

BIO-SCAFFOLDS IN TISSUE ENGINEERING AND REGENERATIVE MEDICINE

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Bio-scaffolds have great prospective in cardiovascular regeneration. A bio-scaffold which is used in tissue engineering and regenerative medicine should have non-toxic, non-inflammatory, antimicrobial, anti-tumor, biocompatible and biodegradable properties. Many available bio-scaffolds in different investigations by different scientists have been evaluated for damaged tissues' replacement. The future of tissue engineering and regenerative medicine is moving toward discovery of the ideal bio-scaffolds for repair and regeneration of damaged tissues and organs. The main concern of bio-scaffold application was cardiovascular complications is the probability of generating a substrate for arrhythmia. It is said that using a bio-scaffold and probable and inevitable its interstitial diffusion may delay in left ventricle activation together with reduction in gap junction concentration at the site of damaged tissue and bio-scaffold application. This leads to arrhythmia in a moment after application of the bio-scaffold. It should be mentioned that the site of bio-scaffold application and the interstitial spread characteristics are other important factors in generating arrhythmias. In addition, use of bio-scaffolds with elastic and strength properties similar to the intrinsic myocardium is essential and should be noted. The second concern is reducing the immune system response which inhibits the encapsulation of bio-scaffolds or related tissue. Encapsulation inhibits incorporation of the bio-scaffold to the myocardium. The third concern is using conductive bio-scaffolds which assist the synchronous beating of cardiomyocytes should be considered. This harmony leads to enhancing protein association, assists cardiomyocyte polarization and increases electrical signal spreading. The forth concern is considering the best time for presenting bio-scaffold which is not clear. But this ideal time for bio-scaffold transplantation is necessary for reducing the immune system response and limitation of scar tissue producing.

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