In vitro models of human cardiac fibrotic tissue on ‘bioartificial’ scaffolds

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Abstract

Cardiac infarction is a global burden worldwide that leads to fibrotic and not contractile myocardial tissue. In this work, in vitro models of infarcted tissue were developed as tools to test novel therapies for cardiac regeneration in the future. Human cardiac fibroblasts were cultured on scaffolds, with different compositions and architectures, as to mimic structural and chemical features of infarcted cardiac tissue. Early findings from in vitro cell tests were reported, showing an enhancement of cell attachment and proliferation in the case of “bioartificial” scaffolds, i.e. scaffolds based on a synthetic and a bioactive polymer.

Materials and Methods

Synthetic polymer scaffolds were prepared by different techniques and, then, functionalised with an adhesive protein. HCFs isolated from human ventricle were cultured on the scaffolds. Their survival, adhesion, proliferation and morphology were studied by biochemical assays and fluorescence microscopy, as a function of scaffold structure and surface composition.

Results

SEM analysis allowed to demonstrate the correct design of scaffolds. Functionalised scaffolds showed superior cell attachment and proliferation compared to non-functionalized scaffolds.

Conclusions

Bioartificial scaffolds were able to support the viability and proliferation of HCFs. The study will allow the modelling of different degrees of human cardiac fibrosis by specific constructs, which will be useful for the in vitro testing of advanced therapies.

References