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Title: Effects of a whole-body strength training program on metabolic responses and body composition.

Running title: Adaptations to whole-body strength training

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Abstract

Aim: This study aimed to evaluate the metabolic responses during a whole-body strength training (WBST) session and the effectiveness of a 8-weeks WBST program on metabolic adaptations and body composition. *Methods:* Three experimental groups followed either a WBST program (n=15), a walking program (WALK, n=11), or control period (CONT, n=12). The oxygen consumption ($\dot{V}O_2$), and the rate of lipid oxidation (LipOx) were evaluated during both incremental exercises (WBST and WALK) before and after both 8-weeks training programs (i.e., WBST and WALK). Additionally, body composition and anthropometric characteristics were evaluated before and after the experimental period, for each group. *Results:* $\dot{V}O_2$ was similar during WBST performed at 80% of MVC (15.4 ± 3.9 ml/min/kg), and during walking at 4.5 km/h (16.8 ± 2.0 ml/min/kg). After WBST program, $\dot{V}O_2$ during walking exercise at 4.5 km/h was significantly reduced (-7.2 ± 10.4 %; $p<0.01$). The reduction of body fat percentage was significantly ($p<0.05$) greater after WBST program (-4.94 ± 4.65 %) than after WALK program (-3.17 ± 1.95 %). In contrast body composition did not significantly change after CONT period. *Conclusion*: This study demonstrated that a WBST session, performed at 80 % of MVC, induced a significant aerobic solicitation and that a 8-week WBST program efficaciously influenced body composition, anthropometric characteristics, and reduced the energetic cost of walking. These findings suggest that WBST may be an interesting alternative to combined aerobic and strength training strategies in overweight management.

Key words:

Overweight management, Oxygen uptake, Lipid oxidation, Body fat percentage, Efficiency

Introduction

Over the last decade, the worldwide prevalence of overweight and obesity has considerably increased (Caballero 2007). Recent studies reported a linear relationship between body fat percentage and impairment of physiological health and well-being (Chen et al. 2006). In that context, any strategy aimed at controlling body weight and composition is valuable from a health and economic point of view.

Exercise appears to be one major factor in long-term success in weight maintenance (van Baak et al. 2003). Indeed, fat oxidation is optimized during low to moderate intensity exercise (Romijne et al. 1993), and high-intensity exercise induces fat oxidation during the recovery period (Folch et al. 2001; Schrauwen et al. 1997). Generally, aerobic training is promoted as the most effective mode of exercise for overweight management as it produces improvements in lipid profiles and insulin sensitivity (Cauza et al. 2005). In aerobic programs, walking is commonly used with overweight person. Indeed, this mode of exercise is easy to achieve, not technical and is efficient in promoting healthy effects with a minimum practice of 150 $min.week^{-1}$ (Siddiqui et al. 2010). In addition, it has been reported that fat oxidation rates over a wide range of intensities were significantly higher during walking compared with cycling exercise (Achten et al. 2003), partly due to the important muscle mass recruited during walking (Hermansen and Saltin 1969). However, aerobic exercises, and especially walking, are often perceived as forbidding or boring, which limit the long-term adhesion to that kind of training program (Siddiqui et al. 2010), and therefore impairs long-term weight maintenance.

More recently, published guidelines have emphasized the value of strength or resistance training to promote weight loss (Haskell et al. 2007, Pollock et al. 2000). Indeed, it appeared that resistance training increased muscle mass (Hunter et al. 2000) and decreased the difficulty in daily living activities, therefore promoting more active behaviours (Hunter et al. 1995, Hunter et al. 2000). These positive adaptations were associated with increases of both resting and daily (Hunter et al. 2000) energy expenditure after the strength training period. As a consequence, regular resistance training has been recognized as an appropriate strategy to promote weight loss and to improve body composition (*i.e.*, reduction of fat mass and increase in lean body mass) (Balducci et al. 2004). Additionally, it has been suggested that fat oxidation rates during exercise may be increased after resistance training (Gilette et al. 1994, Melby et al. 1993).

Nevertheless, typical resistance training remains metabolically less demanding than endurance training, especially because of the limited muscle mass recruited during strength training. Given the limits of aerobic programs, recent studies have used a combination of both training modalities (*i.e.*, resistance and aerobic training). Results demonstrated i) a significant increase of muscle force, ii) improvements in body composition (Cauza et al. 2005), iii) facilitation of daily living activities (Hunter et al. 1995) and iv) improvement of the long-term adhesion to the training program. Current evidence suggests that a combination of aerobic and strength solicitations are necessary for optimal results in the treatment of overweight (for review, Hills et al. 2009). Rather than combining different endurance and strength activities, an alternative strategy could be to perform whole-body strength training (WBST) exercises, which could be able to recruit a large muscle mass at high force levels, and therefore to concurrently induce a significant aerobic solicitation. To date, the acute effect of WBST on metabolic responses has not been established. Further, the effects of a WBST training program on body composition and physiological adaptations remain unknown.

