

**Table 5: Metabolism after Prolonged High-Intensity Intermittent or Sprint Interval Training**

Reference	Baseline Population	Protocol	Metabolism
54	8 adults (sex n.r.), type 2 diabetes, 63±8 years, BMI 32±6, VO <sub>2peak</sub> n.r.	<b>HIIT:</b> 10 x 1 min intervals at ~90% HR <sub>max</sub> with 1 min rest periods 3/wk x 2 wk	CGM (24 hours): mean glucose ↓13%, 24 hr AUGC ↓14%, sum of 3 hr postprandial AUGC ↓30%.
9, 40, 15	4 men & 7 women, metabolic syndrome, 55±13 years, BMI 30±2, VO <sub>2max</sub> 34±3	<b>HIIT:</b> 4 x 4 min incline treadmill walking at 90-95% HR <sub>max</sub> with 3 min recovery periods at 70% HR <sub>max</sub> 3/wk x 16 wk	IS (from HOMA) ↑24% vs baseline & CME & CON; FG ↓4.3% vs. baseline; TAG n.s.
	4 men & 4 women, metabolic syndrome, 52±11 years, BMI 29±2, VO <sub>2max</sub> 36±3	<b>CME:</b> 47 min at 70% HR <sub>max</sub> 3/wk for 16 wk (matched for energy expenditure with HIIT)	IS (from HOMA), FG & TAG n.s.
	5 men & 4 women, metabolic syndrome, 50±9 years, BMI 32±1, VO <sub>2max</sub> 32±3	<b>CON:</b> no intervention	IS (from HOMA), TAG & FG n.s.
23	11, metabolic syndrome, 50±10 years, BMI 31±4, VO <sub>2peak</sub> 34±10	<b>HIIT:</b> treadmill walking/running at 90-95% HR <sub>peak</sub> for 4 min x 4 bouts with active recovery periods of 3 min at 70% HR <sub>peak</sub> x 3/wk x 12 wk	TAG, HDL & FG n.s.
	11 (sex n.r.), metabolic syndrome, 51±8 years, BMI 32±4, VO <sub>2peak</sub> 32±5	<b>RET:</b> 3 sets of 8-12 repetitions x 3-5 exercises x 3/wk x 12 wk	TAG, HDL & FG, n.s.
	10 (sex n.r.), metabolic syndrome, 53±10 years, BMI 30±4, VO <sub>2peak</sub> 28±6	<b>HIIT+RET:</b> HIIT as above 2/wk, 3 resistance exercises for 8-12 repetitions 1/wk, all for 12 wk	TAG, HDL & FG n.s.
	11 (sex n.r.), metabolic syndrome, 47±10 years, BMI 32±4, VO <sub>2peak</sub> 34±10	<b>CON:</b> no exercise	TAG, HDL & FG n.s.
26	9 men & 5 women, chronic heart failure, 68±6 years, BMI 24±n.r., VO <sub>2peak</sub> 16±4	<b>HIIT:</b> 5 x 3 min cycling intervals at 80% VO <sub>2peak</sub> with 3 active recovery periods at 40% VO <sub>2peak</sub> x 3/wk x 12 wk	FG, TC, HDL, LDL, & TAG n.s.
	8 men & 5 women, chronic heart failure, 66±8 years BMI 24±n.r., VO <sub>2peak</sub> 16±3	<b>CME:</b> 30 min cycling at 60% VO <sub>2peak</sub> x 3/wk x 12 wk	FG, TC, HDL, LDL, & TAG n.s.
	9 men & 4 women, chronic heart failure, 68±9 years, 25±n.r., VO <sub>2peak</sub> 21±5	<b>CON:</b> usual care with advice for home-based physical activity	FG, TC, HDL, LDL, & TAG n.s.

