

BIOCARD

Deep BIOModeling of human CARDiogenesis

Call: ERC-2017-AdG

Project Reference: 788381

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Host Institution: Klinikum rechts der Isar, Technical University Munich

Description:

The heart is one of the first and most complex organs formed during human embryogenesis. While its anatomy and physiology have been extensively studied over centuries, the normal development of human heart and dysregulation in disease still remain poorly understood at the molecular/cellular level. Stem cell technologies hold promise for modelling development, analysing disease mechanisms, and developing potential therapies. By combining multidisciplinary approaches centred on human induced pluripotent stem cells (hiPSCs), BIOCARD aims at decoding the cellular and molecular principles of human cardiogenesis and developing advanced inter-chimeric human-pig models of cardiac development and disease. State-of-the-art genetic modification techniques and functional genomics will be used to establish a molecular atlas of cell type intermediates of human cardiogenesis in vitro and unravel how their proliferation, differentiation and lineage choice are regulated in health and disease. This in vitro approach will be complemented by detailed analyses of how distinct hiPSC-derived cardiac progenitor populations commit and contribute to specific cardiac compartments in interspecies chimeric hearts in vivo. Finally, we will capitalize on the novel concept that combinations of different well-defined hiPSC-derived cardiac progenitor pools with timely-matched, native extracellular matrix from embryonic hearts will accomplish for the first time the realization of human heart organoids as 3D culture systems of developing heart structures. Clearly, BIOCARD will open game-changing opportunities for devising novel biomedical applications, such as human heart chamber-specific disease modelling, large-scale drug testing in appropriate human 3D cardiac bio-mimics, and regenerative cell therapies based on functional ventricular-muscle patches and direct cell conversion in vivo.

More information

[The project in CORDIS](https://cordis.europa.eu/project/id/788381)

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Project details

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EUR 2 285 625

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ERC-ADG - Advanced Grant

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