Dynamic Chiropractic

SOFT TISSUE / TRIGGER POINTS

Can the Body Use Fascia as a Method of Communication?

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Typically, we think of communication in the mammalian system as occurring by way of the nervous system. Oschman[1] quotes Sherrington's[2] statement about the single-celled paramecium that swims around gracefully, avoids predators, finds food, mates and has sex all without a single synapse: "Of nerve there is no trace. But the cell framework, the cytoskeleton might serve."

Oschman[1] mentions that while we have been constantly studying the nervous system of the brain, communication occurs by way of connective tissue glial cells and neuronal processes. Research is revealing the relationship between the connective tissue and the nervous system.

Pischinger,[3] who writes about the extracelluar matrix, states that the fascial system is the largest system in the body and is the only system that touches every other system. The fascia may be viewed as a single organ, a unified whole, the environment in which all body systems function.[1,4] Guimberteau[5] writes that the exchange of substances across the intercellular ground substance connects the fascia to cellular nutrition and metabolism.

Langevin6 hypothesizes that the connective tissue forms an anatomical network throughout the body and functions as a body-wide mechanosensitive signaling network. The signals work by way of electrical, cellular and tissue remodeling. Signaling also occurs through changes in movement and posture, and signaling would be altered in pathological conditions such as local decreased mobility due to injury or pain.

Langevin also mentions the connective tissue relation to internal tissues such as lungs and intestines, thereby influencing organ systems. She states that to prove this hypothesis, it must be shown how a specific stimulus is created by alteration of the connective tissue and that the signal would propagate over some distance through the tissue. It must be shown that electrical signals can be generated by mechanical forces.

It has already been shown that some proteins including collagen can display semi-conductive, piezoelectric and photoconductive properties *in vitro*. Oschman1 states that every movement made by the body generates electric fields due to the compression or stretching of bones, tendons, muscles, etc., and that these electric fields spread through the surrounding tissues, providing signals that inform the cells of the nature of the movement, loads, or other activities occurring elsewhere in the body.

Regarding a cellular influence, Langevin6 mentions how the mechanical activation of fibroblasts responds (spreading, lamellipodia formation) within minutes of tissue lengthening resulting in possible cell-to-cell signaling. In another study by Langevin,[7] soft-tissue fibroblasts were shown to form an extensively interconnected cellular network, suggesting they may have important and so-far-unsuspected integrative functions at the level of the whole body.

Finally Langevin's[6] third idea of signaling might come from remodeling of tissue (mechanical load) causing changes in collagen fiber density and orientation, with resultant changes in tissue viscoelastic properties (changes in tissue stiffness).

Maquart, et al.,[8] state that in addition to the soluble factors such as hormones, cytokines or growth factors, cells also receive signals from the surrounding extracellular matrix (ECM) macromolecules. "The activity of connective tissue cells is modulated by a number of factors present in their environment (soft-tissue methods?). Moreover, they may degrade the ECM proteins and liberate peptides, which may by themselves constitute new signals for the surrounding cells. Therefore, an actual regulation loop exists in connective tissue, constituted by peptides generated by ECM degradation and connective tissue cells."

The increasing new information about the effects of mechanical load on our patients, which includes all of the many soft-tissue techniques we use daily in our practices, is slowly explaining why we achieve such great results every day.

References

1. Oschman JL. Fascia as a Body-Wide Communication System. In: Schleip R, Finmdley TW, Chaitwo L, Huijing PA. *Fascia, The Tensional Network of the Human Body*. Elsevier: NY, 2012.
2. Sherrington CS. *Man on His Nature*. Doubleday Anchor: Garden City, NJ, 1951.
3. Pischinger A. *The Extracellular Matrix and Ground Regulation: Basis for a Holistic Biological Medicine*. North Atlantic Books: Berkeley, CA, 2007.
4. Finando S, Finando D. Fascia and the mechanism of acupuncture. *J Bodywk & Mov Ther,* 2011;15:168-76.
5. Guimberteau J. Human Subcutaneous Sliding System. The Basic Stone: The Microvascular Concept. Plea for a New Perception of Human Anatomy and of the Living Matter Architecture. In: Findley T, Schleip R (eds.). *Fascia Research*. Elsevier: Munich, 2007:237-240.
6. Langevin HM. Connective tissue: a body-wide signaling network? *Medical Hypotheses*, 2006;66:1074-1077.
7. Langevin HM, Cornbrooks CJ, Taatjes DJ. Fibroblasts form a body-wide cellular network. *Histochem Cell Biol*, 2004 Jul;122(1):7-15.
8. Maquart FX, Siméon A, Pasco S, Monboisse JC. Regulation of cell activity by the extracellular matrix: the concept of matrikines. *J Soc Biol*, 1999;193(4-5):423-8.

JULY 2012