Therefore, the purposes of the present study were (i) to compare the aerobic solicitation between WBST and walking exercises, and (ii) to evaluate the effectiveness of a WBST training program on metabolic adaptations, body composition, and maximal muscle force, in comparison walking program (Siddiqui et al. 2010).

2. Materials and Methods

2.1 Subjects

Thirty-eight sedentary women (age: 28.4 ± 6.1 years; height: 166.2 ± 7.5 cm; mass: 64.5 ± 8.7 Kg) volunteered to participate in the present study after they were informed in detail about the nature of the experiment and possible risks. All of them were under contraceptive treatment. Exclusion criteria included diabetes, pregnancy, hypertension, dyslipidemia, treatment with antidepressants and use of weight loss drugs. All volunteers were told to maintain their usual diet for the total duration of the study. Informed written consent was obtained from each participant. The local ethics committee approved the project before its initiation.

2.2. Experimental approach to the problem

Firstly, acute metabolic solicitations induced by walking and WBST exercises were compared during specific incremental tests. Secondly, three experimental groups have been constituted to establish the effectiveness of WBST program as a strategy to promote positive health effects and weight maintenance : Twelve women (age: 27.8 ± 5.8 years; height: 167.0 ± 7.2 cm; mass: 64.4 ± 7.2 Kg) were told to respect a 8-weeks control period (CONT), eleven participants (age: 25.1 ± 4.6 years; height: 163.9 ± 6.5 cm; mass: 63.5 ± 9.9 Kg) followed a 8-weeks walking (WALK) training program, and fifteen other subjects (age: 31.3 ± 6.2 years;

height: 167.5 ± 8.7 cm; mass: 65.4 ± 9.4 Kg) participated to a 8-weeks WBST program. Body composition and anthropometric characteristics were measured before (PRE) and after (POST) the 8 experimental weeks, for each group. Additionally, metabolic responses during incremental walking tests were recorded before and after both training programs (i.e., WBST vs. WALK).

Training program: The WBST exercises were conducted on a commercially available device (Huber® Spineforce, LPG Systems, France) which consisted of an oscillating platform and two large handles mounted on a movable column. Several feet and hand positions were marked on the platform and handles, respectively (Figure 1). WBST exercises consisted in adopting specific positions, defined as a combination of various feet and hands positions, and developing high force levels (60-80% of the maximal isometric voluntary contraction (MVC)) against the handles. These actions required the synergist activation of various muscle groups of the lower limbs, trunk and upper limbs. Handles were equipped with strain gauges, and feedback about force development was provided to the subjects. Additionally, an interactive interface, materialized as a target, informed the subject about their ability to maintain the required force level. This "game-like" control panel was intended to stimulate the subject's motivation to practice and adhesion to the WBST training program.

Training was performed three times per week during 8 weeks (*i.e.* 24 training sessions). Each 30-minute training session was supervised by the principal investigator (JBF) to ensure compliance and to maintain optimal exercise technique. Subjects alternated two WBST exercises (Figure 1) every 7s with a 7-s recovery period between each exercise. Three series of 40 contractions were performed during each training session. The first six sessions were performed at 60 %, the following six at 70% and the last twelve sessions at 80 % of MVC.

MVC was evaluated before each training session during two WBST reference exercises (see "*MVC*" paragraph and Figure 1).

Walking exercise was performed on a treadmill (Qasar, HP cosmos, Deutschland). During each 30-min training session, volunteers walked at an averaged speed of 4.4 ± 1.0 km/h, corresponding to the maximal rate of lipid oxidation. The maximal LipOX was determined during the initial incremental walking test. Training was performed three times per week during 8 weeks (*i.e.* 24 training sessions).

All participants having integrated the control group were told recommended to maintain their lifestyle uses during the 8 weeks of the protocol (*i.e.*, diet and physical activity).

