

Title: Defining the health benefits of the nutritional interaction between conjugated linoleic acid and fish oil - **NPB# 02-124**

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Abstract: Synthetic peroxisome proliferator-activated receptor γ (PPAR γ) agonists are beneficial in preventing or ameliorating intestinal inflammation. We have studied the colonic health benefits of natural PPAR γ agonists such as conjugated linoleic acid (CLA) and (n-3) polyunsaturated fatty acids (PUFA) contained in fish oil. Using a model of bacterial-induced colitis, we previously demonstrated that CLA ameliorated disease associated with colitis (i.e., mucosal lesion development and weight loss) in pigs. CLA differentially modulated PPAR expression (α , γ , and δ) and PPAR γ activity in dextran sodium sulfate (DSS)-challenged mice. We hypothesized that CLA fed in combination with (n-3) PUFA would prevent colitis more effectively than CLA alone. To test this hypothesis and as a means of comparison with previous studies, we developed a pig model of DSS colitis. Sixty-four pigs were fed isocaloric diets supplemented with 1.33 g oil/100 g diet of either 1) Soybean oil (control), 2) CLA, 3) Fish oil or 4) CLA & Fish oil (50:50) for 42 days prior to the DSS challenge. On day 42, half of the pigs within dietary treatment (n=8) were administered 100 ml of 4% DSS by gastric intubation daily for 7 days. Weight loss and clinical signs were monitored on a daily basis. Colonic samples were recovered at 7 days post-challenge for transcriptional profiling of the colon and histopathological evaluation of lesions. Expression of colonic PPAR α , and PPAR γ and interferon- γ mRNA was assayed using RT-PCR. Results from the present study indicate that, while the onset of enteric disease was delayed and disease was less severe in pigs fed CLA, dietary supplementation with either (n-3) PUFA alone or (n-3) PUFA in combination with CLA resulted in clinical signs of enteric disease at 2 days, followed by recovery at 6 to 7 days post-challenge. Pigs fed the control diet were more severely affected than pigs in the other treatment groups, as measured by weight loss, colonic lesions and diarrhea. PPAR γ mRNA expression was enhanced in DSS-challenged pigs fed CLA when compared to the other treatment groups. Using the DSS model of enteric inflammation we have shown that while CLA delays the onset of disease, (n-3) PUFA accelerate the recovery. However, when CLA was fed in combination with (n-3) PUFA, the beneficial effects of CLA were diminished.

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