

# Electrical Emergencies: First Aid

Electrical emergencies can happen suddenly and without warning, especially in research laboratories where sensitive equipment, high-voltage devices, and experimental setups are common. This guide provides essential information on how to recognize and respond to electrical emergencies at Columbia University.

## Definitions

- Arc flash - A sudden electrical explosion or discharge that occurs when an electrical current travels through the air.
- Electric Shock - The passage of electrical current through the body resulting in pain, muscle contractions, burns, and nerve damage. These can range in severity depending on the amount of current, the path the current takes through the body, and duration of contact.
- Electrocution - Death resulting from an electric shock.
- Electrical burn - A burn resulting from heat generated when electrical currents flow through the body. High voltage electricity can cause severe internal and external burns.

## Providing Assistance in an Electrical Emergency.

### Call for Help

- Call Public Safety and 911.
- Get the attention of other people who might be working nearby.

### Assess the Area

- Identify the source of the electricity and ensure it is turned off.
- If person maintains contact and if you cannot turn off the power, use a non-conductive object to move the person away from the electrical item.

### Assess the Victim

- Determine if the person is responsive and the extent of their injuries.

### Provide Assistance

- Provide first aid to any visible burns or other visible injuries
- Stay with victim until first responders arrive
- Encourage the victim to receive medical attention. **All victims of electrical shocks should receive medical care even if there aren't any noticeable symptoms.**



**Public Safety**  
212-305-7979  
(CUIMC)  
212-854-5555 (MS)  
212-853-3333 (MV)

# Electrical Burns: First Aid

## Types of Electrical Burn?

- Low-voltage burn - A burn from contact with a source of power 600 volts or less. This voltage does not cause tissue damage along the burn path. These are typically considered mild, superficial burns, but can be severe depending on the contact time.
- High voltage burn - A burn resulting from direct contact to voltage 600 volts or higher. Often the external injuries are misleading as the majority of the damage occurs to sub-dermal tissues.
- Flash burn - Most commonly seen in the cornea of the eye. These can occur if exposed to intense heat from arc flash or electrical fire.
- Flame burn - Caused by contact with something that is ignited by electrical source.
- Arc burn - No contact is required for an arc burn. Not likely in Columbia University lab spaces.

## Dealing with Burns

Electrical exposure can cause burns to the skin and in severe cases to internal organs. To prevent permanent damage prompt medical attention is necessary

- If the victim is conscious have them rinse the burned area with cool water before covering with a clean, non-adhesive, non-fiber dampened dressing.
- If unconscious call Public Safety and 911.
- Seek medical attention.

## What to Avoid



- Do not touch an injured person who is still in contact with an electrical current
- Call 911 if the source of the burn is a high-voltage wire or piece of equipment. Do not get near the high-voltage equipment until after the power is turned off.
- Do not move a person with an electrical injury unless there is immediate danger

# Effects of Electric Current on the Body

Current	Effect on Body
Below 1 Milliamp	Not typically perceptible
1 Milliamp (ex. low power electronics)	Faint tingling sensation
5 Milliamps	Slight shock feeling. Not painful. Average individual would let go.
6-25 Milliamps (women) 9-30 milliamps (men)	Painful shock, loss of muscular control. Individual is unable to let go but can be thrown from the circuit.
50-150 milliamps (ex. shorted battery packs)	Extreme pain, respiratory arrest, severe muscular contractions. Death Possible
1,000-4,300 milliamps (ex. shorted car electrical circuit)	Rhythmic pumping of the heart stops. Muscular contraction and nerve damage. Death likely.
10,000 milliamps	Cardiac arrest, severe burns. Death probable

**Reference:**

W.B. Kouwenhoven, "Human Safety and Electric Shock," Electrical Safety Practices, Monograph, 112, Instrument Society of America, p. 93. November 1968