Case #1
Telemedicine Programming

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Association of Movement Disorder Advanced Practice Providers

Jessica Karl – Relevant Financial Relationships

- No disclosures to report.

All relevant financial relationships have been mitigated

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Outline:

1. Abbott Neurosphere™ Platform
2. ROAM study
3. Case

Abbott Neurosphere™ Platform

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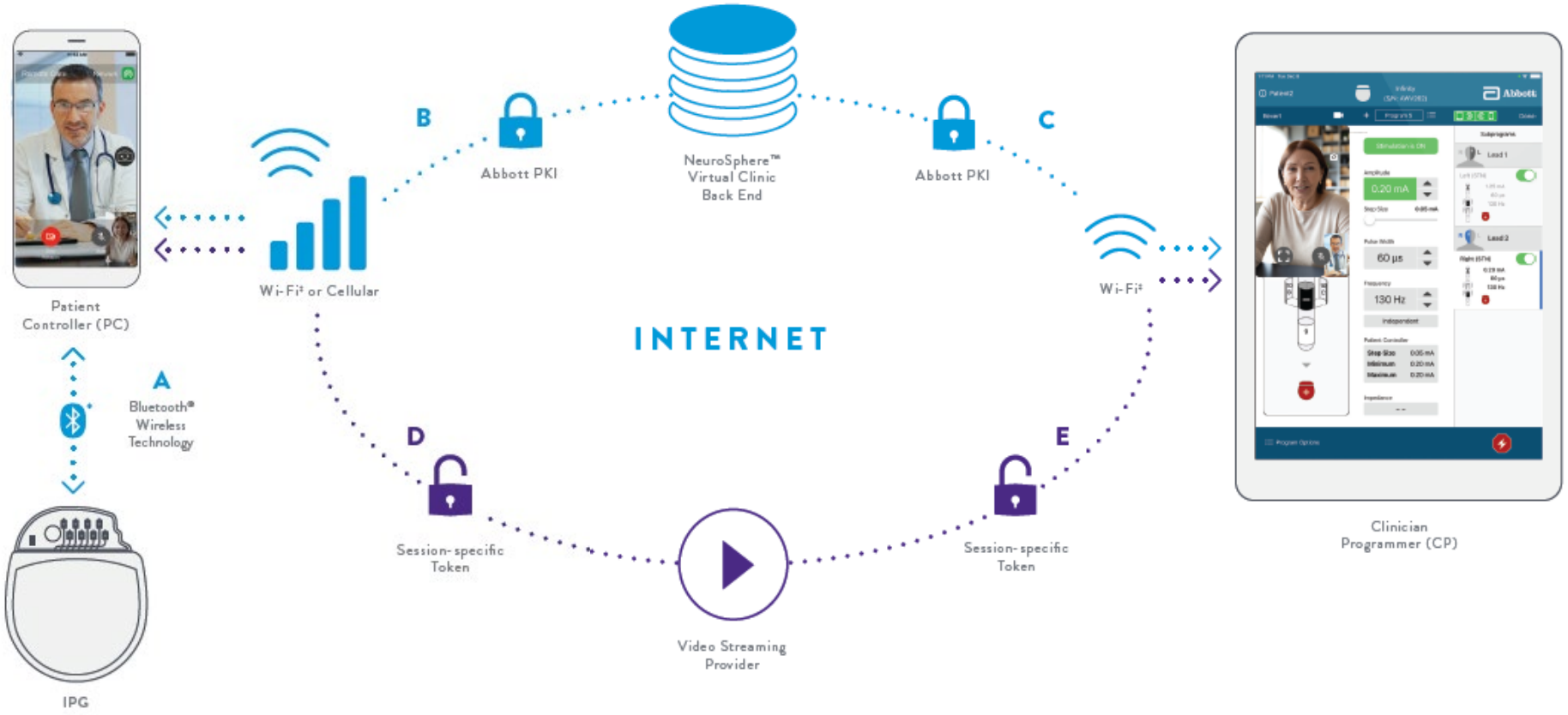
Secure platform backend

