Marching to the Beat of Safety: Preventing and Managing Heat Related Illness

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Outline

- Marching Band – unique risks
- Heat Illness overview
  - Science
  - Sport
  - Prevention and Treatment with lens from Marching Band
- Challenge – your role in Primary and Secondary Prevention

The Physical Nature of Performing

- 3-14 hours of practice
- Working, even when at rest
  - Marching
  - Holding up an instrument
  - Playing music
- Elite sport that is technically difficult and requires precision

The increased risk of injury

Time to perform – aerobic and anaerobic activity

Uniform – choice of clothing

We treat participants differently than athletes

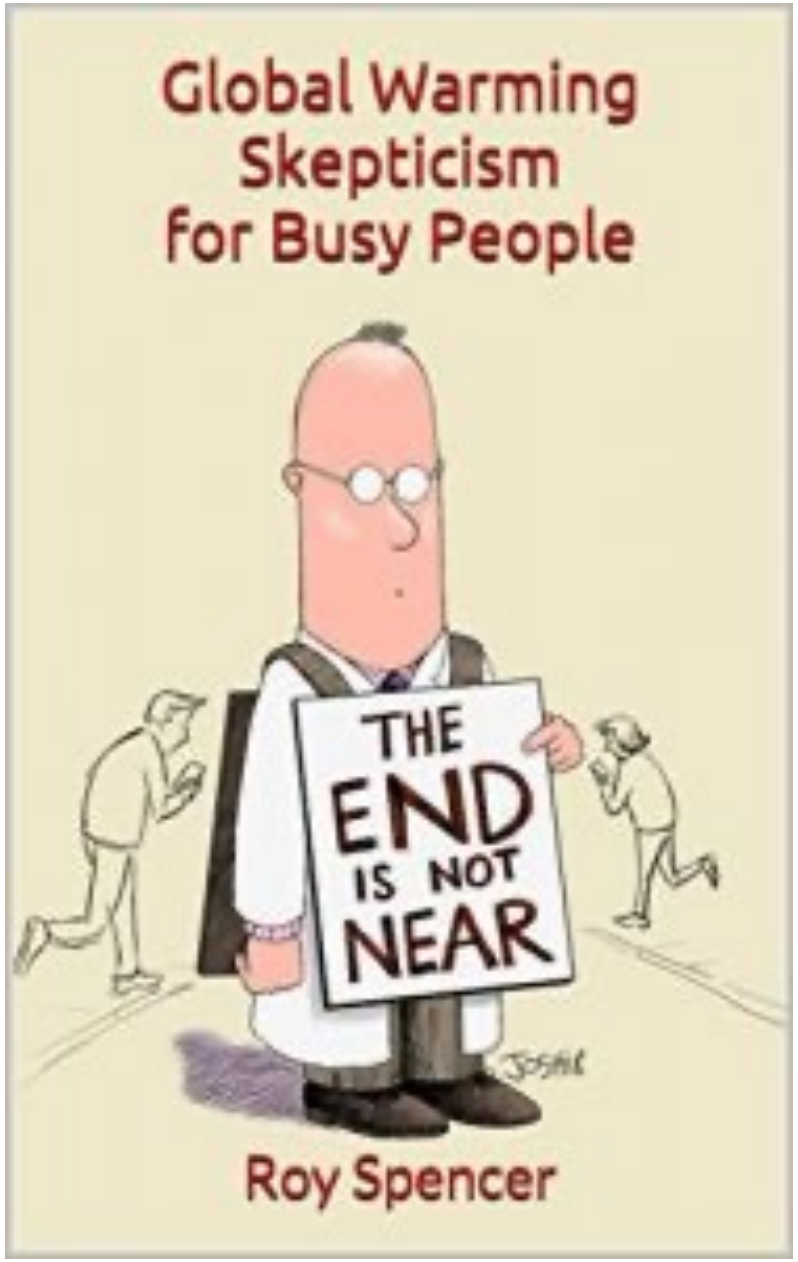
No PPE in most states

