Athlete 365

BEAT THE HEAT

OPTIMISE PERFORMANCE AND REDUCE THE RISK OF HEAT ILLNESS

BEAT THE HEAT DURING PARIS 2024

Paris is likely to experience a heatwave during the 2024 Olympic Games. Hot and humid ambient conditions limit heat dissipation capacity during exercise, impairing endurance performance and increasing the risk of exertional heat illness such as heat cramps, heat exhaustion and heat stroke. This document provides recommendations to optimise performance and reduce the risk of heat illness.

- Heat acclimatise by training in hot conditions for two weeks.
- If you cannot acclimatise for two weeks, try for at least one week.
- Manage exercise intensity based on heart rate (i.e. physiological responses), not power/speed, as those change with heat stress.
- Implement a hydration plan in the days leading up to your event/race.
- Use pre-cooling strategies during your warm-up (e.g. an ice-vest) and test your cooling strategy during pre-Games training.
- Do not use clothing that limits sweat evaporation.
- Discuss your medications with your sports physician – many medications can impair your ability to tolerate heat.
- Diarrhoea and vomiting impair your hydration status and will require the use of Oral Rehydration Solutions (ORS).
- Use a non-greasy sunscreen.
- Wear a hat and Grade 3 sunglasses.

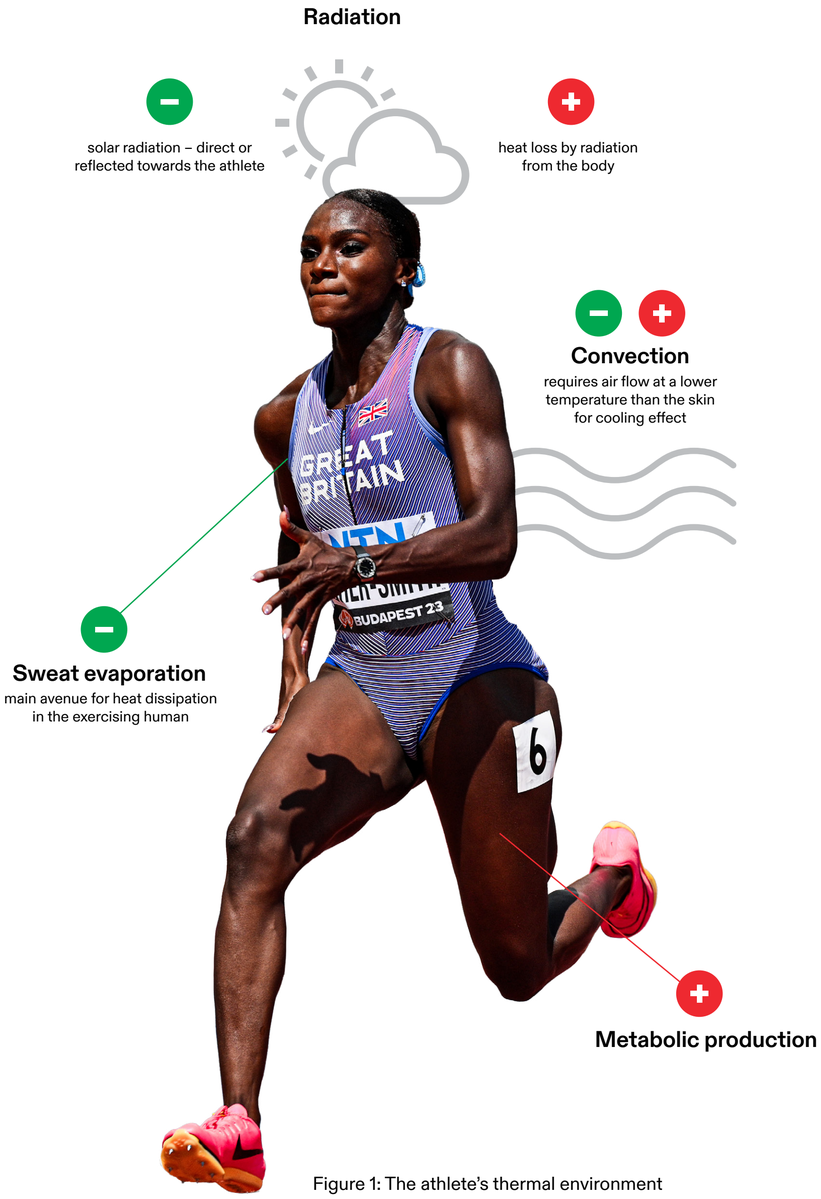

Figure 1: The athlete's thermal environment

WHAT IS HEAT STRESS?

