

**High-intensity interval walking in combination with acute green tea extract supplementation reduces postprandial blood glucose concentrations in physically inactive participants**

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1 Title: High-intensity interval walking in combination with acute green tea extract  
2 supplementation reduces postprandial blood glucose concentrations in physically inactive  
3 participants.

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19 **Abstract**

20 **Background:** Exercise and green tea supplementation have been shown to have the potential  
21 to improve postprandial blood glucose concentrations, but past interventions have not often  
22 investigated attainable and time effective exercise protocols.

23 **Aim:** The purpose of this study was to investigate the effects of interval walking exercise and  
24 acute green tea extract supplementation on the glycaemic response to an oral glucose  
25 tolerance test (OGTT).

26 **Methods:** Twelve physically inactive participants (9 male, 3 female, age:  $22 \pm 1$  y; body  
27 mass:  $81.2 \pm 16.3$  kg; stature:  $175.7 \pm 9.6$  cm; body mass index (BMI; in  $\text{kg/m}^2$ ):  $26.2 \pm 4.3$ )  
28 underwent a 2-hour OGTT immediately following i) no intervention (REST), ii) placebo and  
29 exercise (EX-PLAC), ii) green tea extract supplementation and exercise (EX-GTE), in a  
30 random order. The walking exercise consisted of 6 x 1-min of brisk walking ( $7.92 \pm 0.56$   
31 km/h) separated by 1-min of slower walking (4.8 km/h). Differences between groups were  
32 identified using magnitude based inferences.

33 **Results:** The EX-GTE intervention resulted in a ~9% most likely beneficial effect on blood  
34 glucose area under the curve response to the OGTT ( $702.18 \pm 76.90$   $\text{mmol/L}^{-1} \cdot 120$   $\text{min}^{-1}$ )  
35 compared to REST ( $775.30 \pm 86.76$   $\text{mmol/L}^{-1} \cdot 120$   $\text{min}^{-1}$ ), and a very likely beneficial effect  
36 compared to the EX-PLAC ( $772.04 \pm 81.53$   $\text{mmol/L}^{-1} \cdot 120$   $\text{min}^{-1}$ ).

37 **Conclusion:** These data suggest that an EX-GTE intervention can reduce postprandial  
38 glucose concentrations in physically inactive individuals.

39 **Key words:** Interval training, nutrition, blood glucose, supplement, green tea, walking

40

## 41 **Introduction**

42

43 Glycaemic control is vital in the management and prevention of insulin resistant related  
44 diseases such as metabolic syndrome and type 2 diabetes mellitus (T2DM) (American  
45 Diabetes Association, 2015). Control of postprandial hyperglycaemia is essential for  
46 achieving long-term glycaemic control, defined using recommended HbA<sub>1c</sub> goals. Peak  
47 glucose concentrations typically occur ~60-90 min postprandially and, in individuals with  
48 insulin resistance, are sustained for several hours (American Diabetes Association, 2015).  
49 Glycaemic excursions, such as those following meals, correlate with HbA<sub>1c</sub> levels and have a  
50 detrimental effect, inducing oxidative stress and inflammation (Brownlee, 2005).  
51 Furthermore, HbA<sub>1c</sub> levels are directly associated with increased cardiovascular disease  
52 (CVD) risk and all cause-mortality (Brownlee, 2005); with CVD accounting for more than  
53 65% of all diabetic deaths (Lloyd-Jones et al., 2009). T2DM prevalence continues to increase  
54 among the adult population and presents a major public health challenge (Zghebi et al.,  
55 2017).

56

57 Obesity and a sedentary lifestyle are modifiable risk factors for the development of T2DM.  
58 Lifestyle interventions (exercise and diet modification) are therefore obvious cost-effective  
59 methods to prevent the development of T2DM and obesity. Both resistance and endurance-  
60 based exercise increase whole-body glucose uptake (Koopman et al., 2005; Larsen et al.,  
61 1997). However, a major barrier to exercise participation and adherence is reported 'lack of  
62 time', regardless of sex, age, socioeconomic status, and fitness level (Troost et al., 2002).  
63 Low-volume high-intensity interval training (HIT) has been shown to be a time-efficient  
64 stimulus to improve blood glucose in healthy and insulin resistant individuals, via a number

