

DANONE
GetPRO

PROFESSIONAL

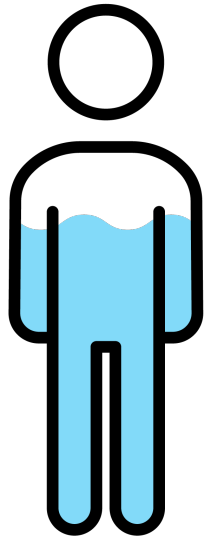
HYDRATION FOR ATHLETES

This resource was created by Michael Naylor, Head of Performance Nutrition, UK Sports Institute in collaboration with the GetPRO Professional nutrition team

This resource is for use under professional supervision

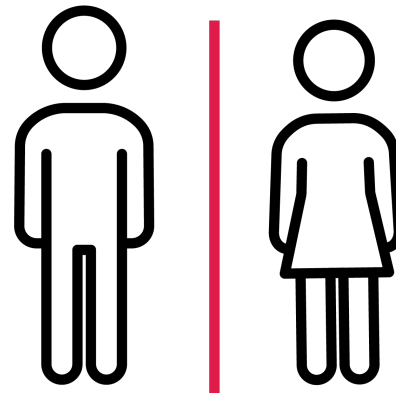
WHAT DO WE MEAN BY HYDRATION?

Hydration during exercise depends on many factors, but it can generally be defined as "avoiding losses greater than 2–3% of body mass while also avoiding overhydration"



Water makes up 2/3 of our body

European Food Safety Authority



2.5L/day

2L/day



Extremely active

Exposed to environmental stress such as heat or altitude

Losing additional fluid through sickness

WHY IS HYDRATION IMPORTANT?



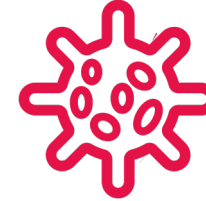
REGULATES BODY TEMPERATURE



AIDS IN DIGESTION



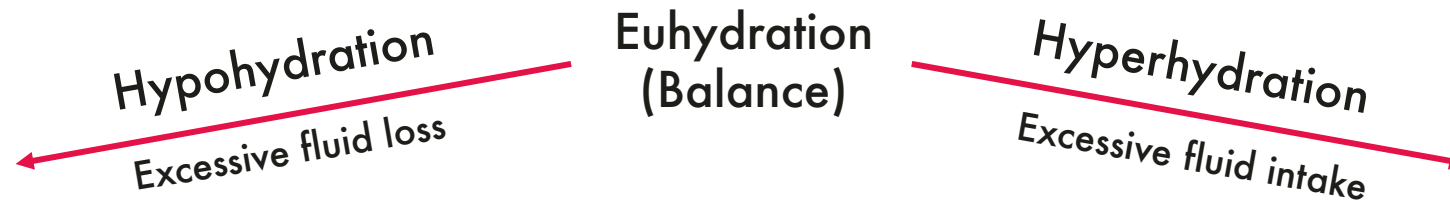
REMOVES WASTE PRODUCTS



DELIVERS NUTRIENTS TO CELLS



LUBRICATES JOINTS



- Heat illness (heat exhaustion, heat stroke, hyperthermia)
- Fatigue
- Dehydration (fluid + electrolytes)
- Decreased cognitive function
- Muscle cramps
- Dark yellow urine
- Feeling thirsty

Exercise associated hyponatremia (EAH):

