**Delamination Is A Major Etiologic Factor Of Double Capsules Around Textured Implants**

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**Purpose**:
Although relatively rare, there has been a noticeable increase in reports of double capsule formation after breast implant placement in recent years. The etiology is uncertain; some authors suggest secondary seeding of cells from periprosthetic seromas, others suggest mechanical forces.

**Methods**:
Using scanning electronic microscopy (SEM) and histology we analyzed 10 patients presenting double capsule phenomenon around textured Allergan Biocell® implants, for a total of 20 samples: the inner capsule along with the prosthesis shell and the outer capsule. The inner capsule was analyzed at both the prosthesis interface (PI) and the outer surface in contact with inter-capsular space (ICS). We evaluated bacterial density and biofilm using the Van Heerden scale on both surfaces of the inner. We correlated the bacterial density to implant age.

**Results**:
The different surfaces showed very different characteristics. The PI SEM ultrastructural characteristics that reflect the clinical Velcro effect; the inner capsule mirrors the textured shell and is firmly attached to the prosthesis. On the contrary, the outer surface of the inner capsule is extremely smooth and displays no visible 3-D texture. Histologically, the inner capsule is delaminated on the peaks of the prosthesis texture, where the shear forces are maximal between the prosthesis and the thoracic/breast tissue. We also found siliconomas embedded in the inner capsule after manual peeling from the prosthesis and absence of vascularization. On the other hand, the outer capsule demonstrated various stages of synovial metaplasia.
The bacterial density and biofilm are significantly higher at the PI compared to the ICS, which indicates a secondary migration of bacteria to the ICS (Wilcoxon $p=0.004$ and $p=0.008$ respectively). Although there is a positive correlation curve between bacterial density and implant age at the PI, results were not significant.

**Conclusion**:
Differing pathophysiological hypotheses for the double capsule phenomenon exist; our findings suggest a mechanical delamination hypothesis. The histology and ultrastructural findings indicates that fractures happen within the capsule and lack spontaneous healing likely because of shearing forces applied between the inner capsule-prosthesis complex and outer capsule. Also intra-capsular delamination occurred at multiple locations and may lead to complete double capsule formation around the implant.