No EAP/AED on sideline

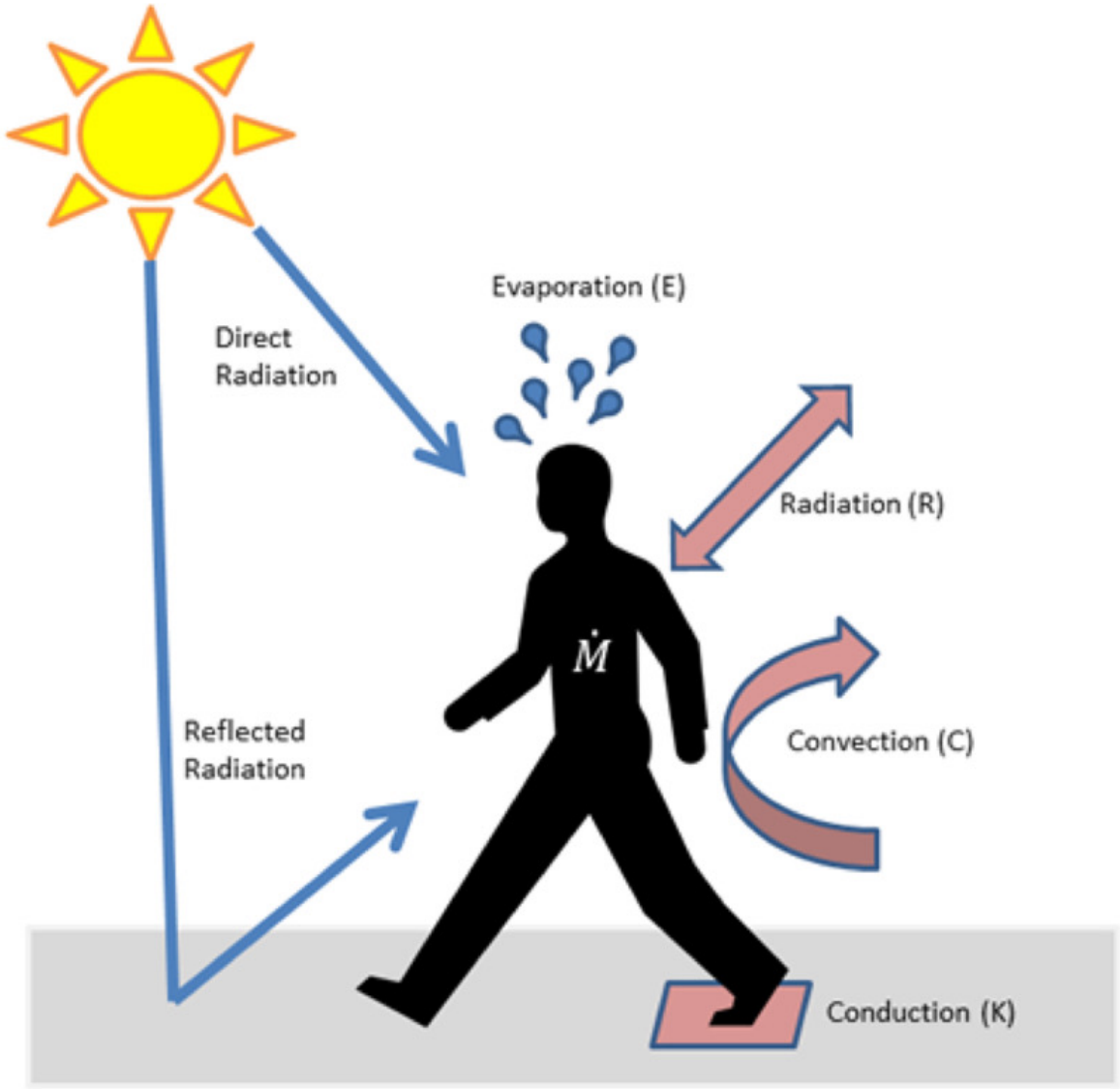
No dunk tank on sideline

No access to athletic trainer

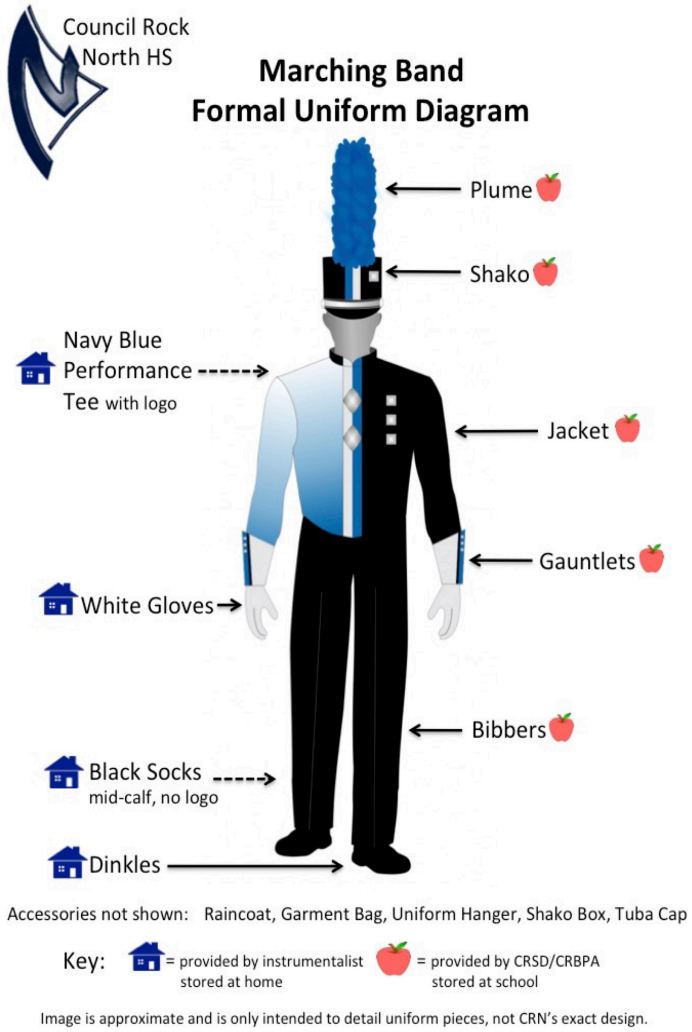
Heat and the Body


Global Warming
Skepticism
for Busy People
THE
END
IS NOT
NEAR
Roy Spencer

Exposure and Release of Heat

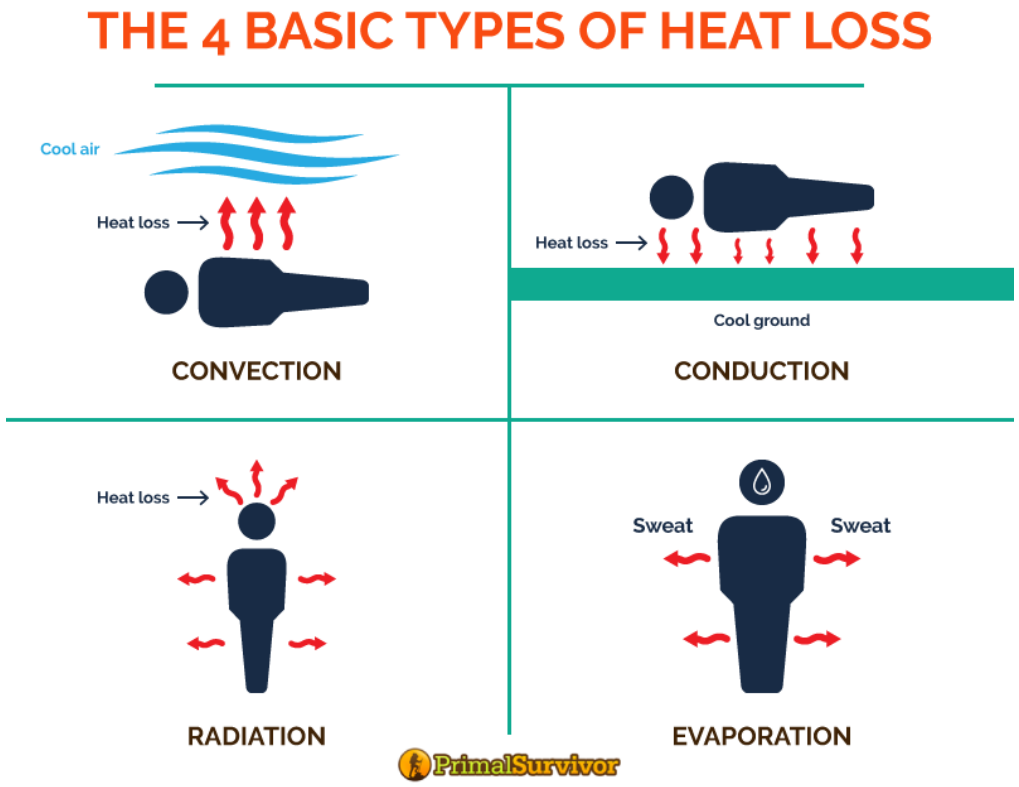


Influence of the Uniform



Heat loss/retention in Marching Band

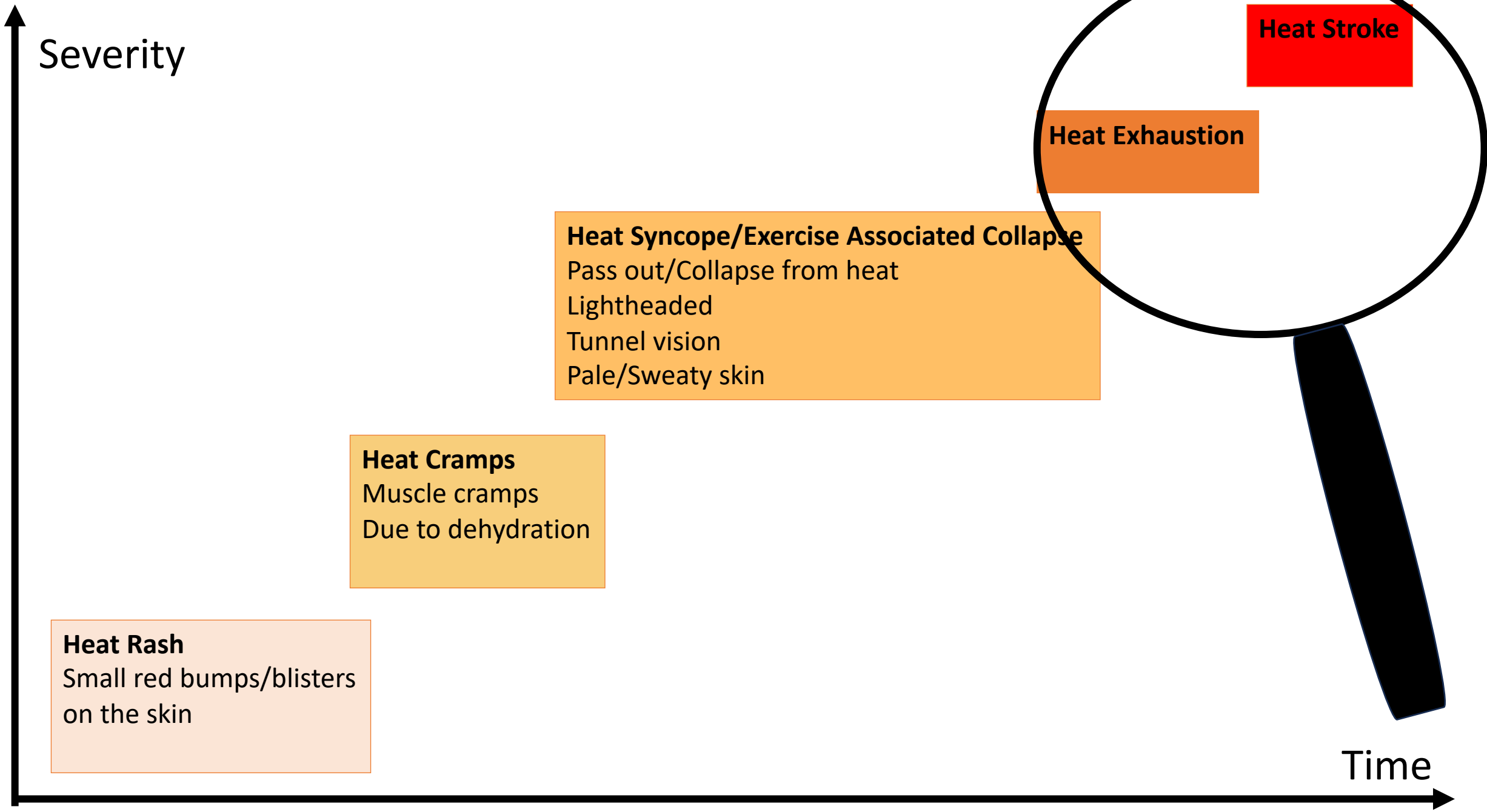
- Conduction – transfer of heat through physical contact
  - Effect of choice of clothing on heat loss/retention
- Convection - Air or water moving over the skin
- Radiation – heat transferred by infrared rays
  - Practice surface
  - Choice of clothing
- Evaporation – loss of heat by conversion of water to gas (sweat, respiration)

