



# Natural History of Spinal Cord Stimulation Devices and Therapy

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## Introduction

Neuromodulation is a non-destructive, reversible, adjustable modality for the treatment of many neurological disorders. Spinal cord stimulation (SCS) is one example used to treat intractable pain. We aimed to evaluate outcomes in patients implanted with a SCS device to evaluate SCS treatment effect factors, to determine if there is a time-dependent failure rate benefit.

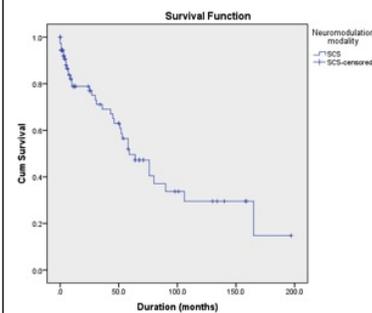
## Methods

A retrospective chart review of prospectively collected data of patients with an implanted SCS device at a single institution between the years 1999-2014 was undertaken and the following data collected: clinical signs, SCS operative procedure details, postoperative complications. Device history and longevity, as determined by the per annum incidence of device and/or therapy failure were evaluated. Kaplan-Meier analysis was applied to generate survival over time and hazard rates for failure. Identification of factors contributing to longevity of hardware was analyzed using log-rank comparisons for univariate analysis and Cox proportional hazards models for multivariate analysis.

## Results

We evaluated data of 112 SCS devices of 112 patients. The mean and median SCS device survival time was  $83.4 \pm 10.3$  and  $59.0 \pm 9.9$  months, respectively. The whole life (200 months) device survival rate was  $\sim 15\%$  while therapy survival rate was  $\sim 67\%$ . The 10 years device survival rate was  $\sim 32\%$  while therapy survival rate was  $67\%$ . There was not enough evidence to conclude if age ( $p=0.1$ ), sex ( $p=0.4$ ), body mass index (BMI) ( $p=0.2$ ), electrode type ( $p=0.35$ ) or location ( $p=0.98$ ) were factors in device and therapy failure. There is a significant difference in 10 years device survival rate among smokers vs non-smokers ( $\sim 48\%$  vs  $\sim 13\%$ ).

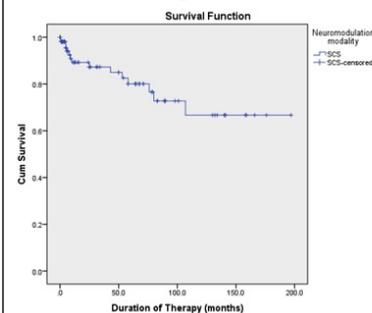
**Figure 1**



Device survival rate

\*censored = device functional at last clinic follow up or device lost to follow up

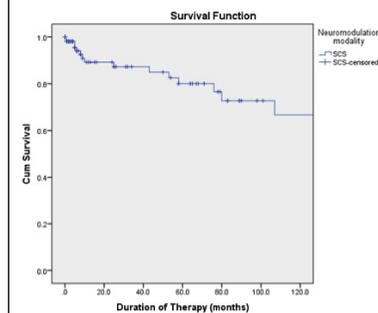
**Figure 2**



Therapy survival rate

\*censored = device functional at last clinic follow up or device lost to follow up

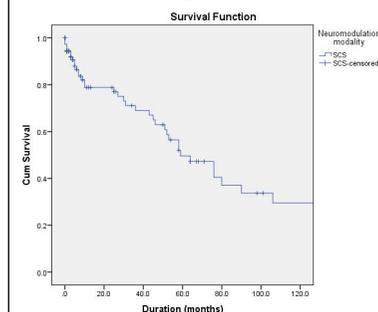
**Figure 3**



10 years device survival rate

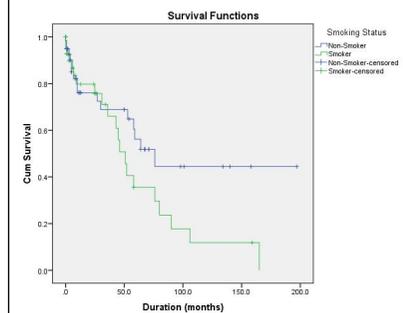
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**Figure 4**



