



IAAF POLICY ON FLUID REPLACEMENT

HEAT STRESS AND HEAT ILLNESS

Heat stress and heat illness occur when the body's heat production goes beyond the many factors responsible for heat loss.

Heat production is determined by the athlete's metabolic rate (energy expenditure)-i.e., race pace, body weight, and running economy. About $\frac{3}{4}$ of the energy produced by exercise is stored as heat. Thus, higher-intensity races such as a 10-kilometer race, are more likely to lead to heat injury than longer races which are run at a slower pace. Many factors determine the body's ability to dissipate heat; environmental factors such as ambient temperature, relative humidity, and air currents, as well as the athlete's level of fitness and his degree of heat adaptation. The environmental factors can be assessed by the measurement of Wet Bulb Globe Temperature (WBGT). It is advised to run distance races below 18 degree of WBGT value.

One of the major factors responsible for cooling and maintaining the body temperature in the warm weather is the body's ability to evaporate sweat. Hence, adequate hydration is one of the most important elements in the prevention of heat injury, and the ability to maintain a high-level of performance.

Performance begins to become impaired when the body loses more than 2-3% of body weight, primarily as fluid losses from sweating. The athlete's heart rate and core temperature will be increased. Thus, maintaining adequate hydration is important, but athletes must realise that hydration alone is not sufficient to prevent heat injury. Athletes must learn to recognise the thirst as a late indicator of dehydration. They should consume fluid before they feel thirst. However, drinking excess amounts of fluid in the absence of thirst may lead to over-hydration and exertional hyponatremia (low blood sodium), especially if the fluids consumed are sodium-free. Exertional hyponatremia can be a life-threatening condition, and is more likely to occur in slower runners who are exercising for four hours or more. Their metabolic rate and heat production are lower, and due to their slower pace they are more able to consume more fluids than they need.

PRE-RACE PREPARATION

1. Heat adaptation. Train under similar conditions as those expected during the race. This ideally may require 7-10 days. If this is not possible, train with additional clothing in order to raise core temperature. However, NEVER wear rubber suits or other clothing which inhibits sweat evaporation.
2. Practice drinking during training runs, so that you can drink comfortably while running. Use the same drinks in the training run and the race run.
3. Salt food heavily for several days prior to the competition. Restore salt in the body.
4. Begin the race well-hydrated. Consume 500-600 ml. of water or a sports drink during the 2-3 hours before the race, and another 300 ml. 10-15 minutes before the start. Never mind that 300 ml of water can be absorbed within 15 minutes.
5. Be careful for WBGT, which will let you know the possibility of heat illness.
6. Do not use any non-steroidal anti-inflammatory drugs (NSAIDs) except acetaminophen. These NSAIDs are thought to increase the possibility of hyponatremia while running long distances.

DURING THE RACE

1. Consume an adequate amount of fluids to prevent dehydration. This means drinking 400-800 ml per hour. Slower runners will require the lower amount, while faster runners will need the larger volume, especially under hot, humid conditions.
2. Consume cool liquids which contain 0.2-0.45% sodium and 5 % glucose or glucose polymer. This combination replaces electrolytes lost in sweat, aids in preventing hyponatremia, and provides carbohydrate for energy.
3. As sweat losses and the ability to absorb fluids may vary considerably among individuals, it is useful to determine one's individual needs by using the guidelines found in Refs. 1 and 2.

AFTER THE RACE

1. Begin to re-hydrate and restore muscle glycogen as soon as possible after the race. Fluids containing electrolytes (sodium and potassium) and carbohydrates are needed to replace losses.
2. Optimal replenishment of muscle glycogen is best carried out in the first 2-4 hours post-competition.
3. If possible, the athlete should weigh himself before and after the race to determine the amount of fluid loss, and replace this loss with 1 ¼- 1 ½ times this amount.

Dehydration and hyponatremia can be prevented in distance running, and performance should be improved by proper fluid and salt replacement before and during the races.

This policy was written by Dr Fumihiro Yamasawa on behalf of the IAAF Medical and Anti-Doping Commission

REFERENCES

1. Hydration Guidelines. www.USATF.org
2. Nutrition for Athletes. International Consensus Conference. International Olympic Committee, Lausanne, June 2003.
3. Noakes, T. and Martin, D.E. IMMUDA-AIMS Advisory statement on guidelines for fluid replacement during marathon running. *New Studies in Athletics* 2002. 17:15-24.