To drink or not to drink to drink recommendations: the evidence

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FEATURE

SPORTS DRINKS

To drink or not to drink to drink recommendations: the evidence

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Fluid intake recommendations during exercise have changed substantially over the past half century. Up until the 1970s, marathon runners were advised to avoid drinking during competitive racing.[1] In 1996, the American College of Sports Medicine (ACSM) advised athletes to replace all sweat lost during exercise by drinking the maximum amounts that can be tolerated.[2] Then, in 2007, the ACSM recommended drinking 0.4-0.8 L/h of fluid during exercise with lower fluid volumes for slower and lighter individuals competing in cool environments, and higher volumes for faster and larger individuals competing in warm environments. These guidelines also state that athletes drink enough to ensure that they do not lose more than 2% of body mass because a greater loss is thought to impair exercise performance.[3]

These guidelines have emerged from studies modelling parameters that influence the rate of sweating. One study[4] predicted that a fluid intake rate of 0.4-0.8 L/h kept body mass loss within 3% and prevented body mass gain in 50-90 kg subjects running marathons at 8.5-15.0 km/h in cool and warm ambient conditions—that is, 18º C and 28º C, respectively. The authors proposed that factors influencing sweat rate—such as body mass, running speed, and ambient conditions—should also be considered before the recommended fluid intake range is adopted and that individual variation needs to be appropriately considered.[4]

But does this fairly reflect the whole population? Even though the guidance is aimed at athletes, the authors of this key study did not specifically consider the fluid requirements of elite marathon runners.[4] For example, maximum running speed used in these calculations was only 15 km/h, whereas to win a major city marathon or break the marathon world record, a male athlete must generally run faster than 20 km/h.

Nor do the environmental temperatures—that is,18º C and 28º C—reflect the lower environmental temperatures typically experienced in many city marathons[5] or the conditions encountered when the world's fastest marathons are run.[6] For example, the top 10 fastest marathons of all time (up to 2004) were performed at a mean ambient temperature of 7.3º C[7]—an observation that is to be expected given exercise performance is strongly influenced by environmental conditions.[8] It is not certain that these guidelines properly account for the needs of all athletes from the very best to the recreational. Guidelines that attempt to cover the needs of the fastest runners completing marathons in just over two hours will not be appropriate for those who run marathons in five to six hours. Thus, more individualised guidelines are required.

To date, the published evidence supports four primary findings. Firstly, there is a wide range of individual rates of fluid ingestion by athletes at all levels of performance, from the elite[4] to the recreational.[9] Secondly, that the freely chosen rates of fluid intake of the very best runners (0.55 ± 0.34 L/hour[10] are within the current recommendations of 0.4-0.8 L/h initially proposed by the International Marathon Medical Director's Association (IMMDA)[11] and subsequently adopted by the ACSM.[3] Thus it is probable that these new guidelines adequately cater for top athletes. Thirdly, there is no evidence that fluid intake during exercise at higher rates than those proposed by the IMMDA guidelines influence sweat rate or has any other biologically important effects.[7]

Fourthly, and most importantly, is the finding that the athletes who lose the most body mass during marathon or ultra-marathon races and Ironman triathlons are usually the most successful.[9] For instance, body mass data collected during the Dubai 2009 marathon showed that the male winner (also the world record holder at the time) finished the race with a reduction in body mass of 5.7 kg, equivalent to a 9.8% loss in body mass. This occurred because his estimated sweat rate was approximately 3.6 L/h. His high rate of fluid intake (>0.8 L/h) was clearly sufficient to maximise his performance even though it did not prevent a large weight loss.[10]

An important consequence of drinking to thirst is that a substantial body mass loss is likely to occur.[9] However, drinking according to the dictate of thirst throughout a marathon seems to confer no major disadvantage over drinking to replace all fluid losses,[11] and there is no evidence that full fluid replacement is superior to drinking to thirst.[11] A meta-analysis of cycling

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studies concluded that drinking either more or less than to thirst impairs exercise performance.[12] This analysis also found that up to a 4% body mass loss did not alter out of door cycling performance. Nor do the world's best marathoners maintain their body mass within current recommended ranges of 2-3% during successful marathon racing. This evidence and the finding that the athletes who lose the most body mass during marathon or ultra-marathon races and Ironman triathlons are usually the most successful, would suggest that there exists a tolerable range for dehydration that may not negatively impact on running performance. Perhaps this mass loss might even confer an advantage by preventing a substantial increase in body mass because of the "overconsumption" of large volumes of fluid.

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