NEUROSPHERE™ VIRTUAL CLINIC

PLATFORM BACKEND TO SET UP A SECURE PROGRAMMING SESSION WITH INTEGRATED VIDEO



• PROVIDER EXPERIENCE

NeuroSphere™ Virtual Clinic

1	Video Display On/Off	6	Full Screen Video
2	Network Status Indicator – Clinician	7	Mute/Unmute
3	Network Status Indicator – Patient	8	Stimulation Settings
4	End Session	9	Stimulation Toggle Button
5	Camera Reverse	10	Stop Stimulation

GREEN

YELLOW

RED

FULL SCREEN VIEW IN REMOTE SESSION

• PATIENT EXPERIENCE

NeuroSphere™ Virtual Clinic

1. Network status indicator
2. Camera reverse
3. Mute button mutes your audio to your doctor
4. End Session

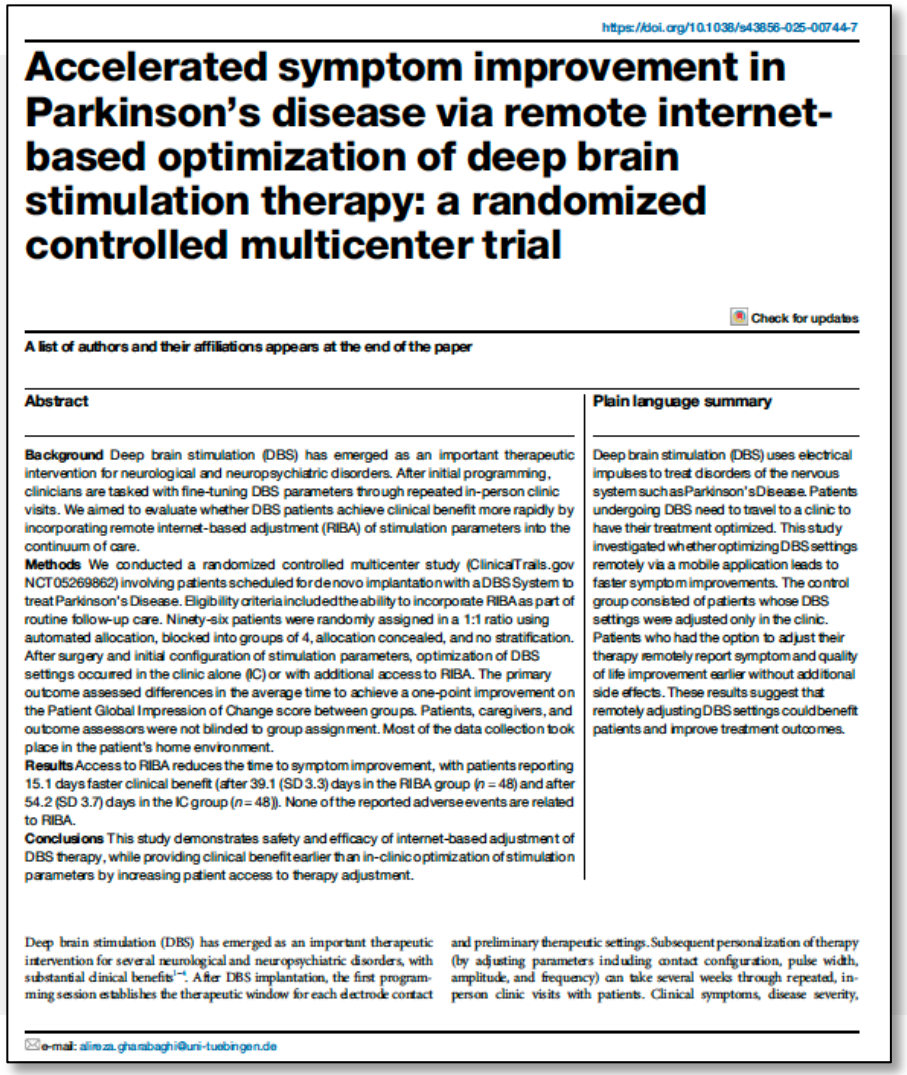
GREEN

YELLOW

RED

ROAM study

ROAM Study



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Accelerated symptom improvement in Parkinson's disease via remote internet-based optimization of deep brain stimulation therapy: a randomized controlled multicenter trial

A list of authors and their affiliations appears at the end of the paper

Abstract

Background Deep brain stimulation (DBS) has emerged as an important therapeutic intervention for neurological and neuropsychiatric disorders. After initial programming, clinicians are tasked with fine-tuning DBS parameters through repeated in-person clinic visits. We aimed to evaluate whether DBS patients achieve clinical benefit more rapidly by incorporating remote internet-based adjustment (RIBA) of stimulation parameters into the continuum of care.

