

Interim Six-Month Results from a Prospective Multicenter Study of Multiphase SCS System With Remote Device Management



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INTRODUCTION

- A proprietary multiphase spinal cord stimulation (SCS) therapy has previously been assessed preclinically and in a short-term clinical trial
- In a large animal model, multiphase SCS produced a larger area of hemodynamic response that penetrated deeper into the dorsal horn and provided greater coverage of the spinal cord versus other SCS modalities¹
- Published results from BENEFIT-02 (NCT03594266), a prospective feasibility study, demonstrated that multiphase SCS resulted in significant pain relief, improvements in sleep quality, and increased physical activity with minimal adverse events²
- While most SCS systems require in-person programming, emerging technologies with remote device monitoring and/or programming offer the potential to improve patient care and outcomes through the proactive and timely identification/resolution of SCS device and therapy-related issues³⁻⁵
- In March 2023, the US Food and Drug Administration approved the Prospera™ SCS System* as an aid in the management of chronic, intractable pain in the trunk and/or limbs (BIOTRONIK SE & Co. KG, Berlin, Germany)
- The system features RESONANCE™, the first and only multiphase stimulation paradigm, paired with proactive care, a patient-centric care model made possible by offering automatic, objective, daily remote monitoring, remote programming, and ongoing management and support

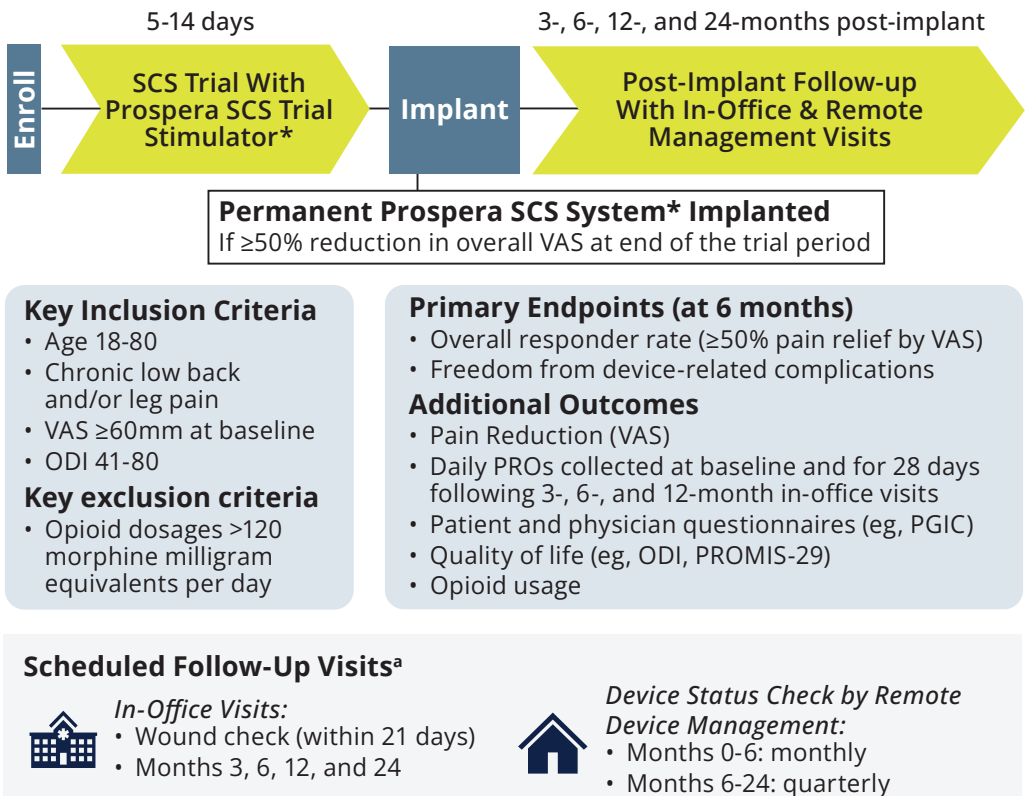
OBJECTIVE

- To describe interim data from BENEFIT-03 (NCT04683718), the first long-term study of an SCS system with a proprietary multiphase stimulation paradigm and automatic daily transmission of objective device monitoring data with remote programming