Reference	Baseline Population	Protocol	Metabolism
50	8 men, post infarction heart failure, 62±8 years, BMI 28±2, VO <sub>2peak</sub> 19±5	<b>HIIT:</b> 2-4 x 4 min incline treadmill walking at 75-80% HRR with 3 min active recovery at 45-50% HRR 3-5/wk x 12 week (sessions/week:2/2/2/3/3/3/4/4/4/5/5/5)	FG ↓10% vs baseline; insulin, HOMA-IR & TAG n.s. vs baseline but greater reductions than CME; TC, HDL & LDL n.s.
	8 men, post infarction heart failure, 63±9 years, BMI 27±3, VO <sub>2peak</sub> 18±4	<b>CME:</b> 30-45 min incline treadmill walking at 45-60% HRR 3-5/wk x 12 week (sessions/week:2/2/2/3/3/3/4/4/4/5/5/5) with variables matched to the HIIT group week by week	TC ↓6%; FG, insulin, HOMA-IR, HDL, LDL, & TAG n.s.
27, 28	25 men & 5 women, post myocardial infarction, 57±10 years, BMI 27±3, VO <sub>2peak</sub> 32±6	<b>HIIT:</b> 4 x 4 min incline treadmill walking at 90-95% HR <sub>max</sub> with 3 min recovery periods at 70% HR <sub>max</sub> 3/wk x 12 wk	HDL ↑3% vs baseline; TAG n.s. At 6 months: HDL declined to baseline level; TAG n.s.
	49 men & 10 women, post myocardial infarction, 58±9 years, BMI 27±4, VO <sub>2peak</sub> 32±7	<b>Group session:</b> 10 min warmup, 35 min aerobic exercise (walking/jogging/lunges), 15 min cooldown, stretching & relaxation.	HDL & TAG n.s. At 6 months: HDL & TAG n.s.
29, 30	24 men & 4 women, following CABG, 60±7 years, BMI 26±6, VO <sub>2peak</sub> 27±5	<b>HIIT:</b> 4 x 4 min incline treadmill walking at 90-95% HR <sub>max</sub> with 3 min recovery periods at 70% HR <sub>max</sub> 5/wk x 4 wk supervised, then advised to continue at home	At 4 wk: HDL & glucose n.s. At 6 months: HDL & glucose n.s.
	24 men & 7 women, following CABG, 62±8 years, BMI 28±4, VO <sub>2peak</sub> 26±5	<b>CME:</b> 47 min at 70% HR <sub>max</sub> 5/wk for 4 wk (matched for energy expenditure with HIIT), then advised to continue at home	At 4 wk: HDL & glucose n.s. At 6 months: glucose & HDL n.s.
20	10 men, sedentary overweight/obese, 32±9 years, BMI 31±4, VO <sub>2peak</sub> 33±1	<b>SIT:</b> 4-7 bouts of 30 s cycle sprints at 6.5% FFM resistance 3/wk for 2 wk (sprints/session: 4/4/5/5/6/6) with 4.5 min active at 30 W resistance	AUC ↓15% & ISI ↑23% 24 hr post last session but n.s. 72 hr post; AUGC, TAG, HDL, FG, fasting insulin all n.s. at 24 & 72 hours post last session
33	7 (sex n.r.), sedentary overweight, 41±12 years, BMI 31±3, VO <sub>2peak</sub> ~23±n.r.%	<b>HIIT:</b> 10 x 1 min cycling at 90% VO <sub>2peak</sub> with 2 min recovery at 30% VO <sub>2peak</sub> x 4 sessions/wk for 8 wk, & diet education (1 hour seminar)	TC, LDL-C & HDL-C n.s.
	6 (sex n.r.), sedentary overweight, 45±17 years, BMI 30±3, VO <sub>2peak</sub> ~24±n.r.%	<b>CME:</b> 50% VO <sub>2peak</sub> matched to energy expenditure of HIIT for time, & diet education (1 hour seminar).	TC, LDL-C & HDL-C n.s.
	8 (sex n.r.), sedentary overweight, 40±13 years, BMI VO <sub>2peak</sub> ~23±n.r.%	<b>Diet:</b> diet education only (1 hour seminar).	TC, LDL-C & HDL-C n.s.