10 years therapy survival rate

**Figure 5**



10 years device survival smokers&nonsmokers

## Conclusion

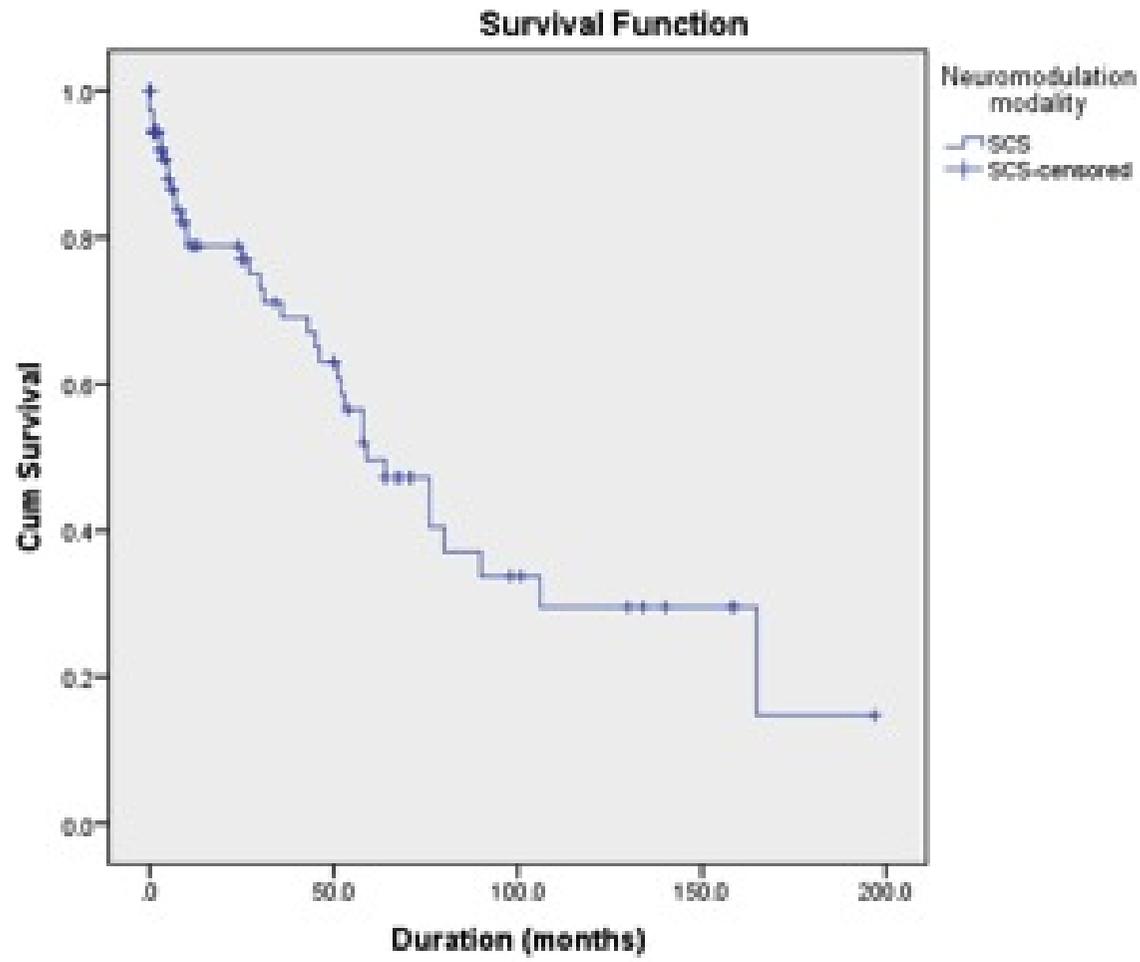
The lifelong device survival of SCS is low, but patients are willing to maintain therapy, therefore they undergo revisions. Smoking is associated with much lower device survival at 10 years. The study provides useful patient-centered data of device and therapy survival in contrast to crude success or complication rates.

