

## Publications

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Publications included in this PhD thesis (presented in appendix)

### Paper I

**Sandby K**, Geiker NRW, Dalamaga M, Gronbaek H, Magkos F. Efficacy of dietary manipulations for depleting intrahepatic triglyceride content: implications for the management of non-alcoholic fatty liver disease. *Current Obesity Reports* 2021;10:125-33.

<https://doi.org/10.1007/s13679-021-00430-4>

### Paper II

**Sandby K**, Magkos F, Chabanova E, Petersen ET, Krarup T, Bertram HC, Kristiansen K, Geiker NRW. The effect of dairy products on liver fat and metabolic risk markers in males with abdominal obesity - a four-arm randomized controlled trial. *Clinical Nutrition* 2024;43:534-42.

<https://doi.org/10.1016/j.clnu.2023.12.018>

### Paper III

**Sandby K**, Krarup T, Chabanova E, Geiker NRW, Magkos F. Accumulation of fat in the liver is associated with increased insulin secretion independent of total body fat, visceral adipose tissue, and pancreatic fat. Under revision and review in *Journal of Clinical Endocrinology & Metabolism*

Other publications produced during the PhD period that are not included in this PhD thesis

Correia BSB, **Sandby K**, Krarup T, Magkos F, Geiker NRW, Bertram HC. Changes in plasma, urine, and fecal metabolome after 16 weeks of consuming dairy with different food matrixes - a randomized controlled trial. *Molecular Nutrition Food Research* 2024:e2300363.

<https://doi.org/10.1002/mnfr.202300363>

## Summary

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It is well established that obesity and metabolic dysfunction are closely linked to the risk of developing cardiometabolic diseases. During the past decades, advances in medical imaging technology have increased awareness and understanding of fat stored in non-adipose tissue, such as the liver, and its link to metabolic function, even independently of total body adiposity. While weight loss per se remains the primary strategy for reducing liver fat, achieving and maintaining a clinically significant weight loss is challenging. Nonetheless, evidence for dietary strategies for reducing liver fat independently of weight loss are scarce and inconsistent, and it is therefore important to explore strategies for reducing liver fat that are independent of weight loss (**Paper I**). Observational studies suggest that consuming fermented dairy products, particularly yogurt, may have health benefits and reduce risk of cardiometabolic diseases. However, evidence on the impact of yogurt consumption on liver fat balance is limited.

Accordingly, the overarching aim of this PhD thesis was to explore the role of liver fat as a marker of metabolic function, and evaluate the effect of dairy foods, in particular yogurt, in modifying liver fat content in males with abdominal obesity during body weight stability.

To achieve this, we conducted a 16-week randomised controlled trial to investigate the effect of yogurt compared to milk on liver fat and cardiometabolic risk in males with abdominal obesity (**Paper II**). Additionally, a cross-sectional analysis was performed to compare individuals with low and high liver fat content, to further explore the role of liver fat as a marker of metabolic function independent of other common measures of adiposity (**Paper III**).

The results from this PhD thesis underline the importance of liver fat content as a marker of metabolic function independently of other adiposity markers (**Paper III**). Contrary to our hypothesis, the effect of yogurt compared to milk was not superior in reducing liver fat and improving cardiometabolic risk during body weight stability. However, consumption of all included dairy products, fermented or not, led to similar mild improvements in some cardiometabolic risk markers without affecting liver fat content (**Paper II**).

## Dansk sammendrag (Danish summary)

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Det er bredt anderkendt at fedme og metabolisk dysfunktion er tæt forbundet med risiko for at udvikle kardiometaboliske sygdomme. I løbet af de seneste årtier har fremskridt inden for medicinsk billedteknologi øget bevidstheden og forståelsen af fedt, som er lagret andre steder end fedtvævet, så som leverfedt, og dets forbindelse til metabolisk funktion selv uafhængigt af andre markører for fedme. På trods af at vægttab er den primære strategi for at reducere leverfedt, kan det være udfordrende at opnå og vedligeholde et klinisk signifikant vægttab. Ikke desto mindre er undersøgelser af koststrategier til at reducere leverfedt, uafhængigt af vægttab, begrænsede og inkonsistente, og det er derfor vigtigt at udforske strategier til at reducere leverfedt, der er uafhængige af vægttab (**Artikel I**). Observationsstudier tyder på, at indtagelse af fermenterede mejeriprodukter, især yoghurt, kan have sundhedsmæssige fordele og reducere risikoen for kardiometaboliske sygdomme, men viden om effekten af yoghurtindtag på leverfedtbalancen er begrænset.

Derfor er det overordnede formål med denne PhD-afhandling at undersøge rollen af leverfedt som en markør for metabolisk funktion og undersøge effekten af mejeriprodukter, især yoghurt, i at ændre leverfedtindholdet hos mænd med abdominal fedme under stabil kropsvægt.

For at opnå dette gennemførte vi et 16-ugers randomiseret kontrolleret forsøg, som undersøgte effekten af yoghurt sammenlignet med mælk på leverfedt og kardiometabolisk risiko hos mænd med abdominal fedme (**Artikel II**). Derudover blev der udført en tværsnitsanalyse for at sammenligne personer med lavt og højt leverfedtindhold, for yderligere at undersøge leverfedtets rolle som en markør for metabolisk funktion uafhængigt af andre almindelige mål for fedme (**Artikel III**).

Resultaterne fra denne PhD-afhandling understreger vigtigheden af leverfedtindholdet som en markør for metabolisk funktion uafhængigt af andre markører for fedme (**Artikel III**). I modsætning til vores hypotese, viste effekten af yoghurt sammenlignet med mælk ikke en overlegenhed i at reducere leverfedt eller forbedre kardiometabolisk risiko under stabil kropsvægt. Dog førte indtag af alle inkluderede mejeriprodukter, fermenterede eller ej, til lignende milde forbedringer i nogle kardiometaboliske risikomarkører uden at påvirke leverfedt (**Artikel II**).

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