Egg Consumption Modulates Expression of Genes Involved in T Cell Activation and Differentiation That Correlate With HDL Profiles

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Objectives: HDL is known to be an important modulator of T cell activity. We have previously demonstrated that whole eggs modulate HDL profiles when compared to egg whites; thus, we investigated whether different egg-based diets affect expression of genes involved in T cell activation and differentiation in a manner that correlates with changes in HDL profiles.

Methods: A 16-week randomized, crossover intervention trial was conducted in which healthy, young adult men and women (18–35 y, n = 26) completed a 4-week egg-free dietary period, followed by random assignment to a 4-week 3 whole egg/day or 3 egg white/day diet period. Participants then entered a 4-week egg-free washout period before switching to the alternative egg treatment for 4 weeks. Fasting HDL profiles and peripheral blood mononuclear cell (PBMC) gene expression immune arrays were measured at the conclusion of each dietary period.

Results: Our data showed that whole egg intake had the greatest impact on PBMC expression of genes related to T cell activation and differentiation. Compared to the egg-free diet, expression of CD4, CD34, and CD68 were significantly reduced following the whole egg period. We similarly observed trends toward decreased expression of HLA-DRA, CCL2, TGF-beta, and CCR4 following the whole egg diet, and increased expression of IL-12 beta, CLTA4, and PF4. When analyzing changes in gene expression between the egg white and whole egg diet periods, we identified a total of 25 and 21 genes related to immunity and inflammation that significantly correlated with changes in the number of large HDL particles and apolipoprotein A1 (apoA1) concentrations in serum, respectively. 68% and 76% of genes that correlated with large HDL and apoA1, respectively, were related to modulation of T cell activity, suggesting that egg-induced changes in HDL profiles may have stronger modulatory effects on T cells compared to other immune cell subtypes within PBMC samples.

Conclusions: Our findings suggest that whole eggs promote anti-inflammatory and modulatory changes in gene expression related to T cell activation and differentiation, which directly correlate with changes in HDL profiles.

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