Mid Atlantic Regional Chapter
of the
American College of Sports Medicine

45th Annual Scientific Meeting, November 4th- 5th, 2022
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 11

fat-1 overexpression mitigates the weight gain and intestinal inflammation in ovariectomized mice on high-fat diets

Natasha M. Malonza, Candace R. Longoria, Ke Sui, Diana Roopchand, Ali Yasrebi, Troy Roepke, Laurie B. Joseph, Sara C. Campbell

Studies show that compared to omega-6 fatty acids, omega-3 fatty acids reduce metabolic endotoxemia and low-grade inflammation. *fat-1* transgenic mice express fatty acid desaturase allowing conversion of omega-6 fatty acids to omega-3 fatty acids, reducing the n-6:n-3 ratio in tissues without diet adjustment. **PURPOSE:** Examine the impact of dietary fat on intestinal inflammatory response in ovariectomized (OVX) mice fed SFA- or PUFA-based HFD with/without E2. **METHODS:** WT (n= 20) and *fat-1* transgenic [Tg(CAG-fat-1)1Jxk] (n=20) C57BL/6 female mice were OVX at 11 weeks and split into experimental groups. WT and *fat-1* mice divided into 10 mice per group and fed SFA- or PUFA-based HFD formulations: 1) HFD-SFA = 45% kcal fat containing low LA (1% kcal), high SFA (31% kcal); and 2) HFD-PUFA = 45% kcal fat containing high LA (22.5% kcal), low SFA (8% kcal). Oral dosing of estradiol benzoate (300 mg/kg) began one week after surgery and then every other day for 8 weeks. After 8 weeks animals were sacrificed, and colon samples were collected for immunohistochemistry. H&E and ABPAS staining was performed to examine colon histology, and immunohistochemical localization of cyclooxygenase-2 (COX-2) was performed to examine colon inflammation. **RESULTS:** E2 supplemented *fat-1* animals had significantly ($P < 0.001$) less weight gain compared to controls on either the 1% or 22.5% LA diet. Average *fat-1* bodyweight with E2 supplementation compared to average WT 1% LA bodyweight (23.85g v 34.375g $P < .001$) and average WT 22.5% LA bodyweight (23.85g v 33.633g, $P < 0.007$). No morphological changes were observed in any treatment group. There was no significant difference between the average goblet cell count (13.3489 v 15.9409, $p < 0.366$) and average nuclei (44.7656 v 44.4219, $p < 0.521$) in *fat-1* or control animals respectively. *fat-1* animals have less localization of COX-2 as indicated by lighter staining compared to control. **CONCLUSION:** Estrogen-supplemented *fat-1* mice appear to be protected from weight gain and intestinal inflammation typically associated with high-fat diets rich in SFA. Further studies can elucidate the protective mechanisms of *fat-1* on intestinal health.

Supported by the Institute of Food, Nutrition, and Health Grant.