

What are radial shock waves ?

How are they generated ?

Where are they used ?

Working mechanisms ?

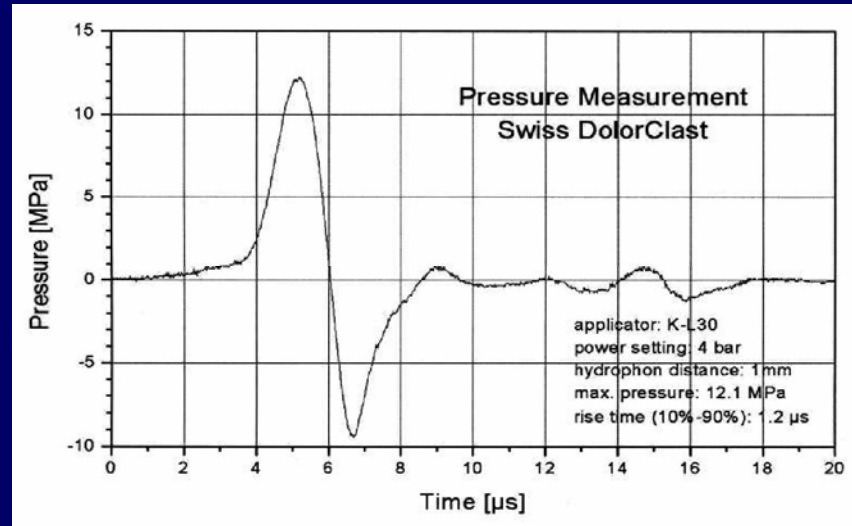
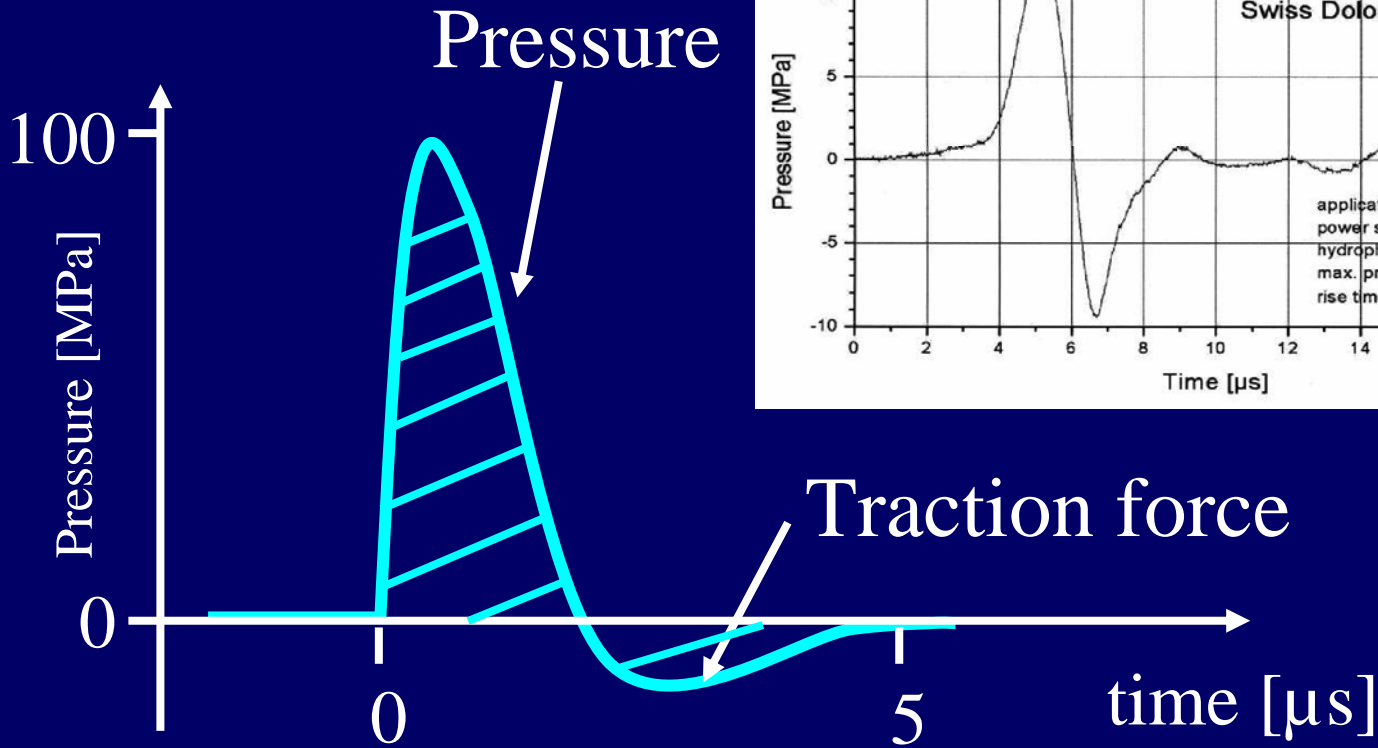
State of the art

Look into the future

A high-speed aircraft, possibly a fighter jet, is shown in flight against a clear blue sky. The aircraft is moving from left to right, leaving a large, bright, white shockwave cloud behind it. The shockwave is a large, billowing cloud of white vapor that extends backwards from the aircraft, indicating supersonic speeds. The aircraft itself is dark and sleek, with a delta-wing configuration. The overall scene is dynamic and emphasizes the power and speed of the aircraft.

