

## SUPPLEMENTARY INFORMATION

### List of clinical studies investigating the effect of diet composition prior to the measurement of substrate oxidation by indirect calorimetry after an overnight fast (n= 25).

H, high; I, intermediate; L, low; P, protein; C, carbohydrate; F, fat; NPRQ, non-protein RQ; CHOOx, carbohydrate oxidation; FatOx, fat oxidation; CON, control; Ex, exercise; FFQ, food frequency questionnaire; FQ, food quotient; WM, weight-maintenance; VLED, very-low energy diet.

Author (year) Country	No. of subjects	Intervention	Measurement protocol	Results (mean ± SE)	Body weight / composition changes during study?
<b>ISOCALORIC DIETS</b>					
Acheson <i>et al.</i> (1984) Switzerland	16 (males)	Parallel study. 3 – 6d on either HF (P11%, F75%, C14%), HC (P11%, F9%, C80%), or mixed diet (P12%, F28%, C60%).	RQ measured in morning (overnight fast), supine, for 1.5 – 2h by ventilated hood indirect calorimetry. Values integrated over 5 min periods.	Fasting NPRQs were significantly different between each group (HF 0.76±0.01, Mixed 0.82±0.02, HC 0.93±0.02; HF vs Mixed, p<0.02; HF vs HC, p<0.001; mixed vs HC, p<0.005)	Not specified.
Bisschop <i>et al.</i> (2001) Netherlands	6 (males)	11d on three different diets (8-10 wk washout between each). LFHC (P15%, C85%, F0%), IFIC (P15%, C44%, F41%), HFCL (P15%, C2%, F83%)	RQ measured by ventilated hood indirect calorimetry (supine) in morning after overnight (14h) fast and following a catheterization procedure. Last 20 min of 30 min measurement used for analyses.	RQ decreased as ratio of fat to CHO increased (0.86±0.02 to 0.81±0.01 to 0.73±0.01, p<0.01). Rates of FatOx increased after HFCL compared to other diets	Not specified.
Bisschop <i>et al.</i> (2002) Netherlands	6 (males)	7d euenergetic CON (P15%, C44, F41%), 7d HC (P15%, C85%), 7d HF (P15%, C2%, F83%). Order of diets balanced.	RQ measured by ventilated hood indirect calorimetry (supine) in morning after overnight (16h) fast and following a catheterization procedure. Last 20 min of 30 min measurement used for analyses.	No significant difference between RQ on HC (0.82±0.03) vs CON (0.78±0.02) diets. RQ on HF diet (0.72±0.03) significantly lower than both other diets (p<0.01)	Not specified.
Chokkalingam <i>et al</i> (2007) UK	10 (males)	6d of either HF (P15%, C10%, F75%), or CON (P15%, C50%, F35%) in random order	RQ measured in morning (overnight fast), supine, for 30 min by ventilated hood indirect calorimetry.	NPRQ significantly lower after HF vs CON (0.75±0.01 vs 0.79±0.01, p<0.05)	No significant change in body weight.
Goris & Westerterp (2000) Netherlands	12 (gender unknown)	4d of habitual diet followed by 4d of more/ less dietary fat (± 0.04 of habitual FQ)	RQ measured in morning (overnight fast), supine, by ventilated hood indirect calorimetry following a 15 min rest. Last 30 min of 45 min measurement used for analyses.	No significant difference in fasting RQ between diets. Data shown graphically.	No difference in mean body weight change between the two diets periods.
Hurni <i>et al.</i> (1981) Switzerland	11 (6 females, 5 males)	7d of mixed diet (P14%, C45%, F41%) followed by 7d HC diet (P15.5%, C79%, F5.5%).	RQ measured by ventilated hood indirect calorimetry (supine) in morning after overnight (12h) fast. Data averaged in 5 min intervals over 1.5 h	RQ significantly higher on HC than mixed diet (mixed 0.80±0.01, HC 0.86±0.01, p<0.001)	Not specified.
Koutsari & Sidossis (2003) USA	5 (males)	14d LC (P15%, C30%, F55%) or 14d HC diet (P15%, C75%, F10%) in random order	RQ measured for 30 min by indirect calorimetry (supine) in morning after overnight (15h) fast, following catheterization procedure and stable isotopic tracer infusion.	Total FatOx significantly lower following HC vs LC diet (p<0.05). Higher CHOOx after HC diet (p<0.001). RQ data not presented.	All subjects maintained their body weight during and between the dietary interventions.
Landry <i>et al.</i>	37 (males)	Parallel study. 7 wk of either HCLF	RQ measured in morning (overnight fast),	No difference in RQ on either diet (HCLF	Significant decrease in body weight in

