SPARC-AD

Integrating multimodal, multiscale imaging and artificial intelligence for early amyloid detection

Our current understanding on molecular mechanisms that determine early Alzheimer's disease (AD) progression is very limited. Amyloids start to build up decades before the onset of the first disease symptoms. Thus, there is a need for their early detection. We propose an interdisciplinary project that aims to characterize molecular structures directly in their native environments. Using our multimodal molecular imaging approach, we will identify pathological types of amyloids and resolve their structures. The main methodological breakthrough is the implementation of artificial intelligence (AI) as a powerful tool for mining complex spectroscopic data and uncovering spatio-temporal patterns that may detect early (subtle) structural changes. The anticipated results on amyloid structures resolved directly in cells and tissues will be used for the development of new tracers for early diagnostic and effective anti-amyloid interventions.

The consortium's specific goals are as follows:

1) By combining multimodal structural imaging with AI, we aim to develop a comprehensive framework for deep molecular profiling of heterogenic samples like brain tissue;
2) Investigate the relationship between amyloid structure and toxicity using a modelling approach;
3) Explore the formation of amyloid in living systems.

Experimental work will involve not only APP mice but also human AD organoids, adding a substantial translational aspect to our research. The strong complementarity within the consortium allows for the design of streamlined multidimensional work packages, ensuring swift progression with mutual contributions from consortium members at each project step. Importantly, our consortium is highly inclusive, gender-equal, and transnational, promoting strong European integration, data, and skill transfer. Collaboration among consortium members via joint student supervision will be essential at every project stage, with significant mobility of young researchers expected to be a key feature.

Total Funding : 1.12 M€

Duration : 3 years

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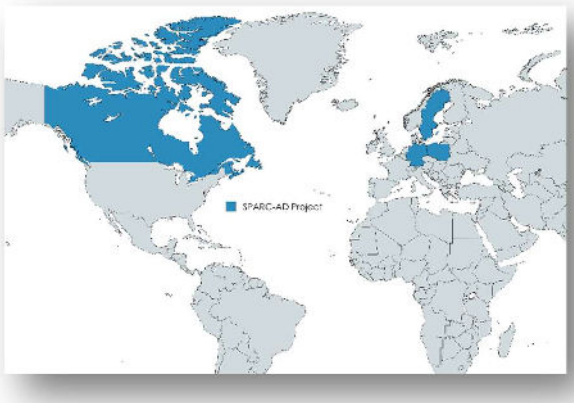

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