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High Intensity Exercise can be an Effective Training Strategy for the General Population

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ABSTRACT

High intensity exercise (HIE) is a training technique commonly employed by elite athletes, but it is also a realistic training method for the general population. In fact, intermittent HIE closely simulates the intermittent nature of the physical demands encountered in both physically demanding occupations and daily activities. The substantial advantages of HIE such as the resultant skeletal muscle adaptations and its time efficiency can outweigh the disadvantages that have discouraged its widespread use by the general population. Due to the vigorous nature of HIE, it is vital to gauge and monitor the appropriate intensity and progression of each individual. To maximize sport, work or daily activity performance, HIE should be an integral part of structured and non-structured physical activity. **Health & Fitness Journal of Canada 2008;1(1): 9-12.**

Keywords: Exercise, interval, intermittent, intensity, skeletal muscle, adaptations

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INTRODUCTION

Traditionally, athletes have used high intensity exercise (HIE) to maximize their sport specific performance, but the general population has often avoided HIE due to its strenuous nature. Recently, several studies involving non-athletes have demonstrated beneficial adaptations that result from this time efficient exercise strategy (Burgomaster et al. 2005, 2008, Gibala et al. 2006, 2008). Generally, however, the participants used in these studies have been younger, healthier and moderately active individuals who do not represent the population as a whole. Nonetheless, after weighing the advantages and disadvantages, HIE can still be a realistic and useful exercise option for many of the general population (Warburton et al. 2005). In fact, HIE more closely simulates the intermittent nature of the physical demands encountered in physically demanding occupations or at home (Astrand et al. 2003).

DEFINITION

High intensity exercise refers to exercise that is performed near maximal levels of effort (at ≥ 75% of maximal heart rate or ≥ 80% of VO_2max or VO_2 peak) for varying durations (10 seconds to 4 minutes). Such vigorous exercise intensities can challenge and exceed an individual's physical comfort level and are associated with excessive breathlessness and physical discomfort. Due to the strenuous nature of HIE, it is difficult to perform HIE for extended periods especially as the intensity increases. The selection of intensity and duration, which are inversely related, is dictated by the training emphasis (i.e., anaerobic versus aerobic or anaerobic-

aerobic skeletal muscle metabolism). Intermittent HIE is characterized by alternating periods of HIE and low intensity exercise or rest. Alternating from higher to lower intensity exercise in a repetitive manner, also referred to as interval training, is the most common method of accomplishing HIE (Warburton et al. 2005). This repetitive strategy enables an individual to accomplish more work thereby providing a more potent skeletal muscle metabolic training stimulus than would be provided by a single bout of prolonged moderate intensity exercise; hence the time efficient reputation.

ADVANTAGES

High intensity exercise can be a powerful and effective training stimulus, as the *intensity* of training influences the training stimulus to a greater extent than the duration or volume of training (Gibala 2008). It has long been known (Astrand et al. 1960a, 1960b; Christensen et al. 1960, Essen 1978) and confirmed recently (Helgerud et al. 2007) that compared to low- and moderate-intensity training, HIE is more effective for improving VO_2max when total work and training frequency are equal. High intensity exercise elicits rapid skeletal muscle remodelling related to the high level of muscle fibre recruitment and increased stress of type II fibres (Gibala and McGee 2008). Increases in skeletal muscle oxidative capacity occur and a substantial increase in local aerobic endurance capacity takes place even though the overall training volume may be low. Therefore, HIE can provide a *more time efficient* alternative as shorter amounts of time may be sufficient to induce skeletal muscle adaptations similar to those associated with 30 minutes of moderate intensity continuous endurance training (Gibala 2006).

DISADVANTAGES

High intensity exercise requires a great deal of effort and motivation to complete and it may be uncomfortable for those unaccustomed to this form of exercise. Many have also argued that owing to the increased demands of HIE that there is an increased risk for musculoskeletal and cardiovascular complications. However, evidence to support this belief is limited. Nonetheless, it is imperative that HIE participants become educated on proper progression of intensity and the need for appropriate recovery. Specifically, it is important for participants to have appropriate rest days between training sessions to allow for recovery. Finally, it is important to keep in mind that all of the benefits normally associated with traditional whole body moderate to high intensity continuous exercise are not necessarily acquired with low volume HIE (Gibala 2007).

