

HEAT STROKE

by Ralf W. Blackstone MD

Heat Exhaustion and Heatstroke are the common terms for severe thermal injury disease. This occurs regularly across the globe resulting in more than 8,000 deaths annually; primarily in those exercising (football players, marathon runners, armed forces recruits, firemen, etc.) in hot and humid conditions. When the Heat Index (combined heat and humidity levels) exceed 110°F., thermal injury disease becomes likely. This occurs at 90°F. and 75% humidity or 95°F. and 57% humidity. At 90°F and 90% humidity, the Heat Index is 121.9°F. These can be lethal conditions.

Researchⁱⁱⁱ supports a rate for heatstroke of 1:1000 for those exercising in a hot environment. However, the rate of thermal injury with organ damage or failure may be 10x that of actual heatstroke. Among firefighters, there are approximately 100 deaths/year due to thermal injury disease. However, the real morbidity rate is higher but essentially unknown as later deaths may be ascribed to organ failure rather than the thermal injury that caused that failure. Even non-fatalities from heatstroke can suffer long-term disabilities as a result of thermal injury.

Heat-waves across populated areas have also resulted in severe thermal injury to large numbers of non-exercising people as the Heat Index rises above 110°F. Chicago in 1995 recorded more than 700 deaths from heatstroke during a one-week city-wide heat waveⁱⁱⁱ with more than 1000 hospitalizations for heatstroke. Similarly, a heat wave across Europe in 2003 resulted in more than 70,000 heatstroke deaths^{iv}, 15,000 in France alone. Nonfatal thermal injuries were not even estimated. Thus the recognition and rapid effective treatment for thermal injury is of prime importance to the world's population in a time of global warming, but especially so to firefighters who may care for, or become, victims themselves.

ⁱMaron BJ, Poliac LC, Roberts WO. Risk for sudden cardiac death associated with marathon running. J Am Coll Cardiol 1996;28:428-31.

ⁱⁱKim JH, Malhotra R, Chiampas G, et al. Cardiac arrest during long-distance running races. N Engl J Med 2012;366:130-40.

ⁱⁱⁱ"Classic heat stroke during Chicago 1995 heat wave". University of Chicago Medicine. August 1, 1998.

^{iv}Robine, Jean-Marie et al. (February 2008). "Death toll exceeded 70,000 in Europe during the summer of 2003". Comptes Rendus Biologies 331 (2): 171-178. doi:10.1016/j. crvi.2007.12.001. ISSN 1631-0691. PMID 18241810.



TEAM MATES Minnesota Vikings



Korey Stringer



Chris Hovan

"Korey would probably have been alive today if we had the Polar Breeze machine."

"If we could have had the Polar Breeze machine on the sidelines I think that I would have added another 5 years to my NFL career."

— Chris Hovan



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"Heat illness during practice or competition is a leading cause of death and disability among U.S. high school athletes."¹

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minutes – as shown in recent studies.

¹Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report, "Heat Illness Among High School Athletes- United States 2005-2009", August 20, 2010, 59(32);1009-1013



Tyler Davenport, age 17, before and 63 days
after heatstroke, before his death.

The Problem: Known as EHS- Environmental Heat Stress- also known as Heat Cramps, Heat Exhaustion and Heatstroke.

Typically occurs when a body's core temperature reaches or exceeds 104.0°F. (40.0°C.) due to environmental heat exposure and/or heavy exercise. This acute temperature and humidity elevation overwhelms the body's core-temperature regulation mechanisms.

Treatment requires rapid physical cooling of the body. The higher the heat and the longer the exposure, the greater the physical damage sustained by the body. Thus, the more rapidly the normal core body temperature can be restored, the less the total thermal injury damage will be sustained.

Once a person's core temperature exceeds 105°F., cellular deterioration of the major organs (liver, kidneys, brain, lungs, etc.) begins to take place unless the core temperature is quickly dropped.

By the time a body's core temperature reaches 106.7°F., rapid cell death and permanent organ damage or failure is happening before your eyes. Even if death is avoided, severe permanent disability can occur.

The current preferred modality for bringing down the body's core temperature to normal is utilizing an ice bath but this method has its draw backs usually in immediate availability.