Insert figure 1

2.3 Data recording and analyses

Metabolic responses: Subjects performed an incremental walking test before and after both training periods (i.e., WBST and WALK). The walking test (Venables et al. 2005) was performed on a treadmill (Qasar, HP cosmos, Deutschland). Volunteers started exercising at a speed of 3.5 km/h at a gradient of 1%. The speed was increased by 1 km/h every 3 min until a speed of 6.5 km/h was reached. Additionally, women, participating to the WBST program, were tested before and after training period on an incremental WBST exercise. This test was composed of three stages of 10-min duration on the Huber® apparatus, interspersed by a 90-s recovery period. Subjects started at 60% of MVC. Afterwards, the level of force was increased by 10% for each stage (*i.e.* 60%, 70%, 80% of MVC).

During both tests, the subjects continuously breathed through a face mask, and respiratory gas exchanges were monitored breath-by-breath (K4B^2, Cosmed, Italy). Before each test, the system was calibrated with a 3-liter Rudolph syringe (Quinton, USA) and a standard gas of known concentration (5% O_2 and 16% CO_2). Oxygen consumption ($\dot{V}O_2$, in ml/min/kg), and rate of lipid oxidation (LipOx) were recorded throughout both tests (*i.e.* walking and WBST). For subsequent data analysis, all these parameters were averaged over the last 2 min of each stage.

Maximal Voluntary Contraction: After a familiarization period (10 min) on the Huber® apparatus, MVC was measured in two standardized positions (Figure 1). Subjects were asked to exert maximal isometric pushing and pulling forces (*i.e.* opposite actions with the two arms on the handles). For each position, pulling and pushing forces were recorded by the strain gauges placed on the handles. Subjects performed two 6-s MVCs at each position. A third trial was performed if the difference between the two first trials was greater than 5%. The recovery period between trials was set to 60s. Strong verbal encouragement and visual feedback about force development were provided to the subjects during each MVC. The highest average force produced over the 6-s period was retained as the MVC value, for each action (*i.e.*, pulling and pushing forces).

Anthropometric measurements and body composition: Body mass was measured with commercial scale (Tanita BC-532, Total Innerscan, Japan). Waist and thigh circumferences were measured with a tape meter, respectively, at the level of the iliac crests, and at middle distance between the right iliac crest and the right lateral femoral condyle. Body fat percentage was evaluated with a skinfold calliper (Baty International, United Kingdom). Skinfolds were measured at 4 standard anatomical sites (i.e., biceps brachii, triceps brachii, subscapular, supra-iliac) on the right side. The tester pinched the skin at the appropriate site to raise a double layer of skin and the underlying adipose tissue. The calipers were then applied

1 cm below and perpendicular to the pinch, and a reading in millimeters was taken two seconds later. The mean of two consecutive measurements was calculated during data processing. Body fat percentage was then calculated according to the equation of Siri (1956).

2.4 Statistical analyses

Descriptive statistics, including means and standard deviations, were calculated for each parameter. One way analysis of variance (ANOVA) was used to compare acute metabolic responses between both incremental tests (WBST and walking). For the latter, only data from the last stage (*i.e.* 80% of MVC) was used for the comparison with the walking test, because it represented the highest metabolic solicitation and was representative of a typical WBST training load. Post-hoc analyses (Newman-Keuls) were used to test differences among pairs of means, when appropriate. One way ANOVA with repeated measures on time (PRE x POST) was used to compare dependent variables between different experimental groups. Post-hoc analyses (Newman-Keuls) were used to test differences among pairs of means, when appropriate. A level of $p<0.05$ was used to identify statistical significance. The statistical analyses were performed by using Statistica software for Windows (Statsoft, version 6.1, Statistica, Tulsa, OK).

3. Results

Acute metabolic responses: LipOx did not significantly differ between WBST at 80% of MVC and walking exercise from 3.5 to 6.5 km/h (Figure 2). The maximal rate of lipid oxidation reached during walking test was significantly greater ($p<0.05$) for participants to the WBST program (0.59 ± 0.24 g/min) than for participants to WALK program (0.34 ± 0.10

g/min). $\dot{V}O_2$ during WBST exercise at 80% of MVC was similar to the $\dot{V}O_2$ recorded during walking at 3.5 and 4.5 km/h., but remained significantly ($p<0.001$) smaller as compared to walking at 5.5 and 6.5 km/h (Figure 2). For each speed step of the incremental walking test, $\dot{V}O_2$ was similar for both training groups.

