



College of Natural Sciences  
& Mathematics

# Heat Illness Prevention Training for Students

Science Safety Office

Updated November 2021

[www.csulb.edu/cnsm/safety](http://www.csulb.edu/cnsm/safety)

# Please Note

- This Heat Illness Prevention Training is for **CSULB students only**. For the purposes of this training, paid student assistants are considered employees.
- Employees are required to complete a different heat illness training. If you are an employee or supervisor of employees, please see [Heat Illness Training](#) or contact the Science Safety Office for more information.
- *This training was adapted by Science Safety Office from Environmental Health and Safety's Heat Illness Prevention Training for CSULB Employees.*

# Introduction

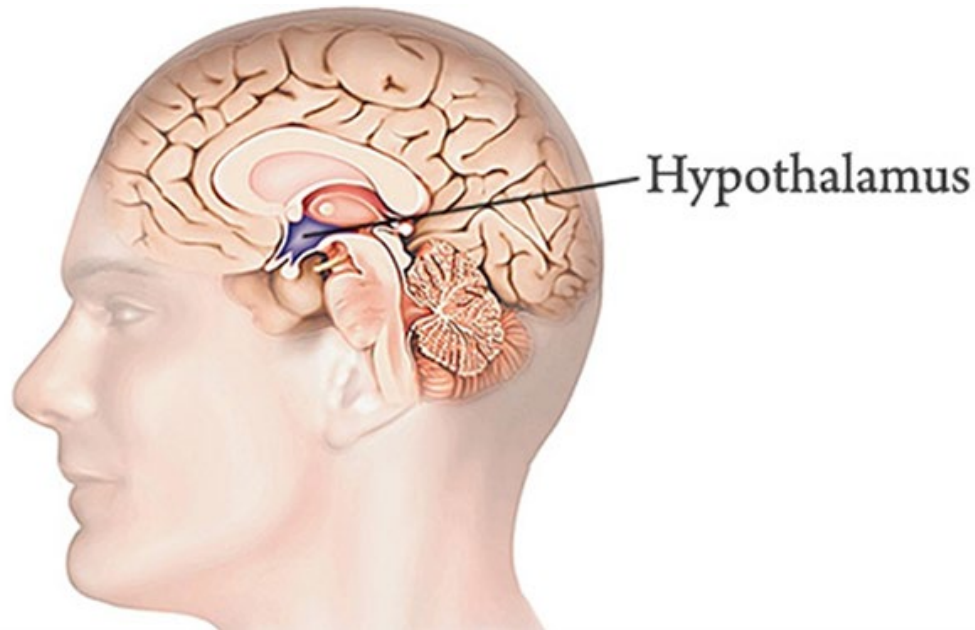
- As CSULB students, your assignments may require you to work in high temperature conditions.
- All heat related illnesses are preventable and this “awareness” level training will provide you with the information you need to complete your work assignments safely.

# Training Outline

- Physiology of Body Temperature Regulation
- Sources of Heat-Related Illness
- Stages of Heat-Related Illness
- California Heat Stress Prevention Regulation
- Emergency Procedures
- What You Can Do to Prevent Heat Stress