Shockwaves are loud.

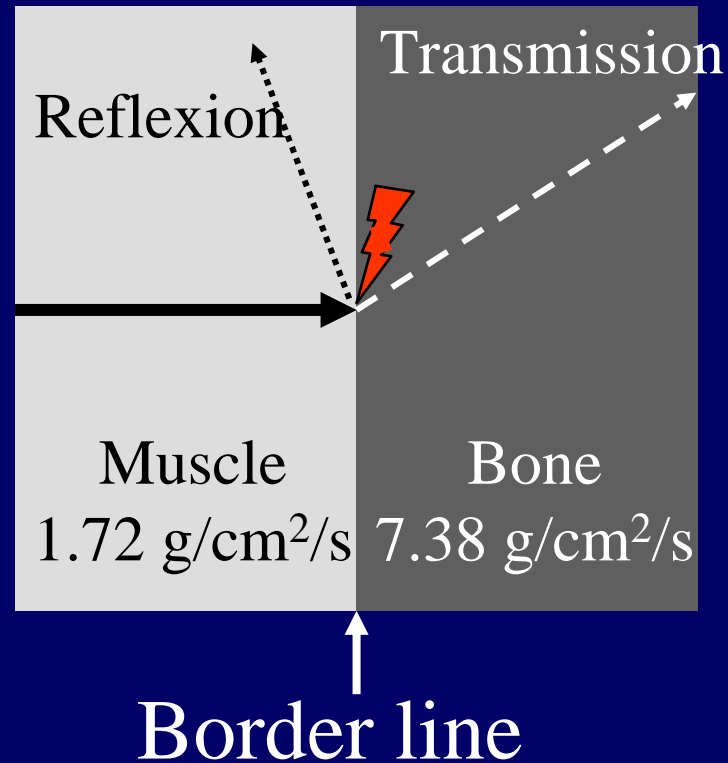
Definition



Energyfluxdensity (EFD) [mJ/mm^2]