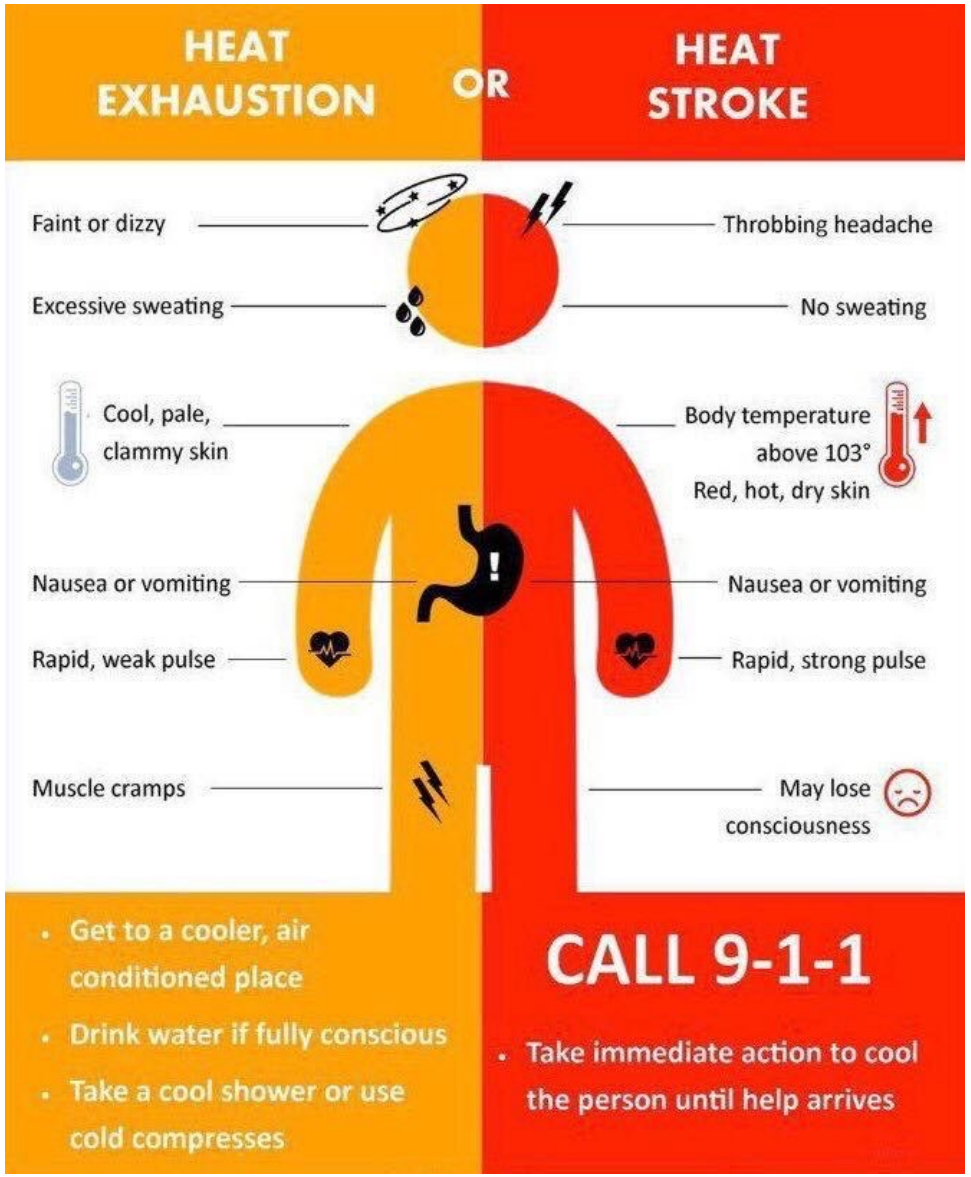


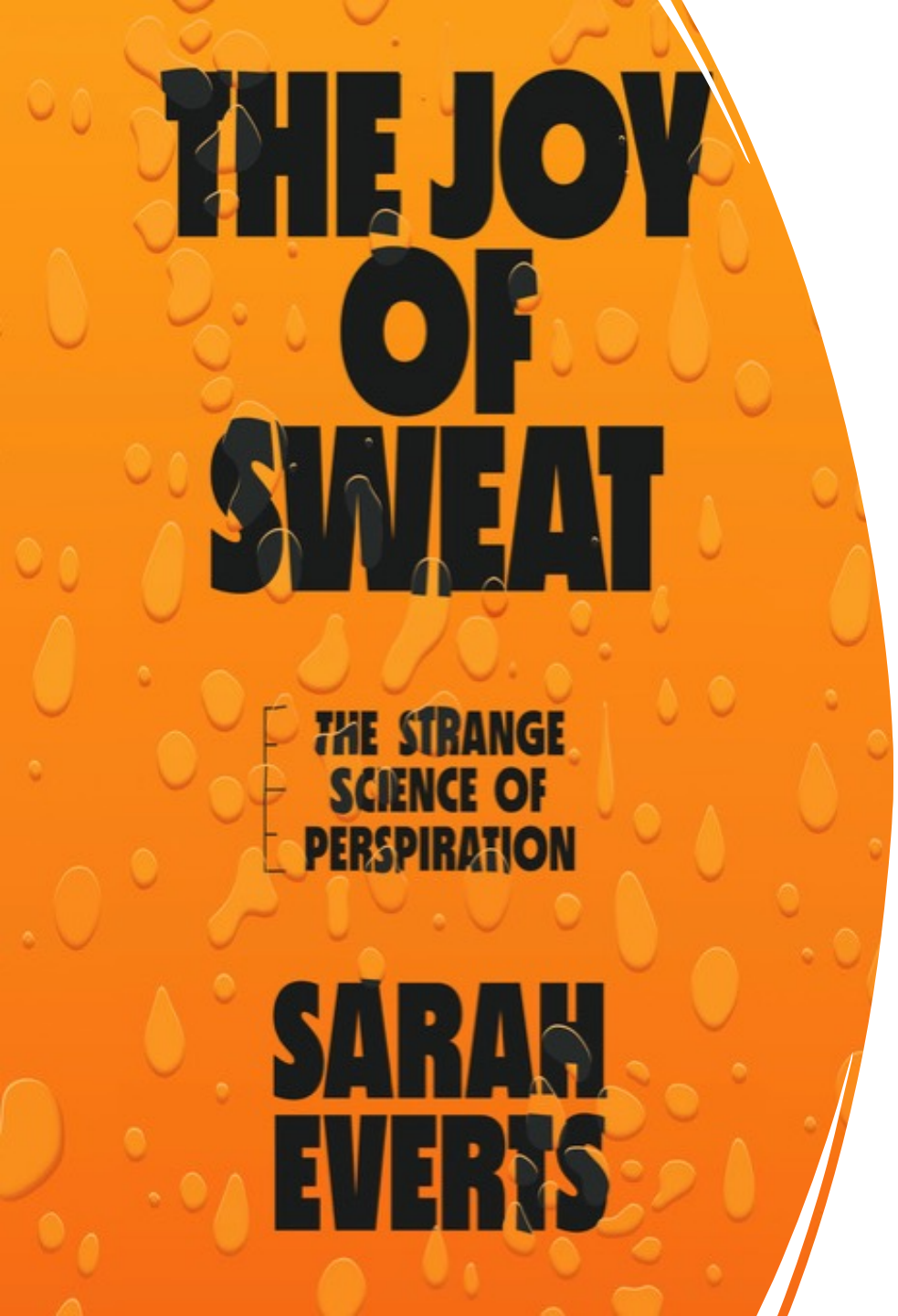
Choice of clothing

Cotton

Wool, Polyester


Severity
Heat Stroke
Heat Exhaustion
Heat Syncope/Exercise Associated Collapse
Pass out/Collapse from heat
Lightheaded
Tunnel vision
Pale/Sweaty skin
Heat Cramps
Muscle cramps
Due to dehydration
Heat Rash
Small red bumps/blisters
on the skin
Time


HEAT EXHAUSTION
OR
HEAT STROKE
Faint or dizzy
Excessive sweating
Cool, pale, clammy skin
Nausea or vomiting
Rapid, weak pulse
