EvaluatIon of disease oNset and disease Stage/severity in Patients with amyotrophIc lateRal sclErosis using fDg-pet imaging

Acronym : INSPIRED

Principal Investigator : Adriano CHIO

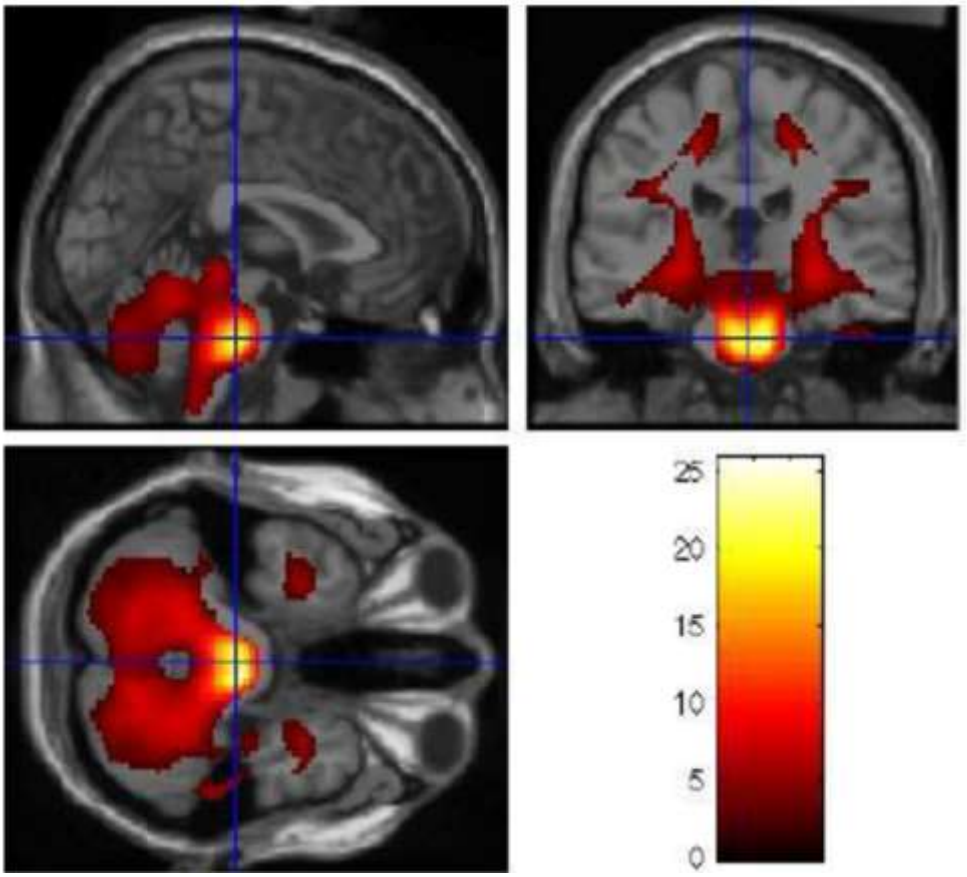
Grant : 240 000€

Duration : three years

Summary of the research project

Clinical studies support the concept of ALS spreading by contiguous propagation, but the age at clinical onset and the speed of disease progression are highly variable. ALS heterogeneity increases variability of outcome measures and poses challenges in clinical trial design.

We demonstrated that FDG-PET metabolic changes in Rolandic and frontotemporal regions have a high diagnostic value in ALS patients.



PETScan image

(Pr Adriano Chio)

Hypermetabolism (in red) in cerebellum, midbrain and white matter corticospinal tracts: the metabolic signature of ALS.

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Over the last 10 years, our knowledge about the neuropathology and genetics of ALS has greatly improved. Aggregates of the protein TDP-43 are found in the majority of patients with ALS, not only in patients with the sporadic form of the disease, but also in several genetic subtypes, including patients with mutations in the TARDBP gene encoding TDP-43 and in the C9orf72 gene, the most frequent genetic cause of ALS. Neuropathological studies have suggested that a centrifugal pattern of disease spreading occurs in ALS, originating in the motor cortical areas, possibly many years before the onset of clinical disease manifestations.

This study has three aims:

1. Can FDG-PET be used to identify a prodromal disease phase in presymptomatic carriers of C9orf72 repeat expansions?
2. Can FDG-PET be used (a) to assess disease stages and (b) to predict the prognosis of patients with ALS?
3. Can FDG-PET discriminate ALS from ALS-mimicking syndromes?

This project is conducted in the Neurology Department of Pr Adriano Chio in Torino in collaboration with Pr Philip Van Damme, Neurology Department in Leuven. The two groups have performed a large number of FDG-PET scans on well-characterized ALS patients in the diagnostic stage of the disease. In Torino and Leuven, FDG-PET data on a cohort of more than 650 patients is available.

Italian teams :

Pr Adriano Chio : Principal Investigator

Neurology Department, University of Torino

from left to right:Dr Davide Bertuzzo (resident in Neurology), Dr Antonio Ilardi (Neurologist), Dr Cristina Moglia (Neurologist), Dr Giuseppe Fuda (Biologist), Prof. Adriano Chiò (Neurologist, Director of the Center), Dr Andrea Calvo (Neurologist), Dr Federico Casale (Biologist), Dr Paolina Salamone (Pharmacologist), Dr Umberto Manera (resident in Neurology), Dr Stefania Cammarosano (Neurologist), Dr Giuseppe Marrali (Biologist), Dr Enza Mastro (Psychologist)

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Belgium team working on the project in front of a PETScan

Front row (left to right):
Joke De Vocht MSc,
Donatienne Van Weehaeghe MD

Back row (left to right):
Philip Van Damme MD PhD,
Koen Van Laere MD PhD,
Jenny Ceccarini Ir PhD,
Stefanie Willekens PhD