

Tissue Planes and Acupuncture Points

Paper Examines Role of Connective Tissue in Treatment

By Editorial Staff

One aspect of acupuncture that has puzzled scientists for decades is the exact location of acupuncture points and their relation to other points on the body.

Research conducted in the mid-1970s, for instance, proposed that structures such as neurovascular bundles, neuromuscular attachments and sensory nerve endings were more likely to be found at acupuncture points than other areas of the body.^{1,2} Other studies suggested acupuncture points were physiologically different from non-acupuncture points, and could be determined by testing the skin's ability to conduct electricity.³ For the most part, however, attempts to identify anatomical and physiological qualities of true acupuncture points have remained inconclusive.

More recent research has focused on the correlation between acupuncture points, meridians and connective tissues. In 2001, Dr. Helene Langevin of the University of Vermont reported that when needles were inserted and manipulated in known acupuncture points, it created a phenomenon called "needle grasp," in which connective tissue wound around the acupuncture needle. This allowed the needle to pull and distort the surrounding tissue and deliver a mechanical signal at the cellular level, leading to "downstream effects" that could activate certain cellular pathways and facilitate healing.⁴

While manipulation created needle grasp at both acupuncture and non-acupuncture points, Langevin's team found that needles inserted and rotated at acupuncture points required greater force to be removed compared to needles used at control points. Other studies conducted by Langevin found that very fine needles obtained a greater effect than wider (>1 mm) needles, and that gold needles created more "needle grasp" versus stainless steel needles.^{5,6}

The latest research by Dr. Langevin's group suggests a much more complex relationship between acupuncture meridians and connective tissues than previously indicated. Their study, which appears in *The Anatomical Record*, found an unusually high correspondence between the sites of acupuncture points and connective tissue planes, leading the researchers to conclude that connective tissue plays a potentially important role in the way acupuncture's healing effects are delivered.⁷

To investigate the theory that acupuncture points are located over tissue planes, Langevin's team marked the location of acupuncture points and meridians in a series of anatomical cross-sections of the human arm, using images obtained from the National Library of Medicine's Visible Human Project. The arm was divided into 13 sections, from the point of the elbow to the upper end of the humerus. In each section, the scientists marked all acupuncture points and the intersection of all meridians with the plane of section.

Points and meridians were located based on written guidelines, such as anatomical landmarks and proportional measurements, and acupuncture charts. Using these guidelines, the authors marked 24 acupuncture points along six meridians on the upper arm. The meridians also intersected with the plane of section at 51 other sites not considered acupuncture points.

Five of the six meridians showed a relationship to tissue planes. Portions of the Heart, Lung and Large Intestine meridians followed fascial planes between muscles, while parts of the Pericardium and Triple Heater meridians followed intramuscular cleavage planes. The Small Intestine meridian did not follow any recognizable tissue plane; however, three of the four points on the section of the meridian that ran through the upper arm "clearly coincided" with the intersection of multiple fascial planes. Altogether, "more than 80% of acupuncture points and 50% of meridian intersections" of the arm appeared to coincide with inter- or intramuscular connective tissue planes.

To rule out the possibility the points corresponded to tissue planes by chance, the researchers also conducted tests on a model arm. Results of the model test showed the likelihood of most of the acupuncture points occurring randomly on fascial tissue planes, or the intersection of meridians with the plane of section, to be less than one in 1,000.

"These findings suggest that the location of acupuncture points, determined empirically by the ancient Chinese, was based on the palpation of discrete locations or 'holes' where the needle can access greater amounts of connective tissue," the scientists noted. "... A greater therapeutic effect at acupuncture points may be at least partly explained by more powerful mechanical signaling and downstream effects at those

points."

Just as acupuncture meridians form a network throughout the body, connecting tissues and organs to each other, so does connective tissue. Similarly, just as needling an acupuncture point may have an effect on a part of the body far removed from the site of insertion, the researchers theorized that generating a signal through connective tissue could have "potentially powerful" functions affecting different parts of the body and different organ systems:

"We propose that acupuncture points may correspond to sites of convergence in a network of connective tissue permeating the entire body, analogous to highway intersections in a network of primary and secondary roads ... By using the road analogy, interaction of an acupuncture needle with connective tissue will occur even at the smallest connective tissue 'secondary road.' Needling a major 'highway intersection,' however, may have more powerful effects, perhaps due to collagen fiber alignment leading to more effective force transduction and signal propagation at those points.

"In summary, the anatomical correspondence of acupuncture points and meridians to connective tissue planes in the arm suggests plausible physiological explanations for several important traditional Chinese medicine concepts ... We propose that acupuncture needle manipulation produces cellular changes that propagate along connective tissue planes. These changes may occur no matter where the needle is placed, but may be enhanced when the needle is placed at acupuncture points."

The researchers also called for a larger study to be conducted, incorporating other parts of the body such as the head, trunk and lower extremities. Performing such an investigation, they suggested, would lead to a better understanding of the relationship between acupuncture points, meridians and connective tissues, and "begin to unravel the veil of mystery surrounding acupuncture."

References

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