

Exercise-induced Th17 Lymphocyte Response and their Relationship to Cardiovascular Disease Risk Factors in Obese, Post-menopausal Women

MARIA A. CARDENAS¹, MICHAEL M. LEVITT¹, BRYAN RICHIE¹, SHAOHAN LU¹, ELISE E. ERICKSON¹, CARMEN COOK¹, JAY HAYNES², ANDREAS KREUTZER¹, JOEL B. MITCHELL, FACSM¹, MELODY D. PHILLIPS, FACSM¹.

¹Texas Christian University, Fort Worth, TX. ²John Peter Smith Hospital, Fort Worth, TX.

Category: Masters

Advisor / Mentor: Phillips, Melody D. (m.phillips@tcu.edu)

ABSTRACT

Obesity-induced inflammation promotes type 2 diabetes and cardiovascular disease (CVD). A causative link between adaptive immunity and pathogenesis of obesity-associated diseases has been established.

PURPOSE: To examine the effects of exercise on circulating T-helper (Th) 17 lymphocytes in overweight/obese post-menopausal women. **METHODS:** Twenty-seven overweight/obese women (BMI $32.7 \pm 5.1 \text{ kg}\cdot\text{m}^{-2}$, 55-75 yr) were randomly assigned to the exercise (EX, n=14) or education (ED, n=13) groups. EX performed a 25-min walk (75-80% HRR) and 2 sets of 8 resistance exercises (70-80% 1RM) with blood samples obtained at: pre-exercise, post-exercise, one-hour and two-hour post-exercise. Blood samples were obtained at the same time points in resting ED. Whole blood was stained using the extracellular markers CD4, CD196, CD194, CD26, and CD161 to identify Th17 lymphocytes via flow cytometry. **RESULTS:** Acute exercise increased lymphocyte number ($p = 0.0001$), but decreased percent of CD4+ cells ($p = 0.019$) at PO. We observed a diurnal response (main effect) where CD26 expression was significantly lower by 2H compared to PRE (PR: 10631 ± 208 ; 2H: 9961 ± 271 MFI). There was a main effect ($p=0.024$) of group for CD26 expression (EX: 10745 ± 251 ; ED 9880 ± 260 MFI). The difference may have been driven by the apparent exercise-induced plateau of CD26 expression at 2H, which minimized the diurnal reduction observed in ED ($p > 0.05$). There was a tendency ($p = 0.09$) for a group x time interaction in Th17 cell number at 1HR (EX = 25.3 ± 4.8 ; ED = $37.2 \pm 5.2 \times 10^3 \text{ cells}\cdot\text{ml}^{-1}$). BMI was significantly correlated with Th17% ($r = 0.5$, $p = 0.008$). HbA1c was positively correlated with Th17 number and percentage ($r = 0.598$, $p = 0.003$; $r = 0.614$, $p = 0.001$, respectively), as well as CCR4+ Th17 cells ($r = 0.421$, $p = 0.036$). Multiple regression analysis revealed that BMI, fat percentage, and HbA1c were significant predictors (69%, $r^2 = 0.685$) of Th17 cell %. **CONCLUSION:** Exercise reduced CD26 expression, the receptor responsible for Th17 cell migration, but did not significantly alter Th17 concentration ($p = 0.09$). CD26 upregulation may indicate that Th17 cells, via chemokine release, promote the stress-dependent migratory response of T-helper cells (CD4+). Obese individuals may experience a preferential differentiation of Th17 cells, based on their association with adiposity (BMI and %fat) and HbA1c.