



## **evocell – the Key for your Body**

Mülheim an der Ruhr, May 2023

### **Shock Waves activate the body's own regeneration**

A central goal of worldwide research is the side-effect-free as possible, non-invasive therapy of diseases.

## Agenda

### evocell – a long wave to success

1. Technical Informationen
2. Mode of Action
3. Study Situation
4. Example Sports / High Professionals

### Medical Product for Health

5. The Future

## Literatur

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### Medical Product for Health

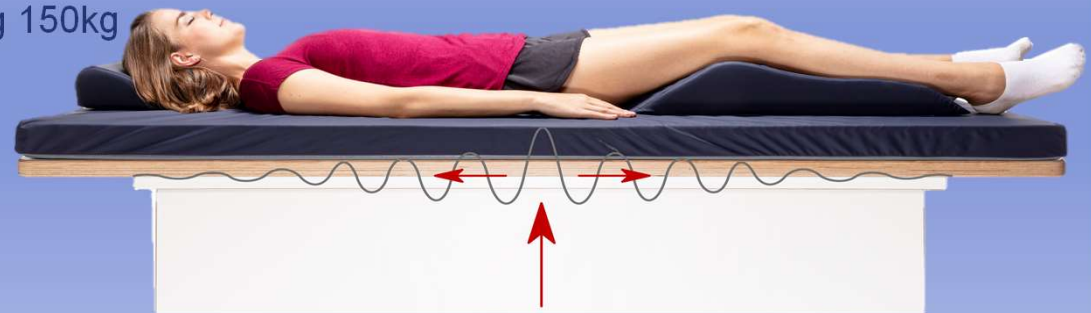
5. The Future

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Mechanotransduction-Couch to **stimulate** the whole Body or **supportive treatment** in physiotherapeutical oder sporting Area.

- Low-Energy
- High Frequency (8-37 Hz)
- Adjustable in 1-Hz Steps
- Lifting-Height frequency- and weight dependent (0,3-1,9mm)
- According to EN 60601-1 (Medical Device)
- Time-Switch 1-60 Minuts (Ø15-20 Min)
- Programm-Function
- Sound Emission at the Head: 67dB(A), at 100-kg Weight
- Max. Payload: standing 125kg, lying 150kg
- Nominal Voltage: 230V AC
- Fuse: T3.15AL250



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### User-friendly terminal:

- Easy handling
- Individual programs for patients/clients
- Flexible control
- Emergency stop switch
- Programs tailored to the customer
- The evocell-couch requires little electricity

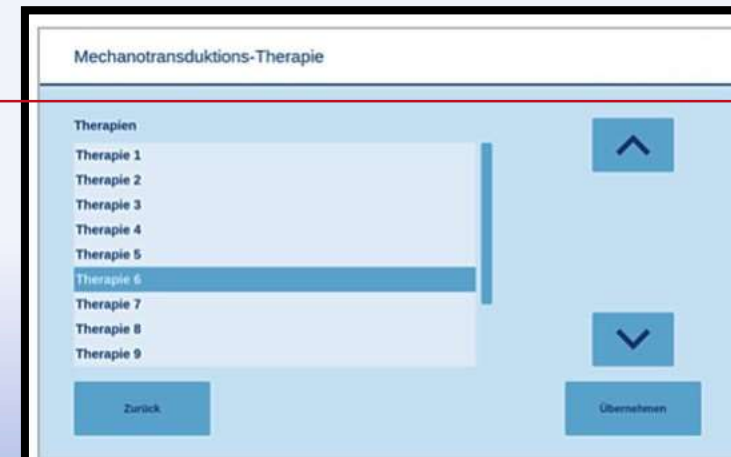
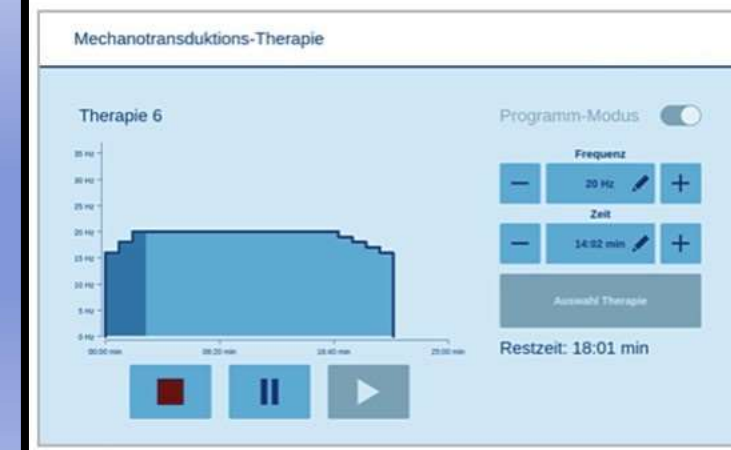


Abbildung 16: Auswahl Therapie



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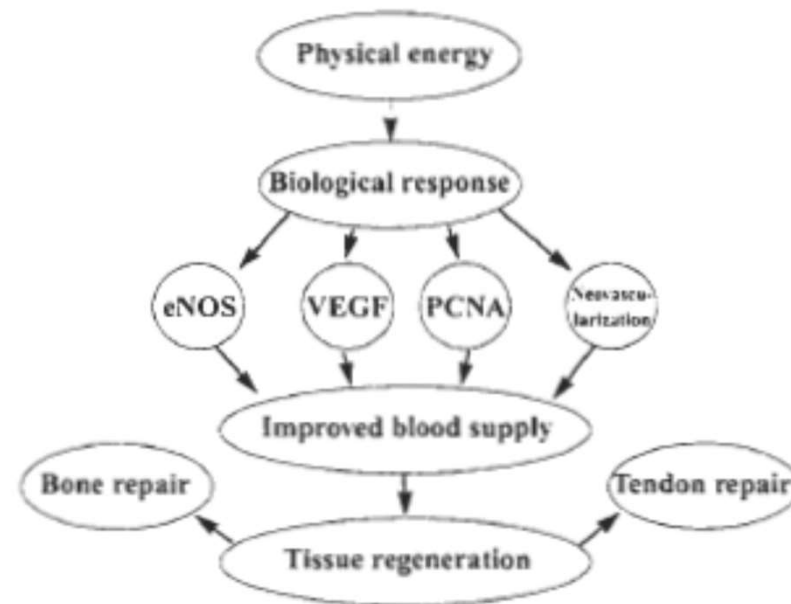
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### Extracorporeal Shock Waves

- Since 1966 in the Medicin
- 1980 in vivo on Humans
- Energy Flux Density decisive
- 65% Energy are transmitted in cortical bone
- Cavitation effects
- focused & radial a.E. for decalcification and in tendinopathies



**Fig. 6** The mechanism of shock wave therapy appears to involve a cascade of interaction between physical shock wave energy and biologic responses.

