Effects of a 12-Week Whole-Grain or Refined Wheat Intervention on Plasma Acylcarnitines, Bile Acids, and Signaling Lipids and Association With Liver Fat

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Objectives: Whole-grain wheat consumption has been shown to have beneficial effects on liver health, including liver fat accumulation, as compared to refined wheat. The mechanisms underlying these effects remain unclear. In this study, we explored the effects of RW vs. WGW consumption on plasma levels of metabolites involved in lipid metabolism in order to identify potential underlying mechanisms of the preventive effect of WGW consumption on liver fat accumulation.

Methods: We performed a post-hoc analysis of a 12-week double-blind, randomized controlled trial in which 50 overweight or obese men and women aged 45–70 years with mildly elevated levels of plasma cholesterol were randomized to either 98 g/d of WGW or RW products. Before and after the intervention, fasting plasma concentrations of acylcarnitines, bile acids, and signaling lipids were measured by targeted UPLC MS/MS, intrahepatic triglycerides (IHTG) were quantified by ^{1}H-MRS, and additional markers of liver health were assessed, including circulating levels of β-hydroxybutyrate, alanine transaminase, aspartate transaminase, γ-glutamyltransferase, serum amyloid A, and C-reactive protein.

Results: The WGW intervention increased plasma concentrations of the two out of 52 signaling lipids platelet-activating factor (18:2) and lysophosphatidic acid (18:2), and decreased concentrations of lysophosphatidylglycerol (20:3), as compared to RW intervention, although these results were no longer statistically significant after FDR correction. Plasma concentrations of the 8 bile acids and 29 acylcarnitines that we measured were not affected differentially by the WGW or RW intervention. Changes in the above-mentioned metabolites were not correlated to change in IHTG upon the intervention.

Conclusions: The plasma acylcarnitines, bile acids, and signaling lipids that we measured do not seem to be directly involved in the mechanisms underlying the protective effect of WGW consumption or detrimental effect of RW consumption on liver fat accumulation.

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