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Shock Waves Today

The Journal for
Shock Wave Users
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Focus on »Physical
Tissue Stimulation«

»Physical Tissue Stimulation«
**Combine Therapy
Options and Achieve
More**

The New MAGNETOLITH®
**Extracorporeal
Magnetotransduction
Therapy (EMTT®) from
STORZ MEDICAL**

Interview
»Physical Tissue Stim-
ulation« with ESWT
and EMTT®: **Successes,
Strength of Evidence and
Future Development**

Sports Medicine
**DUOLITH® SD1 »ultra«
Serves the Sport, Exercise
Medicine and Lifestyle
Institute at the University
of Pretoria**

STORZ MEDICAL

»Physical Tissue Stimulation« in Musculoskeletal Diseases: Combine Therapy Options and Achieve More



A guest contribution by
Prof. Ludger Gerdesmeyer, MD, Kiel and
Martin Ringeisen, MD, Augsburg

The concept of »Physical Tissue Stimulation« has been discussed for some time now for the treatment of soft tissue diseases in the musculoskeletal region. This term refers to a complex treatment strategy with a combination of different treatment options and approaches.

Focused and radial shock wave therapy

Due to the very good evidence, shock wave therapy is one of the firmly established components. Numerous studies^{1,2,3} have repeatedly demonstrated its efficacy in various indications. In addition, further useful components with a complementary mechanism of action are available in the area of »Physical Tissue Stimulation«. As has been shown, some of them are particularly well suited as effective supplements to focused and

radial shock waves – especially when it comes to creating additive effects.

»Suction Wave Therapy«

VACU-ACTOR® vacuum therapy (»Suction Wave Therapy«) is used as a therapy measure to support for radial shock wave therapy, as it can be used to treat both chronic and acute pain conditions. It is particularly suitable for treating muscular overload damage and connective tissue structures.

Vibration therapy

Vibration and massage therapy with the V-ACTOR® handpiece serves to activate muscles and optimally complements radial shock wave therapy. Particularly in trigger point therapy, everyday practice reveals that very good results can be achieved.

Extracorporeal Magnetotransduction Therapy (EMTT®)

This new technique for the treatment of soft tissue and bone diseases generates a high-energy magnetic field that typically reaches intensities of up to 80 mT (millitesla). Another important parameter is the very high oscillation frequency, i.e. an extremely high frequency of individual magnetic oscillations per generated pulse. Our

placebo-controlled studies published in 2017 and 2018^{4,5,6} show the high potential of EMTT® – both as a stand-alone therapy and a supplement to focused shock wave therapy. Our data shows that, while both forms of treatment are successful in their own right, when they are combined they become even more successful in the treatment of soft tissue and bone diseases. ESWT and EMTT® have an additive profile.

Conclusion

These technologies are a useful complement to focused and radial shock wave therapy as they can effectively support it and thus contribute to an improvement in patient care.

Recommended reading ESWT

1 Galasso, O. et al., BMC Musculoskeletal Disorders, BioMed Central Ltd, 13:86, 2012.

2 Gollwitzer, H. et al., The Journal of Bone & Joint Surgery, Inc., 97(9):701-708, 2015.

3 Nedelka, T. et al., Neuroendocrinology Letters, 35(5):393-397, 2014.

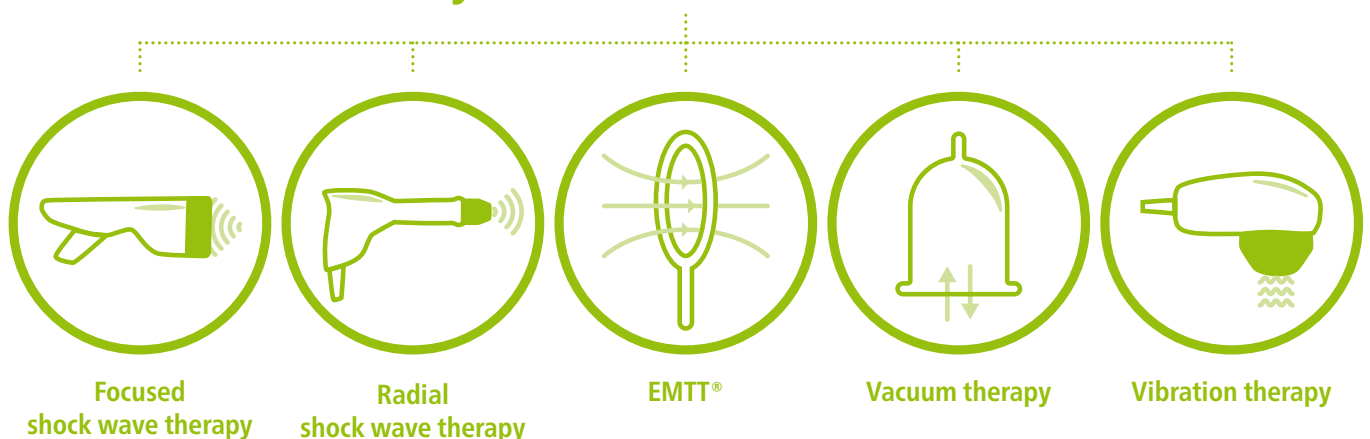
Recommended reading EMTT®/EMTT® and ESWT

4 Gerdesmeyer, L. et al., The Journal for Foot and Ankle Surgery, 56(5):964-967, 2017.

5 Klüter, T. et al., Electromagnetic Biology and Medicine, 37(4):175-183, 2018.

6 Krath, A. et al., Journal of Orthopaedics, 14(3):410-415, 2017.

Physical Tissue Stimulation



The New MAGNETOLITH®

Extracorporeal Magnetotransduction Therapy (EMTT®) from STORZ MEDICAL



Fatigue-free EMTT® treatment of the shoulder thanks to flexible holding arm

Extracorporeal Magnetotransduction Therapy (EMTT®) with MAGNETOLITH® is a non-invasive treatment solution that opens up new possibilities in regeneration and rehabilitation. The areas of application include chronic diseases of the musculoskeletal system such as lower back pain, tendinopathies of the rotator cuff or Achilles tendon. Due to its properties, EMTT® is also ideally suited as a supplement to extracorporeal shock wave therapy (ESWT), as is shown in current study data⁵.

Method

In the course of EMTT®, painful areas of the body are treated with high-energy magnetic pulses,

the field strength of which lies within the therapeutically effective range – of 10 mT (millitesla) and upward. The generated energy is transferred via an applicator to the body areas to be treated. With this pulse intensity it is possible to achieve a therapeutic effect in the cell. The individual pulses penetrate the tissue so that even deeper tissue layers can be reached. There is no temperature increase in the tissue, due to the short duration of the individual pulses.

Effect on the cell

EMTT® treatment can cause a positive cell modulation. Every cell undergoes chemical reactions that serve to generate energy. The prerequisite

for this is membrane permeability. A stable cell membrane ensures permeability for vital substances. A pathological change leads to dysfunction – a metabolic disorder that can ultimately lead to disease. The chemical reactions of the cell potential can be positively influenced by EMTT®. The sodium-potassium pump can be reactivated and physiological cell processes can be normalized.

EMTT® in everyday practice

The treatment requires little effort, is non-invasive and practically free from side effects. The treatment is comfortable and uncomplicated for patients. One session lasts between 5 and 20 minutes; depending on the indication, 6 to 8 sessions are required. The applicator is positioned on the region of the body to be treated without the need to remove clothing. The user can also employ the practical holding arm for fatigue-free treatment. The pulse intensity is adjusted depending on the clinical picture. After the first treatment by the doctor, further treatments can be carried out by qualified personnel.

Summary

EMTT® from STORZ MEDICAL expands the treatment portfolio of orthopaedic practices. Due to its properties, it is particularly suitable as a supplement to extracorporeal shock wave therapy (ESWT).



