

# USER GUIDE

## orthogold100<sup>®</sup>

MTS Spark Wave<sup>®</sup> Therapy





MTS Medical UG, a committed leader in the advancement of electrohydraulic ESWT technology, specialises in the research, development and manufacturing of highly advanced Spark Wave Therapy systems. Our premium shock wave therapy systems, designed and equipped with MTS' own advanced Spark Wave Technology, are successfully used worldwide in the healthcare fields of orthopaedics, traumatology, wound care, aesthetics and urology.

Hospitals, clinics and practicing physicians from around world have realized, and prefer, the superiority of MTS Spark Wave Therapy systems. They know that MTS therapy systems guarantee the most effective shock waves for pain-free, high quality treatment as well as outstanding healing results in fewer treatment sessions. And, most importantly, patients realize the benefits as well.

Since 1998 MTS has collaborated with internationally renowned universities and research institutions and has become recognized as a pioneer in the field of non-invasive tissue healing and regeneration. It is the vision of MTS to improve the quality of life through advanced healing methods that drives us and will continue to guide us in the future.

Every premium MTS therapy system features our signature Spark Wave Technology. Additionally, MTS supports all customers with our dedicated and well-trained Technical Service and After Sales Support departments.

Witness. The Spark of Life.

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# 1. INTRODUCTION

## 1.1 BACKGROUND INFORMATION AND HISTORY

This manual supports the user of the orthogold100 with practical instructions and important information when using extracorporeal Spark Wave Therapy in medical practice.

Shock wave therapy is a multidisciplinary application that has been successfully used for decades in orthopaedics, physiotherapy, sports medicine, urology, dermatology and veterinary medicine.

Its main benefits are rapid pain relief, restoration of mobility as well as improved tissue regeneration and wound healing. It is a non-invasive, practically side effect- and painless therapy, ideal for accelerating the healing of various indications that cause acute or chronic conditions.

The recommendations and information given here are evidence-based, state of the art and in accordance with world renowned expert committees.

The term „shock wave therapy“ is historically derived from extracorporeal shock wave lithotripsy (ESWL), which was first used clinically in 1980 for the non-invasive disintegration of kidney stones.

Since the early 1990s, these acoustic waves have been used under the term extracorporeal shock wave therapy for the treatment of chronic pain and bone healing disorders. The spectrum of indications to be treated is still expanding. In the meantime, treatment of numerous orthopaedic conditions, chronic wounds, aesthetic applications and several urogenital indications including erectile dysfunction are acknowledged worldwide. Furthermore, cardiac and neural applications are being performed and investigated experimentally.

## About the ISMST – The International Society of Medical Shockwave Treatment

The International Society for Medical Shockwave Treatment (ISMST) is the most important society for shock wave applications with good cooperation of all national societies in many countries. The society promotes research and development of shock wave therapy worldwide. Annual congresses, certification courses and recommendations of the ISMST experts represent important guidelines for shock wave therapy. The ISMST recommendations and guidelines are available at

<https://www.shockwavetherapy.org/home/>

The spread of shock wave therapy and the ISMST continued enormously. With further indications of the successful therapy the spectrum of users and scientists enlarged from the trauma surgery and orthopaedics to the sports medicine, rehabilitation medicine, rheumatology, dermatology, plastic surgery, cardiology and veterinarian medicine.



## ISMST Consensus Statement on ESWT Indications and Contraindications – Status July 2020:

### INDICATIONS

#### 1. Approved standard indications

- 1.1. Chronic Tendinopathies
  - 1.1.1. Calcifying tendinopathy of the shoulder
  - 1.1.2. Lateral epicondylopathy of the elbow (tennis elbow)
  - 1.1.3. Greater trochanter pain syndrome
  - 1.1.4. Patellar tendinopathy
  - 1.1.5. Achilles tendinopathy
  - 1.1.6. Plantar fasciitis, with or without heel spur
- 1.2. Bone Pathologies
  - 1.2.1. Delayed bone healing
  - 1.2.2. Bone Non-Union (pseudarthroses)
  - 1.2.3. Stress fracture
  - 1.2.4. Avascular bone necrosis without articular derangement
  - 1.2.5. Osteochondritis Dissecans (OCD) without articular derangement
- 1.3. Skin Pathologies
  - 1.3.1. Delayed or non-healing wounds
  - 1.3.2. Skin ulcers
  - 1.3.3. Non-circumferential burn wounds

