Chitosan physical hydrogels for the regeneration of infarcted myocardium

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Myocardial infarction occurs as a consequence of an obstruction of blood vessels supplying the heart (coronary arteries). This leads to the death of myocardial cells (cardiomyocytes). The damaged tissue does not repair spontaneously and scar tissue is formed instead, as the mature contracting cardiac cells have limited capacity to proliferate. The objective of this project is to develop bio-functionalized hydrogel patches that will allow regeneration and functional recovery of the cardiac muscle after myocardial infarction. The strategy is to associate polysaccharide-based hydrogels and trophic factors (proteins), so as to develop cardiac patches capable of inducing beneficial effects for tissue regeneration. More precisely, chitosan physical hydrogels were performed by a NaOH induced-gelation process. Thus, bio functionalized patches were produced varying in composition (polysaccharide concentration, degree of acetylation of chitosan, etc.) and characterized, in particular in terms of mechanical properties, as in the final application, gels will be sutured on the injured tissue. Cardiomyocytes were cultured *in vitro* on hydrogels to assess the effect of patch composition on the survival and proliferation of cells. Chitosan hydrogel patches were also tested *in vivo* using a rat model of myocardial infarction. Our results illustrate the beneficial effect of optimized chitosan hydrogel patches in the regeneration and functional recovery of the cardiac tissue after infarction.

Biography

Orianne Domenge has completed her Engineering degree in Chemistry and Process Engineering from CPE Lyon (Higher School of Chemistry, Physics and Electronics) and a Specialization in Biochemistry. She is currently pursuing her PhD in Biomaterials in IMP laboratory (Polymer Materials Engineering) and is working on the development of bio-functionalized polysaccharide patches in order to improve myocardial function after infarction.

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