

Host-Implant Interaction Metabolite 10-HOME Mediated Dysregulation of Adiponectin Resulting in Breast Implant Associated Systemic Manifestations

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Background:

Breast implant illness (BII) is a poorly understood systemic complication with unknown etiology. Surgical injury at the implant site initiates local inflammation, impacting adipose tissue through decreased adipose-derived adipokine expression. This acute stress responses activates lipid peroxidation pathways, generating oxylipins, causing inflammatory, nociceptive, and vascular responses to injury. One such oxylipin, (E)-10-hydroxy-8-octadecenoic acid (10-HOME), formed from oleic acid, is abundant in host-implant interaction. However, it is unclear how adipose inflammation is maintained. This study aims to elucidate how host-implant interaction metabolites effect adiponectin expression, subsequently affecting T-cell differentiation eliciting an autoimmune state.

Methods:

LiSa-2 (human derived adipose tissue secondary cell line) were grown in IMDM and RPMI (4:1) until confluent, then cultured in a well plate. Cultured cells were treated with 10 μ M 10-HOME for 48h, then were co-cultured with naïve T-cells (PBMC derived) for 48h. T-cells were harvested and flowcytometry was performed using CD4, CD184, CD194, CD196 markers and respective isotypes to verify differentiation (Th1, Th2, Th9/22). To study adiponectin gene expression, treated Lisa-2 cells were harvested for qRT-PCR. ELISA was performed using treated LiSa-2 culture media.

Results:

We showed decreased expression of adiponectin, after 10-HOME treatment of LiSa-2 cells, compared to untreated cells. qRT-PCR ($p=0.0022$) showed downregulation of adiponectin gene transcripts in treated LiSa-2 cells, highlighting changes in modulation. Using ELISA ($p=0.0006$), the culture media of treated cells showed significantly less adiponectin than untreated media. Treated LiSa-2 cells led to polarization of naïve CD4⁺ T cells to Th1 subtype, evaluated by flowcytometry ($p=0.0494$). No significant difference in polarization was observed for Th2, Th9 and Th22 subtypes.

Conclusion:

This study provides evidence that LiSa-2 with 10-HOME treatment caused increased Th1 polarization *via* modulation of adiponectin expression. Adiponectin regulates many inflammatory pathways, but its effect on Th-cell-mediated responses is poorly understood. Further studies should investigate the mechanism for adiponectin modulation causing T-cell imbalance.