#### 2. Common empirically-tested clinical uses

- 2.1. Tendinopathies
  - 2.1.1. Rotator cuff tendinopathy without calcification
  - 2.1.2. Medial epicondylopathy of the elbow
  - 2.1.3. Adductor tendinopathy syndrome
  - 2.1.4. Pes-Anserinus tendinopathy syndrome
  - 2.1.5. Peroneal tendinopathy
  - 2.1.6. Foot and ankle tendinopathies
- 2.2. Bone Pathologies
  - 2.2.1. Bone marrow edema
  - 2.2.2. Osgood Schlatter disease: Apophysitis of the anterior tibial tubercle
  - 2.2.3. Tibial stress syndrome (shin splint)
- 2.3. Muscle Pathologies
  - 2.3.1. Myofascial Syndrome
  - 2.3.2. Muscle sprain without discontinuity
- 2.4. Skin Pathologies
  - 2.4.1. Cellulite
- 2.5. Skin calcinosis
- 2.6. Periodontal disease

- 2.7. Jawbone pathologies
- 2.8. Complex Regional Pain Syndrome (CRPS)
- 2.9. Osteoporosis

#### 3. Exceptional indications – expert indications

- 3.1. Musculoskeletal pathologies
  - 3.1.1. Osteoarthritis
  - 3.1.2. Dupuytren disease
  - 3.1.3. Plantar fibromatosis (Ledderhose disease)
  - 3.1.4. De Quervain disease
  - 3.1.5. Trigger finger
- 3.2. Neurological pathologies
  - 3.2.1. Spasticity
  - 3.2.2. Polyneuropathy
  - 3.2.3. Carpal Tunnel Syndrome
- 3.3. Urologic pathologies
  - 3.3.1. Pelvic chronic pain syndrome (abacterial prostatitis)
  - 3.3.2. Erectile dysfunction
  - 3.3.3. Peyronie disease
- 3.4. Others
  - 3.4.1. Lymphedema

#### 4. Experimental Indications

- 4.1. Heart Muscle Ischemia
- 4.2. Peripheral nerve lesions
- 4.3. Pathologies of the spinal cord and brain

### CONTRAINDICATIONS

#### 1. Focused waves with low energy

- 1.1. Malignant tumor in the treatment area (not as underlying disease)
- 1.2. Fetus in the treatment area

#### 2. High energy focused waves

- 2.1. Lung tissue in the treatment area
- 2.2. Malignant tumor in the treatment area (not as underlying disease)
- 2.3. Epiphyseal plate in the treatment area
- 2.4. Brain or Spine in the treatment area
- 2.5. Severe coagulopathy
- 2.6. Fetus in the treatment area

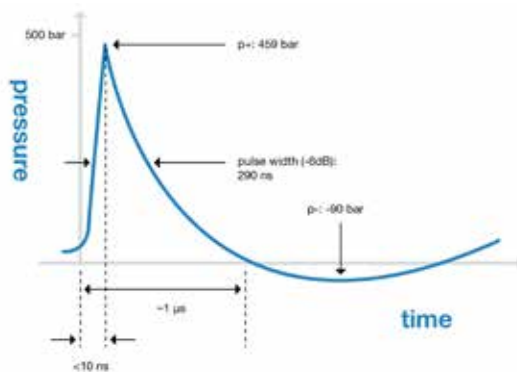
Source: <https://www.shockwavetherapy.org/about-eswt/indications/>

