



Reduction of programming time and strong symptom control using Image Guided Programming (IGP)

Lange et al., 2021 – University Hospital of Würzburg

<https://www.frontiersin.org/articles/10.3389/fneur.2021.785529/full>



KEY HIGHLIGHTS

Parkinson's disease (n = 10)
Bilateral STN-DBS

Randomized, double-blind,
controlled, crossover study

20min
56%

frontiers
in Neurology

ORIGINAL RESEARCH
published: 08 November 2021
doi: 10.3389/fneur.2021.785529



Reduced Programming Time and Strong Symptom Control Even in Chronic Course Through Imaging-Based DBS Programming

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- Using IGP, programming optimization lasted less than 20 min, which was significantly shorter (56%) than Clinical Based Programming optimization
- Equivalent long-term improvement in motor outcomes

INTRODUCTION



Traditional DBS programming is a time-consuming and complex task that relies on considerable physician expertise and subjects patients to a long testing procedure



Boston Scientific's IGP software displays patient-specific anatomy, combined with precise postoperative lead location and orientation to inform programming and stimulation location relative to the target



IGP offers a way to streamline this process



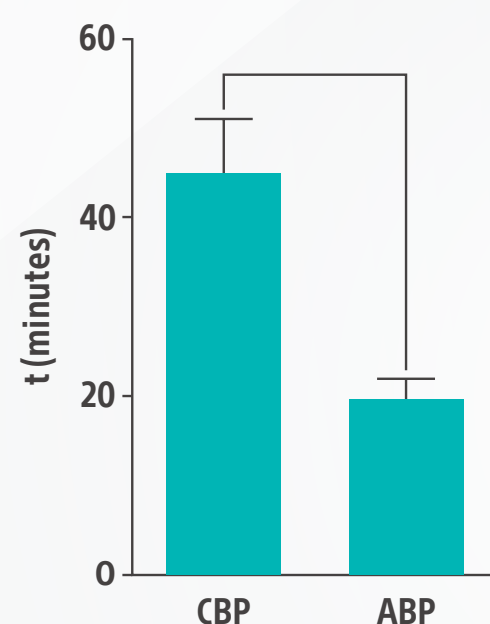
This work represents the Würzburg's group experience using IGP software in an 8-week randomized, double-blind, controlled, crossover study

RESULTS

Data demonstrated efficiency and efficacy

Reduction in Programming time

Time needed for directional monopolar review
vs. anatomy-based programming



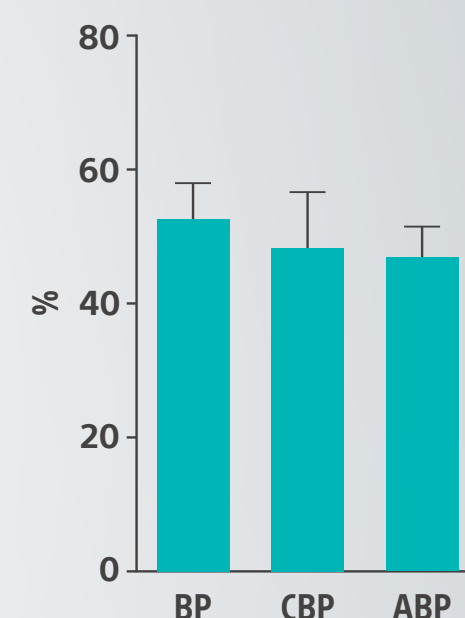
20_{min}
total

56%
shorter

The average programming time when using Anatomy-Based (Image-Guided) Programming (ABP) was 19.78 ± 1.85 min, which was significantly shorter ($p=0.039$) than 45.40 ± 5.79 min using Clinical-Based Programming (CBP)