METHODS

- BENEFIT-03 is a prospective, multicenter, single-arm study with 24-month follow-up conducted at up to 5 Australian sites with Human Research Ethics Committee approval and participant informed consent, evaluating effectiveness and safety of the Prospera SCS System* (Figure 1)
- Additional study data are detailed in 2 other ASRA posters presented by L. Kapural

Figure 1. Study Design



ODI, Oswestry Disability Index; PGIC, Patient Global Impression of Change; PRO, patient-reported outcomes; PROMIS-29, Patient-Reported Outcomes Measurement Information System-29; Version 2.1; SCS, spinal cord stimulator; VAS, Visual Analog Scale. *As needed, participants will also be seen in clinic and contacted for remote management visits.

INTERIM 6-MONTH RESULTS†

Participants and Baseline Characteristics

- From Sept 2021 to Sept 2022, 55 participants were consented and assessed for eligibility; of these, 46 were provisionally enrolled, 34 trialed, and 31 implanted with the Prospera SCS System* (mean implant duration: 310 days [range: 42-556])
- Participants had high baseline disease burden, with mean pain duration over 10 years and 56.5% taking opioid analgesics (Table 1)
- Participants with baseline travel data (n=43) reported a mean of 16 office visits over the 12 months prior to enrollment for their chronic pain management
 - Visits required a mean travel time of 109 minutes (n=44), resulting in high costs and affecting work

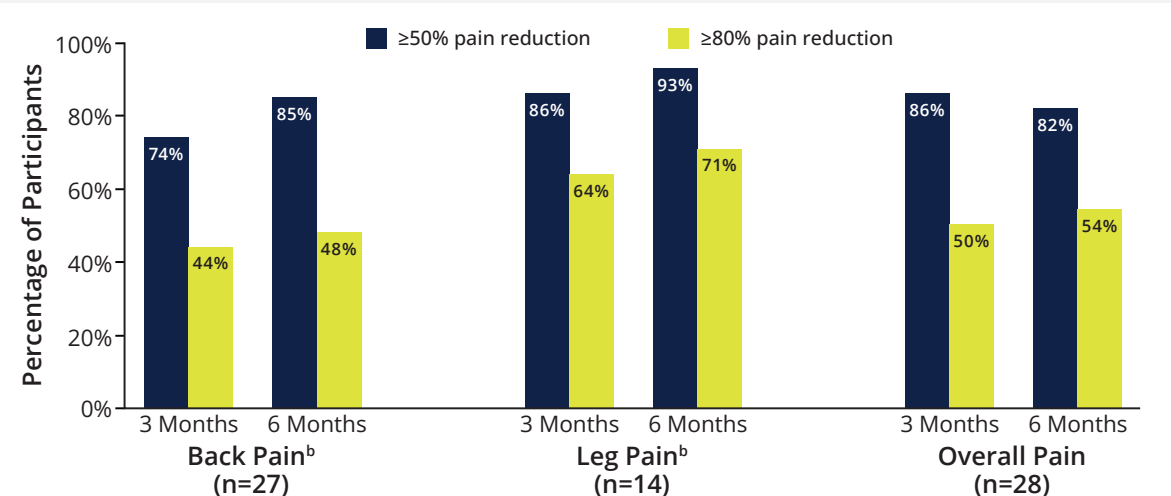
Table 1. Baseline Characteristics

n=46 ^a	
Age, mean (SD), years	58.6 (13.6)
Female, n (%)	24 (52.2)
Duration of pain, mean (SD), years ^b	10.5 (9.4)
Pain intensity (VAS), mean (SD)	
Overall	80.3 (12.2)
Back	71.7 (21.0)
Leg	55.1 (32.9)
With previous back surgery, n (%)	23 (50.0)
Taking opioid analgesics, n (%)	26 (56.5)
Morphine equivalent units, mean (SD), mg/day ^c	42 (34.7)
Most frequent pain diagnoses (>20%), n (%) ^d	
Degenerative disc disease	21 (45.7)
Low back pain	16 (34.8)
Failed back surgery syndrome	11 (23.9)
Primary region of pain, n (%)	
Low back	33 (71.7)
Leg	13 (28.3)
Employment status, n (%) ^e	
Full time	5 (11.4)
Part time	8 (18.2)
Unemployed	18 (40.9)
Retired	13 (29.6)