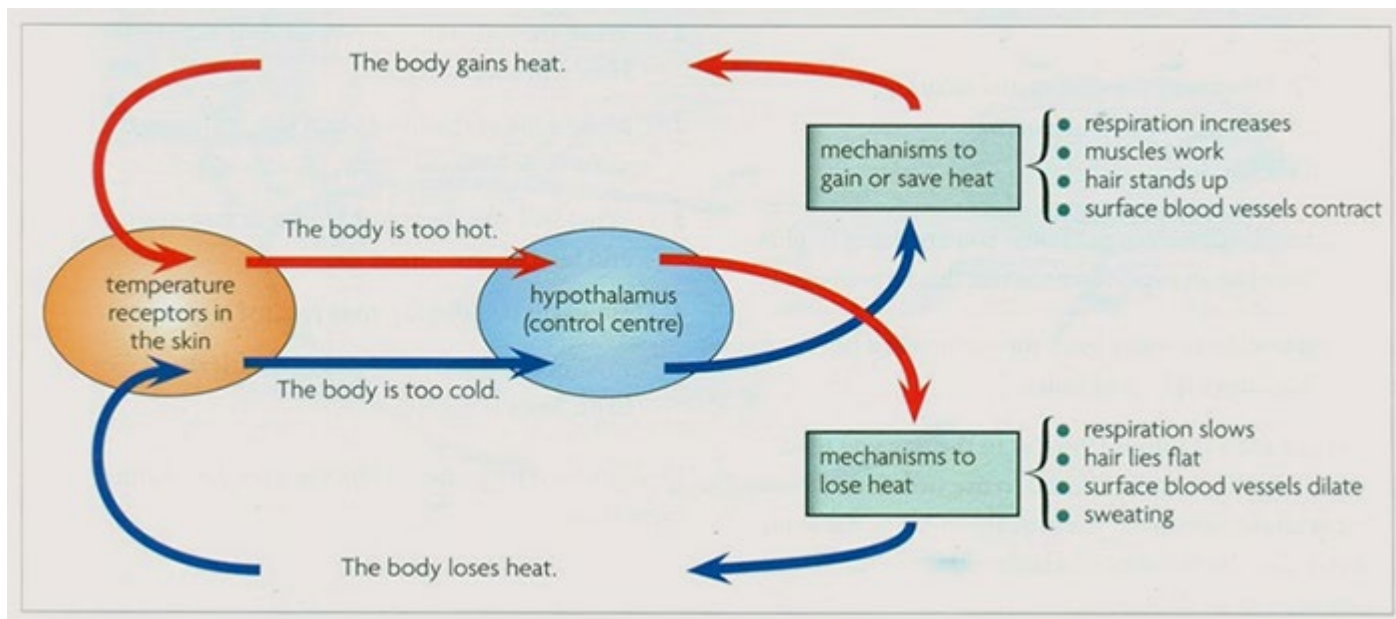
# Physiology of Body Temperature Regulation

- Body temperature is regulated by the hypothalamus, an almond-sized gland located in the central area of the brain.



# Normal Body Heat Regulation

- Unlike a thermostat, which simply turns a heater or air conditioning unit on or off until a desired temperature is reached, the hypothalamus regulates numerous, finely-tuned and complex body processes to maintain homeostasis, or a stable physiological equilibrium.

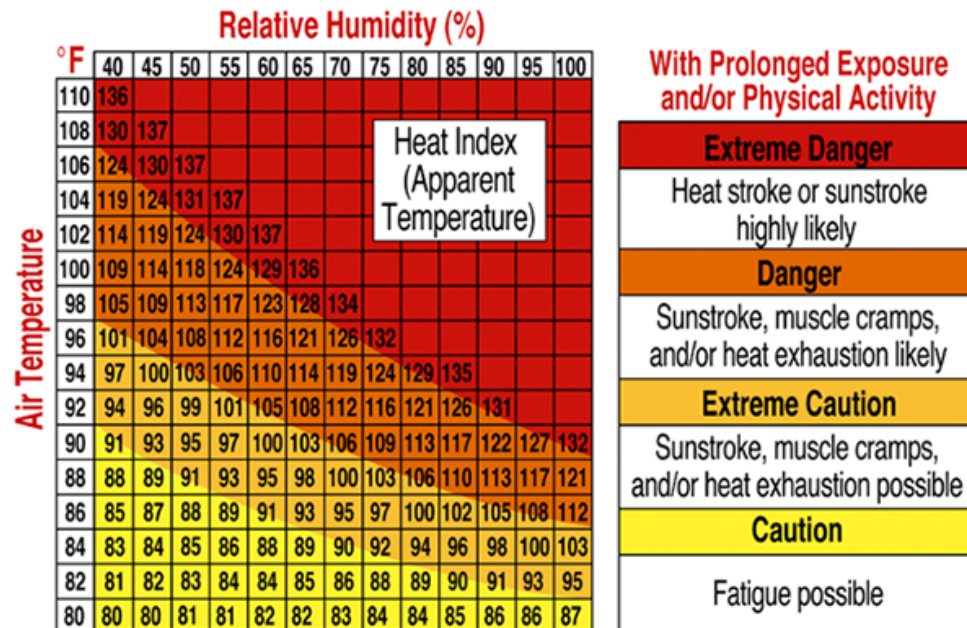


# Effects of Heat and Humidity on Body Temperature Regulation

- Perspiration occurs when the body gets too hot.
- The process of perspiration evaporating on the skin cools the body and reduces body temperature.
- When atmospheric moisture is high (i.e., high humidity), evaporation of perspiration cannot occur and the rate of perspiration decreases.
- Body temperature increases.