## 1.2 WHAT ARE SPARK WAVES®?

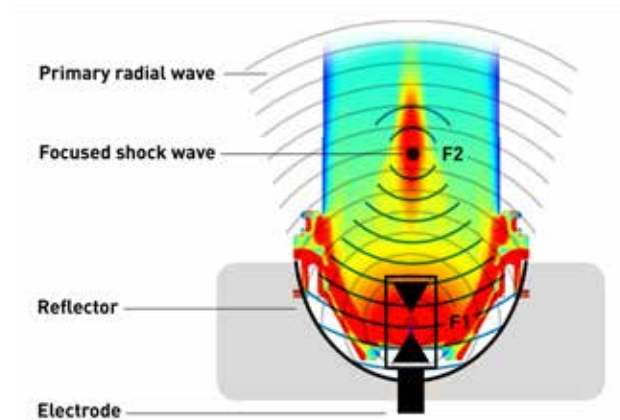
Spark Waves are high-energy acoustic waves that behave much like other sound waves except that they have much greater pressure and energy. The energy of a shock wave is released as pressure on the environment. This pressure wave builds up extremely quickly and consists of a very high positive and a minor negative part (Fig. 1.1.). The technology that generates the shock wave has a considerable influence on the energy distribution. Spark Wave Technology uses traditional electrohydraulic generation principles and ensures optimum energy composition and distribution; the pressure amplitude is mainly positive with only minimal negative tensile wave energy and provides regenerative energy not only in the focal area, but in the entire acoustic field extending from the spark source (Fig. 1.2.).

The original principle used in medicine is that in which the shock waves are generated by a spark plug, the electrohydraulic principle.

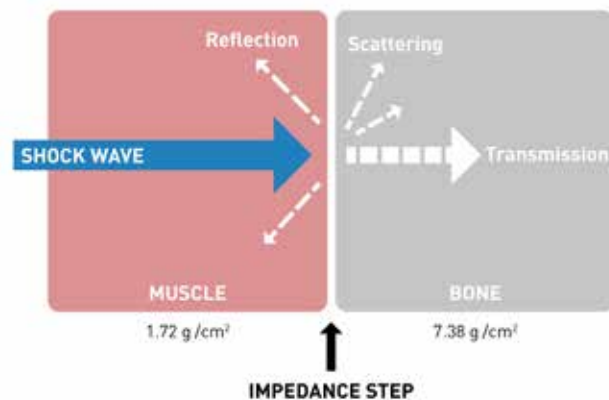
As with sound waves, Spark Waves can travel great distances with ease as long as the acoustic impedance stays the same. However, when the acoustic impedance changes, energy is released and the greater the change in impedance the greater the release of energy. There is a much higher release of energy at a soft tissue / bone interface than at a muscle / fascia interface (Fig. 1.3.).



**Fig. 1.1. Schematic Pressure Profile of a Focused Shock Wave.** Characteristic properties: Extremely fast rise of the curve, very high pressure, low negative wave compared to very high peak pressure.



**Fig. 1.2. Electrohydraulic Shock Wave Generation.** An electrode is placed in the first focal point of a water-filled semi-ellipsoid reflector and high voltage is applied to the tips of the electrode. Thereby, an electric spark is generated between these tips and a spherical shock wave is released by the rapid vaporization of the water between the tips. The shock wave spreads out from the applicator leading to a low intensity radial primary wave, followed by a focused shock wave with focus F2 which occurs due to the reflection of the spherical wave at the reflector. The colours display imaging by a DICOM (Digital Imaging and Communications in Medicine) MATLAB (matrix laboratory) simulation of the acoustic field with Spark Wave Technology. Red corresponds to the area with the maximum energy.

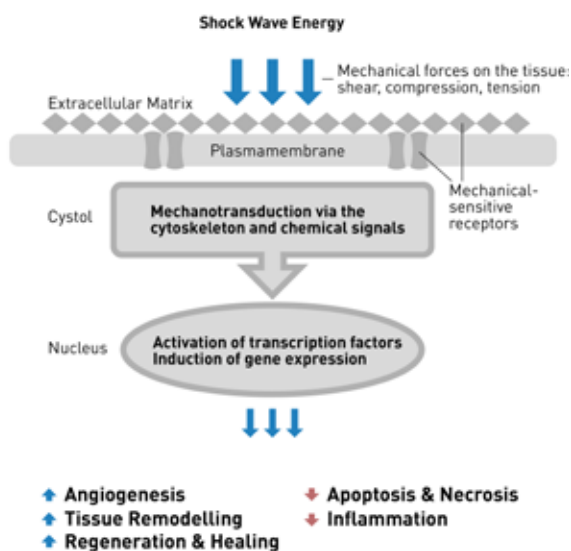


**Fig. 1.3. Acoustic Impedance.** As with other waves, the energy is released at interfaces, at those places where the waves from one medium meet another medium. These phenomena occur at the interfaces, which are also known from classical wave theory: Transmission (transverse waves, longitudinal wave), (partial) reflection, diffraction and / or deflection, scattering, wave velocity x density of the medium = acoustic impedance, pressure / tension wave, shear forces.

