Basic Mechanisms of Osteopathic Manipulative Treatment: A Must Read

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An important article was published in the September 2015 issue of T*he Journal of the American Osteopathic Association* (*JAOA*).[1] The article, by Manal Zein-Hammoud, PhD, and Paul R. Standley, PhD, titled "Modeled Osteopathic Manipulative Treatments: A Review of Their in Vitro Effects on Fibroblast Tissue Preparations," is important to the osteopathic medical profession for several reasons: (1) It is a derivative summary and explication of a substantial body of work over at least 10 years and fundamental to osteopathic medicine; (2) The studies described are well designed, controlled, and executed; and (3) The conclusions from the studies are potentially groundbreaking for understanding the mechanisms and mechanics of various osteopathic manipulative treatment (OMT) techniques.

The Zein-Hammoud and Standley article is a critical summary of at least 10 years of Standley's extensive work with fibroblasts and his interest in OMT, developed while he was on the faculty of the Midwestern University/Arizona College of Osteopathic Medicine in Glendale. This review and synthesis article follows in the tradition of J.S. Denslow, DO, and I.M. Korr, PhD, whose primary research findings were often published in appropriate international scientific journals,[2,3] and then derivative papers, which provided summaries and connections to the osteopathic medical profession, were published in the *JAOA*.[4,5] Standley has had many of his articles published in other journals and several in the *JAOA*, 2 of which were awarded the prestigious George W. Northup, DO, Medical Writing Award.[6,7] However, the present article provides an overview of the body of his fibroblast work and what it means for the understanding of potential fundamental mechanisms of several OMT techniques and how they work.

The studies flowing from Standley's laboratories are textbook examples of well-designed, -controlled, and -executed studies. Those described in the review are primary examples of how a program of scientific work flows and builds on itself to finally tell a story. One or 2 studies may be interesting or even groundbreaking, but a good research program will produce a body of work that paints an ongoing and internally consistent picture. The student of research would be well advised to look at this research program as a model of how to develop a true research program and follow it to a logical conclusion.

Standley's interest in fibroblasts, the fundamental cells in many different tissues, such as muscle, fascia, and other soft tissues, led to his interest in how they respond to mechanical stress and strain and how they might respond to OMT, especially counterstrain and myofascial release. The model fibroblast preparation Standley developed and has used in many of his studies involves seeding fibroblast cells onto elastic substrates and letting the cells grow and attach to the substrate. Forces can then be applied to the cells by stretching the membrane in various ways to stress or injure the fibroblasts.

His work has shown that fibroblasts respond differently to various strain patterns, secreting various anti-inflammatory chemicals and growth factors, with implications for wound healing and muscle repair, among other physiologic processes. By simulating OMT-patterned movements on layers of fibroblasts, Standley has shown that detrimental responses of fibroblasts can be altered or reversed with the OMT simulations. Various combinations of forces and OMT or no OMT allow for well-controlled observations of the effects produced. He has gone on to develop a 3-dimensional fibroblast preparation called a bioengineered tendon that can be stretched or pierced to look at the response to these stressors and the effects of OMT on these injuries. In one example, he showed that direct myofascial release was most effective in reversing strain-induced injuries when it was of low magnitude for a longer duration.[8] Thus, these preparations have the potential not only to show the effectiveness of OMT simulations, but to provide

information on the optimal parameters for such treatments. One quite provocative finding in the 3-dimensional fibroblast preparation was that in noninjured preparations, direct myofascial release seemed to increase the extracellular matrix of the preparation, suggesting a possible increase in strength of the bioengineered tendon.[9]

This derivative, summative review of a very productive body of work is certainly one of the most provocative and thought-provoking papers to appear in the *JAOA* in some time. It shows how an interest in basic mechanisms at a cellular level can be developed into work that can provide fundamental information on the mechanisms and principles of osteopathic medical practice. Furthermore, Zein-Hammoud and Standley present this information in a readable and understandable way. The article should be required reading for all osteopathic medical students and all osteopathic medical school faculty. (doi:10.7556/jaoa.2015.110)

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