WWTF Project LS17-037

Photochemical control of biohybrid matrices to reconstitute nervous system organization from three-dimensional neural organoids

Abstract

The in vitro formation of three-dimensional tissues from stem cells, termed, organoids, have had a profound impact on several areas of research including developmental biology, disease modelling, toxicology, and regenerative medicine. Currently most organoid systems involve the random morphogenesis of the organoid within a complex, ill-defined extracellular matrix gel called Matrigel that limits reproducibility and controllability of organoid formation. The applicants have developed a tunable PEG-hydrogel system for the controllable growth of neural and intestinal organoids. Complete reconstitution of neural tissue involves the specification of neuronal progenitors, axonal outgrowth in defined patterns, and generation of peripheral nervous system from neural crest. The aim of this proposal is to develop hydrogels with photochemically cleavable linkages for the spatial and temporal control of stiffness and protein activity. This will be used to control the time and location of axonal outgrowth from the neural organoids, as well as neural crest emigration and dorsal root ganglion formation.

Scientific disciplines:
106039 - Stem cell research (60%) | 304007 - Tissue engineering (40%)

Keywords:
Neural organoid, PEG scaffolds, photo-chemical modification

Principal Investigator:	Elly Margaret Tanaka
Institution:	Research Institute of Molecular Pathology (IMP)
Collaborators:	Matthias Lutolf (Ecole Polytechnique Federale de Lausanne) (Co-Principal Investigator)

Status: Ongoing (01.04.2018 - 30.09.2022) 54 months

Funding volume: EUR 500,000

Further links about the involved persons and regarding the project you can find at
https://archiv.wwtf.at/programmes/life_sciences/LS17-037