Direct effect

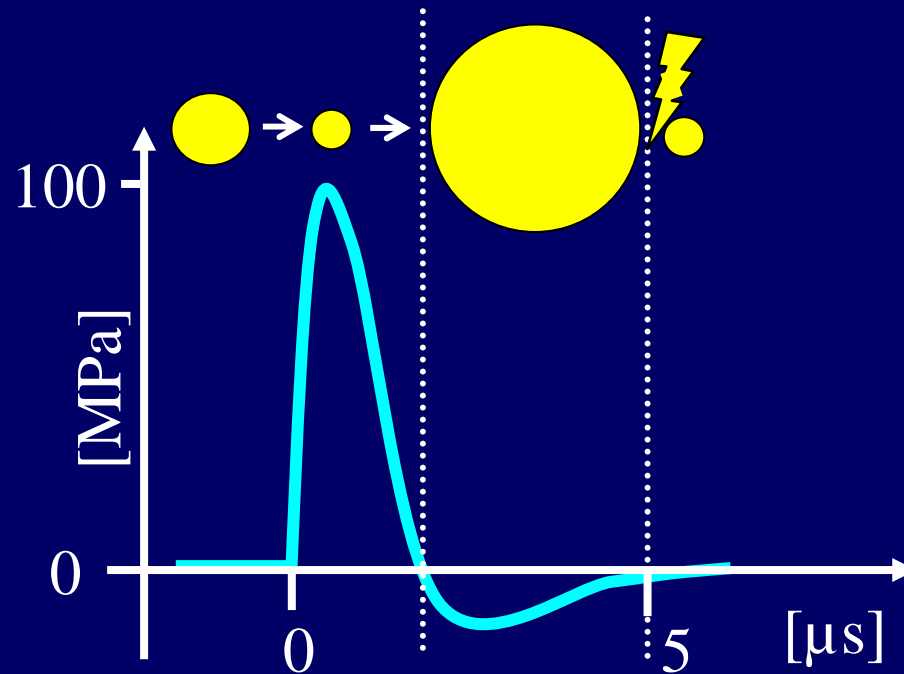
Acoustic density



Indirect effect

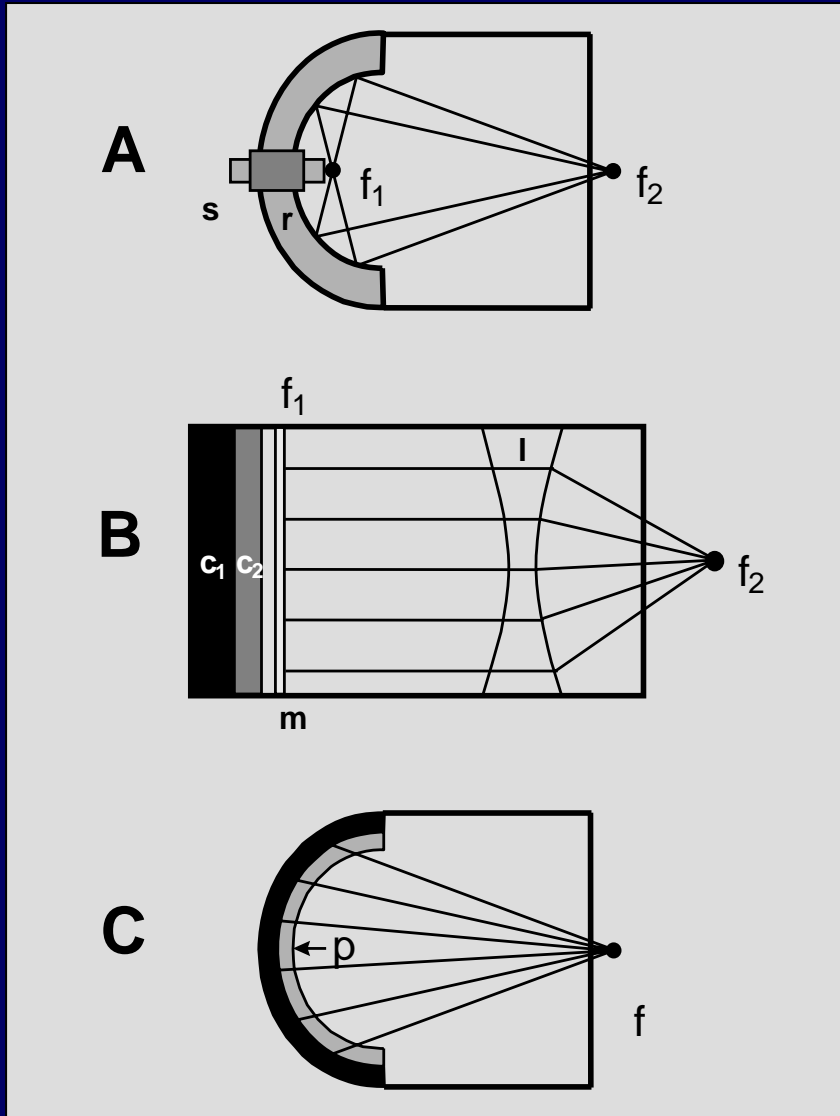
Cavitation

Shockwave-gasbubble -interaction



Delius et al., UMB, 1988

Generating shock waves

