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Cardiovascular therapies using Biomaterials and EHDA

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Abstract

Investigating how biomaterials can be used to treat the consequences of cardiovascular disease and focus on the interactions between potential implantable materials and the implant cite (e.g. through in vitro assessment). These consequences can arise as a result of myocardial infarction, arrhythmia, thrombosis and other cardiovascular implications. This is done by engineering a more efficient drug delivery method for treatment of damaged cardiovascular tissue by adapting previous methods with new engineering and materials angles. A new method in which to provide an alternative for tissue regeneration within the specific damaged area will be determined. A combination of in vitro assessments through cardiac cell lines will be used as well as an engineering platform which will consist of trailing materials and biomaterials upon different surfaces and tracking their behaviour to identify any influence. Once the cells have been influenced, the reactants can be treated in order to grow on selected surfaces and also be treated with biocompatible polymers in order to allow them to grow in a fibrous way to be delivered to the tissue successfully. Moreover, the effect on in vitro cardiac tissue will be investigated with aims to ensure that the tissue is regenerated. How quickly it regenerates and how efficient the result is will immediately affect the formulation and the method of delivery of the drug/reactants. For assessment microscopic techniques scanning microscopy (SEM), Fourier transform infra-red spectroscopy (FTIR), X-ray Diffraction (XRD) and Atomic force microscopy (AFM) will be done and to determine whether the regeneration has indeed taken place using the chosen materials and method. The reactants chosen will be identified as to whether they can be grown on a fibre like structure, to increase the chances of delivery. The traditional heart patch which is made from a polymer will be incorporated with different topographical features which are shown to enhance and control the behaviour of the cells and in conclusion, improve the intracellular interaction. Once investigated and research has been completed, it will be a way to minimise or eradicate the consequence of limited oxygen presence within the cardiovascular tissue in which has limited tissue regeneration in the past when carrying out drug delivery to the cardiovascular tissue.

Biography

Bushra Yousef started her PhD at the age of 21 in 2017 after graduating from De Montfort University with a 2:1 in Pharmaceutical and Cosmetic Science. She is currently working on biomaterial therapies to target cell death as a result of cardiovascular diseases. She has collaborated in one published paper focussing on multi-tip electrospraying to achieve nanoparticle production. She is hoping to publish many more papers on cardiomyocyte behaviour in relation to different geometries and environments.

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