

Ultrasound-Elastography: Assessment of the Elastic Properties of Fascia and Muscle in Sports Injuries with Prolonged Pain and Dysfunction

Wolfgang Bauermeister, MD, PhD, Prof. – ½ day workshop

Educational objectives:

Imaging of the elastic properties of fascia and muscles to demonstrate that the hardened inelastic tissue site harbor myofascial trigger points and fibrosis which are outside the symptomatic area.

To understand the value of shearwave and compression elastography for research and clinical application in sports related injuries

Workshop description:

Sports injuries can result in pain and dysfunction leading to prolonged off time. Even though the actual injury has healed, pain can be triggered from sensitized nociceptors - peripheral sensitization - above and below the injury site. Therefore, a previously normal sports activity can provoke pain and dysfunction (Allodynia). Along with the peripheral sensitization the tissue gets harder. Palpation along the myofascial chains can detect the superficial but not the deep hardening. Palpation requires experience and skills, it is subjective and difficult to document or to communicate. Objective imaging procedures like conventional MRI, X-Ray or Ultrasound cannot image the tissue stiffness. Ultrasound-Elastography can provide images of the hardening within the fascia and the muscles. Compression Elastography provides numerical measures like pixel count and relative stiffness through strain ratios. Shearwave Elastography measures the propagation velocity of the shearwave and absolute stiffness. Therefore, elastography can identify the tissues with allodynia which require treatment. The efficacy of the treatment can be monitored with elastography as well.

Workshop schedule:

- 09:00 – 09:05 Welcome address and introduction

- 09:05 – 09:25 Current research:

The principle of Ultrasound Elastography, vibrational, compression and shearwave-elastography.

- 09:25 – 00:30 Questions

- 09:30 – 09:40 Practical application example:

Ultrasound Elastography for scanning the myofascial chains to identify hardened, inelastic fascia and muscles using compression- and shearwave elastography. Advantages and disadvantages of the different elastography-technologies.

- 09:40 – 10:00 Diagnostic findings with compression-elastography

- 10:00 – 10:20 Diagnostic findings with shearwave-elastography

- 10:20 – 10:50 Scanning of the superficial back line

- 10:50 – 11:10 Discussion and break

- 11:10 – 11:20 Scanning of the superficial frontline

- 11:20 – 12:20 Monitoring the effects of therapeutic interventions repetitive peripheral magnetic stimulation with Ultrasound-Elastography

- 12:20 – 12:30 Debriefing and discussion

Reading:

1. Bauermeister W: Nociceptive input from the posterior lumbar fascia and the back muscles in chronic low back pain. Journal of Bodywork and Movement Therapies 2018, 22(4):869-870.
2. Bauermeister W, Raßmann P: Nachweis von Neurogenen Entzündungen beim Myofaszialen Schmerzsyndrom mittels Strain-Elastografie und Validierung durch Algometrie. Ultraschall in Med 2017, 38(S 01):V10.006.
3. Bauermeister W, Raßmann P: Die Bedeutung der Strain-Elastografie für die Diagnose unspezifischer Rückenschmerzen. Ultraschall in Med 2017, 38(S 01):V10.004.
4. Bauermeister W: Optimierung des Strain-Elastografie durch Computer assistierte Steuerung der Ultraschallsonde. Ultraschall in Med 2017, 38(S 01):P2.011.

5. Bauermeister W: Sonoelastography: Real time measure of tissue stiffness in idiopathic low back and pelvic girdle pain In: 9th Interdisciplinary World Congress on Low Back and Pelvic Girdle Pain October 31 - November 4, 2016 2016; Singapore; 2016: 137-142.
6. Bauermeister W: Ultrasound Elastography for the Evaluation of the Elastic Properties of Fascia and Muscle. In: Fourth International Fascia Research Congress. Reston, VA USA; 2015.
7. Bauermeister W: Trigger Point Imaging with Ultrasound-Elastography. In: TAP Chronic Pain Conference Treating and Preventing Chronic Pain. Arlington, VA USA; 2015.
8. Bauermeister W: Triggerpunktbehandlungen mit Elastographie Kontrolle. In: Connect 2013 Connective tissues in sports medicine. University of Ulm; 2013.
9. Bauermeister W: Ultrasound Elastography for the diagnosis of myofascial pain syndromes. In: DER DEUTSCHE SCHMERZ- und PALLIATIVTAG 2012 23 Deutscher interdisziplinärer Schmerz und Palliativkongress. Frankfurt; 2012.
10. Bauermeister W: Ultrasound Elastography, a Novel Method for the Diagnosis of Trigger Points and a Tool to Evaluate the Efficacy of Shockwaves in the Treatment of Myofascial Pain Syndroms. In: 14th congress of the ISMST. Kiel; 2011: 44.
11. Cespedes I, Ophir J, Ponnekanti H, Maklad N: Elastography: elasticity imaging using ultrasound with application to muscle and breast in vivo. *Ultrason Imaging* 1993, 15(2):73-88.

Presenter:

Wolfgang Bauermeister MD PhD, is a US-trained Physiatrist, Diplomate of The American Board of Physical Medicine and Rehabilitation. He is Professor at the Dept. of Physical Rehabilitation and Sports Medicine, Kharkiv National Medical University, Ukraine and director of the Schmerzinstitut Muenchen. He conducts research, teaching and clinical work in the field of Sports- and Pain-Medicine.

He received a German medical degree (1974), and PhD (1975) from the University of Hamburg Medical School and a second medical degree in the USA (1982). In the US (1980 - 1988) he gained experience in pain clinics where he took care of athletes and chronic pain patients. After a residency (1984-1988) at TUFTS New England Medical Center – TUFTS University Boston USA- in the specialty of Physical Medicine and Rehabilitation he got certified (1989) by the American Board of Physical Medicine and Rehabilitation. After his return to Germany (1988) he became exposed to shockwave Lithotripsy. He found that some patients, who had suffered from low back pain and sciatica, were pain free after the Lithotripsy. They had severe bruising at the site of entrance of the shockwaves, which coincided with typical trigger point areas responsible for low back pain and sciatica. Through his observations in 1988 the idea was born, that shockwaves could remove Myofascial Trigger Points.

It took several years before shockwaves make their way into the orthopedic field. After careful evaluation of the potential of this technology Dr. Bauermeister started in the year 2000 to train doctors and therapist. Since then has published several articles and books and by now the Triggerpoint Shockwave Therapy TST® is a generally accepted and widely used medical approach.

Driven by the need to make trigger points visible Dr. Bauermeister started 1999 to work with Ultrasound Elastography, which was used for the diagnosis of prostate tumors. He found that not only tumors, but also Myofascial Trigger Points could be visualized. It took him several years to obtain a suitable device, which would enable him to acquire high definition Elastography images of myofascial trigger points. Now the technology is generally available and is well suited not only to diagnose trigger points but to monitor the therapy effects which helps to formulate optimal treatment approaches.