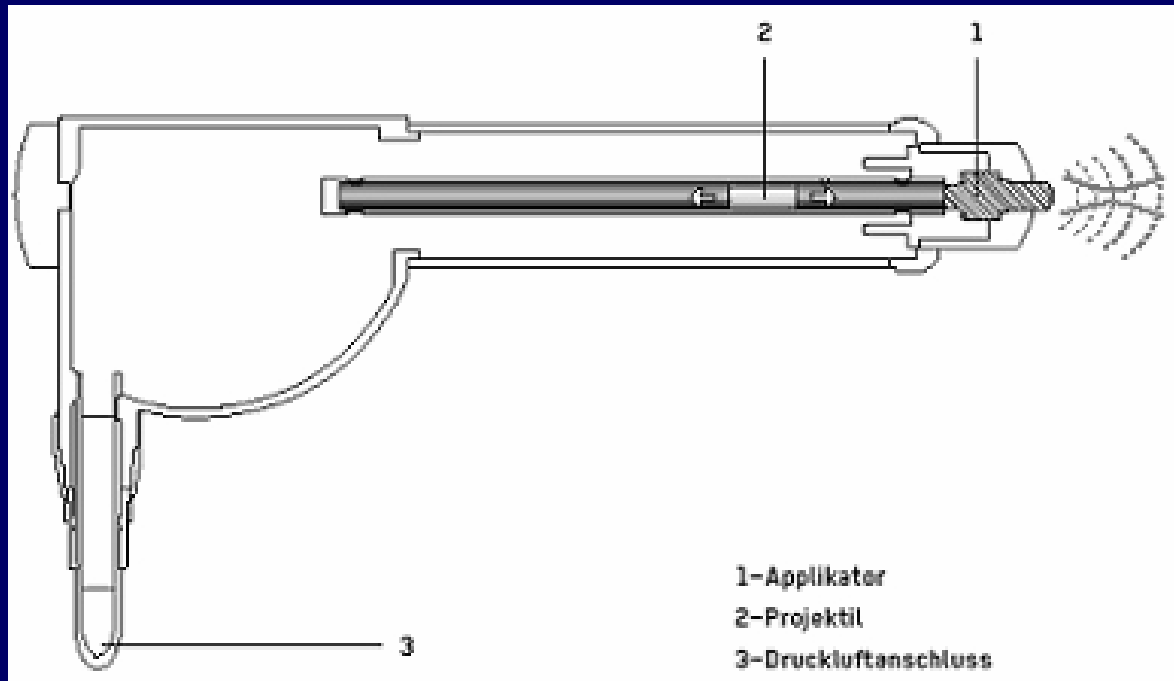


elektrohydraulisch

elektromagnetisch

piezoelektrisch

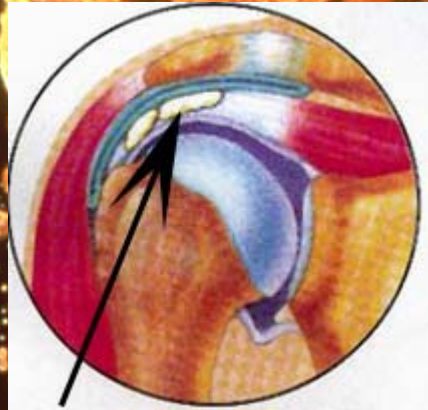
Radial generation





Function

Desintegration



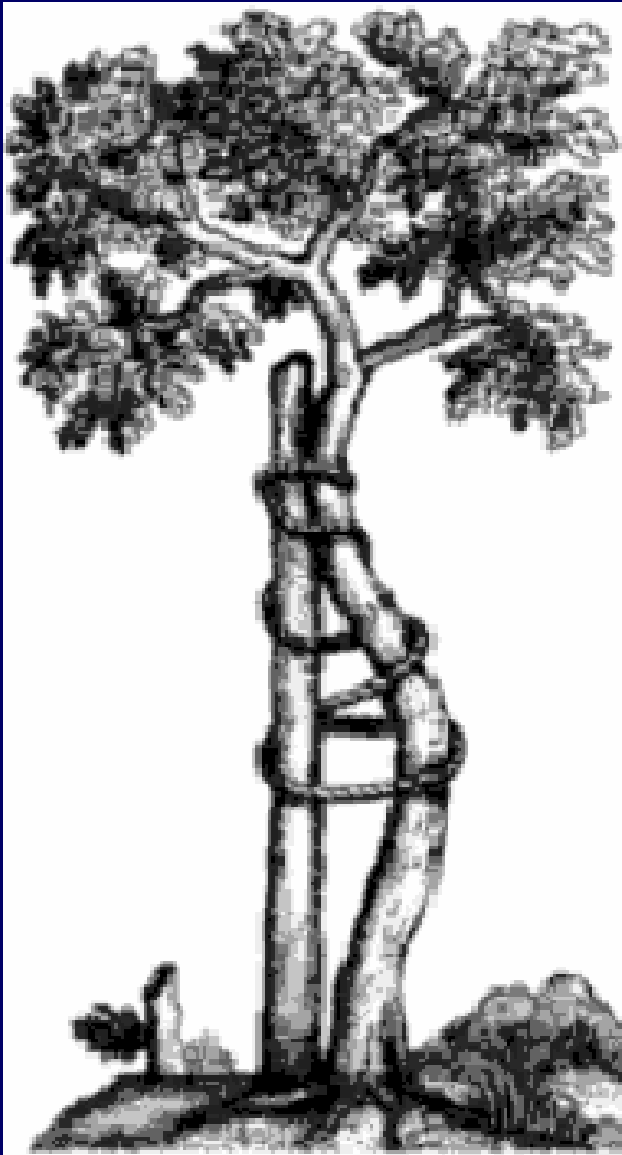
Pain relief

**New bone
formation
Blood flow**



Indications for rSWT



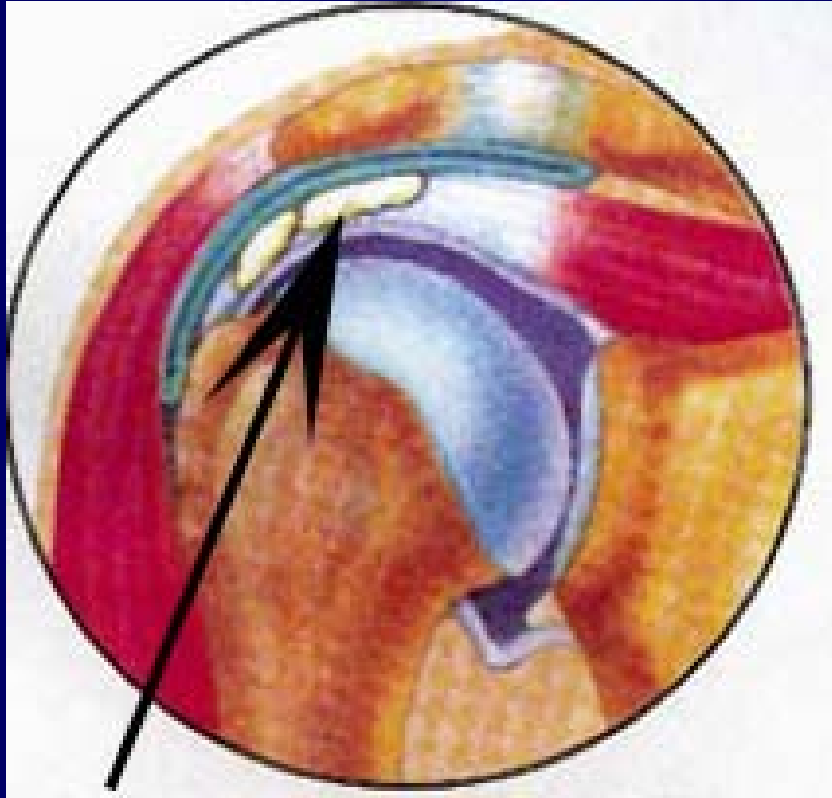


Shoulder pathologies
Plantar Fasciitis
Tennis elbow
Trigger points
Tendon pathologies
(Non-unions)

