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Molecular and cellular neurobiotechnology group

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Modulating Parkinson's disease in microfluidic devices using induced pluripotent stem cells and microfluidic devices

α -Synuclein is a key player in the pathogenesis of synucleinopathies, including Parkinson's disease, dementia with Lewy bodies and multiple system atrophy. Transmission of synthetic α -synuclein aggregates has been demonstrated in several cellular and animal models. Several groups have reported that α -synuclein shows prion-like propagation in wild-type mice. However, the basis of the spreading process remains poorly understood although cell-to-cell transport via exocytosis has been suggested.

Our laboratory described this years that the natural protein PRNP is a receptor of α -synuclein (Urrea et al., 2017a, b). In current experiments, we are analyzing in detail this process by using microfluidic devices. We would like to explore changes in neuronal map activity during the progression and neurodegeneration mediated by α -synuclein. To analyze the process, we will use in vitro models using induced pluripotent stem cells (iPSc)(see Matamoros et al., 2017 for details). These iPSc derive from Parkinson's disease patients and controls and will be differentiated in microfluidic devices.

Our group used this technology in recent studies (Tong et al., 2014, 2015). To modulate neural activity, we will use single cell optogenetics. Lastly, and in collaboration with bioengineering companies we are developing molecules aimed to control the spreading of the proteins.

The project is multidisciplinary.

Job position description

Requirements for candidates:

- Studies in Biology, Biochemistry or Medical engineering or similar.
- High level of English.
- Self-critical, capacity to learn and bring knowledge.
- High motivation and ability to be involved in an international multidisciplinary team.
- Excellent team working and communication skills