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How Do Microcurrents Work? Intercellular Communication and Microcurrents

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One of the most commonly asked questions I hear is, "How/why does microcurrent work?" We undoubtedly observe a high percentage of positive clinical results - with these results (in many cases) greatly exceeding the expectations of patient and practitioner. This is especially true of practitioners who have previously used other forms of conventional electric stimulation or electroacupuncture. In my classes and interviews, I do my best to answer this question with the following points:

- Microcurrents create an acupuncture-like effect and release pain by promoting free circulation of blood and energy flow in the body.
- Much chronic pain is due to electrical polarity patterns in the body that are distorted from the natural, harmonious polarity pattern (positive at midline, more negative at extremities). Applying polarized microcurrents can re-establish the proper polarity patterns of the body, thus relieving physiologic and psychological stress.
- Microcurrents can add an outside source of gentle energy to supplement deficient areas and help drive cellular energy metabolism by promoting transfer of charged calcium ions through cell membranes to augment ATP and nucleic acid production. (For citations, see www.microlightresearch.com/research.htm.)
- The addition of color light to microcurrent stimulation adds an additional pain-relieving factor through additional physiologic effects. (For further information, see articles posted at www.eastwestmed.com/colorhub.php.)
- Pulsed microcurrent stimulation and wavelengths of light deliver specific frequencies to parts of the body, creating resonance effects. This means that the frequencies delivered by the stimulation equipment are able to help bring painful, inflamed or dysfunctional body tissues into more healthy conditions, in a similar manner as tuning a guitar string.

Yet even these explanations are limited. Fascinating recent research is revealing some of the mechanisms by which microcurrent and light therapies affect intercellular communication systems, thus facilitating instantaneous effects on organs, glands, hormones, the immune system and mood/emotions.

A valuable reference on this subject is "Intercellular Communication, NO and the Biology of Chinese Medicine," by Dina Ralt.[1] This thoroughly documented article proposes a clear link between the TCM notion of *qi* and an identifiable biochemical substance in the body - nitric oxide (NO). The article has a long list of valuable references at the end for further study. Ralt states, "NO is impossible to live without, short-lived, highly diffusible and toxic, and is thus an excellent candidate for a cellular communication signal which carries the *qi* information. The levels of NOS (a neuronal form of NO) are altered by a variety of pathophysiolocal conditions such as hypertension, hypercholesterolemia, aging, cigarette smoking, diabetes, heart failure and under-physical activity and dementia."

The article goes on to state that measured NO levels are consistently higher in skin acupoints and meridians associated with low electrical resistance. This suggests that microcurrent stimulation, which rapidly lowers electrical resistance at acupoints, boosts NO levels, and this may help account for some of the remarkable results of such treatments.

You can easily see for yourself that microcurrent lowers electrical resistance at acupoints by using a microcurrent unit with conductivity meter monitoring and watching the change in conductivity readings before and after a six-second stimulation of a set of points.

Another good resource is "Microcurrent Therapies: Emerging Theories of Physiological Information Processing" by Ray Smith.[2] Smith lists many research citations that explain the three known systems of intercellular communication - neural, hormonal and the peptide ligand-receptor system. Neural and hormonal communication have been known and commonly accepted for decades. The third system is emerging from recent research. In addition to the known endocrine glands, there are cells spread throughout the body that secrete minute peptides which have instantaneous distal effects in many other areas. These help regulate immune function, organs, glands and the mind/emotions. These peptides are intimately linked with stressors, and are highly affected by positive or negative thoughts and feelings - the much sought-after mind-body link.

The article lists many documented ways that microcurrent stimulation produces rapid healing and regeneration. Drawing on the studies of W. Bauer, Smith states: "Now we can be fairly certain that microcurrent, applied this way, is stimulating numerous peptide responses from immune cells flowing beneath the electrodes. Or as Bauer theorizes, an electromagnetic field may act in the same way as a hormone upon the cell membrane, causing a 'perturbation' or repositioning of the molecular plasma membrane of cells."

These and many other studies point the way to a more profound understanding of the self-regulating systems of our marvelous bodies, and how microcurrent applied through acupoints can facilitate cellular communication processes that directly regulate all physiologic and psychological systems. Much of this effect is probably associated with the ability of microcurrent to rapidly lower electrical resistance and repolarize the body.

Gap junctions are small channels that form between neighboring cells. They provide for two-way intercellular communication between healthy cells by allowing for the exchange of small molecules and ions (the second messengers) that affect cell communication and signaling. Six connexin proteins localized at the cell membrane are arranged in a similar manner to a camera diaphragm to form a *connexon*. Connexons from one cell dock with connexons from an adjacent cell to form a gap junction channel. Functional gap junction intercellular communication (GJIC) and cell signaling maintain homeostatic balance and enable healthy cells and tissue to respond to external stimuli. Conversely, disrupted GJIC is associated with almost all cancers, vascular and kidney diseases, and up to 70 percent of all neurodegenerative diseases. Hence, the successful regulation of cell-to-cell communication by way of gap-junction modulation represents a novel approach to the treatment of these diseases.[3]

In the 1980s, medical science became aware of a third basic communication system, the peptide "ligand-receptor system," in which a network involving the neuronal, the hormonal, the gastrointestinal and the immune systems communicates with each system and the rest of the body via peptides and messenger-specific peptide receptors. While we know that the nerves and endocrine

glands manufacture messenger chemicals, and that the gastrointestinal membranes comprise the largest endocrine "gland" in the human body, we did not know that immune cells also make, store and secrete neuropeptides that communicate and interact with the other communication systems to control the tissue integrity of the body. Like the others, the peptides manufactured by the cells of the immune system also can regulate mood or emotion.[4]

References

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