### 1.3 BIOLOGICAL AND THERAPEUTIC EFFECTS OF SPARK WAVES®

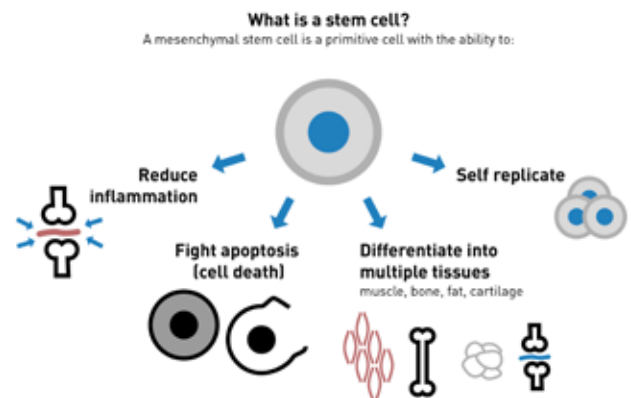
In regenerative medicine, the physical energy of Spark Waves is applied to all kinds of tissues at a desired depth and with an adjustable energy flux density (EFD), depending on the respective indication and pathophysiology. With its unique wide focus size, Spark Wave Technology delivers the highest possible amount of total biologically effective energy to the target area. This physical energy produces mechanical stimulation which is recognized by mechanoreceptors of the cell and transduced into various cellular responses: The expression and release of regeneration-associated molecules, like growth factors and other signaling molecules (chemokines and cytokines), are activated (Fig. 1.4.). All these factors trigger intracellular signalling cascades which are implicated in processes including metabolic activation, proliferation, migration and recruitment of mesenchymal and haematopoietic progenitor cells, which finally lead to improved angiogenesis, neovascularisation, tissue remodelling and regeneration (Fig. 1.5.).

Additionally, the anti-inflammatory as well as the antibacterial effect of Spark Waves, in combination with various other biological regeneration processes,



**Fig. 1.4. Mechanotransduction Mechanism - Phases of Spark Wave Therapy.** **1. Physical Phase:** Shock waves generate a positive pressure to generate absorption, reflection, scattering and transmission. **2. Chemical Phase:** The mechanical stimulus leads to biochemical reaction, biomolecules are released and cell signaling pathways are activated. **3. Biological Phase:** Modulation of angiogenesis, alteration of inflammatory response, bone and soft tissue healing.

support the natural self-healing of the diseased tissue. The efficacy of Spark Wave Therapy has been thoroughly proven in clinical studies and state of the art research has demonstrated its curative effects on orthopaedic indications.



**Fig. 1.5. Biological Function and Regenerative Potential of Stem Cells.** Spark Wave Therapy has a highly beneficial effect on most every kind of tissue. Spark Waves promote sustainable regeneration of blood vessels and skin as well as of musculoskeletal and nervous tissues, which has been widely proven by comprehensive research and numerous clinical trials.

### 1.4 SIDE EFFECTS OF SPARK WAVE® THERAPY?

No serious side effects have been reported by clinicians even when using highest energy settings; however, the following minor and transient side effects have been observed in very rare cases:

- Transient moderate increase in pain
- Redness and swelling
- Hematoma and petechial haemorrhage
- Headaches and fainting during extracorporeal shock wave treatments
- Short-term hypaesthesia
- Nausea during therapy
- Tingling during therapy

## 2. GENERAL TREATMENT INFORMATION

### 2.1 SPARK WAVE® THERAPY PARAMETERS

The Spark Waves generated by the applicator are transmitted through the skin into the tissue by using coupling gel. The penetration depth of the energy focus is preset on the device by the membrane pressure and can, if required, be manually increased in real time during the treatment by increasing the pressure of the applicator on the skin surface.

