

The physiology of champions

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What could be a greater test of the limits of human physiology than the Olympics? To mark the 2008 games in Beijing, the *Journal of Physiology* present a special issue focusing on the science behind human athleticism and endurance.

This unique collection of original research and in-depth reviews examines the genes that make a champion, the physiology of elite athletes, limits to performance and how they might be overcome.

Excess body heat is a barrier to performance in many sports, and a novel study by Romain Meeusen et al. shows that both the neurotransmitter systems have an important impact on the control and perception of thermoregulation.

Rats whose dopaminergic and the noradrenergic reuptake was inhibited – by the anti-smoking aid Xyban – were able to exercise twenty minutes longer than usual in the sweltering heat and tolerated higher core body temperature.

What genes makes a champion, asked Alun Williams et al? They identify 23 individual genetic variations that enhance athletic performance — “If the optimum genetic combination existed in one person, world records like Paula Radcliffe’s would probably be shattered.”

Left to nature, the odds of anyone alive having all 23 variations is just 200,000:1. But what might the future hold for genetic manipulation and

testing?

It's no surprise that Marcus Amman et al. have shown that tiring out a leg muscle will subsequently reduce your performance in a 5km cycling time trial — but would you have guessed that it is 'all in the mind'?

It is not the muscle's own temporary weakness that reduces performance, they find, but instead the brain places an unconscious 'brake' on the central motor drive to the limbs and therefore regulates exercise performance.

The Journal of Physiology's Olympic Special Issue will be published on 1 January 2008.

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