Metabolic adaptations: The maximal rate of lipid oxidation during the incremental walking test did not significantly change between PRE (WBST: 0.59 ± 0.24 g/min; WALK: 0.34 ± 0.10 g/min) and POST (WBST: 0.53 ± 0.15 g/min; 0.39 ± 0.13 g/min) both protocols, whatever training modalities. In contrast, $\dot{V}O_2$ during walking at 4.5 km/h was significantly reduced after the WBST training period (-7.2 ± 10.4 %; $p<0.01$) (Figure 3), while it did not significantly change after WALK program. LipOx during walking at 4.5 did not change after both WBST and WALK program in comparison with initial test. $\dot{V}O_2$ and LipOx during WBST at 80% of MVC was also similar before (16.2 ± 4.2 ml/min/kg and 0.44 ± 0.2 g/min, respectively) and after (17.8 ± 3.4 ml/min/kg, and 0.48 ± 0.04 g/min, respectively) WBST training period.

Insert figure 2

Insert figure 3

MVC: The absolute force was greater after WBST training as compared to the initial test: Maximal pushing force was significantly ($p<0.01$) increased after training (right: + 21.7 ± 34.2 %; left: + 29.0 ± 37.9 %). The same trend ($p = 0.09$) was observed for the pulling force (+ 17.4 ± 30%, in average).

Anthropometric measurements and body composition:

Body mass was similar before (64.4 ± 8.7 kg) and after (64.8 ± 9.0 kg) the experimental period, whatever studied group. Anthropometric measures and body composition did not significantly change after the period of control. Thigh circumference did not significantly differ after training programs (WBST: 54.3 ± 1.1 cm, WALK: 54.1 ± 6.6 cm) in comparison with initial values (WBST: 54.4 ± 1.0 cm, WALK: 54.3 ± 7.2 cm). In contrast, waist circumference was significantly ($p<0.001$) reduced after WBST training (-3.1 ± 2.1 cm), but not after WALK program. Supra-iliac, biceps brachii, and triceps brachii skinfolds thickness were also significantly ($p<0.001$) lower after the WBST training period (14.5 ± 6.2 mm, 15.1 ± 10.1 mm and 26.2 ± 12.6 mm, respectively) in comparison with initial values (12.3 ± 1.2 mm, 13.1 ± 8.3 mm, and 23.7 ± 11.8 mm, respectively), while only triceps brachii skinfold thickness was significantly ($p>0.05$) reduced after training (-3.0 ± 3.8 mm). Body fat percentage was significantly ($p<0.01$) lower after both modalities of training (WBST: 29.6 ± 9.1 %; WALK 34.0 ± 4.0 % 32.0 ± 7.1 %) as compared to initial values (WBST: 32.0 ± 7.1 %; WALK: 35.2 ± 4.1 %) (Figure 4). In contrary, body fat percentage was not affected by the control period (PRE: 33.0 ± 5.9 %; POST: 32.6 ± 5.8 %). The reduction of body fat percentage was significantly ($p<0.05$) greater after WBST program (-4.94 ± 4.65 %) than after walking program (-3.17 ± 1.95 %) (Figure 4).

Insert figure 4

4. Discussion

The main purposes of this study were (i) to compare acute metabolic responses between WBST and walking exercises, and (ii) to test the effectiveness of a 8-week WBST program on metabolic adaptations, body composition, and muscle force, in comparison with walking program or control period. Our results showed that a high-force WBST exercise session induces significant aerobic solicitation and lipid oxidation, which were comparable to a natural walking exercise (4.5 Km/h). The present study also evidenced that a WBST training program significantly improved body composition, anthropometric characteristics, maximal muscle force, and reduced the energetic cost of walking. The reduction of body fat percentage after WBST program was significantly greater than after walking training period.

In the present study, WBST was compared with an incremental walking test. In accordance with Chenevière et al. (2009), the present results evidenced that, during walking, the maximal rate of lipid oxidation was reached at 5.5 Km/h. In the literature, the maximal rate of lipid oxidation during walking varied from 0.40 g/min (Chenevière et al. 2009) to 0.46 g/min (Venables et al. 2005). In the present study, maximal values of LipOx, which reached 0.42 g/min, in average for both training groups (i.e. WALK and WBST), were coherent with these pervious results. A great inter-individual variability for maximal LipOx was observed during the present experiment, which was also in accordance with other findings (Achten and Jeukendrup 2004).

The rate of lipid oxidation during WBST was similar to that measured at walking speeds corresponding to the naturally chosen speed locomotion, *i.e.* 3.5-4.5 km/h. $\dot{V}O_2$ during WBST at 80% of MVC was similar to walking at 4.5 Km/h. These findings could have practical consequences in weight maintenance program. Indeed, nowadays walking is the most common aerobic exercise prescribed to overweight persons (Siddiqui et al. 2010), but is often perceived as boring. WBST could be an appropriate alternative through its ability to induce a significant aerobic solicitation and to stimulate subject's motivation to exercise regularly. Nevertheless, the present result needs to be interpreted with caution. Indeed, a single exercise intensity (80% of MVC) has been studied over a relatively short duration (10 min). Metabolic responses may differ as a function of WBST exercise characteristics (*e.g.*

profile, intensity, duration). Thus, future experiments should evaluate the effect of different WBST modalities on acute energetic responses.

