SPECIAL-INTEREST DISCUSSION ON: TARGETED CONTROLLED MUSCLE BUILDING TO THE STANDARDS OF MODERN TRAINING THERAPY, INCORPORATING COMBINED SHOCK WAVE TECHNOLOGY TO TREAT MYOFASCIAL PAIN SYNDROME

Interview with Professor K. Karanikas, Ph.D., by Dr U. Dreisilker, M.D.

Professor Konstantin Karanikas graduated in sports sciences from the German Sport University in Cologne in 1989 before pursuing a supplementary course of study in preventive and rehabilitative measures at Bochum University. He holds a doctorate in biomechanics from the Department of Biomechanics at the German Sport University in Cologne for his thesis on the adaptation of neuromuscular force capabilities during walking and running after injuries to the cruciate ligaments of the knee and surgery.

Konstantin Karanikas has been working for the Mettmann-based "Medi-Sport" rehabilitation centre for about 20 years.

Ulrich Dreisilker, an orthopaedist, sports medicine specialist, chirotherapist and acupuncture practitioner in Mettmann for many years, has been using shock wave technology with great success for over 15 years.

D: We know about the relationship and interaction between the muscular system and all other systems of the human organism. Any disease or dysfunction of one of these systems, such as the psyche or digestive apparatus, inevitably produces a response in the muscular system. Muscles not only report their own deficiencies, but also changes that have occurred in other body systems.

Jogging and other types of physical exercise are known for their beneficial effect on the cardiovascular system and on the entire muscular system in general.

K: Absolutely. However, specific strain produced by sports activities or by daily stress causes some muscles to be subjected to unilateral exertion to a higher degree than others. This in turn results in asymmetrical loading of the affected joints, which, in the long run, produces changes in the joint structure. This applies not only to the extremity joints or mandibular joints, but also to the facet joints and intervertebral disks.

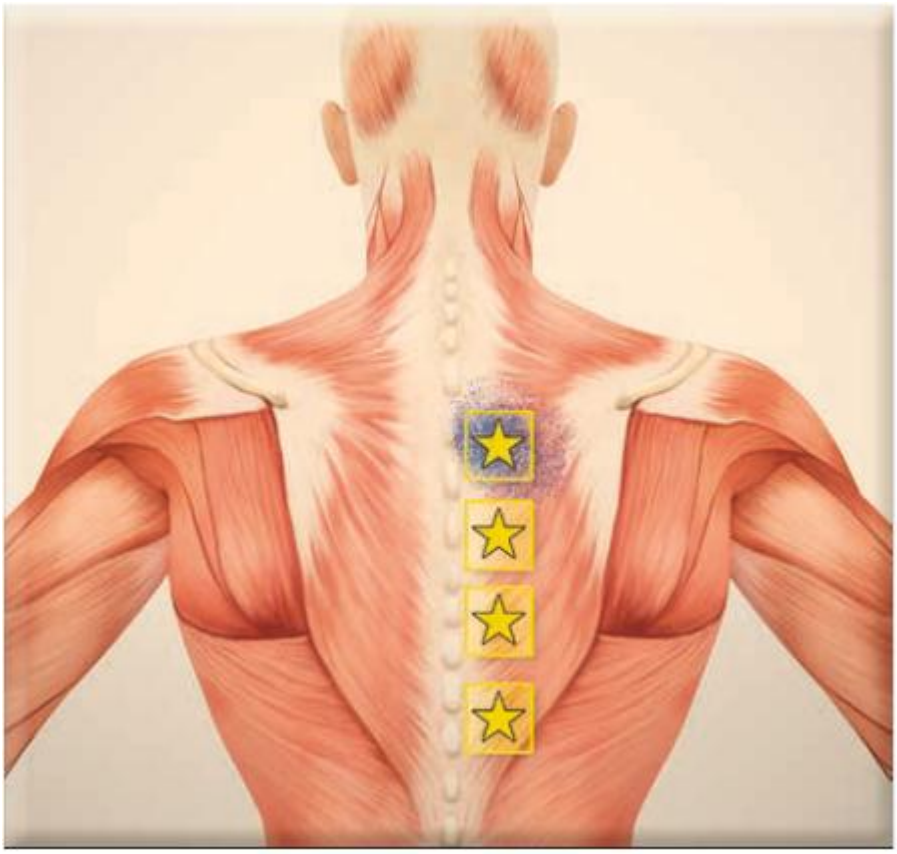

Fig. 1: ESW-induced regional pain referral from the paravertebral muscles of the thoracic spine (picture © STORZ MEDICAL)

