

Primus Project : Projection in Multiple Sclerosis

The overall objective of PRIMUS is to develop and validate a CE-marked data-driven clinical decision support system (CDSS) for multiple sclerosis (MS). Delivering patient-specific analytics derived from various MS reference datasets, the CDSS will support clinicians' decision-making process by providing easily interpretable information about treatment options. PRIMUS will promote data-driven homogenization of shared decision practices with and for patients with MS.

MS is a paradigmatic disease, being intrinsically complex and multifactorial, with different phenotypes and heterogeneous progression patterns. Over the past two decades, MS practice has been flooded with data. The number of available treatments has considerably increased (10 different mechanisms of action). **Although clinical, biological and imaging information is now being generated on a massive scale**, it continues to be applied to decision-making in a haphazard, siloed and nonstandardized fashion, making it hard to decipher the different therapeutic options. Furthermore, the standardization and expertise required to properly interpret imaging is sadly lacking, even though data from magnetic resonance imaging (MRI) of the brain and spinal cord are the strongest markers of disease activity, treatment response, and disability progression.

Reference data are crucial for managing MS care and determining *the right treatment for the right patient at the right time*, given the disability burden caused by delayed identification of the optimum treatment path for each patient, the high cost of disease burden for society, and the wide range of therapeutic agents, each costing between € 8 000 and € 30 000 per year per patient.

To achieve this goal, PRIMUS will develop advanced artificial intelligence (AI) neuroimaging solutions and a patient- and physician-centered CDSS. Accessing multiple high-quality datasets on the scale of individual patients, the CDSS will bring to the point of care on-demand analytics from computational algorithms with gated access to data from both real-world registries and clinical trials.

This new tool will be collaboratively designed and tested by a public-private alliance between:

A- Internationally renowned academic partners:

- **Rennes University Hospital** and its federation to develop pioneering health technologies (**FHU Tech-San**) which is sponsoring the PRIMUS project, and **Rennes 1 University**, with Prof. G Edan and Dr A Kerbrat. Prof. Edan coordinates the French Clinical Research Infrastructure Network for MS (**FCRIN4MS**);
- **Nantes University** and **INSERM** (Nantes-CRTI lab) and **Nantes University Hospital**, with Prof. PA Gourraud (in charge of CDSS design and development) and Prof. D Laplaud (PI of the clinical study);

- **Lyon University, the EDMUS Foundation and Lyon University Hospital (HCL)**, with Prof. S Vukusic (OFSEP HD MS cohort);
- **Empenn INRIA/INSERM unit**, with O Commowick and B Combès for their imaging experience,(longitudinal analysis) and the France Life Imaging computational infrastructure (collection of MRIs);
- **b<>com institute of technology**, with M Deschanel (visualization and transfer of CDSS to treating neurologists);

B-two leading international biopharma companies:

Biogen FRANCE SAS and **MERCK**, which will provide access to randomized clinical trial (RCT) datasets, enabling us to make selective use of these datasets in on-demand computations;

C- Pixyl, a French deep-tech startup

Pixyl is a **med tech startup** working to improve patient care by placing the most advanced AI neuroimaging solutions in the hands of radiologists and clinicians. It will be the startup company for the use of both the AI solutions and the CDSS. Drawing on its experience in marketing imaging tools for decision-making in MS, Pixyl will develop a CE-marked software application and extend its commercial value proposition beyond the processing of imaging data.