Owing to the ability of WBST to induce a significant solicitation of the oxidative processes, it was expected that a WBST training period could significantly modify energetic responses to exercise. Indeed, several studies have evidenced that lipid oxidation during submaximal exercise was increased after endurance (Costill et al. 1979, van Loon et al. 1999, van Loon et al. 2004) or resistance training (Hunter et al. 1995, Melby et al.1993). However, the rate of lipid oxidation during walking was not affected by the both training programs tested in the present study. It could be suggested that the duration (Pratley et al, 1994) and/or the intensity of training program was insufficient to involve permanent metabolic adaptations. However, during WBST exercise, oxygen uptake and LipOx were not affected by the training period, while the absolute force level significantly increased.

The origin of this precedent result may be linked to an improved mechanical efficiency during WBST exercise after the training period. Interestingly, the economy of walking was significantly also improved after WBST program, while walking protocol have not induced comparable changes. After WBST program, the increase of the pushing force could be attributed to an improvement of the trunk muscles force. Indeed, opposite arm swings and rotational isometric force during pushing action on the Huber® apparatus needed significant solicitation of trunk stabilizer muscles. Opposite arm swings and rotational movements of the trunk are also typical attributes of walking activities (Gregersen and Lucas 1967). Recent evidence from behavioural studies has suggested that both deep (Hodges and Richardson 1997) and superficial (Callaghan et al. 1999) trunk muscles contributed to the control of stability at an intersegmental level. Kinematic approaches evidenced that the trunk may act as an attenuator of ground reaction forces and as an inverted pendulum which converts potential energy to kinetic energy (Sartor et al. 1999). It has also been evidenced that core strength plays an important role in optimizing the excursion of the centre of mass and maximizing the propulsive forces developed by the legs during walking (Barnes 2002). The probable increase of stabilizer trunk muscles force after the WBST training period could thus explain the improvement of efficiency during both walking and WBST exercise. In practical terms, the reduction of oxygen uptake and energy expenditure during walking after WBST program could induce a concomitant reduction of the perceived effort (Pincivero et al. 2004). These results could thus have positive consequences on the self-induced physical activity. Indeed, a reduction of the perceived difficulty during exercise has been shown to encourage regular physical activity (Donnelly et al. 2009), and therefore increase daily energy expenditure (Hunter et al. 2000). These potential long-term effects of WBST training programs on self-induced daily physical activity levels and energy expenditure remain to be evidenced experimentally.

In the present study, we also formulated the hypothesis that a WBST training period could involve significant modifications of body composition. While body mass was unchanged after the experimental period, whatever experimental groups, body fat percentage was significantly reduced after both WBST and WALK protocols. Previous studies have shown that resistance training was associated with a decrease in fat mass and a concomitant increase in lean body mass and thus little or no change in total bodyweight (Balducci et al. 2004). Our findings are also in accordance with those of Hunter et al. (2000) who reported similar modifications of body composition after a resistance training program. In contrast, previous studies that have examined walking program, reported significant effects on body fat mass only from 150 min/week (Siddiqui et al. 2010) vs. 120 min/week in the present study, and without change in body lean mass. Moreover, the present study reported a significant reduction of waist circumference and abdominal subcutaneous fat after WBST program, while no significant change were evidenced after walking protocol or control period. These findings are consistent with previous studies that have reported a decrease of abdominal subcutaneous fat, when the training program combined aerobic and resistance training (Cauza et al. 2005, Irving et al. 2008). These results could therefore have positive consequences on the overweight management, knowing that subcutaneous fat contributing to insulin resistance and metabolic syndrome (Irving et al. 2008). Nevertheless, while being greater than after walking program, the extent of these modifications appeared to be quite limited in comparison with previous reports (Hunter et al. 2000) and with the general recommendations of the American College of Sport Medicine (ACSM) (Donnely et al. 2009). The training period was short (2 months) in comparison with other studies. Indeed, previous studies have reported an increase of resting energy expenditure after longer resistance training programs (Melby et al. 1993), which was attributed to an increased muscle mass (Strasser et al. 2010). It could be suggested that a longer (> 6 months) WBST training program could induce greater modifications of body composition in comparison with the present results, partly du to an increase of resting and daily energy expenditure. This remains to be demonstrated.

