



MICRO-PATTERNED SILICONE SURFACES LIMIT CAPSULAR THICKNESS AROUND BREAST PROSTHESES

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Breast prostheses are often accompanied by clinical complications such as bacterial infection (~2.4-16%) or capsular contracture (CC; ~7.6-40%) formation and result in pain and discomfort to the patients. The formation of CC has been attributed to bacterial colonization, either on the surface of the implant or within the surrounding capsule. Thus, it was realized that the use of antibacterial eluting implants or surfaces that deter bacterial adhesion could circumvent this adverse outcome. Sharklet™ surfaces that mimic shark skin denticle patterns are known to deter bacterial adhesion and biofilm formation. Therefore, it was hypothesized that similar micropatterns would limit bacterial adhesion, and in turn, CC thickness around implants. In order to test this hypothesis, 10 mm diameter silicone implants with 3X3, 5X5, and 10X10 micropatterns, in addition to a non-patterned control implant, were fabricated. Efficacies of these designs to limit CC formation were tested in a rat model; where twelve Sprague Dawley rats were divided into 4 groups. During the implantation surgery, a longitudinal incision was made parallel to the spinal column, and a subdermal pocket was made on the opposite side of the spine by blunt dissection. A single implant (i.e., 10X10, 5X5, 3X3, or smooth control) was then inserted into this pocket, which was then inoculated with *Staphylococcus aureus* (3.0×10^4 CFU). The incision line was closed, and animals were allowed to ambulate for 12 weeks. At necropsy, the implants and adjacent tissues were collected, fixed with 10% formaldehyde, embedded in PMMA, sectioned, polished to optical finish, and then histologically analyzed. The CC thickness data revealed that 3X3 and 5X5 groups had significantly thinner capsules ($p < 0.05$) when compared to the smooth control group, which supported the tested hypothesis. It was therefore concluded that micropatterns could be used to prevent thicker CC formation around breast prostheses.