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Title	ELASTOMERIC CARDIOPATCH SCAFFOLD FOR MYOCARDIUM REPAIR AND VENTRICULAR SUPPORT
Running Title	Elastomeric cardiopatch scaffold
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Abstract	Background - Post-ischemic ventricular dilatation progressing towards pathological remodeling raises the need to assist the heart to decrease ventricular wall deterioration. Myocardial tissue engineering could play a key therapeutic role due to its capacity to replace extracellular matrix by creating niches for cell homing. Objectives - The purpose of this study is the preclinical evaluation of a biomimetic Cardiopatch created with elastomeric scaffolds and nanotechnologies. This in-vivo tissue engineering procedure might reduce infarct size and fibrosis improving ventricular shape and function. Methods and Results - Cardiopatch was created seeding adipose tissue-derived progenitor cells (ATDPCs) into porous elastomeric scaffolds (CLMA, PEA) filled with nanofibers gel (self-assembling peptide). Cardiopatch was implanted onto infarcted sheep heart. Evaluation at 6-month with ultrasounds showed a reduction in longitudinal LV deformation in cardiopatch treated group assessed

	by speckle-tracking imaging. Magnetic Resonance Imaging (late gadolinium enhancement) showed reduction of infarct size related to LV mass in cardiopatch treated group vs control group. Histopathology at 6 month showed that cardiopatch anchored and integrated to the infarct area with minimal fibrosis interface, promoting angiogenesis and migration of ATDPCs from cardiopatch to surrounding tissues. Conclusions - Our study showed the feasibility, safety, and effectiveness of cardiopatch grafted onto myocardial infarct scars in large animals. This treatment decreased fibrosis and limited infarct scar expansion, reducing post-ischemic ventricular deformity. A capillary network developed between cardiopatch and the heart. Cardiopatch biotechnology evolves for the creation of Cardiowrap, bioprostheses for ventricular support and myocardial regeneration, reducing the risk of heart failure progression and the indication for heart transplantation.
Condensed Abstract	It is evident that mortality from MI has decreased through the current cardiology treatments. However there are many survivors presenting HF, due to reduced contractile function and adverse post ischemic LV remodeling. Synthetic biomaterials have been designed as mimic various biophysical and biomechanical attribute of natural myocardium. Novel cardiac repair strategies include porous elastomeric 3D Cardiopatch filled with nanofibers gel (self-assembling peptide), seeded with stem cells. Furthermore, Cardiowrap ventricular support bioprostheses are in development using these biomaterials, based in the multilayered helical alignment of cardiac muscle fibers, useful to improve cardiac pump performance.
Key Words	Heart Failure, Cardiac Tissue Engineering, Cardiopatch, Cardiowrap, Translational and Clinical Research
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