## Learning Objectives

By the conclusion of this session participants should be aware of

- mean SCS device survival
- factors that influence SCS device survival

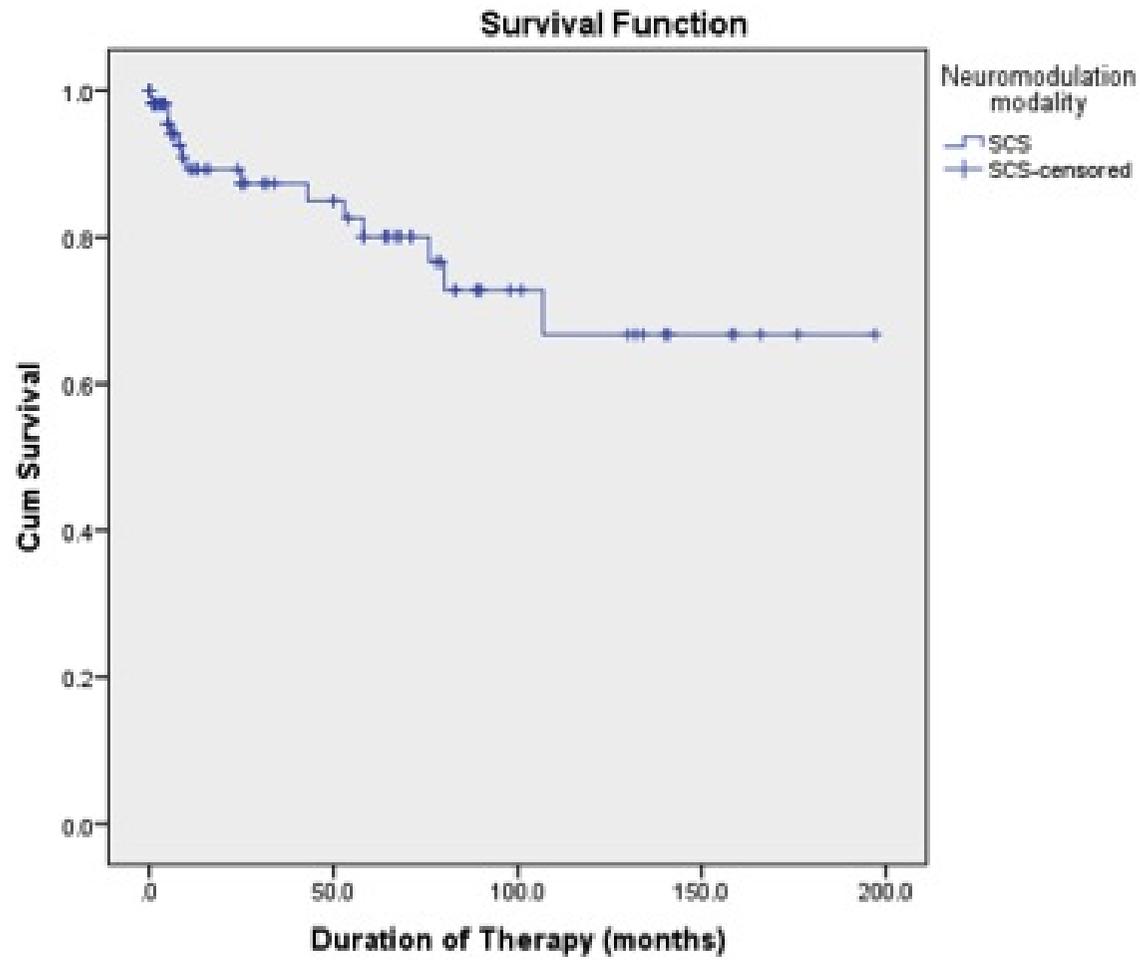
Figure 1



Device survival rate

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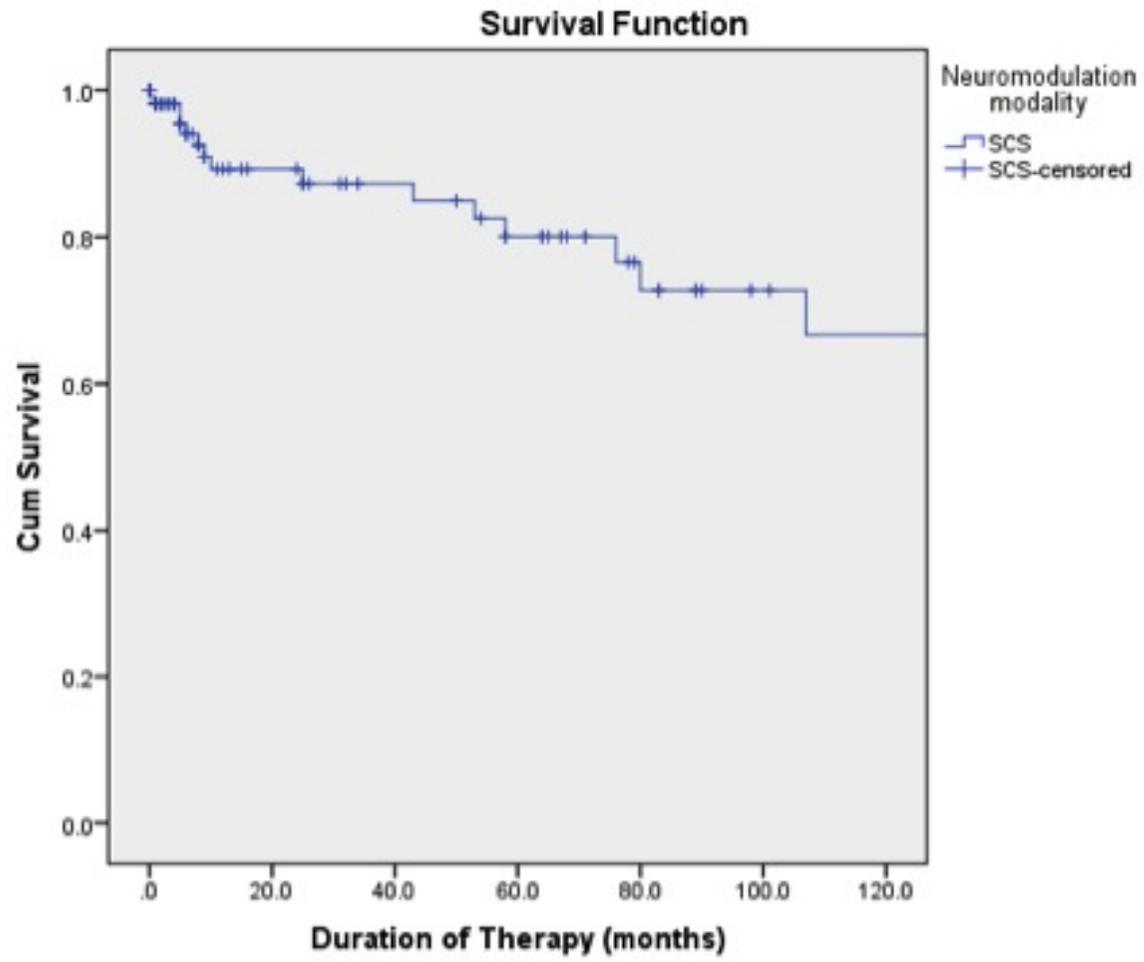
Figure 2



