

# Effects of running versus specific aerobic training in young elite handball players

Martin Buchheit<sup>1,4</sup>, Paul B. Laursen<sup>2</sup>, Fabien Leblond<sup>3,4</sup>, Christine Renaud<sup>3</sup>, David Ruch<sup>3</sup>, Jennifer Kuhnle<sup>4</sup> and Said Ahmaid<sup>1</sup>

<sup>1</sup>Laboratory of Exercise Physiology and Rehabilitation, Faculty of Sport Sciences, University of Picardie, Jules Verne, 80025, Amiens, France.

<sup>2</sup>School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Joondalup, WA, Australia.

<sup>3</sup>Picardie handball league, Pont Sainte Maxence, France

<sup>4</sup>Myorobie Association, Montvalezan, France

[martin.buchheit@u-picardie.fr](mailto:martin.buchheit@u-picardie.fr)



## Introduction

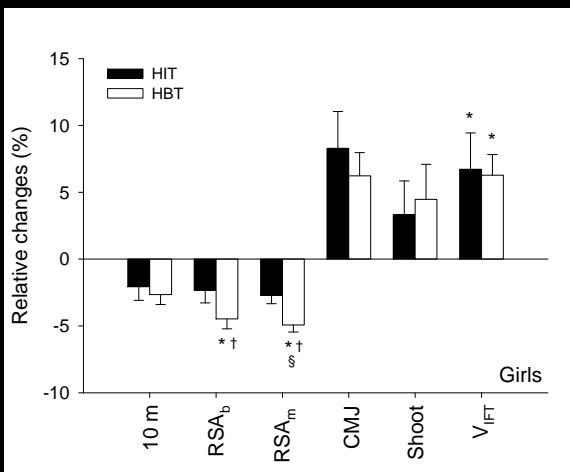
Recently, small-sided handball (HB) games have been shown to solicit peak oxygen uptake as much as high intensity running exercises<sup>1</sup>. Nevertheless, the long term effects of HB games were still unknown. The aim of the present study was to compare the effect of high-intensity running exercises versus specific handball aerobic training on athletic performance in young elite handball players.

## Methods

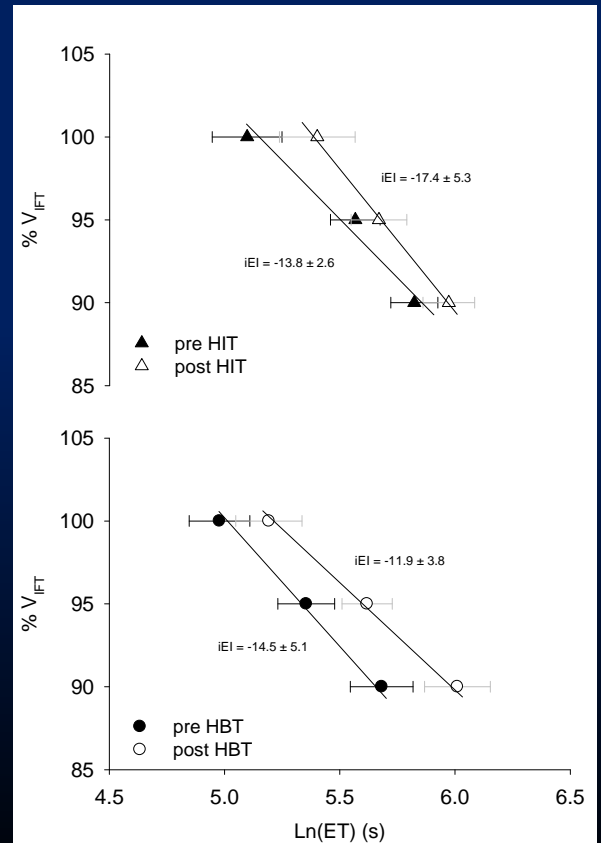
32 highly-trained adolescents ( $15.5 \pm 0.9$  y, 16 girls, 16 boys) were randomly assigned to either running (HIT;  $n = 17$ ; girls = 8) or specific handball (HBT;  $n = 15$ ; girls = 8) training groups. During 10 weeks; HIT consisted in 15-s runs at 95% of the speed reached at the end of the 30-15 Intermittent Fitness Test ( $V_{IFT}$ )<sup>2</sup> interspersed with 15 s of passive recovery (15/15); HBT consisted in small-sided handball games (4-a-side)<sup>1</sup> of similar duration than HIT series. Groups performed either HIT or HBT twice per week and maintained similar external training programs. Before and after training, performance was assessed by the  $V_{IFT}$ , times to exhaustion performing 15/15 exercises at 100, 95 and 90% of  $V_{IFT}$ , a counter movement jump (CMJ), a 10 m sprint time (10m), throwing velocity (Shoot), and best ( $RSA_{best}$ ) and mean ( $RSA_{mean}$ ) times on a shuttle-repeated sprint ability test<sup>3</sup>. The intermittent endurance index (iEI) was also calculated from the relationship between the fraction of  $V_{IFT}$  at which the runs were performed and respective exhaustion times expressed in logarithm<sup>4</sup>.

