What is Exertional Heat Illness (EHI)?

EHI occurs when the body produces more heat during exercise than it can dissipate. Normally, the body cools itself by sweating and increasing blood flow to the skin. But, during heavy exercise, particularly during hot conditions, these defenses can be insufficient. The result can be a spectrum of symptoms varying from mild to life-threatening. The challenge is to recognize conditions that lead to EHI (heavy exertion and hot weather), learn preventive strategies to mitigate risk, be aware of symptoms that require intervention, and know when to call for help.

Who is at risk?

Anyone who cycles is at risk given the right conditions of exertion and external heat. EHI can occur in any type of weather, but is more likely as the temperature rises, the ride intensity increases, or a combination of these. Also, weather apps can be deceiving since heat radiating off the pavement can magnify heat exposure significantly above the stated or predicted temperature.

Fun fact:

1. Excessive heat impairs athletic performance.

In a huge study of 382,000 Boston Marathon runners, every degree (centigrade) increment in temp above "ideal" on race day resulted in a slower Boston Marathon time by 1 minute, 47 seconds. Heat reduces VO2 max and other metrics of performance by up to 25%. Take-home lesson: don't go for a PR during hot weather.

Spectrum of Symptoms:

EHI exists on a continuum shown in the chart in Figure 1 of the article:

1. **Heat Exhaustion**: Core temperature less than 104.9 Fahrenheit. Associated symptoms include muscle cramps, low BP and associated lightheadedness, rapid heart rate (including at rest), increasing fatigue, and exercise intolerance. If a cyclist recognizes this stage early, and initiates cooling, fluid replacement, and cessation of exercise, then symptoms are reversible.

2. **Exertional Heat Injury**: Same symptoms as above, plus temperature >104.9, and heat-related organ damage. This might include kidney injury, muscle breakdown (rhabdomyolysis), or liver damage. These diagnosis of these conditions require medical and laboratory evaluation in an emergency room. This stage is not associated with alterations of consciousness.

3. **Exertional Heat Stroke**: Same symptoms as #2 above, worsening organ damage, but with CNS dysfunction (e.g. coma, disorientation, seizures).

Note: EHI can also lead to cardiac rhythm abnormalities, cardiac arrest, and heart attacks at any stage, but more likely with increasing severity of EHI.

Long Term Sequelae:

Long term studies suggest that EHI can lead to increased long-term risk for cardiac disease, even after apparent recovery of EHI. Under the heading "Long-Term Outcomes", the authors discuss the studies that show long-term increase in cardiovascular mortality, all-cause mortality, and risk for heart attacks.

Prevention:

1. Be flexible. Cut back exercise amount and intensity when hot (or don't exercise at all). Have a low threshold mid-ride to reduce distance, speed, and amount of climbing if it's subjectively too hot outside. Always be prepared for a sudden shift in weather from comfortable to hot.
2. The authors suggest that an athlete acclimate/train for heat via "repeated, nonexcessive exposures to exercise in hot environments". Gradual heat exposure over time via increasing intensity, higher temperature rides will increase tolerance to cycling in hot weather (e.g. greater than 85 degrees).
3. Fluid replacement is crucial (subject of a future Safety article). We suggest that riders carry 2 bottles of liquid and plan for refills along the route.
4. Build aerobic fitness before tackling hot-weather rides. Don't plan a hot-weather ride after taking a break from riding. First, get back in shape and acclimate to hot weather.

Treatment:

The article discusses 2 principles of treatment,

1. Cooling
2. Basic life support

On a CVC ride, this translates to:

1. recognize symptoms early,
2. stop riding,
3. seek a cool setting,
4. hydrate if cyclist able.
5. have a low threshold to call 9-1-1.

Our hope is to convey an awareness of EHI symptoms, preventive strategies, and when to call for help. Feel free to contact us for any questions or discussion.

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