Shoulder pathologies

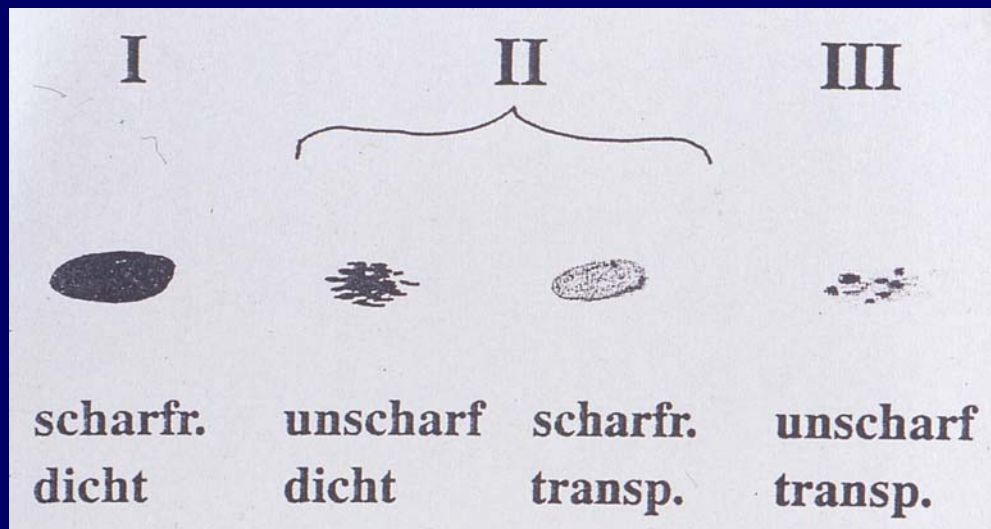


Tendinosis calcarea



Tendinosis calcarea

Morphology



Gärtner, Z Orthop, 1993



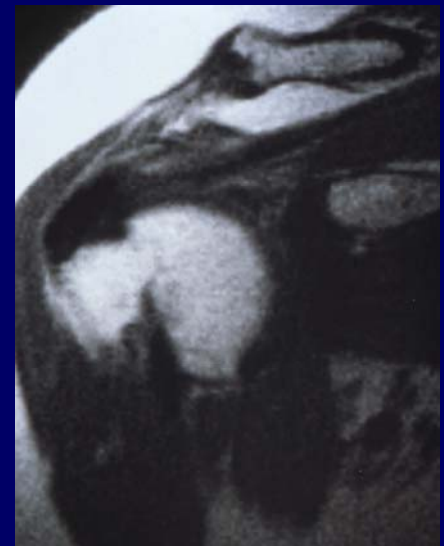
Tendinosis calcarea

Positive result

MRI

without
contrast uptake

Maier et al., AOTS, 2000



Tendinosis calcarea

Desintegration

Pain relief

Increased blood supply

Tendon regeneration

Improved function

Avoiding surgery

Plantar fasciitis

„Tennis heel“



Plantar fasciitis



Plantar fasciitis

Overload of the fascia



Traction of calcaneal periosteum: Periostitis



Subperiosteal microfractures



Bony spur

Plantar fasciitis

Clinical diagnosis

Bony spur has no influence of the result



Plantar fasciitis

Positive results

MRI

with calcaneal edema



Maier et al., J Rheumatologie, 2000

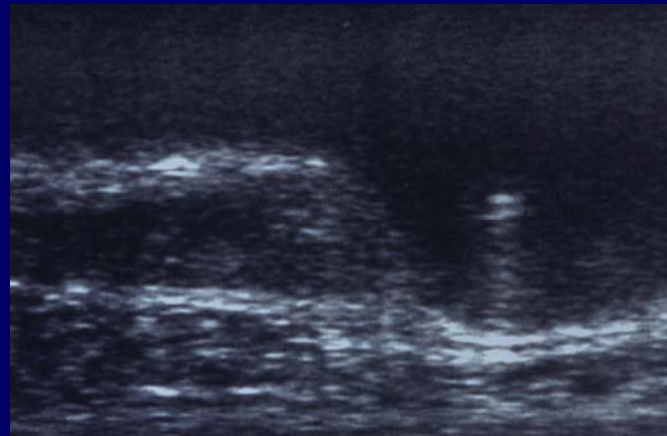
Plantar fasciitis

Pulses 2000 - 3000

Frequency 4 – 8 Hz

pressure 2.5 – 4.0 bar

(no LA)



Plantar fasziitis

Desintegration ?