Wang, 2003

## Extracorporeal Shock Wave

### Focused Shock Waves

- High penetration depth
- Short sound pulses
- Highly energetic
- 2-4 Hertz (aber auch bis 35 Hz)

### Radial Shock Waves

- By Definition more a pressure wave
- Medical Technical Term: Shock Wave
- Low energy – high effect
- Well tolerated by the body

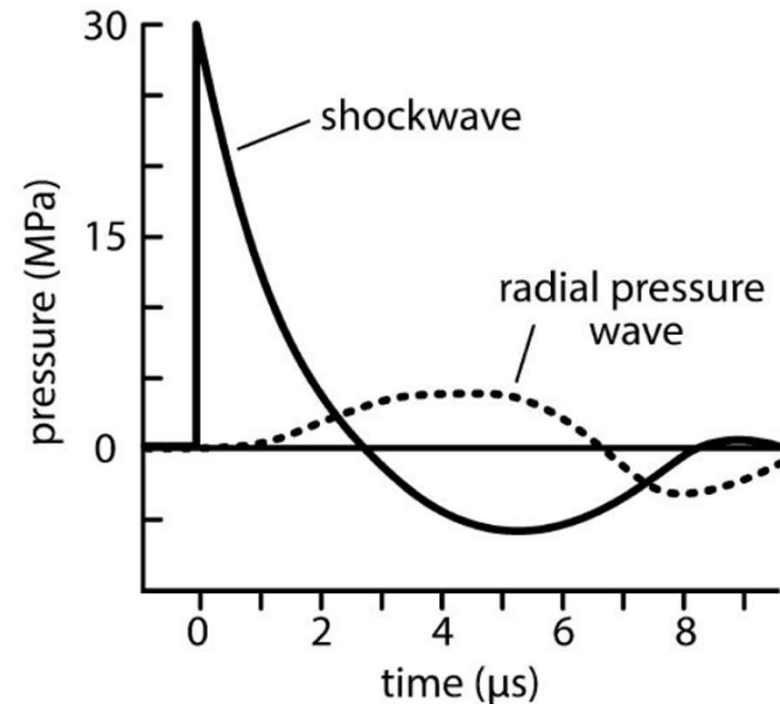
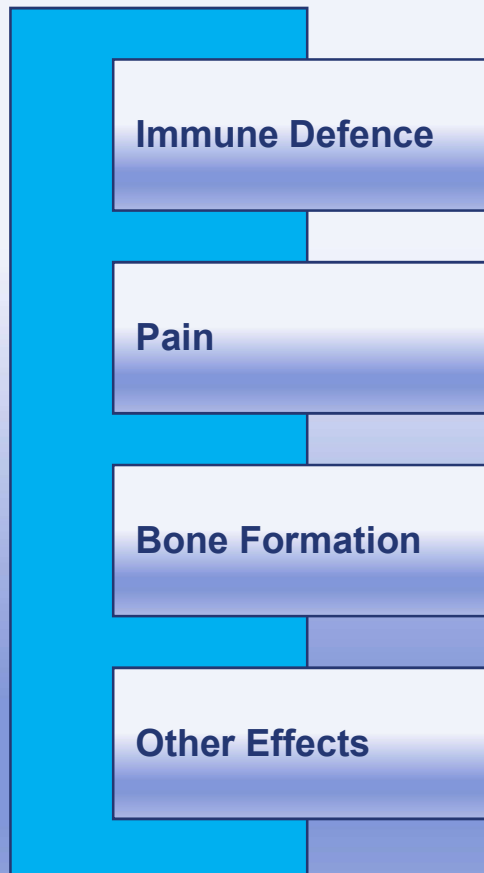


Fig. 2  
Illustration showing the difference in pressure waveform between a shockwave and a radial pressure wave as used in medical applications.



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- Reduction Leukozyten-Migration
- Less Zytokine, Interleukine and Chemokine
- Reduction body's inflammatory response
- Hyperstimulation of the analgesics
- Edema, Swelling-and inflammation reduction
- Genexpression TGF-beta 1 and IGF-1
- Stimulation Osteoblasten-Aktivität
- Encourage, Propagation & Spread
- Neovascularisation (Wound Healing)
- Education Neurotransmitter (Nitric Oxide)
- Tenozyten Suggestion → Tendinitis repair (Banes et al., 1999)
- Basic Alignment of all Cells

## Extracorporeal Shock Waves



„Therefore it seemed likely that physical shockwaves raise the mechanotransduction and convert into biological signals that lead to a cascade of biological responses in tendons.“

Notarnicola & Moretti, 2012

„These findings seem to indicate that tendon tissue can convert SW stimulation into biochemical signals via release of TGF- $\beta$ 1 and IGF-1 for tendinitis repair.“

Banes et al., 1999

„ESWT-treated tissue had more small, newly formed collagen fibrils and a greater expression of TGF $\beta$ 1 (4 weeks later, horses).“

Caminoto et al., 2005

„TGF1 has been reported to act as a potent inhibitor of extracellular matrix degradation and inflammation during the healing of a wound.“

Feinberg et al., 2000

„Higher fibroblast proliferation, mRNA expression high for TGF1 $\beta$ , collagenous type 1 & 3. Tissue repair seems to be stimulated by ESWT.“

Berta et al., 2009

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### Mechanotransduction

- Effect of Shock Waves
- Indirect action as an activator of a cell response
- Causes cellular restructuring of the ECM and also of the cell components
- Neovascularisation, increased blood supply
- Initiated Migration, Proliferation, Differentiation as well as apoptosis
- Over 80% of all „Cell Building Blocks“ are mechano-sensitiv

### Mechanoreception

- Recording the mechanical signals
- Extra- & Intracellulare Receptors

### Signaltransduction

- Signal-Forwarding down to the cell nucleus
- Ütransmission through ECM in the Form of tensile forces

### Proteinexpression

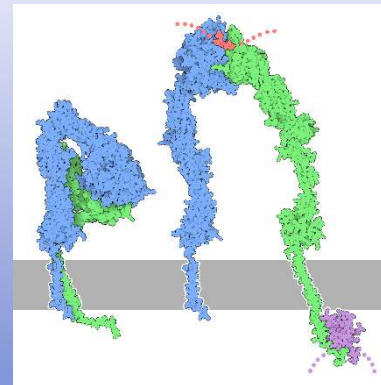
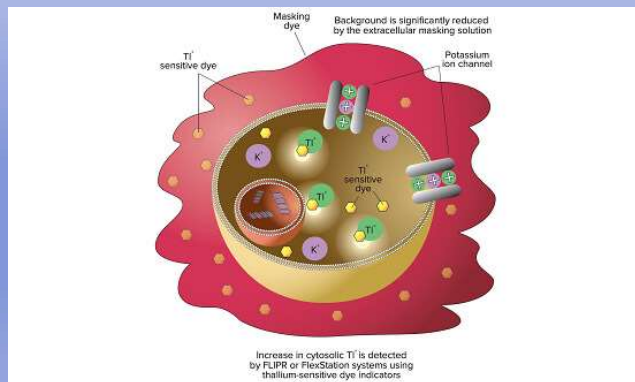
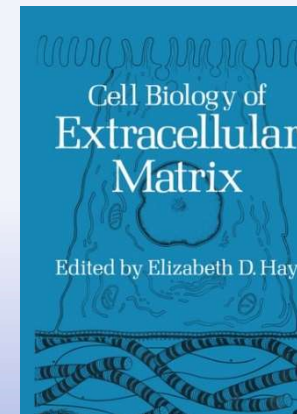
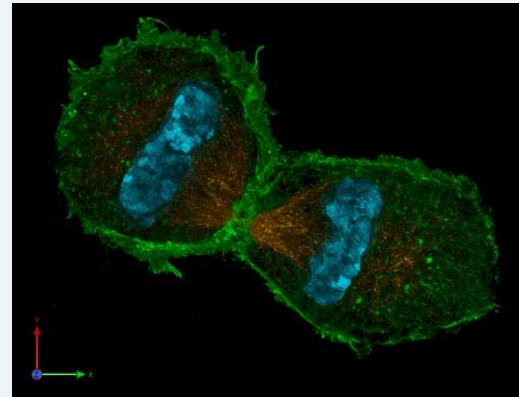
- Signal Processing inside the Cell
- Effective Cell-Answer



## Mechanotransduction

### Mechanosensitive Building Blocks:

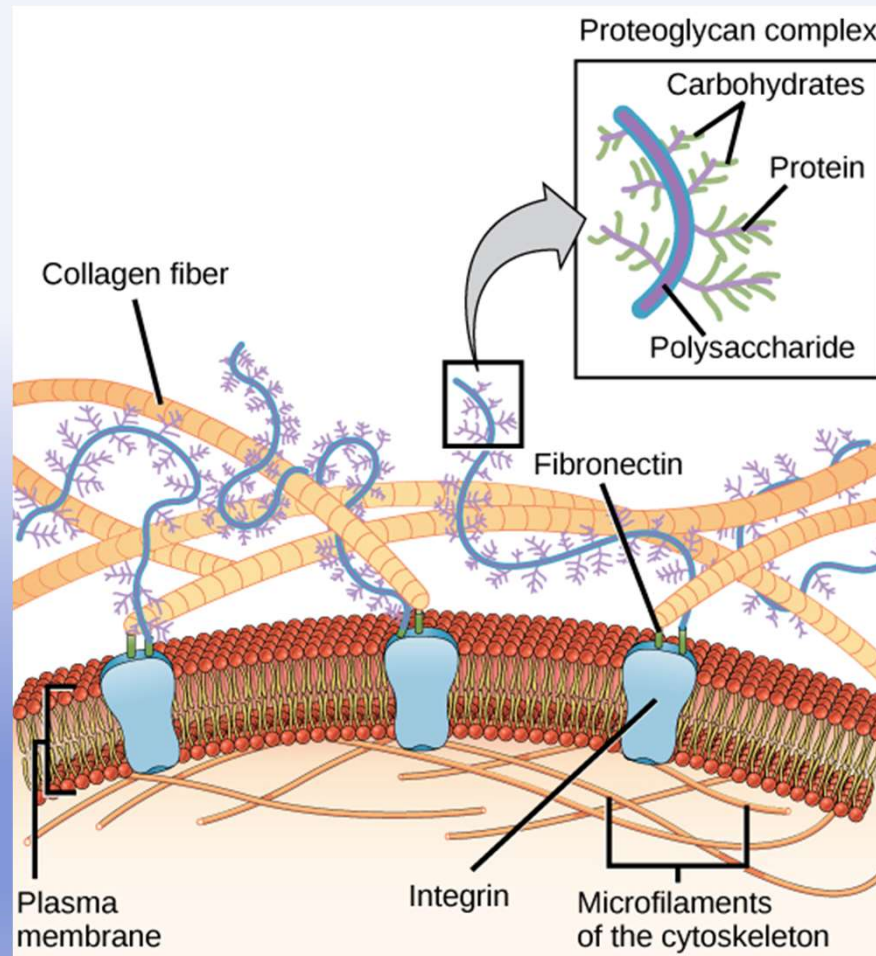
- Extracellular Matrix
- Integrins
- Focal Adhesions
- Ion channel
- Cytoskeleton
- Transmembrane proteins