The direction and exact localisation of the focus are determined by a thorough clinical examination and pain description of the patient (feedback), ultrasound, x-ray or laser and general anatomical knowledge. A fixed position is important, a pause of the treatment is possible at any time. Specific information on recommended treatment parameters for individual indications can be found under Section 4 Treatment Protocols.

Musculoskeletal disorders require about 1 to 3 Spark Wave sessions. Many conditions respond very well and require only a few treatments, while others require more. The total number of treatments is case specific, no general predictions can be made. As long as the chronic condition continues to respond to the treatment, Spark Wave Therapy should be continued.

The healing and remodelling of tissue are processes that take months, so the full therapeutic effect of Spark Wave Therapy naturally starts a few weeks after the treatment.

### 2.2 TREATMENT PROCEDURE

During therapy, the Spark Waves should be directed into the affected tissue region and adjacent areas with maximum therapeutic energy. During the entire treatment, it is important to ensure good coupling between the applicator and the skin. The applicator is then moved slowly in a circular motion on the skin. This ensures an even distribution of energy throughout the treatment area and at the same time a firm contact without air entering between the membrane and the skin. When treating large areas, it may be necessary to reposition the membrane at different points. The applicator should always be moved smoothly and can be angled up to 20 degrees from the vertical when it is moved across the treatment site.

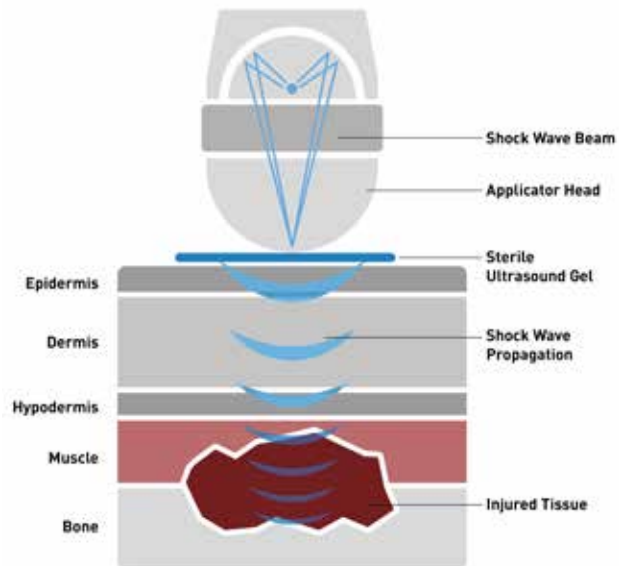


Fig. 2.1. Schematic Representation of Musculoskeletal Treatment with Spark Wave Therapy.



## 2.3 APPROVED INDICATIONS OF THE ORTHOGOLD100®

orthogold100 utilizes two specially designed applicators, each to treat a specific set of orthopaedic indications.

### Soft-focused applicator OE035

Perfectly suited for the treatment of

- Myofascial trigger point syndrome

### Focused applicator OE050

Perfectly suited for the treatment of

- Impingement syndrome with or without tendinosis calcarea (calcifying tendinitis)
- Epicondylitis humeri radialis and ulnaris (tennis elbow)
- Patella tendon syndrome
- Plantar fasciitis and heel spur
- Achillodynia
- Pseudarthrosis in small bones (also infected and in the chronic state)

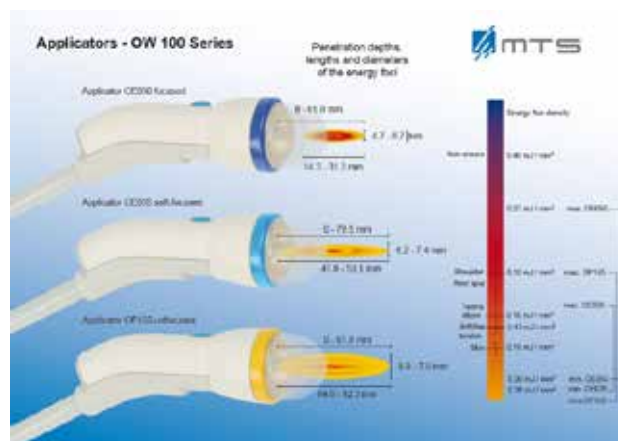
## 2.4 INDIVIDUAL SPARK WAVE® APPLICATORS

All MTS applicators feature MTS's highly sophisticated SmarTrobe® technology, which provides consistent Spark Wave performance quality.