Therapy survival rate

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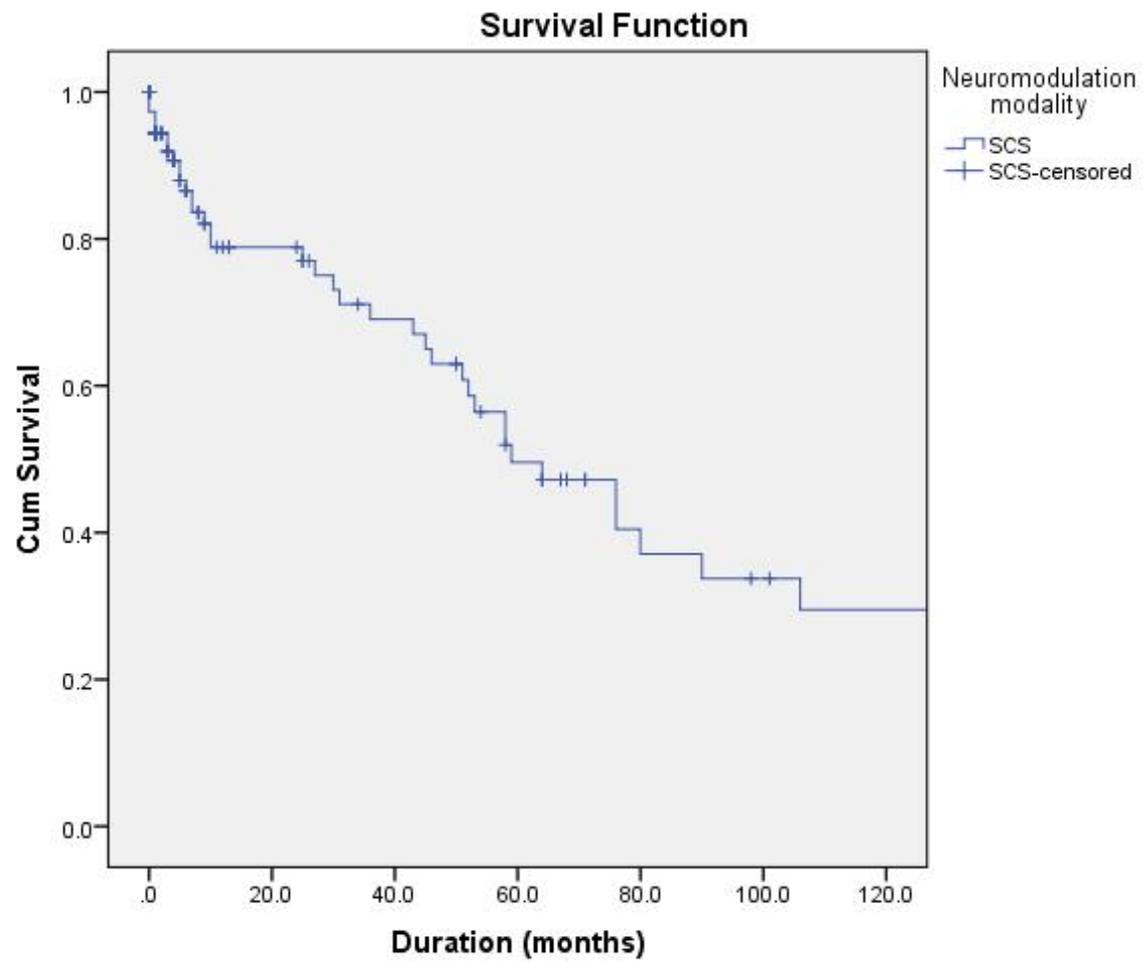
Figure 3



