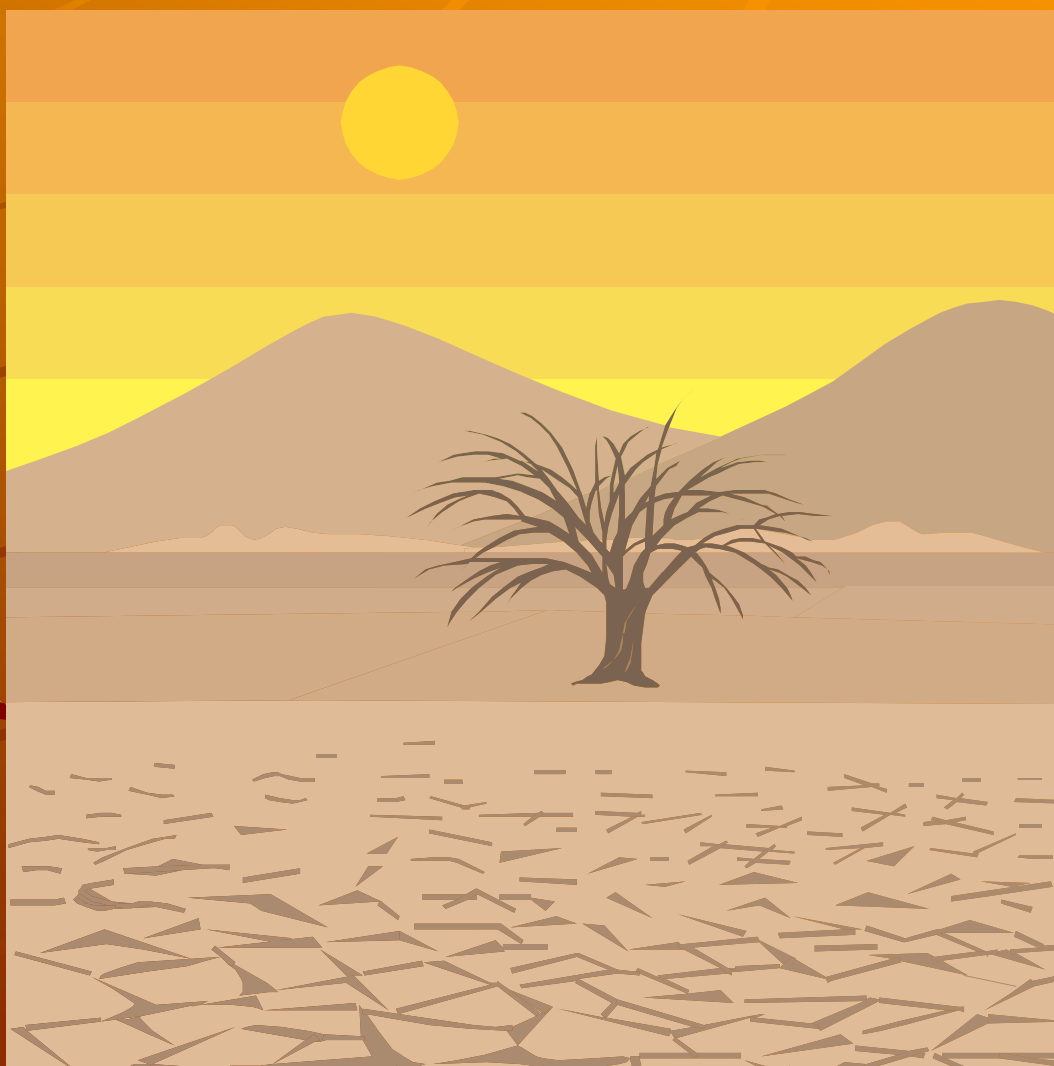


How *HEAT* puts Stress on your body



PRESENTATION GOAL: TO HELP YOU UNDERSTAND THESE ITEMS:

- 1. Your body's handling of heat**
- 2. Hot environments increase likelihood of accidents**
- 3. Why your body's cooling system may fail**
- 4. The types of heat-related illnesses**
- 5. Factors causing heat illness**
- 6. Personal factors that may cause heat illness**
- 7. Basic preventive and control measures for heat stress**
- 8. Verification of heat stress control measures**

