

Investigation into the acute effects of intermittent energy restriction on postprandial substrate metabolism

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The intermittent energy restriction (IER) approach to weight-loss involves short periods of substantial energy restriction (ER) followed by non-restricted intake⁽¹⁾. Little is known about the acute effects of total and partial ER on postprandial substrate metabolism within overweight/obese populations, which forms the main objective of this study. Secondary outcomes included subsequent energy compensation.

Ten (three female) healthy, overweight/obese (36 ± 5 y; 29.0 ± 1.1 kg/m²) subjects were recruited into this three-way, cross-over dietary investigation. Subjects completed three one-day dietary interventions in a randomized order with a one-week washout: isoenergetic intake, partial 75 % ER (using LighterLife™ FoodPacks) and total 100 % ER. Postprandial responses to a liquid test-meal were assessed the following day via serial blood measurements. Subjects also completed dietary diaries for two subsequent days of *ad libitum* intake. Data were analysed using repeated measures ANOVA and presented as mean \pm SEM.

Relative to the isoenergetic control leg, postprandial glucose tended to be higher after partial ER ($p = 0.089$), and was significantly increased following total ER with a delay in the time to peak (both $p < 0.05$) (Fig 1A). Postprandial triacylglycerol was reduced after partial and total ER, by 22 and 39 % respectively (both $p < 0.05$) (Fig 1B). Fasting and postprandial hepatic production of 3- β -hydroxybutyrate (3- β OHB) were elevated after both ER interventions (both $p < 0.05$) (Fig 1C). Cumulative 3-day energy intakes remained significantly lower after both total and partial ER interventions, with subjects sustaining comparable energy deficits of -28 ± 5 % and -30 ± 3 % respectively (all $p < 0.001$ vs iso).

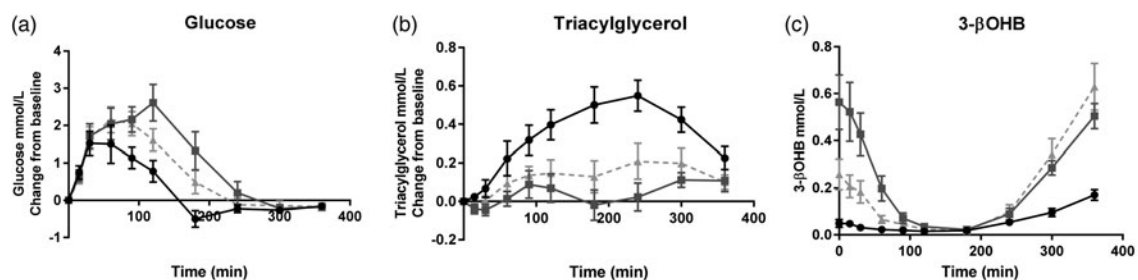


Figure 1A-C. Postprandial substrate responses
Total 100 % ER (—■—), partial 75 % ER (---▲---), isoenergetic control diet (—●—)

One day of substantial (75–100 %) ER was sufficient to produce acute improvements in postprandial triacylglycerol, which we hypothesise was driven by a shift in hepatic fatty-acid partitioning towards oxidation. By allowing some food intake, partial ER was able to mitigate the increase in postprandial glycaemia found with total fasting whilst furthermore producing a comparable three-day energy deficit. Findings of this acute study highlight the potential utility of IER as a treatment strategy for hyperlipidaemia, but now requires translation over chronic timescales.

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