Pain Intensity and Responders

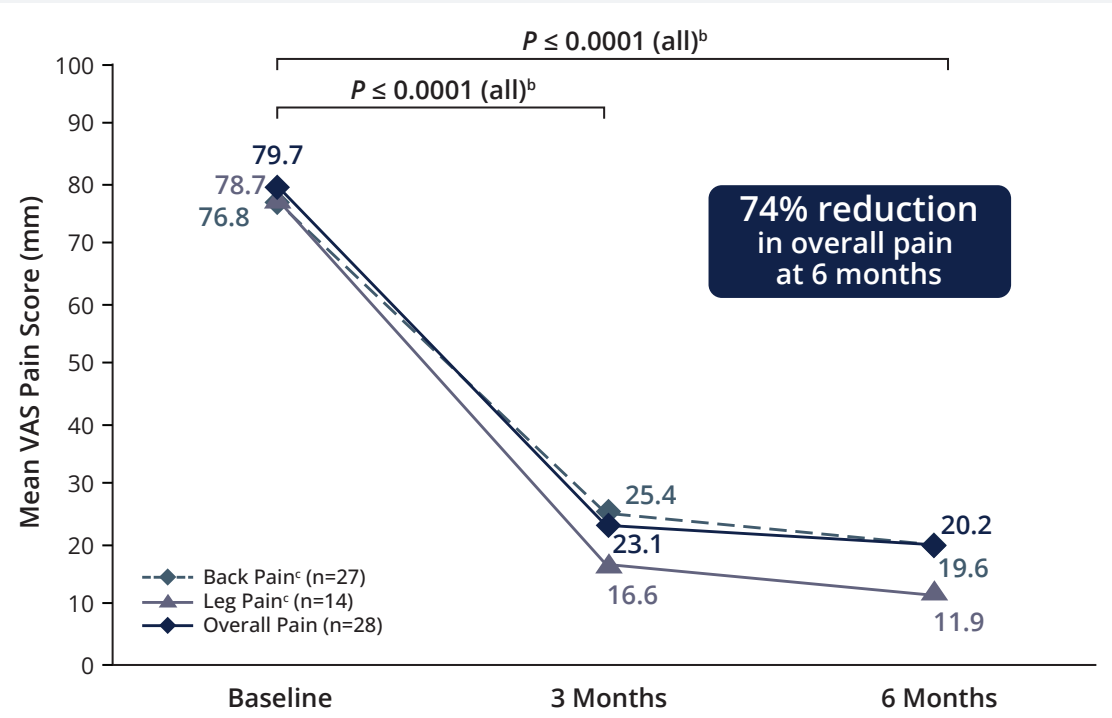
- At 6 months, 82-93% of participants were responders (with ≥50% pain reduction from baseline in back, leg, or overall pain) and 48-71% had ≥80% pain reduction from baseline (Figure 2)
- Back, leg, and overall pain mean VAS scores significantly improved from baseline (76.8-79.7) to month 3 (16.6-25.4) and month 6 (11.9-20.2) (Figure 3)

Figure 2. Responders From Baseline to 3 and 6 Months^a



^aParticipants with baseline and 6-month data were included in the analysis (cutoff date: June 2023). ^bParticipants with baseline VAS≥60mm for back or leg pain included in each respective analysis.

