Hydration

A storm in a drink bottle!

By Greg Cox, Sorts Dietitian

One of the most talked about issues at present within exercise physiology and sports medicine circles is the issue of athletes drinking during exercise. Are athletes drinking enough? Are they drinking too much? Are current guidelines used for endurance sports appropriate for all competitors under all exercise conditions?

Much of this debate has been sparked by new research that has identified endurance athletes who have drunk "too much" during exercise. An article published in *The New England Journal of Medicine* earlier this year, reported that 13% of 488 runners sampled from the 2002 Boston marathon had hyponatremia at the completion of the race. [1]

HYPONATREMIA – what the hell is that? Hyponatremia is defined as a plasma sodium concentration < 135 mmol. L^{-1} – in layman terms – low blood sodium levels. A well known author in the area – Tim Noakes, has been quoted as saying "it's potentially the most dangerous current threat to the health of the ultraendurance athlete". [2]

Now who would have believed 10 years ago that we would be talking about drinking too much? Much of the research and education about hydration in the past has focused on the debilitating effects of dehydration. A clear message delivered by sports science professionals has been to drink as much as you can tolerate in order to replace your sweat losses during exercise. So who do you believe? Drink too much and you could suffer from hyponatremia, drink too little and your likely to suffer from the effects associated with dehydration.

In a news release on April 21st this year, the American College of Sports Medicine past president Larry Kenney stated that "There are dangers associated with both extremes of behavior - severe under-drinking and severe over-drinking. Not drinking at all is not a safe option for preventing hyponatremia." The key, he said, is "drinking intelligently, not drinking maximally." So how does one drink intelligently?

How much do athletes drink?

Even in ideal situations, athletes typically replace 30-70% of sweat losses. When sweat losses are high (> 800 ml) it becomes difficult to consume fluid at a sufficient rate to match sweat losses. In some situations, it is not practical to match sweat rates as the nature of the sport means that the effort to drink causes more disadvantage than the advantage gained from a high fluid intake. Fluid intake needs to be a trade-off between how much fluid can be tolerated and the potential benefit to performance. Gastric emptying rates, individual tolerance levels and opportunities while exercising, all influence the amount of fluid that can be consumed comfortably during exercise.

Recent discussion has focused on the issue of "functional dehydration". That is, when reductions in body weight due to loss of body fluid (dehydration) lower the oxygen cost of movement. For example, if dehydration reduces body weight and the absolute cost of running by 4%, yet the absolute power output is reduced by less than 4%, there would be a theoretical increase in power to weight. Our understanding of functional or tolerable

dehydration is limited with recent unpublished data showing conflicting results between lab and field environments. At this stage it's difficult to ascertain whether some weight loss during exercise (specifically running) from a loss of body fluid is detrimental or beneficial to running performance.

How much should you drink?

Current advice regarding the amount you should drink during exercise ranges from "drink to your thirst" right through to "drink as much as can be tolerated". The American College of Sports Medicine (ACSM) position stand - Exercise and Fluid Replacement, 1996 has long been the benchmark for which scientists and educators have based their advice for endurance athletes. ACSM suggest that during exercise, fluid requirements can be met by ingesting 600-1200 ml per hour of fluid. These guidelines have recently being under attack from a team of researchers who have based much of their advice on field-based observations of athletes under real life exercise conditions. This team of researchers lead by Tim Noakes, take the opposite view by suggesting that athletes drink an amount that is dictated by their thirst. It's hard to believe we have been studying issues that relate to hydration for the past 40-50 years and the best advice offered by some is "drink to your thirst".

The National Athletic Trainers' Association published a position statement in 2000 that concludes "Fluid replacement should approximate sweat and urine losses at least to maintain hydration at less than 2% body weight reduction." (4) So what does this mean to you? In order to make sense of this you need to monitor your individual fluid balance during training and competition sessions to develop a plan for subsequent exercise sessions.

Sports drinks – are they useful?

