THE EFFECT OF BREAST IMPLANT SURFACE CHARACTERISTICS ON CELL ADHESION

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Capsular contracture is the most common complication of breast augmentation occurring in approximately 10% of the patient population. Aetiology remains unknown but it is characterised by dense fibrocollagenous connective tissue with local inflammatory response. Host response is influenced by several factors including implant surface texture, chemistry and interactions between cells and the extracellular matrix (ECM). It has been found that the contractile forces are disrupted by the 3-dimensional surface of textured implants resulting in reduced capsular contracture rates. The aim of the research presented here was to characterise the physical and mechanical properties of silicone breast implant shells and evaluate the interaction of fibroblasts with the implant surfaces. The physical and mechanical properties of commercially available textured and smooth breast implant shells were evaluated using (a) confocal laser scanning microscope, (b) contact angle goniometer, and (c) microtest 5 kN tensile testing device. In addition, the kinetics of fibroblast adhesion with these surfaces was further analysed.

The results showed that higher cell adhesion was obtained for the rougher surfaces (roughness in the range of 8.88 - 18.83 mm), while the valleys of the topography may provide room for cells to adhere and spread. Additionally, it was shown that the textured surfaces showed higher bending stiffness, with values obtained between 0.26 and 0.19 N mm. Of all the surfaces considered, the Mentor smooth implants had the lowest thickness (0.45 mm) that resulted in the lowest bending stiffness of 0.06 N mm. The textured surfaces exhibited reduced hydrophilicity with high water contact angles.

In summary it is shown that the combination of properties such as roughness, wettability, and stiffness can influence cell adhesion on smooth and textured surfaces of commercially available breast implants. This indicates that cell adhesion is further enhanced by the magnitude of surface roughness and wettability.

Keywords: Breast implants, cell attachment, surface topography

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