EMTT® treatment of the elbow



Treatment with the MAGNETOLITH®

At a Glance

- Fields of application: chronic diseases of the musculoskeletal system
- Non-invasive and outpatient
- Useful supplement to shock wave therapy
- Flexible holding arm for a fatigue-free treatment

Interview with Prof. Ludger Gerdesmeyer, MD

»Physical Tissue Stimulation« with ESWT and EMTT®: Successes, Strength of Evidence and Future Development

Prof. Ludger Gerdesmeyer, MD



Prof. Ludger Gerdesmeyer, MD, is a specialist in orthopaedics, trauma surgery, paediatric orthopaedics and sports medicine. He is Chief Physician of the Oncological and Rheumatological Orthopaedics Section of the Clinic for Trauma Surgery at the University Hospital Schleswig-Holstein (Kiel campus), an executive board member of DIGEST (the German-speaking International Society for Extracorporeal Shock Wave Therapy) and president of DIGEMTT® (the German-speaking International Society for Extracorporeal Magnetotransduction Therapy).

Prof. Ludger Gerdesmeyer, MD, is one of the leading experts in the field of »Physical Tissue Stimulation«, also known as »Soft Tissue Engineering«. In an interview, he explains the significance of extracorporeal shock wave therapy (ESWT) and the newly available Extracorporeal Magnetotransduction Therapy (EMTT®).

Prof. Gerdesmeyer, how do you assess the current evidence of the ESWT?

We have an evidence level 1 situation in almost all areas. The classic indications with very good evidence include heel spur, achilles tendon disease, shoulder tendon disease, frozen shoulder and bone treatments. ESWT is therefore one of the best studied forms of treatment, far ahead of any infiltration therapy or operation. Unfortunately it is still not seen as a first-line option, despite the excellent data position.

How has the quality of ESWT treatment improved in recent years?

Treatment options have improved on two levels. First, at the application level: Under the leadership of the professional societies DIGEST and ISMST (International Society for Medical Shock Wave Treatment), training curricula have been developed in which standardized treatment protocols were worked out for the individual indications. These and the guidelines for the treatment of different indications are based on existing evidence. This concerns the frequency application, the energy intensity as well as the time between applications and also implies, among other things, when radial treatment can be performed, and when focused treatment. The second improvement has been implemented at equipment level: Today, we have specific device components with very precise focus applications and reproducible applications of the individual therapies. We can apply them very precisely and determine how much energy is used in the treatment, and how precisely which area is targeted.

A new therapeutic option in the field of »Physical Tissue Stimulation« is Extracorporeal Magnetotransduction Therapy (EMTT®). You are already using the method and doing research into it. How do you assess the procedure?

Magnetotransduction therapy generates a high-energy magnetic field that can typically have an intensity of up to 80 mT and a very high oscillation frequency. According to our investigations into human cell cultures, these specific characteristics are necessary to produce any biological effect at all. We know from the available data that purely static magnetic fields cannot achieve a biological effect. A single intense magnetic field, such as is used in magnetic resonance imaging, has a single effect and is not clinically relevant. Only high frequency and re-

petitive therapy beyond single magnetic fields leads to a summation of these biological effects. These effects include all magnetically inducible electrical processes we have in the body. Another important aspect is that, with EMTT®, we can generate a non-contact induction of these metabolically active processes. This is not possible with conventional devices. I myself initially used EMTT® for pure pain therapy treatment in the musculoskeletal area. Here, it has been shown that the level of pain decreased significantly even after individual applications. This was the reason for proving efficacy by means of studies.

Can you briefly classify the results of the EMTT® studies you have conducted so far?

In the past four years, we have conducted several placebo-controlled studies on individual indications in the field of musculoskeletal degenerative diseases as well as basic work on human cell lines. As a result, we see a high potential for EMTT® both as a stand-alone therapy and as an adjuvant therapy with other methods such as ESWT. In this way, we were able to show that EMTT® works additively with ESWT: In the treatment of shoulder diseases, it was possible to significantly increase the established effect of ESWT with EMTT®.⁵ We were surprised at the size of the effect. One possible explanation for this is the differential effect of both methods on metabolic processes. ESWT works as a mechanotransduction therapy, while high-energy magnetic field therapy works as a magnetotransduction therapy. Both effects seem to have an additive effect. This work could set the trend in the field of »Soft Tissue Engineering«. We will see more work in the future showing such additive effects.

Do EMTT® and ESWT treat the same indications or are there differences?

EMTT® has a different treatment approach – it initially targets degenerative diseases. While



Extracorporeal Magnetotransduction Therapy generates a high-energy magnetic field.

ESWT is aimed at local inflammatory diseases such as enthesiopathy, tendon attachment disease or pseudarthroses, EMTT® takes a more regenerative approach to degeneration, i.e. joint diseases or degenerative muscle tendon diseases. Even in the overlapping indication areas, such as enthesiopathy of the rotator cuff, it will probably even be possible to achieve additive effects by taking a different approach if both forms of therapy are applied in parallel. In basic research, it has been possible to establish in cell-biological terms that magnetotransduction therapy has a very good effect on inflammatory processes, e.g. interleukin systems. Inflammatory promoters in the interleukin system are reduced, while anti-inflammatory reactions seem to be favoured. Here it could be shown

that – in the sense of anti-inflammatory therapy – the inflammation process as a whole is very favourably influenced by the magnetotransduction therapy. This could result in inflammatory processes in particular becoming the target of EMTT® treatment in clinical applications. These include, for example, all rheumatoid diseases. This concerns tendon insertion diseases, rheumatic diseases, diseases of the small joints (fingers, toes) or the resulting synovial diseases such as bursa disease of the knee, hip or finger joints. If the anti-inflammatory reactions in relation to the interleukin system can also be reproduced clinically, EMTT® may provide a form of therapy for which there is a wide range of indications in the field of rheumatology. Medication consumption might be significantly reduced if

EMTT® can be used to bear down on the soft tissue and inflammatory components.

How do you assess the future significance of ESWT in the field of »Physical Tissue Stimulation« and what do you expect from EMTT®?

Within the complex treatment strategy in the sense of what I call »Soft Tissue Engineering«, ESWT represents an established area with a very good evidence base. However, it only corresponded to some of the possibilities within the framework of this concept. We will see complex therapies here with multiple therapeutic approaches in the future. I think EMTT® is a very important therapeutic component. This allows significantly larger areas to be effectively influenced physiologically. This is mathematically possible up to a depth of 15 cm, so that not only the local pathology but also the accompanying inflammatory processes can be addressed. I believe that EMTT® will play an important role in the treatment of soft tissue diseases in the future. It remains to be seen to what extent other indications such as inflammatory processes or bone treatments will play a role and which additive forms of therapy are appropriate. Today, EMTT® is already being successfully used in various practice systems and clinics. There are now almost 20 treatment centres in Germany. The DIGEMTT® (the German-speaking International Society for Extracorporeal Magnetotransduction Therapy) emerged from this association. It has set itself the goal of standardizing the form of therapy, drawing up treatment protocols and subjecting further indications to clinical testing.

Thank you for the interview.

At a Glance

- ESWT: Evidence level 1 situation in almost all areas
- EMTT® technology generates a high-energy magnetic field (typically up to 80 mT).
- EMTT® studies: High potential as stand-alone therapy as well as adjuvant therapy with other procedures such as ESWT
- EMTT® works additively to ESWT
- »Physical Tissue Stimulation« includes multiple therapeutic approaches, ESWT and EMTT® are important components.



EMTT® targets degenerative diseases.



ESWT is used for local inflammatory diseases.

DUOLITH® SD1 »ultra« Serves the Sport, Exercise Medicine and Lifestyle Institute at the University of Pretoria



Sport, Exercise Medicine and Lifestyle Institute (SEMLI) at the University of Pretoria, South Africa

The University of Pretoria has identified sport, exercise medicine and lifestyle interventions for chronic disease as one of its four main strategic niche areas for research activity in the next decade. To realise this strategic goal the Sport, Exercise Medicine and Lifestyle Institute (SEMLI) was established in June 2015, under the directorship of Prof Martin Schweltnus.