The Body's Response to Heat

- ▶ The body tries to maintain a constant internal temperature
- ▶ When the internal temperature rises, the body attempts to get rid of excess heat by:
 - Increasing blood flow to skin surface resulting in increased heart rate
 - Releasing sweat onto skin surface



Effects of Body's Response

- ◆ Increased heart rate
- ◆ Reduced blood flow to brain
 - Reduced mental alertness and comprehension
- ◆ Reduced blood flow to active muscles
 - Fatigue, loss of strength
- ◆ Increased sweating
 - Slipperiness of carried objects



**Potential result of = a Higher rate of mistakes/injuries
too much heat**

Role of Body Electrolytes

- ◆ *Sodium, potassium and calcium are usually the elements most likely to suffer from an electrolyte imbalance.*
- ◆ *Coordinate muscle contractions*
- ◆ *Heart function*
- ◆ *Conductivity of electric signals in the nervous system.*

Note: Usually, body gets enough electrolytes from normal diet

When Cooling Mechanisms Fail

- ◆ High air temperature reduces effectiveness of the cooling system
- ◆ High humidity reduces evaporation rate of sweat
- ◆ Excess loss of body electrolytes
- ◆ Dehydration



Heat Exhaustion

◆ Cause:

- Too much loss of water & salt: sweating

◆ Signs & Symptoms:

- Heavy sweating, intense thirst, skin is pale and cool, rapid pulse, fatigue or weakness, nausea & vomiting, headache, blurred vision, fainting

◆ Treatment:

- Move to cool area, rest with legs elevated, loosen clothing, give fluids, cool with water & fan



Heat Stroke

◆ Cause:

- Total breakdown of body's cooling system

◆ Signs & Symptoms:

- High body temperature (>103)
- Sweating stops and skin is hot, red, and dry
- Headache, dizziness, weakness, rapid pulse, chills, difficulty breathing
- If untreated, delirium and unconsciousness



Heat Stroke - Treatment

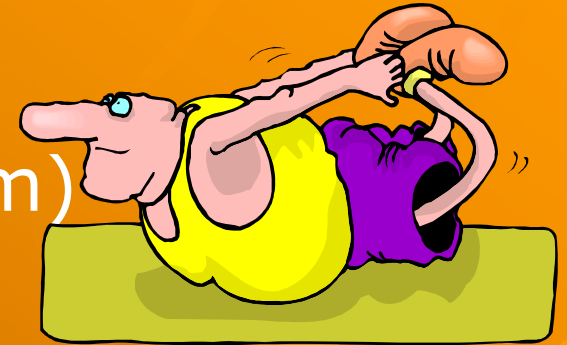


- ◆ Treat as a medical emergency
 - May result in death, if not treated
 - 4,000 Americans die each year
- ◆ Move victim to cool area
- ◆ Give small cup of water (if not nauseous)
- ◆ Loosen and/or remove clothing
- ◆ Cool with water or massage with ice
- ◆ Fan vigorously to improve evaporation

Heat Cramps

◆ Cause:

- Loss of body electrolytes (sodium, potassium & calcium)



◆ Signs & Symptoms:

- Painful spasms in arms, legs and abdomen
- Hot, moist skin



◆ Treatment:

- Drink water, rest, massage cramped areas

Dehydration

Cause:

- Excessive fluid loss

Signs & symptoms:

- Fatigue, weakness, dry mouth

Treatment:

- Fluids replacement
- Electrolyte replacement ... maybe
(no salt tablets!)



Heat Rash

Cause:

- Inflamed skin

Signs & Symptoms:

- Rash w/ pink pimples, itching, tingling

Treatment:

- Cleanse area & dry, apply calamine or other lotions



Preventing Heat Illnesses

- ▶ Know the factors that increase risk
 - The environment you're working in
 - The work you're doing
 - Your own conditioning

