

Electrophysiology, An Introduction

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I was made aware of the importance of electrophysiology when I was studying photonic therapy under Dr. Brian McLaren, an Australian veterinarian. He challenged me to think of all the body's physiologic processes in terms of positive and negative charges. He introduced me to the concept of discharge of injury, and the body neutralizing that strong electrical charge with whatever material is handy. For example, an arthritic, painful joint has the discharge of injury neutralized by bone, which leads to osteophyte formation. In the brain, multiple discharges of injury result in the typical amyloid deposition associated with Alzheimer's disease.

An article in the June 6, 2006 Daily Oklahoman by Bill Some, and Rich Some, PhD, celebrates the “body electric”. I quote:

It all began in 1786 with Luigi Galvani, an Italian anatomist who found that if two metals were connected and their open ends touched to the muscles of a dead frog, these would contract, say John R. Cameron et al. in “Physics of the Body.”

Galvani thought the dead frog generated the stimulus, but today we know better. What he had done was create a rudimentary battery.

Essentially all functions and activities of the body involve electricity in some way, even muscle forces that are done by the attraction of opposite electrical charges. The body puts out a host of signals tracked by doctors using a host of different machines. Body electric-magnetic indeed!

This seems pretty unbelievable, especially to those of us trained in western physiology. A simple exercise to demonstrate this principle can be easily done in the exam room. I have the owner put the thumb and forefinger of their right hand together in a circle, and I tell them to resist me trying to pull it apart with my right forefinger. I cannot break the fingers apart. Then, I have them place the forefinger of their left hand touching the skin at the base of their throat. I can easily break their two fingers apart. I then have them place the middle finger of their left hand in the same place on their throat, and I am unable to break the two fingers apart. This demonstrates the principle of electrophysiology. Simply put, one finger is a positive lead, and one is a negative lead. One finger augments the body's electrical system, and the other one is a direct short to the electrical system.

Dr. McLaren explained the principles of blood clotting, and I will quote him from an E-mail he sent to me.

“Blood clots on a glass slide due to the negative charges. When you remove the Ca^{++} with EDTA and make the blood more negative, it will not clot. Add heparin, a highly positively charged protein molecule, and the blood won't clot. Therefore the point is, the body only works within a defined narrow physiological range.

When a vessel is damaged, rather than the discharge of injury (which can be recorded at the surface as a positive), the ends of the cut collagen fibers in the blood vessel wall, are negatively charged. It is the change in the electromagnetic field potential which causes the platelets to grow pseudo-pods and aggregate. The change in the shape of the platelets (stretching of the wall-tension produces a positive charge-) changes the expression of ATP, etc, to initiate the clotting cascade.

From the very limited work we did, I believe we were able to show treating stop-bleeding points, not only decreased clotting time, but also stimulated an increase in the anti-clotting factors (increased PT and PTT). Your experience with road accidents demonstrated that you could reduce intra-cranial pressures.”

Another physiologic process we are all familiar with is Wolffe's Law. I have relied on this principle to help very severe fractures heal. Wolffe's Law says bone remodels according to the stress placed on it. We need to understand the structure of bone to understand the principles involved. Bone is basically a collagen rod that has a matrix of many minerals imbedded in it. This is extremely important, because collagen is piezo-electric. That means when pressure is applied to collagen crystals, then bend and don't break. When they bend, they store an electrical charge, and when they return to their original configuration, they release that electrical charge. The peizo-electric crystal in a telegraph key is a real world example of this principle.

Bone is normally negatively charged on the inside and positively charged on the outside. When a bone is broken, a strong positive charge develops where the bone is under tension, and a strong negative charge develops where the bone is under compression. These strong charges are why it is so important to get the fracture reduced as well as possible as quickly as possible. (When my younger son fell out of a tree and broke his radius and ulna, I had a chance to spend some quality time with the orthopedic surgeon when he treated him. He related how important it was to get any fracture reduced ASAP. He said patients just seem to relax and do so much better, even in the cases involving multiple severe injuries, as soon as the fractures are reduced.)

Because the body does not do well with these extreme charges, the cations—magnesium, calcium, boron, etc.—travel from the site of tension to the site of compression. This is how the bone remodels and heals. The principle is what keeps the bones in their normal shape, even when there are no fractures. This was brought home to me when I read an interview Joni Erickson-Tada had given. She had a diving accident, when she was 17 that led to her becoming a quadriplegic. She is now over 50, and when asked if she

would accept experimental stem cell therapy if it would allow her to walk again, she replied she would not accept any therapy to help her walk. She explained how she knew the bones of her body, especially her legs, were so fragile, she was sure they would snap with the slightest weight bearing.

In conclusion, the idea of this article is not meant to be an exhaustive treatise on electrophysiology. Rather, it is a challenge for health professionals to incorporate these principles as they practice their healing arts.

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