

WISCONSIN DIVISION OF PUBLIC HEALTH

FACT SHEET

Topic: Electricity

What is Electricity?

Electricity is a type of energy. Voltage is the characteristic of electricity most often measured. The difference in electrical "charge" between two surfaces is called potential and it is measured in volts or voltage. Voltage can be hazardous if a person comes in direct contact with the surfaces and electricity flows through the body. The flow of electricity is called current and it is measured in amperes or amps. Electrical current is what you can feel, and it is what can cause harm to people. Electricity below 1,000 volts is regarded as low-level electricity.

The human body is resistant to the flow of electricity. So, the amount of current that flows through a body depends on the voltage level and the resistance of the body. Resistance is measured in ohms. Humans have a body resistance of about 10,000 ohms. For example, exposure to 1 volt of electrical potential results in a current flow of about 0.0001 amps through a person. Wearing rubber-soled shoes, gloves, or some other insulating material – that is, a material with high resistance - will result in lower currents.

What are the effects of exposure to electricity?

Most everyone has felt the effects of electricity at some time or another. The shock or tingling feeling caused by cattle fences or static-cling are both examples the effects of electricity. In addition to tingling and electric shock, electricity can also cause more serious effects, such as muscle cramps, burns, and unconsciousness. Under some circumstances electricity can cause permanent damage and even death. See the table below for a summary of electricity's effects.

Effects of electricity on humans

<u>Amperes</u>	<u>Voltage</u> <u>(assuming 10,000 ohms body resistance)</u>	<u>Effect</u>
0.0005 - 0.001	5 - 10	Feel sensation of electricity
0.002	20	Mild electrical shock
0.002 - 0.010	20 - 100	Muscle cramp – still able to let go
0.004	40	Painful electrical shock
0.006 – 0.025	60 - 250	Muscle cramp – cannot let go
0.020 – 0.050	200 - 500	Unconsciousness and possible suffocation
0.040 – 0.100	400 – 1,000	Heart problems, effects on brain, possible suffocation, and reduced blood flow
0.300	3,000	Severe burns
0.100 – 4.00	1,000 – 4,000	Heart failure, possible death

Some people are concerned that very low-level electricity (less than 5 volts) measured on surfaces in and around their homes may be responsible for problems such as headaches, tiredness, chronic pain, inability to sleep, balance problems, dizziness, paralysis, seizures, skin rashes, eye irritation, convulsions, heart attacks, and cancer. There are no published studies that link very low-level electricity to these chronic health problems.

Health professionals use special equipment to expose patients to electricity to provide various benefits. Electricity can help damaged tissue heal rapidly, relieve pain, stimulate muscles, control incontinence, and move medications into the body without injections. Pain control treatments use voltages ranging from a few volts to as high as 110 volts. Many thousands of patients have received these treatments over the past twenty years.

Electricity shouldn't be confused with electromagnetic fields (EMF). EMF is a different type of energy given off when electricity flows. There have been many studies on the effects of electromagnetic fields (EMF). There is some evidence that high levels of EMF could possibly cause cancer. For more information on EMF, see the EMF Fact Sheet also available from the Wisconsin Division of Public Health.

Recommendations

Modern digital equipment can detect very low-level voltages on surfaces in homes that were undetectable only a few years ago. These levels of electricity may be normal and not due to malfunctioning electrical equipment. Sources of this very low-level electricity include electrical appliances, fixtures, and wiring.

If you believe low-level electricity may be causing health problems, seek help first from your physician. Electricity should only be considered as a cause of health problems when you have eliminated all other causes or when you feel electricity. Talk to your physician about other causes of your symptoms before considering electricity. Consult with your physician to treat any health symptoms that you may be experiencing.

If you can feel electrical shock or tingling on surfaces in and around your home, you may have an electrical problem. An electrical potential of 5 volts can result in a 0.5 milliampere current through the body, which can be felt as an electrical shock or tingling. The International Commission on Non-Ionizing Radiation Protection recently set a reference level for human contact at 0.5 milliamperes. Underwriters Laboratories (UL) also uses 0.5 milliamperes as the standard for safety of electrical appliances, such as toasters or blenders. Based on the current state of the science, 5 volts is a reasonable guideline to use when determining if electricity is a concern for the general public and action might be necessary. Contact your electric provider if you have any of the following on surfaces in your home:

- You can feel electricity
- You experience electrical shock (not just from static)

PPH 7142 (6/99)