Tianzhu Zhang, J Nanomater Mol Nanotechnol 2018, Volume 7
DOI: 10.4172/2324-8777-C7-038

Mussel-inspired copolymer grafted polypropylene mesh for rat abdominal wall defect repair

Tianzhu Zhang
Southeast University, China

In hernia repair, polypropylene (PP) mesh is one of the most common prosthetic materials because it leads to successful long-term treatment. However, when a prosthetic material is placed on an intraperitoneal hernia, it may lead to serious adhesions between the mesh and viscera, which limits its application. In the present study, dopamine methacrylamide (DMA), a derivative of dopamine, was polymerized and then reacted with polyethylene glycol methacrylate (PEGMA) to produce poly(polyethylene glycol methacrylate-co-dopamine methacrylamide) (p(PEGMA-co-DMA)) using traditional free radical polymerization. It was grafted *in situ* on the PP mesh's surface utilizing the dopamine catechol group to obtain an anti-adhesive PP mesh. The structure and properties of the p(PEGMA-co-DMA) graft were characterized by Nuclear Magnetic Resonance (NMR), Gel Permeation Chromatography (GPC), Attenuated Total Reflection Flourier Transformed Infrared Spectroscopy (ATR-FTIR), X-ray photoelectron spectroscopy (XPS), Thermal Gravimetric Analysis (TGA), water contact angle measurements and scanning electronic microscopy (SEM). NIH-3T3 cells were employed to assess anti-adhesion and biocompatibility *in vitro*. Moreover, the efficacy of the p(PEGMA-co-DMA)-coating as a barrier for reducing post-surgical adhesions was evaluated with a rat abdominal wall defect model. Compared with the native PP mesh, the p(PEGMA-co-DMA)-grafted PP mesh demonstrated excellent anti-adhesion and biocompatibility properties both *in vitro* and *in vivo* testing. The results suggest that this kind of p(PEGMA-co-DMA)-grafted PP mesh is a promising candidate for abdominal wall defect repair.

Biography

Tianzhu Zhang obtained his PhD degree from the Institute of Chemistry, the Chinese Academy of Sciences in 2003. From 2004 until 2009, he conducted his post-doctoral research at Ghent University (with Prof Dr. Filip Du Prez), the Catholic University of Leuven (with Prof Dr. Erik Nies) in Belgium, at Technische Universitat Munchen and the University of Ulm (with Prof Dr. Bernhard Rieger) in Germany. In 2009, he joined the School of Biological Science and Medical Engineering at Southeast University in China as a full professor. As a head of the research group, his research interests mainly focus on the surface functionalization of polymer materials and ECM-mimic smart hydrogel. In 2009, he was the Winner of Education Ministry's New Century Excellent Talents Supporting Plan for his excellent work. In 2011 he was awarded the first prize of China Petroleum and Chemical Industry Federation of Science and Technology Progress.

zhangtianzhu@seu.edu.cn

Notes: