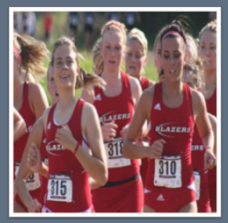

Calculating Training Impulse: A Comparison of Three Different Methods

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Introduction

Training impulse (TRIMP) is a commonly used method of calculating training load (intensity x duration). Several methods of calculating TRIMPs have been proposed, including the summated heart rate zone[1], Lucia[1], and Taylor[2] methods. This study introduced a modified version of Taylor's method that is specific to each athlete. No studies were found in the literature that examined the relationship between the TRIMP values associated with the various methods of calculating TRIMPs. The purpose of this study was to examine the relationship between three methods of calculating TRIMPs during recovery (R), slow long distance (SLD), tempo (T), and Interval (I) running.

Methods

14 Division III female cross country runners volunteered to participate in this study. All participants finish in the top half of a 2.5 mile trial run.

Urinalysis was used to determine hydration status. All subjects were hydrated (USG <1.020).

Body composition was determined using Biostat bioelectrical impedance.

The subjects performed a progressive treadmill test at a 1% incline beginning at 5 mph and increasing by 0.5 mph every two minutes. Heart rate was measured concurrently and blood lactate levels were tested every two minutes.

Heart rate and blood lactate data were used to create a unique non-linear TRIMPs weighting scale for each athlete. With this weighting scale we were able to calculate the modified Taylor method TRIMP values (Figure 3).

For two consecutive weeks, heart rate data were collected using Polar Team System heart rate monitors during all coach prescribed running, including recovery (R); slow, long distance (SLD); tempo (T); and Interval (I) running.

The TRIMP for each athlete during each training session was calculated using the Lucia method (Figure 1), the summated heart rate zone method (Figure 2), the and modified Taylor method (Figure 3).

Results

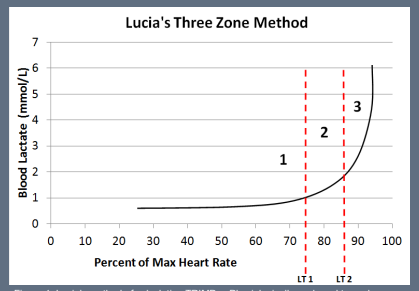

Figure 1. Lucia's method of calculating TRIMPs. Physiologically anchored to each athlete based on lactate curve. Linear weighting scale.

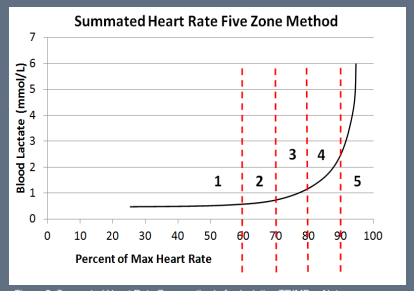

Figure 2. Summated Heart Rate Zone method of calculating TRIMPs. Not physiologically anchored to athlete, but based on percent of max heart rate. Linear weighting scale.

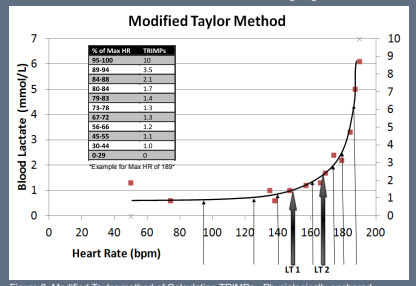

Figure 3. Modified Taylor method of Calculating TRIMPs. Physiologically anchored to each athlete based on lactate curve. Non-linear weighting scale.

		Modified Taylor Method	Lucia's Method	Summated Heart Rate Zone Method
Overall	Modified Taylor	1	.756**	.728**
	Lucia's Method	.756**	1	.868**
N=156	Summated HR	.728**	.868**	1
Recovery Training	Modified Taylor	1	.727**	.807**
	Lucia's Method	.727**	1	.844**
N=81	Summated HR	.807**	.844**	1
Long and Slow Training	Modified Taylor	1	.706**	.855**
	Lucia's Method	.706**	1	.853**
N=21	Summated HR	.855**	.853**	1
Tempo Training	Modified Taylor	1	.347	.232
	Lucia's Method	.347	1	.814**
N=26	Summated HR	.232	.814**	1
Interval Training	Modified Taylor	1	.625**	.617**
	Lucia's Method	.625**	1	.844**
N=22	Summated HR	.617**	.844**	1

Table 1. Pearson correlation of different methods of calculating TRIMPs as they apply to different training types. ** denotes significance at the .01 level (two-tailed). * denotes significance at the .05 level (two-tailed).

Discussion

The results indicate strong positive relationships between TRIMPs calculated by the three methods when the majority of the practice session heart rate data were below lactate threshold one (LT1).

When heart rates were near or above lactate threshold two (LT2) for the majority of the practice, correlations between the methods were not as strong.

The modified Taylor method of calculating TRIMP awarded athletes more points for training at a higher intensity. Therefore, the modified Taylor method resulted in a higher TRIMP value when working at or above lactate threshold compared to the other two methods.

Conclusions

The results of this study suggest that the three methods of calculating TRIMPs are not equivalent, and therefore coaches need to become aware of the advantages and disadvantages of each method.

References

1. Borresen, J., & Lambert, M. (2009). The Quantification of Training Load, the Training Response and the Effect on Performance. *Sports Med, 39*(9), 779-795.

2. Taylor, R. (2008) Heart rate training for college soccer. Presented at the National Strength and Conditioning Association's Sport Specific Training Conference in Anaheim, CA.

Acknowledgements

Thank you to the College of Saint Benedict Cross Country coach, Robin Balder-Lanoue and the cross country team for their cooperation and participation in our study. Also thank you to Don Fischer, and Mary Stenson.