Commercially available sports drinks (4-8% carbohydrate, 10-25 mmol/L sodium) promote effective rehydration during exercise and simultaneously deliver a source of useful fuel to the brain and working muscles. The inclusion of sodium and flavouring in sports drinks has been shown to improve voluntary fluid intake making it easier for athletes to achieve fluid intake goals while exercising. Water can be a suitable choice in lower intensity exercise or exercise lasting less than 60 minutes. Interestingly, researchers from Birmingham University have conducted a series of studies that have clearly demonstrated that frequent consumption of a sports drink during high intensity endurance exercise enhances exercise performance. In a nutshell, researchers demonstrated that ingesting a sports drink during 1 hour of high intensity endurance exercise, improved exercise performance by a whopping 2.3% (5). That's a fair improvement to your half marathon time.

My take on the issue

The amount you "should" and "do" drink during an event is a function of a number of factors including, but not limited to:

Your individual sweating response – people's sweating response varies, some people are heavy sweaters while others are light sweaters under similar environmental conditions

The intensity of the exercise you are undertaking. The greater intensity the higher your sweat rate during exercise

The environmental conditions. In hot, humid conditions your sweat rates will be higher than in mild, cool conditions

The opportunities you have to consume fluid during exercise. When running quickly it's difficult to consume fluid, whereas when the pace of running is slower the opportunities and tolerance to drinking is greater

The socially accepted practices of the sport in which you compete. It's normal practice for "hard-core" runners to turn up for their long run without having planned a drink break schedule for the run. This is in complete contrast to your "lycra clad" triathlete running partners who turn up with drink bottle belts and gel flasks!!

In my mind the advice provided to an athlete falls along a continuum. For fast athletes, competing in hot humid conditions it's virtually impossible for them to consume too much fluid – chances are for these fast athletes they will face the adverse effects of not drinking enough while exercising. My message for these athletes would be to create opportunities to encourage fluid intake to ensure they meet minimum fluid intake guidelines. A different message however is needed for slower athletes that are competing at a leisurely pace, whom have greater opportunity to drink. For these athletes the message would be to control their opportunities for fluid intake while exercising in order to manage their fluid intake. For these athletes they need to make sure they avoid over drinking while exercising, particularly in cool conditions.

Fluid intake strategies!

You should not drink excessively on the final days leading into competition. If you plan to undertake hyperhydration strategies in your final preparation for competition, these strategies should be undertaken with the supervision of a suitably qualified sports deititian or sports scientist.

Including fluid with a meal/snack 1-2 hours before race will assist you to top-up fluid stores and allow time for excretion of excess ingested fluid. As a general guide include 400-600ml of fluid with your pre-event meal/snack. The exact amount you include however, will vary according to your individual tolerance, the environmental conditions and the race you are about to complete.

As opportunities for fluid intake are often limited during running events, consider consuming a bolus of fluid (e.g. 200-400ml) immediately before race start to further top-up fluid stores and assist gastric emptying during the race. This tactic should be practised in training before competition to assess your tolerance.

For athletes running quickly, have a plan with your drinks in order to meet minimum suggested guidelines. Take cues from other athletes drinking, or use a count down timer to remind yourself to drink regularly throughout an event.

Fluid balance during exercise - How to calculate percent body weight loss during exercise:
Step 1 – Measure body weight before exercise in minimum clothing
Step 2 – Measure body weight after exercise (one again in minimal clothing and towel dried)
Step 3 – Calculate the difference between the pre and post-exercise weight
Weight lost predominantly reflects a mismatch between fluid intake and fluid loss during exercise. One kilogram of body weight loss reflects 1 litre of fluid that has not been replaced during exercise.
Note: Consideration must be given to the fluid consumed during exercise and fluid losses (such as urine) if you are trying to calculate sweat losses. Also, during extended exercise, weight loss associated with the use of body fuel stores should to be considered in this calculation.

