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Hello. I was recently doing some research for a local elementary school. This school wanted me to put on an electrical show for them. I am not a teacher nor have I taken physics. I came across your site and found a question a student had asked about a lemon battery. The response given to the student was very informative and correct to one point. Tamara stated that high voltage would not hurt you but big current will. But in fact you can't create current capable of harm with out the voltage to overcome the resistance.

- Thomas (age 26)

N.C.

Thomas -

What you're saying is true... It is true that you can't create a great deal of current without creating a certain amount of voltage. But this does not mean that it is the voltage that hurts you.

Let's take a look at current and voltage independently. Having a great deal of voltage simply means that you have the potential to make charge move. Having just the potential to do this will not hurt you in the slightest unless you actually have some charges there to move. If all you're looking at is current, then you're talking about having a great deal of charge moving across you. Having all that charge moving across your body will hurt you a great deal - most importantly, it could stop your heart.

If you have a great deal of current, then you must have voltage, as you described. This is because current is moving charges and you can think of voltage as how much motivation the charges have to move. If the charges had no motivation to move, then they would not. So you must have voltage in order to get current. And if you have enough current to hurt you, then you also happen to have a high voltage.

But having a high voltage does not mean that you have a high current. You can have all the 'motivation' in the world for the charges to move, but if there's no charges there, you won't get any current. So you can have a lot of potential to make charges move (voltage) without actually having any charges moving (current). This means that you can have high voltage without getting hurt at all. A great example of this is static electricity. By pulling a sweater off over your head on a cold winter day you often feel sparks crackling...this requires thousands of volts, but does not really hurt.

However, you are correct in that the statement I made is a bit of a generalization. Although current alone can hurt you whereas voltage alone can't, the combination of them can be important in a different way. This is because of the way that electricity produces heat. The amount of heat produced depends on how much power the circuit has. Power is equal to voltage times current. So if you had an extremely

high voltage, but a fairly small current (because of a limited supply of electrical charge), you could still conceivably cook yourself with heat.

The reason that we generally don't address this is that unless you've done an extremely good job of producing a high voltage circuit with only a fairly low current, you will reach a current high enough to kill you (by stopping your heart) well before you cooked yourself to death. **So the moral of the story is this: even with a small current, you might be able to kill yourself because of in part because of high voltage... but without current, you can't hurt yourself much.**

I hope this clears up the confusion. If you're interested in some demonstrations for your show, feel free to check out the Electricity section of our demo list under "Our Demos". Plasma balls can be purchased at most novelty shops and our Van De Graaff generator was ordered from a mail-order company called Science First.

- Tamara

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