Multimodal approach for the investigation of the CNS

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The spread of neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis, multiple sclerosis and Huntington's disease, represents one of the most prominent health problems worldwide. Recently, there was a growing interest in high-resolution imaging techniques for the identification of several pathological markers, signalling the presence of neurodegenerative diseases.

Within this framework, we developed a multidisciplinary network between X-ray advanced imaging techniques, functional magnetic resonance imaging and new algorithms to develop a solid multimodal method for pre-clinical research. This will allow for a direct, quantitative estimation of important morphological and topological parameters characterizing the vascular and neuronal networks in the spinal cord (SC). In particular, the 3D SC geometry obtained using SXrPCuT, in combination with specifically designed algorithms, will tackle the study of the SC vascular and neuronal networks, which together contribute to the blood oxygenation level dependent (BOLD) signal in functional Magnetic Resonance Imaging (fMRI). This will greatly aid the regular application of SC fMRI in the clinical practice, e.g., for the early identification of spinal cord injuries and neurodegenerative diseases.