10 years device survival rate

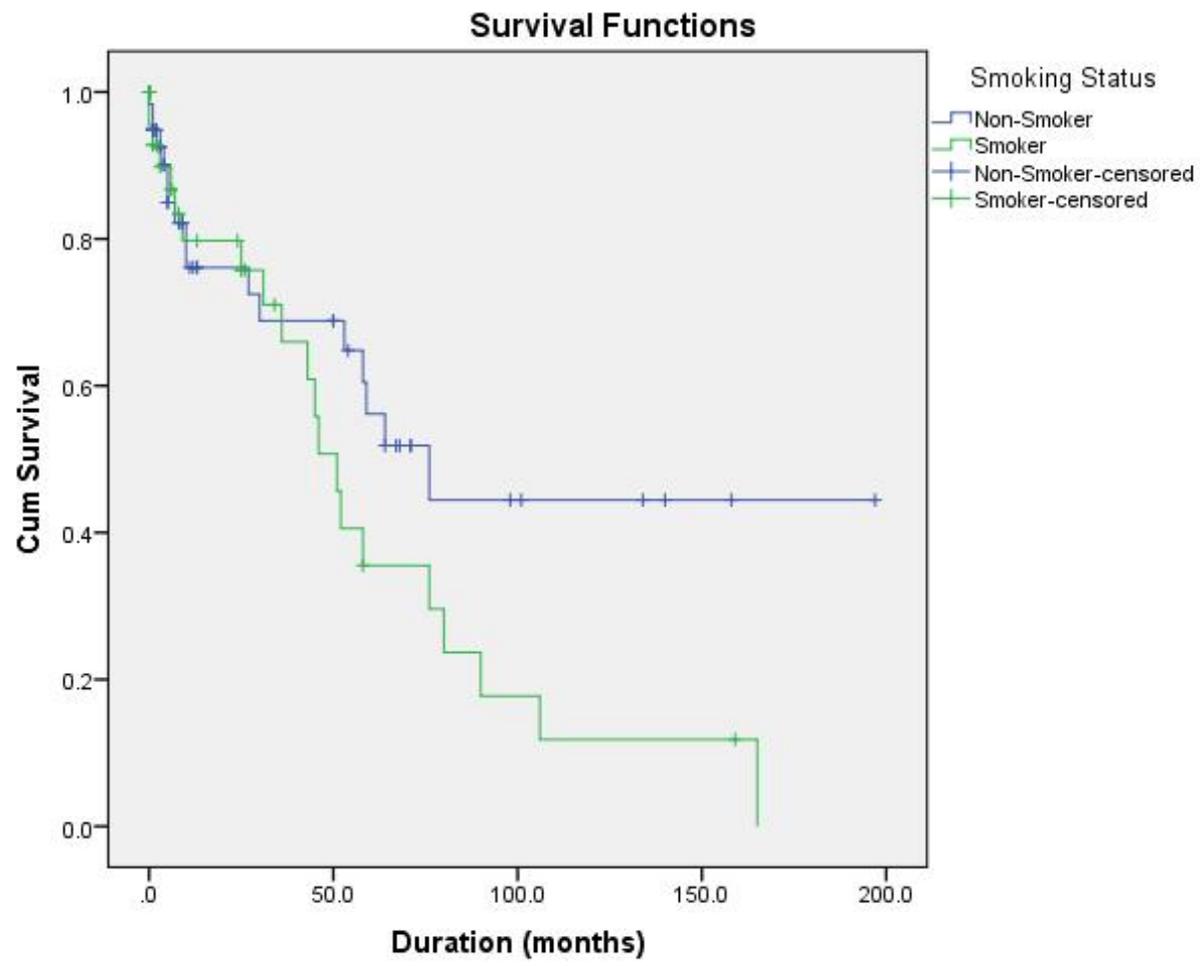
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Figure 4



10 years therapy survival rate

Figure 5



10 years device survival smokers&nonsmokers