65 of different modalities (Adams, 2013). Little et al. (2011) conclude that HIT training  
66 increases muscle mitochondrial capacity and GLUT-4 protein content, rapidly improving  
67 glucose control (10 x 60-s cycling bouts). Additionally, regular HIT training (two weeks  
68 cycling intervention) may reduce obesity risk, by increasing energy expenditure and fat  
69 oxidation, enhancing weight loss, aiding in the prevention of T2DM (Whyte et al., 2010).  
70 Lower intensity interval training, such as interval-walking has also been found to be a  
71 feasible training method in T2DM participants. Karsoft et al. (2013) report high adherence  
72 rates ( $89 \pm 4\%$ ) and significant improvements in  $\dot{V}O_{2\max}$  ( $16.1 \pm 3.7\%$ ) and glycaemic control.  
73 Moreover, Francois et al. (2014) found that even brief bouts of incline walking (6 x 1 min  
74 bouts at  $\sim 90\%$   $HR_{\max}$ ) prior to meals significantly improved glycaemic control in individuals  
75 with insulin resistance.

76

77 Pragmatic lifestyle interventions combining physical activity and diet modifications are  
78 effective at promoting weight loss, and improve glycaemic control, potentially reducing the  
79 risk of developing T2DM and cardiovascular disease (Hordern et al., 2012). However, there  
80 is a need for more research to establish optimal strategies that are both cost-effective and  
81 attainable. Interestingly, after investigating diabetic patients' perceptions of illness and  
82 treatments, Broadbent et al. (2011) report that 86% of patients adhered to medication,  
83 whereas, just 22% report to adhere to nutritional advice. Suggesting that nutritional  
84 supplementation may be an effective alternative to diet manipulation. Recent research has  
85 found that green tea catechin (GTC) supplementation in humans may improve risk factors  
86 related to metabolic syndrome, including increased insulin sensitivity and reduced cholesterol  
87 and adiposity (Bogdanski et al., 2012; Suliburska et al., 2012). An accessible concentrated  
88 form of the catechins that are linked to lower disease risk (Kao et al., 2006) can be found in  
89 green tea extract (GTE). Specifically, the most biologically active molecule in GTE,

90 epigallocatechin gallate (EGCG), is of a high concentration, accounting for ~50-80% of the  
91 total catechin content (Khan and Mukhtar, 2007). Importantly, a recent meta-analysis  
92 concluded that GTC ingestion lowers fasting blood glucose (-1.48 mg/dL; 95% CI: -2.57, -  
93 0.40 mg/dL) in human adults (n = 1584) (Zheng et al., 2013), and Venables et al. (2008) have  
94 reported that just 24-hrs of green tea extract (GTE) supplementation improves glycaemic  
95 control (-15 ± 4% serum insulin AUC) after an oral glucose load in healthy men (n =11) at  
96 rest.

97

98 There is limited research on the use of GTE in combination with exercise. A single study has  
99 reported that GTE supplementation attenuates the glucose and insulin responses to an oral  
100 glucose load 1 hr after a graded exercise test but not at rest (Martin et al., 2016). The exercise  
101 employed by Martin et al. (2016) was also appropriate to control workload between  
102 conditions and analyse substrate oxidation. However the translation of results from such an  
103 exercise may be limited, as individuals are unlikely to complete a graded exercise test within  
104 their regular physical activity for practical and comfort reasons. Further work is needed to  
105 build upon this proof of principle research of Martin et al. (2016), and examine if the results  
106 from laboratory tests hold true for more attainable and time efficient physical activity such as  
107 low-volume interval-walking. The aim of this study was to examine the effect of interval-  
108 walking exercise, and any additive effects of GTE, on glycaemic control.

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112

113 **Materials and methods**

114

115 **Participants**

116 Twelve participants (9 male, 3 female, age:  $22 \pm 1$  y; body mass:  $81.2 \pm 16.3$  kg; stature:  
117  $175.7 \pm 9.6$  cm; body mass index (BMI; in  $\text{kg}/\text{m}^2$ ):  $26.2 \pm 4.3$ ) were recruited for the study.

118 All participants were considered to be physically inactive after completing a Global Physical  
119 Activity Questionnaire (GPAQ); defined by not meeting national guidelines to achieve a  
120 healthy lifestyle – *150 minutes of moderate-intensity exercise per week or 75 minutes of*  
121 *vigorous-intensity exercise per week*. All participants gave written informed consent to  
122 participate in the study, and the study and its protocol received full ethical approval from the  
123 Faculty of Health and Life Sciences Research Ethics Committee at Northumbria University.

