Association between dietary carbohydrates and liver fat content: the NEO study

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Background: Liver fat is a major cause of chronic liver disease and associated with type 2 diabetes. Current treatments to reduce liver fat are mainly aimed at weight loss by caloric restriction. However, changing the composition of the diet may be a more feasible option. Because dietary carbohydrates may increase liver fat content through de novo lipogenesis, we aimed to investigate the association between isocaloric replacement of dietary carbohydrates with fat or protein and liver fat.

Methods: In this cross-sectional analysis of the Netherlands Epidemiology of Obesity study, liver fat was assessed by proton-MR spectroscopy and intake of macronutrients was estimated with a food frequency questionnaire. Macronutrients were converted to percent of total energy intake (En%). Dietary fat and protein were further subdivided into sources (plant-, dairy- and meat-based). We used linear regression analysis to model isocaloric replacement of 5 En% carbohydrates with 5 En% fat or protein in relation to liver fat.

Results: In total, 1814 participants (44% men) were analysed, with a mean (SD) age of 55 (6) years, BMI of 26 (4) kg/m^2 and liver fat content of 5.5% (7.7). Isocaloric replacement of 5 En% carbohydrates with 5 En% of protein was associated with less liver fat (0.82 times; 95% CI 0.72, 0.94), in particular dairy (0.78 times; 0.63, 0.96) and plant-based protein (0.74 times; 0.51, 1.06). We observed no association between replacement of dietary carbohydrates with dietary fat and liver fat content. However, the associations with fat from meat (1.10 times; 0.95, 1.28) and fat from dairy (0.96 times; 0.88, 1.03) had opposite directions.

Discussion: These results indicate that, in order to reduce liver fat content, it appears best to replace dietary carbohydrates with dietary protein, possibly due to the inhibited fat oxidation and increased satiety induced by dietary protein. However, the source of these proteins appears important, which is in line with the current food group-based dietary guidelines.