5

The Spark of Life

Piezoelectricity is what allows your cigarette lighter to produce that tiny spark. It is static electricity created by bending a crystal, and it is being created all the time in our body.

The importance of the piezoelectric effect in the bone is still being elucidated. We know that it is the orientation of the collagen fibres that stimulates bone growth.[1, 2] The tiny electrical currents produced by this deformation of collagen stimulate the bone cells, called osteoblasts, to lay down more bone.[3] The way in which this occurs is, in theory, quite simple. When, for instance, you land from a jump the bones in your legs subtly bend and flex to absorb the shock. This flex is felt right the way through the bone, but the areas under most stress will flex the most. The collagen fibres in these areas will deform the most and so produce more electrical charge. This charge will then be detected by bone cells (osteoblasts), which will start laying down new crystals onto the collagen fibres. The result of this is that the bone in this area becomes harder and less flexible: the bone is stronger exactly where it needs to be.

This process is occurring all the time. Even subtly shifting your weight while reading this has caused this effect. The reason that astronauts lose so much bone mass when they go into space is because they lose this piezoelectricity. Without any gravitational stress on their bones the collagen stops producing any electricity. Even rigorous daily exercise cannot make up for the constant stressing produced by gravity. After a year in space astronauts are so fragile that the bones of these ultra-fit soldiers are like those of geriatrics. In space, astronauts lose *at least* 1 per cent of their bone per month[4] and nothing seems to be able to stop this.

This piezoelectric effect is what Dr Becker exploited to produce his bone-healing machines, and electricity and bone growth have become so linked within the scientific world that there are now hundreds of scientific papers on this. The UK's leading orthopaedic hospital in Stanmore routinely uses electrical devices to aid bone healing.[5]

The science of this is still poorly understood. However, what is definitely known is that collagen produces electricity, and electricity guides bone growth.

There is no reason to think that the collagen in the rest of the body isn't producing electricity when it is deformed. It is a property of collagen that produces the electricity, not of the bone, and the collagen elsewhere in fascia is exactly the same type. Collagen in fascia is laid down along lines of mechanical stress – every time it is stretched or moved it will generate tiny electrical charges. This electricity is completely ignored by Western medical doctors – ask any doctors about it and you will almost certainly be met with blank looks. Yet it is quite astonishing that the connective fabric of our body, the tissue that wraps and joins our entire body, is in effect an interconnected, living electrical web. This is so similar to the ancient Chinese descriptions of Acupuncture channels and Qi that it is remarkable.

Collagen is not only an electrical producer, it also has very interesting conduction properties: it is a semiconductor.[6] In other words, it behaves not quite like an insulator and not quite like a conductor. These are the same properties that give computers their 'intelligence'.

The structure of collagen suggests further properties that are on the edge of our current understanding of the body. Collagen is a triple helix and there is speculation (although no research) that it will conduct electricity much better down its length than across it. If this was the case then it would mean that the microstructure of fascia may have far more order and importance that we give it credit for.

The interesting electrical properties of collagen are intriguing, since everything in the body is electric. On the surface of every

cell sits a pump that is as vital to life as your lungs are. The pump constantly throws out three sodium ions in exchange for letting two potassium ions in. This creates a net charge of negative ions within the cell, resulting in a tiny electrical charge across the cell. Without this charge the cell cannot function, and within minutes of this pump stopping working the electrical charge would disappear and the cell would swell up and die!

Electricity is essential to life.

The effect of electricity within the body moves beyond the grind of cellular existence. Nerves in the body use it to transmit information, muscle uses it to force contractions, and the brain uses it to think. The heart's rhythm comes from an electrical pacemaker, and the eyes even use electricity to register photons.

As Becker[7] would say, we really are 'Body Electrics', constantly emitting and absorbing an invisible silent energy that permeates all around us at the speed of light.

Every physiological process, every movement, every thought could be seen to have a twofold basis in reality: a physical reality and an energy reality. When the heart beats, the physical movement can be felt with your hand, or seen using ultrasound, but the electrical reality can be seen even more clearly with an electrocardiogram (ECG). Western medicine relies upon this test so often because in many ways this energy reality is more real than the physical reality, and is certainly easier to measure.

Increasingly, science is realising that electricity not only governs how we function, it also governs how we form. Electricity has been shown to tell stem cells where to move to, one of the most vital aspects of embryology.[8] The ability of electricity to mend broken bones is an expression of this, since bone healing is an example of regeneration and our ability to reform.

In the midst of this electrical world sits collagen, omnipresent and connecting to everything. It is accepted within Western medicine as the key constituent of our connective tissue, its strength supporting our body. As both an electrical semiconductor and an electrical generator of piezoelectricity, collagen's pre-eminence in the body may go beyond its mechanical strength. Instead, collagen

should be seen as an electrical super-substance, a semiconducting, piezoelectric, bio-helix, holding, generating and even directing body electricity.

An electrical force held in a fabric into which our body is woven: this is science that is beginning to sound like Chinese medicine and Qi.