The vision of the SEMLI is to be an international leader in scientific, translational research that promotes health and well-being in the population through lifestyle interventions, reducing exercise related injuries and medical complications, and promoting sporting excellence.

Fundamental to the success of the institute is its unique multi-disciplinary approach to research and scientific/clinical services, allowing constant interaction and collaboration between experts,



Prof Schweltnus is a renowned physician in the field of sports and exercise medicine and director of SEMLI

and fostering an invaluable culture of research informing best clinical practice, and vice versa.

Prof Schweltnus is a renowned physician in the field of sports and exercise medicine and is credited with the establishment of the first postgraduate training programme in Sports Medicine in South Africa, which was established at the University of Cape Town in 1989. Over the past 25 years, Prof Schweltnus has had a very active career in clinical service, teaching and research, for which he received international recognition. He is a former president of the South African Sports Medicine Association (SASMA), a former vice-president of the International Sports Medicine Federation (FIMS), and has served in the international Olympic Committee (IOC) Medical and Science Group for 14 years. For the past six years, Prof Schweltnus also served as the director of one of only four IOC-accredited international research centres. He has published more than 100 peer-reviewed articles in accredited international scientific medical journals and has supervised numerous master's and PhD students. He is a dedicated clinician who provides clinical care to athletes and patients with chronic lifestyle-related diseases through a comprehensive lifestyle intervention programme.

»Many randomized controlled studies have demonstrated the effectiveness and safety of both focused and radial Extracorporeal Shock Wave Therapy (ESWT), especially for the treat-

ment of musculoskeletal pathologies in sports medicine.«, explains Prof Schweltnus. »Today, ESWT with the DUOLITH® SD1 »ultra« is a well-established research and treatment option in our institute.«

To strengthen and support the University of Pretoria's commitment to the ESWT development it was decided to focus on

- Providing an environment where the value of further research on ESWT can support young sportsmen and women in an integrated and holistic manner.
- Providing facilities and expertise that will enhance the ESWT development and performance of sports talent on provincial, national and international levels.
- Leading and mentoring similar research initiatives/institutes countrywide and for the continent.
- Protecting and securing sustainable long term treatment results, based on sustained research.
- Conducting further ESWT research.
- Educating students and sports professionals in the potential use of ESWT.
- Supporting international ESWT workshop series

At a Glance

- Prof Schweltnus is a renowned physician in the field of sports and exercise medicine
- ESWT research at SEMLI

The New DUOLITH® SD1 »ultra«: Hardware Updates for the Future



The new DUOLITH® SD1 »ultra«: focus on user-friendliness

A new generation of the DUOLITH® SD1 »ultra« will be launched in autumn 2019. With the new hardware, the success story to date will be continued in the future. The functionality, the brilliant and high-quality design as well as the modularity remain unchanged.

The new control module – focus on user-friendliness

In future, the DUOLITH® SD1 »ultra« will have a PCAP display (projective capacitive touch). This type of multi-touch screen is built into all current smartphones and offers brilliant colours, flexible brightness and improved ease of use thanks to a more touch-sensitive surface.

A new motherboard, processor, graphics card and increased RAM make the DUOLITH® SD1 »ultra« more powerful above all and also offers scope for future expansion.

F-SW module – extended frequency range

The innovations make the focused module the most powerful module ever. The new and optimized CTU (Charge Trigger Unit) will in future allow focused modules to be generated to freely adjust the frequency independent of the

intensity levels. This significantly expands the treatment options for users. Users can make their treatment more flexible, adapt it individually to the patient and the indication, and apply more shock waves in a shorter time – a success for everyday work in practice.

