Exploring the limits: Understanding the challenges facing Winter Olympic champions

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As the world turns its sporting gaze towards Vancouver for the 2010 Winter Olympics, The Physiological Society journal *Experimental Physiology* marks the occasion with a special issue exploring the biological and environmental challenges elite winter athletes must overcome to win gold.

"When most people think about these games we conjure up glorious images of snow and high mountains", said co-editor Mike White from the University of Birmingham, "but when Physiologists think of cold and altitude most immediately think of environmental challenges including hypothermia and hypoxia."

To explore these challenges the editors avoided the standard, resisted the stereotypical and rejected dated physiological methods to create an innovative and integrative new approach to study and debate the limitations to performance in elite winter sport.

The Biathlon, an event combining cross-country skiing and rifle shooting, serves as an ideal example for physiologists. For Biathletes high aerobic capacity and motor functions are vital to success while performance limitations include the ability of the respiratory system at high-altitude and in cold environmental conditions.

"When skiing, a fall is always possible," said author Richard Ferguson from Loughborough University. "The question is whether or not the fall was preventable, and if it resulted from muscle fatigue or failure to

execute a motor programme correctly the answer is yes."

The Biathlon also involves shooting, with a miss incurring a penalty lap of the circuit which has a strong influence on the race result.

"When looking at shooting, Martin Lakie's expertise on tremor and John Cootes' understanding of heart rate recovery come to the fore" said co-editor Stuart Egginton from the University of Birmingham. "The mechanical correlates of the heart beat and pulse wave propagation though the arm have a clear impact on accurate sighting of the target. Whether errors can be avoided by having a rapid heart rate recovery and a longer interpulse interval in which to shoot is debated here."

The papers also reveal how the physiology of a medal winning performance in many winter sports is still far from fully understood. Writing in the preface to this special issue, world renowned explorer Sir Ranulph Fiennes said: "While it is surprisingly to me how much we already know, these papers also identify where our knowledge is inadequate to allow a full mechanistic explanation. It is particularly gratifying to see how information from different disciplines is being harnessed to this end."

Provided by Wiley

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