Guide to the heart: Differentiation of human pluripotent stem cells towards multiple cardiac subtypes

Schwach, V.

Stellingen behorend bij het proefschrift getiteld

‘Guide to the heart: Differentiation of human pluripotent stem cells towards multiple cardiac subtypes’

I. COUP-TFII is dispensable for acquiring an atrial phenotype during retinoic acid-directed differentiation of human embryonic stem cells (This thesis).

II. Myocardial infarction results in the loss of up to 1 billion contractile cardiomyocytes and since these divide only slowly in adult heart, their early replacement has been proposed as an approach to prevent later heart failure (This thesis).

III. Tet-On-MYC NKX2.5$^{eGFP/+}$ hESC-derived cardiac progenitor cells can be expanded and differentiated to cardiovascular cells in a controlled manner in both cardiac and non-cardiac niches in response to Doxycycline-induced cMYC together with FGF (This thesis).

IV. Temporal and spatial cues from cardiac cells and their microenvironment during human cardiac development (from fetal to adult stages), exemplified by localized and progressive build-up of cardiac extracellular matrix components, are essential for a proper understanding of cardiomyocyte maturation (This thesis).

V. COUP-TFII confers the atrial identity (Wu et al., Developmental Cell. 2013; 25(4), 417–426. DOI: 10.1016/j.devcel.2013.04.017).

VI. Human induced pluripotent stem cells are attractive candidates for therapeutic use, with the potential to replace deficient cells and to improve functional recovery in injury or disease settings (Ong et al., Circulation. 2015; 132: 762-771. DOI: 10.1161/CIRCULATIONAHA.114.015231).

VII. Advancing structural and functional maturation of stem cell-derived cardiomyocytes remains a key challenge for applications in disease modelling, drug screening, and heart repair (Tiburcy et al., Circulation. 2017; 135: 1832–1847. DOI: 10.1161/CIRCULATIONAHA.116.024145).

VIII. The neonatal mouse heart is capable of mounting a robust regenerative response after ischemic myocardial necrosis, which is mediated primarily through proliferation of preexisting cardiomyocytes (Porello et al., PNAS. 2013; 110: 187-192. DOI: 10.1073/pnas.1208863110).

IX. If you want to see the truth, do not be for or against it (Seng-ts’an; ~606 AD). Be open-minded for the unexpected.

X. The world is my country and to promote science is my religion (Christiaan Huygens; 1629-1695). Home is where the heart and lab are.

XI. Science is like a puzzle that requires creativity and persistence in solving.

Verena Schwach
Leiden, 15 January 2020