Introduction

The training dose-adaptive response relationship is at the core of sports physiology and performance. However, quantifying training dose remains an area of some confusion. Three basic approaches are described in the literature for quantifying endurance training sessions based on the heart rate (HR) response. Time in Zone (TIZ), Session-Goal (SG) and a hybrid combination of SG and TIZ, named modified SG approach (SG/TIZ) (Figure 1).

Because these three methods are used interchangeably there can be confusion regarding interpretation of training data. The purpose of this study was therefore to directly compare these three methods of TID quantification in a large sample of training sessions performed by elite endurance athletes.

Methods

Twenty-nine elite XC skiers (16 male, 13 female, 25 ± 4 yr, 70 ± 11 kg, 76 ± 7 mL·min⁻¹·kg⁻¹ VO₂max) conducted 570 training sessions during a ~14 d altitude training camp. The proportion of training in zone 1, zone 2 and zone 3 was quantified in those three methods described using total training time or frequency of sessions, and simple conversion factors across different methods were calculated.

Results and discussion

Comparing the TIZ and SG/TIZ methods, 96.1 and 95.5 % respectively of total training time was spent in zone 1 (P < .001), with 2.9/3.6 and 1.1/0.8 % in zones 2/3 (P < .001). Using SG, this corresponded to 86.6 % zone 1 and 11.1/2.4 % zone 2/3 sessions (Figure 2).

Figure 1: Illustration of intensity distribution using three different methods in three basic intensity zones. The TIZ method uses the HR curve (solid line) as basis for allocating time in different zones. The SG/TIZ method uses the dotted line indicates in combination with lactate values. The SG approach defines this example as a zone 3 session based on the intensity during the core section of the session.

Figure 2: Training intensity distribution in 570 sessions analyzed with three different methods; TIZ, SG/TIZ and SG.

Estimated conversion factors from TIZ or SG/TIZ to SG and vice versa, were 0.9/1.1 respectively in the low intensity training (LIT) range (zone 1), and 3.0/0.33 in the high intensity training (HIT) range (zone 2 & 3) (Figure 3).

Figure 3. The figure illustrates how to convert reported training distribution from a “time based ratio” method (TIZ or SG/TIZ) to a method of categorical allocation of each training session (SG), or vice versa. Panel A: LIT range and Panel B: HIT range.

Conclusions

This study provides a direct comparison and practical conversion factors across studies employing different methods of TID quantification associated with the most common HR based analysis methods.