## Mechanosensitive Building-Blocks – The Extracellular Matrix (ECM)

### Extracellular Matrix:

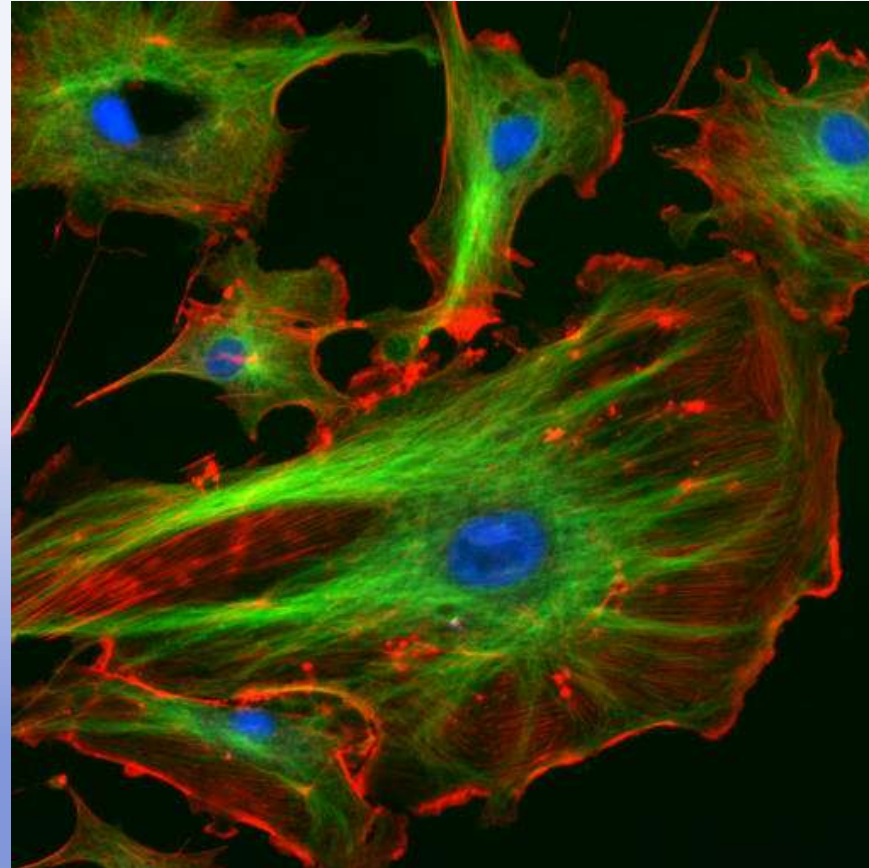
- Hold Cells together
- Captures Cells
- Cells adhere
- Signal-Routing
- Interaction of cell surfaces-receptors and the Cytoskeleton
- Control of cell growth
- Constantly up and down of the ECM



## Mechanosensitive Building-Blocks – Cytoskeleton

**The Cytoskeleton=**  
intracellular scaffold of  
proteins

- Take and maintain form
- Maintain polarity
- Maintain spatial relationship of cell organelles
- Intracellular transport
- Contraction
- Movement, migration
- Eukaryotic cytoskeleton



Quelle: Wikipedia

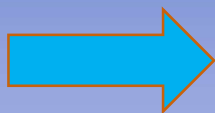


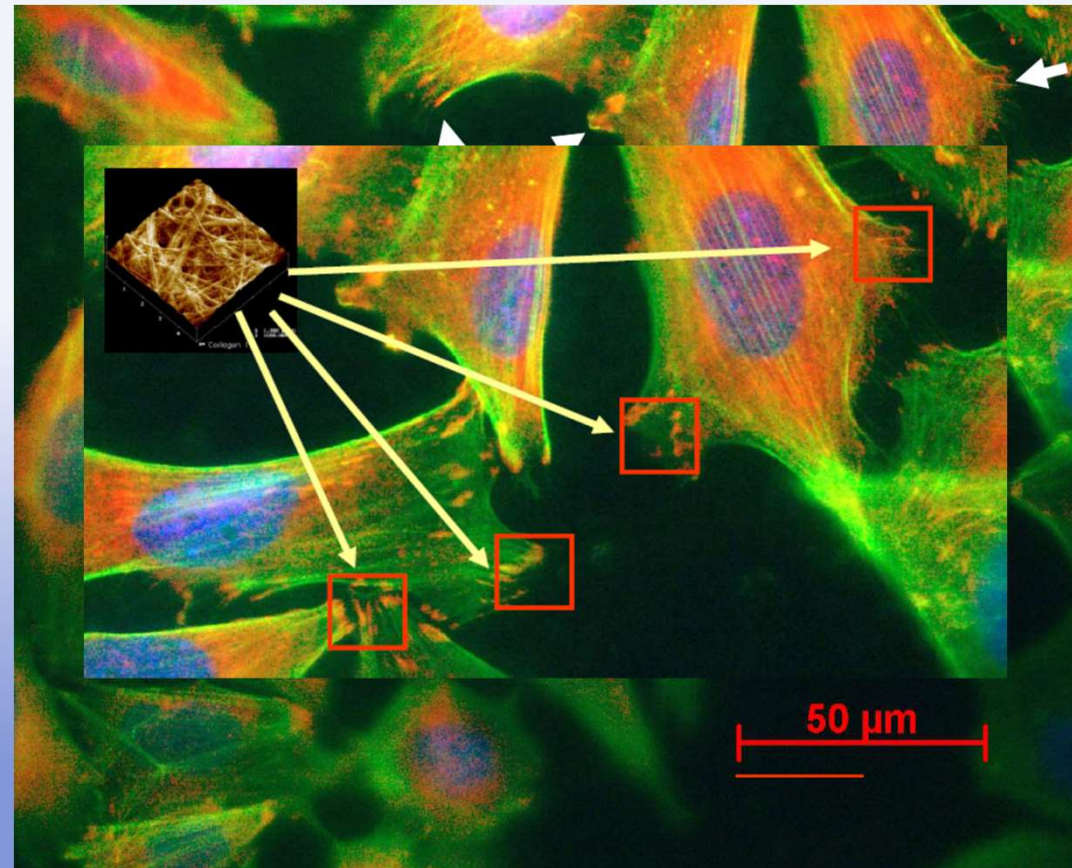
Image structure of a cell structure before treatment and during treatment from an Evocell Patient is impressive

## Mechanosensitive Building-Block – Vinculin

### Vinculin

#### Focal Points (Vinculin red)

- Osteoblasts
- Binding over ECM
- Signal forwarding via ECM, focal Adhesions + Vinculin



