

# Default Mode Network alterations in refractory schizophrenia patients with auditory verbal hallucinations

Anna Alonso-Solís<sup>1</sup>, Yolanda Vives-Gilbert<sup>2</sup>, Eva Grasa<sup>1</sup>, Santiago Durán-Sindreu<sup>3</sup>, Alejandro Keymer<sup>3</sup>, Alexandra Roldán<sup>3</sup>, Fidel Núñez-Marín<sup>4</sup>, Beatriz Gómez-Ansón<sup>4</sup>, Víctor Pérez<sup>5</sup>, Iluminada Corripio<sup>1</sup>.

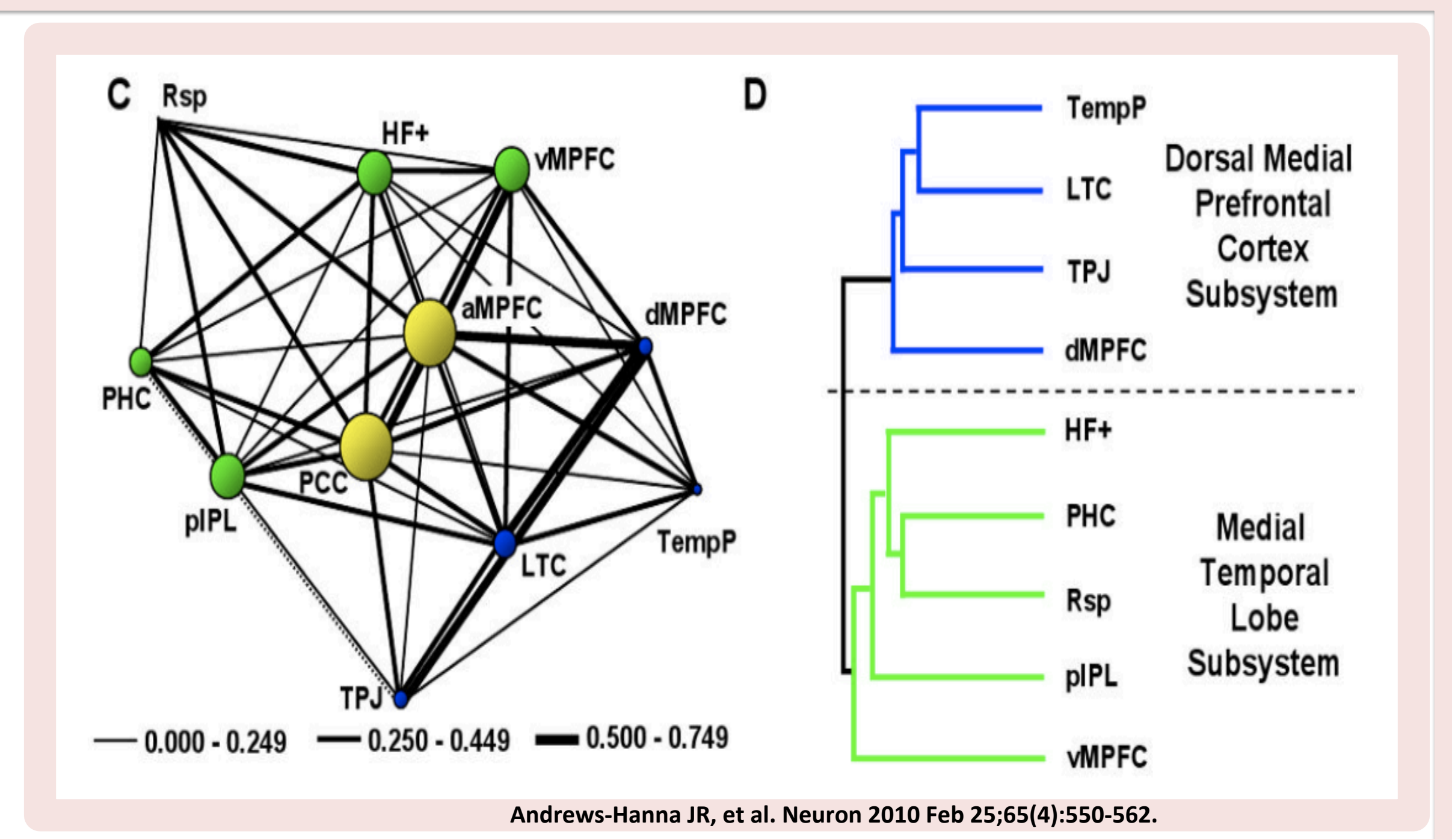
<sup>1</sup>Institut d'Investigació Biomèdica-Sant Pau (IIB-Sant Pau) Hospital de la Santa Creu i Sant Pau. Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM). Universitat Autònoma de Barcelona (UAB), Psychiatry, Barcelona, Spain. <sup>2</sup>Port d'Informació Científica (PIC) Universitat Autònoma de Barcelona (UAB). Institut de Física d'Altes Energies (IFAE), Medical Imaging, Bellaterra Barcelona, Spain. <sup>3</sup>Institut d'Investigació Biomèdica-Sant Pau (IIB-Sant Pau) Hospital de la Santa Creu i Sant Pau. Universitat Autònoma de Barcelona (UAB), Psychiatry, Barcelona, Spain. <sup>4</sup>Hospital de la Santa Creu i Sant Pau. Universitat Autònoma de Barcelona (UAB), Radiodiagnosis, Barcelona, Spain. <sup>5</sup>Servei de Psiquiatria Parc de Salut Mar, Institut de Neuropsiquiatria i Addiccions, CIBERSAM.