Muscle cramps
Throbbing headache
No sweating
Body temperature above 103°
Red, hot, dry skin
Nausea or vomiting
Rapid, strong pulse
May lose consciousness
• Get to a cooler, air conditioned place
• Drink water if fully conscious
• Take a cool shower or use cold compresses
CALL 9-1-1
• Take immediate action to cool the person until help arrives



Things that influence our ability to sweat

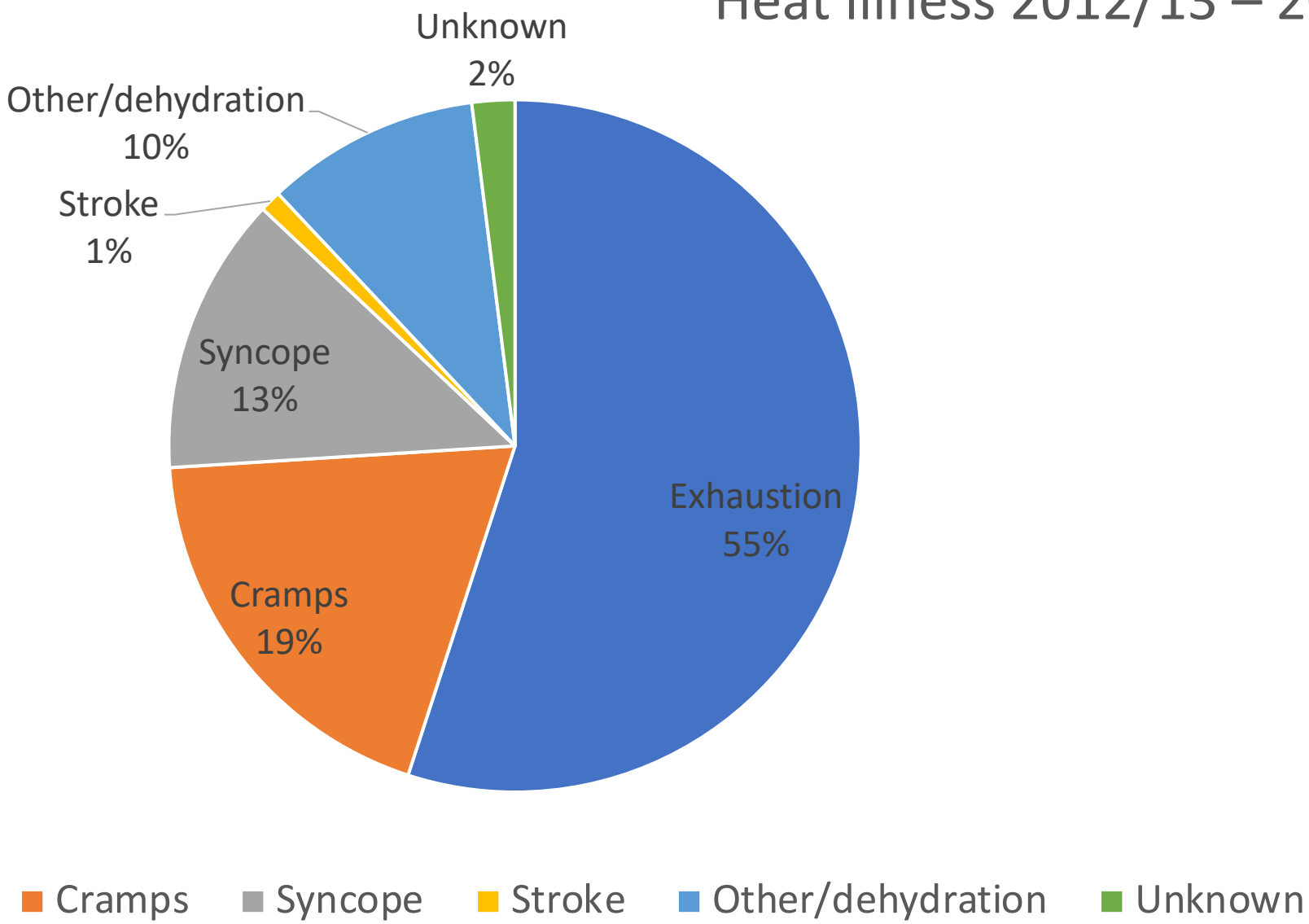
- Genetics
- Medical history
- Medications!
- Obesity
- Hydration status

