Decreased Bacterial Activity on Nano-patterned PDMS Replica for Catheter-associated Infection Prevention

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Nowadays, catheter-associated infections are the most serious and costly of all healthcare-associated infections. Recent studies have suggested a sensitivity of cell and bacteria to nano-scale topographical properties as a potential tool for selectively increasing desirable cell functions while simultaneously decreasing competitive cell functions. Here, we presented a simple and cheap method to prepare a nano-patterned polydimethylsiloxane (PDMS, a commonly used catheter material) replica by using highly ordered nanotubular anodized titanium (ATi) as the template. In vitro bacterial studies using *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* were conducted to assess the effectiveness of the nano-patterned PDMS at inhibiting bacterial growth. In addition, human fibroblast and endothelial cell assays were conducted to determine the influence of the nano-patterned structure on mammalian cell behavior as a measurement of toxicity. In this study, to elucidate the mechanisms of how surface topographies affect cell/ bacteria adhesion, the protein interactions with different surfaces were also investigated by using the bicinchoninic acid (BCA) protein assay.

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