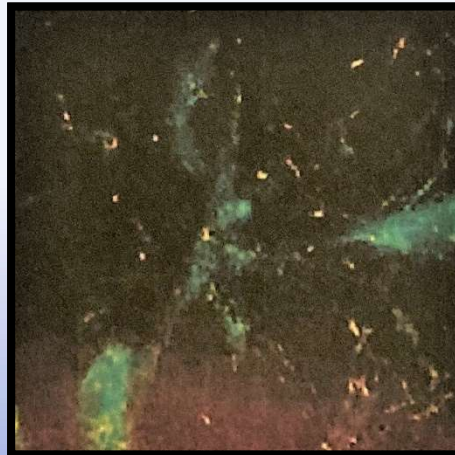
Quelle: TU Dresden Biomaterials



## The Effect of an Evocell treatment after just 15 minutes

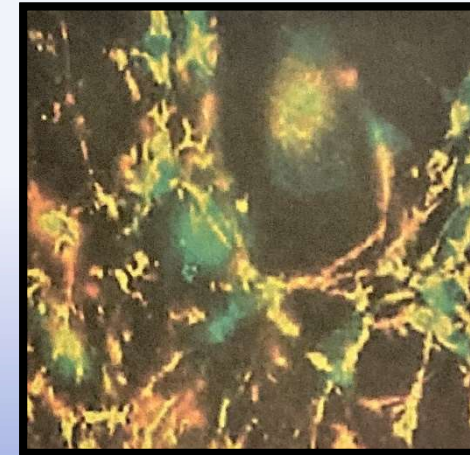
This Example shows the Effect of an Evocell Treatment after just 15 minutes.

The Treatment activates the entire Cell-Structure



### Beforehand

Aging Cell Structure, partially already inactiv with reduced Vital-Signs.



### Afterword

Cell Structure activated with Evocell. The Cells are stimulated, highly vital, communicating and have resumed their **original** Function.

## That means...

### Effects

- Mechanical Transd. can change the chemical potential of cells. The whole body can be influenced by shock waves, as many cell parts are sensitive to mechanical stress.
- Low energy level with low impulses showed positive stimulatory effects, whereas the high energy level with high impulses had significant inhibitory effects. At lower energy, up-regulation of proliferating cell nuclear antigen (PCNA), collagen type 1 & 3 and TGF1b gene expression were observed, followed by an increase in NO production, TGFb1 and collagen synthesis (Orhan et al. 2004)
- Medial Tibial Stress Syndrome: 85% of patients return to active Sports faster (Rompe et al., 2009)
- Mechanotransduktion ist verantwortlich für verschiedene Zellprozesse wie Proliferation, Genexpression und Zell-Zell Kommunikation, bis hin zur Apoptose
- evocell treatment showed sig. pain reduction after 3 sessions (compared to the starting VAS,  $p < 0.05$ ) and highly significant decrease in pain intensity ( $p < 0.001$ ) over the whole period (Haag et al. 2016)

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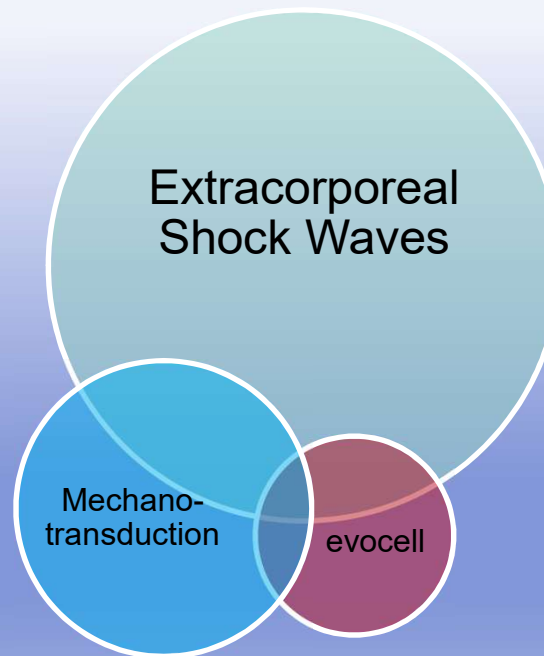
### **Medical-Product for Health**

5. The Future Story

## Literatur

## Study Situation

- Argumentative Effects of Mechanotransduction
- Evocell is a medical device. The study is done by the university of vienna with 7.000 patients
- „evocell initiatst/stimulat Mechanotransduction. Mechanotransduction is able to do following...“
- Take your time and read the literature



## Study Situation I

- Pilotstudie (EK-Nr. 1593/2015) der Meduni Wien: Wissenschaftliche Untersuchung der Akzeptanz, Effektivität und Effizienz einer Schmerzbehandlung mit der medizinischen Ganzkörperliege mit biomechanischer Wellentechnologie an 200 Probanden (Rückenschmerz)
- Wissenschaftlicher Kongressbeitrag Prof. R. Crevenna Gesellschaft zur Erforschung onkologischer rehabilitativer Grundlagen 2017
- Abschlussarbeit (B.Sc., 2017) an der TUM Lehrstuhl für Trainingswissenschaft Prof. M. Lames. „Auswirkung der Mechanotransduktion auf die kurzfristige Regeneration im Sport“.
- Abschlussarbeit (B.Sc., 2016) an der TUM Lehrstuhl für Konservative und Rehabilitative Orthopädie Dr. T. Brauner zum Thema „Effekte einer Stoßwellentherapie auf ausgewählte Parameter bei Patienten mit idiopathischen Schmerzen im Lendenwirbelbereich“.
- Abschlussarbeit (B.Sc., 2016) an der Hochschule Fresenius, „Der Regenerationsprozess und dessen Optimierung bei männlichen Athleten des Landeskaders Ski Alpin: Fahrradergometer vs. Ganzkörperstoßwelle – Ein Vergleich“.

## Study Situation II

- Crevenna R, Cenik F, Margreiter M, Marhold M, Komanadj TS, Keilani M (2016). Whole body vibration therapy on a treatment bed as additional means to treat postprostatectomy urinary incontinence. *Wie Med Wochenschr*, 167:139-141, DOI 10.1007/s10354-016-0469-7
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- Maehr B, Keilani M, Wiltschke C, et al. Cancer rehabilitation in Austria-aspects of Physical Medicine and Rehabilitation. *Wien Med Wochenschr*. 2016;166(1–2):39–43.