When you are exercising, muscle contractions produce a considerable amount of heat, increasing muscle temperature and core body temperature.

This heat is normally dissipated to the environment. However, hot ambient conditions will limit dry heat loss (convection and radiation), and humid environments will limit sweat evaporation.

To account for temperature, humidity and solar radiation, most International Federations quantify heat stress using the Wet-Bulb-Globe-Temperature (WBGT) index.

For example, a hot and dry environment (e.g. 37°C, 25% relative humidity during the 2016 UCI World Championships in Qatar) and a warm and humid one (e.g. 28°C, 75% humidity during the 2014 FIFA World Cup in Brazil) are equivalent in the WBGT index (27°C).

Several IFs adapt their rules in high WBGT conditions (e.g. longer breaks in tennis, an additional break in football, etc.) or even cancel/ postpone the event.

HOW DOES HEAT AFFECT PERFORMANCE?

A moderate increase in muscle temperature (e.g. warm-up) may improve explosive actions such as sprints, jumps and throws. However, a large increase in core body temperature induces cardiovascular stress, increasing your heart rate to such an extent that it limits your exercise performance.

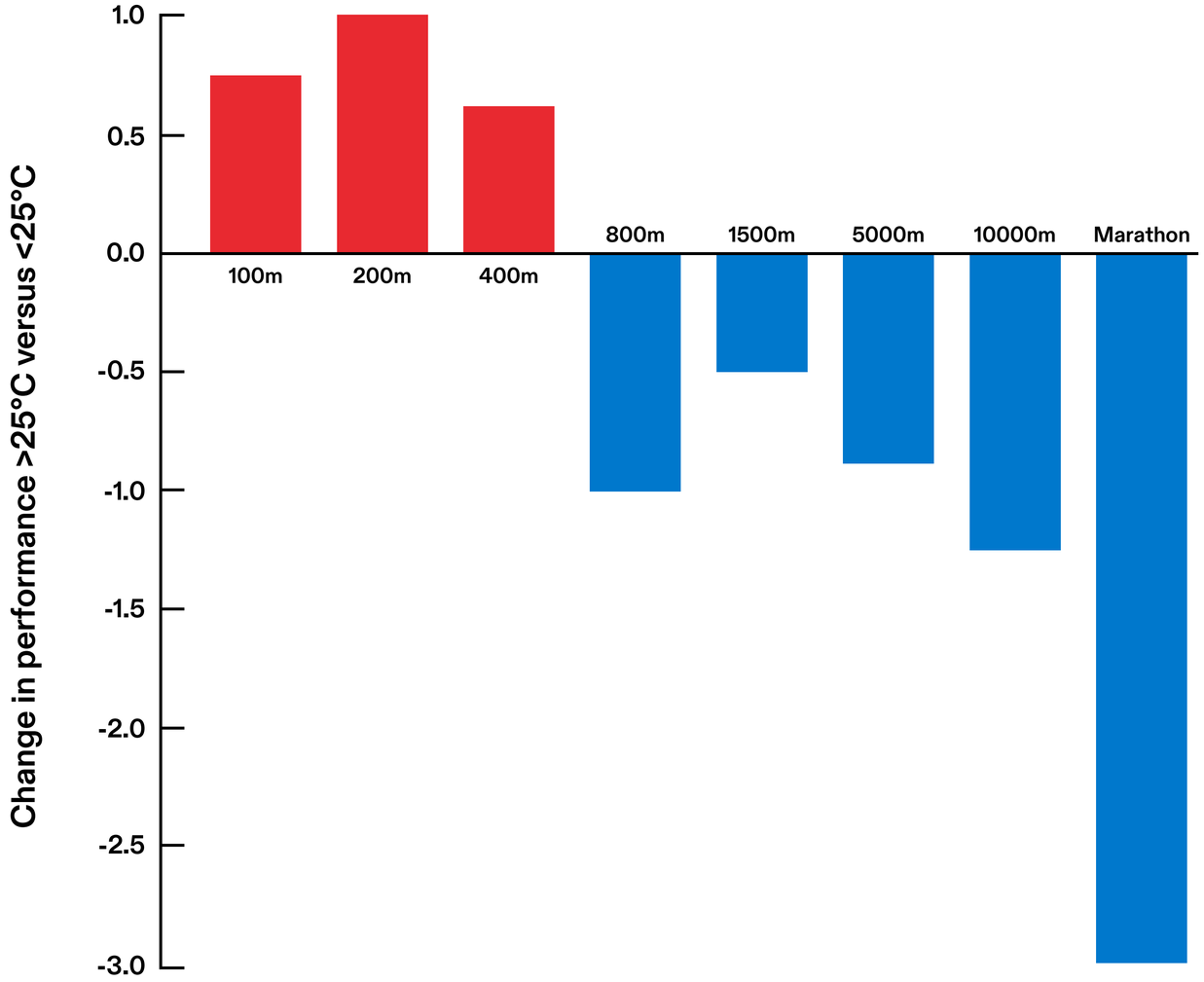

Figure 2: The effect of temperature on running performance

HOW BEST TO PREPARE FOR COMPETITION IN THE HEAT

The best way to prepare for competition in the heat is to train in the heat (i.e. to heat acclimatise). Heat adaptation is achieved by repeated exercise-heat exposure.

It is therefore recommended that athletes train in a similar environment to that of their competition for 60 to 90 minutes per day for two weeks prior to competition.

The most visible body adaptations to repeated training in the heat include:

- **an increased sweat rate**
- **a better retention of electrolytes**
- **a decreased heart rate at a given intensity**
- **a decreased body core temperature**

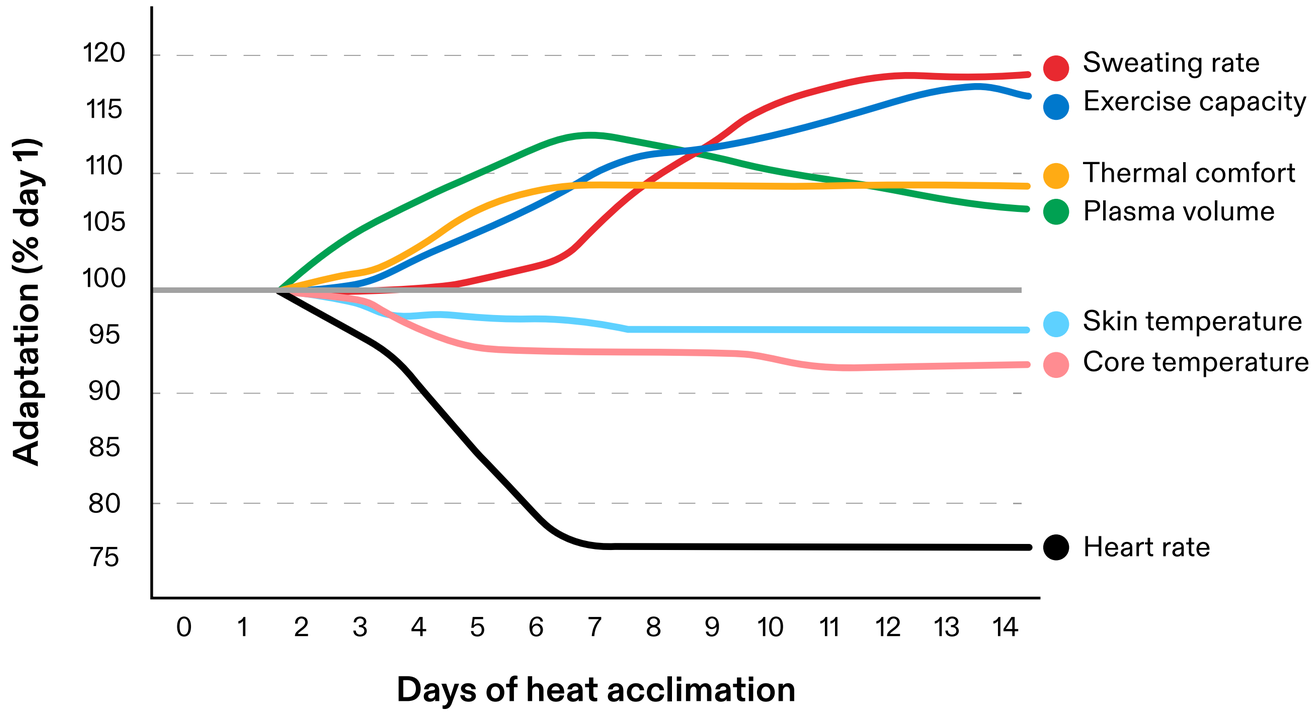

Figure 3: Adaptations to repeated training in the heat for un-acclimatised athletes

