357e Probing Effect of Rifampicin-Impregnated Silicone on Staphylococcus Epidermidis Biofilm Formation

Xuemei Liang, Anfeng Wang, Ting Cao, Haiying Tang, Steven O. Salley, James P. McAllister II, and K.Y. Simon Ng

Infection is one of the most common catheter-related complications, especially in shunt systems used to treat hydrocephalus. Staphylococcus epidermidis is directly related to infections owing to its ability to form a biofilm on implanted materials. In this study scanning electron microscopy (SEM) and atomic force microscopy (AFM) were employed to investigate the effect of the antibiotic rifampicin on the colonization and growth of S. epidermidis 35984 on the surface of silicone. A cast molding method was used to load rifampicin into the silicone precursor before it was cured. It was found that the cast molding approach was effective in reducing the drug release "burst effect" and would be an alternative approach to prepare a long lasting drug release catheter. Bacteria with a diameter of 800 ~ 1000 nm and height of 200 ~ 500 nm were found to be embedded in the biofilm. Figure 1 shows the different structures of S. epidermidis colonization observed on the rifampicin-loaded silicone surfaces (compacted multilayered structures) and bare silicone surfaces (sparsely dispersed, single-layered structures) by atomic force microscopy and scanning electron microscopy. The continuously released rifampicin from the silicone matrix could prevent the growth of S. epidermidis to form large colonies and thus minimize the secretion of slime which is critical for biofilm formation. The rifampicin-loaded silicone prepared by the cast molding approach is suitable for future clinical applications and to minimize potential catheter infections.

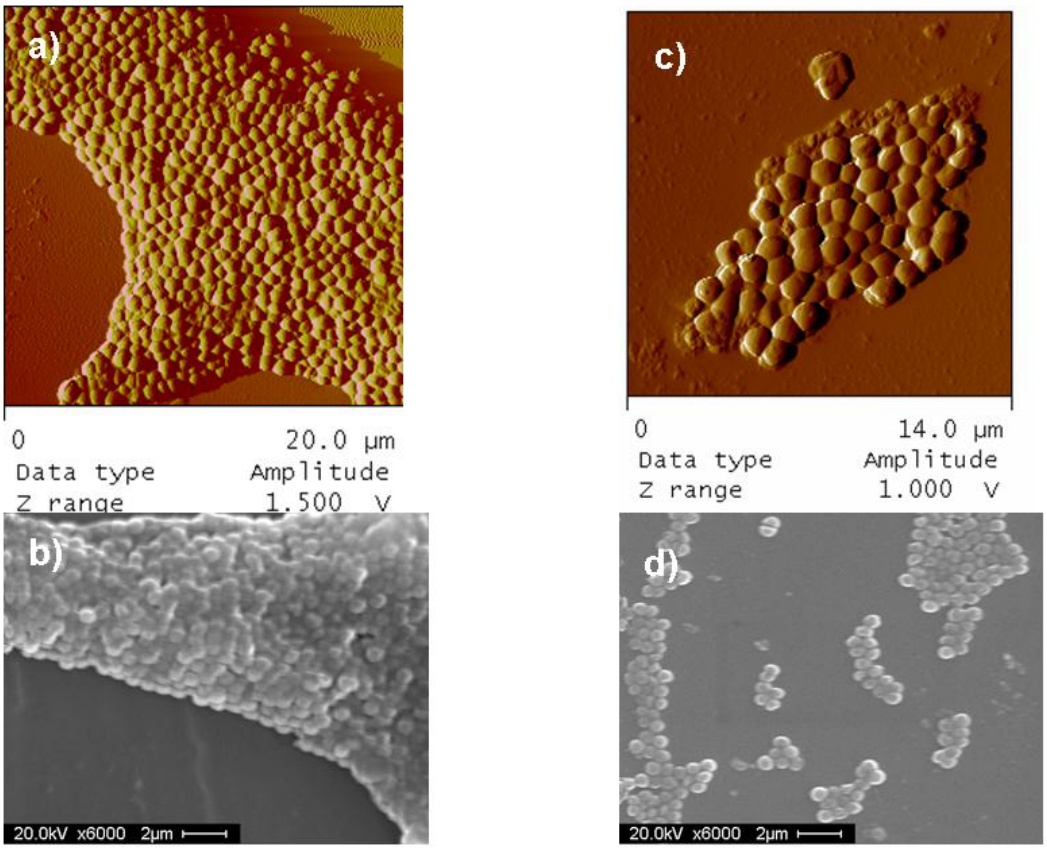

Figure 1. AFM and SEM images of *Staphylococcus epidermidis* on silicone surface (a and b), and rifampicin-loaded silicone surface (c and d). Multi-layered structure was dominant on silicone surface and single-layered structure was observed on drug-loaded surface.