

## Electrical Impedance and Sonoelastography as a Tool for the Examination of Changes in Lumbar Fascia after Tissue Manipulation

Stefan Dennenmoser, Robert Schleip, Werner Klingler

Fascia Research Group, Division of Neurophysiology, University of Ulm, Einstein-Allee 11,  
D-89081 Ulm, Germany, Phone: +49-731-500-23250, Fax: +49-731-500-23260, Email:  
stefan.dennenmoser@fasciaresearch.de

### BACKGROUND:

Electrical impedance is a parameter which can be used to determine the amount of water within human tissue and to differentiate between intracellular and extracellular water. Ultrasound elasticity imaging directly reveals the physical property of fascial tissues and makes it possible to quantify changes in tissue thickness as well as stiffness before and after fascial manipulation.

### METHODS:

The erector spinae region between the 2nd and 4th lumbar vertebra of 59 subjects was manually treated for 3 to 5 minutes. Measurements were taken before and after the tissue manipulation (TM) in order to compare parameters of electrical impedance, such as resistance, reactance and phase-angle, also a sonoelastographic histogram was generated. Subjects were asked beforehand about their sex, age, body mass index, level of activity and history of pain.

### RESULTS:

Impedance of the lumbar region showed significantly lower values after TM, the histogram of the Sonoelastography indicates a fascial softening. This effect was most prominent in women and middle-aged participants. Also those without or little pain and those with more sportive activity showed an increased softening of the tissue. Surprisingly the numbers point to a tendency, that participants with backpain showed more fascial (extracellular) and less muscular (intracellular) changes, whereas the changes in sportive participants was more on the muscular side.

### CONCLUSION:

The observed significant impedance and sonoelastographic changes could resemble tissue hydration effects after TM leading to tissue softening. Besides the expected softening-effects on the lumbar region, both kinds of tissue, musculature and fascia, react differently depending on the sex, age, pain-history and activity-level of the person. Since there is no data about the normal values of

different kinds of human tissue, more detailed research is necessary to estimate individual effects and variations.

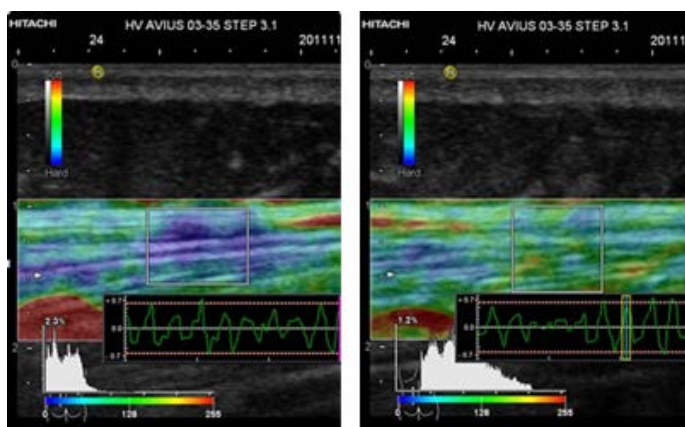


Fig.1: Sonoelastographic images of the lumbar fascia before and after the treatment show a change in colours from blue (hard tissue) to green (middle) and a more balanced histogram at the bottom left.