- Humidity

Heat Illness in Sport

Sport	Overall Heat Illness Rate per 100,000 Athlete Exposures
Boys' football	4.58
Girls' field hockey	3.99
Girls' cross country	2.32
Girls' soccer	1.18
Boys' cross country	1.16
Girls' tennis	0.76
Cheerleading	0.40
Girls' lacrosse	0.40
Boys' soccer	0.38
Girls' track and field	0.28

Heat illness 2012/13 – 2020/21



Heat illness 2012/13 – 2020/21

- Type of aid the athlete received (as reported by the AT):
  - Athlete removed from play: 85%
  - Given fluids via mouth: 79%
  - Cooled by wet towels/ice bags: 61%
  - Equipment removed: 59%
  - Athlete moved to shade: 58%
  - Athlete taken into air conditioning: 38%
  - Clothing removed: 21%
  - Athlete transported to hospital: 16%
  - Given IV fluids: 12%
  - Cooled by ice bath/CWI: 12%
  - Cooled by fans: 10%
  - Athlete received no aid 1%
  - Other 7%

COVID-19 pandemic may have affected these results.

Interventions

Prevention of Heat Illness

Primary

Acclimate

Hydrate

Know the environmental conditions

Secondary

Cool appropriately

Emergency Action Plan

Acclimate

Area of Practice Modification	Practices 1-5		Practices 6-14
	Days 1-2	Days 3-5	
# of Practices Permitted Per Day	1		2, only every other day
Equipment	Helmets only	Helmets & Shoulder Pads	Full Equipment
Maximum Duration of Single Practice Session	3 hours		3 hours (a total maximum of 5 hours on double session days)
Permitted Walk Through Time	1 hour (but must be separated from practice for 3 continuous hours)		
Contact	No Contact	Contact only with blocking sleds/dummies	Full, 100% live contact drills

NOTE: warm-up, stretching, cool-down, walk-through, conditioning, and weight-room activities are Included as part of practice time

Secondary School Guidelines

Preseason Heat-Acclimatization Guidelines for Secondary School Athletics. Journal of Athletic Training. 2009;44(3):332-333.

Hydrate

BEFORE EXERCISE

- Begin exercise well-hydrated
- Drink 16-20 oz. of water or sports beverage at least four hours before exercise
- Drink 8-12 oz. of water 10-15 min. before exercise

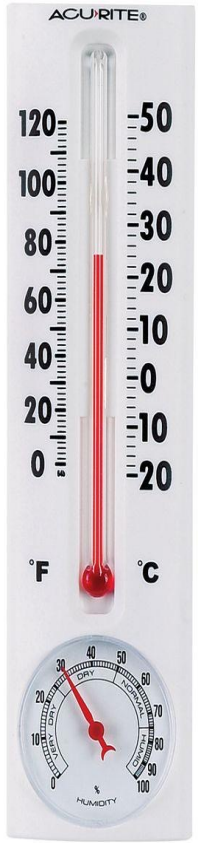
DURING EXERCISE

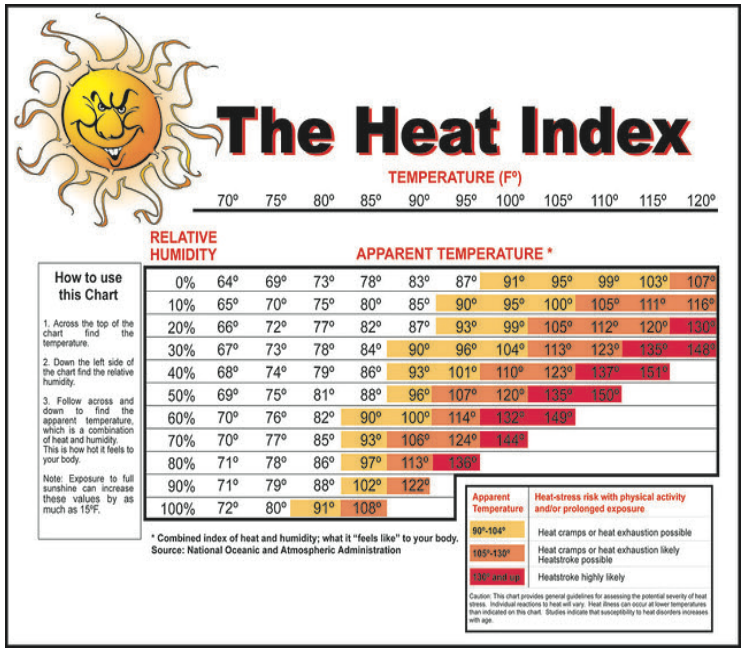
- Drink water or sports beverage every 15-20 min. during exercise
  - 3-8 oz. of water (2-3 large gulps) for exercise ‹60 min.
  - 3-8 oz. of sports beverage for exercise ›60 min.

AFTER EXERCISE

- Rehydrate
- 16-24 oz. of fluid for every pound lost within 2 hours of exercise
  - ➤ Chocolate milk is a great option to help rehydrate and refuel after a workout

How do we measure temperature?