5. Conclusions

This study demonstrated that a 30-minute WBST session, performed at 80 % of MVC, induced a significant aerobic solicitation, which was comparable to the naturally chosen walking speed, *i.e.* 4.5 Km/h. These present results also evidenced that a 8-week whole-body strength training program (90 min/week) positively influenced body composition (*e.g.* reduction of body fat percentage), anthropometric characteristics (*e.g.* reduction of waist circumference and subcutaneous abdominal fat), and maximal muscle force, in a greater extent than walking program. Finally, this mode of training induced an improvement of the walking economy in contrary to walking training. These findings suggest that WBST may be an interesting alternative strategies in overweight management, based on both aerobic and strength training. Moreover, owing to its ability to facilitate walking, WBST should be a fundamental component of exercise prescription for overweight persons. Indeed, the improved walking economy may act as a powerful stimulus for behavioural changes towards a more active lifestyle.

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Conflict of interest

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Figure legends

Figure 1

The whole-body strength training (WBST) exercise on the Huber® apparatus consisted in opposite arm actions (pushing-pulling), with feet in lunge. Position was regularly inverted (position 1 vs. position 2) in order to exert similar muscle work with both arms. Markers on the platform and handles were used to standardize feet and hands positions, respectively. Grey arrows represent the orientation of muscle action during exercise.

Figure 2

Averaged oxygen uptake ($\dot{V}O_2$, upper pannel) and rate of lipid oxidation (LipOx, lower pannel) during the whole-body strength training (WBST) testing session at 80% of MVC (black histogram), and during incremental walking test at 3.5, 4.5, 5.5 and 6.5 Km/h (grey histogram), before training. Data are expressed as mean ± SD. ***: Walking speed step > Huber 80%, $p<0.001$

Figure 3

Oxygen uptake ($\dot{V}O_2$) during walking at 4.5 km/h before (PRE, black histogram) and after (POST, grey histogram) the training program: WBST program (left panel) and walking program group (WALK, right panel). Data are expressed as mean ± SD. *: POST < PRE, $p<0.05$.

Figure 4

Reduction of the percentage of body fat mass after WBST program (black histogram), walking program (WALK, grey histogram) and after control period (CONT, white histogram). Data are expressed as mean ± SD. $$$: significant reduction from initial values, $p<0.01$. *: significant differences between PRE and POST values, $p<0.05$

