C4 & C6-enriched triglycerides increase postprandial circulating levels: a randomized trial

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Background

Short Chain Fatty Acids (SCFA) are produced by the gut microbiome. They are linked to various health benefits (Fig 1)[1].

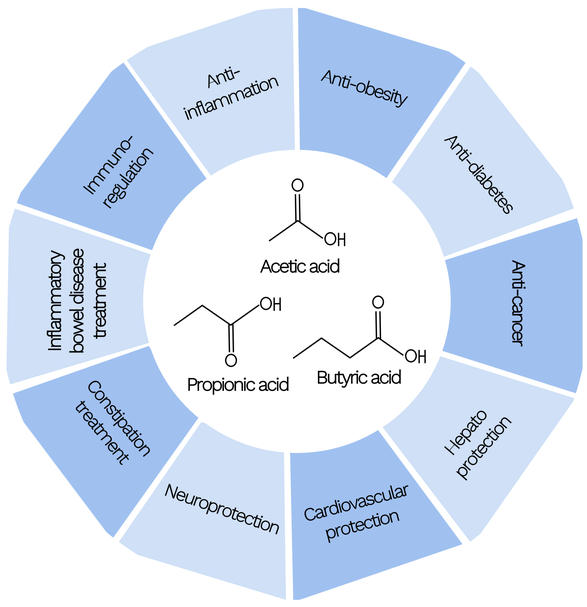

Figure 1: Health benefits SCFA, adopted from Xiong et al., 2022

A diet low in fibers or an unhealthy microbiome results in limited SCFA production in the gut and reduced availability in the circulation. SCFA absorption is important for metabolic effects. Consumption of SCFA may therefore provide a valuable strategy to combat metabolic diseases[2,3]. A structured triglyceride containing butyrate (C4) and hexanoate (C6) was developed aiming to improve absorption and metabolic effects.

Aim

To evaluate whether orally administrated C4 & C6-enriched triglycerides increase C4 and C6 levels in the circulation.

Methods

In a double-blind placebo-controlled crossover study, 12 overweight/obese men consumed a liquid high fat mixed meal containing either control (high oleic sunflower oil) or a low (650 mg), medium (1325 mg) or high dose (2000mg) of C4 & C6-enriched triglycerides. Blood was sampled at baseline and after ingestion for 6h. Primary outcomes; plasma C4 and C6 concentration. Secondary outcomes; gastro-intestinal tolerance and metabolic markers.

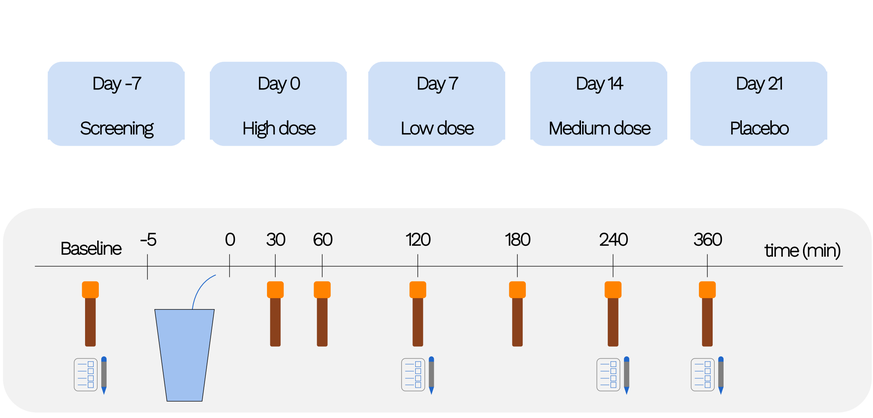

Figure 2: Example of study design. Each participant was randomized for the order in which they received the dose, with a washout period of 1-4 weeks

Conclusion

An acute dose of C4 & C6-enriched triglycerides was well tolerated and increased postprandial circulating C4 and C6 levels. Future research is needed to investigate the long-term effects of the C4 & C6-enriched triglyceride.

