MICHIGAN ORTHOPAEDIC SURGEONS | SPINE SURGERY

Ryan Berger, M.D. Orthopaedic Spine Surgeon

Spinal Cord Stimulation for Painful Diabetic Neuropathy

An Evidence-Based Referral Guide for Referring Clinicians

85%	10 kHz	94%
≥50% pain relief at 6 months (RCT)	FDA-approved for Painful Diabetic Neuropathy	Trial-to-permanent conversion rate

Why Refer for SCS?

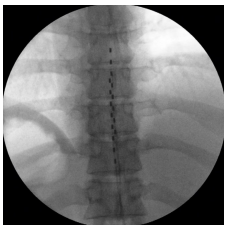
Painful diabetic neuropathy (PDN) affects up to 26% of diabetic patients. When first- and second-line medications fail, high-frequency 10-kHz SCS delivers superior, durable relief — and is the only PDN therapy shown to also improve neurological function.

How SCS Works: 10-kHz spinal cord stimulation delivers high-frequency electrical pulses to the dorsal column of the spinal cord, modulating pain signal transmission via gate-control and central sensitization pathways. Unlike conventional low-frequency SCS, 10-kHz therapy achieves this effect without paresthesia — patients experience pain relief with no tingling or buzzing sensation, a key advantage over older SCS systems.

SCS produced a mean 5.46-point pain reduction (0–10 scale) vs. best medical therapy — far exceeding the minimal clinically important difference. (Meta-analysis, 2025)

International guidelines recommend SCS before long-term opioid therapy. SCS carries no addiction risk and improves sleep, function, and quality of life.

Spinal Cord Stimulator IPG
Implantable Pulse Generator — actual device size



AP Fluoroscopy — SCS Lead
Intraoperative lead placement, mid-thoracic

Comparative Efficacy

Treatment	≥50% Pain Relief	Neurologic Improvement	Durability
10-kHz SCS	**85–90%**	**66–71% ✓**	**Sustained 24 mo**
Pregabalin	~47%	None	Limited
Duloxetine	42–59%	None	Limited
Opioids	~40%	None	Not recommended

Sources: SENZA-PDN RCT (JAMA Neurology 2021); ASPN SWEET Guidelines (2024); Meta-analyses (Neuromodulation 2025, Pain 2021)

Who to Refer

✓ REFER IF:
- PDN affecting lower extremities
- Pain ≥5/10 despite medication trial
- Failed gabapentinoid or duloxetine/SNRI
- Intolerable medication side effects
- Motivated for non-pharmacologic Rx
- No HbA1c minimum required

✗ DO NOT REFER IF:
- Active systemic infection
- Unable to operate device
- Active substance use disorder
- Untreated major psychiatric disorder

Referral Pathway

STEP 1
Identify Candidate
PDN with pain ≥5/10 after ≥1 failed medication trial (gabapentinoid or duloxetine)

STEP 2
Place Referral
Contact Dr. Berger's office with prior medication history and pain scores

STEP 3
SCS Trial (~7 days)
Outpatient, reversible lead trial — 94% of patients proceed to permanent implant

The SCS trial is outpatient, minimally invasive, and fully reversible. Leads are placed under fluoroscopy and connected to an external generator worn ~7 days. Success is defined as ≥50% pain reduction. In SENZA-PDN, 94% of trial patients converted to permanent implant.

Safety Profile & Insurance Coverage

Safety Profile

- Lead migration: 0.9–14% (usually repositionable)
- Surgical site infection: ~3–7% (3.2% in diabetic cohorts with proper precautions)
- Reoperation: 2–31% (device longevity / revision)
- Epidural hematoma: 0.25–0.3%; neurologic injury: 0.03–0.25%

Device designed to last ≥10 years. Most modern systems are MRI compatible. Most patients return to normal activity within 2–4 weeks of permanent implant.

Insurance & Authorization

- Covered by Medicare and most major commercial payers following FDA approval (2021/2022)
- Prior authorization required — Dr. Berger's office handles all documentation

Documents helpful for referral:

- Medication trials with dates and response
- Current pain scores and functional limitations
- Confirmed DM diagnosis / recent HbA1c

Key Supporting Evidence

SENZA-PDN RCT — JAMA Neurology, 2021	85% of 10-kHz SCS patients achieved ≥50% pain relief vs. 5% with conventional management. 24-month data: 90.1% maintained relief; mean reduction 79.9% from baseline.
ASPN SWEET Consensus Guidelines, 2024	International guidelines recommend SCS (especially 10 kHz) for refractory PDN before opioid therapy. SCS is the only modality improving both pain AND neurological function in 66–71% of patients — specifically demonstrated improvements in thermal and vibration sensory detection thresholds, protective sensation, and lower-extremity motor function.
Meta-Analysis — Neuromodulation, 2025	SCS yielded a mean 5.46-point pain reduction vs. best medical therapy ($p<0.00001$). Quality of life improved significantly (EQ-5D MD: +0.16; self-reported health MD: +15.3 points).
Patient Selection Guidelines — RAPM, 2023	Psychological evaluation recommended. Relative contraindications include active psychiatric disorders, substance use disorders, and inability to operate the device.

■ **Refer a Patient — Ryan Berger, M.D.**
Michigan Orthopaedic Surgeons
■ **Southfield**
26025 Lahser Road, 2nd Floor
Southfield, MI 48033
■ (248) 663-1900 | Fax: (248) 663-1901
Mon–Thu 7:30 AM–5 PM | Fri 7:30 AM–4 PM

■ **West Bloomfield**
33200 W. 14 Mile Rd., Suite 220
West Bloomfield, MI 48322
■ (248) 855-7400 | Fax: (248) 626-6481
Mon–Thu 7:30 AM–5 PM | Fri 7:30 AM–12 PM

Online referrals:
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Main line: (947) 729-2642
ryanbergermd.com