UCI 2016 ROAD WORLD CHAMPIONSHIPS DOHA 2016 QATAR

ASPETAR سبيتار

BEAT THE HEAT


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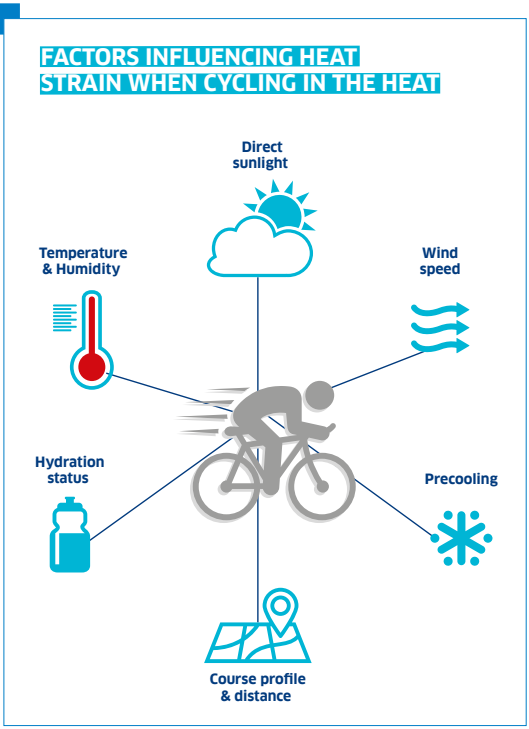
Cycling events are typically held in the summer, often in hot and humid conditions. This document addresses some Frequently Asked Questions regarding cycling under such conditions and provides recommendations to prevent the development of heat illness and optimise performance.

HOW DOES HEAT IMPACT ON CYCLING PERFORMANCE?

Maintaining high power outputs during cycling increases heat production and as a result, body temperature. The heat produced is lost to the environment mostly by the evaporation of sweat and cooling of the skin due to high wind speeds. The body's ability to lose heat is therefore limited in hot and/or humid conditions as less heat can be lost to the environment. In order to lose heat, a large volume of blood is sent to the skin, which increases the work of the heart. As a result, **heart rate becomes elevated** for a given power output and endurance capacity progressively decreases.



IS THE INFLUENCE OF HEAT STRESS THE SAME ON ALL RACE DISCIPLINES?

THE INFLUENCE OF HEAT STRESS IS INFLUENCED BY RACE DURATION.

PROLOGUE

Races of shorter duration (under 20 min) are less affected by conditions of high heat and/or humidity as they may not be long enough to increase whole-body temperature to levels that can affect performance. However, a very long and intense warm-up can influence performance during a subsequent event. Countermeasures to offset large increases in temperature during warm-up are suggested below.

TIME TRIAL

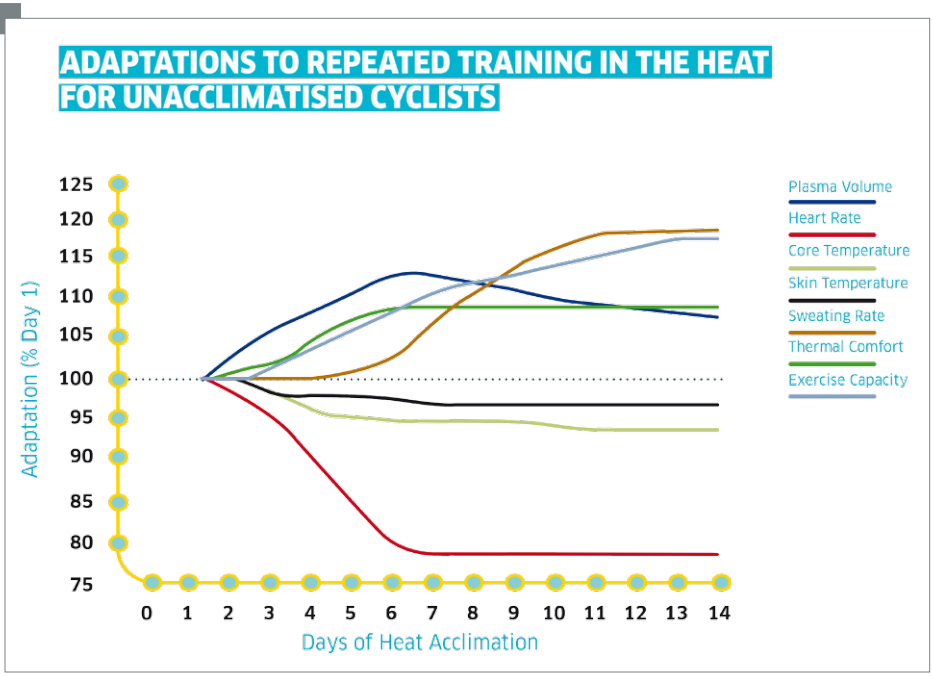
These events (30-75 min) are likely to be the most affected by heat stress. During a long time-trial, high power outputs are maintained for extended time periods and a tremendous amount of heat is produced, leading to large increases in body temperature. As a result, specific power outputs will become harder to maintain and heart rate will increase at these power outputs.