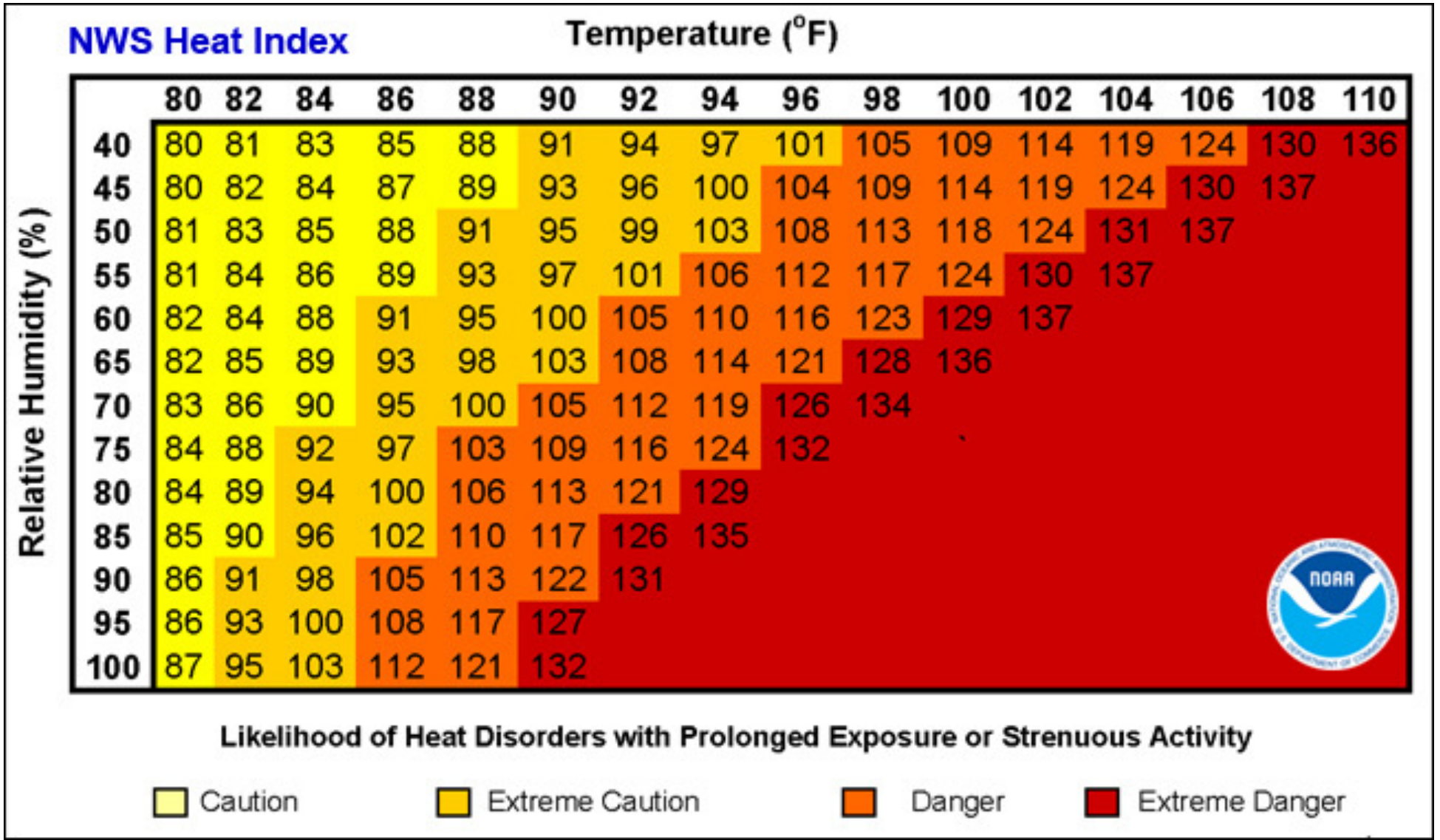


WBGT= (0.1xDB) + (0.2xGT) + (0.7xWB)

- T_w = Natural wet-bulb temperature (combined with dry-bulb temperature indicates humidity)
- T_g = Globe thermometer temperature (measured with a globe thermometer, also known as a black globe thermometer)
- T_d = Dry-bulb temperature (actual air temperature)
- Temperatures may be in either Celsius or Fahrenheit

	WBGT	HEAT INDEX
Measured in the sun	✓	✗
Measured in the shade	✗	✓
Uses temperature	✓	✓
Uses relative humidity	✓	✓
Uses wind	✓	✗
Uses cloud cover	✓	✗
Uses sun angle	✓	✗

