

ENVIRONMENTAL CONDITIONS

Heat, cold, humidity, wind, rain, & altitude all affect your nutrition strategy.

No matter the weather conditions, it is going to have an impact on the athlete's fuel and fluid balance. Whether an athlete is competing in the cold or heat, wind or rain, or even snow, the conditions can affect body temperature, workload, perceived exertion, heat loss/gain, and in some instances, the resistance of the athlete's equipment. Knowing this, nutrition strategies will need to be designed with the environmental conditions in mind.

ENVIRONMENTAL CONDITIONS & NUTRITION

Extreme temperatures & altitude can affect an athlete's nutrition strategy when competing indoors or outdoors (if an indoor venue is not properly insulated/sheltered). But outside, performance can be affected by wind, rain, lack of cloud cover, heat, humidity, cold, and altitude. This is important to keep in mind when designing pre, during, and post-nutrition strategies.

The following information outlines the negative effects of environmental conditions on performance and the alterations that can be made to the athlete's nutrition strategy to limit negative side effects.

EXTREME TEMPERATURE

Body temperature regulation impacts performance.

Increased Heat decreases performance by:
Increasing core temperature, sweat rates, risk of heat illness, and GI distress.
Decreasing muscle contraction rate, time to fatigue, energy availability, and fluid balance.

Increase Cold decrease performance by:
Increasing shivering resulting in increased muscle contraction, muscle recruitment, metabolism, sweating, and dehydration.
Decreasing maximum heart rate and time to fatigue, energy availability, and fluid balance.

To limit negative side effects:

1. Increase carbs during events to prevent fatigue.
2. Increase fluids to prevent dehydration.
3. Replenish electrolytes during and after event.

HUMIDITY

Humidity is the measure of water vapor in the air. As humidity increases, the ability of sweat to evaporate from the skin's surface decreases, thus decreasing heat loss in exercising athletes.

Humid conditions can result in increased:
Core body temperature
Risk of heat illness
Fuel utilization
Electrolyte loss
Fluid imbalance
GI disturbances

To limit negative side effects:

1. Aim for 5-7 m/kg of fluids 2-3 hours prior to exercise.
2. Drink ~ 6 m/kg of fluids every 2-3 hours.
3. Replace electrolytes during and after events.
4. Low FODMAP carbohydrates to increase energy and prevent GI distress.

ALTITUDE

At high altitude, oxygen levels & barometric pressure decreases impacting physiological & mental performance, and promoting:

Increased:
Heart rate/cardiac output/blood pressure
Red blood cell carrying capacity
Respiratory rate
Basal metabolic rate/Resting metabolic rate
Reliance on glycolysis
Risk of injury & altitude sickness

Decreased:
VO2 Max
Sensory & mental function
Lactic acid production
Thirst sensation & desire to drink

To limit negative side effects:

1. Increase carb intake to account for increased utilization.
2. Increase fluids to account for additional respiratory loss & environmental conditions.
3. Consider iron supplementation.

ACCLIMITIZATION

Acclimatization is the process of becoming accustomed to the new conditions in which the athlete will compete or train.

For **heat and humidity**, an athlete acclimated can start sweating faster, thus cooling and reducing the risk of heat illness. Increased blood volume can also ensure better blood supply to the working muscles.

In the **cold**, increase the insulation of the body's core, thus preventing heat loss.

At **high altitudes**, arriving 2 weeks before the event will help the athlete increase hemoglobin mass, and improve nutrition & hydration strategies while improving other physiological parameters.

References:

Racinals, J.M. et al.(2015)Consensus Recommendations on Training & Competing in the Heat. Mortexa, K. et al. (2016) Athletes at High Altitudes