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Lightning

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LIGHTNING

Lightning supposedly does not strike twice, but once is too much for the more than 100 humans and thousands of animals that die each year from lightning bolts.

University of Wisconsin-Madison electrical engineer Theodore Bernstein told scientists gathered at the American Association for the Advancement of Science conference recently how electricity affects living things.

Death results if electrical shock causes the heart to quiver instead of beat, noted Bernstein. And, if the electricity affects the respiratory center at the base of the skull or prevents chest muscles from relaxing, breathing may stop.

The effects on large mammals such as humans or cows are related to the strength of electrical current, amount of time the shock is delivered and body weight of the victim. Effects are worse for stronger currents, longer exposure times and smaller body weights, Bernstein said, adding:

“Electrical deaths sometimes raise legal problems. Often there is no mark or sign to indicate what caused the death, and it is up to the engineer to determine if electricity could have been responsible.”

Experiments have shown that currents as low as 0.2 milliamperes (one milliamperes = 1/1000 ampere) can be dangerous, nine milliamperes can prevent a person from letting go of the wire and 150 milliamperes for one second can cause heart quivering—called ventricular fibrillation—which leads to death.

Such current levels are easily encountered in a household, noted Bernstein. As an example, a 100-watt light bulb requires about one ampere when operating.

“The danger from electrical shock is something like Russian roulette,” Bernstein continued. “There is usually enough current to cause death, but factors like body weight, grounding, current path through the body, heart strength and stage of the heart beat influence the damage the current can do.”

He said that single, direct-current (DC) shocks are not as dangerous as alternating-current (AC) shocks of the same strength. However, repeated pulses of DC electricity can be dangerous because the first shock may cause the heart to beat at the wrong time and following current pulses can more easily cause fibrillation.

Bernstein warned it is dangerous to be in open places on hot, humid days when thundershowers are nearby. He added that death records show the most dangerous place to be under trees in open areas. Other unsafe locations during a lightning storm are fields, golf courses or near clotheslines or fences.

Treatment for victims of lightning or other electrical accidents consists of artificial respiration and closed chest heart massage. Some victims require treatment with a defibrillator which is usually available at a good hospital.

Bernstein noted that first aid will help most electrical-accident victims. When several people are shocked simultaneously, the ones who appear to be dead should be given treatment first. Efforts to revive victims should be continuous and lengthy since some cases have required more than 20 minutes of artificial respiration.