124 The study contained no drop out of participants.

125

126 **Preliminary testing**

127 Basic anthropometric measures were taken, as well as safety measures, including, fasting  
128 blood glucose ( $4.41 \pm 0.17$  mmol/L) and systolic blood pressure (SBP;  $124.7 \pm 14.3$  mmHg)  
129 (Omron M6 AC Blood Pressure Monitor, Omron, United Kingdom). Fasting blood glucose  
130 was collected following an overnight fast ( $> 8$  hr) using finger capillary blood sampling,  
131 followed by blood analysis (Biosen 5030 lactate analyser, Cardiff UK). No participants  
132 presented a blood glucose over 7 mmol/L and/or a systolic blood pressure over 160 mmHg.  
133 Following recording of preliminary measures, participants completed a graded exercise test  
134 on an incline treadmill (Woodway, Waukesha WI). Participants started at 5 km/h and 4%  
135 incline, and gradually increased treadmill speed ( $1 \text{ km}/\text{h}/\text{min}^{-1}$ ) and treadmill incline (1

136  $\%/min^{-1}$ ) in order to achieve a target RPE of 16 (Borg's Perceived Rate of Exertion).  
137 Participants wore a Polar Electro heart rate monitor (Polar, Finland) throughout preliminary  
138 and intervention exercise testing periods to quantitatively monitor work rate alongside RPE.  
139 Average HR was measured as  $170 \pm 6$  bpm after participants achieved an RPE score of 16.

140

#### 141 **Study design**

142 A within-groups, double blind, crossover design was used to compare the effects of green tea  
143 extract to a placebo, and to a **resting condition**. A familiarisation visit took place prior to  
144 participant completion of three randomly ordered experimental trials. The experimental trials  
145 included (1) resting conditions (REST), (2) acute exercise with GTE (EX-GTE), and (3)  
146 acute exercise with a placebo (EX-PLAC). All trials were conducted in the morning  
147 following an overnight fast (10-12 hrs). At least 3 days separated each trial day ( $5.7 \pm 1.7$   
148 days), acting as a washout period.

149

#### 150 **Supplementation**

151 Participants were provided with capsules prior to each exercise trial of either decaffeinated  
152 GTE powder (EGCg Green Tea Extract, Now Foods, Bloomingdale IL) or a plain-flour  
153 placebo to colour match the capsules, and then the opposing capsules the following exercise  
154 test day.

155

156 Due to the pharmacokinetic evidence that the bioavailability of ingested catechins is greater  
157 in a fasted state (Chow et al., 2005), and considering a half-life of  $\sim 4$  hr (Lee et al., 2002),

158 participants were asked to ingest each capsule with 500 ml of water ~1 hr before the provided  
159 dextrose solution, and also ~1 hr before breakfast, lunch and dinner the day prior to each trial  
160 day. Therefore, participants ingested a total of 4 GTE capsules, and 4 PLA capsule each.  
161 Each 400 mg GTE capsule (98% total polyphenols, 80% catechins, 50% EGCG) contained  
162 320 mg of catechins per capsule.

163

164

### 165 **Study controls**

166 Participants were asked to maintain a habitual diet, and to not consume alcohol or excessive  
167 amounts of caffeine the day before each trial. A 24-hr food diary was completed by each  
168 participants on these days to monitor intake. Participants were also asked not to perform any  
169 exercise the day prior to each trial.

170

### 171 **Experimental protocol**

172 The resting trial consisted of a 5-minute sitting rest period followed by a 2-hr oral glucose  
173 tolerance test (OGTT). OGTT protocol involved a baseline capillary blood sample (minute 0)  
174 followed by the ingestion of a 250 ml 75g oral glucose beverage (Dextrose powder,  
175 MyProtein Ltd., Cheshire UK) in a fasted state (10-12 hr overnight fast), then capillary blood  
176 sampling for 2 hrs following ingestion (at minutes 15, 30, 45, 60, 90, 120).

177

178 After preliminary testing, each participant's treadmill speed and incline was noted, after  
179 achieving an RPE score of 16 (speed:  $7.92 \pm 0.56$  km/h; incline  $6.88 \pm 1.17$  %). The trial

180 exercise protocol consisted of 6 x 1-min long bouts at a speed that elicited an RPE of 16,  
181 interspersed with ‘slow’ walking (4.8 km/h (3 mph)) for 1-min (total exercise time = 12  
182 mins). This exercise protocol was modified from the work of Francois et al. (2014), who  
183 found ‘exercise snacking’ to be a time-efficient and effective approach to improve glycaemic  
184 control. RPE was used as a simple and inexpensive alternative to  $HR_{max}$  as it is easier to  
185 measure in a real-world setting. This study aimed for participants to achieve an RPE score of  
186 16 (hard - very hard) to mimic the research of Francois et al. (2014) which targeted a measure  
187 of 90%  $HR_{max}$ . A typical RPE response in the Francois et al. (2014) study resulted in the  
188 mean RPE of 16 in high-intensity bouts 4-6, this is in accordance with the work of Francois  
189 and Little (2015) which suggests its take ~3-4 intervals to accurately determine intensity.  
190 Following the exercise bout, a baseline blood glucose sample was taken prior to the  
191 administration of the oral glucose load and 2-hr OGTT.

