Editorial
Volume 13:1, 2020

Journal of Tissue Science & Engineering

ISSN: 2157-7552

Open Access

The Search for a Long-lasting Bioengineered Tissue, Treating Valvular Heart Disease

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Editorial

Tissue engineering's potential applications in regenerative medicine span from structural tissues to organs with complex functions. Focuses on heart valve tissue engineering, a goal that entails a unique combination of biological, technical, and technology challenges [1]. We stress fundamental concepts, techniques, and methods, as well as advances and ongoing issues. To give a foundation for comprehending the enabling scientific principles, we first look at normal heart valve functional anatomy, biomechanics, development, maturation, remodelling, and injury response.

We investigate three techniques to accomplishing the aim of an engineered tissue heart cell seeding of biodegradable synthetic scaffolds, cell seeding of processed tissue scaffolds, and in-vivo repopulation of implanted substrates by circulating endogenous cells without preceding in vitro cell seeding. Finally, we examine the field's problems and recommend future avenues for preclinical and translational clinical investigations that will be required to solve significant regulatory issues for the safety and efficacy of tissue engineering and regenerative methods to heart valves. Although some progress has been achieved toward the objective of developing a therapeutically viable tissue created heart valve, further success and eventual human benefit will be contingent on breakthroughs in biodegradable polymers and other scaffolds, cellular engineering, and tissue engineering [2].

Manipulation extracellular matrix reconstruction procedures and techniques to describe and potentially non-invasively measure the speed and quality of tissue healing and remodelling [3]. Engineered tissue heart valves, heart valve remodelling Circulating stem cells, biodegradable scaffold, and decellularized scaffold. Tissue engineering's potential applications in regenerative medicine range from structural tissues, skin, cartilage, bone to complex organs such as the heart and other cardiovascular system components, liver, kidney, and pancreas. However, there are limitations to conventional surgical approaches and existing prosthetic devices, serious complications associated with transplantation, and critical shortages of available donor tissues. Blood arteries, myocardium, and heart valves have been the primary focus of cardiovascular tissue engineering [4].

Adults who have diseased valves replaced with mechanical prosthetic or tissue valves such as bioprosthetic valves porcine aortic valve or bovine pericardial xenograft, cadaveric allograft, or pulmonary-to-aortic autograft valves Ross procedure have improved survival and quality of life. However, each of these valve types has limitations. For example, mechanical valves require anticoagulation to control thromboembolism whereas bio prosthetic. Nonthrombogenicity infection resistance and cellular viability are anticipated advantages of a designed tissue heart valve. The design criteria and characteristics of conventional and tissue engineered heart valve replacements are summarised and contrasted.

In The most pressing need for heart valve tissue engineering and regeneration technology is in the paediatric and young adult populations, where valve replacement outcomes are less favourable than in older persons [5]. The promise of growth, repair, and remodelling as a kid receiver matures is most exciting, since it eliminates the need for repetitive procedures caused by a valve substitute's incapacity to enlarge as an individual grows. Currently, only autografts such as Ross valves transferred from the pulmonary to aortic position in an individual are feasible, although however, the Ross technique is technically complex, hazardous, only serves a tiny patient population, and produces questionable results, including ambiguity about whether the grafts would expand in proportion to recipient growth.

Conflict of Interest

None.

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How to cite this article: Keynes, Walter. "The Search for a Long-lasting Bioengineered Tissue, Treating Valvular Heart Disease." J Tiss Sci Eng 13 (2022): 259.

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Received: 10 January, 2022; Manuscript No. jtse-22-65887; **Editor Assigned:** 14 January, 2022; PreQC No. P-65887; **Reviewed:** 21 January, 2022; QC No. Q-65887; **Revised:** 24 January, 2022, Manuscript No. R-65887; **Published:** 31 January, 2022, DOI: 10.37421/2157-7552/2022.13.259