



(3) Macromolecular:

796 - NMR studies for the development of tissue-engineered cardiac patches based on silk fibroin

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Abstract Body: We are developing a novel tissue-engineered cardiac patch composed of silk fibroin (SF) using the electrospinning method. Although SF has some good properties for biomaterials itself, it needs to improve physical condition to fit the target tissue in order to use as regenerative medical materials. Therefore, we are trying to create a new SF composite material appropriate to cardiac patch by using some kinds of polyurethane (PU). In this study, SF-PU composites were prepared and examined their structural and physical properties by using solid-state nuclear magnetic resonance (NMR) measurements, including T₁H and T₁ρ^H. From the T₁ρ^H measurements, SF/segmented polyurethane (sPU) = 1/1 composite was shown high molecular miscibility. The soft segments in sPU were shown slower molecular motion in SF composite rather than in solitary sPU by T₁ρ^H measurement. These results indicate that SF-PU composite material will be a potential candidate for silk-based tissue-engineered cardiac patch. In fact, the cardiac patches made of the SF-sPU composite were having a benign course in transplant experiments for the abdominal aorta in dogs. We will talk about results of precise analyses of the various SF/PU composite materials and the *in vivo* experiments as the cardiac patches.

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