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Project title Fabrication of microfluidic devices for connectoid formation

Aim of project (max 1100 characters)
The aim of this first experiment is to assess the reproducibility of connectoid formation, comparing microfluidic devices generated in different labs/facilities.

Scientific background (max 2000 characters)
Connectoids represent a microfluidic-based multi-organoid system specifically designed to mimic long-range interactions between anatomically distinct and physically separated brain areas. In our lab, we leveraged this bioengineered 3D model to recapitulate the nigrostriatal pathway, which involves both dopaminergic neurons in the ventral midbrain and their striatal targets, within a fully humanized cellular context. As this dopaminergic neurons are primarily affected in Parkinson´s Disease (PD), this system can represent a novel system to model and investigate specific aspects of PD in vitro.

Motivation for need of microfluidics (max 2000 chars)
Current organoid based models do not fully recapitulate long-range neuronal connections, as the topographical organization of human axonal networks requires precise spatial arrangements that are difficult to achieve with current cell culture systems. With microfluidic devices, we are able to spatially organize human pluripotent stem cell derived organoids into interconnected 3D structures that overcomes these spatial limitations.

Expected outcome (max 3200 chars)
The formation of connectoids will be mainly assessed using brightfield microscopy, immunofluorescence staining and confocal imaging. The dynamics of dopaminergic neuron axonogenesis and maturation will be measured, and compared across different devices generated in separate labs/facilities.