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Increasing passive recovery duration leads to greater performance despite higher blood lactate accumulation and physiological strain during repeated shuttle 30-s sprints

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Introduction

Increasing recovery duration during very short (i.e., <6 s) repeated sprints has been shown to improve performance and to decrease physiological strain (Balsom et al., 1992; Glaister et al., 2005), inferred from lower heart rate (HR), post-exercise blood lactate accumulation ([La]b) and rating of percieved exertion (RPE)). Whether this effect is preserved when considering sprints (i.e., 30 s) and recovery (i.e., >60 s) of longer durations is not known. The aim of the present study was to examine the effect of increasing recovery duration on repeated 30-s sprint performance and HR, [La], and RPE.

Methods

Thirteen male team-sports players (21±1 y; 76.8±6.3 kg; 1.79±0.10 m, 6.5 h.week-1 + 1 game) performed 6 maximal 30-s shuttle sprints, each interspersed with either 35 (RS35) or 80 s (RS80) of passive recovery. The two assessments were performed one week apart and in a random order. HR was measured continuously (Polar S810, Polar Electro, Kempele, Finland), and [La]b (Lactate Pro, Arkray Inc, Japan) and RPE (0-10 Borg scale) were collected 3 minutes post trial. Maximal (RSAb) and mean (RSAm) distance covered, as well as speed decrement index (%Dec) (Glaister et al. 2005) were computed for each recovery condition. Data were compared with paired t-test. Standardized differences (Effect size, ES), as well as the chance that the true (unknown) values for RS80 were higher, unclear or smaller than for RS35 were also calculated (Hopkins et al. 2009).

Results

Maximal distance was similar for both trials (135±10 vs. 137±9 m, P=0.30), whereas mean distance was lower (117±7 vs. 127±9 m, P<0.001) and %Dec higher (13±7 vs. 8±3 %, P=0.03, ES=-0.91) for RS35 compared with RS80. Maximal HR was similar for both conditions (94±4 vs. 94±4% HRmax, P=0.75), whereas mean HR was higher for RS35 (88±4 vs. 84±1% HRmax, P<0.001 for RS35 vs. RS80, respectively, Fig. 1). [La]b and RPE were greater for RS80 compared with RS35 (15.1±1.7 vs. 13.3±2.2 mmol.l-1, P=0.03, ES=0.84 and 8.7±0.9 vs. 7.9±1.0, P=0.07, ES=0.74). Between-exercise differences and qualitative outcomes are presented in Figure 2.

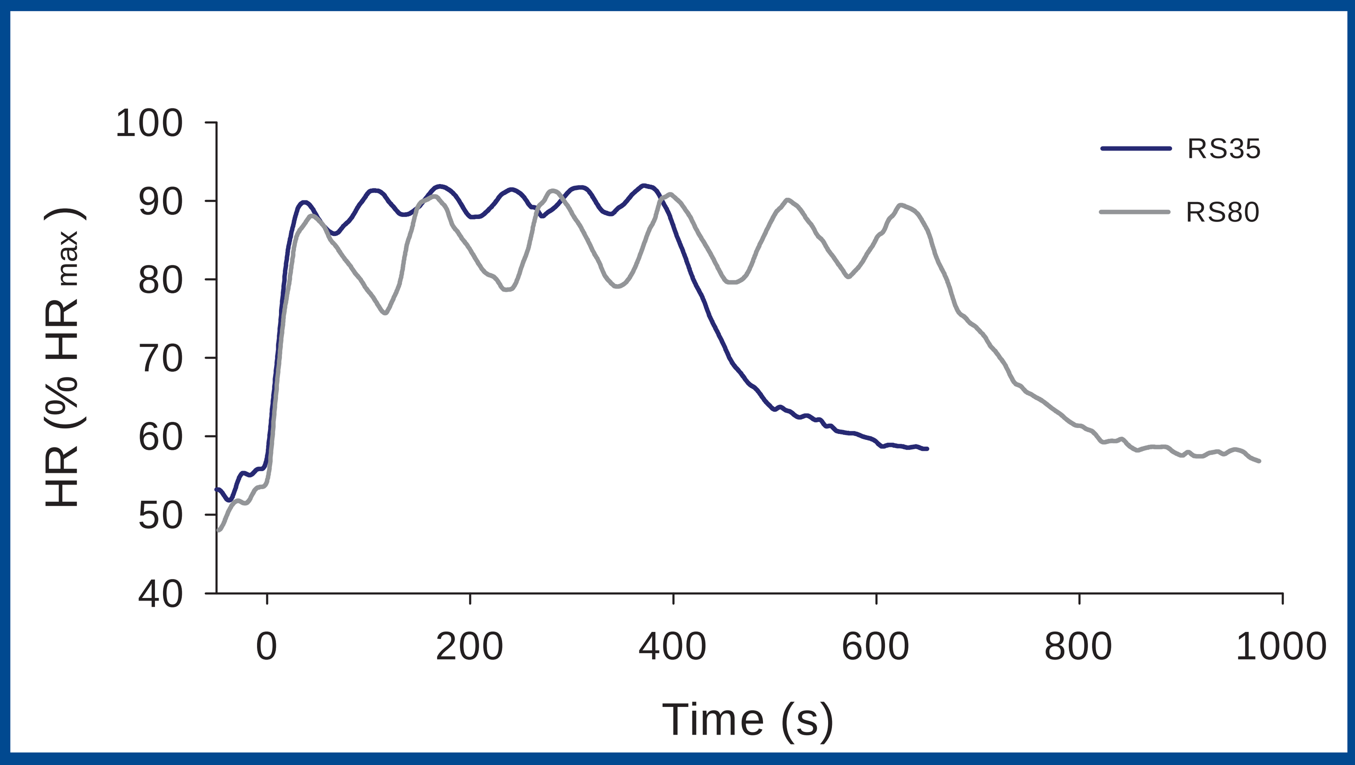

Fig 1. Average (n=13) HR response to 6 maximal 30-s shuttle sprints, each interspersed with either 35 (RS35) or 80 s (RS80) of passive recovery.

