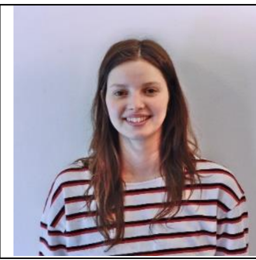
ESR 9

Project title and research strand:	Elastin-inspired fibres for aortic heart valves. Strand 2: Fibres for medical application.	
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Abstract

Over the last 30 years, tissue-engineered heart valves target to a replacement that is able to remodel and grow with the patient, reducing the risk of multiple surgeries caused by the current commercially available heart valve substitutes. However, this field of research is still ongoing and few attempts have been done towards a complete growing valve, although a clinically viable tissue-engineered heart valve has yet to be developed (Nachlas et al., 2017; Stassen et al., 2017). Therefore, the of biological materials to mimic the native tissue is compelling. Herein, we propose a novel biohybrid aortic valve composed of Elastin-Like Recombinamers to resemble the extracellular matrix that compose the native tissue and Native-Like Silk Fibroin (NLFS) fibers to mechanically support the valve performance, in an analogous manner to the collagen fibers. These two biological materials were successfully combined in a tubular shape that exhibited a modulation of the anisotropic behaviour according to the change of the NLFS fibers angle (5°, 15°, 25° and 45°). Subsequently, the most suitable, that matches biological and mechanical properties, was selected to be fashioned in a valve and subjected to aortic conditions to further evaluate its performance. The biohybrid aortic valve met the regulations imposed by the ISO guidelines for heart valve replacement with transcatheter techniques, proving its capability to be a candidate for aortic valve replacement in order to overcome the limitations for the commercially ones and guarantee a better quality of life to the patients.

Visual Summary – Poster