192

### 193 **Statistical analysis**

194 A sample size calculation was conducted using a custom made spreadsheet (Will Hopkins;  
195 [www.sportsci.org](http://www.sportsci.org)), based on glucose AUC reproducibility data from previous work (Gordon  
196 et al., 2011), who found increases greater than  $63.5 \text{ mmol/L}^{-1} \cdot 120 \text{ min}^{-1}$  and decreases greater  
197 than  $80.9 \text{ mmol/L}^{-1} \cdot 120 \text{ min}^{-1}$  to exceed daily variation. A between subject standard deviation of  
198  $100 \text{ mmol/L}^{-1} \cdot 120 \text{ min}^{-1}$  was taken from Venables et al. (2008), and a within subject standard  
199 deviation of  $98 \text{ mmol/L}^{-1} \cdot 120 \text{ min}^{-1}$  was calculated by taking 13% (upper 95% CI of normal  
200 daily variation; Gordon et al., 2011) of the average glucose AUC reported by Venables et al.  
201 (2008). These values resulted in a sample size of ten being required to achieve 90% power.

202

203 Glucose area under the curve (AUC) was calculated using the incremental method. All data  
204 were log-transformed prior to analysis. The descriptive summary for all variables comprised  
205 of the geometric mean and dispersion shown as standard deviation (SD) (Hopkins et al.,  
206 2009). An analysis of variance (ANOVA) model was used on peak and AUC glucose data.  
207 Following this, a magnitude-based inferences approach (Hopkins et al., 2009), was used to  
208 analyse the mean effect of the intervention (EX-GTE), versus placebo (EX-PLAC) and rest  
209 (REST). Inferences were based on the disposition of the 90% confidence limits (CL) for the  
210 mean difference to the minimal clinically important difference (MCID). Log-transformed  
211 data were back transformed to provide percent differences between conditions. The  
212 probability (percent chances) that differences in glucose AUC between EX-GTE, EX-PLAC  
213 and REST were beneficial (>MCID), harmful (>MCID with opposite sign), or trivial (within  
214  $\pm$  MCID) was calculated (Hopkins et al., 2009). Robust clinical data for the MCID on all  
215 variables is scarce, therefore, MCID was determined using a standardised mean difference of  
216 0.2 times between subjects' standard deviations (Cohen, 1988). Subsequently, the percent  
217 chances were defined via probabilistic terms assigned using the following scale; <0.5%, most  
218 unlikely or almost certainly not; 0.5 to 5%, very unlikely; 5 to 25%, unlikely or probably not;  
219 25 to 75%, possibly; 75 to 95%, likely or probably; 95 to 99.5%, very likely; >99.5%, most  
220 likely or almost certainly (Batterham and Hopkins, 2006). Inferences were categorised as  
221 clinical, with the default probabilities for declaring an effect clinically beneficial being <0.5%  
222 (most unlikely) for harm and >25% (possibly) for benefit (Hopkins et al., 2009).  
223 Additionally, in the case of an effect being possibly beneficial (>25%) an unacceptable risk  
224 of harm (>0.5%) and with an odds ratio for benefit: harm of <66, would be classified as  
225 unclear.

226

227

## 228 **Results**

229

230 The heart rate ( $170 \pm 13$  vs.  $166 \pm 13$  beats.min<sup>-1</sup>) and RPE ( $13 \pm 2$  vs.  $14 \pm 2$ ) were  
231 comparable between exercise trials. Comparison between conditions for glucose AUC and  
232 peak glucose can be seen in Table 1. When compared to the REST condition ( $775.30 \pm 86.76$   
233 mmol/L<sup>-1</sup>.120 min<sup>-1</sup>), there was a most likely beneficial effect of EX-GTE ( $702.18 \pm 76.90$   
234 mmol/L<sup>-1</sup>.120 min<sup>-1</sup>) on glucose AUC and a very likely beneficial effect compared to EX-  
235 PLAC ( $772.04 \pm 81.53$  mmol/L<sup>-1</sup>.120 min<sup>-1</sup>). The effect was unclear between EX-PLAC and  
236 REST. **The average response to the OGTT at all time points is presented in Fig 1.** There was  
237 a very likely beneficial effect of EX-GTE ( $7.51 \pm 0.91$  mmom/L) when compared to REST on  
238 peak glucose ( $8.30 \pm 0.92$  mmol/L). The effect was unclear on all other outcomes.