HOW MUCH CAN PERFORMANCE BE IMPROVED BY HEAT ACCLIMATISATION?

Heat stress can dramatically decrease endurance performance, but this fall can be progressively mitigated with heat acclimatisation.

The performance gain when competing in the heat thanks to heat acclimatisation is larger than with other preparatory strategies. Heat acclimatisation will also reduce the risk of heat illness.

For this reason, heat acclimatisation should be a priority before any event where hot and/or humid conditions are possible, such as during Paris 2024.

Heat acclimatisation will not impair performance in a cooler environment, and may even enhance performance under certain conditions.

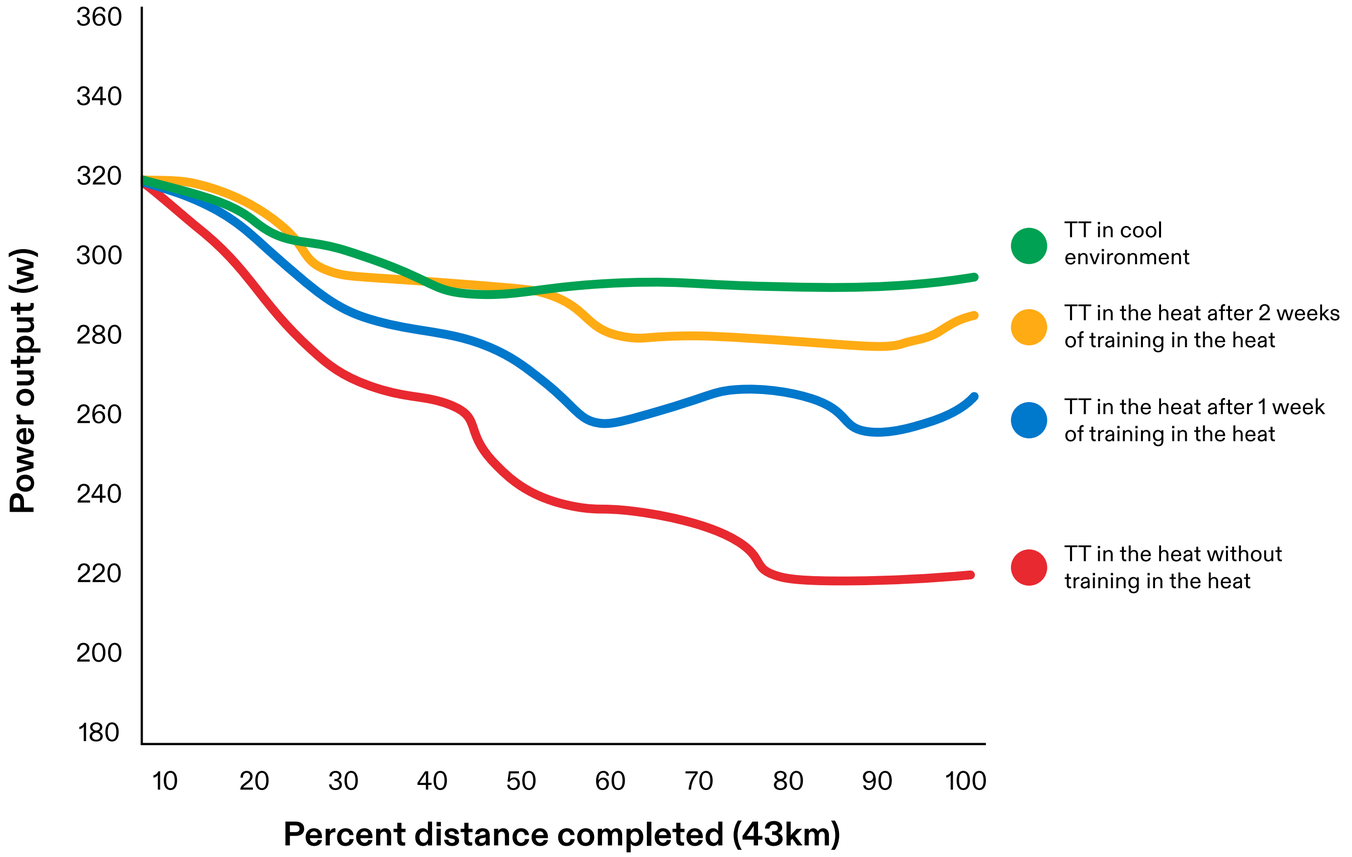

Figure 4: The impact of heat acclimatisation on cycling time trial (TT) performance in the heat

HOW TO HEAT ACCLIMATE IN A COLD COUNTRY

If it is not possible to do a training camp in a hot environment (acclimatisation), most adaptations can be acquired by simulating heat during indoor training (acclimation), using passive heat exposures or wearing extra clothing during training. Using these techniques before travelling to a hot environment can also reduce the time required for acclimatisation upon arrival.