(2003) Canada		(P13%, C60%, F27%) or LCHF (P13%, C46%, F41%)	supine, by ventilated hood indirect calorimetry. Measurements made for 20 min following catheterization and 30 min rest.	0.80±0.05, LCHF 0.79±0.05).	both groups compared to starting body weight, but no difference between dietary groups.
Lovejoy <i>et al.</i> (2002) USA	25 (12 males, 13 females)	Randomized, double-blind, crossover study was conducted comparing 3 controlled 4 wk diets (P15%, C57%, F28%) enriched with different fatty acids	RQ measured in morning (overnight fast), supine, by ventilated hood indirect calorimetry. Measurements made for 30 min following 30 min rest.	FatOx with trans fatty acid enrichment > saturated > monounsaturated.	Caloric intake was adjusted to maintain body weight (± 2kg) throughout the study.
McNeill <i>et al.</i> (1988) UK	11 (females)	6d CON (P14.8%, C44.5%, F40.7%) followed by 6d HC (P14.8%, C54.4%, F30.8%)	RQ measured in morning (overnight fast), supine, by ventilated hood indirect calorimetry. Measurements made for 20 min following 40 min rest.	RQ significantly higher on HC diet than CON (CON 0.82±0.01, HC 0.85±0.01, p<0.001).	Small decrease in body weight during study (-0.6±0.4kg), but no correlation between fasting RQ and BMI or % body fat.
Roberts <i>et al.</i> (2008) UK	8 (6 females, 2 males)	3d of either HC (P15%, C75%, F10%) or HF diet (P15%, C45%, F40%). 6 wk washout between diets	RQ measured for 20 min by ventilated hood indirect calorimetry. Length of fast and timing of measurement not provided.	No significant effect of diet on RQ (HC 0.78±0.01, HF 0.77±0.01, p=0.75) or relative substrate oxidation	Not specified.
Roust <i>et al.</i> (1994) USA	15 (moderately obese females) and 8 (age-matched non-obese females)	CON for 2 wk (P20%, C30-35%, F40-45%). LF for 4 wk (P20%, C53%, F27%).	RQ measured by nose clip and nonbreathing valve and mouthpiece. Average of measurements made at 0600 and 0800 used for analyses (12 and 14 h fasted, respectively). Posture and measurement length not specified.	RQ not different between groups and did not change significantly in response to HC Upper-body obese (n=8) CON 0.80±0.02, LF 0.81±0.02. Lower-body obese (n=7) CON 0.79±0.01, LF 0.82±0.03. Non-obese (n=8) CON 0.83±0.03, LF 0.80±0.02	No changes in body weight or fat mass between diets in any of the subject groups.
Saltzman <i>et al.</i> (1997) USA	14 (7 pairs of identical male twins)	9d of either LF (P16%, C64%, F20%) or HF (P14%, C46%, F40%) in random order. Substrate oxidation measured at day 2, 4 and 9.	RQ measured by ventilated hood indirect calorimetry (supine) in morning after overnight (10h) fast and following 30 min rest. Measurement length not specified.	No significant trends in proportions of FatOx & CHOOx over course of each dietary phase. RQ data not presented	Not specified.
Schutz (1995) Switzerland	5 (males)	7d mixed diet (C45%) followed by 7d HC diet (C72%)	No details provided in original article.	RQ increased with HC diet in all 5 individuals.	Not specified.
Skovbro <i>et al.</i> (2011) Denmark	21 (males)	Randomly assigned to 2.5 wk of HF (P15%, C25-30%, F55-60%) or CON (P10-15%, C55-60%, F25-35%)	RQ measured by ventilated hood indirect calorimetry (supine) in morning after overnight fast.	No differences in RQ (HF 0.81±0.01, CON 0.84±0.02)	Dietary energy intake was adjusted to maintain a stable body weight (measured daily). Significant decrease in % body fat after CON diet, no change after HF diet.
Smith <i>et al.</i> (2000) USA	6 (males)	5d CON diet (P15%, C48%, F37%) followed by 4d HF diet (P15%, C35%, F50%)	Measurements made in a respiratory chamber. Exact details of fasting RQ measurement (measurement timing and length) not provided.	Fasting RQ decreased significantly from CON after 2d of HF diet (p<0.05)	Energy intake and expenditure (exercise) altered to maintain energy balance.
Van Herpen <i>et al.</i> (2011) Netherlands	20 (overweight males)	LF (P15%, C65%, F20%) for 3 wk run-in, then half switched to isocaloric HF (P15%, C30%, F55%) for next 3 wk	RQ measured by ventilated hood. No further details on measurement protocol given.	RQ not different after LF or HF diet LF group (Run-in 0.82±0.1, Experimental 0.81±0.1) HF group (Run-in 0.81±0.1, Experimental 0.81±0.1)	Body weight did not change in either group following dietary intervention.
Westerbacka <i>et al.</i> (2005)	10 (overweight females)	14d LF (~P19%, ~C61%, F16%) or HF (~P13%, ~C31%, F56%) in	RQ measured by ventilated hood indirect calorimetry in morning after overnight fast and	Rates of lipid, CHO and protein Ox unchanged between diets (data not provided).	No change in body weight, intra-abdominal or subcutaneous fat during

