

# The comparative effects of intermittent versus continuous energy restriction on anthropometry and cardiometabolic disease risk markers in obese patients utilizing weight loss support services provided by an NHS tier 3 weight management service

R. Antoni<sup>1</sup>, K.L. Johnston<sup>3</sup>, C. Steele<sup>2</sup>, D. Carter<sup>2</sup>, M.D. Robertson<sup>1</sup> and M. Capehorn<sup>2</sup>

<sup>1</sup>Nutrition, Metabolism and Diabetes Research Group, Faculty of Health and Medical Sciences, University of Surrey, Guildford, GU2 7WG,

<sup>2</sup>Rotherham Institute for Obesity, Clifton Medical Centre, The Health Village, Doncaster Gate, Rotherham, S651DA and

<sup>3</sup>Lighterlife UK Ltd, Cavendish House, Parkway, Harlow Business Park, Essex, CM19 5QF

Weight loss through continuous energy restriction (CER) has notoriously poor outcomes. Intermittent energy restriction (IER) as a method of weight loss has attracted considerable attention<sup>(1)</sup> due to its purported superior metabolic benefits and because short spells of severe energy restriction alternated with days of habitual intake may be easier to follow. However, findings from previous weight loss comparison studies have been variable<sup>(1)</sup>. This is the first intervention trial comparing IER versus CER for weight loss and improvement in cardiometabolic outcomes in obese patients registered with an NHS tier 3 weight management setting – Rotherham Institute for Obesity (RIO)

This trial was granted ethical approval by the South Yorkshire NRES committee (14 YH 0018). 200 (n = 47 male) obese patients who had been referred via their GP to the RIO weight loss clinic, volunteered to participate and in accordance with standard RIO care were allowed to choose which of the two dietary intervention they wished to follow. The IER intervention was a formula based very low-energy diet (LighterLife Fast) consisting of 2638 kJ two days per week alongside five days unrestricted healthy eating (n = 100) and the CER intervention was a healthy daily diet 2510 kJ below estimated energy requirements (n = 100). Anthropometry and established fasting cardiometabolic disease risk markers were measured before and after a six-month intervention period. Completer data were analysed using analysis of covariance to compare changes between groups, with baseline levels, age, gender and co-morbidities included as covariates. Paired t-tests were used for within-group comparisons.

27 IER patients and 39 CER patients completed the study. Mean (standard deviation) weight-loss loss was 5 (5.6) % in the IER group and 3 (4.0) % in the CER group (p = 0.046). Weight-loss was accompanied by significantly greater reductions in fat mass (bioimpedance) in the IER group (11 [11.8] % vs. 2 [10.2] %, p = 0.010), as well as waist circumference (4 [5.2] % vs. 2 [4.0] %, p = 0.047).

**Table 1.** Changes in fasting parameters over six months. \* Significant within-group.

	IER				CER				P value
	Pre		Post		Pre		Post		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Glucose mmol/L	5.1	0.7	4.9	0.7	5.3	1.2	5.3	1.5	0.120
Insulin uU/mL	24.2	10.8	19.1	11.4	28.6	20.2	25.3	11.8	0.019
Total chol mmol/L	4.7	0.9	4.6	0.7	4.7	1.0	4.7	1.0	0.824
LDL mmol/L	2.9	0.7	2.9	0.7	2.9	1.0	2.8	1.0	0.486
HDL mmol/L	1.16	0.3	1.25	0.2*	1.16	0.3	1.18	0.3	0.029
TAG mmol/L	1.4	0.5	1.2	0.4*	1.4	0.6	1.4	0.7	0.006
Systolic BP mmHg	129	11	122	11*	117	11	123	12*	<0.001
Diastolic BP mmHg	77	8	73	7*	74	9	71	7*	0.937

In summary, both CER and IER groups achieved or surpassed, respectively, the clinically significant weight-loss threshold identified by the National Institute of Clinical Excellence. Indeed, both groups exhibited improvements in at least one cardiometabolic disease risk marker. Changes in body weight and adiposity were greater among IER patients and the superiority of IER in reducing levels of fasting insulin and triacylglycerol is in line with some previous research<sup>(2-3)</sup>. The superior changes in HDL cholesterol and systolic blood pressure observed with IER are novel to this study. Further research into how these findings translate over the longer term, as well as the factors influencing the acceptability of and adherence to IER, are required.

1. Antoni R. *et al.* (2017) *Proc Nutr Soc* (in press)

2. Harvie MN, Pegington M, Mattson M *et al.* (2011) *Int J Obes* 35 714–727

3. Varady K, Bhutani S, Klempel MC *et al.* (2011) *Lipids Health Disease* 10 119