ROAD RACE

Racing in a peloton might offer more opportunities to rest/recover compared with an individual time trial. This may minimise the increase in body temperature as the production of high power outputs will be more intermittent. However, uphill courses might lead to large increases in body temperature due to the high intensity of work and the low wind velocity.

HOW TO BEST PREPARE TO CYCLE IN THE HEAT?

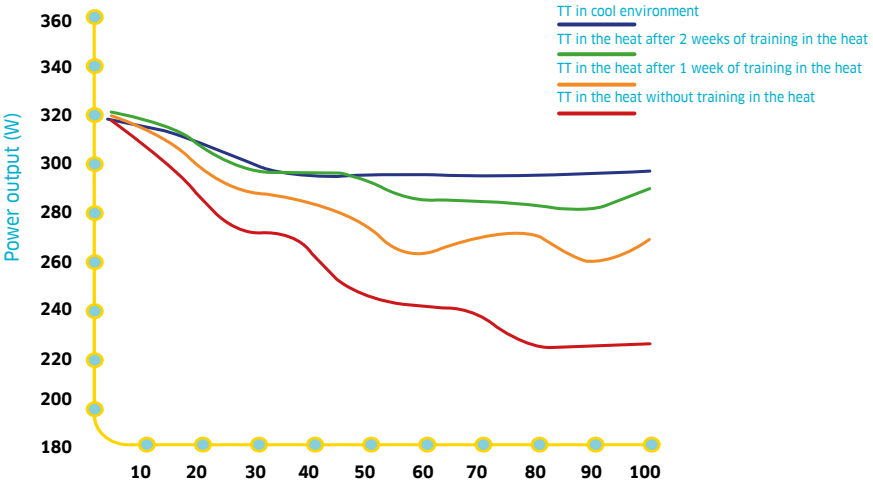
The best way to prepare for competing in the heat is to heat acclimatise. Some degree of heat acclimatisation is obtained by regular training, even in cool conditions, but the most efficient method for obtaining all benefits is to train in conditions similar to the upcoming competition. The most visible adaptations of the body to **repeated training in the heat include;** an increased sweat rate, a decreased heart rate at a given intensity, a better retention of electrolytes, and a decreased body core temperature. These adaptations will contribute to increase performance in the heat and minimise the risk of developing heat illness.



HOW MUCH TIME IS REQUIRED TO HEAT ACCLIMATISE?

There are large individual differences between athletes in the rate and magnitude of adaptations related to heat acclimatisation. However, as highlighted in the figure before, most adaptations develop within 7-10 days. As such, it is recommended that cyclist **preparing for an event** to be held in hot and/or humid conditions train in a similar environment for 2 weeks prior to competition. Conducting an initial heat acclimatisation camp several weeks before the target event may increase the speed at which adaptation occurs in a follow-up pre-competition camp.

THE IMPACT OF HEAT ACCLIMATISATION ON TIME TRIAL (TT) PERFORMANCE IN THE HEAT

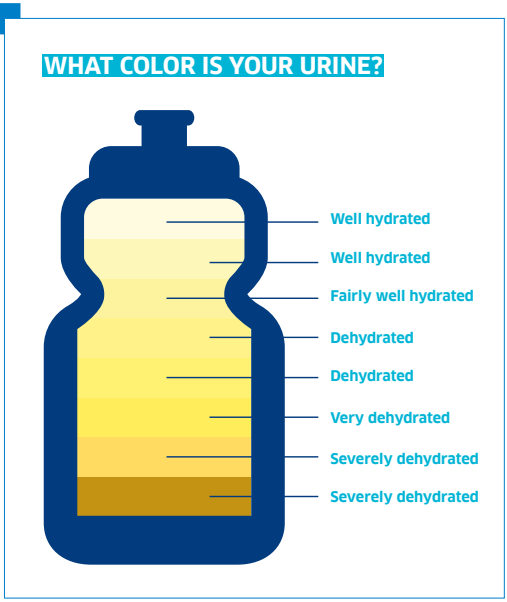


ARE THERE ALTERNATIVE WAYS TO HEAT ACCLIMATISE IF I LIVE IN A COLD COUNTRY AND CANNOT TRAIN IN THE HEAT?

