Deliverable 3.1 – Design of Physiological Chamber (Summary)

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A custom-made highly versatile physiological chamber has been designed for long term imaging of 3D neuron cultures in a LSFM configuration. All the important parameters for cell survival and control, the temperature, the buffer flow and the PH, can be controlled and finely tuned for the different imaging experiments. Besides, the design is flexible enough to add any further parameter controlling device that may arise during the development of the project

The functional imaging of the iPSC derived neuronal cell cultures is a challenging task, both from the instrumental and from the sample handling points of view. To obtain reliable functional data from the 3D cultures, good physiological conditions should be maintained during the whole imaging experiments. We have designed an incubator for calcium imaging compatible with a light sheet microscope that provides and stable, transparent environment for high quality imaging, as well as an ideal platform for live long-term imaging of cellular activity in 4D.

One important decision yet to be made by the consortium is the final geometry (or geometries) of the scaffolds for the 3D cell cultures. The physiological chamber that we have been designed is to be adapted to the selected scaffolds and other geometrical constraints imposed by the chosen 3D cell cultures. Furthermore, the presented design was meant for the standard LSFM implementation. However, in case it would be required, the design is flexible enough so that it could be easily adapted for the alternative inverted version of our LSFM.