Breast Implants and Immunomodulation: Does Peri-Implant Inflammation Promote Systemic Recognition of Breast Tumor Antigen?

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Introduction

Historically, there has been public concern that breast implants may be associated with breast cancer. In reality, women with cosmetic breast implants have significantly reduced rates of future breast cancer development than the general population.1 We postulate that, just as implants have been thought to have potential negative immunologic reactions (heightened autoimmune hypersensitivity, immune progression to breast implant associated ALCL), perhaps heightened immune surveillance induced by the presence of a foreign body breast implant provides collateral immunoprotection against breast cancer.

Methods

Blood samples were collected and sera purified from women with long-term breast implants (LTBI) and women with prior breast surgery (PBS) but no implant, as well as implant-surgery naïve (ISN) women. ANOVA testing with post-hoc multiple comparisons were performed for statistical analysis.

Results

104 women presenting with breast-related complaints were recruited from the plastic surgery outpatient clinic. Thirty-six (34.6%) had long-term breast implants (LTBI) in place for 6 months or greater, while 27 (26.0%) had prior breast surgery (PBS) but no implant history and 41 (39.4%) were both implant- and surgery-naïve.

Table 1. Demographics. LTBI long-term breast implant; PBS prior breast surgery; ISN implant/surgery-naïve

<table>
<thead>
<tr>
<th>Age (SD)</th>
<th>BMI (SD)</th>
<th>Pregnancy History</th>
<th>Post-Menopausal</th>
<th>Family History of Breast Cancer</th>
<th>Silicone</th>
<th>Smooth</th>
<th>Sub-muscular</th>
<th>Capsular Contracture</th>
<th>Implant Rupture</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTBI (n=36)</td>
<td>45.1 (SD 13.3)</td>
<td>24.2 (SD 4.5)</td>
<td>27 (75.0%)</td>
<td>10 (27.8%)</td>
<td>5 (13.9%)</td>
<td>25 (69.4%)</td>
<td>22 (61.1%)</td>
<td>18 (50%)</td>
<td>19 (52.8%)</td>
</tr>
<tr>
<td>PBS (n=27)</td>
<td>38.9 (SD 14.6)</td>
<td>24.9 (SD 3.9)</td>
<td>12 (44.4%)</td>
<td>8 (29.6%)</td>
<td>4 (14.8%)</td>
<td>25 (92.6%)</td>
<td>22 (66.7%)</td>
<td>23 (85.2%)</td>
<td>6 (22.2%)</td>
</tr>
<tr>
<td>ISN (n=41)</td>
<td>35.8 (SD 11.3)</td>
<td>23.4 (SD 3.7)</td>
<td>19 (46.3%)</td>
<td>6 (14.6%)</td>
<td>5 (12.2%)</td>
<td>24.2 (SD 4.5)</td>
<td>24.9 (SD 3.9)</td>
<td>24.8 (SD 3.9)</td>
<td>24.3 (SD 3.9)</td>
</tr>
</tbody>
</table>

*p=0.007*

Conclusion

Our incipient study demonstrates a tantalizing correlation between breast implants and breast cancer immunosurveillance. Specifically, women with breast implants have heightened antibody responses to specific breast cancer antigens mammaglobin-A and MUC1.

Figure 1. Diagrammatic illustration of the hypothesis.

Figure 2. Antibody levels to various breast cancer-associated antigens in nine women pre- and one month post-breast implant placement. Antibody levels were significantly elevated to mammaglobin-A and MUC1 post-implant placement.

Figure 3. Antibody levels to various breast cancer-associated antigens. Women with long-term breast implants (LTBI) had significantly elevated antibody responses to mammaglobin-A and MUC1 than women with prior breast surgery (PBS) but no implants and implant/surgery-naïve women (ISN).


Objectives

1. To compare antibody responses to common breast cancer-related proteins between women with a history of long term breast implants and a cohort of implant-naïve women.
2. To compare antibody responses to common breast cancer-related proteins over time before and after breast augmentation.