Figure 3. Improvement in VAS Pain Scores Through 6 Months^a

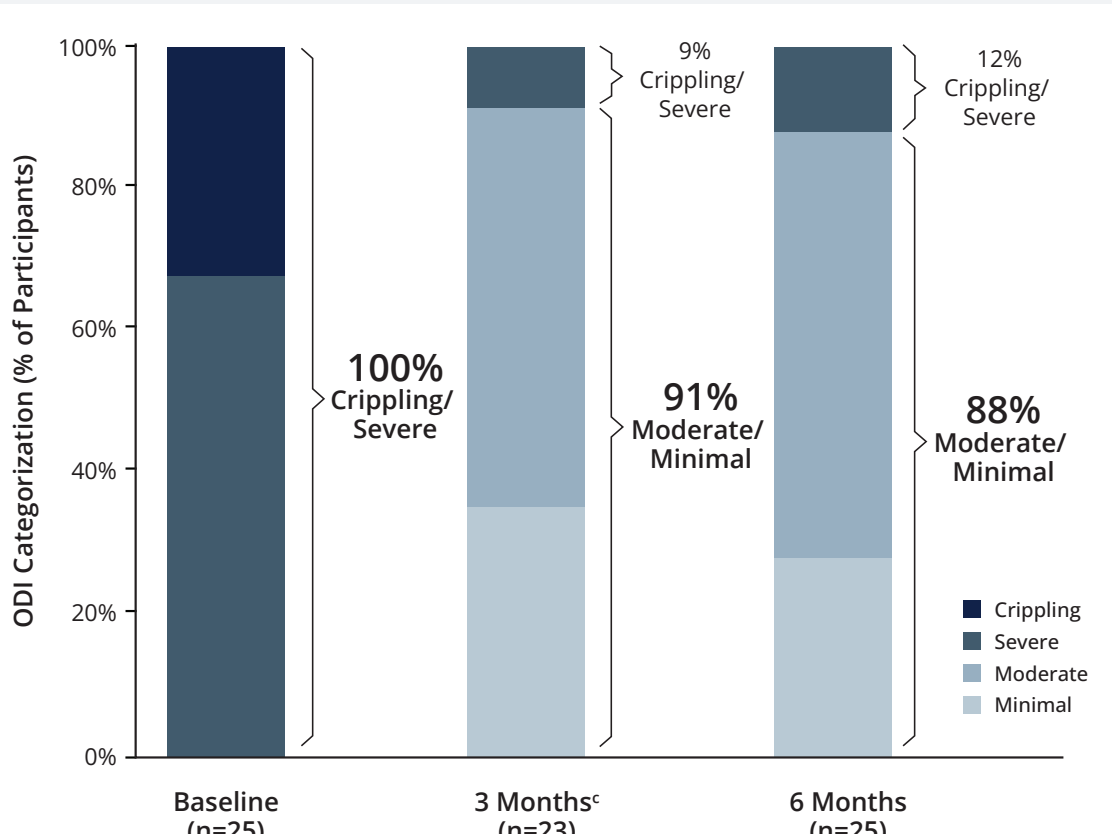


VAS, Visual Analog Scale. ^aParticipants with baseline and 6-month data were included in the analysis (cutoff date: June 2023). ^bNonparametric signed-rank test. Study not powered to detect VAS reduction. ^cParticipants with baseline VAS≥60mm for back or leg pain included in each respective analysis.

Oswestry Disability Index and Opioid Medication Usage

- Oswestry Disability Index (ODI) scores improved from baseline to month 6, indicating less severe disability; categorization by ODI score is shown in Figure 4
- Among those with opioid usage at baseline (n=15/23; 48.2 mg/d morphine equivalent units):
 - By 3 months, 47% eliminated opioids and 60% eliminated/reduced opioid dose by ≥50%
 - By 6 months, 80% eliminated opioids and 87% eliminated/reduced opioid dose by ≥50%