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## Example Sports



**DOCTOR CHRISTIAN SCHNEIDER**  
 HEAD OF THE ORTHOPAEDIC CENTRE OF  
 EXCELLENCE - MUNICH, GERMANY.  
 SPORTS PHYSICIAN OF THE YEAR 2018

*"I use EvoCell everyday on my athletes. The EvoCell treatment bed is extremely effective for many indications in the orthopaedic sector with conditions involving the musculoskeletal system - spinal problems, sports injuries and trauma. It offers assistance in preventative work as well as faster and more robust recovery."*

THIS UNIQUE, EXCLUSIVE & POWERFUL  
 TREATMENT IMPROVES SLEEP QUALITY  
 AND BLOOD CIRCULATION



**PAT CASH WIMBLEDON SINGLES CHAMPION**

*"There is something very special about EvoCell. I have used it many times to successfully erase chronic backpain. It repaired my carpal tunnel syndrome in my racket hand. It cured all my muscle soreness fro workouts. I have found EvoCell reduces inflammation, settles the nervous system and gives my body a type of reset."*



89% OF USERS FOUND FAR-REACHING BENEFITS

*"Therapeutic use seems to be beyond all questions"*

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCE  
 Established at the Schon Klinik in Munich.

- **New Blood Vessel Formation:**  
 New blood vessels improve blood supply and oxygenation of the treated area(s) and supports the faster healing of tendons, muscles and bones.
- **Reversal of Chronic Inflammation:**  
 EvoCell increases the activity of "mast cells". This actively helps to restore and enhance the normal healing and regenerative process.
- **Stimulation of Collagen Production:**  
 EvoCell accelerates pro-collagen fibres into a structure that makes newly formed tendons denser. This creates firmer structures and increased cell rejuvenation.
- **Dispersion of Pain Mediator:**  
 EvoCell shockwave therapy lowers the neurotransmitter concentration and triggers pain relief.
- **Releases Trigger Points:**  
 EvoCell reverses metabolic crisis in the myofilaments and releases the trigger points.



## Example Sports II



*“Evocell has unequivocally accelerated and boosted my recovery in an extraordinary way.”*

**ROB OSBORNE** ELITE MASTERS CYCLIST

*Summer 2019 - Emergency operation after I broke my femur in two places. Expert operation for a titanium 'nail' inserted into my femur, held in place with a massive bolt, stabilised with a pin further down. The surgeon needed to cut the glutei and surrounding muscles to insert the bolt, nail and pins. I was on morphine, tramadol and paracetamol*

*to allow me just to function. I arrived at Chelsea on my crutches. After all my exertions and disappointments of 'Elixir' machines, I was very skeptical.*

*Within just one week of Evocell treatment, I had ridden outside on my bike for the first time since my accident. A few days later, I walked without crutches. One week later my coach put me back on a winter training regime. Since being on Evocell, muscle definition is returning, nerve damage is repairing, movement is returning and pain has all but disappeared.”*

## Example Sports III

*“I use EvoCell after intensive training. I note that I regenerate and recover faster. my muscle tension radically decreases. I highly recommend EvoCell with good conscience!”*

**FRITZ DOPFER** WORLD CLASS SKI CHAMPION



*“EvoCell helps me to relax my muscles and musculoskeletal system, especially after intensive weights & training. EvoCell is invaluable for all my training and competition.”*

**LAURA DALMEIER** WORLD CLASS SKI CHAMPION

Laura started in her first world cup ski races in the 2012/13 season. In 2014, she participated in the winter Olympics in Sochi. As of 2017 she is a 7 times world champion, winning a record five gold medals at the 2017 World Championships. In 2018 she became the first woman ever to win the Biathlon Sprint and the Pursuit in the same Olympics.

## Take home message about Mechanotransduction Statements of the professional Sports



- High anecdotal evidence from competitive sports (Ski-Jumping, Biathlon, Soccer, Motorsports etc.)
  - relaxing
  - detonating
  - High blood flow to the muscles
  - Metabolism high and prepared
  - Concentration and endurance
  - Laura Dahlmeier uses evocell for the last 7 years (Pyeongchang, 2018: 2x Gold, 1x Bronze)
  - Perfect for soccer players with diagnosis cruciate ligament tear ( Brazilian Player Dante)



## Take home message about Mechanotransduction Statements of the professional Sports



### Dante Bonfim Costa Santos

- Shortname „Dante“
- Bayern Munich 2012-2015
- Brazilian Nationalplayer
- Dante used Evocell in Munich
- Dante has his own Evocell



## Take home message about Mechanical Transduction Mechanismen

- Over 80% of our cell parts are sensitive to mechanical stress
- Cells can be activated mechanically
- The ECM is continuously restructuring
- Mechanical Transduction increases the ability to communicate with cells
- Mechanical Transduction increases the sensibility of cells (mechanical prestension, d'Agostino et al., 2015)
- Molecules can change in energetic potential depending on their spatial arrangement (Confirmation)
- Disturbance in mechanical transduction can be cause or consequence of diseases (Example: Aneurysma, Atherosklerosis, Osteoporosis, muscle dystrophien, cardiomyopathies, "Heydemann & McNally, 2007; Tietse et al., 2020; Gimbrone et al., 2000")
- Low-energy shock waves do have a stimulating effect