Results & discussion

Orally administrated C4 & C6-enriched triglycerides increased total circulating C4 and C6 levels for low, medium and high dose ($iAUC_{0-6h}$) (Fig 3). The medium dose resulted in the highest absorption, indicating an optimal dose.

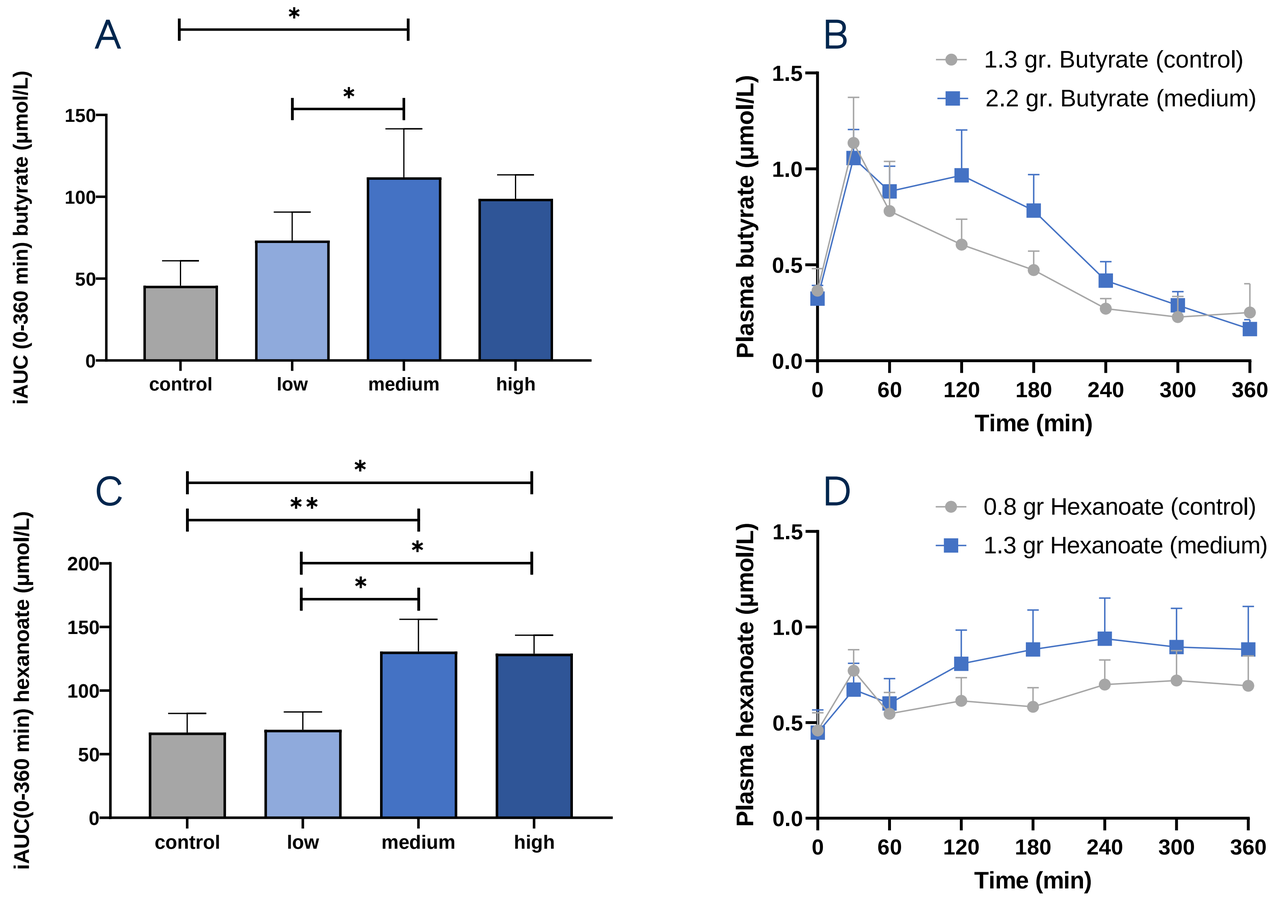

Figure 3: The effect of C4 & C6-enriched triglycerides on postprandial circulating SCFA: C4 (A, B) and C6 (C, D) concentrations. iAUC: incremental area under the curve. Graphs indicate means ± SEM, p<0.05, p**<0.01*

The C4 & C6-enriched triglycerides were well-tolerated (Fig 4).

