

The History of Spinal Cord Stimulation to Treat Painful Diabetic Peripheral Neuropathy

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INTRODUCTION

Diabetic peripheral neuropathy (DPN) is the most common neuropathic syndrome seen in patients with diabetes. Roughly 30% of the diabetes patient population¹ experience painful DPN symptoms including bilateral stabbing or burning pain in addition to numbness in the feet and lower legs. Traditionally painful DPN symptoms have been treated with conventional medical management (CMM) including glycemic control, general risk factor management, as well as pharmaceutical agents. These treatment approaches are often unsuccessful in the long-term¹. Spinal cord stimulation (SCS) has been demonstrated as an effective treatment for painful DPN of the lower extremities with multiple publications dating back to 1996 showing benefits of SCS for pain relief and improved Quality of Life (QoL) in DPN patients (Figure 1)²⁻¹⁹.

MATERIALS & METHODS

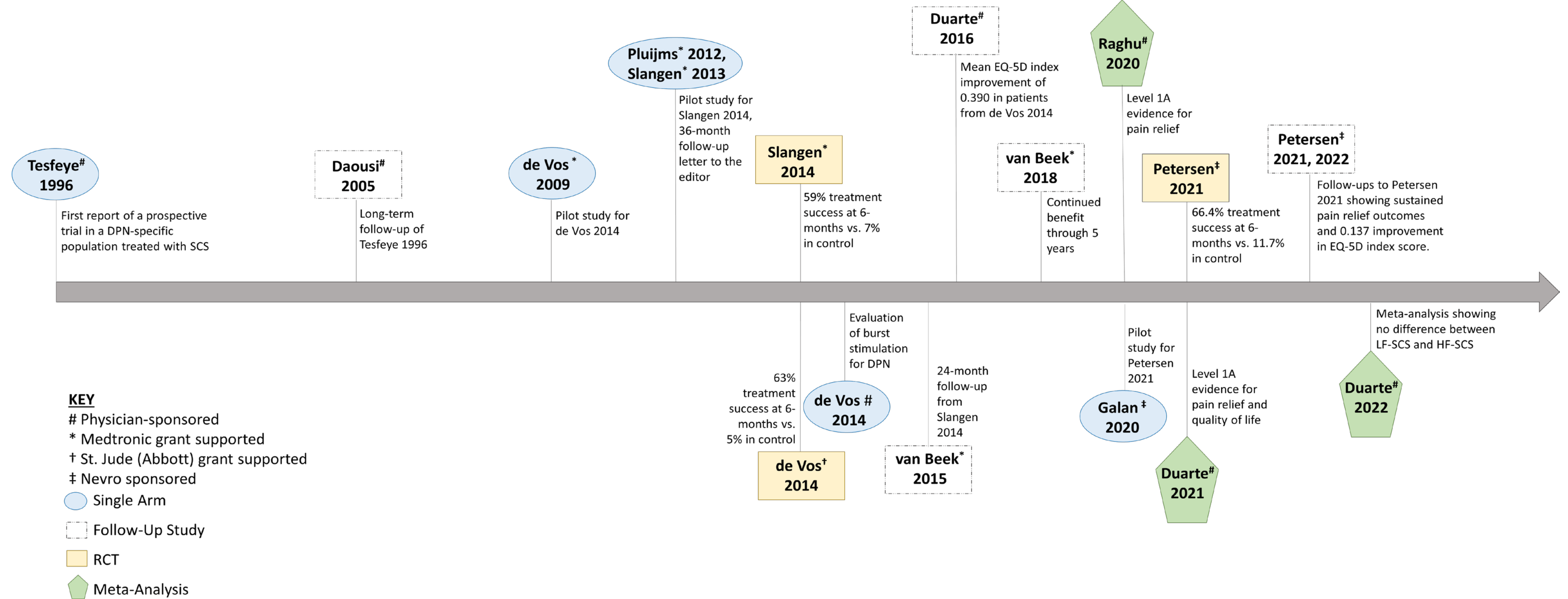
A systematic literature review of the robust body of evidence for SCS in the treatment of painful DPN was conducted. Publications were selected for inclusion by two independent reviewers using defined selection criteria. Additional relevant publications from outside the search dates were included.

RESULTS

SCS was first documented as an effective treatment for DPN in three single-arm studies published between 1996 and 2012^{2,4,5}, one of which was followed-up to thirty-six months¹⁸, and another to seven-years³. These studies paved the way for two RCTs published in 2014^{6,7}, one of which was followed-up to five-years in two publications^{8,10}, and another⁷ was followed-up with analyses on QoL⁹ and an evaluation of the effects of burst SCS¹⁷. Three meta-analyses were published in 2020, 2021, and 2022^{11,12,19}. A post-hoc analysis of a multi-center single-arm study on high frequency (10kHz) SCS to treat DPN was published in 2020¹³ and followed by an RCT published in 2021¹⁴ with additional 1-year follow-up^{15,16}. Collectively these studies demonstrate that SCS is an effective therapy for patients with painful DPN by reducing pain and increasing QoL for DPN patients (Figure 1).

RESULTS

Figure 1. Key studies of SCS for the treatment of painful DPN. Studies were selected by two independent reviewers according to defined selection criteria. Treatment success, defined as ≥50% pain relief or ≥50% pain relief and/or PGIC of Much Better or Very Much Better, is listed per randomized controlled trial (RCT) by Intention to Treat (ITT) analysis.



DISCUSSION

This review of a large body of evidence shows a decades-long history of the effectiveness of SCS for symptom relief in patients suffering from painful DPN. Future research on the effectiveness of new waveforms and novel methods of energy delivery to the spinal cord are needed. The study of outcomes in addition to pain relief is also needed, which may better illustrate the breadth of effects of SCS therapy on the underlying disease factors. Increasing awareness of the current evidence is essential to increasing therapy adoption by expanding payer support and influencing referring health care provider behavior.

DISCLOSURE

This study was supported by Medtronic.

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UC202309432EN SCS DPN NANS history FY23



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