# Heat Index

- Apparent temperature measuring physical discomfort and potential physiological danger when relative humidity is combined with air temperature.
- High air temperatures with very high humidity can be life-threatening.





# Sources of Heat-Related Illness

- High temperature and humidity
- Direct sun exposure
- Indoor radiant heat sources
- Limited air movement
- Not enough fluids
- Physical exertion
- PPE and clothing
- Physical condition and health problems
- Medications
- Pregnancy
- Lack of recent exposure
- Advanced age
- Previous heat-related illness

# Factors that Increase Risk of Heat Illness

- **Prescription medications** - Medications that affect the body's ability to stay hydrated and respond appropriately to heat include:
  - High blood pressure and heart (beta blockers, diuretics)
  - Allergies (antihistamines)
  - Calming medications (tranquilizers)
  - Certain psychological conditions (antipsychotics)
  - Illegal or misused drugs (cocaine, amphetamines)

# Factors that Increase Risk of Heat Illness, 2

- **Age** - Workers over 65 may have a higher susceptibility to heat exhaustion if in poor physical health, ill or medicated with certain prescription medications.
- **Obesity** - Carrying excess weight can affect the body's ability to adequately regulate its temperature.
- **Acclimatization** - Traveling to a warm climate from a cold environment can put one at risk of a heat-related illness if the body hasn't had enough time to adapt/adjust to higher temperatures.

# PPE and Heat Stress

- Care must be exercised to prevent overheating when wearing Tyvek, nitrile gloves, respirators, impermeable hoods, rubber boots and other personal protective equipment (PPE) with reduced ventilative capacity.
- This is especially important when working in hot outdoor environments or indoor conditions with excessive radiant heat (e.g., kilns, furnaces, ovens, etc).



# PPE and Heat Stress, 2

- While wearing PPE in a hot environment, remember to:
  - Take regular breaks.
  - Hydrate with lot of water, electrolyte-infused liquids, or other oral rehydration solutions.
  - Rest in cool, shaded areas.

# Stages of Heat-Related Illness

- Stage #1 - Heat Cramps
- Stage #2 - Heat Exhaustion
- Stage #3 - Heat Stroke

# Stage #1 - Heat Cramps

- Muscular pains and spasms due to heavy exertion.
- Usually involves the abdomen or the legs, but can occur at any muscle.
- Caused by loss of water and salt from heavy sweating.



# Treating Heat Cramps

- Immediately stop the activity.
- Rest in a cooler area.
- Hydrate with lots of water, electrolyte-infused liquids or other oral rehydration solution.
- Gentle stretching of affected muscles.





# Stage #2 - Heat Exhaustion

- Occurs through heavy work exertion in hot and/or humid conditions where body fluids are lost through heavy sweating.
- Fluid loss causes blood flow to decrease in the vital organs, resulting in a form of shock.
- Sweat does not evaporate effectively. As a result, the body is not cooled efficiently.

# Heat Exhaustion Symptoms

- Symptoms include:
  - Cool, moist, pale, flushed, or red skin
  - Heavy sweating
  - Headache
  - Nausea or vomiting
  - Dizziness
  - Exhaustion
- Body temperature may be near normal.

# Treating Heat Exhaustion

- Move to a cool, shaded area.
- Lie flat with legs elevated.
- Hydrate with lot of water, electrolyte-infused liquids or other oral rehydration solution.
- Remove excess clothing.
- Fan or wet down affected person.
- Place wet cloth or cold pack on forehead, top of head and/or back of neck.
- Monitor person and do not leave unattended.