The OW100 / OW100S Series utilizes three specially designed applicators, each to treat a specific set of indications.

Applicators are easily interchangeable with the device and offer the user an economical and practice-oriented treatment.

The applicator OE050 / OE050S and the OE035 / OE035S are perfectly suited for musculoskeletal applications. The OP155 / OP155S applicator is especially effective for dermatological and urogenital indications.



**Fig. 2.2. Individual OW100 / OW100S Applicators, Focus Sizes, Penetration Depths and Application Areas.** The applicator OE050 / OE050S and the OE035 / OE035S are perfectly suited for musculoskeletal applications. The OP155 / OP155S applicator is especially effective for dermatological and urogenital indications.

## 3. TREATMENT PROCEDURE

### 3.1 NO LOCAL ANAESTHETICS

Spark Wave Therapy for musculoskeletal disorders may be uncomfortable in some cases. Nevertheless, pain anaesthesia is usually not necessary for the treatment, as patients tolerate the therapy very well. If necessary (e. g. in a highly sensitive patient), the energy level and frequency for the initial pulses can be reduced and then gradually increased.

For high-energy applications, such as the treatment of pseudoarthrosis, local anaesthesia may be necessary. Please note that local infiltration of anaesthetics into the treatment area may decrease the response rate of the therapy.

### 3.2 PREPARATION OF THE TREATMENT SITE

- Shave the hair if necessary to avoid air bubbles in the treatment area.
- Localise the treatment target by patient feedback, ultrasound, x-ray or laser.
- Measure the required penetration depth of the focus and adjust the membrane pressure of the applicator accordingly.
- Apply generous amounts of ultrasound gel to the treatment site. The gel can be re-applied as required to ensure good membrane / skin coupling.
- Perform the treatment according to the recommended protocol (see chapter 4 Treatment Protocols Table 4.1.).
- Also follow the instructions and information in the user manual.

- MTS also recommends reviewing the latest ISMST and Digest (Deutschsprachige internationale Gesellschaft für Extrakorporale Stoßwellentherapie) guidelines, as well as up-to-date expert literature for the treatment of advanced orthopaedic indications with shock wave therapy.

### 3.3 AFTER THERAPY

Treatment according to current standards and as indicated by the treating physician is applied. For example, physical therapy, drug treatment (painkillers), further immobilization (plaster, fixator, ...) with relief or additional thrombosis prophylaxis in case of bone fracture management can be recommended.

No special instructions regarding shock wave therapy are necessary for the patient.

### 3.4 MONITORING AND FOLLOW-UP

Regular monitoring e. g. by imaging procedures should be arranged after the sessions. The treatment data should be recorded precisely.

If there is no improvement in the condition, alternative therapies should be considered.