## BACKGROUND

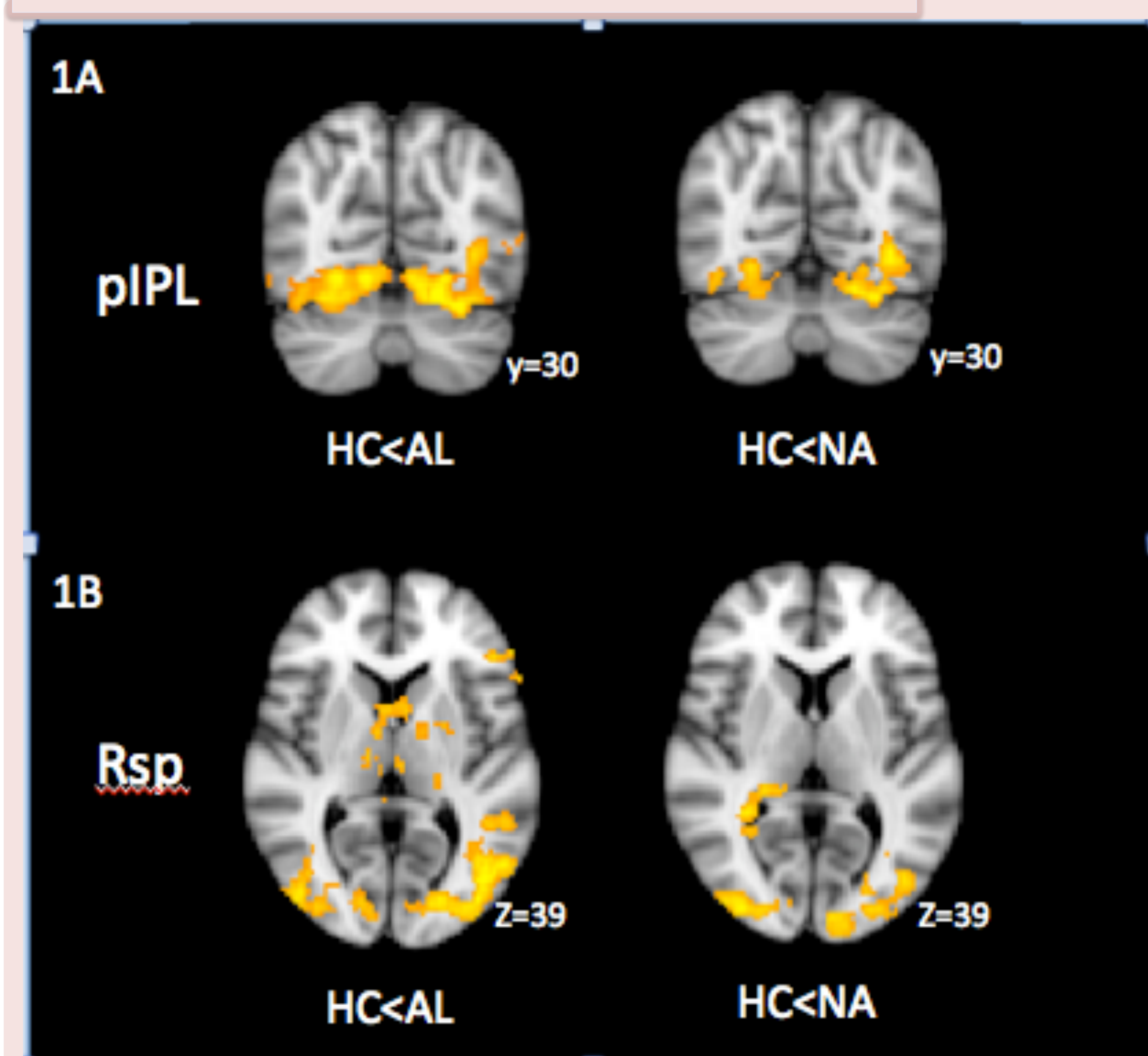
- Auditory Verbal Hallucinations (AVH) are one of the most common and distressing symptoms of schizophrenia. Understanding the neural mechanism that underlies AVH, as a phenotype of resistant schizophrenia, has been an important issue in psychiatric research.
- Alterations in functional connectivity during rest have been frequently reported in patients with schizophrenia. Though the Default Mode Network appears to be abnormal in schizophrenia patients, little is known about refractory schizophrenia.
- The aim of this study is to explore the role of the DN resting state activity in AVH.