Figure 4. Oswestry Disability Index^{a,b}

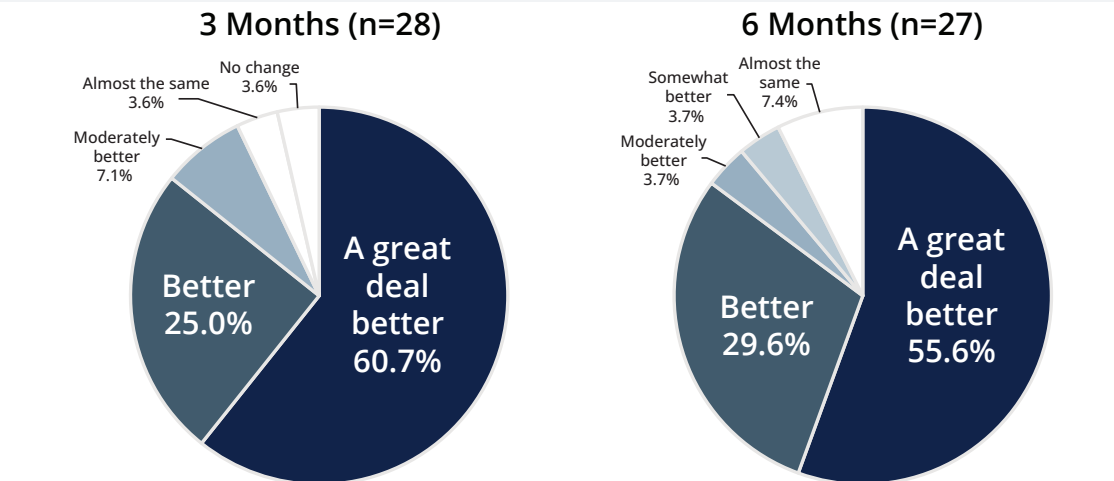


ODI, Oswestry Disability Index. ^aODI category of bedridden not shown (0% at baseline, 3 months, and 6 months). ^bParticipants with baseline, 3-month, and 6-month data were included in the analysis (cutoff date: June 2023). ^cTwo participants had incomplete questionnaires at 3 months.

PGIC and PROMIS-29

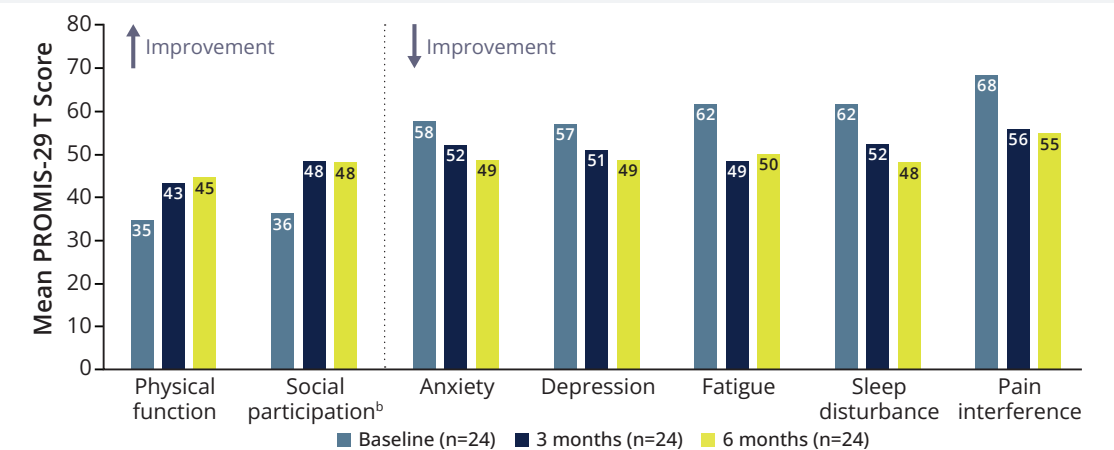
- Most participants (85%) said their stimulator made their life better or a great deal better (Figure 5)
- All domains of the PROMIS-29 questionnaire were improved from baseline to month 6 (Figure 6)

Figure 5. Participant Global Impression of Change^{a,b}



^aChange in activity limitations, symptoms, emotions, and overall quality of life versus life prior to having stimulator. ^bParticipants with 3-month and 6-month data were included in the analysis (cutoff date: June 2023).