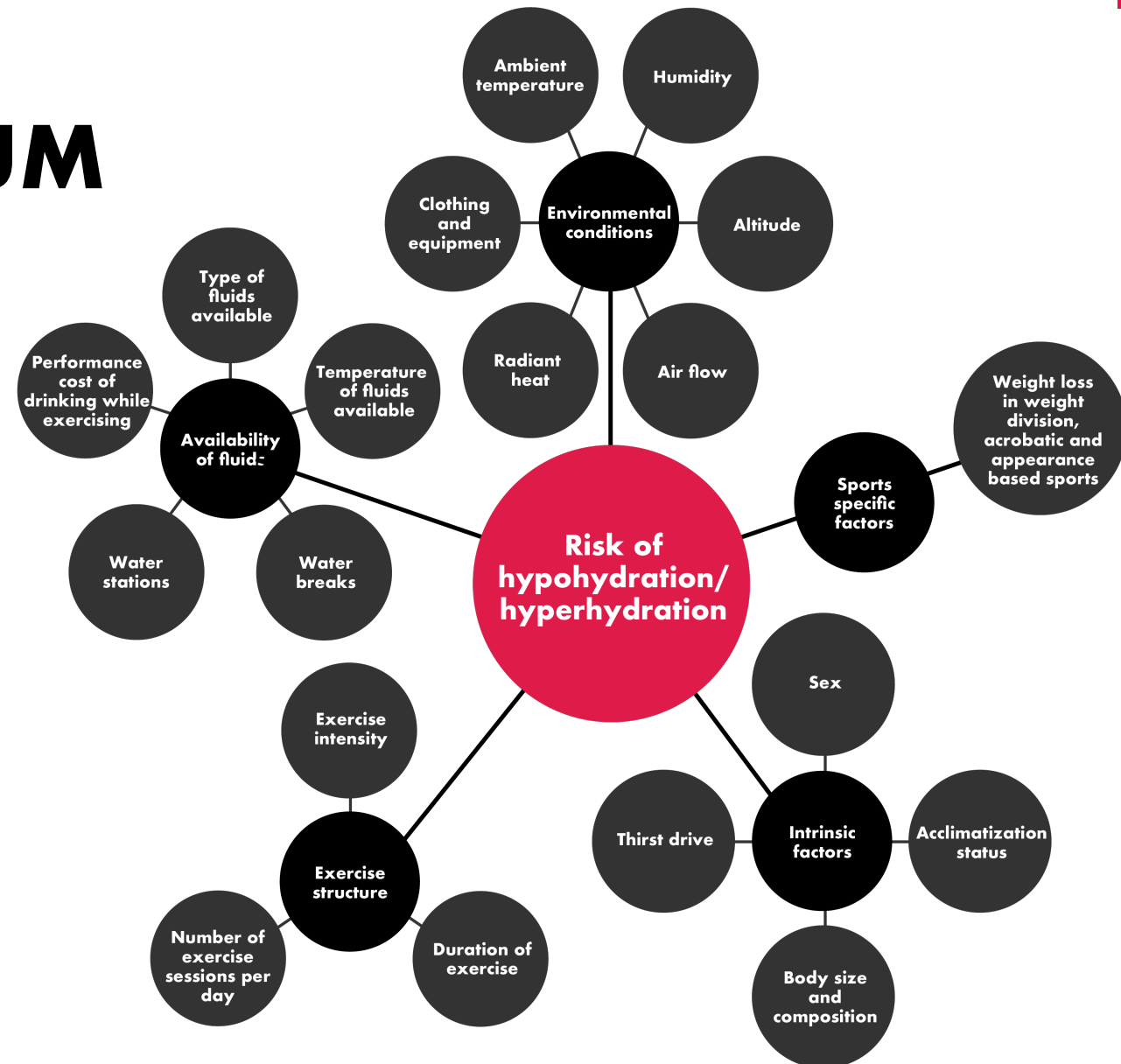
- Decreased blood plasma volume, vomiting, oliguria or anuria, collapse, seizure, coma + even death during or soon after sport

EAH Risk Factors:

over drinking during exercise, weight gain during exercise, exercise duration > 4 h, inexperience, inadequate training, slow pace, high or low BMI, readily available fluids

WHAT FACTORS IMPACT OPTIMUM HYDRATION?

- Environmental Conditions
- Sport Specific Factors
- Intrinsic Factors
- Exercise Structure
- Availability of Fluids



WHAT DOES THIS MEAN FOR THE ATHLETE?



Sweat rates are highly individual and can vary from 0.5 L/hr to 3 L/hr.



Sweating is accompanied by a loss of electrolytes and sodium is the predominate electrolyte lost in sweat.



Average sweat sodium concentrations have been seen to vary from 15 mmol/L to 90 mmol/L, with the average reported to be ~40 mmol/L. Standard sport electrolytes contain between 20-30 mmol/L, helping promote the absorption and retention of water.

Even athletes with low or average sweat sodium concentrations can accrue a substantial sodium deficit due to high sweat rates (>2L/h) or extended periods of strenuous exercise



Factors influencing our sweat rate and sweat sodium concentration include:

- Duration / intensity of exercise
- Genetics
- Diet
- Heat / heat acclimatization status
- Hydration status
- Clothing

WHAT ARE THE HYDRATION RECOMMENDATIONS?

