Activa® PC neurostimulator

- Long-term evaluation of anterior thalamic deep brain stimulation for epilepsy in the European MORE registry
- Bradykinesia and Its Progression Are Related to Interhemispheric Beta Coherence
- Long Term Performance of a Bi-Directional Neural Interface for Deep Brain Stimulation and Recording
- Differential Effects of Pathological Beta Burst Dynamics Between Parkinson's Disease Phenotypes Across Different Movements
- Lack of progression of beta dynamics after long-term subthalamic neurostimulation
- Uncovering biomarkers during therapeutic neuromodulation with PARRM: Period-based Artifact Reconstruction and Removal Method
- Chronic embedded cortico-thalamic closed-loop deep brain stimulation for the treatment of essential tremor
- Case Report of Dual-Site Neurostimulation and Chronic Recording of Cortico-Striatal Circuitry in a Patient With Treatment Refractory Obsessive Compulsive Disorder

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The Activa® PC neurostimulator from Medtronic is a dual-channel device capable of delivering bilateral stimulation with a single device.

Activa PC contains a non-rechargeable battery and microelectronic circuitry to deliver a controlled electrical pulse to precisely targeted areas of the brain. The device is typically implanted subcutaneously near the clavicle, connected to an extension and leads, which are implanted in the brain.

The Activa portfolio provides the ability to control the stimulation field with innovative interleaved pulses and patient-specific therapy groups. The Activa system utilizes internal memory to store information that can be accessed from the N'Vision® clinician programmer. The patient's medical history, therapeutic window parameters, and valuable information about actual therapy usage can be stored within the device. The sorting capabilities of the device help clinicians choose settings that will allow them to program a positive therapeutic response while maximizing power-usage efficiency.

Deep brain stimulation using the Activa PC neurostimulator is approved for the treatment of symptoms due to Parkinson's disease, essential tremor, and dystonia.

Troubleshooting of deep brain stimulators (Activa SC/PC/RC Medtronic PLC) sometimes results in a decision to replace a tunneled stretch-coil extension cable.

Henderson et al., present a simple technique to accomplish this atraumatically without a tunneling tool.

In the treatment of patients with deep brain stimulators, complication avoidance and efficiency of operative time are paramount. They sought to find the most safe, effective, and rapid method for performing the conceptually-simple yet technically-nuanced act of replacing lead extension cables.

#6 (8.0 metric) surgical steel 18“ (45cm) monofilament (Ethicon US, LLC), also known as #6 sternal wire, was connected in-line with DBS extension cables (Medtronic DBS Extension 37086-60) in novel fashion to overcome intra-procedural hurdles encountered during the past decade in a busy functional neurosurgery service.

Patients tolerate the procedure well and return home shortly after recovery with no complications.

A less expensive and faster technique for passing pulse generator extension cables may be the use of a sternal wire. Using the described technique, pulse generators may be quickly and safely adjusted from side-to-side and site-to-site as the clinical situation dictates [1].

Case series

Wolf et al. from Mannheim prospectively collected data from 11 consecutive patients (10 men, mean age at DBS implantation 52.6 ± 14.0 years) with chronic DBS for dystonia (n = 7), Parkinson's disease (n = 3), and essential tremor (n = 1) who underwent Implantable Pulse Generator IPG replacement switching from a CV NRC system (Activa® PC; Medtronic®) to a CC RC system (Vercise® RC; Boston Scientific®). Systematic assessments before and after IPG replacement were performed.

DBS technology switching at the time of IPG replacement due to battery depletion was at a mean of 108.5 ± 46.2 months of chronic DBS. No perioperative complications occurred. Clinical outcome was stable with overall mild improvements or deteriorations, which could be dealt with in short-term follow-up. Patients were satisfied with the new RC IPG.

This study confirms both the safety and feasibility of switching between different DBS technologies (CV to CC, NRC to RC, different manufacturers) in patients with chronic DBS. Furthermore, it shows how the management can be planned using available information from the previous DBS settings. Individual assessment is needed and might partly be related to the DBS target and the underlying disease. MR safety might be a problem with such hybrid systems [2].

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Henderson F Jr, Takacs I. Rapid and Minimally-Traumatic Replacement of Stimulator Extension Cables: Technical Note on a Novel Use for Sternal Wire. World Neurosurg. 2016 Oct 18. pii: S1878-8750(16)31041-5. doi: 10.1016/j.wneu.2016.10.053. PubMed PMID: 27769951.
2)
Wolf ME, Klockziem M, Majewski O, Schulte DM, Krauss JK, Blahak C. Implementation of New Technology in Patients with Chronic Deep Brain Stimulation: Switching from Non-Rechargeable Constant Voltage to Rechargeable Constant Current Stimulation. Stereotact Funct Neurosurg. 2020 Jan 16:1-7. doi: 10.1159/000505076. [Epub ahead of print] PubMed PMID: 31945765.