Light-assisted programming of synthetic organoid tissues

Initiative: Freigeist-Fellowships

Bewilligung: 13.12.2020

Laufzeit: 6 Jahre

Projekt-Website: https://www.synthetic-biology.hhu.de/research/beyer-group

The project aims at developing innovative experimental model system to advance biomedical research through application of synthetic biology and optogenetics. The proposed work shall overcome current limitations of organoid technologies. Organoids are in vitro ?mini organs" that can be generated from patient cells and have recently surfaced as promising model systems to i) understand health and disease, ii) develop personalized medical treatments, and iii) advance regenerative medicine. However, their generation suffers from limited control precision. Combining synthetic biology and optogenetics with organoid technology will enable an unpreceded level of control to guide organoid design and growth. Light will be used to regulate key developmental processes, profiting from reduced invasiveness and utmost spatial and temporal precision. It is the goal to obtain mature brain and liver organoids with precisely defined regional identities, vessel formation, and designer functions. This includes introducing synthetic sensor and regulation circuitry to assist in drug screening and personalized medicine strategies. Engineering organoids with light will form an attractive research field at the interface of synthetic biology and biomedicine. The team is most grateful for the consideration and hopes that the panel shares the visions.

Projektbeteiligte

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