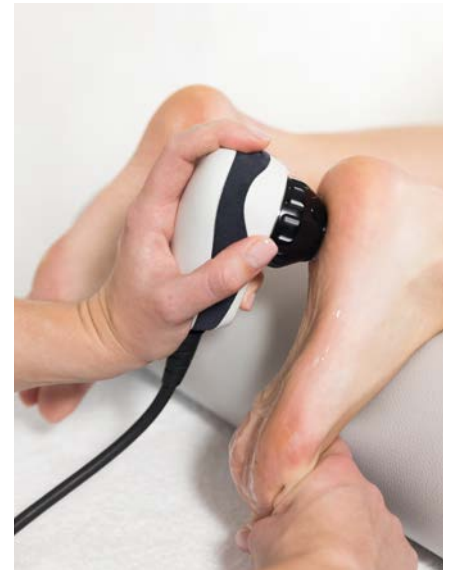
R-SW module – new forms of therapy

VACU-ACTOR® technology, which makes vacuum therapy possible, has already proven itself in the MASTERPULS® 200 »ultra« radial shock wave device. It has now also been integrated into the R-SW module of the DUOLITH® SD1 »ultra«. This allows agglutinated tissue layers and fasciae to be quickly released during treatment. VACU-ACTOR® technology is also suitable for the treatment of scars, which in turn brings with it new areas of application.

At a Glance

- More powerful control module with PCAP display
- Shorter treatment duration due to flexible adjustment of intensity and frequency
- VACU-ACTOR® technology

The New V-ACTOR® »HF« Handpiece for Vibration Therapy



Heel treatment with the new V-ACTOR® »HF« handpiece

STORZ MEDICAL has developed a new handpiece for vibration therapy. The V-ACTOR® »HF« handpiece can handle frequencies up to 50 Hz.

These improved performance characteristics can stimulate the entire tissue more strongly and increase microcellular metabolism and blood circulation.

The shape of the handpiece has been optically and ergonomically adapted so that it fits almost any hand. It is also easy to clean. Thus, the user can save valuable time.

The new V-ACTOR® »HF« handpiece is compatible with all current devices of the »ultra« series.

At a Glance

- Vibration therapy up to 50 Hz
- Ergonomic handpiece
- Easy to clean
- Compatible with all current devices of the »ultra« series

Keep the Following Dates Free:



September 2019

- **AAPSM 2019 – Meeting of American Academy of Podiatric Sports Medicine**
19 – 22 September 2019
Cambridge (MA), USA
www.aapsm.org
- **SHOCK WAVE Lodz**
20 September 2019
Lodz, Poland
- **International Summit for Shock Wave, Computer Assisted Orthopaedic Surgery and Regenerative Medicine and Regenerative Medicine**
21 – 22 September 2019
Kaohsiung, Taiwan
- **Stoßwellentherapie 4.0 plus**
28 September 2019
Vienna, Austria

October 2019

- **Salon Rééduca 2019**
3 – 5 October 2019
Paris, France
www.salonreeducacom
- **SHOCK WAVE Ukraine**
11 October 2019
Ivano-Frankivsk, Ukraine
- **SHOCK WAVE Tbilisi**
18 October 2019
Tbilisi, Georgia
- **DKOU 2019 – German Congress for Orthopaedics and Trauma Surgery**
22 – 25 October 2019
Berlin, Germany
<https://dkou.org/>
- **Impulse NVMST Shock Wave Congress Zwolle**
25 October 2019
Zwolle, Netherlands
- **SHOCK WAVE Seoul**
27 October 2019
Seoul, South Korea

November 2019

- **SHOCK WAVE Boston**
7 – 8 November 2019
Boston (MA), USA
- **MEDICA 2019**
18 – 21 November 2019
Düsseldorf, Germany
www.medica.de

December 2019

- **Zdravookhraneniye 2019**
2 – 6 December 2019
Moscow, Russia
www.zdravo-expo.ru/en/
- **GFFC – 27th International Symposium for Foot Surgery**
6 – 7 December 2019
Munich, Germany
www.gesellschaft-fuer-fusschirurgie.de
- **Multidisciplinary International Musculoskeletal Pain Congress 2019**
7 – 8 December 2019
Hong Kong
www.miamsk2019.com/en/

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