Methods We conducted a randomized controlled multicenter study (ClinicalTrails.gov NCT05269862) involving patients scheduled for de novo implantation with a DBS System to treat Parkinson's Disease. Eligibility criteria included the ability to incorporate RIBA as part of routine follow-up care. Ninety-six patients were randomly assigned in a 1:1 ratio using automated allocation, blocked into groups of 4, allocation concealed, and no stratification. After surgery and initial configuration of stimulation parameters, optimization of DBS settings occurred in the clinic alone (IC) or with additional access to RIBA. The primary outcome assessed differences in the average time to achieve a one-point improvement on the Patient Global Impression of Change score between groups. Patients, caregivers, and outcome assessors were not blinded to group assignment. Most of the data collection took place in the patient's home environment.

Results Access to RIBA reduces the time to symptom improvement, with patients reporting 15.1 days faster clinical benefit (after 39.1 (SD 3.3) days in the RIBA group ($n = 48$) and after 54.2 (SD 3.7) days in the IC group ($n = 48$)). None of the reported adverse events are related to RIBA.

Conclusions This study demonstrates safety and efficacy of internet-based adjustment of DBS therapy, while providing clinical benefit earlier than in-clinic optimization of stimulation parameters by increasing patient access to therapy adjustment.

Plain language summary

Deep brain stimulation (DBS) uses electrical impulses to treat disorders of the nervous system such as Parkinson's Disease. Patients undergoing DBS need to travel to a clinic to have their treatment optimized. This study investigated whether optimizing DBS settings remotely via a mobile application leads to faster symptom improvements. The control group consisted of patients whose DBS settings were adjusted only in the clinic. Patients who had the option to adjust their therapy remotely report symptom and quality of life improvement earlier without additional side effects. These results suggest that remotely adjusting DBS settings could benefit patients and improve treatment outcomes.

Deep brain stimulation (DBS) has emerged as an important therapeutic intervention for several neurological and neuropsychiatric disorders, with substantial clinical benefits[1–4]. After DBS implantation, the first programming session establishes the therapeutic window for each electrode contact and preliminary therapeutic settings. Subsequent personalization of therapy (by adjusting parameters including contact configuration, pulse width, amplitude, and frequency) can take several weeks through repeated, in-person clinic visits with patients. Clinical symptoms, disease severity,

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ROAM-DBS: Remote Optimization, Adjustment, and Measurement for DBS

- The ROAM study (n=98) showed that when remote DBS optimization is incorporated into clinical care:
  - Improvement in symptom relief (patient global impression of change, primary endpoint) and QOL (PDQ-39) are achieved sooner
  - Reduction in clinical visits

Case

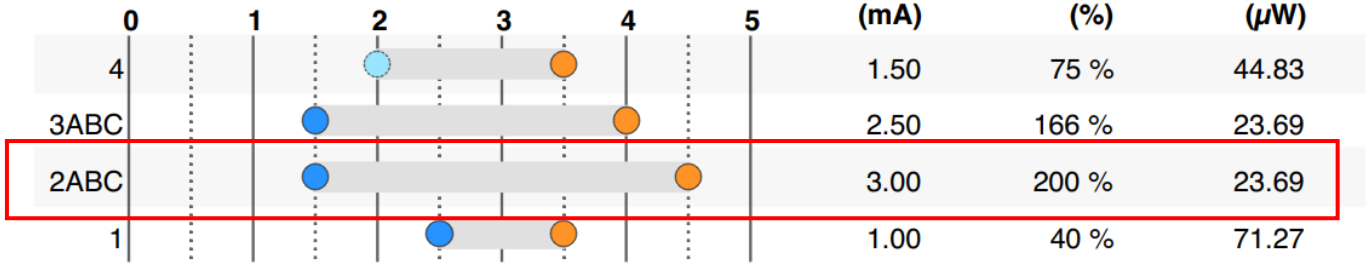
History

- 72-year-old female with a 7- year history of idiopathic PD underwent **bilateral STN DBS in December 2021**
- Indications for surgery:
  - Motor fluctuations and dyskinesias
  - OFF state: severe dystonia in bilateral toes/feet, resting tremor, rigidity
  - ON state: moderate dyskinesias in the bilateral upper extremities, face, and neck
  - Medication: 200-250mg of levodopa every 3 hours, 5x/day; entacapone 200mg 5x/day

Initial programming

- January 2022
- 10 days of microlesion effect bilaterally; required less levodopa
- OFF medication for 12 hours prior to initial programming session
- Baseline examination:
  - Left body: mild resting tremor in UE/LE; mild dystonia (toe/foot)
  - Right body: moderate resting tremor in UE/LE; severe dystonia (toe/foot)
  - Minimal bradykinesia and rigidity bilaterally (microlesion)

Lead 1: Left



	Window (mA)	Window (%)	Power (μW)
4	1.50	75 %	44.83
3ABC	2.50	166 %	23.69
2ABC	3.00	200 %	23.69
1	1.00	40 %	71.27

Electrode	mA	Effect		
4	2.00	Partial	Benefit	• Rest Tremor • Dystonia
	Notes	Rest tremor with concentration, dystonia minimal		
	3.50	Sustained	Side Effect	• Tremor (Mild) • Speech Disturbance (Mild)
3ABC	1.50	Complete	Benefit	• Rest Tremor • Dystonia
	Notes	Tremor resolved, dystonia minimal		
	4.00	Sustained	Side Effect	• Speech Disturbance (Mild)
2ABC	1.50	Complete	Benefit	• Rest Tremor • Dystonia
	Notes	Minimal dystonia		
	2.50	Transient	Side Effect	• Dyskinesia (Mild)
	4.50	Sustained	Side Effect	• Muscle Contraction (Mild)
	Notes	RLE became tight		
1	1.55	Transient	Side Effect	• Dyskinesia (Mild)
	2.50	Complete	Benefit	• Dystonia
	Notes	Feels zero tension/dystonia		
	3.50	Sustained	Side Effect	• Speech Disturbance (Mild)

L/R	Contacts	mA	PW	Freq	Range
L STN	2-C+	2.0	60	130	0-2.0

Patient instructions

- Medication reduction
  - Based on response to stimulation
  - Observe levodopa response in clinic if needed
- Dyskinesia
  - Turn off stimulation until dyskinesia resolves
  - Lower levodopa dose
  - Turn stimulation down

Follow up visit #1 – In person

- **History**:
- Reported severe L body dyskinesias
  - Began evening of the initial programming visit
- Patient turned R STN stimulation OFF (0.0mA) until next day
- Next day turned R STN stimulation to 0.5mA and increased LD to 150mg every 3 hours

- **Programming**:
- Held medication for 12 hours
- Increased R STN amplitude to 2.5 mA*
  - Resolution of tremor, dystonia; minimal bradykinesia
  - 50mg of LD – observed for 1 hour, no dyskinesias
- No change to L STN
- *Can also slowly increase amplitude while slowly pulling back on medication; depends on sensitivity of patient

Follow up visit #2- Remote

- **History**:
- R STN:
- Lowered amplitude to 2.2mA
- Taking 50mg of LD every 3 hours
- Sx well controlled

- **Programming**:
- None completed
- Planned to implement advanced programming strategies if needed*

Pearls

1. STN induced dyskinesia can look very different from patient's pre-operative dyskinesias
2. Medication and STN DBS can have a synergistic effect
   - Reduction of medication necessary to use higher stimulation parameters
3. Peak dose vs. diphasic (?)
4. Programming may need to occur in the medication-ON state
   - Evaluate severity of dyskinesias
   - Adjust parameters accordingly
5. Pallidofugal fiber/Zi activation

Thank you!

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