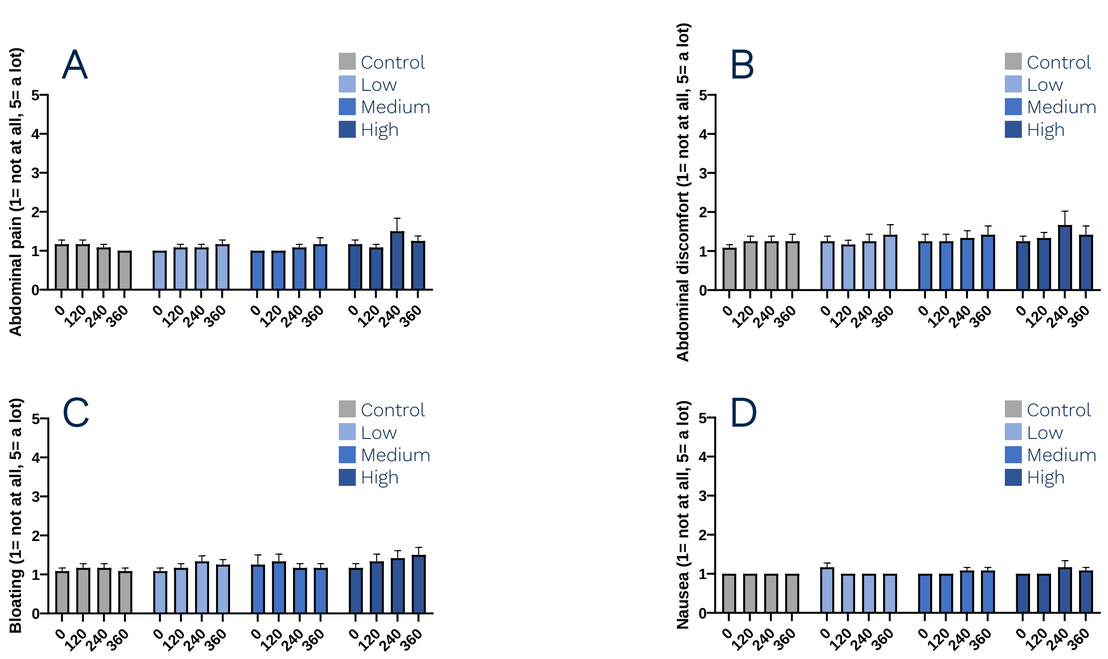

Figure 4: The effect of C4 & C6-enriched triglycerides on gastrointestinal complaints assessed by a gastrointestinal symptom rating scale. Postprandial GSRS scores (t0-t360 min) indicated on a Likert scale after ingestion of C4 & C6-enriched triglycerides for: abdominal pain (A), abdominal discomfort (B), bloating (C) and nausea (D). Graphs indicate means ± SEM

An acute dose of C4 & C6-enriched triglycerides did not resulted in significant effects on metabolic markers; glucagon-like peptide 1, glucose, insulin, triglyceride and cytokines (data not shown).

1. Xiong et al., Health benefits and side effects of short-chain fatty acids. Foods. 2022; 11(18):2863.
2. Blaak et al., Short chain fatty acids in human gut and metabolic health. Benef Microbes. 2020;11(5):411-55.
3. Canfora et al., Colonic infusions of short-chain fatty acid mixtures promote energy metabolism in overweight/obese men: a randomized crossover trial. Sci Rep. 2017;7(1):1-12.

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