## Results

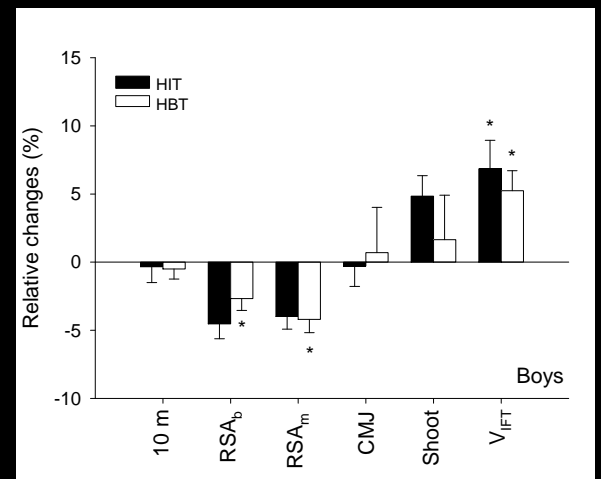
During the first and last training sessions, mean HR was similar during HIT and HBT. Regarding estimation of iEI, the relationship between  $\%V_{IFT}$  and  $\ln(ET)$  during the three exercise sets was strong for each individual subject ( $0.94 < r^2 < 1$ ;  $P < 0.01$ ).  $RSA_{best}$ ,  $RSA_{mean}$ , and  $V_{IFT}$  were significantly improved in both groups and genders, whereas 10m, CMJ and iEI were not. Except for RSA parameters that were significantly more improved with HBT than HIT ( $P < 0.05$ ), no significant differences between HBT and HIT groups were found in any of the measured variables.



**Fig 2 & 3.** Training-induced change for girls in physical performance, 10-m sprint time (10 m), best time during the repeated-sprint ability test ( $RSA_b$ ), mean sprint time during the RSA test ( $RSA_m$ ), countermovement jump (CMJ), throwing velocity (Shoot) and velocity reached at the end of the 30-15IFT ( $V_{IFT}$ ). \*: large effect size ( $ES > 0.8$ ). †: significant difference in relative changes between training groups ( $P < 0.05$ ). §: significant difference between pre- and post-training revealed with the 2-factors ANOVA ( $P < 0.05$ ).



**Fig 1.** Changes in times-to-exhaustion at 100, 95 and 90% of  $V_{IFT}$  (expressed logarithmically;  $\ln(ET)$ ) and associated intermittent endurance index (iEI) before and after high-intensity run training (HIT, triangles) or handball specific training (HBT, circles) with girls and boys pooled.



## Conclusions

Both small-sided handball games and running exercises are effective training modes for adolescent handball players. However, specific handball training should be considered as the preferred training method due to its specificity and higher impact on RSA.

## References

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