239

240 [Insert Figure 1.]

241

## 242 **Discussion**

243

244 This study aimed to investigate the effect of high-intensity walking exercise on glycaemic  
245 control, and any additive effect of an acute GTE supplementation strategy. The main finding  
246 was that the walking exercise alone did not influence the glycaemic response during a 2-h  
247 OGTT, but the combined walking exercise with GTE had a 'most likely', and 'very likely'  
248 beneficial effect on glucose AUC and peak glucose respectively.

249

250 Previous research has suggested that high-intensity interval walking may be effective at  
251 reducing mean postprandial blood glucose concentrations (Francois et al., 2014; Jakobsen et  
252 al., 2016). Francois et al. (2014) reported that 6 x 1 min bouts of inclined interval walking  
253 (90% HR<sub>max</sub>) interspersed with periods of slow walking significantly reduced mean 3 hr  
254 postprandial glucose before breakfast ( $-1.4 \pm 1.5$  mmol/L,  $p = 0.02$ ) when compared to  
255 traditional continuous exercise (30 min moderate-intensity; 60% HR<sub>max</sub>), a 17% reduction in  
256 3 hr post-breakfast AUC (interval walking:  $1,090 \pm 178$  mmol/l vs. continuous exercise:  
257  $1,307 \pm 337$ ,  $p = 0.04$ ). The present study aimed to emulate the exercise protocol of Francois  
258 et al. (2014) whilst using RPE to measure effort, as opposed to HR<sub>max</sub>, to give a reliable  
259 (Ciolac et al., 2015) but simple and inexpensive method that could be replicated more easily  
260 in the real world, to simplify the translation of our findings to practice. However, this study  
261 did not find a worthwhile effect between postprandial glucose concentrations of exercise  
262 alone with placebo and the resting condition. More specifically, we aimed for participants to  
263 achieve an RPE score of 16 throughout exercise testing, in an attempt to replicate the 90%  
264 HR max targeted by Francois et al. (2014). However, average trial RPE failed to give the  
265 desired effect (RPE = 16) with an average RPE score of  $13.4 \pm 1.7$  (HR:  $170 \pm 13.1$  bpm) and  
266  $13.7 \pm 1.6$  (HR:  $165.8 \pm 13$  bpm) during the EX-PLAC and EX-GTE trials, respectively.  
267 Moreover, the average HR during the high-intensity intervals was  $170 \pm 6$ , ~85% of HR<sub>max</sub>,  
268 lower than the desired 90% of HR<sub>max</sub> (~178 bpm,  $p < 0.01$ ). This suggests that the study  
269 duration, and/or intensity may not have been high enough to induce the desired physiological  
270 changes. Similarly, Jakobsen et al. (2016) suggest that altering the intervention to 3 min long  
271 bouts of high-intensity walking may improve glycaemic control, specifically, by reducing  
272 postprandial glucose concentrations. The study found no difference between mean glucose  
273 after 1 min walking cycles compared to control, whereas 3 min bouts attenuated glucose  
274 response following a 4 hr liquid mixed meal tolerance test. The inclusion of a step test in

275 place of a ramp test would be recommended in future, with sufficient breaks between steps to  
276 reduce the effect of cumulative fatigue during the graded exercise test and increase the  
277 walking speed at an RPE of 16. Whilst the current study found no benefit to high-intensity  
278 interval walking alone for glycaemic control, these results are contrary to the limited previous  
279 research.

280

281 The addition of GTE to the walking intervention did reduce postprandial glucose  
282 concentrations, and the ~9% reduction in glucose AUC in the EX-GTE trial can be  
283 interpreted as being ‘most likely beneficial’ compared to REST and ‘very likely beneficial’  
284 compared to exercise alone (Table 1). The effect of this intervention was greater than the  
285 typical 6% daily variation of OGTT results identified by Gordon et al. (2011). This would  
286 suggest that the study intervention may improve insulin sensitivity of the skeletal muscle,  
287 agreeing with the work of Martin et al. (2016) who suggest that GTE may alter skeletal  
288 muscle glucose uptake in humans. Possibly due to the increased translocation of glucose  
289 transporters which is apparent in rodent studies, specifically, green tea has shown to have a  
290 similar effect to exercise, in that, prolonged consumption increases GLUT-4 translocation in  
291 normal and insulin resistant skeletal muscle, in addition to increased adipocyte insulin-  
292 receptor binding (Wu et al., 2004).