Reference	Baseline Population	Protocol	Metabolism
21	2 men & 8 women, obese, 37±10 years, BMI 32±4, VO <sub>2peak</sub> 27±5	<b>HIIT+Diet:</b> Up to 10 x 4 minutes cycling at 90% VO <sub>2peak</sub> with 2-3 minutes rest periods, for 6 supervised sessions over 14 days. (see below for diet)	TC ↓7.8%, LDL ↓7.1%, TAG ↓27% vs baseline; FG, fasting insulin, 2 hr glucose, & AUGC n.s.
	3 men & 6 women, obese, 41±14 years, BMI 32±3, VO <sub>2peak</sub> 26±9	<b>Diet:</b> 75% of food record estimated requirement (35% CHO)	TC ↓10%, LDL ↓7.6%, TAG ↓27% vs baseline; FG, fasting insulin, 2 hr glucose, & AUGC n.s.
24	12 men, overweight/obese, 24±5 years, BMI 29±3, VO <sub>2peak</sub> 38±6	<b>HIIT:</b> 6 x 4 min cycling at 85% VO <sub>2peak</sub> , with 2 min rest x 6 sessions over 14 d.	FG, & fasting insulin n.s.
42	2 men & 7 women, sedentary or active, 29±9 years, BMI 26±4, VO <sub>2peak</sub> 33±6	<b>SIT:</b> 4-7 bouts of 30 s cycle sprints at 7.5% BW resistance 3/wk for 2 wk (sprints/session: 4/5/6/6/7/4) with 4 min active or passive recovery between sprints	IS (from hyperinsulinemic euglycemic clamp) ↑~20% (72 hours post last exercise session); RER n.s. vs. CON; FG, insulin & NEFA n.s.
	2 men & 8 women, sedentary or active, 23±3 years, BMI 28±5, VO <sub>2peak</sub> 35±9	<b>CON:</b> no exercise	IS (from hyperinsulinemic euglycemic clamp); RER, FG, insulin & NEFA n.s.
32	20 men, active, 30±5 years, BMI 23±4, VO <sub>2peak</sub> n.r.	<b>HIIT:</b> 4 x 800 m runs at ~90% age predicted HR <sub>max</sub> (220-age) with a 1:1 work-to-rest ratio 3/wk x 8 wk	HDL ↑18%, TC/HDL ↓18% vs baseline & CON; TC n.s.
	16 men, active, 30±5 years, BMI 23±2, VO <sub>2peak</sub> n.r.	<b>CON:</b> no vigorous exercise	TC, HDL & TC/HDL n.s.
48	4 men & 3 women, sedentary, 45±5 years, BMI 27±5, VO <sub>2peak</sub> 30±3	<b>HIIT:</b> 1 min intervals at 60% W <sub>max</sub> with 1 min active recovery at 30 W resistance x 10 intervals x 3/wk x 2 wk	72 hr post last exercise: insulin ↓16%; HOMA-IR ↓35%; glucose n.s.
17	20 men, sedentary & overweight, 25±5 years, BMI 28±1, VO <sub>2peak</sub> 34±1	<b>SIT:</b> 8 s sprints with 12 s recovery periods at a cadence of 120-130 & 40 RPM, respectively, for 20 min at 80-90% HR <sub>peak</sub> x 3/wk for 12 w	RQ ↓2.4% vs. CON; glucose, HOMA-IR, TAG & TC n.s.
	18 men, sedentary & overweight, 25±4 years, BMI 29±1, VO <sub>2peak</sub> 29±1	<b>CON:</b> no exercise	Only used as a comparator for SIT

Reference	Baseline Population	Protocol	Metabolism
33	8 men, sedentary, 37±8 years, BMI n.r. (BW 96±11 kg), VO <sub>2peak</sub> 36±5	<b>HIIT:</b> 5 x 2 min running >95% HR <sub>max</sub> with 2 min rest periods 3/wk x 12 wk	FG ↓8.8% & 2-hr glucose ↓16% (OGTT); fasting insulin, TC, LDL, & HDL n.s.
	9 men, sedentary, 31±6 years, BMI n.r. (86±16 kg), VO <sub>2peak</sub> 39±7	<b>CME:</b> 60 min running at 80% HR <sub>max</sub> (~65% VO <sub>2peak</sub> ) 3/wk x 12 wk	FG ↓8.8% & 2-hr glucose ↓13% (OGTT) vs baseline; TC, LDL-C, & HDL-C n.s.
	8 men, sedentary, 36±6 years, BMI n.r. (95±24 kg), VO <sub>2peak</sub> 38±9	<b>RET:</b> 60 min 3-4 sets of: squat, hack squat, incline leg pres, isolated knee extension, hamstring curls, and calf raises 3/wk x 12 wk	TC ↑10%; FG, 2-hr glucose (OGTT), fasting insulin, LDL-C, & HDL-C n.s.
	11 men, sedentary, 30±6 years, BMI n.r. (87±11 kg), VO <sub>2peak</sub> 39±8	<b>CON:</b> no exercise x 12 wk	FG, 2-hr glucose (OGTT), fasting insulin, TC, LDL-C, & HDL-C n.s.
34	8 women, sedentary, 23±3 years, BMI 23±2, VO <sub>2peak</sub> 33±2	<b>SIT:</b> cycling 10 min total containing 2 all out sprints for 10/15/20/20/20/20 s in wk 1-6 x 3/wk, respectively, remaining time was at 60 W	Glucose AUC ↑6% vs baseline but n.s. vs CON; insulin AUC (OGGT), & ISI (Cederholm) n.s.
	8 women, sedentary, 22±1 years, BMI 23±2, VO <sub>2peak</sub> 33±2	<b>CON:</b> no exercise	Glucose AUC ↑14% vs baseline; insulin AUC (OGGT), & ISI (Cederholm) n.s. vs baseline or CON
	7 men, sedentary, 26±3 years, BMI 24±2, VO <sub>2peak</sub> 36±2	<b>SIT:</b> cycling 10 min total containing 2 all out sprints for 10/15/20/20/20/20 s in wk 1-6 x 3/wk, respectively, remaining time was at 60 W	ISI (Cederholm) ↑28%; glucose & insulin AUC (OGGT) n.s. vs baseline or CON
	6 men, sedentary, 25±2 years, BMI 24±2, VO <sub>2peak</sub> 38±3	<b>CON:</b> no exercise	glucose & insulin AUC (OGGT), & ISI (Cederholm) n.s.
49	16 men, active, 22±2 years, BMI 24±3, VO <sub>2peak</sub> 48±9	<b>SIT:</b> 4-6 30 s cycle sprints against resistance of 7.5% BW with 4 min unloaded cycling between sprints x 3/wk x 2 wk (sprints per session: 4/4/5/5/6/6)	Glucose AUC ↓12%, insulin AUC ↓37%, IS (Cederholm index) ↑23%, NEFA AUC ↓26%