## METHODS

- We collected Resting State Functional Magnetic Resonance Imaging (R-fMRI) data with a 3T scanner from:
  - 19 schizophrenia patients with chronic AVH (AL)
  - 14 schizophrenia patients without AVH (NA)
  - 20 healthy controls (HC).
- Following standard preprocessing, we examined the **functional connectivity (FC)** of two DN subsystems and the two DN hubs ( $P < 0.0045$ , corrected).



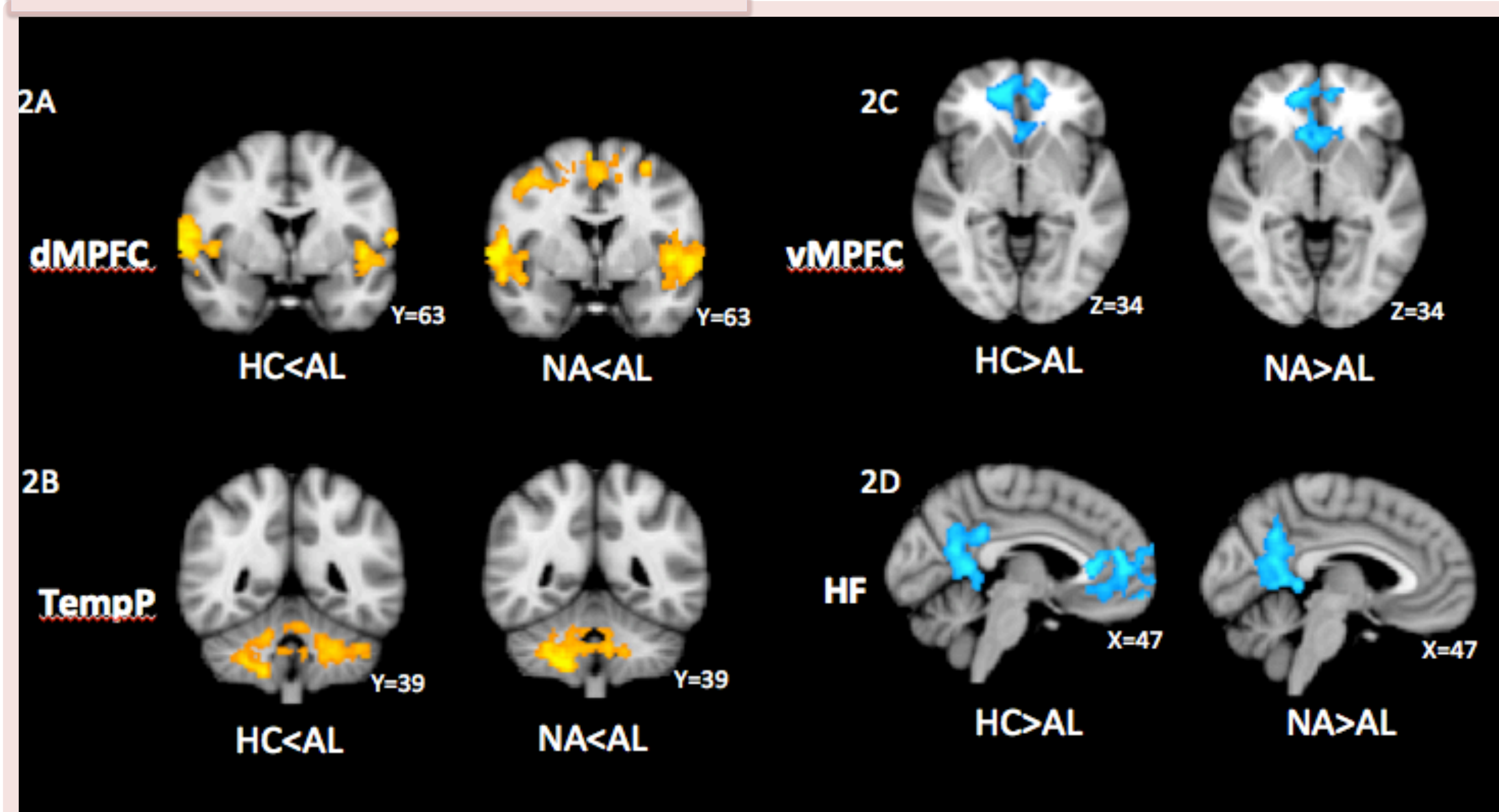
## SCHIZOPHRENIA CONNECTIVITY



## RESULTS

- Compared to HC, **schizophrenia patients** exhibited **higher FC** between **pIPL** ROI and bilateral occipital fusiform gyrus and bilateral lingual gyrus among others and between **Rsp** ROI and bilateral lateral occipital cortex, bilateral intracalcarine cortex and left occipital fusiform gyrus.
- Compared to non hallucinating and healthy controls, **hallucinating patients** exhibited:
  - Higher FC between: **dMPFC** ROI and bilateral central opercular cortex, bilateral insular cortex, and bilateral precentral gyrus among others; and between **Temp** ROI and cerebellum
  - Lower FC between: **vMPFC** ROI and bilateral paracingulate cortex, bilateral anterior cingulate cortex and bilateral subcallosal cortex; and between **HF** ROI and bilateral posterior cingulate cortex and bilateral precuneus cortex

## HALLUCINATING CONNECTIVITY



## CONCLUSIONS

- This is one of the first studies to examine the intrinsic activity of the default mode network in two different phenotypes of patients with schizophrenia.
- The results show that hallucinating and non-hallucinating patients displayed different patterns of functional connectivity in the DN. Whereas hallucinating patients showed an increased functional connectivity between dorsomedial prefrontal and temporal regions of the DN, non-hallucinating patients showed an increased functional connectivity between ventromedial prefrontal and posterior regions of the DN.
- Differences in the DN may emerge from the abnormal auditory perception experienced by refractory schizophrenia patients.