Figure 6. PROMIS-29 Assessment^a



PROMIS-29, Patient-Reported Outcomes Measurement Information System-29; Version 2.1. ^aParticipants with baseline, 3-month, and 6-month data were included in the analysis (cutoff date: June 2023). ^bAbility to participate in social roles and activities.

Safety

- Only 1 device- or procedure-related serious adverse event was reported (Table 2)

Table 2. Summary of Adverse Events^a

	Number of AEs	Number (%) ^b of participants with AE
Total SAEs	6	6 (10.9)
Device- or procedure-related	1	1 (1.8)
Lead anchor failure, surgically resolved ^c	1	1 (1.8)
Not related to device or procedure	5	5 (9.1)
Baclofen overdose	1	1 (1.8)
Perianal abscess	1	1 (1.8)
Reaction to concomitant medication	1	1 (1.8)
Seizures	1	1 (1.8)
Seizures with functional decline	1	1 (1.8)
Total non-serious AEs	35	17 (30.9)
Device- or procedure-related	16 ^d	9 (16.4)
Not related to device or procedure	19 ^e	13 (23.6)

AE, adverse event; SAE, serious adverse event. ^aCutoff date: June 2023. ^bOf all consented participants (n=55). ^cBy replacement of anchor. ^dLead migration (3 events); bilateral leg heaviness (2 events); and areas of numbness, cellulitis, charging malfunction, fall, inadequate pain relief from permanent SCS implant, wound site itchiness, new area of pain, seroma, vomiting, wound site pain, and suspected superficial infection (1 event each). ^eCOVID-19 infection, fall, new area of pain, and suspected kidney stones (2 events each); acute disc injury, acute low back pain, laryngitis, nose infection, paronychia, pneumonia, rash, sacroiliac joint pain, suboxone withdrawal symptoms, suspected miscarriage, and unrelated neck pain (1 event each).

CONCLUSIONS

- BENEFIT-03 interim results provide evidence supporting safety and effectiveness of multiphase stimulation with remote device management and proactive care
- At 6 months, in-clinic VAS scores indicated highly effective chronic pain relief: 82% of participants were responders and 54% were high responders
- Consistent with effective pain relief, 88% of participants transitioned from severe/crippling disability to moderate/minimal disability
- Of opioid users, 87% eliminated use or reduced their dose by ≥50% at 6 months
- Serious adverse events related to the device or procedure were rare, with only 1 event reported

Proactive Care: BIOTRONIK Neuro's remote support team may reach out to patients to ensure proper usage of the spinal cord stimulator based on remotely monitored data. BIOTRONIK Neuro does not provide health advice or clinical actions outside the scope of spinal cord stimulator proper usage. This product support is not a replacement for the patient's responsibility to communicate any medical questions or concerns with the physician's office.

*Approved in the US only; not commercially available outside the US.

†At the time of this interim analysis not all participants had completed 3- and 6-month follow-ups. Outcomes may change as additional participant data are collected.

AUTHOR DISCLOSURES

M. Russo has historical minor equity holding in SPR Therapeutics and options in Saluda Medical and Presidio Medical. J. Yu has consulted for Abbott, Nevro, Medtronic, Boston Scientific and participated in research for Nevro, Boston Scientific, Medtronic, Saluda, Biotronik, and Nalu. V. Mohabbati has consulted for Medtronic, Abbott, Saluda, Nevro, and participated in research for Nevro, Medtronic, Abbott, Nalu, and Saluda. K. Amirdelfan has consulted for Medtronic, Boston Scientific, Nevro, Biotronik, and Nalu (minor options). L. Kapural has consulted for Nevro, Abbott, Medtronic, Nalu, Saluda, and Biotronik and participated in research for Nevro, Medtronic, Gimer Medical, Neuros, Saluda, Biotronik, and SPR Therapeutics. P. Verrills has consulted for Presidio, Biotronik, Saluda, and Nalu and has participated in research with Biotronik and Presidio.

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