293

294 A limitation of the present study is the absence of a GTE group without the exercise  
295 intervention to give further context to the combined effect of GTE and exercise, however,  
296 previous research has indicated that GTE alone may not sufficiently reduce postprandial  
297 glucose concentrations. As mentioned, Martin et al. (2016) state that GTE attenuated glucose  
298 response to an oral glucose load following acute exercise, however, the study found no effect

299 under resting conditions (Glucose AUC: GTE =  $394 \pm 70$ , PLA =  $409 \pm 78$  mmol/L<sup>-1</sup>·60 min<sup>-1</sup>,  
300 <sup>1</sup>, p = 0.51). Venables et al. (2008) also found that GTE significantly lowered insulin AUC (-  
301  $15 \pm 4\%$ , p < 0.01) and increased insulin sensitivity (insulin sensitivity index (ISI):  $13 \pm 4\%$ ,  
302 p < 0.05), albeit with no difference in glucose concentrations (p > 0.05). Furthermore, a  
303 combined intervention should be recommended where possible due to the further reaching  
304 benefits of physical activity. Importantly, this study presents evidence that a combined  
305 walking and GTE intervention can improve glycaemic control. This offers insight in to a  
306 potentially more real world applicable and achievable exercise in physically inactive people  
307 than has been researched in the past, as previous studies have for example used higher  
308 intensity cycling protocols (Little et al., 2011; Whyte et al., 2010). It should also be  
309 considered when interpreting our results that although the participants were physically  
310 inactive, their glycaemic control was good under all testing conditions, and fasted blood  
311 glucose was  $4.41 \pm 0.17$  mmol/L. The results may be different in populations with poorer  
312 glycaemic control, and further research is warranted in this area.

313

314 In conclusion low-volume interval-walking exercise combined with GTE supplementation  
315 was found to reduce postprandial glucose concentrations in physically inactive individuals. A  
316 combined walking and green tea routine may be an achievable and translatable intervention  
317 for physically inactive people.

318

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320 The authors wish to thank those who volunteered to take part in the study.

321

322 **Authors' contributions**

323 XXX and XXX conceived the study. XXX recruited participants and collected the data. XXX  
324 performed the statistical analysis. XXX, XXX and XXX contributed to drafts of the manuscript, and  
325 all authors have read and approved the final version of the manuscript, and agree with the order of  
326 presentation of the authors.

327

328

329 **Availability of data and materials**

330 The datasets used and/or analysed during the current study are available from the  
331 corresponding author on reasonable request.

332

333 **Declaration of conflicting interests**

334 The authors declared no potential conflicts of interest with respect to the research, authorship,  
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341

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434 Figure caption

435 **Fig 1.** Average post-prandial blood glucose (mmol/L) response at each time point of the OGTT  
436 for the REST, EX-PLAC and EX-GTE conditions. Error bars for EX-PLAC have been removed for  
437 clarity.

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454 **Table 1 Clinical inferences of differences in glycaemic control between treatment groups**

Variable	Comparison	Difference between groups (% mean; 90%CL)	Likelihood (%) of intervention being beneficial / trivial / harmful	Clinical inference
Glucose AUC (mmol.min <sup>-1</sup> )	EX-GTE to REST	-9.4 ±4.9	99.8 / 0.1 / 0.1	Most likely beneficial
	EX-GTE to EX-PLAC	-9.1 ±7.1	98.0 / 0.0 / 2.0	Very likely beneficial
	EX-PLAC to REST	-0.37 ±50	50.5 / 0.0 / 2.0	Unclear
Peak glucose (mmol/l)	EX-GTE to REST	-9.8 ±7.5	98.2 / 0.0 / 1.7	Very likely beneficial
	EX-GTE to EX-PLAC	-7.23 ±12	84.1 / 0.2 / 15.2	Unclear
	EX-PLAC to REST	-2.79 ±50	53.7 / 0.1 / 46.2	Unclear

AUC = area under the curve; REST = resting condition; EX-PLAC = exercise intervention with placebo; EX-GTE exercise intervention with green tea extract supplementation

