

Heat Stress 101



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True or False? Heat is the number one weather related killer in the United States.

TRUE!

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Heat Wave



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NOAA's National Weather Service

Heat Index Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

■ Caution
 ■ Extreme Caution
 ■ Danger
 ■ Extreme Danger

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The Heat Index

Heat Index	Risk Level	Protective Measures
Less than 91° F	Lower (caution)	Basic heat safety and planning
91° F to 103° F	Moderate	Implement precautions and heighten awareness
103° F to 115° F	High	Additional precautions to protect workers
Greater than 115° F	Very high to extreme	Triggers even more aggressive protective measures

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Causal Factors for Heat Injury

- Age, weight, degree of physical fitness
- Degree of acclimatization
- Use of alcohol or drugs
- A variety of chronic health conditions, such as hypertension, all affect a person's sensitivity to heat



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Factors for Heat Injury

- Prior heat injury predisposes an individual to additional injury
- Type of clothing worn must be considered

Fabrics?

Colors?

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What is Heat Stress?

Heat Stress is the combination of:



Metabolic Heat

+



Environmental Factors

+



Clothing / PPE

→

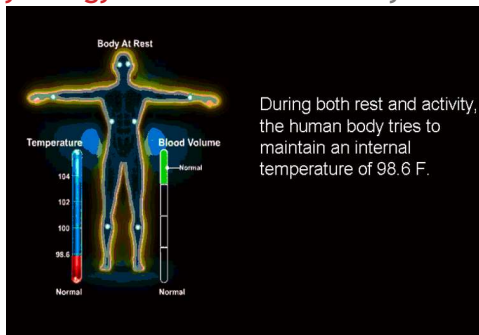


which results in **increased heat storage** within the body.



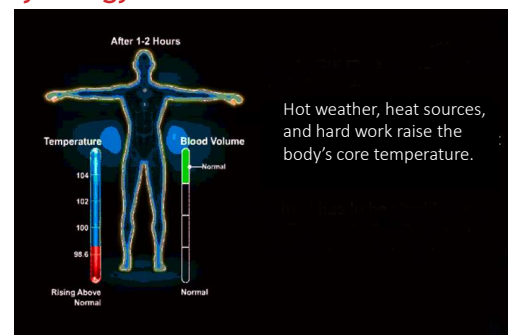
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Physiology of Heat Stress: Body At Rest



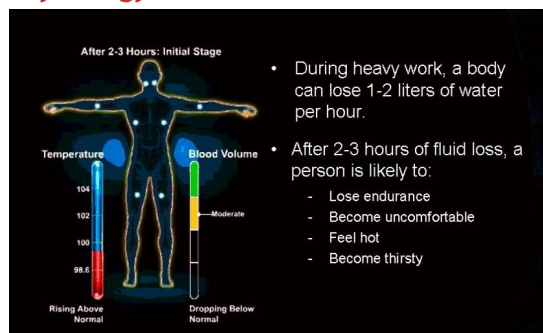
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Physiology of Heat Stress: 1-2 Hours



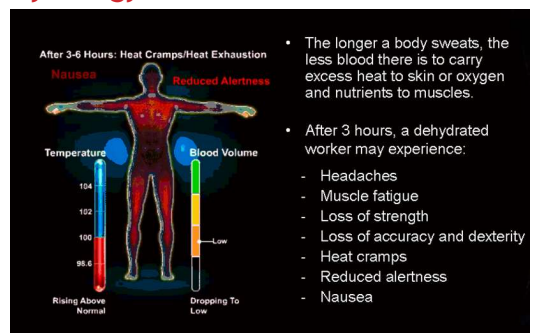
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Physiology of Heat Stress: 2-3 Hours



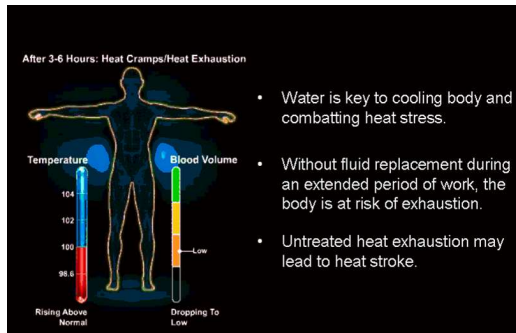
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Physiology of Heat Stress: 3-6 Hours



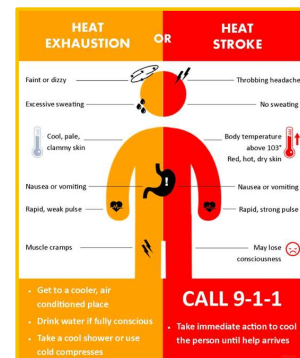
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Physiology of Heat Stress: 3-6 Hours



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Heat Disorders



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Heat Disorders: When Cooling Mechanisms Fail

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

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Heat Rash



- Most common problem in hot work environments
- Symptoms:**
 - Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive
 - Sweat cannot freely evaporate from the skin and sweat ducts become plugged
- Treatment:**
 - Keep skin dry, use cooled sleeping quarters, and calamine lotion

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Heat Cramps



- May result after excessive water loss, sweating, and dehydration
- Symptoms:**
 - Severe pain and cramps in legs and abdomen, fainting or dizziness, weakness, profuse sweating, and headaches
- Treatment:**
 - Gentle massage on cramping muscle, increase fluid intake, provide rest, and move to a cool place

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Heat Exhaustion



- Blood moves toward outer body to remove heat
- Symptoms:**
 - Fatigue, headache, dizziness, profuse sweating, rapid pulse, thirst, loss of appetite, nausea, vomiting, and fainting
- Treatment:**
 - Get to the shade, cool off, increase fluids; use cold wet towels or ice; use a fan; elevate legs above heart; loosen clothing; don't give any liquids containing alcohol or caffeine

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Heat Stroke



- Medical emergency and a life-threatening condition caused by the failure of the heat-regulating mechanisms of the body due to high heat and humidity
- Core temperature rises, and body stops sweating
- **Symptoms:**
 - Skin is hot, dry, and flushed; rapid pulse; confusion; nausea; convulsions; abnormally high body temperature; unconsciousness
- **Treatment:**
 - Call 911; **SEEK MEDICAL ATTENTION IMMEDIATELY**
 - Move to cooler location, loosen clothing, immerse in cool water, wrap in wet sheets, and apply cold compresses to the head, neck and groin.

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Controls



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Engineering Controls

- General ventilation
- Air treatment
 - Air cooling
 - Air conditioning
- Heat conduction
 - Insulation and surface modification
- Radiant heat sources
 - Shielding



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Work Practice Controls

- Perform work activities during cooler periods of the day
- Minimize activity in hot areas
- Slow down work pace; decrease work rate
- Reduce number and duration of exposures
- Wear proper clothing
- Provide recovery areas



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Action Items

- A heat illness prevention program
- A heat acclimatization program
- Access to an adequate supply of potable water
- Means for employees to cool off (e.g., shaded areas, air-conditioned rooms, vehicles, fans)
- Adequate number of rest periods
- Appropriate protective clothing, such as cooling vests
- First aid training (e.g., recognition, treatment of heat illnesses)

Any Questions?

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