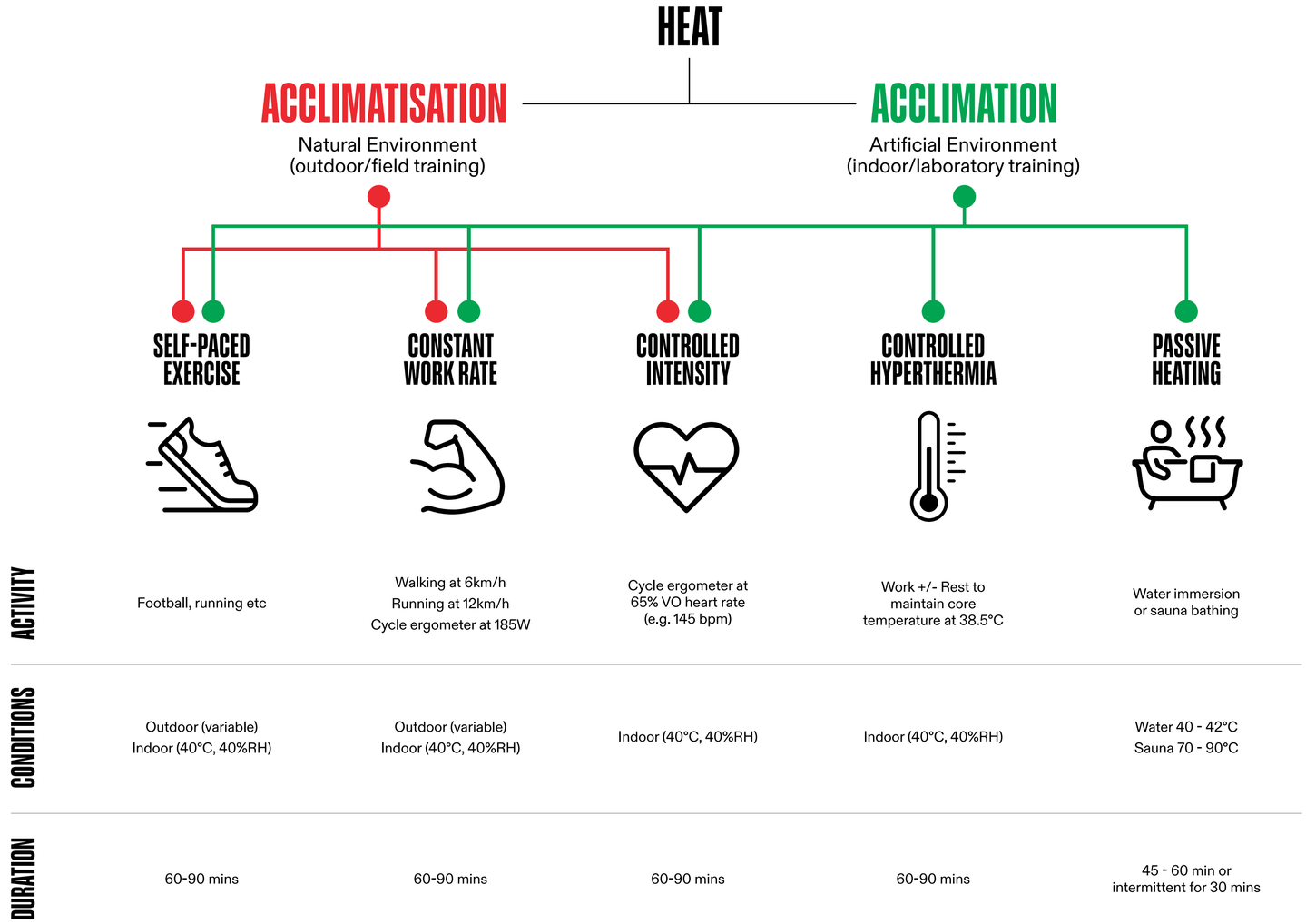

Figure 5: The different methods to adapt to the heat

WHEN TO HEAT ACCLIMATISE

A two-week acclimation period should be integrated into the month preceding the competition/event, while accommodating the taper and travel plan.

