

# EFFECTS OF CONCURRENT ECCENTRIC OVERLOAD AND HIGH-INTENSITY INTERVAL TRAINING ON TEAM SPORTS PLAYERS' PERFORMANCE

Javier Sanchez-Sanchez<sup>1</sup>, Oliver Gonzalo-Skok<sup>1,2</sup>, Manuel Carretero<sup>1</sup>, Adrian Pineda<sup>3</sup>, Rodrigo Ramirez-Campillo<sup>1,4</sup>, and Fábio Yuzo Nakamura<sup>1,5</sup>

<sup>1</sup>Research Group Planning and Assessment of Training and Athletic Performance, Pontifical University of Salamanca, Salamanca, Spain,

<sup>2</sup>San Jorge University, Zaragoza, Spain,

<sup>3</sup>Santiago de Compostela Fut-Sal, La Coruña, Spain,

<sup>4</sup>Department of Physical Activity Sciences, Research Nucleus in Health, Physical Activity and Sport, University of Los Lagos, Osorno, Chile,

<sup>5</sup>Department of Medicine and Aging Sciences, "G. d'Annunzio" University of Chieti-Pescara, Italy

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## Abstract:

The aim of the study was to compare the effects of an in-season five weeks of high-intensity training (HIT) with a concurrent HIT eccentric overload training (CT) program on male amateur team-sports players' fitness performance. Twenty-two athletes were randomly assigned to either HIT (n=10) or CT (n=12). Both groups completed a HIT program. The CT group also completed two-three sets of six repetitions of eccentric overload training. Before and after training, performance was assessed for change of direction ability (COD), repeated sprint ability for best time (RSA<sub>b</sub>), mean time (RSA<sub>m</sub>) and slowest time (RSA<sub>s</sub>), jumping, and shuttle-run performance. Within-group analyses in both groups showed substantial better scores on COD, RSA<sub>b</sub> and RSA<sub>m</sub> and shuttle-run performance. Between-group analyses showed greater improvements in COD, RSA<sub>b</sub>, RSA<sub>m</sub>, RSA<sub>s</sub>, and jumping after the additional CT compared to solely HIT. In conclusion, compared to HIT alone, concurrent eccentric overload and HIT training within the same session improved COD, RSA, jump, and shuttle-run performance in basketball and soccer amateur players.

**Key words:** repeated sprint, maximal aerobic power, resistance training, change of direction, plyometrics, basketball, soccer

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## Introduction

In team sports, players are required to repeatedly perform brief high-intensity actions (HIAs) such as sprints, accelerations-decelerations, turns, changes of direction (CODs) and jumps (Ben Abdelkrim, El Fazaa, & El Ati, 2007; Stolen, Chamari, Castagna, & Wisloff, 2005). For example, during a basketball match, a short sprint takes place every 21 to 39 s, while a HIA is repeated every 10 to 20 s (Ben Abdelkrim, Castagna, El Fazaa, & El Ati, 2010; Ben Abdelkrim, et al., 2007). The ability to maintain HIAs for the entire match is important in soccer (Gabbett, & Mulvey, 2008) and basketball (Castagna, et al., 2007) alike. However, decrements in HIAs, mainly at the later stages of matches, have been reported (Ben Abdelkrim, et al., 2007).

Several physiological and mechanical factors may mediate performance decrements in HIAs during team sports matches (Mendez-Villanueva, Hamer, & Bishop, 2008). Of note, players with a greater fatigue-resistance perform HIAs more frequently, with short rest intervals in competition (Carling, Le Gall, & Dupont, 2012). High-intensity interval training has been recommended to enhance fatigue-resistance and repeated HIA ability in team sports athletes (Buchheit, Mendez-Villanueva, Delhomel, Brughelli, & Ahmaidi, 2010a; Buchheit, Mendez-Villanueva, Quod, Quesnel, & Ahmaidi, 2010b; Gonzalo-Skok, et al., 2016).

Besides improving the fatigue-resistance ability, the development of HIA-related abilities is also important within a team sports settings, as