Figure 1

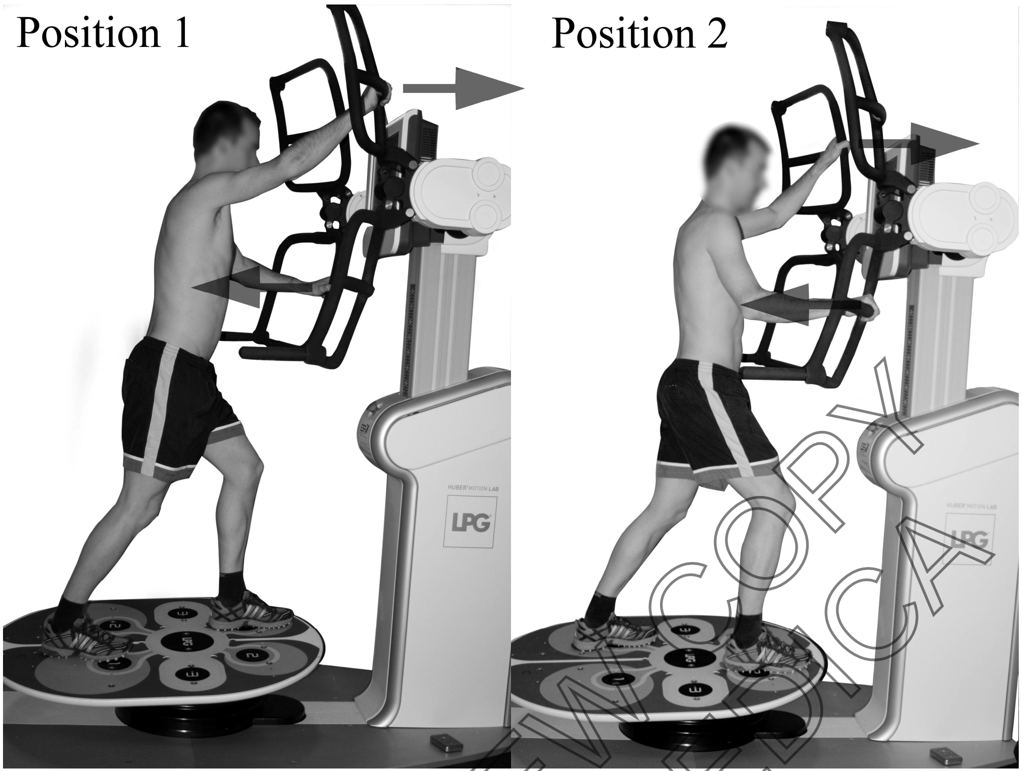
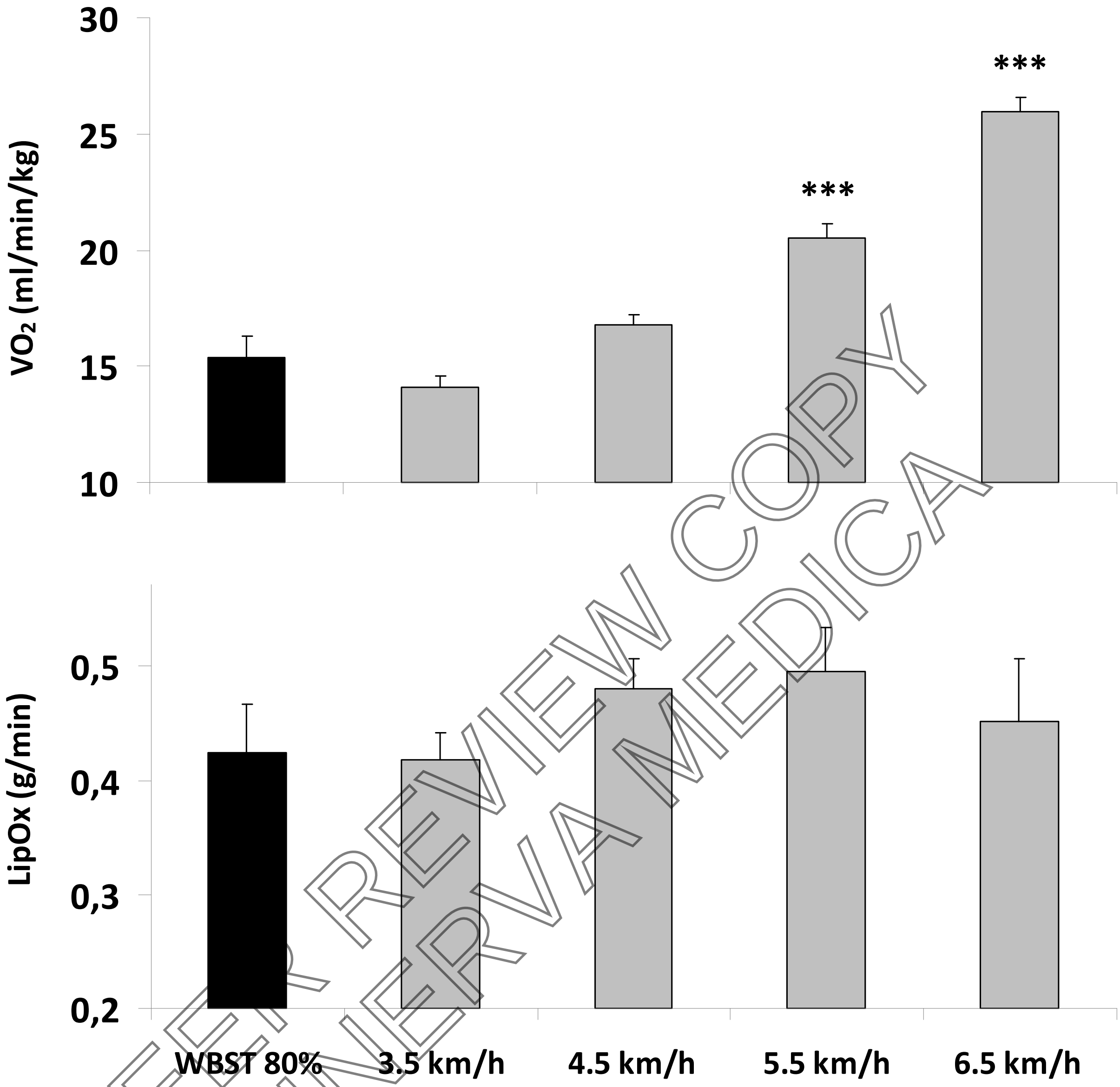


