Exercise Reduces High-Fat Diet Induced Colon Inflammation but Does Not Influence MUC2 Expression

Paul J. Wisniewski II[1], Laurie B. Joseph, PhD[2], Gabriella Composto[2], Stanley A. Lightfoot, MD[3], Sara C. Campbell, PhD[1].[1]Department of Exercise Science and Sports Studies, [2]Ernest Mario School of Pharmacy; Department of Pharmacology and Toxicology Rutgers, The State University of New Jersey, [1]New Brunswick, NJ 08901 & [2]Piscataway, NJ 08854, [3]Chief Pathologist, Oklahoma City, OK

Obesity is a potent risk factor for colorectal cancer (CRC) development and exercise has shown to significantly reduce the risk thereof. Further, alterations in the colon mucus barrier are closely involved in the pathology of chronic gut inflammatory disease. **PURPOSE:** We aimed to determine whether exercise can attenuate high-fat diet (HFD) induced colon inflammation and whether the primary component of the colon mucus barrier, MUC2, was affected by inflammatory status. **METHODS:** 49 (n=6/group) 6-week old C57BL/6NTac male and female mice were weighed and randomly assigned to one of 4 groups: (1) lean-sedentary (LS, 10% fat diet, Research Diets); (2) obese-sedentary (OS, 45% fat, Research Diets); (3) lean-exercise (LX); and (4) obese-exercise (OX) for 12 weeks. Mice had *ad libitum* access to food and water. Exercised mice had free access to a running wheel in their cages. Food intake was monitored every other day and body weights once per week. After 12 weeks, animals were sacrificed and distal colon tissues were fixed for histological analysis and immunohistochemistry for cyclooxygenase-2 (COX-2), a marker of inflammation, and MUC2. All tissues sections were blindly scored by a board certified pathologist[3]. Slide staining was reported using a dual number system (#X#). The first number was the intensity of the stain and the second number was the amount of stain present in the specimen. Intensity was graded on 1–3 and the amount indicated as follows- 1-<10%; 2-11-40%; 3-41-60%; and 4->60%. Total score was obtained by multiplying the two numbers. **RESULTS:** OS animals showed the greatest expression of COX-2. Conversely, OX animals had a significantly reduced expression compared to OS. LX animals showed the greatest reduction in COX-2 expression compared to all groups. All MUC2 expression was centralized in the goblet cells of the colon mucosa with varying differences between the epithelium and crypts in stain present. Exercise nor did inflammation appear to affect the intensity of MUC2 staining. **CONCLUSIONS:** Exercise attenuates HFD induced colon inflammation in both male and female mice. MUC2 expression does not appear to be influenced by inflammatory status or exercise suggesting that post-translational modifications of mucins are more indicative of health status.

Statement of Disclosure: The authors have nothing to disclose.