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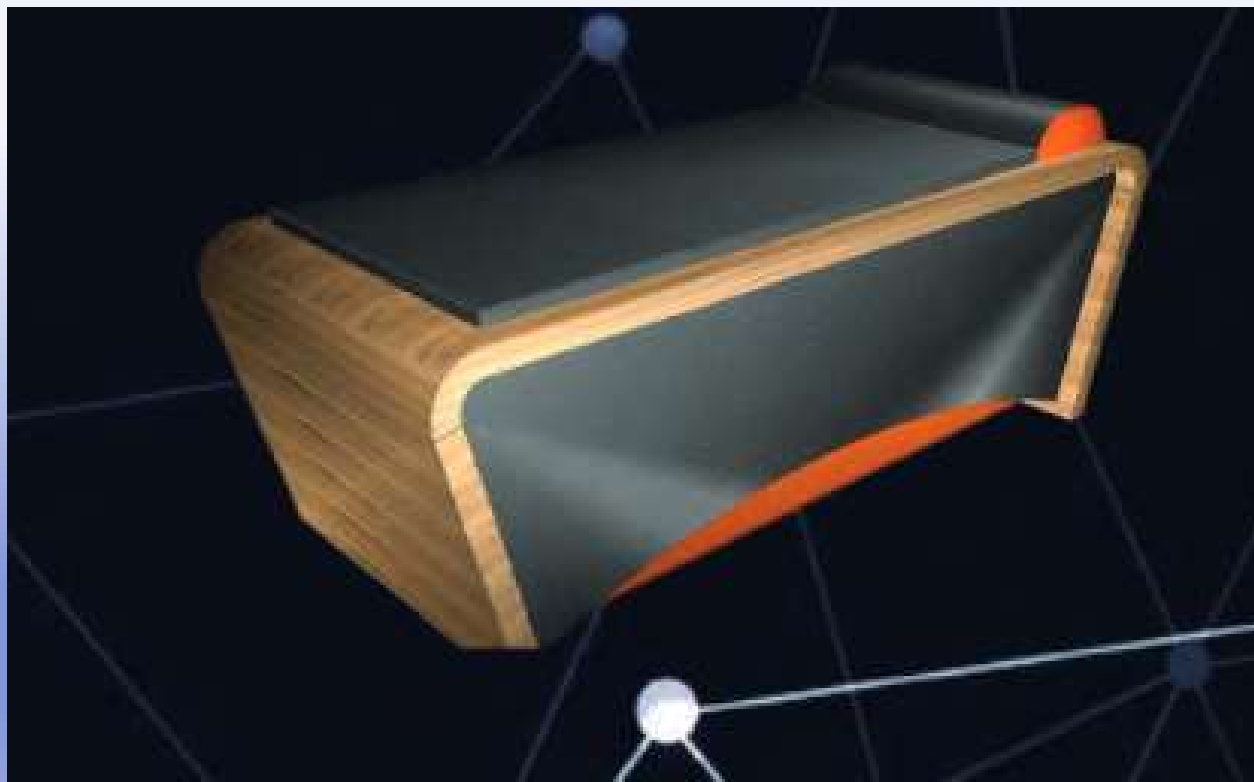
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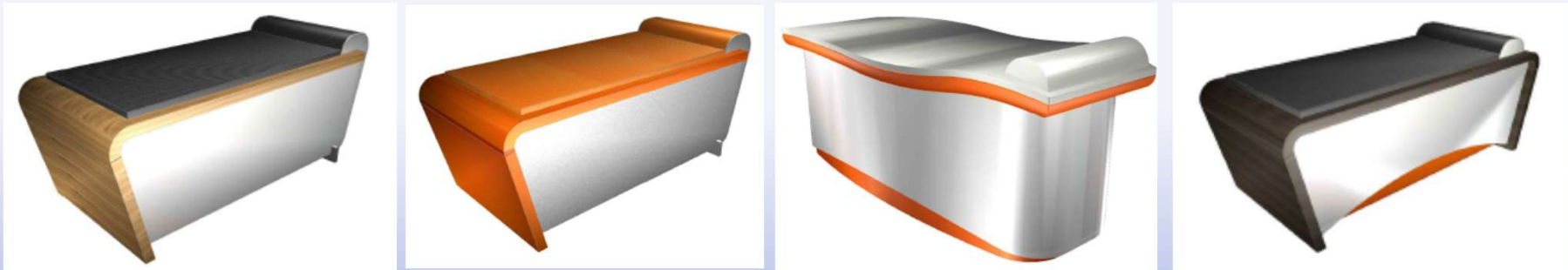
5. The Future

### **Literatur**

The Future...



Your individuell...





## MATRIX-Therapy for all Parts of the Life

*The Future in your Hand*



### Medicine

- Rheumatism/Arthrosis
- Spine/Intervertebral disc
- Incontinence
- Morbus Crohn
- COPD
- Sarcopenia
- Pain Therapy
- Increase of the Immun System
- Bone Formation
- Muscle Building on Bones
- Formation of Collagen Structures
- Lowering the Inflammation Levels
- Wound Healing



### Sports

- Building Muscle Tone
- Rapid Regeneration in competitive Sports
- Rehabilitation
- Lower risk of injury
- Shorter downtime (Convalescence Period)
- Reduction in Lactate Levels
- Shortening of the convalescence period



### Wellness

- General relaxation
- Muscle stimulation
- Improvement of the complexion
- Reduction of cellulite
  
- Weight reduction with appropriate nutrition

Only an excerpt of the possibilities

*Thank you for your Interest*

The Evocell-Therapy ist the first full-body medical treatment in the world, with biomechanically effective low-energy and high-frequency shock waves.

## Research Literature Mechanotransduction

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## Research Literature Mechanotransduction

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## Research Literature Extracorporeal Shock Waves

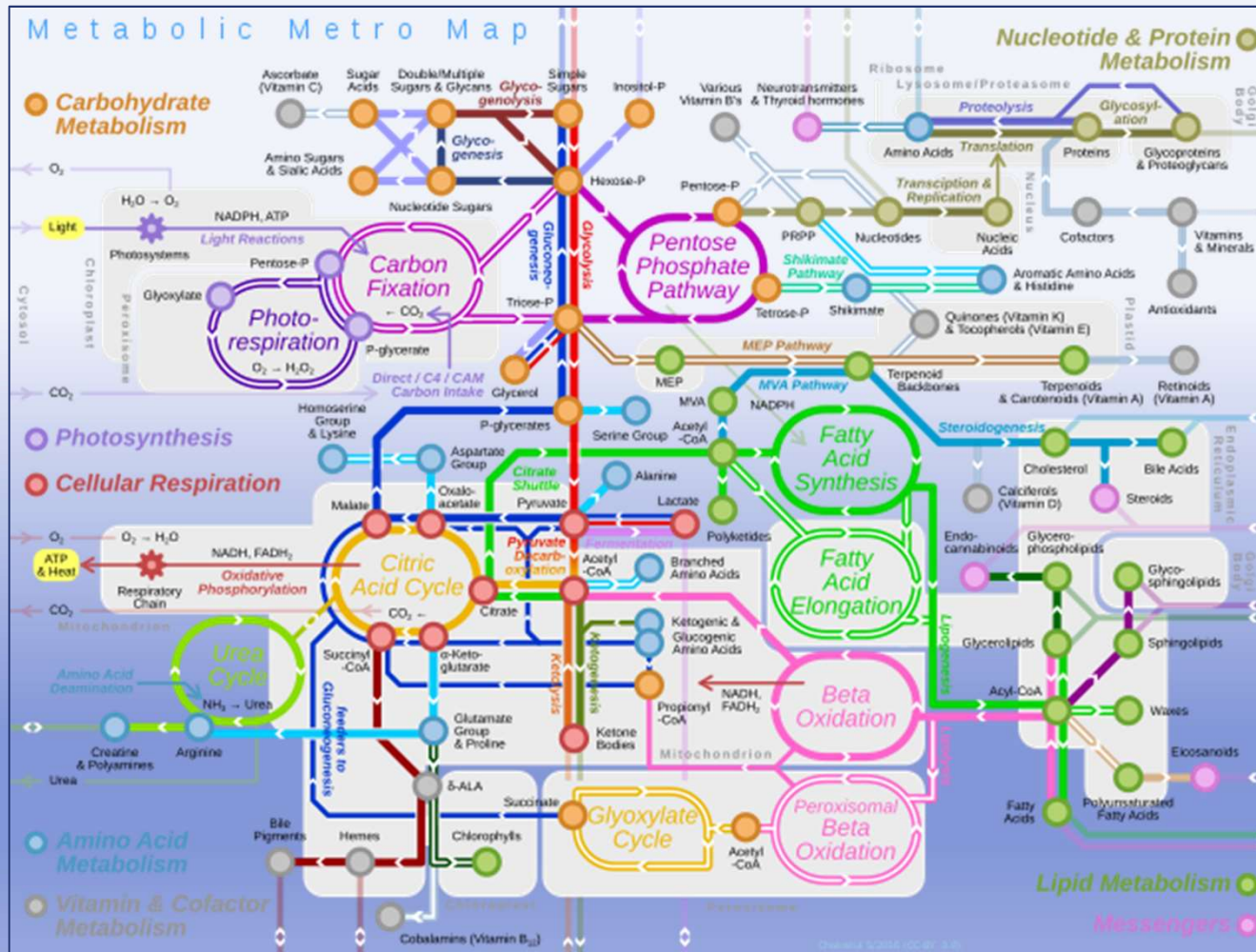
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## Offer