Fig. 2: Trigger point diagnosis with the F-SW handpiece (picture © STORZ MEDICAL)

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Fig. 3: Treatment of calcific tendinitis / shoulder pain with the F-SW handpiece (picture © STORZ MEDICAL)

D: Studies have confirmed that over 80% of all upper and lower back pain syndromes are caused by muscular problems. This is why doctors should first find out whether patients have tensed or shortened muscles, postural anomalies or tender spots in muscles that are painful on palpation (trigger points).
But the clinical findings thus obtained depend to a great extent on the examiner and may be different when follow-up examinations are conducted by the same or by some other examiner, producing results that are not comparable, isn't that so?
K: Yes, absolutely. The diagnosis of muscle conditions by mere palpation, pressure testing, motion and angle measurements or based on the doctor's or physiotherapist's experience or assumptions alone should be a thing of the past. After all, we have always been aware of the fact that such subjective perceptions and assessments may involve many errors. Today, focused shock waves provide a viable technique for objective pain and trigger point diagnosis.

Fig. 4: Treatment of achillodynia / pain syndrome around the Achilles tendon with the R-SW handpiece (picture © STORZ MEDICAL)

D: So as a sports scientist you call for precisely verifiable or objectifiable measuring data?
K: Yes, that's right. Modern technology and today's standards enable us to conduct targeted analyses by means of electromyographic, isokinetic, coordinative examinations. Balance and biofeedback tests incorporating modern shock wave technology provide a range of precise and reliable objective measuring data that are readily retrievable any time.
D: What can you use these data for in your work as sports scientist and therapist?
K: Based on these data, we can develop a targeted and well-dosed muscle training programme that is tailored to the specific needs of the individual. Unfortunately, this new sports scientific knowledge and equipment has not gained wide recognition and application so far. In fact, most patients and athletes still receive entirely inappropriate uncontrolled training plans without precise measuring data for prevention and therapy. The therapist is left without any precise information and analysis and without any control or orientation. The result of all this is a haphazard treatment approach without any chance of success, causing an unnecessary increase in costs.
D: Is this situation comparable to the chaos of an unsystematic medication-based treatment performed over months and years without checking the dose and blood parameters, let alone its effects? There are medical guidelines designed to prevent such procedures. The 'best' example of an inappropriate approach in pain therapy is the still widespread – because convenient – use of injections instead of resorting to shock wave therapy.
K: In the past, one used to assume that athletes always had a well trained muscular system regardless of the type of sport they practised. But then, there

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are those who suffer from upper and lower back pain despite their sports activities. Precise muscle force measurements then reveal that the force of the postural muscles in these athletes does not even reach the levels that would be normal for their age. Many patients and athletes train in gyms or similar facilities without being familiar with any measuring data of their muscle force or of the intensity and frequency of their training sessions. So after having trained at gyms for years, many people are found to have force deficits and especially measurable dysbalances of the postural muscles, the starting point of myofascial pain syndrome.

D: You mentioned postural muscle dysbalances. These conditions are often associated with shortened muscles and myofascial tender spots in muscles that are painful on palpation. Can these muscle knots, which are also referred to as trigger points, be identified and documented with modern measuring systems? There have been tests using shear waves, produced by ultrasound waves, to verify the quality and quantity of muscular trigger points before and after shock wave treatment. However, this examination method is not mature enough at this stage, it is rather complex and thus very expensive. What would you suggest?

K: We continue to depend on the clinical symptoms, in other words the results we obtain by palpating the tender knots, the taut bands and the rather rare inconstant twitch response. The characteristic referred pain phenomenon is indicative of the presence of trigger points. In the past, I tried to induce this referred pain by manual pressure. Shock wave therapists treating myofascial problems prefer focused shock waves for diagnostic purposes because they are capable of reaching deeper layers. Radial shock waves cannot be directed at the target with pinpoint accuracy and they are not effective in deeper layers. Superficial trigger points are easy to induce, whereas more application pressure is required to produce referred pain from deeper trigger points. The referred pain we are able to induce is a reliable and reproducible diagnostic tool.