**Fig. 3.1. Spark Wave Therapy for Impingement Syndrome.**



**Fig. 3.4. Spark Wave Therapy for Plantar Fasciitis.**



**Fig. 3.2. Spark Wave Therapy for Epicondylopathy.**



**Fig. 3.5. Spark Wave Therapy for Achillodynia.**



**Fig. 3.3. Spark Wave Therapy for Patella Tendon Syndrome.**



**Fig 3.6. Spark Wave Therapy for Myofascial Trigger Point Syndrome.**

## 4. TREATMENT PROTOCOLS

Indication	Energy Range [mJ / mm <sup>2</sup> ]	Frequency [Hz]	Impulses / Session	Number of Sessions	Treatment Interval
<b>4.1 Impingement syndrome with or without tendinosis calcarea (calcifying tendinitis)</b>	0.15 - 0.27	2 - 4	1000 - 1500	1-3	1 - 2 weeks
Recommended applicator: OE050 / OE050S					
<b>4.2 Epicondylitis humeri radialis and ulnaris</b>	0.10 - 0.16	2 - 4	800 - 1200	1-3	1 - 2 weeks
Recommended applicator: OE050 / OE050S					
<b>4.3 Patella tendon syndrome</b>	0.10 - 0.19	2 - 4	1000 - 1500	1-3	1 - 2 weeks
Recommended applicator: OE050 / OE050S					
<b>4.4 Plantar fasciitis &amp; heel spur</b>	0.10 - 0.27	2 - 4	1000 - 1500	1-3	1 - 2 weeks
Recommended applicator: OE050 / OE050S					
<b>4.5 Achillodynia</b>	0.10 - 0.19	2 - 4	1000 - 1500	1-3	1 - 2 weeks
Recommended applicator: OE050 / OE050S					
<b>4.6 Myofacial trigger point syndrome</b>	0.10 - 0.27	2 - 4	300 - 400 pulses per MTrP	3 - 8	1 - 2 times/week
Recommended applicator: OE035 / OE035S					
<b>4.7 Pseudarthrosis in small bones (also infected and in the chronic state)</b>	0.20 - 0.27	2 - 4	-2500 - 4000	1	2nd and 3rd treatment possible after 3 to 6 months
Recommended applicator: OE050 / OE050S					

**Table 4.1. Recommended Treatment Parameters for Orthopaedic Indications.**

## 5. MEDICAL INFORMATION

### 5.1 IMPINGEMENT SYNDROME WITH OR WITHOUT TENDINOSIS CALCAREA (CALCIFYING TENDINITIS)

Impingement syndrome is defined as a group of symptoms in the shoulder including progressive pain and impaired function, resulting from inflammation of or injury to the rotator cuff that causes encroachment by surrounding bony structures and ligaments, such as the acromion.

Calcifying tendinitis is characterised by calcareous deposits in tendons and tendon attachments. They occur particularly at the rotator cuff of the shoulder joint, also known as calcified shoulder. The supraspinatus tendon is most frequently affected.

Treatment of impingement syndrome of the shoulder can be conservative, pharmacological or surgical (e. g. needling of the calcium deposit, arthroscopic resection, open resection). Conservative treatments must be carried out before surgical procedures are performed. Spark Wave Therapy is an efficient and safe method of first choice.

The patient should be explicitly advised of the risk of tendon rupture in the case of previous damage and premature sports performance after treatment.

### 5.2 EPICONDYLITIS HUMERI RADIALIS AND ULNARIS (TENNIS ELBOW)

Epicondylitis refers to a painful condition of several tendons in the area of the elbow. Symptoms are the pressure pain on the outside of the elbow, the joint can no longer be fully stretched and the weakness of the wrist. The main causes of this are overstrain due to repetitive movements in the elbow joint, such as frequent computer work (especially mouse work), musicians (such as violinists) or sportsmen (such as rowers, golfers or tennis players).

Treatment of epicondylitis can be conservative, pharmacological or surgical (e. g. tendon notch denervation). Conservative treatments must be carried out before surgical procedures are performed. Spark Wave Therapy is an efficient and safe method of first choice. Avoid direct focus on the ulnar nerve.

### 5.3 PATELLA TENDON SYNDROME

The patella tip syndrome (jumper's knee, patellar tendonitis) develops when the patellar tendon (patellar ligament) is irritated by unaccustomed or excessive tension forces. For example, in sports that involve intensive jumping (basketball, volleyball), activities that involve many stop-and-go movements (tennis, badminton) or quick changes in direction (football).

Treatment of patella tendon syndrome can be conservative, pharmacological or surgical (e. g. debridement of the tendon, denervation of the tendon / refixation). Conservative treatments must be carried out before surgical procedures are performed. Spark Wave Therapy is an efficient and safe method of first choice.

The patient should be explicitly advised of the risk of tendon rupture in the case of previous damage and premature sports performance after treatment.

### 5.4 PLANTAR FASCIITIS AND HEEL SPUR

Plantar fasciitis occurs when the strong band of tissue that supports the arch of your foot becomes irritated and inflamed. Heel spurs occur when calcium deposits build up on the underside of the heel bone. Heel spurs are often caused by strains on foot muscles and ligaments, stretching of the plantar fascia, and repeated tearing of the membrane that covers the heel bone. Plantar fasciitis is more common in runners. People who are overweight and those who wear shoes with inadequate support also have an increased risk of plantar fasciitis.