Motor symptom control and Patient Satisfaction

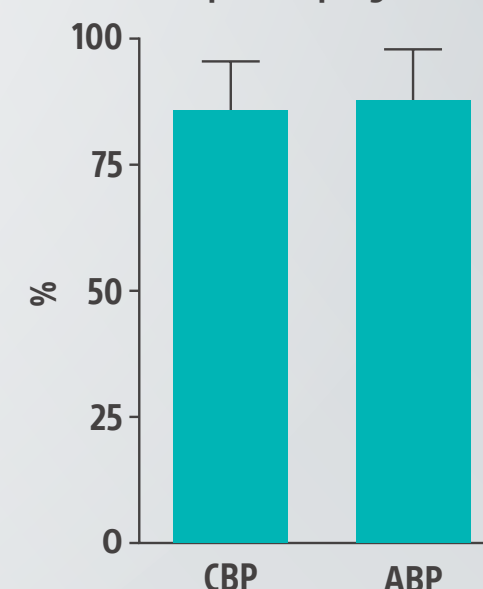
Percentage of improvement
relative to MedOFF/StimOFF



47%

The relative reduction in motor symptoms was 47.46% when using ABP, comparable to Baseline Program (BP) and CBP

Percentage of month
spent in program



88%

When given a choice to go back to their BP, patients preferred to spend 88.6% of the time on ABP, comparable to CBP (86.1%)



➤ CONCLUSIONS

Image-guided DBS programming in PD patients drastically reduces programming time without compromising symptom control and patient satisfaction in this small feasibility trial.

- ✓ First study on the clinical effects of stimulation settings derived using Image Guided Programming in a chronic approach.
- ✓ Strong study design demonstrating efficiency and efficacy using Image Guided Programming.
- ✓ Overall high satisfaction of patients with settings derived using Image Guided Programming.



Back up information

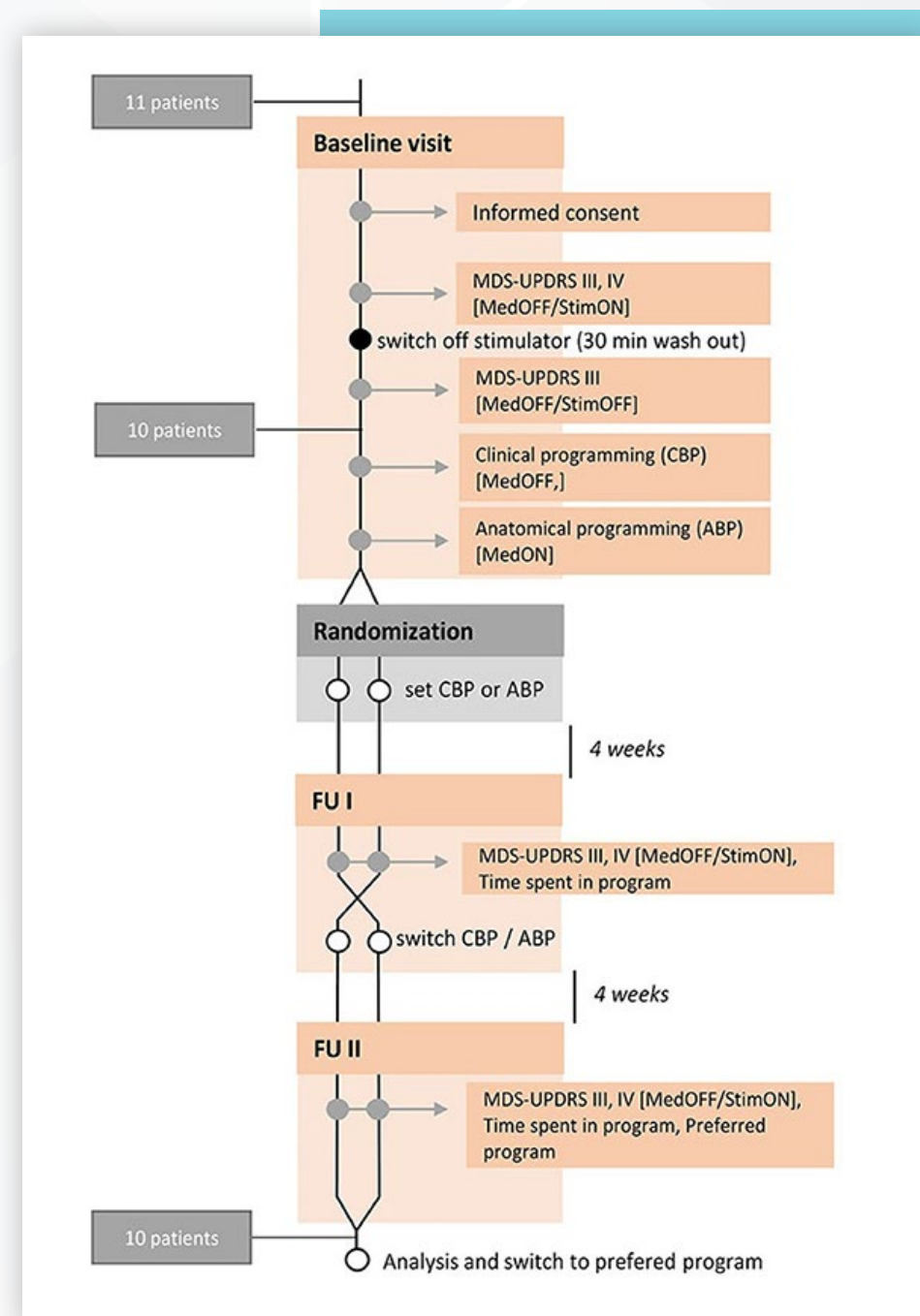
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Study Design: Randomized, double-blind, controlled, cross over, 8 weeks