Pain relief

Increased blood
supply

Tendon regeneration

Improved function

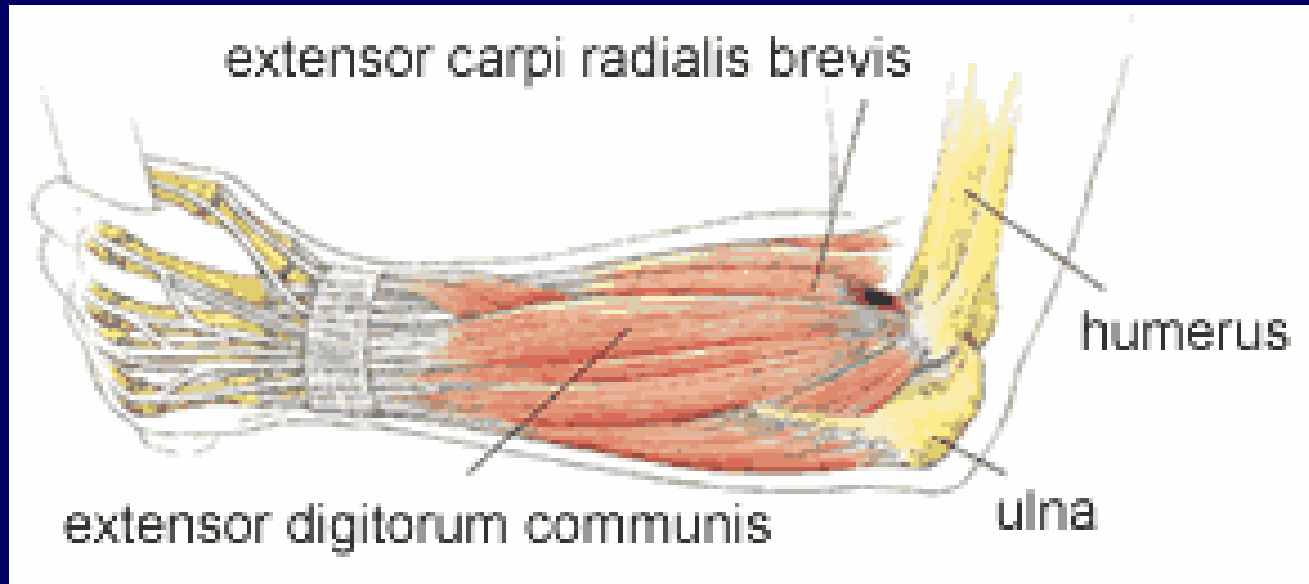
Avoiding surgery

Radial epicondylitis

„Tennis elbow“



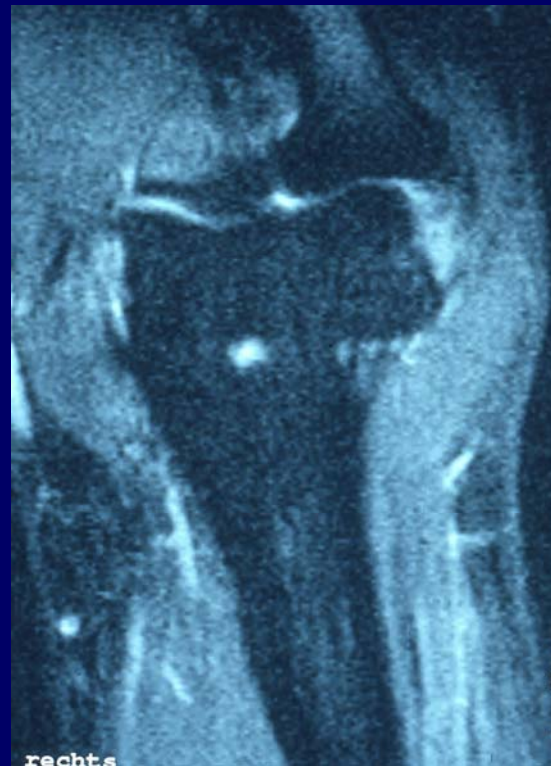
Radial epicondylitis



Radial epicondylitis

Positive results

MRI
with CM
uptake



Maier et al., AOTS, 2001

Radiale epicondylitis

Pulses 2000 - 3000

Frequency 4 – 8 Hz

pressure 2.5 – 4.0 bar

(no LA)

Radial epicondylitis

Pain relief

Increased blood supply

Tendon regeneration

Improved function

Avoiding surgery

Trigger points



Trigger points

- Painfull knots
- Palpation under the skin
- **Referred pain**
- Pain transmission not along a defined nerve or muscle
- Corresponding with chinese accupuncture points

Trigger points

Pathophysiology:

