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Opinion Article

The Role of Saturated and Polyunsaturated Fatty Acids in Modulating Gut Microbiota and Hepatic Steatosis

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DESCRIPTION

Dietary lipids can influence metabolic health *via* gut microbiota-mediated processes, but the impact of lipid-microbiota interaction on liver steatosis is poorly understood. They look at how dietary lipids affect the makeup of human gut microbiota and how microbiota-lipid interactions affect steatosis in male mice. Saturated Fatty Acid (SFA) deficiency is related with increased microbial diversity in humans, regardless of fiber intake. Poorly absorbed dietary long-chain SFA, particularly stearic acid, cause a shift in the bile acid balance as well as enhanced metabolism and steatosis in mice.

These advantages rely on the gut microbiota and are conveyed *via* microbial transmission. Polyunsaturated fatty acid-rich diets protect against steatosis but have no effect on the microbiome. In conclusion, diets high in poorly absorbed long-chain SFA change gut microbiota profiles independently of fiber consumption, and this interaction is important for improving metabolism and lowering hepatic steatosis.

The most common chronic liver disease and a main cause of liver-related mortality is Non-Alcoholic Fatty Liver Disease (NAFLD). The first phase in the development of NAFLD is hepatic steatosis, which is determined by various factors such as fatty acid intake and disposal, *de novo* lipogenesis, and fatty acid oxidation inside the liver. Several of these processes can be influenced by the makeup of dietary fatty acids.

NAFLD has been associated to an abnormal gut microbiome. NAFLD-associated gut microbiota have been shown in mouse studies to contribute to the development of various metabolic abnormalities. Microbiome profiles distinguishing NAFLD patients from healthy persons have been established in humans. Furthermore, fecal microbiota transfer from hepatic steatosis patients has been demonstrated to increase hepatic fat accumulation in recipient animals, indicating a link between the gut microbiota and NAFLD. The interaction of dietary lipids with the gut microbiota can have an impact on host physiology and disease development. They previously demonstrated that variations in adiposity and adipose tissue inflammation between mice fed a lard diet and mice fed a fish oil diet are conveyed by gut microbiota transfer. Similarly, milk fat has been found to trigger a pro-inflammatory immune response as well as colitis via a microbiota-mediated mechanism. A high-fat milk diet has also been demonstrated to cause steatosis. However, it is unclear how the interplay of dietary lipids and gut bacteria promotes hepatic steatosis.

In this study, they show that the amount of dietary SFA effects human liver function and gut microbiota profile. They also show in mice that dietary fatty acid content influences hepatic steatosis and metabolism, as well as the gut microbiota. Compared to mice fed MF, animals provided PUFA-enriched diets exhibited lower steatosis and lipogenesis, while mice fed stearic acid-enriched diets had lower steatosis and higher cholesterol production.

Mice fed stearic acid-enriched diets had higher cecum levels of long-chain SFA, which correlated positively with the richness of microbial taxa associated with enhanced host metabolism. The microbiota of mice fed stearic acid-enriched diets enhanced fecal free fatty acid saturation, caused a shift in vena porta bile acid composition, and protected against MF diet-induced steatosis and decreased metabolism.

To summarize, they show how specific changes in dietary fatty acid composition, irrespective of dietary fiber, affect gut microbiota, bile acid profile, host metabolism, and liver steatosis. The data presented suggest that the interplay of the gut microbiota and dietary lipids can be employed to modify liver steatosis. Furthermore, it implies that fatty acid absorption is an important element in regulating dietary influence on the microbiota in the distal portions of the gut. They discovered that the composition of dietary fatty acids alters the gut microbial profile in a human cohort, indicating therapeutic relevance. The interaction between dietary fatty acids and gut flora can be used to improve metabolic health dietary recommendations.

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