Hydration is highly individual! Drinking to thirst is generally accepted unless undertaking an event over 2hrs

Athletes should not drink so much that they gain weight during exercise

PRE-EXERCISE



Begin exercise well hydrated

DURING EXERCISE



Sufficient fluid should be consumed during exercise to limit dehydration to less than 2% body mass. Sodium should be included if exercise lasts over 2hrs or if sweat losses are high

POST EXERCISE



Rehydration should include replacement of both water and salts lost in sweat

WHAT DOES THIS LOOK LIKE IN PRACTICE?

PRE-EXERCISE



Begin exercise well hydrated

DURING EXERCISE



Drink to thirst with addition of sodium if high sweat losses or if exercising over 2hrs

POST EXERCISE



Include replacement of both water and salts lost in sweat at a normal rate, alongside food

HYDRATION RECOMMENDATIONS IN THE HEAT



Athletes should not drink so much that they gain weight during exercise



6 ml of fluid per kg of body mass every 2–3 hours, or 2L per day. Can include sodium if high sodium sweater/ high sweat rate



1–2L per hour of exercise plus 1L for each 5°C increase in ambient temperature above 21.5°C. Include 0.5 – 0.7g/L sodium when exercising over 1hr (or if high sodium sweater)



Rehydrate after exercise heat stress slightly above body mass loss (100-120%), including carbohydrate, protein, fluid + sodium. Remember fluid / sodium can also be provided by food.



The Institute of health has recognised that public health recommendations to limit sodium ingestion should not be applied to individuals with elevated sweat loss, due to exercising in the heat

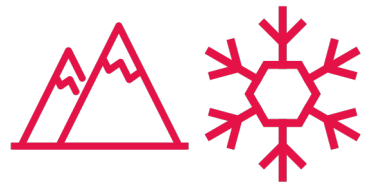
ENVIRONMENTAL FACTORS AND INFLUENCES



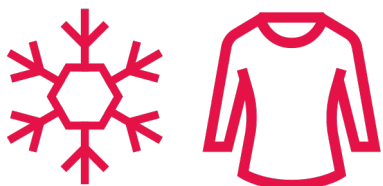
High temperature/humidity and clothing can limit heat dissipation. If this thermal strain continues, it can result in reduced exercise intensity, impacting performance and potentially health.



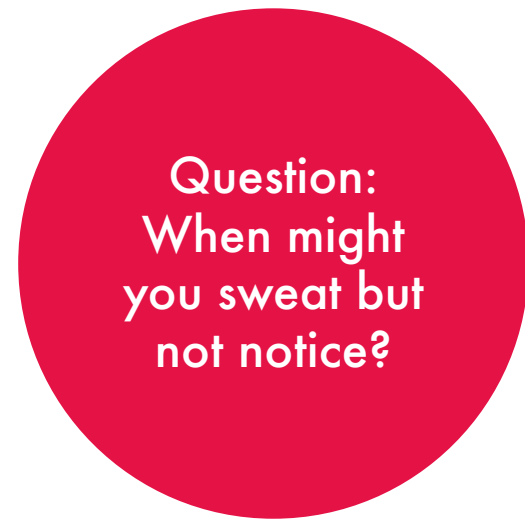
This includes wetsuits + water temperature!



Altitudes above 4900-7600m can increase water and electrolyte losses, decreasing plasma volume and total body water content. In both cold air and high altitude, respiratory water losses, may increase and require additional water consumption due to low air water pressures.



Exercising in the cold can produce large sweat rates, particularly if wearing lots of clothes. Additionally, the cold can decrease thirst sensitivity, thus increasing risk of hypohydration.



Question:
 When might you sweat but not notice?

