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LTP modified vascular graft materials for endothelial cells growth

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Cardiovascular disease (CVD) is the no. 1 killer in the world, and is responsible for >17.3 million deaths every year1. Bypass surgery, using the autologous vein has been one of the most effective treatments for CVD. However, more recently vascular grafts have shown great potential in bypass surgery. Vascular grafts currently employ a number of scaffold materials such as Dacron and ePTFE and treatments that mimic the native vessel wall2-3. These however, does not work well for small diameter grafts (<6 mm) due to intimal hyperplasia and thrombosis. In our study we plan to improve the endothelialization of intimal surface of graft by modifying with low temperature plasma (LTP) to increase the cell attachment/viability and proliferation. The scaffolds were treated with LTP using Harris Plasma Cleaner system with air as the feed gas for 30 sec at 45W (HI setting). X ray photoelectron spectroscopic analyses and contact angle wettability studies confirmed the introduction of oxygenated functionalities on the surface and enhanced hydrophilicity due to the improvement in oxygen content ~1 in the graft surface from LTP air plasma. Scaffolds were also modified with fibronectin and collagen by dipping method. Endothelial cell studies by microscopic and metabolic assays indicated that cell viability increased in LTP treated scaffolds especially when treated with protein. Scaffolds treated with fibronectin or collagen had cells viable for a week compared to untreated samples. MTT results validated the improved number of metabolically active viable cells. Work is under progress to improve cell viability on these scaffolds.

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