GAUGING INTENSITY

Exercise intensity prescriptions should be based on the individual participant's response to exercise or exertion. Monitoring heart rate is ideal for gauging intensity as it provides a quantitative measurement that is specific to each individual's response to exercise. The intensity of HIE is considered to be ≥ 75% of an individual's maximal heart rate (220 – age) (CSEP and Health Canada 1999). However, palpating heart rate can be difficult for some people and heart rate monitors are not only expensive but can be inconvenient to use. The rating of perceived exertion (RPE) scale (Borg 1982) is another alternative. This scale of 6 to 20 allows an individual to gauge his/her personal perception of the intensity of exercise. High intensity is indicated by a response between 16 (Hard) and 20 (Very, Very Hard) on the RPE scale. The simplest and most convenient method of gauging intensity of exercise is the 'Talk Test' (Brawner et al. 1995, Foster et al. 2008, Goode 1991, Good et al. 1993, 1998). The Talk Test approximates ventilatory threshold and exercise is classified as HIE if a person's breathing does not allow a conversation to be carried out. Each of these methods allows the exerciser to monitor intensity specific to the exerciser throughout the exercise session and thereby prevent overexertion. The exerciser should be careful to reduce the workload or stop exercising if

the intensity is too strenuous or if nausea, dizziness or disorientation is experienced.

HIGH INTENSITY EXERCISE FOR THE GENERAL POPULATION

High intensity exercise is a realistic option for most individuals provided they are properly cleared to participate. For individuals not keen on a structured intermittent HIE regimen, high intensity physical activity can be incorporated into activities of daily living. Simple daily methods of increasing intensity such as taking the stairs instead of the elevator/escalator and then progressing into taking two steps at a time or going up the stairs at a faster pace can simulate HIE. This type of intermittent high intensity physical activity throughout the day can add up and provide many benefits compared to a sedentary or low physical activity lifestyle.

High intensity exercise has even been prescribed for individuals with chronic diseases including patients with cardiovascular disease (Warburton et al. 2005; Rognmo et al. 2004). Common findings included marked increases in aerobic fitness and/or exercise capacity.

Therefore, it would appear that HIE is a suitable alternative to traditional exercise for the general population including patients with cardiovascular disease. If the discomforts of HIE can be tolerated it can be incorporated into daily routines and lead to improved overall health and well-being for many of the general population.

Implications

Specificity is the hallmark of all acute and chronic physical activity. High intensity exercise is a training strategy that induces specific skeletal muscle adaptations that can be effective in improving an individual's ability to sustain effort and/or generate high power outputs to carry out physical demands more efficiently. In order to maximize sport, work or daily activity performance, HIE should be an integral part of structured and non structured physical activity. However, when beginning a HIE program it is essential that you seek the advice of a university-trained and qualified exercise professional such as the Canadian Society for Exercise Physiology – Certified Exercise Physiologist (CSEP-CEP).

Example of a high intensity interval-training program for *beginner* exercisers

Warm-up	5 minutes	Walking at normal pace
Exercise interval (High intensity)	30 seconds	Fast walking at a speed that elicits breathlessness
Recovery Interval (Low intensity)	Until breathing resumes normal patterns	Walking at normal pace
Repeat high intensity and recovery intervals 3-5 times		
Cool-down	5 minutes	Walking at normal comfortable pace

Example of a high intensity interval-training program for *intermediate* exercisers

Warm-up	5 minutes	Speed walking at a pace slightly faster than normal
Exercise interval (High intensity)	1 minute	Jogging at a speed that elicits breathlessness
Recovery Interval (Low intensity)	Until breathing resumes normal patterns	Speed walking at a pace slightly faster than normal
Repeat high intensity and recovery intervals 3-5 times		
Cool-down	5 minutes	Walking at normal comfortable pace

Example of a high intensity interval-training program for *experienced* exercisers

Warm-up	5 minutes	Jogging at a comfortable pace
Exercise interval (High intensity)	2 minutes	Running at a speed that elicits breathlessness
Recovery Interval (Low intensity)	Until breathing to resumes normal patterns	Speed walking at a pace slightly faster than normal
Repeat high intensity and recovery intervals 3-5 times		
Cool-down	5 minutes	Walking at normal comfortable pace

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AUTHOR QUALIFICATIONS

The author qualifications are as follows: Nami Osakabe[1], MSc, CSEP-CEP; V. Roni Jamnik[1], MSc, PhD, CSEP-CEP

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