FACTORS THAT INFLUENCE HYPOHYDRATION IN TEAM SPORTS

Sport	Availability of fluid		Environment		Intensity		Hypohydration risk	
	Training	Competition	Training	Competition	Training	Competition	Training	Competition
Basketball	High	High	Low	Low	Mod	Mod	Low	Low
Ice hockey	High	High	Low	Low	Mod	High	Mod	Mod
Football	High	High	Mod	Mod	Mod	High	Mod	Mod
Baseball	High	High	Mod	Mod	Low	Low	Low	Low
Softball	High	High	Mod	Mod	Low	Low	Low	Low
Volleyball	High	High	Low	Low	Low	Low	Low	Low
Soccer	Mod	Low	Mod	Mod	Mod	High	Mod	High
Lacrosse	High	High	Mod	Mod	Mod	Mod	Mod	Mod
Rugby	High	Low	Mod	Mod	Mod	High	Mod	High

FACTORS THAT INFLUENCE HYPOHYDRATION IN TEAM SPORTS

Sport	Availability of fluid		Environment		Intensity		Hypohydration risk	
	Training	Competition	Training	Competition	Training	Competition	Training	Competition
Tennis	High	Mod	Mod	Mod	High	High	Mod	Mod
Wrestling	High	High	Mod	Mod	High	High	High	Low
Gymnastics	High	High	Low	Low	Mod	Low	Low	Low
Running (<1 h)	Low	High	Mod	Mod	High	High	Low	Low
Running (1-2 h)	Low	High	Mod	Mod	Mod	Mod	Mod	Mod
Running (>2 h)	Low	High	Mod	Mod	Low	Mod	Mod	Mod
Cycling (<1 h)	High	High	Mod	Mod	High	High	Low	Low
Cycling (>2 h)	Mod	Mod	Mod	Mod	Mod	Mod	Low	High
Swimming	High	High	Low	Low	High	High	Low	Low
Triathlon (<2 h)								
Swim	Low	Low	Low	Low	Mod	Mod	Low	Low
Bike	Mod	High	Mod	Mod	Mod	Mod	Low	Low
Run	Low	High	Mod	Mod	Mod	Mod	Low	Low
Triathlon (2-5 h)								
Swim	Low	Low	Low	Low	Mod	Mod	Low	Low
Bike	Mod	High	Mod	Mod	Mod	Mod	Low	Low
Run	Low	High	Mod	Mod	Mod	Mod	Low	Low
Triathlon (5-9 h)								
Swim	Low	Low	Low	Low	Mod	Mod	Low	Low
Bike	Mod	High	Mod	Mod	Mod	Mod	Mod	Mod
Run	Low	High	Mod	Mod	Mod	Mod	Mod	Mod
Triathlon (>9 h)								
Swim	Low	Low	Low	Low	Mod	Mod	Low	Low
Bike	Mod	High	Mod	Mod	Mod	Mod	Mod	Mod
Run	Low	High	Mod	Mod	Mod	Mod	Mod	Mod

EVENT SPECIFIC HYDRATION SOLUTIONS



FIFA rules allow a hydration and cooling break after 30min of play in each half of a football match



The World Athletics rules allow for the installation of a refreshment table on the track for 5000m and 10000m races



The international Tennis Federation rules allow an additional 30s for each change over in a tennis match as well as a 10min break after the second set



World Triathlon improved the number of drink stations numbers during the run course with a maximum distance of 1.25 km between aid stations.