Finland		random order	following 10 min rest.	RQ data not presented	dietary intervention.
<b>HYPERCALORIC / HYPOCALORIC DIETS</b>					
Hays <i>et al.</i> (2004) USA	34 (20 females, 14 males)	Baseline diet for 1 wk (P20%, C45%, F35%), then 12 wk of either CON or HC diet (P18%, C63%, F18%), or HC+Ex. Diet = 150% of predicted energy requirements	RQ measured in the morning (after overnight fast) by ventilated hood indirect calorimetry for 30 min, following a 5 min washout period.	No significant change in RQ observed between baseline and post diet intervention or diet+ex. CON wk1 0.85±0.02, wk14 0.87±0.02 HC wk1 0.80±0.02, wk14 0.84±0.03 HC+Ex wk1 0.85±0.04, wk14 0.85±0.02	Significant decreases in body weight, BMI, and % body fat in HC and HC+Ex groups. No changes in CON group.
Labayen <i>et al.</i> (2003) Spain	11 (obese females)	Parallel study. 10 wk intervention comparing HP (P30%, C40% F30%), HC (P15%, C55%, F30%) energy restricted diet	RQ measured by ventilated hood indirect calorimetry. No other details given.	Fasting FatOx decreased in HC group (-48%), but was unchanged in HP group.	Dietary intervention decreased body weight, BMI and fast mass in all groups. Body weight and fat mass decreased more with HP diet than HC diet.
Lejeune <i>et al.</i> (2005) Netherlands	75 (overweight, gender unknown)	VLED for 4 wk followed by 6 months weight maintenance (WM). During WM randomized to either CON or HP diet (+30g/d, P18-20%)	RQ (supine) was measured by ventilated hood indirect calorimetry in the morning for 30 min.	After 4 wks VLED decreased RQ vs baseline. After 3 months WM, no significant difference between CON and HP diets. After 6 months WM, RQ with HP diet significantly lower than CON (0.82±0.05 vs 0.85±0.06, p<0.05)	Significant decreases in body weight and fat mass following VLED. Significantly less weight regain during WM with HP versus CON. Fat mass decreased in HP group during WM, but increased in CON group.
McCargar <i>et al.</i> (1989) Canada	6 (males)	Four 14d diet treatments – two ratios of CHO:fat (2:1 and 1:1) at two energy levels (maintenance and 75% of maintenance)	RQ was measured, via mouthpiece, in the fasted state, with 3 sets of 5 readings conducted at 15 min intervals. Fasting length and length of each reading was not specified.	On maintenance diets: RQ on HC significantly higher than HF (HC 0.84±0.05, HF 0.78±0.04, p<0.05). No difference in RQ between HC and HF at 75% of maintenance (HC 0.79±0.05, HF 0.75±0.03).	Weight loss greater with HC than HF diet. BMI decreased with decreased energy intake, but not different between HC and HF diets.
Minehira <i>et al.</i> (2004) Switzerland	11 lean (5 males, 6 females) and 8 overweight (4 males, 4 females)	4d isoenergetic (P15%, C50%, F35%), 4d hyperenergetic diet (175% energy requirements, P9%, C71%, F20%)	RQ measured by ventilated hood indirect calorimetry in the morning, following an overnight fast, 2 h rest, and blood collection, in a semi-recumbent position.	Increased RQ with overfeeding (HC), smaller increases observed in overweight subjects. Higher FatOx in overweight at end of isocaloric diet. Suppression of lipid oxidation after HC (no difference between lean and overweight).	Increase in body weight with overfeeding, but no change in fat mass.
Schwarz <i>et al.</i> (1995) USA	6 (gender unknown)	Two sequential 3 x 5d phases. Phase 1: 5d eucaloric phase followed by 5d +50% C, followed by 5d -50% C. Phase 2: 5d +25% C, 5d -25% C 5d +50% F. Eucaloric diet (P15%, C47%, F38%).	Three 30 min RQ measurements were made over a 2 h period, between 0700 and 0900, following an overnight fast.	Increases in NPRQ with increasing %C. No effect of +50%F on NPRQ vs eucaloric diet. (Eucaloric 0.84±0.004, +50% C 0.95±0.01, -50% C 0.77±0.01, +25% C 0.91±0.01, -25% C 0.80±0.004, +50% F 0.84±0.02)	Body weight changed in parallel with energy intake, composition not specified.
<b>OTHER</b>					
Cooling & Blundell (1998) UK	16 (males)	Fasting RQ measured in habitual HP vs LF consumers (as assessed by FFQ) prior to a dietary challenge	A 30 min steady baseline RQ measurement was made by ventilated hood indirect calorimetry following an overnight (12h) fast.	Lower RQ in habitual HF vs LF consumers (HF 0.84±0.01, LF 0.89±0.02, p<0.05)	N/A (single measurement)