

# Voxel-based morphometry of the human brain during Spinal Cord Stimulation in patients with Failed Back Surgery Syndrome

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## Introduction

Spinal Cord Stimulation (SCS) is considered an effective pain-relieving treatment for patients with Failed Back Surgery Syndrome (FBSS). Despite the clinical effectiveness, structural brain modifications after subsensory SCS are not yet explored. The aim of this study is to identify structural volumetric changes during subsensory SCS, in patients with FBSS.

## Methods

Twenty-two patients with FBSS underwent a fMRI protocol before SCS and 3 months after SCS. Voxel-based morphometry was used to evaluate changes in gray matter (GM) and white matter (WM) volume before and during SCS. Clinical parameters were correlated with volumetric changes.

## Results

After SCS, a significant decrease in GM volume was found in inferior frontal gyrus, precuneus, cerebellar posterior lobe and middle temporal gyrus. A significant increase was found in inferior temporal gyrus, precentral gyrus and middle frontal gyrus after SCS. Additionally, significant increases in volume of superior frontal and parietal WM and a significant decrease in volume of precentral WM were revealed after SCS. A significant correlation was revealed between the change in precentral WM volume and change in leg pain intensity.

## Conclusion

Subsensory SCS is able to induce volumetric changes in different brain regions, suggesting the reversibility of brain alterations after chronic pain treatment.