Body mass index trajectory as an objective biomarker of spinal cord stimulation response: a retrospective cohort study

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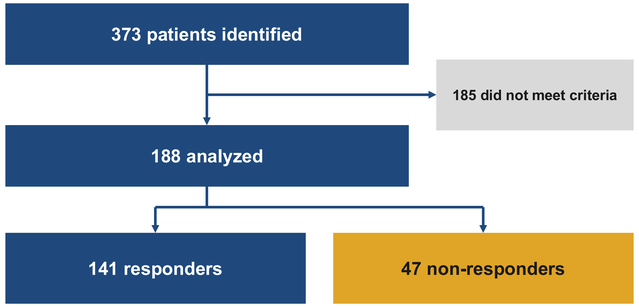
INTRODUCTION

Spinal cord stimulation (SCS) is an established therapy for chronic pain, yet response is judged almost entirely by subjective, patient-reported outcomes, and objective biomarkers are scarce. We hypothesized that successful SCS restores mobility and produces secondary weight loss, making post-implant body mass index (BMI) and weight trajectory an objective marker of therapeutic response independent of self-reported pain.

METHODS

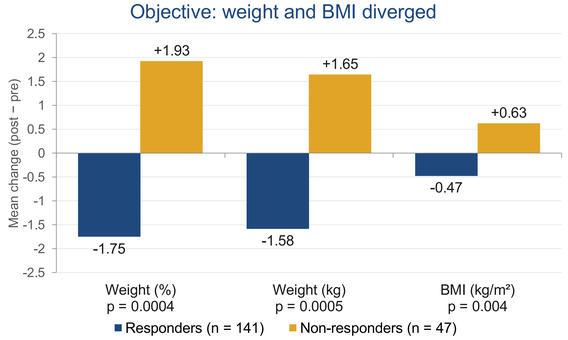
- Single-center retrospective cohort, Ochsner Health facilities, 14 July 2022 – 14 July 2025
- SCS implants identified via Epic SlicerDicer (CPT 63650/63655)
- Pre- and post-implant weight, BMI, Pain Disability Index (PDI), and numeric pain score abstracted from office notes
- Excluded: missing follow-up metrics, prior bariatric surgery, weight-loss–promoting treatment, revisions unrelated to pain
- Responder = treating physician's documented global assessment of benefit, not a pain-score cutoff
- Paired and Welch two-sample t tests (R/RStudio, Microsoft Excel)
- IRB approved (STUDY00003187; protocol 2025.424); consent and HIPAA authorization waived

Cohort selection



After SCS, responders lost weight while non-responders gained weight — yet pain scores improved equally in both groups.

RESULTS



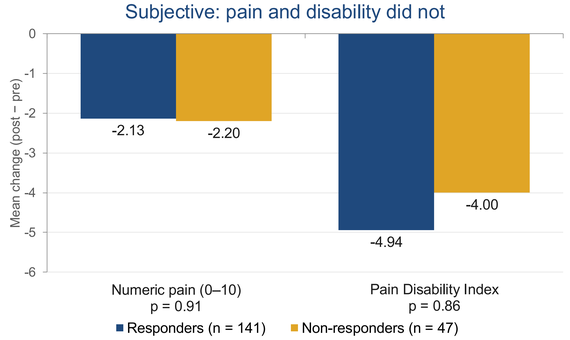


Table 1. *Between-group comparison of change scores (post − pre), by response*

Measure	Responders: mean Δ (SD) [95% CI]	Non-responders: mean Δ (SD) [95% CI]	Welch p
Body weight (kg)	−1.58 (5.87) [−2.56, −0.60]	+1.65 (5.09) [0.14, 3.17]	**0.0005**
Body-weight change (%)	−1.75 (7.00) [−2.92, −0.59]	+1.93 (5.46) [0.31, 3.56]	**0.0004**
BMI (kg/m²)	−0.47 (2.46) [−0.88, −0.06]	+0.63 (2.10) [0.01, 1.25]	**0.004**
Numeric pain (0–10)	−2.13 (3.41) [−2.71, −1.54]	−2.20 (4.09) [−3.45, −0.96]	0.91
Pain Disability Index	−4.94 (17.39) [−9.06, −0.83]	−4.00 (22.45) [−14.50, 6.50]	0.86

Analytic N = 188 (141 responders, 47 non-responders); per-measure n varies with missing data. Bold = p < 0.05.

WHOLE COHORT (N = 188)

- **Numeric pain score:** 6.62 → 4.43 (p < 0.001)
- **Pain Disability Index:** improved (p = 0.016)
- **Body weight:** 86.93 → 85.82 kg (p = 0.068, NS)
- **BMI:** 30.16 → 29.98 kg/m² (p = 0.257, NS)

Pain and disability improved overall, but weight and BMI did not change — until patients were stratified by response.

DISCUSSION

- Weight and BMI trajectory distinguished responders from non-responders, whereas pain and disability scores improved in both groups.
- Response was classified by the treating physician's global assessment rather than the numeric pain score, which was unreliable over long-term follow-up.
- Weight is an involuntary outcome that may track whether analgesia restored mobility and activity.
- If validated, post-implant BMI trajectory could serve as an inexpensive, universally recorded objective adjunct to subjective outcomes.
- *Limitations: single-center retrospective design, uneven groups (141 vs 47), unblinded responder classification, and variable follow-up.*

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