Know your environmental conditions



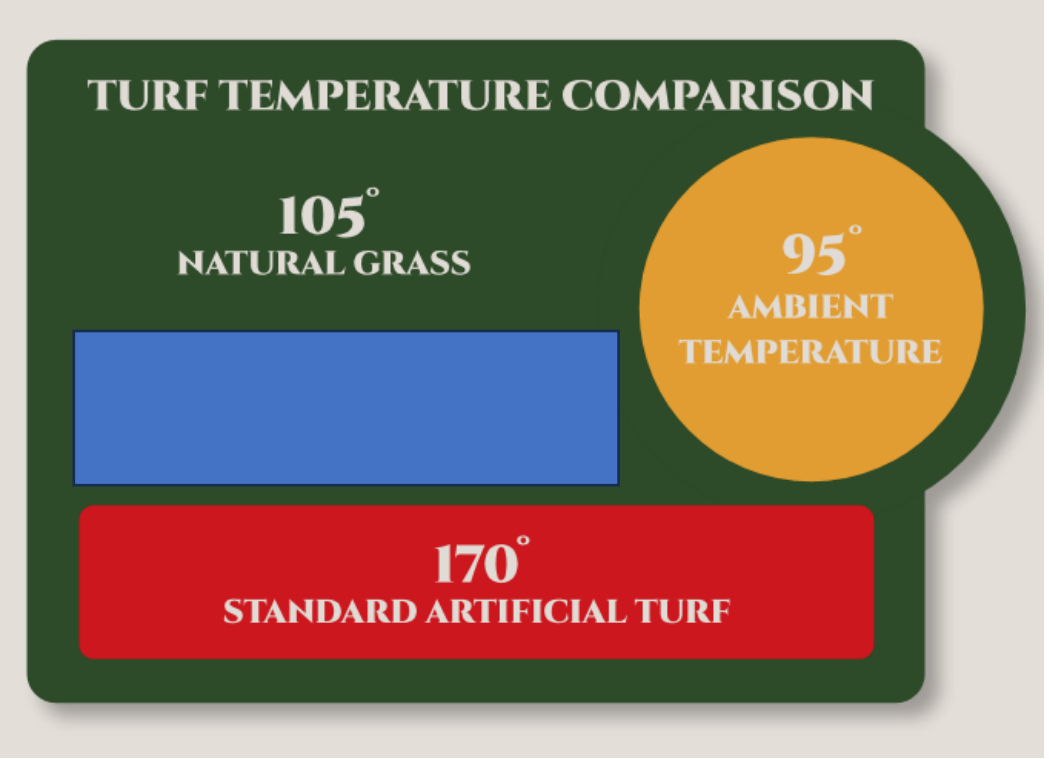
Wet Bulb Globe Temperature

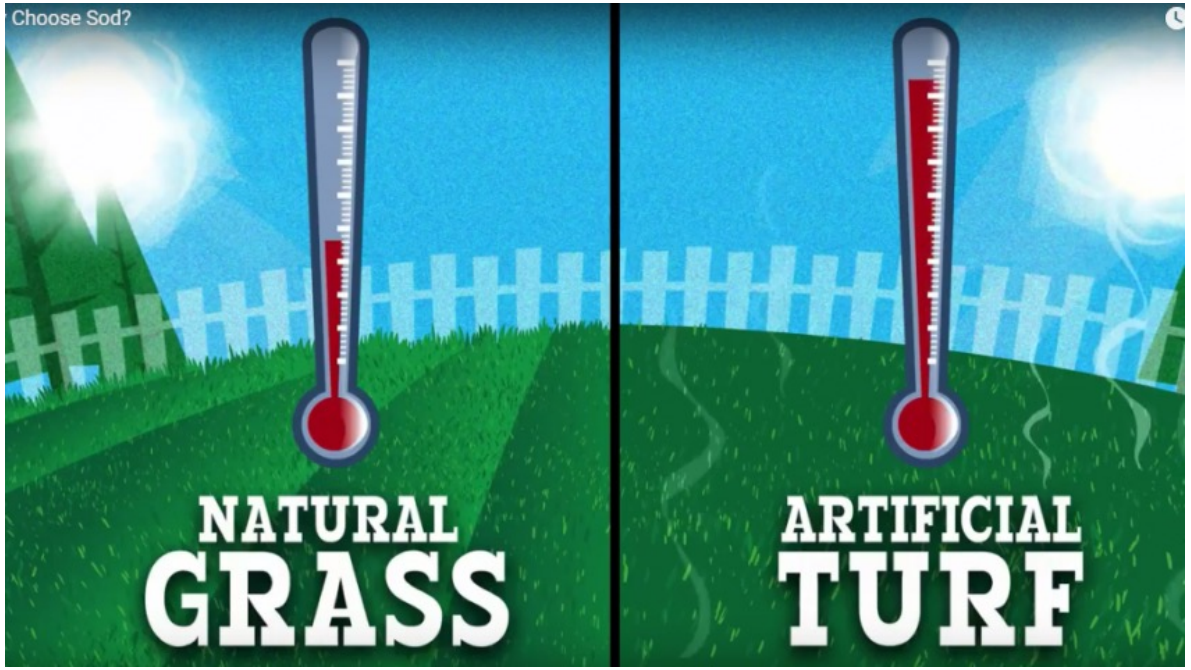
- Air temperature
- Humidity
- Radiation
- Wind - convection

Radiation

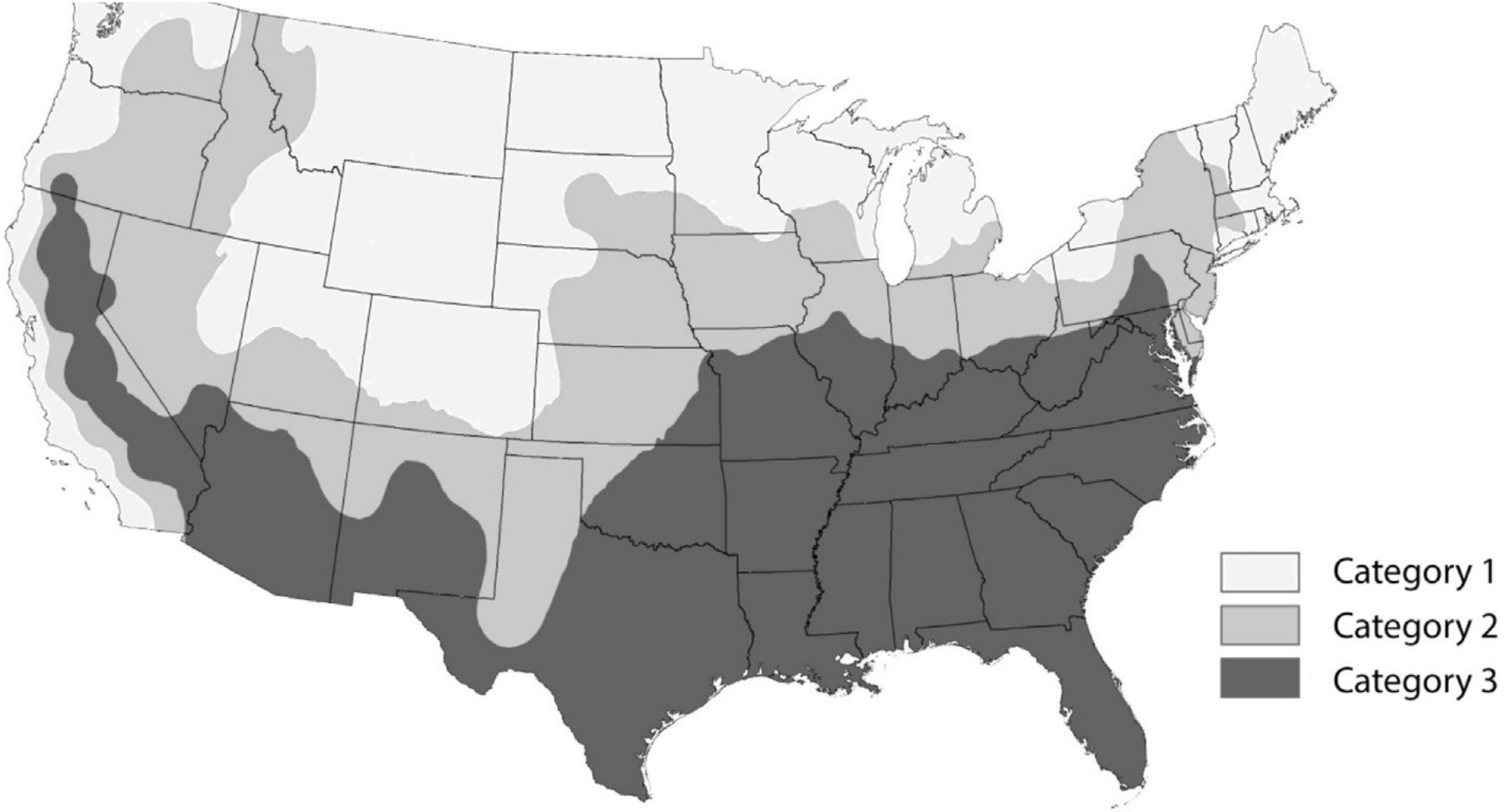
Time	Grass in shade	Grass in sun	Air Temp	Cement	Red Brick	Blacktop
7am	70	74	76	78	78	80
8	72	77	77	80	81	81
9	78	85	88	93	95	89
10	82	86	90	99	105	103
11	85	98	92	105	115	121
12pm	88	100	93	112	125	130
1	90	103	94	115	130	135
2	91	105	95	125	135	140
3	91	105	95	124	134	140
4	89	102	95	118	131	137
5	87	98	93	112	122	131
6	85	96	91	106	110	122
7	83	86	90	100	105	112
8	80	80 (dusk)	87	95	98	103
9	78	78 (dark)	84	90	92	93

