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The effects of dietary fat modification on insulin sensitivity in subjects with the metabolic syndrome: insights from the LIPGENE Dietary Intervention Study

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Evidence suggests that dietary fatty acid composition affects insulin sensitivity. The LIPGENE Human Dietary Intervention Study is a multi-centre pan-European randomised controlled trial with the aim of determining the relative efficacy of reducing dietary SFA consumption, by altering the quality and reducing the quantity of dietary fat, on metabolic risk factors of the metabolic syndrome (MetS)[1].

Free-living subjects (*n* 417) with the MetS received one of four dietary treatments for 12 weeks: high-fat (38% energy; HF) SFA-rich (HFSFA) diet; HF MUFA-rich (HFMUFA) diet; low-fat (28% energy; LF) high-complex-carbohydrate (HCC; LFHCC) diet; LFHCC diet with 1.24 g long-chain *n*-3 PUFA/d (LF*n*-3PUFA). Dietary compliance pre-, mid- and post intervention was assessed from 3 d weighed food intakes. An intravenous glucose tolerance test (IVGTT), determined insulin sensitivity (S_I) and acute insulin response to glucose (AIRg) pre- and post intervention. HOMA-IR, a measure of insulin resistance[2], and quantitative insulin sensitivity check index (QUICKI), a measure of insulin sensitivity (S_I)[3], were measured as common surrogate measures.

Dietary fat modification had no significant effect on S_I, or any of the other IVGTT variables, HOMA-IR or QUICKI. The effect of the four dietary treatments was determined in volunteers with a habitual high- or low-fat intake pre-intervention, defined as being above or below the median (36% total energy from fat). S_I was significantly lower following the HFSFA diet ($P = 0.021$) in subjects with a habitual low-fat intake pre-intervention. The sensitivity to SFA was more applicable to females for whom S_I was reduced following the HFSFA diet. HOMA-IR was also reduced in females following the HFMUFA diet ($P < 0.05$). In females with an habitual high-fat diet (>36% energy), AIRg improved following the HFMUFA diet ($P < 0.05$).

The study has provided interesting data in relation to the effect of dietary fat modification on modifiable metabolic risk factors associated with S_I. The effectiveness of dietary fat modification has been shown to be dependent on pre-intervention dietary fat intake. Furthermore, altering dietary fat seems to be more effective in females.

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