

Improving health & performance: nutritional supplements, science of pacing, and the concussion tool (SCAT2)

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Welcome to this bonus issue of *BJSM*. Two issues in September for the price of one! Thanks to the International Olympic Committee's commitment to Injury Prevention and Health Protection, *BJSM* now publishes 16 issues a year. We have lots of great material — just check "Online First" and read on.

Nutrition supplementation is never far from the sports clinician's mind; athletes wanting legal ergogenesis. Oxford's Dr Lindy Castell has partnered with Professor Louise Burke of the Australian Institute of Sport and Dr Samantha Stear of the English Institute of Sport to provide not just one article but a complete BJSMopedia of updates on food and quasifood (see p 728).¹ Two pages per issue through until London 2012; evidence-based, edifying and eclectic. Feel free to communicate with Dr Castell directly (bjsm@bmjgroup.com) or via the blog (<http://blogs.bmj.com/bjasm>).

OPTIMISING PERFORMANCE – CLEVER PACING OR BRUTE FORCE?

Sticking with performance, this issue highlights the issue of pacing. Investigators from the world over approach the problem of how to optimise performance. From Portsmouth, Corbett and colleagues² (see p 770) show that the second and third 2000 m cycling time trial strategies are different from the first. Their findings are compatible with a complex intelligent regulatory system. US exercise physiology doyen Carl Foster partners with investigators from Spain and the Netherlands to examine pacing strategy in four groups of well-trained non-athletes, using two different ergometric modes (see p 765).³ To my non-expert eye, it appears that the participants "save themselves" in the early stages of the first few trials and then "go for broke" with high power output at the end. With experience, in subsequent trials, the participants went out more aggressively so that their performance was essentially stable by the third or fourth trial. "The pattern of power output evolved from a low early power and high power output in the terminal portion of the time trials to a higher power during the early portion with

more moderate terminal power output." The paper tantalises athletes, coaches and clinicians by raising the possibility that performance may be improved by better optimising the *pattern of power distribution* (pacing) rather than by increases in total power output alone.

And in a cleverly designed complement to those studies, Lander and colleagues (New Zealand) applied contemporary "fast-response" technology to measure lactate concentration, integrated EMG and core temperature elevations during self-paced or forced exercise at a constant pace (see p 789).⁴ The enforced constant paced condition posed significantly greater physiological and thermoregulatory challenges than did the matched-intensity self-paced trial despite there being no difference in performance. "Self-paced exercise facilitates the opportunity for individuals to continually modify effort via feedback and feedforward mechanisms in response to frequent homeostatic challenges." Further evidence that familiarity of the exercise bout and certainty about its end point allow a more aggressive RPE strategy that produces superior exercise⁵ (see p 782) comes from the Cape Town pioneers of the Central Governor Model. And the same South African group measured the effects of an amphetamine (methylphenidate) on exercise performance while fixing the rating of perceived exertion of 16 (see p 775).⁶ The centrally acting stimulant allowed subjects to exercise for longer at higher cardiorespiratory and metabolic stress, providing compelling evidence that there is some muscular reserve in the natural state. They concluded that endurance performance is not only "limited" by mechanical muscle failure ("peripheral fatigue") but is highly regulated by the CNS. Given the current interest in performance and its regulation,⁷ *BJSM* commends Professor Frank Marino of Charles Sturt University for providing a forum for debate in the recent *International Symposium on the Limits to Exercise Performance: The Future of Fatigue in Exercise*. As much as some people might like this topic to go away, it looks like the tide has turned to suggest that the traditional model

does not have all the answers. *BJSM* welcomes all perspectives. Keep an eye on Online First for a plethora of papers that we couldn't squeeze into the September issue!

CONCUSSION

The consensus statement from the 3rd International Conference on Concussion in Sport (Zurich) (http://bjsm.bmj.com/cgi/content/full/43/Suppl_1/i76) is being heavily downloaded — a great example of knowledge exchange. In this print issue of *BJSM*, we share one of several research papers that provided essential data that led to these new, improved guidelines (see p 730).⁸ This University of Calgary paper highlighted limitations in the "old SCAT" that have now been addressed so clinicians can feel confident in using the SCAT 2 (http://bjsm.bmj.com/cgi/reprint/43/Suppl_1/i85) and the Pocket SCAT2 (http://bjsm.bmj.com/cgi/reprint/43/Suppl_1/i89). This is an example of the research to action cycle. Research, consensus, new research, new consensus. Iterative steps. It's OK to make changes! Congratulations to the Concussion Group for their openness and willingness to adopt new data as it comes to light. Paul McCrory explains the concussion consensus paper on a *BJSM* podcast you can find via the home page (<http://podcasts.bmj.com/bjasm/>). And a sneak peek of the next few months' *BJSMs*? You'll hear from our *BJSM* sports medicine society leaders — that's all I'm allowed to say right now.

Competing interests: None.

Br J Sports Med 2009;43:727.
doi:10.1136/bjasm.2009.065243

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