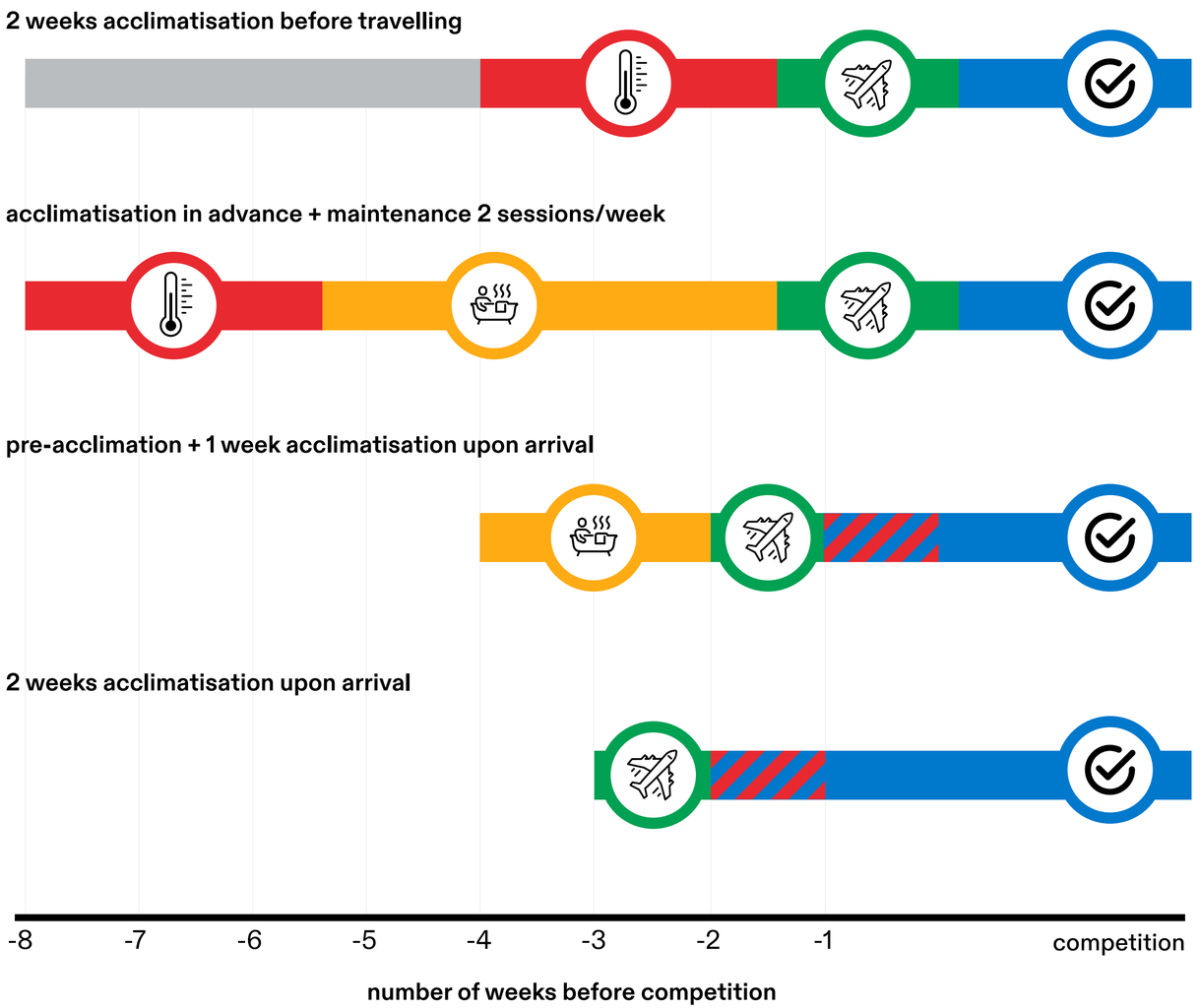

Figure 6: Examples of heat acclimation strategies, depending on travel requirements

HYDRATION

Profuse sweating while exercising may lead to progressive dehydration, accelerating the rise in body temperature and impairing prolonged exercise performance.

While drinking to satisfy thirst is adequate for exercise lasting less than one or two hours in cool environments, planned drinking (including sodium and carbohydrates) is generally better for activities lasting more than 90 minutes, particularly during high-intensity exercise in the heat.

Individualised prescription of fluids must remain within the limits of how much fluid can be absorbed (typically a maximum of about 1.2 litres per hour) and should never result in over-hydration, as a minor loss in body weight is normal due to sweating.

Simple techniques such as measuring body mass before and after exercise or evaluating urine colour in the morning can help athletes assess fluid losses through sweating and estimate their hydration needs and status.

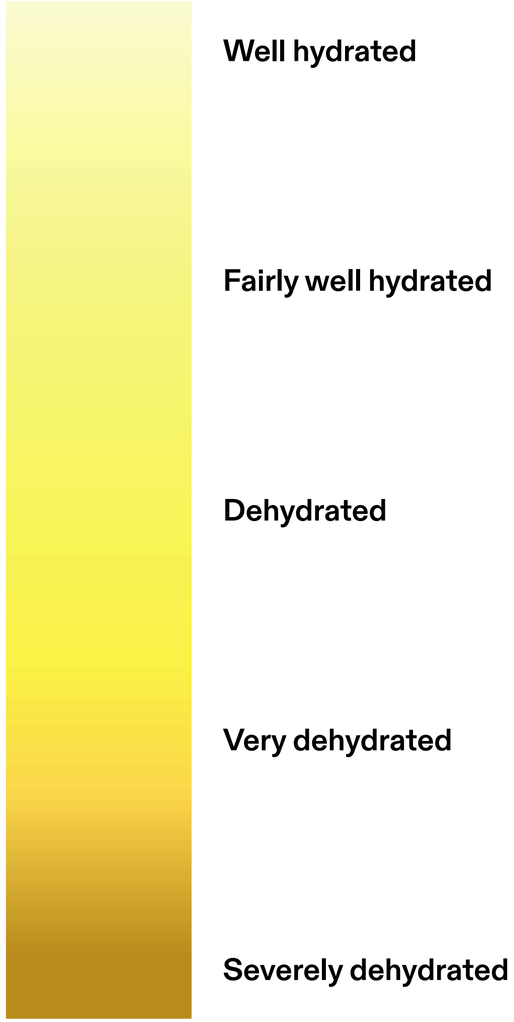

Figure 7: What colour is your urine?

WARM-UP AND PRE-COOLING

Minimise unnecessary heat exposure and heat gain before the competition by adapting the warm-up to the environmental conditions.

Athletes can also use shade, together with external (ice-vests, cold towels or fanning) and internal (cold fluid or ice slurry ingestion) pre-cooling methods before the competition starts.

During competition, athletes can protect their eyes by wearing Grade 3 sunglasses and their skin by using non-greasy sunscreen. Lightly coloured clothing can also minimise the effect of the sun's radiation, but should not impair sweat evaporation if you are exercising.

WHAT TO DO IF YOU EXPERIENCE SYMPTOMS OF HEAT ILLNESS

There will be a dedicated medical team to treat exertional heat stroke during all events at risk during the Olympic Games. However, if you feel unwell while training in the heat or see somebody feeling unwell, even outside the scope of the Games, your first reflex should be immediate cooling.

Speak with your doctor about any of your previous heat-related issues and inform them about any recent illness, even if resolved, as these may have residual effects impairing your heat tolerance.

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