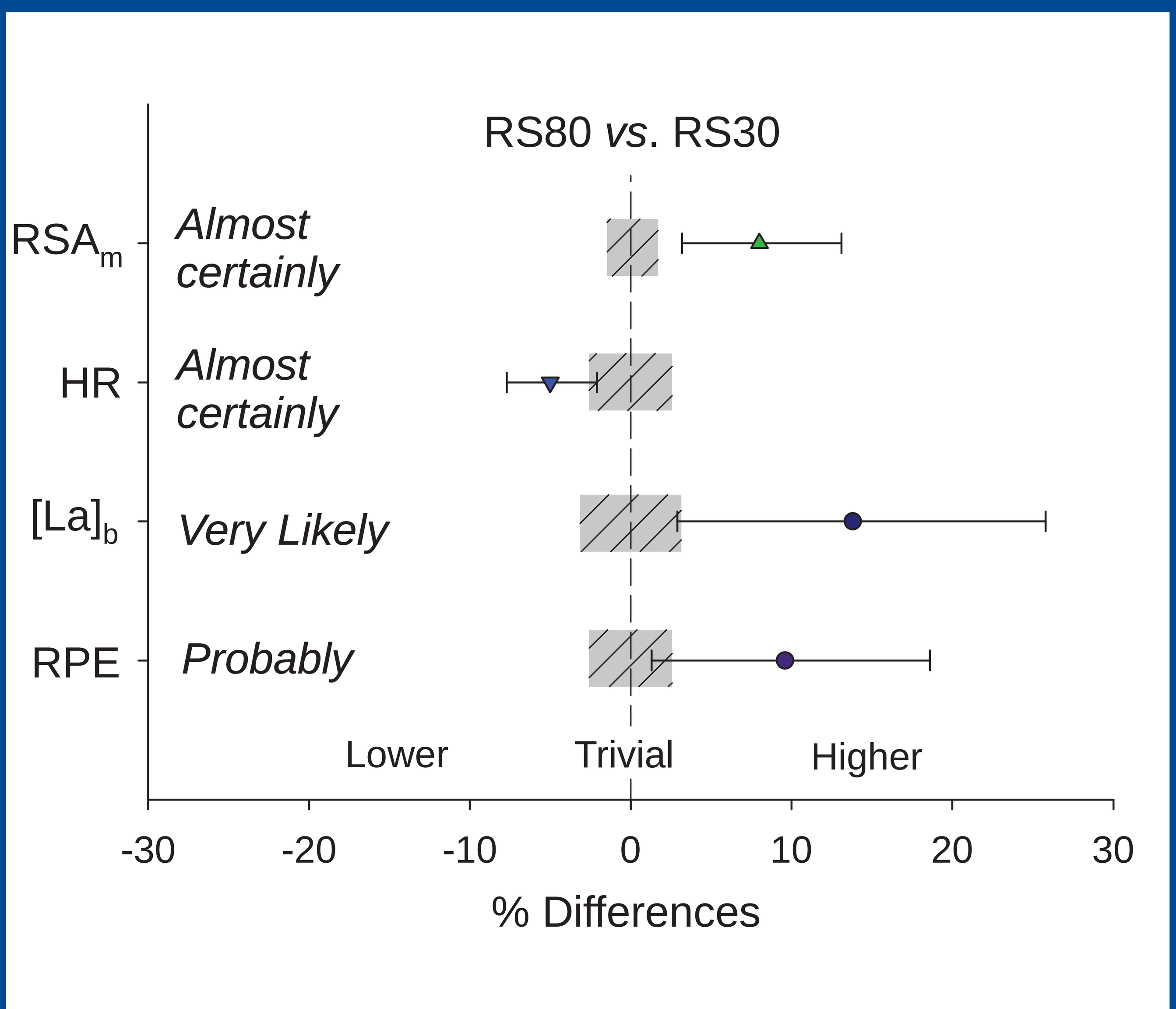

Fig 2. Differences between mean sprint running distance (RSAm), average HR (HR), blood lactate concentration ([La]b) and rate of perceived exertion (RPE) measured for 6 maximal 30-s shuttle sprints interspersed with 80 (RS80) compared to sprints interspersed with only 35 s (RS35) of passive recovery (bars indicate uncertainty in the true mean changes with 90% confidence intervals). Trivial areas were calculated from the smallest worthwhile change (i.e. SDx0.2).

References

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Glaister M., Stone M. H., Stewart A. M., Hughes M. and Moir G. L., (2005). J Strength Cond Res, 19, 831-7.
Hopkins WG, Marshall SW, Batterham AM, and Hanin J. (2009) Med Sci Sports Exerc, 4, 3-13.

Conclusions

Increasing passive recovery from 35 to 80 s during repeated 30-s maximal shuttle running sprints in team-sport players leads to greater total distance covered and lower speed decrement, despite an increase in physiological strain (RPE) and [La]b accumulation. This beneficial effect on running performance is not surprising; the longer passive recovery duration may enabled greater PCr resynthesis between sprints. However, the increase in [La]b accumulation contrasts previous studies (Balsom et al. 1992; Glaister et al. 2005). This could be related to higher running speeds reached, as well as a decrease in aerobic participation with increased recovery duration, possibly leading to an increased anaerobic deficit at the initiation of each sprint. Increasing passive recovery duration can thus be used by coaches to trigger anaerobic system participation during 30-s repeated sprints.