Radiation


TURF TEMPERATURE COMPARISON
105°
NATURAL GRASS
95°
AMBIENT TEMPERATURE
170°
STANDARD ARTIFICIAL TURF


Choose Sod?
NATURAL
GRASS
ARTIFICIAL
TURF

Find your State



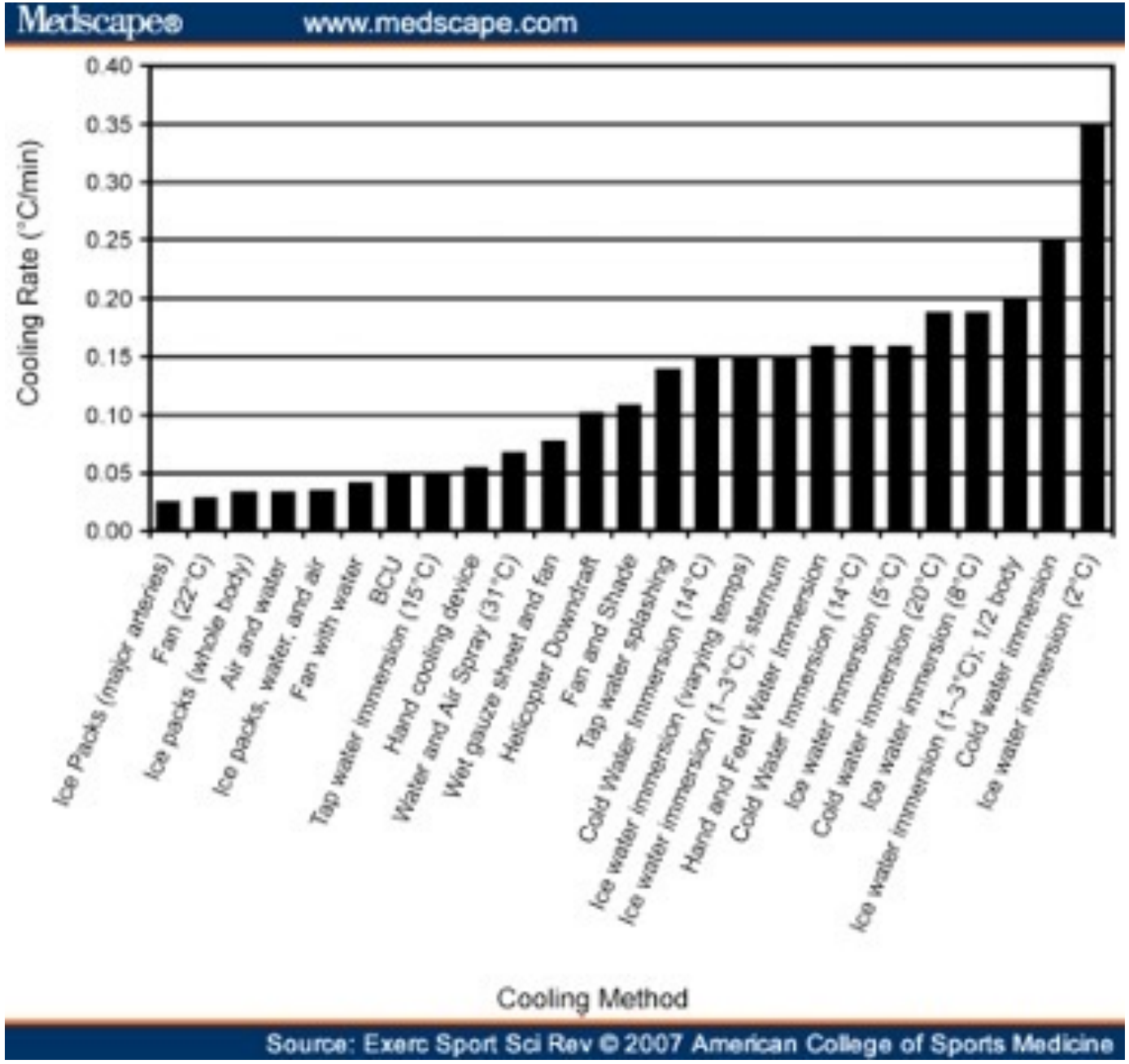
Guidelines

WBGT by Region (F)			Event Conditions	Recommended Actions & Breaks
Cat 1	Cat 2	Cat 3		
<76.1	<79.8	<82.1	Good conditions	• Normal activities • 3 separate 3 minute breaks each hour of training, OR a 10 minute break every 40 minutes
76.2-81.0	79.9-84.6	82.2-87.0	Less than ideal conditions	• 3 separate 4 minute breaks each hour, OR a 12 minute break every 40 minutes of training
81.1-84.1	84.7-87.7	87.1-90.0	Moderate risk for heat related illness	• Maximum of 2 hours of training with 4 separate 4 minute breaks each hour, OR a 10 minute break every 30 minutes of training
84.2-86.1	87.8-89.7	90.1-91.9	High risk for heat related illness	• Maximum of 1 hour of training with 4 separate 4 minute breaks within the hour • No additional conditioning allowed.
>86.2	>89.8	>92.0	Extreme conditions	• No outdoor training, delay training until cooler, or cancel training

United States Soccer and the Korey Stringer Institute Guidelines

Secondary Prevention

Time to death


Medscape®
www.medscape.com
Cooling Rate (°C/min)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Ice Packs (major arteries)
Fan (22°C)
Ice packs (whole body)
Air and water
Ice packs, water, and air
Fan with water
BCU
Tap water immersion (15°C)
Hand cooling device
Water and Air Spray (31°C)
Wet gauze sheet and fan
Helicopter Downdraft
Fan and Shade
Tap water splashing
Cold Water Immersion (14°C)
Ice water immersion (varying temps)
Ice water immersion (1–3°C): sternum
Hand and Feet Water Immersion
Cold Water Immersion (14°C)
Ice water immersion (5°C)
Cold water immersion (20°C)
Ice water immersion (8°C)
Ice water immersion (1–3°C): 1/2 body
Cold water immersion
Ice water immersion (2°C)
Cooling Method
Source: Exerc Sport Sci Rev © 2007 American College of Sports Medicine

Cold water Immersion

The Emergency Action Plan

- Who knows CPR?
- Who retrieves all necessary emergency equipment?
- Who calls EMS, flags them down, and directs them to the scene?
- Who takes care of the rest of the team?
- Who dissuades “Looky Lous”?

By failing to plan, you are planning to fail.

Benjamin Franklin

Pearls

- HS Football accounts for most deaths due to exertional heat stroke
- Once heat stroke occurs, have 30 minutes to cool the victim
- Prevention takes many shapes but most important, have to know the heat the body is exposed to so can react
- Death from Heat Stroke is 100% preventable
- Use the WBGT to help guide your practices/games
- Make and practice an EAP

Challenge

01

Consider unique aspects of the marching band participant

02

Identify areas of intervention to reduce risk for sustaining heat illness

03

Identify areas of intervention to reduce rate of death from heat illness

04

Write down 2 things you can do

- 1 today
- 1 when you return home