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.*
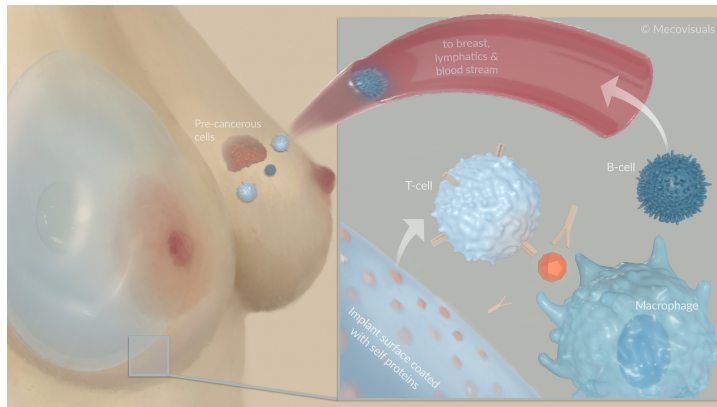

Figure 1. Diagrammatic illustration of the hypothesis.

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.

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-naive

	LTBI (n=36)	PBS (n=27)	ISN (n=41)	p-value
Age	45.1 (SD 13.3)	38.9 (SD 14.6)	35.8 (SD 11.3)	0.007*
BMI	24.2 (SD 4.5)	24.9 (SD 3.9)	23.4 (SD 3.7)	0.36
+Pregnancy History	27 (75.0%)	12 (44.4%)	19 (46.3%)	0.02*
Post-Menopausal	10 (27.8%)	8 (29.6%)	6 (14.6%)	0.25
Family History of Breast Cancer	5 (13.9%)	4 (14.8%)	5 (12.2%)	0.95
Silicone	25 (69.4%)			
Smooth	22 (61.1%)			
Sub-muscular	18 (50%)			
Capsular Contracture	19 (52.8%)			
Implant Rupture	6 (16.7%)			

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 MUC-1 post-implant placement.
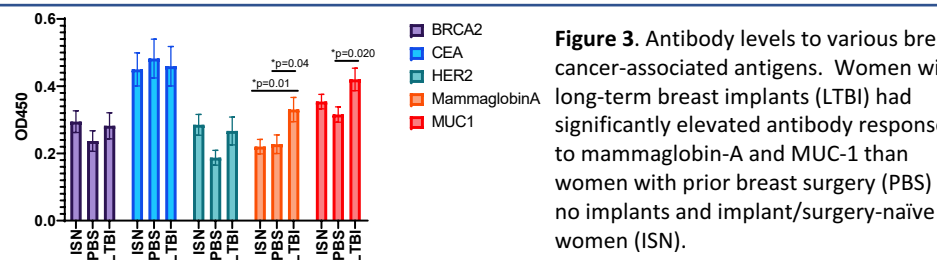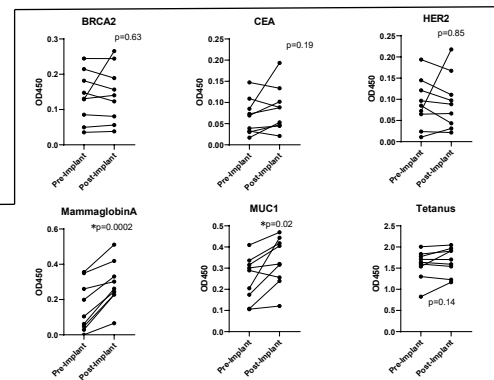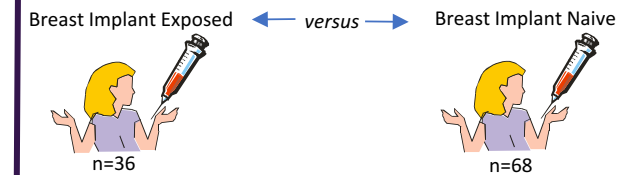

Figure 3. Antibody levels to various breast cancer-associated antigens. Women with long-term breast implants (LTBI) had significantly elevated antibody responses to mammaglobin-A and MUC-1 than women with prior breast surgery (PBS) but no implants and implant/surgery-naïve women (ISN).

Methods

Breast Implant Exposed   *versus*   Breast Implant Naive

n=36   n=68

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.

Pre-Implant   *versus*   1 Month Post-Implant

Breast Augmentation n=9
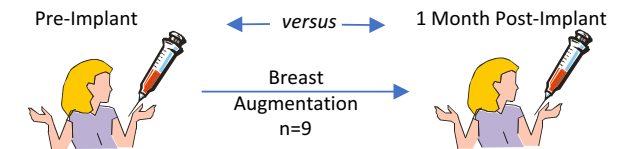
Blood samples were also collected from women prior to breast implant placement and one-month post-implant placement. Paired t-tests were performed to compare antibody responses before and after implant placement.
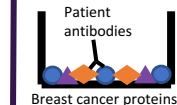
ELISA assays were performed according to standard established protocols to measure antibody responses to breast cancer-associated antigens. OD_{450} values were utilized for comparison.

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.

[1]Noels EC, Lapid O, Lindeman JH, Bastiaannet E. Breast implants and the risk of breast cancer: a meta-analysis of cohort studies. Aesthet Surg J. 2015;35(1):55-62.