If not possible to train in the same environment as the upcoming competition, most adaptations can be acquired by artificially simulating heat or minimising heat dissipation (e.g. no fan) during indoor training. This is called heat acclimation. It **is also possible to use passive** heat acclimation techniques such as hot water immersion or sauna bathing for 30-40 min post-training. Water temperature should be 40-43°C to induce adaptation while remaining tolerable (this can be easily measured with a floating pool thermometer). Although these techniques are not as specific as exercise heat acclimatisation per se, they can be used before traveling to a hot environment to reduce the time required for acclimatisation upon arrival.

HOW DOES HYDRATION IMPACT ON PERFORMANCE?

Exercising in the heat causes heavy sweating that can result in dehydration if fluids are not sufficiently replaced. Severe dehydration intensifies the rise in whole-body temperature and impairs prolonged cycling performance. This **occurs as dehydration negatively impacts** the function of the heart by making it more difficult to maintain blood pressure and blood flow to the working muscles and skin (to lose heat). Therefore, sufficient hydration prior to and during exercise and in recovery is important for athletes to perform well and ensure their safety in the heat.



HOW MUCH TO DRINK WHEN CYCLING IN THE HEAT?

During exercise **it is recommended that hydration regimens be individualised** to each athlete based on sweat rate to prevent body mass losses exceeding 2-3%. This individual prescription has to remain within the limits of the how much fluid can be absorbed by the body (~1.2 L/h). It is also important to recognise that hydration regimens should never result in over-hydration, as this can have serious health consequences (so called "hyponatremia", an imbalance of the salts in the body) that can be more severe than dehydration and even lead to death.

Simple techniques such as measuring body weight before and after exercise or evaluating urine colour can help athletes assess fluid losses through sweating and estimate hydration needs and status. During stage racing or training camps, riders can monitor their morning body weight (post void) to detect a change in hydration status based on a series of daily measurements. For example, a fall in morning body weight of 2% or more is suggestive of dehydration.

WHAT TO DRINK WHEN CYCLING IN THE HEAT?

Sodium (salt) supplementation during exercise is recommended for heavy and 'salty' sweaters who may deliberately increase sodium intake prior to and following hot-weather training and racing. **During exercise lasting longer than 1 h**, it is advisable to add electrolyte tablets or the equivalent pinch of salt to water, especially for athletes experiencing muscle cramping. It is also advisable to include 30–60 g/h of carbohydrates to drinks for exercise lasting longer than 1 h and up to 90 g/h for events lasting over 2.5 h. This can be achieved through a combination of fluids and solid foods. Following training or competing in the heat, recovery drinks should include sodium, carbohydrates and protein to optimise recovery. The preferred method of rehydration is through the consumption of fluids with foods, including salty food.

WHAT OTHER COUNTERMEASURES CAN BE UTILISED BEFORE RACING IN THE HEAT?

It is advisable to minimise unnecessary heat exposure and heat gain. Riders should therefore warm-up in the shade prior to racing if possible. They might also consider external (ice-vests, cold towels, or fanning) and internal (cold fluid or ice slurry ingestion) precooling methods. A practical approach might be the use of fans and commercially available ice-cooling vests during warm-up, which can provide effective cooling without affecting optimal muscle temperature and function. **Any cooling method should be tested and individualised** during training to minimise disruption to the athlete.

WHAT OTHER COUNTERMEASURES CAN BE UTILISED WHEN RACING IN THE HEAT?

Riders should **protect their eyes by wearing UV ray blocking sun-glasses** in a dark tint (i.e. grade 3) and their skin by using non-greasy sun-screen. Lightly coloured clothing can also minimise the effect of the sun's radiation but clothing should not impair sweat evaporation. Many riders use ice to cool the neck area during racing, commonly called "ice-socks" in the peloton. This requires team-cars to have cool-boxes or race organisers to provide ice during the race.

IS THE EFFECT OF HEAT THE SAME FOR MALE, FEMALE AND JUNIOR ATHLETES?

Young athletes, especially those in their mid- to late-teens, experience large body weight and sodium losses due to extensive sweating and do not always hydrate as well as adults. **It is recommended that young athletes and their coaches pay particular attention to their hydration** status and heat acclimatisation strategy. Females have lower sweat rates than males during high intensity exercise in the heat and may reach greater core temperatures in a shorter time period, potentially putting them at greater risk of developing heat illness. It is therefore important for female athletes to heat acclimatise in order to increase their sweat response and decrease the rise in body temperature associated with cycling in the heat.

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