Abstracts are selected on the basis of interest to our readers. Publication does not suggest an endorsement of content or validation of conclusions.

Too much or too little – fluid and exercise

The recent Tour de France – watched obsessively by the Editor – brought up a common misconception: that dehydration is a reason for poor performance in an athlete who does not drink enough during competition. As Lance Armstrong appeared to falter in the first time trial, being beaten by his arch-rival Jan Ulrich, the commentators reported that Armstrong had apparently lost 6 kg during the event and this obvious dehydration must be the reason for his defeat.

At the same time, the *British Medical Journal*[1] carried an editorial by Professor Tim Noakes pointing out that advice to runners and cyclists to drink copiously during endurance events can lead to fatal hypernatraemic encephalopathy. The article starts by mentioning a recent report that a participant in the 2002 Boston marathon died from hyponatraemic encephalopathy because she drank excessive quantities of a sports drink before and during the race. Noakes points out that from 'antiquity to the late 1960s' athletes were advised not to drink during exercise as it was believed that this would impair performance. In 1969 an incorrect title to an article 'The danger of inadequate water intake during marathon running' started the debate. In fact, the article did not look at the 42-km marathon, nor did it identify any dangers. What it did show was that the most dehydrated athletes won the 32-km races. But, the title sparked a rash of studies, mainly funded by a new sports drink industry, which culminated in guidelines for ingesting fluid during exercise.

These guidelines assume that all weight lost during exercise must be replaced (assuming that dehydration is a threat), that the athlete's thirst underestimates actual fluid requirements during racing, that a universal guideline is possible because all athletes are essentially the same, and finally that high rates of fluid intake can do no harm. The advice was to replace all water lost through sweating or to consume at least 600 – 1 200 ml/hour. But, as Noakes points out, there is no evidence for any of these assumptions. But it was these now outdated guidelines that prompted Tour de France commentators Phil Liggett and Paul Sherwen to assume that Armstrong was dehydrated.

Ian Rodger, a cyclist who has worked with Tim Noakes, was also glued to the screen during the time trial in question. As Super Sport's own team of commentators started pontificating on the problems of dehydration during exercise, he sent through the following e-mail, which aptly sums up the problems and misconceptions which still abound around optimal fluid intake during exercise: 'The interminablycited 20% decline in performance due to negligible dehydration is simply wrong. This dates back to the early days of dehydration research, where experimental design bore no relation to competitive cycling. In fact dehydration *per se* is less important than core temperature, particularly in conditions of high exercise intensity and high temperature. Perversely, high dehydration can be said to assist performance in heat, because it means that the cyclist has been able to maintain high sweat rates and so cool himself effectively. This delays the development of a critical core temperature, which in turn allows a higher exercise intensity.

'In fact, the most dehydrated cyclists are often the fastest ones, as they can sustain the highest exercise intensity and so sweat rate/loss. Obviously, the scenario isn't quite that straightforward since, at some point, sweating suppression and heat storage will occur, inhibiting performance. In addition, in a very heterogeneous population, found in a fun ride in extreme heat, it is equally possible that a recreational cyclist can suffer levels of dehydration which will inhibit sweating and progress to dangerous hyperthermia'. *(Editor's note:* As apparently happened to some in *The Argus* Cycle Tour of 2002.)

The fluid loss experienced by Armstrong was quite possible, according to Rodger. He has measured sweat rates of up to 5 l/hour in cyclists time-trialling in heat and humidity. Armstrong would have been pushing upwards of 450 watts during his time trial, so would probably have been sweating at the same rate. As Rodger points out, if you add in the sweat lost during his warm-up, this easily amounts to a 6-kg weight loss. What Rodger did say was that he was surprised that Armstrong, with his scientific approach to training, did not use a cooling jacket during his warm-up, which would have saved his time-trial performance.

Lance Armstrong went on to win his 5th consecutive Tour de France – nothing wrong with his performance! And Tim Noakes has finally had his suggestion that drinking according to your thirst is safe and effective accepted by the USA Track and Field Organisation (**www.usatf.org**).

1. Noakes TD. *BMJ* 2003; **327:** 113-114.

Use it or lose it

The prevention of dementia is a major public health priority, but there is little information on effective preventitive strategies. There appears to be a relationship between dementia and reduced participation in leisure activities in midlife as well as between cognitive status and participation in leisure activities in old age. Katzman has proposed that persons with higher educational levels are more resistant to the effects of dementia as a result of having greater cognitive reserve and increased complexity of neuronal synapses. It may be that, like education, participation in leisure activities may lower the risk of dementia by improving congnitive reserve.

Investigators in a study reported in the *New England Journal of Medicine* examined the relation between leisure activities and the risk of dementia in a prospective cohort of 469 subjects who still lived in the community and did not have dementia at baseline.

During the study, subjects were interviewed with the use of a structured medical history questionnaire and were examined by the study doctors. Functional limitations on 10 basic and instrumental activities of daily living were rated on a 3-point scale for each activity, with 1 point indicating 'no limitation', 2 indicating 'does activity with difficulty' and 3 points indicating 'unable'.

Participants were examined on 6 cognitive activities – reading books or newspapers, writing for pleasure, doing crossword puzzles, playing board games or cards, participating in organised group discussions and playing musical instruments. They were also examined regarding 11 physical activities – playing tennis or golf, swimming, bicycling, dancing, participating in group exercises, playing team games such as bowling, walking for exercise, climbing more than 2 flights of stairs, doing housework and babysitting. Frequency of participation was reported as daily, several days per week, once weekly, monthly, occasionally or never.

During follow-up which amounted to 2702 person-years, 124 participants developed dementia. By the end of the study period, 361 subjects had died, 88 had dropped out and 20 were still active.

This prospective, 21-year study demonstrates a significant association between a higher level of participation in leisure activities at base line and a decreased risk of dementia, both for Alzheimer's disease and vascular dementia. The investigators identified 3 possible explanations for this association. First, the presence of preclinical dementia may decrease participation in leisure activities. Second, unmeasured confounding factors may influence the results. Third, there may be a true causal effect of cognitive activities.

The investigators conclude that clinical trials are needed to define the causal role of participation in leisure activities. A recent study reported reduced cognitive declines after cognitive training in elderly persons without dementia. It may be that the results of this study will result in recommendations of participation in cognitive activities to reduce the risk of dementia in the same way that physical activity is recommended to reduce the risk of cardiovascular disease.

Verghese J *et al. N Engl J Med* 2003; **348:** 2508 – 2516.