Figure 2



VO2 (ml/min/kg)
30
25
20
15
10
***
***
LipOx (g/min)
0,5
0,4
0,3
0,2
WBST 80%
3.5 km/h
4.5 km/h
5.5 km/h
6.5 km/h

Figure 3

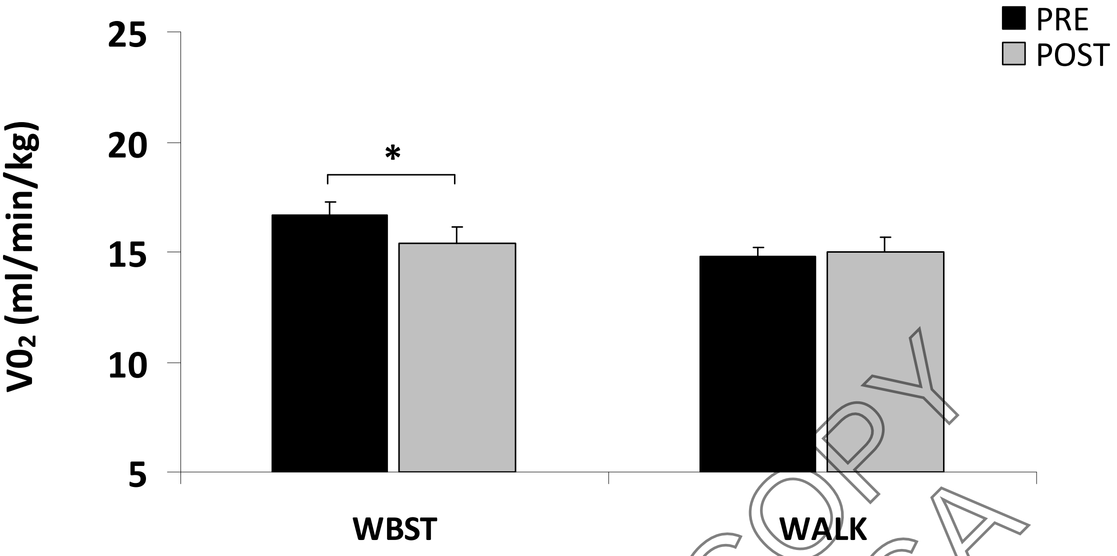
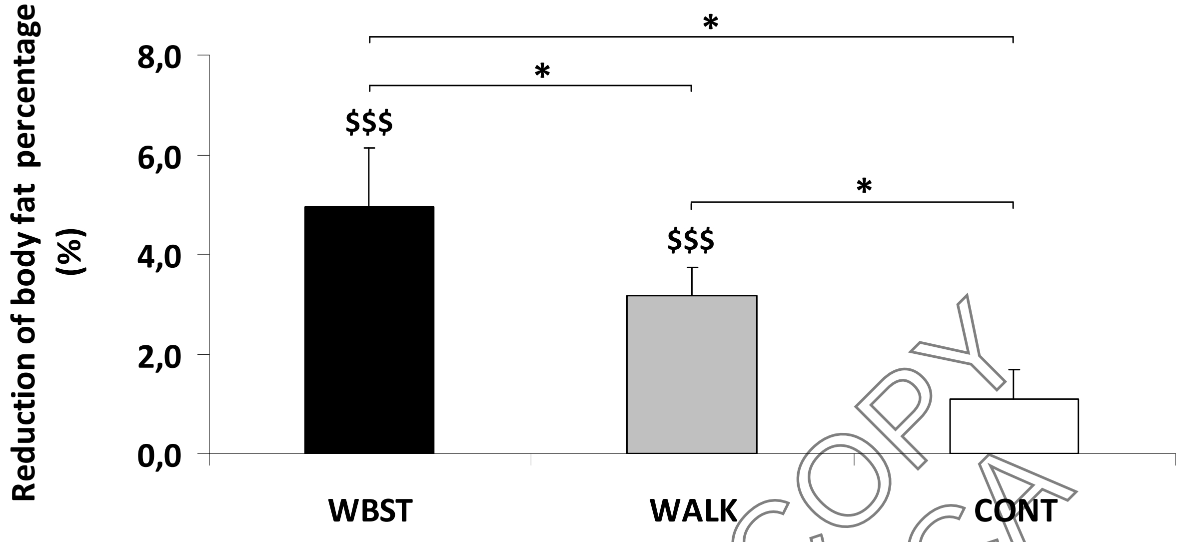


Figure 4



Reduction of body fat percentage (%)
8,0
6,0
4,0
2,0
0,0
*
*
*
$$$
$$$
WBST
WALK
CONT