# Stage #3 - Heat Stroke

- **Heat stroke is a life-threatening condition!**
- Body's temperature control system, which produces sweating to cool the body, stops working.
- Body temperature can rise so high that brain damage and death may result if the body is not cooled quickly.

# Heat Stroke Symptoms

- Symptoms include:
  - Hot, red, and dry skin
  - No sweating
  - Changes in consciousness
  - Rapid, weak pulse
  - Shallow breathing
  - Exhaustion
- Body temperature can be very high - sometimes as high as 105°F.

# Heat Stroke Treatment

- **CALL 9-1-1**
- Move victim to shady area.
- Remove clothing.
- Immediately apply cold or cool water to skin (e.g., from water hose, ice cooler water drench, etc.), place cold packs under on head, neck, armpits and groin.
- In addition, perform any other immediate actions to cool person down until help arrives.



# California Heat Stress Prevention Regulation

- (Title 8, California Code of Regulations, Section 3395)
- Employer responsibilities to employees, including training, are described under this standard.
- The Science Safety Office provides this awareness level training to students to help them recognize potentially hazardous environments and take appropriate action.

# CA Regulation: Required Elements for Employees

- 80 - 95 degrees (F)
  - Weather forecast monitoring
  - Provide water – 1 qt./hour/person (clean, cool)
  - Provide adequate shade - enough for all workers
  - Shade breaks on request until recovered
- 95 degrees (F) and above
  - Pre-shift heat stress meeting
  - Emergency communications in place
  - Call for emergency services if needed
  - Frequent reminders to drink water
  - Observation of workers for symptoms
  - Close supervision of new employees
  - Implement a Buddy System



# CA Regulation: Required Elements for Employees, 2

- Other Provisions:
  - Minimum 5 minute “cool-down rest period” to be encouraged when employees feel they need to protect themselves from overheating.
    - Access to shade must be provided.
    - Affected employee must be monitored during this period.
    - Affected employee cannot be ordered back to work until heat stress symptoms have abated.
    - First aid or emergency response shall be provided if needed.
  - Employees must be monitored by a supervisor or designee during a “heat wave”, defined as “any day where the temperature is at least 80 degrees F and at least ten degrees F higher than the average daily high temperature in the preceding five days.”
  - Employees newly-assigned to a high heat area must be closely observed and monitored for the first 14 days of employment.

# Emergency Response Procedures

1. At high temperatures, activate effective communication by voice, observation and/or electronic means so employees or students can contact a course instructor, supervisor or emergency medical services when necessary.
2. Course instructor or supervisor to take immediate action when he/she observes or receives report of signs or symptoms of heat illness.
3. Affected person should not be left alone or sent home without being offered onsite or offsite medical services. Students can receive treatment at Student Health Services or their personal healthcare provider.
4. Course instructor or supervisor shall arrange transportation if offsite medical services are needed.
5. Course instructor, supervisor and employees must be ready to provide clear and precise instructions to responders in the event of a medical emergency. Students should also be ready to do so also.

# What You Can Do to Prevent Heat Stress

- Know the signs and symptoms of heat stress.
- Wear loose, breathable clothing such as cotton. If you must work in the sun, wear hats and use sunscreen.
- If possible, stay out of the sun.
- When the weather is hot, avoid caffeine.
- Cool down whenever possible.
- Maintain proper hydration. Drink small amounts of water frequently. Avoid feeling thirsty.

# Heat Stress Prevention Summary Review

- We've discussed the following topics:
  - Physiology of Body Temperature Regulation
  - Sources of Heat-Related Illness
  - Stages of Heat-Related Illness
  - California Heat Stress Prevention Regulation
  - Emergency Procedures
  - What You Can Do to Prevent Heat Stress

# Questions and Comments

- If you have any questions or comments about the information in this training, please contact your course instructor or supervisor.
- Additionally, you may contact the Science Safety Office:
  - Location: MIC-207
  - Phone: 562.985.5623
  - Email: [CNSM-Safety@csulb.edu](mailto:CNSM-Safety@csulb.edu)