

## **Anatomo-clinical atlases in subthalamic Deep Brain Stimulation correlating clinical data and electrode contacts coordinates**

Florent Lalys, Claire Haegelen, Muriel Baillieul, Alexandre Abadie, Pierre Jannin

► **To cite this version:**

Florent Lalys, Claire Haegelen, Muriel Baillieul, Alexandre Abadie, Pierre Jannin. Anatomo-clinical atlases in subthalamic Deep Brain Stimulation correlating clinical data and electrode contacts coordinates. 7th Annual World Congress for Brain Mapping and Image Guided Therapy, IBMISPS'2010, Apr 2010, United States. inserm-00616979

**HAL Id: inserm-00616979**

**<https://www.hal.inserm.fr/inserm-00616979>**

Submitted on 25 Aug 2011

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# ANATOMO-CLINICAL ATLASES IN SUBTHALAMIC DEEP BRAIN STIMULATION CORRELATING CLINICAL DATA AND ELECTRODE CONTACTS COORDINATES

*Florent Lalys*<sup>1,2,3</sup>, *Claire Haegelen*<sup>1,2,3,4</sup>, *Alexandre Abadie*<sup>1,2,3</sup>, *Muriel Baillieux*<sup>1,2,3</sup>,  
*Pierre Jannin*<sup>1,2,3</sup>

<sup>1</sup> INSERM, U746, Faculty of Medicine CS 34317, F-35043 Rennes, France

<sup>2</sup> INRIA, VisAGeS Unit/Project, F-35042 Rennes, France

<sup>3</sup> University of Rennes I, CNRS, UMR 6074, IRISA, F-35042 Rennes, France

<sup>4</sup> Department of Neurosurgery, Pontchaillou University Hospital, F-35043 Rennes, France

## 250-word abstract

### Introduction

Movement disorders in Parkinson disease patients may require functional surgery, when medical therapy isn't effective. In Deep Brain Stimulation (DBS), electrodes are implanted within the brain to stimulate deep structures such as SubThalamic Nucleus (STN). The targeting of the STN is based on anatomic, imaging and statistical data obtained on anatomic and prospective clinical studies. An accurate localization requires the use of Atlases, such as histological or high-resolution ones. A new family, called probabilistic functional Atlases, integrate various parameters like the position of electrodes, stimulation recordings or electro-physiological recordings. In STN DBS, there remain interrogations about contacts location that provide the largest motor improvement while producing the least neuro-psychological side effects.

### Methods

To approach this issue and understand phenomena better, we created atlases that associate anatomical position of active contacts with different clinical scores. The study population was composed of twelve patients with bilateral SNT DBS. Three motor scores (UPDRS, Schwab & England, Hoen & Yahr) and five neuro-psychological ones (STROOP, verbal fluency, MATTIS, TMT, WCST) were integrated in the study. Electrode contacts of patients were automatically extracted from post-operative images, and then warped (using a dedicated registration workflow with linear and non-linear transformations) in the same high-resolution MRI template. Correlations between contacts localization and clinical scores were carried out using non-supervised classification and have enabled the extraction of clusters and the definition of rules to find the optimum site for therapeutic STN DBS.

### Results

The postero-superior region has been found to be very effective for stimulation, whereas the antero-inferior region has shown neuro-psychological deteriorations.

### Conclusion

Comparisons with existing results have shown that such anatomo-clinical atlases are very promising for understanding phenomena better.

## Keyword

Deep Brain Stimulation, Anatomo-clinical atlases, clinical data, MRI template