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Development of fibrinogen micro carriers as biodegradable scaffolds for skin and vascular engineering

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The aim of this study was to fabricate different structural fibrinogen (Fbg) microfibers (MFs) and microtubes (MTs) using gel solvent extraction method with silicon tube as template. To improve the biocompatibility and bioactivity, surfaces of both MFs and MTs were enriched with immobilized fibronectin (FN), using water soluble EDC for cross-linking. The ultrafine structures and outer morphology of Fbg-MFs and Fbg-MTs were characterized with scanning electron microscopy, revealing highly rough outer morphology. Cross-linking between FN and Fbg was characterized by FT-IR and fluorophore-conjugated goat anti-mouse immunoglobulin G by fluorescence microscopy, presenting uniform distribution of FN throughout the Fbg-MFs and Fbg-MTs. The proteolytic degradation of FN/Fbg-MFs and FN/Fbg-MTs could be controlled upto 8 weeks *in vitro* with plasmin, confirming its biodegradable properties. The biocompatibility and cell proliferation of the Fbg-MFs and Fbg-MTs were assessed by measuring ATP activity (CellTiter-Glo Luminescent Cell Viability assay) in C2C12 fibroblast cells. Cell attachments and proliferations on these scaffolds were further examined using fluorescence and SEM microscopic images. In summary, the experimental results suggested that both Fbg-MFs and Fbg-MTs were biocompatible, and FN immobilized surface demonstrated the improved cell adhesion, proliferation and long term degradation. Lastly, this study revealed that FN could be easily grafted onto Fbg surfaces, and it could be a potential substratum for growth factors or drug release. Especially, in wound healing and vascular tissue engineering, the developed Fbg scaffolds could promote and orient cell adhesion and proliferation.

Biography

Thanavel Rajangam completed his B.Pharmacy and M.Pharmacy from The Dr,M.G.R Medical University (India) and currently doing his 3rd PhD at Department of Bionanotechnology, Gachon University (S. Korea), under the guidance of Dr. Seong Soo A.An.

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