The Casualty Statistics:

- 100's of firefighters become physically disabled every year due to the residual effects of thermal injury disease
- Heat Stroke is the second largest killer of athletes in the U.S.
- The incidence of heat stroke is rising in the United States as the leading cause of death and disability among high school athletes³
- On average one young child dies in hot cars of heat stroke every 9 days.
- Over 800 people die per year of heat stroke in the U.S.⁵

Note: While ice-water immersion baths are the current gold-standard for heatstroke treatment, they are not usually available in the immediate time-frame necessary. Cooling the head and brain are usually neglected in preference to only cooling the body. As much of the head and neck as possible, without compromising airway, should also be submerged in ice-water with the body for a more effective treatment of heatstroke.

The higher the Heat Index the faster the victim's body core temperature must be reduced. When dealing with heat injury victims, it is literally a race with time to improve their condition.

The Solution: *Polar Breeze*[®] – Total Body Cooling Technology developed by Stat-Tech

Polar Breeze[®] is a state-of-the-art total body cooling technology designed and patented to rapidly reduce core body temperature. When time is of the essence, nothing lowers the body core temperature faster than the Polar Breeze[®] - Air Chilling System.

Polar Breeze[®] utilizes a cold air stream into the largest surface-area organ of the entire body- the lungs. While immersion in ice-water can cool the 1.7 to 2.3 square meters (2.0-2.75 square yards) of the body surface area, the lungs offer a cooling area directly into the bloodstream of 30 to 70 square meters and up to 100 square meters in some athletes - that's half the size of a tennis court!. Cooling the bloodstream cools the entire body from the inside out, head-to-toe! The greater the surface area, the faster this occurs!

In actual recent testing, Polar Breeze[®] has dropped core body temperature 1°F. every two minutes in firefighters undergoing training in a Burn House.

Polar Breeze[®] is not a respirator so the athlete can naturally breath cold 58-63°F. air continuously into the lungs until his core temperature returns to a safe range.

The higher the Heat Index (a combination of high heat and high humidity), the greater the chance of becoming a heat injury victim.

Regular temperature measurements, hydration, and rehab with Polar Breeze[®] help the athlete maintain near-normal body temperature during exertion. This may help the athlete maintain focus, concentration, and performance.

¹by Firefighter Life Safety Research Center Illinois Fire Service Institute University of Illinois at Champaign-Urbana - July 2008

³Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report, "Heat Illness Among High School Athletes- United States 2005-2009", August 20, 2010, 59(32);1009-1013

⁴by American College of Emergency Physicians

⁵by American College of Emergency Physicians

POLAR BREEZE[®]
The Ultimate in Total Body Cooling

When Moments Matter ...
Don't Settle for Less than the Most Effective Cooling Possible!



"What you guys are doing will make a difference. I've seen so many men flake out from heat. Wow! It's COLD! That's really great!"

SPECIAL OPS CHIEF KENT WATTS, Clearwater Fire Department, Clearwater, Fl.

"It feels like it cools quickly but not an overbearing cold. The perfect temperature. Not a shock. I can feel my core temperature dropping. It's awesome."

SEAN Firefighter, Dallas, Tx.

"If I had this (device, I think) that child may not have died."

Athletic Director in School with Heat Stroke Death #1

"This device is something like (AED's) defibrillators; I foresee it being in all schools."

County Supt. of School with Heat Stroke Death #2

"If this machine were to be regularly used to cool down our football players along with their being properly hydrated we'd go a long way toward helping eliminate heat illness and hyperthermia."

Athletic Director in School with Heat Stroke Death #3

"You could work harder with the knowledge you will cool off."

LEE, Firefighter, Hampshire, England

"This is a device that every high school should have."

Director of Phys. Ed. in School with Heat Stroke Death #4

"I almost fell asleep a couple of times. Plus I can tell the difference in cooler air inhalation and blowing down my back too."

CAPTAIN JOE TALLEY, Instructor, Ocala, Fl.

"It's going to slow down dehydration – save energy – and prepare us for the trauma challenge. We won't be dripping on our casualties."

ANTHONY, Carlow Fire and Rescue, Carlow, Ireland, UK

"Oh – oh my goodness! Cool therapy – beautiful! In Spain we have a lot of people with heat shock. Really Healthy!"

RAFAEL, Firefighter, Madrid, Spain