Fig. 5: Focused shock waves (F-SW) (picture © STORZ MEDICAL)

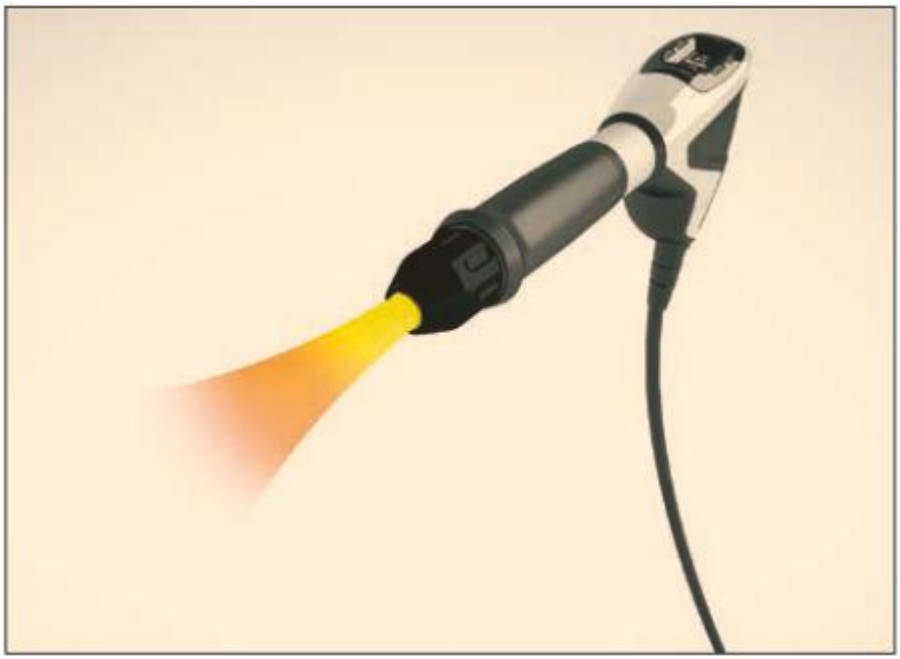

Fig. 6: Radial shock waves (R-SW) (picture © STORZ MEDICAL)

D: Shock wave therapy is the method of choice I am using in the treatment of the myofascial pain complex. This method is gaining increasing acceptance and popularity because high success rates confirm the effectiveness of the procedure.

K: Combined focused/radial shock wave technology has yielded excellent results in many medical practices for years and is a great asset in our daily work with patients. Therapists using this technology require a sound knowledge of anatomy, clinical experience as well as experience in differential diagnosis and skill. Especially the

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Fig. 7: DUOLITH® SD1 »ultra« – focused and radial shock wave therapy (picture © STORZ MEDICAL)

treatment of complex myofascial pain involves a continuous learning process on the part of the therapist. As doctors we need to be perfectly familiar with the different mechanisms of action and fields of application of radial and focused shock waves in order to ensure successful treatment.

D: One last question: as a sports scientist, what would you recommend people approaching you for advice, especially ageing patients?

K: Training of muscular capabilities and skills should take place on a regular basis, similarly to tooth brushing. The ideal approach would be to perform measurements of force relationships and posture at the beginning and in the course of a training cycle.

The following fact applies specifically to older patients: no optimum fat breakdown can be achieved without adequate muscle mass and muscular force. In physiological terms, muscle mass and, consequently, muscular force are known to decrease with increasing age. Nevertheless, muscle training will help to increase muscle mass and force in older people, too. This improves posture and eliminates pain as shortened muscles and painful trigger points are released.

Training up to the point of muscular exhaustion should be avoided by older people and should rather be left to ambitioned weight lifters and top athletes. Even lower levels of exertion (20 – 30 repetitions per exercise) are beneficial in individuals engaged in a normal level of physical activity. Training at 25% of maximum exertion is sufficient to improve cardiovascular fitness. While muscle building is minimal at this level, it helps to reduce undesired fat deposits, even if only to a minor extent. The latter effect is not only a cosmetic issue, it also improves the entire metabolic activity in the body.

D: Professor Karanikas, thank you for sharing your thoughts.

English translation of the original article in German "Orthopädie und Schmerztherapie – Das Interview. Fachgespräch zum Thema: Gezielter kontrollierter Muskelaufbau mit Standards einer modernen Trainingstherapie unter Einbeziehung der kombinierten Stosswellentechnologie beim myofaszialen Schmerzsyndrom " in: Orthopädie-Report, Sonderheft 2013/2014