For athletes running steadily, you have to have a plan with your drinks in order to avoid over drinking during an event. Keep track of your fluid intake in order to ensure you don't over do it with your drinks.
Customise the volume of fluid and the composition of fluid you plan on drinking during an event to suit the environmental conditions in which you are competing.
In longer races, familiarise yourself with fluids and foods offered by race organisers if you plan to rely on these during the race.
Sports drinks (e.g. Gatorade) offer the specific benefit of providing fluid, carbohydrate and electrolytes simultaneously. Research has shown that consuming carbohydrate and fluid simultaneously enhances performance of endurance exercise.

References

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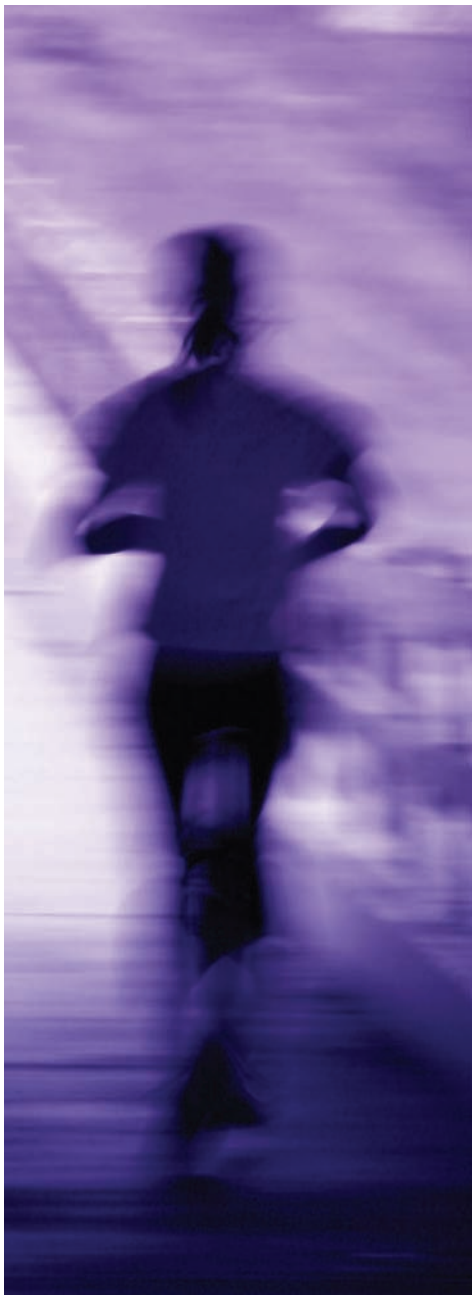

CHILLI TOFU AND NOODLE STIR FRY

Serves 4-6

900g fresh hokkien noodles
spray canola or olive oil
350g firm tofu, cut into cubes
1 teaspoon minced garlic
1 teaspoon minced ginger
1 onion, sliced into thin wedges
1 red capsicum, sliced
1 zucchini, sliced
1 carrot, sliced
200g fresh baby corn
1 bunch Chinese broccoli, roughly chopped
1/2 cup MAGGI Stir Fry Sauce
3 tablespoons MAGGI Chilli Sauce
2 tablespoons toasted sesame seeds

Place noodles in a large heatproof bowl, cover with boiling water and leave to stand for 2 minutes, gently using a wooden spoon to separate strands. Spray a non-stick wok or frying pan with oil and heat. Cook tofu in 2-3 batches and cook over a high heat until browned, set aside. Reheat wok, add garlic, ginger, onion and stir fry for 2 minutes or until soft. Add the remaining vegetables and stir fry for about 3-5 minutes or until tender but still crisp. Add drained noodles, tofu and combined sauces to wok and stir fry for 2 minutes or until heated through. Toss through the sesame seeds and serve immediately. Garnished with chervil, if desired.

Tip: Fresh udon noodles can be used instead of the hokkien noodles. They are available in the dried noodle section of your supermarket.

Preparation: 10 minutes
Total cooking: 15 minutes