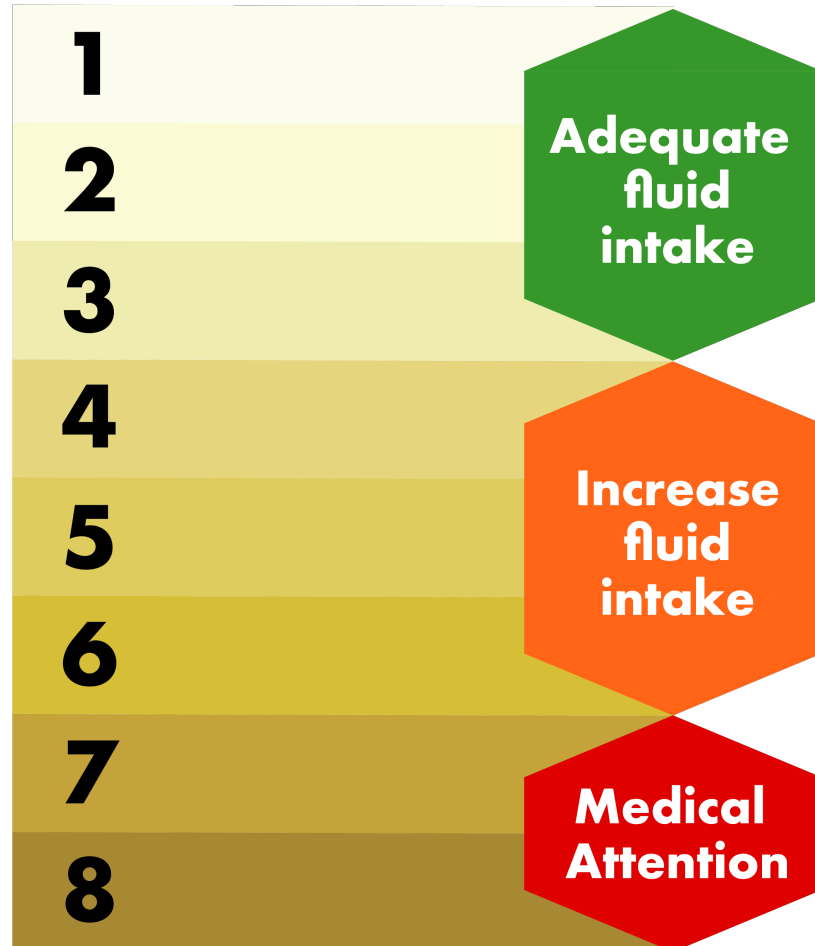
The Union Cyclist International rules allow one car-feeding during a cycling time trial



Marathon Des Sables places obligatory water checkpoints athletes must go through, or they receive a penalty

MONITORING HYDRATION

Actions



SUMMARY

Good hydration practices include:

- 1) Begin exercise in a euhydrated state
- 2) Prevent excessive hypohydration during exercise
- 3) Replace remaining losses following exercise prior to the next exercise bout

Fluid intake varies depending on:

- Individual sweat rate
- Exercise mode
- Exercise intensity
- Environmental conditions
- Exercise duration

Characteristics and rules of each sport may influence optimal hydration strategies:

- Clothing or event uniform
- Availability of fluid during and training and competition

TAKE HOME MESSAGES

Good hydration practices include beginning exercise in a euhydrated state; preventing excessive hypohydration during exercise; and replacing remaining losses following exercise prior to the next exercise bout

Drinking to thirst is generally accepted, with addition of sodium if high sweat losses or if exercising over 2 hours

Hypohydration is influenced by individual sweat rate, exercise mode, intensity, duration, and environmental factors such as heat

Characteristics and rules of each sport, such as the use of particular uniforms or the availability of fluid during training and competition, may influence optimal hydration strategies

REFERENCES

1. **NHS. Hydration [Online]. NHS inform. 2023. Available at: <https://www.nhsinform.scot/campaigns/hydration/>**
2. **Baker LB Jeukendrup AE. Optimal composition of fluid-replacement beverages. *Comp Physiol*. 2014 Apr 1;4(2):575–620.**
3. **Casa DJ *et al*. Fluid Needs for Training, Competition, and Recovery in Track-and-Field Athletes. *Int J Sport Nutr Exerc Metab*. 2019;29(2):175–80.**
4. **Belval LN *et al*. Practical Hydration Solutions for Sports. *Nutrients*. 2019 Jul 9;11(7):1550.**
5. **Holtzman B Ackerman KE. Recommendations and Nutritional Considerations for Female Athletes: Health and Performance. *Sports Med*. 2021 Sep 13;51(1).**
6. **Racinais S *et al*. Consensus recommendations on training and competing in the heat. *Br J Sports Med*. 2015 Jun 11;49(18):1164–73**
7. **Racinais S *et al*. Consensus recommendations on training and competing in the heat. *Br J Sports Med*. 2015 Jun 11;49(18):1164–73.**
8. **Racinais S *et al*. IOC consensus statement on recommendations and regulations for sport events in the heat. *Br J Sports Med*. 2022 Sep 23;57(1):bjsports-2022-105942**
9. **RACE REGULATION 2023 | MARATHON DES SABLES - Site officiel [Online] Available at: <https://www.marathondessables.com/en/2023-edition/race-regulation-2023> [Accessed May 2024].**

About the author: Michael Naylor is a leading health & performance nutritionist with over 15 years' experience in elite sport. In his role as Head of Nutrition for the English Institute of Sport he provides expertise to 25 of Team GB's Olympic and Paralympic sports.



THANK YOU