Reference	Baseline Population	Protocol	Metabolism
11	15 healthy women, 22±1 years, BMI 24±2, VO <sub>2peak</sub> 29±8	<b>SIT</b> : 3 sessions/wk over 15 weeks: 8 s sprints/12 s active (20-30 rpm) recovery at 0.5 kg resistance. Progressing from 5 min sessions to 20 min sessions with 0.5 kg resistance added once 20 minutes	HOMA-IR ↓33% vs baseline but n.s. vs. CME & CON; fasting insulin ↓31% vs baseline & CON
	15 healthy women, 21±1 years, BMI 22±1, VO <sub>2peak</sub> 31±8	<b>CME</b> : 3 sessions/wk over 15 weeks: 10-20 min at 60% VO <sub>2peak</sub> for 10-20 min progressing to 40 minutes	HOMA-IR ↓11% but n.s. vs CON, fasting insulin ↓9% vs baseline but n.s. vs CON
	15 healthy women, 22±1 years, BMI 24±1, VO <sub>2peak</sub> 31±6	<b>CON</b> : no change in physical activity	HOMA-IR n.s. vs baseline, fasting insulin n.s. vs baseline
38	7 men, active, 20-40 years, BMI 25±3, VO <sub>2peak</sub> 37±7	<b>HIIT</b> : 4 x 4 min treadmill running at 90% VO <sub>2peak</sub> with min recovery periods at 60% VO <sub>2peak</sub> 3/wk x 8 wk	48 hr post last session RER, NEFA, TAG n.s.; VLDL-TAG ↓28% vs baseline & CON
	8 men, active, 20-40 years, BMI 23±2, VO <sub>2peak</sub> 40±16	<b>CON</b> : no intervention	RER, NEFA, TAG & VLDL-TAG n.s.

Study population demographics (sample size by sex, health or activity description, body mass index in kg/m<sup>2</sup>, and either VO<sub>2peak</sub> or VO<sub>2max</sub> in mL/kg/min as reported by study authors in are provided as means ± standard deviation, where reported, rounded to nearest whole number. Sample sizes are based on those included in the final analysis. Results have been converted to percentage change from baseline if the change was statistically significant followed by indication if this was significant relative to comparison group(s). Results are rounded to two significant figures. Where data was reported in graph form it may not have feasible to accurately calculate percentage change so ~ is used to indicate this. The protocol column contains the core exercise but does not describe warm up and cool down protocols, which consisted predominantly of 5-10 minutes periods of light-to-moderated intensity activity. **Abbreviations**: AUC, area under the curve; BMI, body mass index (kg/m<sup>2</sup>); BW, body weight; CABG, coronary artery bypass graft; CGM, continuous glucose monitoring; CON, control group; FG, fasting plasma glucose concentration; hr, hour or hours; HRR, heart rate reserve; HDL, high-density lipoprotein; HIIT, high intensity intermittent training group; IS, insulin sensitivity; ISI, insulin sensitivity index; min, minutes or minutes; NEFA, non-esterified fatty acids; n.r., not reported; n.s., no statistically significant change/difference; OGTT, oral glucose tolerance test; OGIS, insulin sensitivity calculated from 2-hour oral glucose tolerance test; s, seconds; RER, respiratory exchange ratio; RET, resistance exercise training group; RM, repetition maximum; RPE, rate of perceived exertion; RPM, revolutions per minute; RQ, respiratory quotient; SIT, sprint interval training group; TAG, triacylglycerol; TC, total cholesterol; VLDL, very low-density lipoprotein; W<sub>max</sub>, maximum workload.