

# 28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Prediction of maximum lactate concentration during an all-out anaerobic test in elite ice hockey players

Allisse, M.

University of Sherbrooke

## INTRODUCTION:

Maximum lactate concentration is an important measure in the development of hockey players and is typically performed using a lactate analyzer. However, this procedure may become cumbersome and costly when attempting to evaluate large groups of hockey players. Thus, the aim of this study was to develop an equation allowing an indirect assessment of the maximum lactate concentration produced from an all-out on-ice skating effort in elite adolescent ice hockey players.

## METHODS:

Twenty elite male ice hockey players participated in this study (age=15.7±1.0 years). The lactate anaerobic skating test (LAST) consisted of skating back and forth on an 18.2 m (60 ft) course at maximal speed with abrupt stops at each end for a total of 6 shuttles (total distance=218.2 m; average time=52.0±2.0 s). The maximum post-exercise lactate concentration was measured using a Lactate Pro analyzer and heart rate with a Polar chest strap. The variables used to estimate lactate concentration were time (s), heart rate (bpm), number of skating strides during the last shuttle (6th) and the skating stride index (SSI, number of skating strides during the last back and forth shuttle, divided by the average speed (strides/(m/s)) to complete the LAST course).

## RESULTS:

The average maximum lactate concentration was 14.3 mmol·L<sup>-1</sup>, which is consistent with the values found in adult elite players. No significant difference was observed in lactate production between younger and older individuals (P=0.248). The regression equation showed a strong correlation (r=0.929) with a standard error in the estimate (SEE) of 0.69 mmol·L<sup>-1</sup>, indicating an excellent accuracy of the equation. By removing variables directly related to skating efficiency in the lactate prediction equation, the correlation coefficient dropped to r = 0.49 and the SEE increased to 1.5 mmol·L<sup>-1</sup>, indicating 10.5% SEE that is 117% greater than the SEE obtained with the equation incorporating skating variables. Equation: Lactate (mmol L<sup>-1</sup>) = - 161.88 + (Time 218.2 m×3.10) + (stride\_6×8.36) + (HR×0.064) + (SSI×-34.51).

## CONCLUSION:

This study allows coaches to associate a metabolic estimation during an on-ice test that involves the solicitation of the anaerobic lactate system. The inclusion of skating variables significantly improves model accuracy and confirms the relevance of including skating economy variables for estimating maximum lactate level. Its validity and reliability make the prediction equation a tool of choice for noninvasively evaluating the metabolic expenditure of players. The maximum lactate concentration estimation has been automated using an Excel file where only the total time, the number of skate strides during the last shuttle (6th) and the maximum heart rate at the end of the test need to be entered. The estimation of lactate concentration will allow coaches to better target the needs of their elite players and thus improve their specific physical preparation.

Topic: Training and Testing

Presentation: Poster

European Database of Sport Science (EDSS)

Supported by SporTools GmbH



33982