Treatment of plantar fasciitis can be conservative, pharmacological or surgical (e. g. plantar fascia release, osteotomy of the spur). Conservative treatments must be carried out before surgical procedures are performed. Spark Wave Therapy is an efficient and safe method of first choice.

## 5.5 ACHILLODYNIA

Achillodynia is the pain syndrome of the Achilles tendon. It is usually caused by overloading of the tendon. Athletes often suffer from achillodynia, especially during intensive running training. But not only runners and other athletes are affected.

Overweight people also often have problems with the Achilles tendon. Rheumatism and foot malpositions can be further triggers for achillodynia.

Treatment of Achillodynia can be conservative, pharmacological or surgical (e. g. debridement of the tendon, stabbing of the tendon, refixation). Conservative treatments must be carried out before surgical procedures are performed. Spark Wave Therapy is an efficient and safe method of first choice.

The patient should be explicitly advised of the risk of tendon rupture in the case of previous damage and premature sports performance after treatment.

## 5.6 MYOFASCIAL TRIGGER POINT SYNDROME

The myofascial pain syndrome is an acute and chronic pain disorder of the skeletal muscles. Pressure on sensitive points in the muscle (trigger points) causes pain and sometimes distant parts of the body. This is called referred pain.

This syndrome typically occurs in acute and chronic overloading, overstretching, direct trauma or unphysiological stress on the musculoskeletal system. Clinical examination (mobility, senso-motoric, specific stretching test). Palpation is the gold standard of clinical examination of muscles and fascia including trigger point diagnostics. Spark Wave Therapy can be also used as diagnostic tool.

Treatment for myofascial pain syndrome typically includes medications, trigger point injections or physical therapy. Spark Wave Therapy is an efficient and safe method of first choice.

## 5.7 PSEUDARTHROSIS IN SMALL BONES (ALSO INFECTED AND IN THE CHRONIC STATE)

Pseudarthrosis is the more or less mobile discontinuity of a bone, which results from the insufficient bony consolidation of a fracture. Called also false joint.

The cause is usually insufficient immobilization of the fracture, either due to insufficient fracture care or lack of compliance with too early loading. It leads to delayed callus formation. Other possible causes include soft tissue in the fracture gap, local circulatory problems, infections such as osteomyelitis, diabetes mellitus, peripheral arterial disease (PAD).

Pseudoarthrosis is only referred to when the fracture gap persists for more than six months. Until then, one speaks of delayed fracture healing.

After ESWT, the pseudarthrosis should be immobilised exactly between 3 and 5 weeks, depending on the localisation, in order not to endanger the newly sprouted in capillaries (this can result in relief for this period, especially in the area of the lower extremity).

## 6. SUMMARY

### 6.1 TREATMENT WITH ORTHOGOLD100® STIMULATES HEALING PROCESSES AT THE CELLULAR LEVEL

- Activating endogenous growth factors (e. g. BDNF, BMP, FGF-2, IGF-1, NO, PCNA, PLGF, TGF-β, VEGFs)
- Inducing stem cell proliferation and migration
- Stimulating neovascularisation and angiogenesis
- Enhancing blood circulation and cell metabolism
- Reducing cell apoptosis and tissue necrosis
- Acting anti-inflammatory and antibacterial
- Stimulating the catabolism and the natural anabolic growth function of tissues (blood and lymphatic vessels, skin, connective tissue, bones, cartilage, tendons, joints, smooth and striated muscles, nerves ...)
- Promoting tissue remodelling and regeneration

### 6.2 BENEFITS OF ORTHOGOLD100® AT A GLANCE

- Safe and effective therapy system for regenerative medicine
- Effective treatment of acute or chronic tendinopathies and musculoskeletal disorders
- Increases muscle resilience and performance capacity
- Promotes wound healing
- Non-invasive, tissue-conserving, painless and highly efficient method to enhance musculoskeletal tissue remodelling and regeneration
- Activates the metabolism and proliferation of progenitor cells
- Improves blood circulation and tissue perfusion
- Regenerative and anabolic action
- Anti-inflammatory and antibacterial effect
- Analgesic power
- User-friendly and patient-convenient
- Premium MTS Spark Wave® Technology

## 7. BIBLIOGRAPHY

### 7.1 RECOMMENDED LITERATURE

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