

Interfaces pour le vivant

Title of the research project: **Neuronal cells culture in acoustic levitation**

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Subject description:

The aim of our project is to propose a new approach for cell manipulation, without mechanical contact, allowing neuronal cells culture to generate monolayers or organoids in a better and simpler way than conventional techniques. This technique is called acoustophoresis. The principle consists in generating an Acoustic Radiation Force (ARF) into resonators that can be either closed micro-cavities or micro-channels. Using the proper geometric and physical parameters, it is then possible to handle a large number of micron-sized objects in a suspension, without contacts. The ARF leads to the creation of large aggregates in acoustic levitation, at mid-height of the cavity. The primary objective of the project will be to use a new acoustic cavity adapted to cell culture and developed by PMMH in order to generate a single monolayer and study the behavior of neuronal cells. Neuronal sheets will be grown under levitation for increasing amount of time and neuronal differentiation will be characterized “of-chip” using conventional immunocytochemical analysis. We will then try to build multiple monolayers in order to study 2D to 3D progressive connectivity. The ultimate objective will be to build spheroid-like structures reminiscent of brain organoids. Once the principle has been validated, we aim at using genetically modified neurons in order to mimic a chronic neurodegenerative process.