▶ Think about what you can do to prevent heat stress



Environmental Factors

- ◆ Air temperature
- ◆ Humidity
- ◆ Radiant heat source
- ◆ Air circulation



Methods of Measuring Heat Hazard

ENVIRONMENTAL FACTORS

- ◆ Air temperature
- ◆ Humidity
- ◆ Radiant heat source
- ◆ Air circulation



HEAT INDEX METHOD

- ◆ Air temperature
- ◆ Humidity

* WBGT METHOD

- ◆ Air temperature
- ◆ Humidity
- ◆ Radiant heat source
- ◆ Air circulation

* WBGT = Wet Bulb Globe Temperature

Work-related Factors

◆ Workload

- Type of work
- Level of physical activity
- Time spent working

◆ Clothing

- Weight (heavy v. breathable)
- Color (dark v. light)
- Personal protective equipment and clothing



Personal Factors

- ◆ Age

- ◆ Weight/fitness

- ◆ Use of drugs, alcohol, caffeine, medication

- ◆ Prior heat-related illness



Prevention & Control

- ◆ Drink plenty of fluids
 - Don't rely on your thirst
 - 5-7 oz. every 20 minutes



- ◆ Acclimatization: adjust to the heat
 - The body takes 3-5 days to get used to the heat
 - Be careful when returning from a change in routine: (i.e. vacation)



Prevention & Control

(continued)

- ◆ Choose proper clothing
 - Choose light colors and lightest weight possible
 - Select proper personal protective equipment
- ◆ Schedule tasks with consideration of the heat forecast
 - Schedule entire work crew to a night shift during extreme conditions
 - Schedule heaviest tasks for night or morning



Prevention & Control

(continued)

- ◆ Shade/shielding from radiant heat sources in work area and break area
- ◆ Fans in work area and break area (if less than 96° F)
- ◆ Air conditioning of work area and break area
- ◆ Cool vests
- ◆ Work/rest cycles – Control measure of last resort!



Verification of Control Measures

- ◆ If control measures are not effective, heat stress conditions may even be increased!
- ◆ Ineffective control measures may create a false sense of accomplishment.



Verification of Control Measures

Shade vs. Full Sun Survey

HEAT STRESS SURVEY RESULTS

Location	WBGT °F	Temperature °F	Percent Humidity	Heat Index °F
B2 Smoke Shack Full Sun	86	94	55	109
Inside B2 Smoke Shack Shade	87	95	54	109
B2 Blue Tarp Shack Full Sun	89	94	55	111
Inside B2 Blue Tarp Shade	89	96	53	109
A Leg HPIW Project Full Sun	93	97	52	114
A Leg HPIW Project Shade	94	97	49	108



VS



Verification of Control Measures Heart Rate

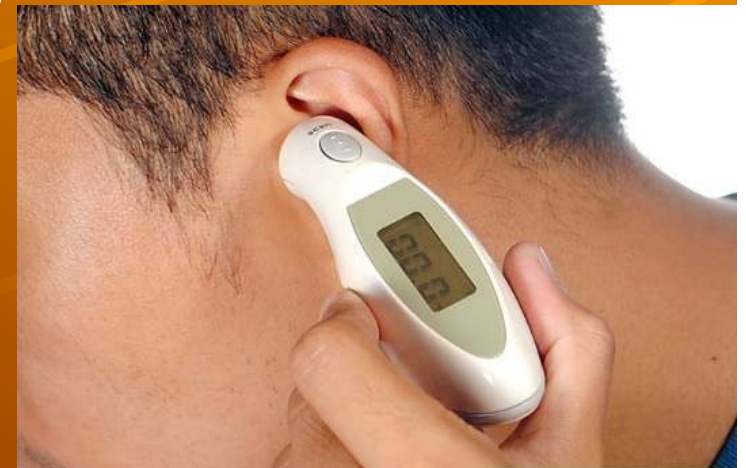
- ◆ Count the pulse during a 30-second period as early as possible in the rest period.
- ◆ If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
- ◆ If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.



Verification of Control Measures Body Temperature

Use an aural (ear) thermometer:

- ◆ At end of work period, if temperature exceeds 99.6°F , shorten the next work period by one-third without changing the rest period.
- ◆ If temperature still exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by one-third.
- ◆ Do not permit a worker to wear a semi-permeable or impermeable garment when his/her oral temperature exceeds 100.6°F



Verification of Control Measures Body Weight

- ◆ Measure the worker's weight on a scale at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration.
- ◆ The body water loss should not exceed 1.5 percent total body weight loss in a work day.



Questions?

