Energetics: Ice Hockey

SPORT & EXERCISE SCIENCE, Vol.1, No.5

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Time motion and physiological demands analysis indicates that a typical shift in a hockey game last 30-80 seconds, followed by 4-5 mins (including stoppage time) of active recovery. Considering positional differences, defensemen play close to 50% of a game, while forwards play 35% of the time, with a work to rest ratio of 1:3.5 – 1:8. This data indicates that hockey is powered transitionally between aerobic and anaerobic energy pathways.

Montgomery, and Twist & Rhodes report that peak on-ice heart rates (HR) exceed 90% of max, and average above 85% of max. Given these high HR's, oxidative metabolism cannot fully satisfy a hockey players energy demands. Hockey athletes require highly developed anaerobic glycolytic and phosphagen energy pathways. Seliger et al., and Green et al., have found that the anaerobic metabolism accounts for 69%, oxidative metabolism 31%, ice hockey energy demands. Peter Twist reports that there is a large amount of variation in energy system utilization per player, based on differences in intragame intensities, level of competition, playing time, position, and individual conditioning.

The ATP-PC, and the glycolytic energy system's ATP production peaks after 10-45 seconds, and provides energy for shifts lasting an average of 45 seconds. Shifts lasting longer than 45 seconds are characteristic of fatiguing musculature, and representative of an inverse performance relationship. As ATP production continues to rely on the glycolytic pathway, lactate and hydrogen ion concentration increase, contributing to increased fatigue and decreased performance.

The importance of a well developed aerobic system in ice hockey is demonstrated be a decreased recovery time between shifts and by reduced fatigue in the latter stages of a game.
Twist and Rhodes report that forwards require a higher recovery time and play less shifts that defensemen due to the tasks they perform; they cover more surface area, are required to change directions and generate increases in skating velocity more frequently than defensemen. While they report that defensemen engage in similar activities, with similar intensities, the difference in frequency of the demands, necessitates forwards play less shifts, and recover longer.

The training hockey player, coach or parent should consider the specific game and athletic profile when developing their pre-season conditioning plan. Consider your level of play, positional and physical demands, and try to mimic those demands in your training program.

When attempting to train your energy systems, high intensity intervals, as discussed on page 1 of this issue, should be the strength of your program. Vary the work to rest intervals throughout the session and throughout the program so that you progressively place greater stress on your system. Do this well, and you'll be skating harder, and longer, and you'll be looking to score, not the for the bench.
If you would like more information on hockey training and pre-, or in-season conditioning please contact our Director of Athletic Conditioning at eric@performancetrainingsystems.net

If you would like more information on the physiological demands of ice hockey, you can download a full report from our web page at http://www.performancetrainingsystems.net/Resources/Hockey%20Paper%20-%20Final.pdf