Comparison between Clinical-Based Programming (CBP) and Anatomical-Based (Image Guided) Programming (ABP)

Inclusion Criteria

- Idiopathic bradykinetic Parkinson's syndrome
- Stable implant (>3 months) of bilateral directional electrodes (Cartesia™) into the STN, connected to a Vercise™ PC or Gevia™ IPG
- Correct lead placement: at least one contact in the dorsolateral part of the STN
- MDS-UPDRS III Improvement of 30% through DBS alone (Δ StimON-MedOFF/StimOFF-MedOFF)



Methods: Groups and Blinding

Patients were randomized (1:1 ratio) into:

- CBP, Clinical Based Programming: following directional monopolar review
- ABP, Anatomy (Image Guided) Based Programming: choosing active contacts based on the visualization of the electrode location and rotation in relation to the STN

NOTE: The Baseline Program (BP), the program active at the baseline visit, could be reactivated by patients in case of severe side effects or loss of clinical efficacy not compensated by increases in amplitude

Patients and treating physicians were unaware of the group assignment



Physicians responsible for activating programs were not involved in clinical assessment

Physicians performing assessments had 5-10 years experience in DBS programming

► Methods: Programming activation and measurements

Clinical and Anatomical Programming

- **CBP:** Performed in MedOFF for both hemispheres
 1. All levels evaluated in ring mode for effect (relief of rigidity) and side effect thresholds
 2. If the best level included directional contacts, the best contact (or combination) was chosen

-
- **ABP:** Performed in MedON
 1. Image Fusion of preop MRI and postop CT
 2. Automatic Segmentation STN, S. Nigra, N. Ruber
 3. Selection of stimulation facing dorsolateral STN identified using Guide XT

Outcome measurements

- **Programming Time:**
 - CBP: Time needed for monopolar review
 - ABP: Time for loading images, printing anatomical plan, and time to adjust settings on the patient
-
- **Motor Outcomes:** (Baseline, and Follow-Up at 4 and 8 weeks)
 - Baseline: UPDRS-III: MedOFF/StimOFF & MedOFF/StimON
UPDRS IV for motor complications, side effects
 - FU 4 & 8: UPDRS-III: MedOFF/StimON
UPDRS IV for motor complications, side effects
-
- Time spent in an individual program
 - Patients' personal preference for programs (CBP, ABP, BP)



▶ INDICATIONS

Results from different clinical investigations are not directly comparable. Information provided for educational purposes only.

This summary is created by Boston Scientific and is intended to consolidate the paper for educational use only.

Image Guided programming in PD patients enables a reduction in programming time compared with standard clinical based programming (p=39).

Lange F, Et al. Reduced Programming Time and Strong Symptom Control Even in Chronic Course Through Imaging-Based DBS Programming. Front Neurol. 2021 Nov 8;12:785529. N=10

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