White matter connectivity analysis in patients suffering from depression.

Julie Coloigner, Jean-Marie Batail, Isabelle Corouge, Dominique Drapier, Christian Barillot

To cite this version:
Julie Coloigner, Jean-Marie Batail, Isabelle Corouge, Dominique Drapier, Christian Barillot. White matter connectivity analysis in patients suffering from depression. 2018 - 7ème Forum de l’Institut de Psychiatrie, Sep 2018, Amiens, France. pp.1. hal-01890087

HAL Id: hal-01890087
https://hal.archives-ouvertes.fr/hal-01890087
Submitted on 8 Oct 2018

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.
White matter connectivity analysis in patients suffering from depression

J. Coloigner¹, J.-M. Batail², I. Corouge¹, D. Drapier² and C. Barillot¹

¹Univ Rennes, Inria, CNRS, Inserm, IRISA UMR 6074, VISAGES ERL U-1228, F-35000 Rennes, France
²Academic Psychiatry Department, Centre Hospitalier Guillaume Régnier, Rennes, France, EA 4712 Behavior and Basal Ganglia, CHU Rennes, Rennes 1 University, Rennes, France

Introduction

- Major depressive disorder (MDD) is characterized by a profound dysregulation of affect and mood: cognitive dysfunction, insomnia, fatigue and appetite disturbance.
- Up to 80% of patients will suffer from a relapse.
- Understanding the neural correlates underlying the depression is critical for improving the efficacy of diagnostic and treatment strategies.
- Dysfunction of the circuits connecting frontal and subcortical brain regions, leads to a “disconnection syndrome” [1].
- Using graph theory-based analysis, we examined white matter changes in the organization of networks in patients suffering from depression.

Material and Methods

Data:
- LONGIDEP is a routine care cohort of patients suffering from MDD who underwent clinical, neuropsychological testing and imaging study.
- DTI scans: 30 directions using an EPI sequence with a b-value of 1000s/mm².
- 20 MDD patients and 20 healthy controls (CTL) subjects.

Network node definition:
- Parcellation of the cerebral cortex into 66 cortical and 14 subcortical regions using FreeSurfer image analysis [2].
- Each regions represents a node of the cortical network

Diffusion tractography:

Results

- Widespread white matter abnormalities in patients with MDD: reduced connection between the frontal and parietal lobes, and between the frontal pole and limbic regions
- In the frontal pole: reduced strength and reduced clustering
- Higher betweenness in right and left thalamus and in right putamen for MDD

Conclusion

- Decreased fiber density in circuits connecting subcortical brain regions with the frontal and parietal cortex, supporting the theory of limbic-frontal circuit dysfunction in MDD.
- Less segregated network organization in the frontal lobe, implicated in abnormalities of emotion regulation and cognition in MDD.
- Thalamus and putamen: highly interactive regions that likely participate in more functional interactions.

Figure 1. Overview of the method

Figure 2. Regions exhibited significant between-group differences in regional nodal parameters between MDD and control groups. The blue color represented the higher values of regional nodal metrics in MDD group, and the red color represented the higher values of regional nodal metrics in CTL group (p<0.05, with permutation test).

References: