Breast Implants And Breast Cancer Immunosurveillance: An analysis of immune cell phenotypes in the breast and antibody responses to breast cancer antigen in women with cosmetic implants.

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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 previously demonstrated women with breast implants have higher antibody responses to select breast cancer proteins compared to women with no implant exposure. **Here, we present antibody response data on a larger cohort of women and with a longer follow-up period. Secondarily, we measured gene expression of immune cell-specific genes to quantify differences in immunophenotypes of cells present in the breast gland of implant-exposed versus implant-naïve women.**

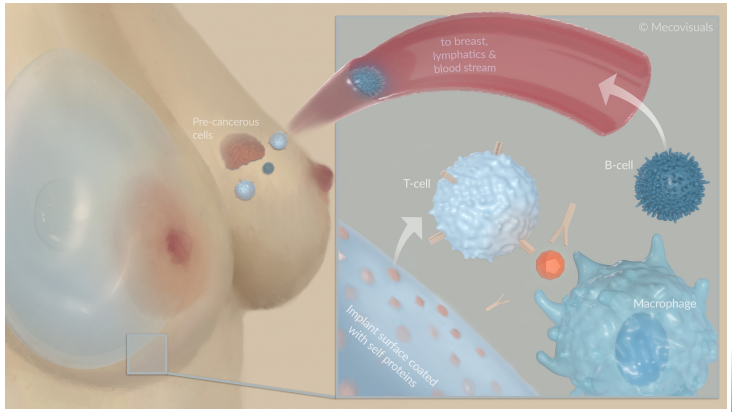


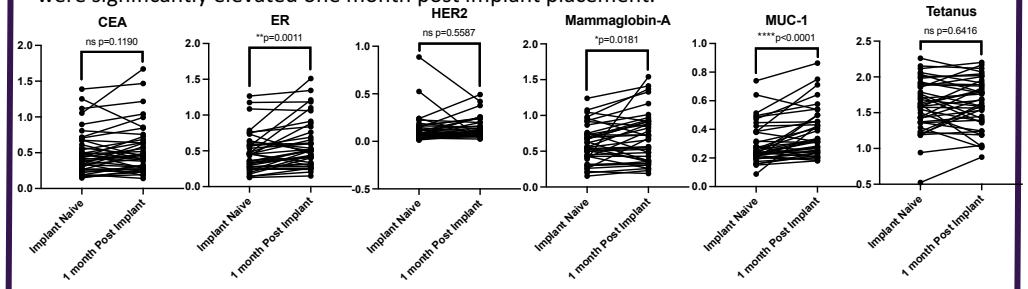
Figure 1. Diagrammatic illustration of the hypothesis.

Objectives

1. To compare antibody responses to common breast cancer-related proteins before and one-month after breast implant placement.
2. To determine whether elevated antibody responses one month after breast implant placement were sustained at six months after breast implant placement.
3. To compare immune cell phenotypes present in the breast gland of implant-exposed versus impant-naïve women.

Results

Figure 2. Thirty-nine patients had blood drawn prior to and one month after implant placement. Median age was 31 (IQR 11) and median BMI 22.3 (IQR 3.8). Fifteen patients (38%) had a history of prior pregnancy, three (7.7%) were post-menopausal, and eight (21%) had a family history of breast cancer. Antibody levels to ER (p<0.001), mammaglobin-A (p=0.01), and MUC-1 (p<0.001) were significantly elevated one month post implant placement.



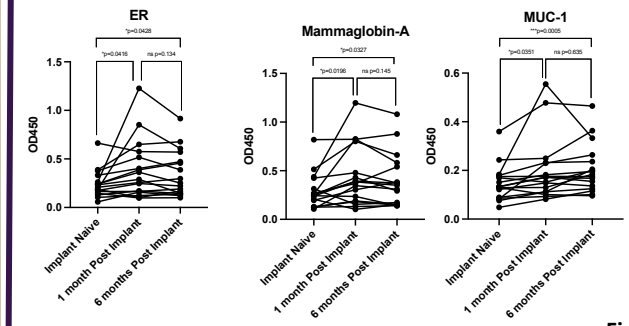


Figure 3. Antibody levels to these same three proteins remain significantly elevated at 6 months post-implant placement.

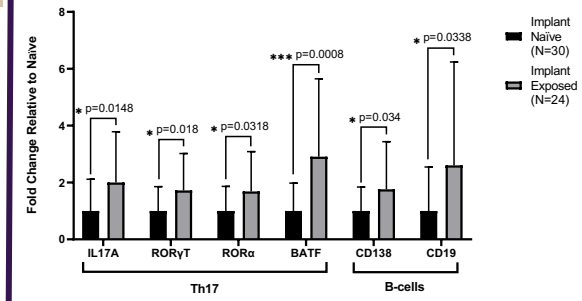
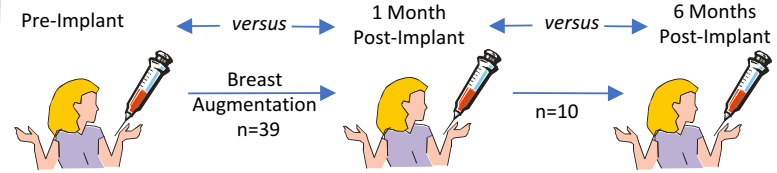
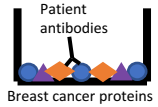


Figure 4. Breast tissue was collected from 65 patients (35 implant naïve versus 30 implant exposed). Median age was 36 (IQR 16) and median BMI 23.5 (IQR 6.1). Women with implants were significantly older (41 vs 32, p=0.001) and more often post-menopausal (33% vs 5.7%, p=0.004). Th17 cell-specific and plasma cell-specific genes were significantly upregulated in implant-exposed compared to implant-naïve breast.

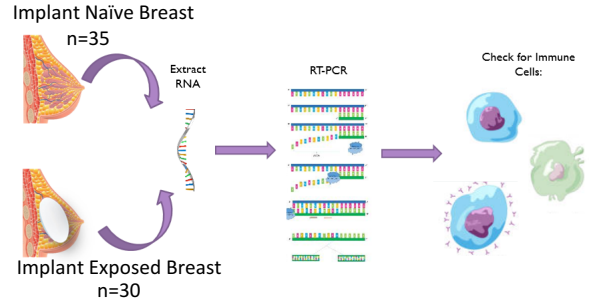
Methods



Blood samples were collected from women prior to breast implant placement, one-month post-implant placement, and six-months 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.



Quantitative rt-PCR was performed to measure expression levels of genes specific to certain immune cell phenotypes in the breast tissue of implant-exposed versus implant-naïve women. Expression was normalized to GADPH.

Conclusion

Women with cosmetic breast implants have elevated expression of genes specific to plasma cells in the breast gland, as well as elevated antibody responses to common breast cancer proteins as early as one month post implant placement. These responses are sustained at six months. Further studies will elucidate the immunologic mechanism for this potential cancer surveillance role.

[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.*