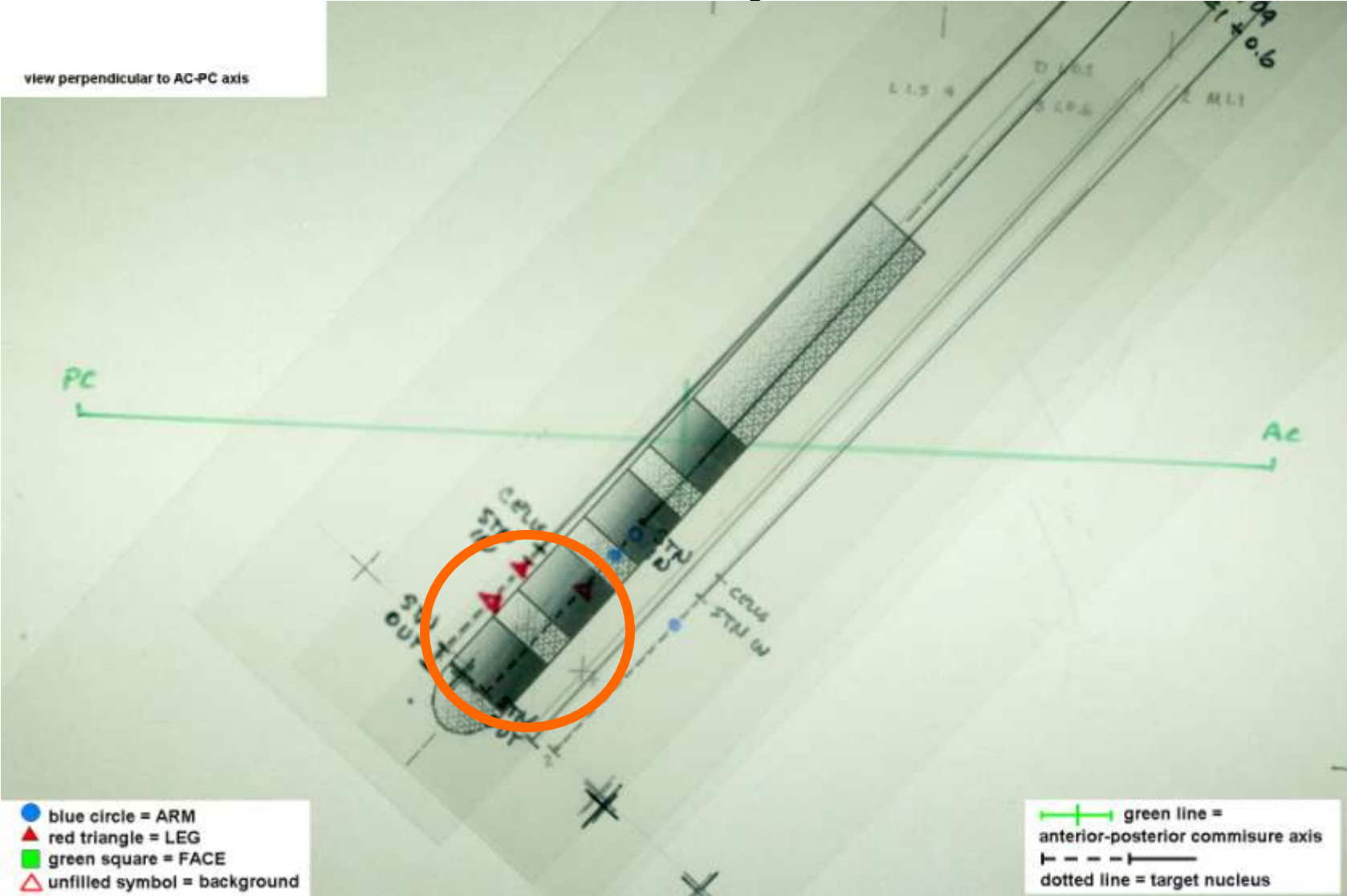


Coronal T2 MRI showing STN  
Zonenshayn: Neurosurgery, 47(2). 2000.282-294

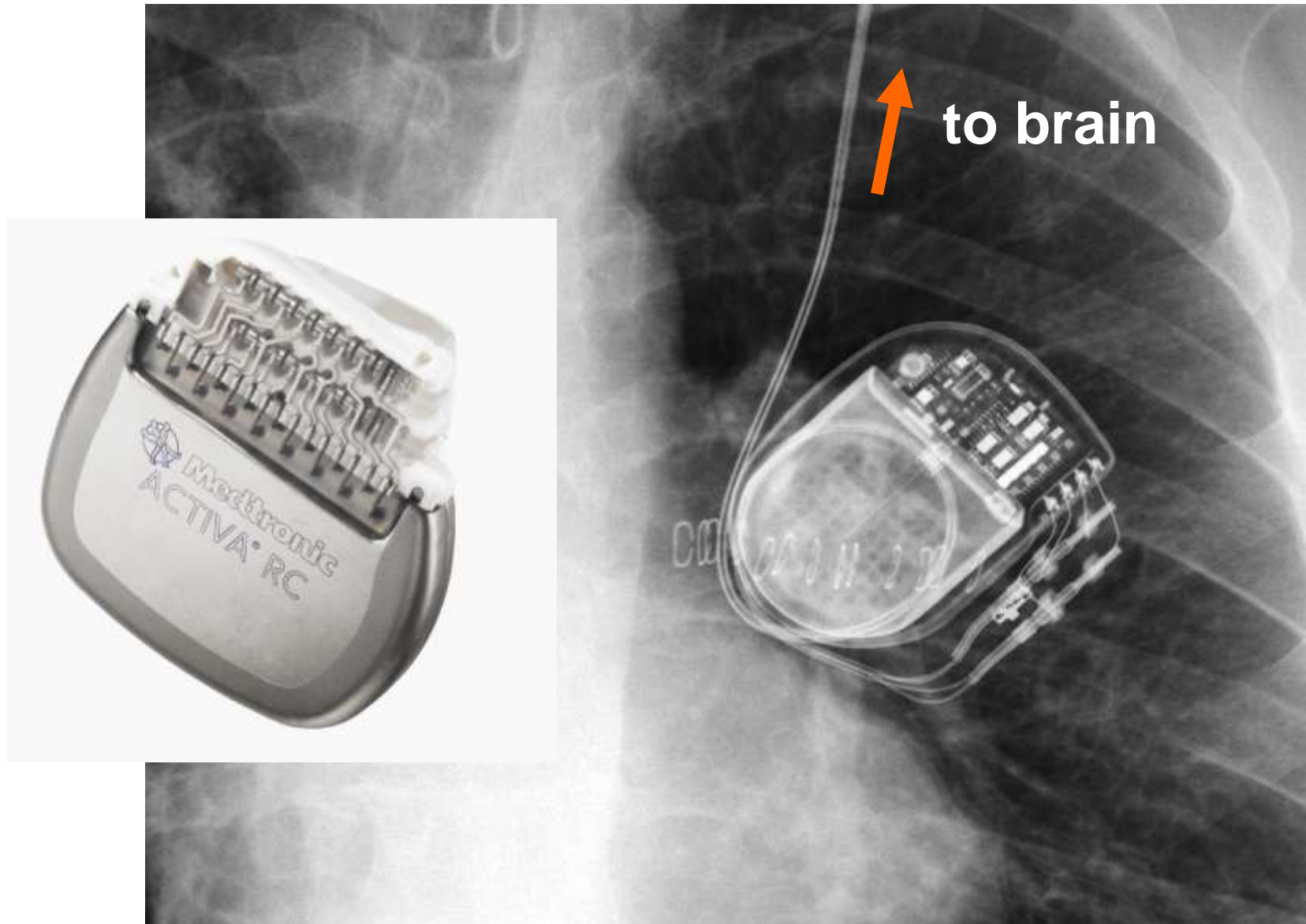
Steps to achieve +/- 0.5 mm accuracy:

- MRI localization of target relative to anterior & posterior commissures
- Day-of-surgery CT in stereotactic frame
- Ventriculogram at surgery start
- Bilateral plane X-ray to locate electrode
- Recording multiunit neuron signals at known electrode depths
- Repeat X-ray & recording for each track

# Relative positions of DBS contacts and somatosensory neurons



# Implantable Pulse Generator (IPG)



# New rechargeable battery

## **Medtronic Activa® RC**

“The Activa RC device provides bi-lateral stimulation (to both sides of the brain) and offers a more advanced approach to device programming, and additional tools for capturing history relevant to the patient’s therapy.

Activa RC is the first and only rechargeable DBS neurostimulator in the world and lasts for nine years before replacement is necessary.

Patients need to recharge the device at home on a regular basis depending on their stimulation settings.”



# Activa<sup>®</sup> 37651 RC Recharging System

## Components:

The AC power supply  
(charges the recharger) (1)

The recharger (2)

The antenna (3)

The shoulder belt (4)



Recharging System

# Problems with rechargeable stimulators

DBS patients with arm tremor or dystonia have trouble positioning the recharging coil over the IPG.

No such problem for pain patients given similar stimulators.

Positioning problem may be severe if battery is discharged to the point that the stimulator is not working.

Existing vest holding the charging coil in place is difficult for a person with impaired arm and hand function to put on.

Patients report extended time for recharging.