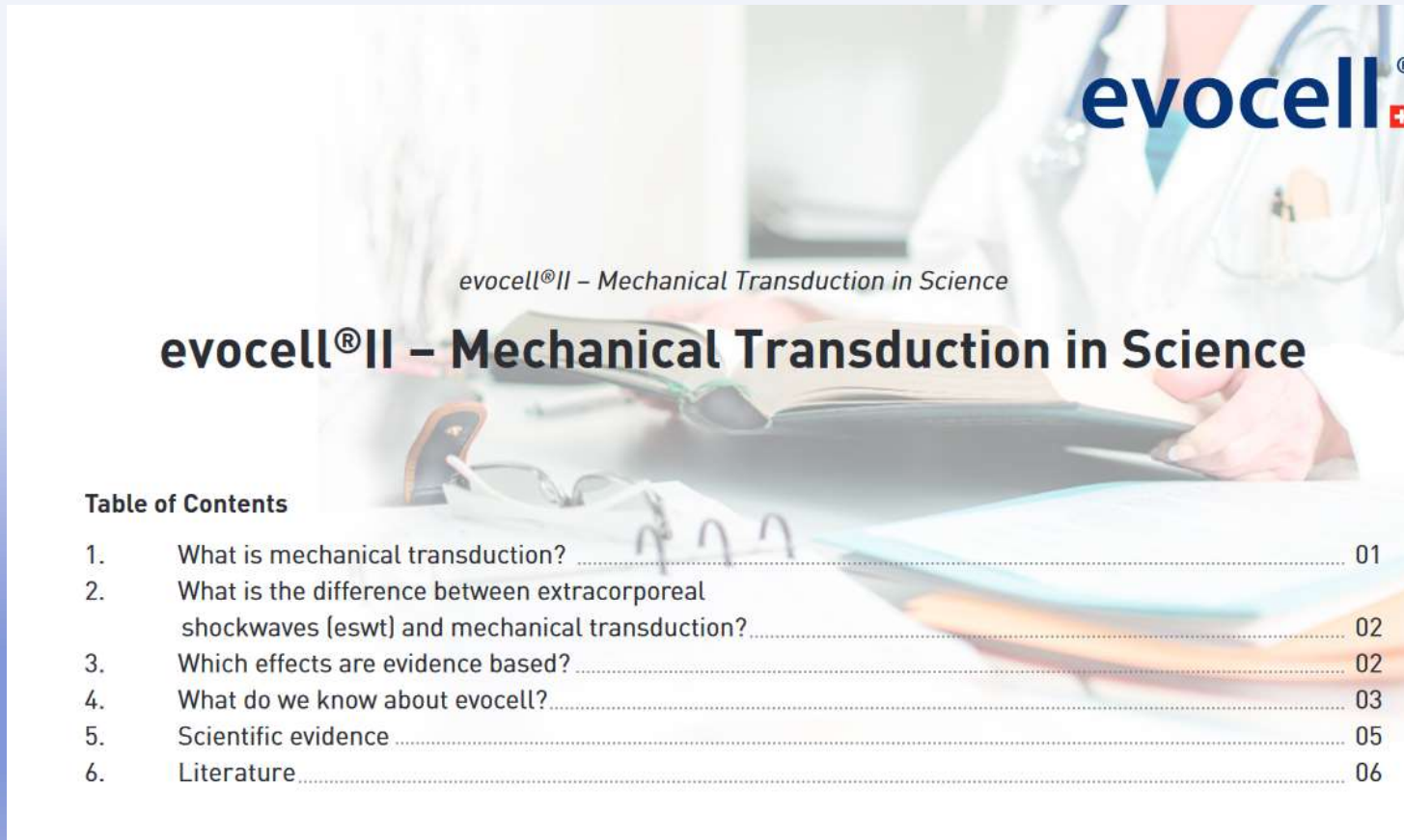
### 25 Medical Devices

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| <ul style="list-style-type: none"><li>• Medical Devices includes<ul style="list-style-type: none"><li>• Medical MTT Device</li><li>• Pad</li><li>• Physio-Cultivation</li><li>• Control Device (English Language)</li><li>• Permit as Medical Device</li></ul></li><li>• Price per Device: € X</li><li>• Plus Transport</li><li>• Yearly Support starting third year: € X</li></ul> | <ul style="list-style-type: none"><li>• Price<ul style="list-style-type: none"><li>• 10 Devices</li><li>• Pad</li><li>• Physio-Cultivation</li><li>• Control Device</li><li>• Permit as Medical Device</li><li>• 25% on Account after Signing the Contract</li></ul></li></ul> |
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## Attachment Metabolism







*evocell<sup>®</sup>II – Mechanical Transduction in Science*

# **evocell<sup>®</sup>II – Mechanical Transduction in Science**

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