STRUCTURAL BIOLOGY OF ALZHEIMER'S DISEASE. BIOPHYSICAL STUDIES

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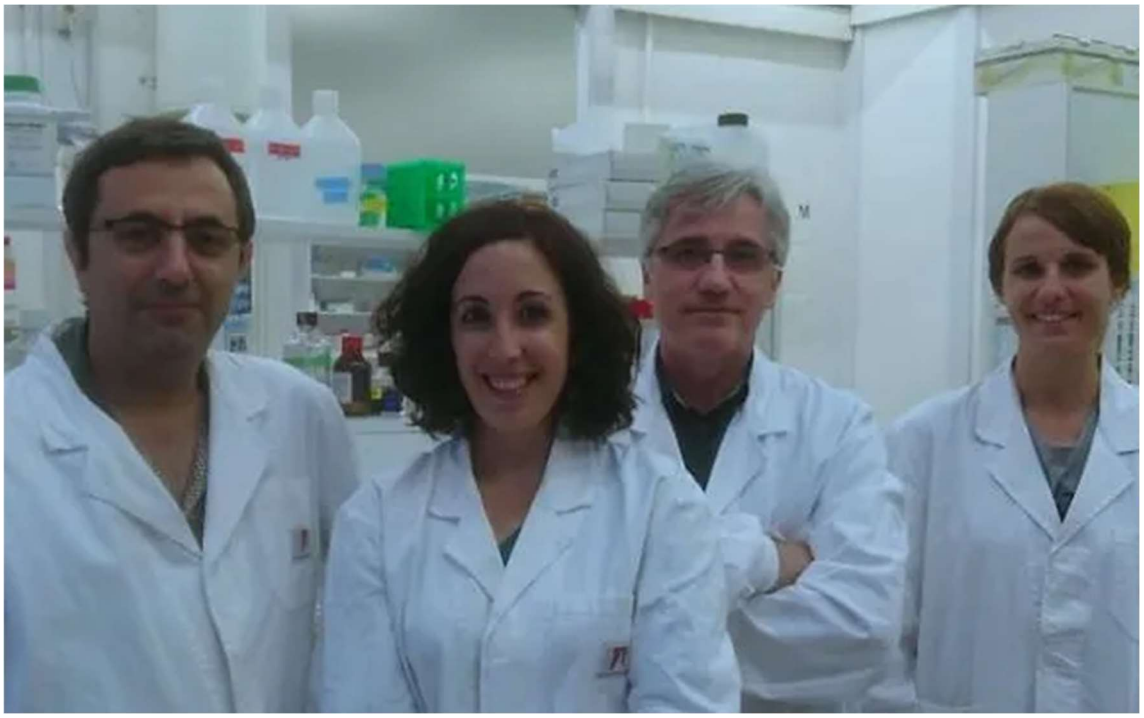

PROFILE

My research' group activity is dedicated to the characterization of **amyloid peptides** and proteins related to **conformational diseases** and to the study of **dendrimers** as antiamyloidogenic agents. The studies on amyloid peptides related to conformational diseases have been carried out in close collaboration with Núria Benseny and three other important collaborations: (1) Prof. I. Ferrer's laboratory at IDIBELL (Barcelona); (2) Profs. M. Bryszewska and B. Klajnert, at the University of Lodz (Poland); (3) Dr. Dietmar Appelhans, at the Institute of Polymer Research in Dresden (Germany).
A review containing some important results from these collaborations was published in **Progress in Polymer Science (Magnani et al. 2017, Prog Polym Sci 64:23-51), entitled 'Can dendrimer based nanoparticles fight neurodegenerative diseases? Current situation versus other established approaches'**.
Moreover, I have collaborated with Prof. Gunnar Gouras from the Unversity of Lund (Sweden) in a study in which **synchrotron-based infrared imaging** was used for

identification of amyloid pre-plaques in a transgenic mouse model of Alzheimer, and which has been published in **Nature Communications (Nat Commun 2017, 8:14726)**. The research on the molecular characterization of the **amyloid aggregates** related to the onset and development of the so called conformational diseases, such as **Alzheimer's** and prion diseases, has focused on the characterization of the amyloid **oligomeric (non fibrillar) toxic species** and on the effects of the amyloid peptides on model (liposome) biological membranes. In parallel, we have studied the use of **dendrimers as potential antiamyloidogenic agents**. In collaboration with with Dr. Dietmar Appelhans' group in Dresden, a specialist in **glycodendrimers**, we described that glycodendrimers are biocompatible and are able to block amyloid toxicity in neuroblastoma cell cultures. After that, and in collaboration with Prof. Isidre Ferrer from IDIBELL in Barcelona, we showed that glycodendrimers are **biocompatible** and more importantly, they can cross the BBB when **administered intranasaly in a murine model**. The glycodendrimers design has been improved and at present, the group has preliminary results showing that **glycodendrimers decorated with histidine** cause a **memory recovery** in transgenic model.

In the last years, my group has specialized as well in **synchrotron-based micro-FTIR and X-ray fluorescence spectroscopies**, which allow for the in situ characterization of amyloid deposits (in brain sections) and of characteristic hallmarks of the pathology such as oxidative stress and metal ion levels variations.

RESEARCH

RESEARCH INTERESTS

In vitro and in vivo characterization of amyloid aggregates related to Alzheimer's disease. Biophysical Studies.

Dendrimers as polymeric antiamyloidogenic agents in Alzheimer's disease.

STRATEGIC OBJECTIVES

Characterization of early formation aggregates in brains affected by Alzheimer's disease, using synchrotron based imaging techniques.

Brain delivery of dendrimers as antiamyloidogenic agents using liposome-based delivery systems.

MAIN RESEARCH LINES

Application of synchrotron-based infrared imaging and X-ray fluorescence microscopy to the detection of amyloid aggregated species in mouse-model and human Alzhimer's brains.

Liposome-based nanosystems for the delivery of antiamyloidogenic agents to the brain.