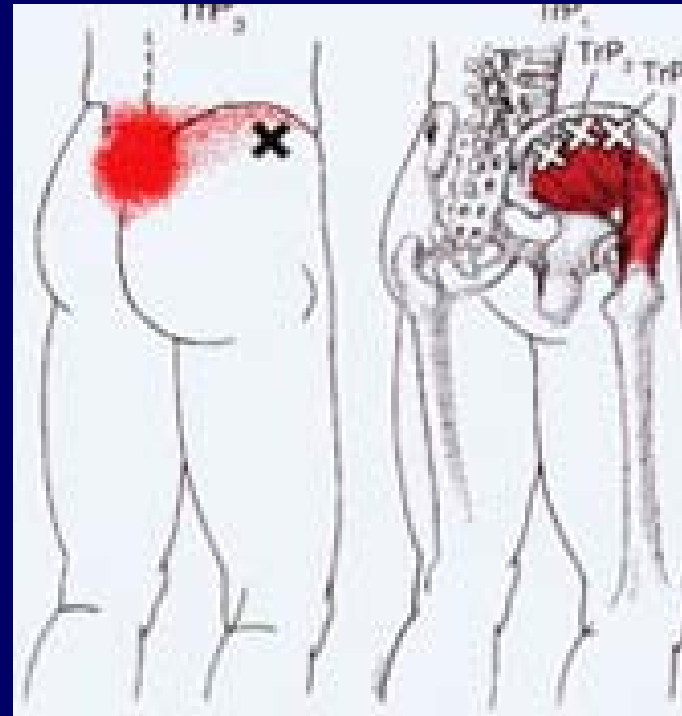
Most contractes muscle fibres

Deminished blood support

Little oxygen

Pain

Trigger points



Trigger points

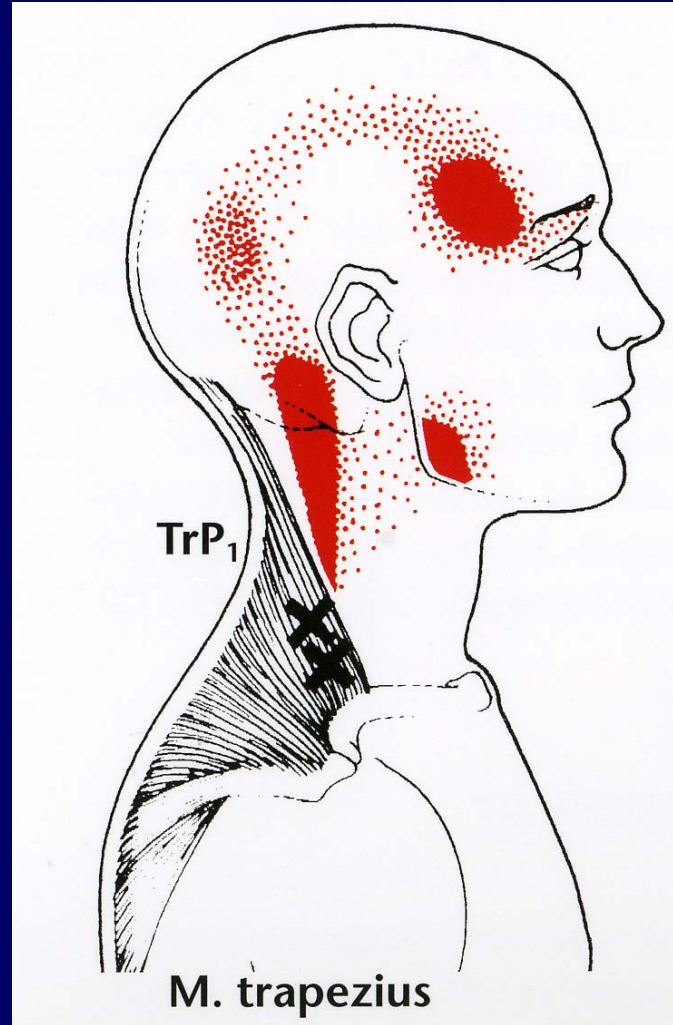
Pulses 200 – 300/Trigger

Frequency 15 Hz

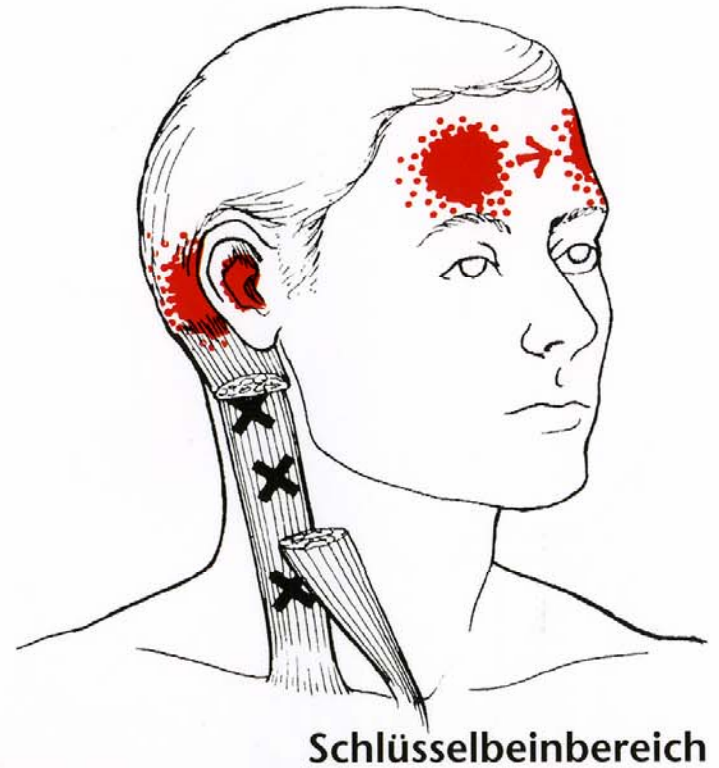
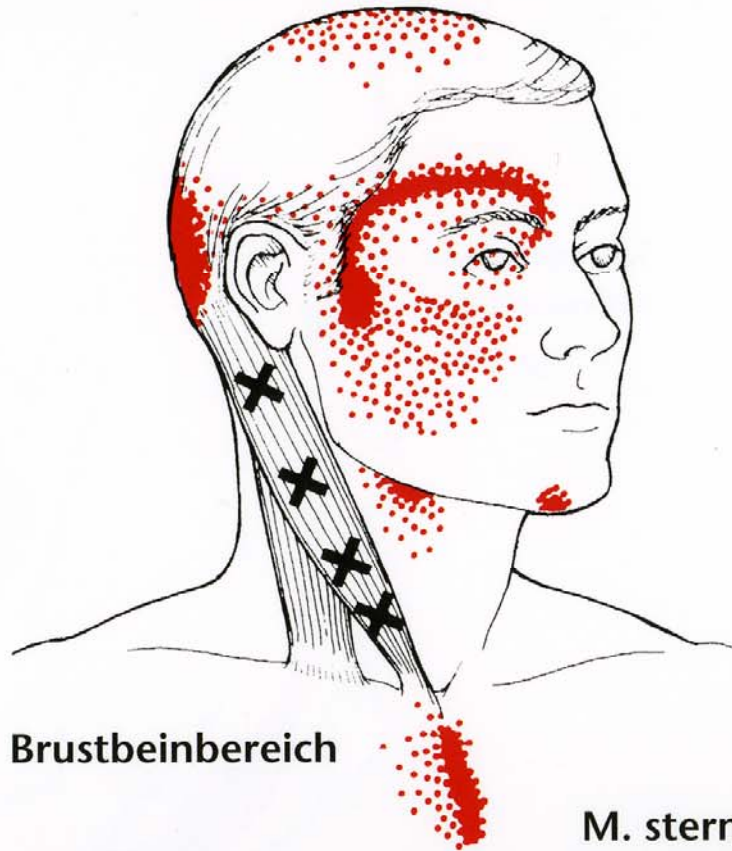
Pressure < 2.5 bar

(no LA)

Trigger punkte – cervical spine

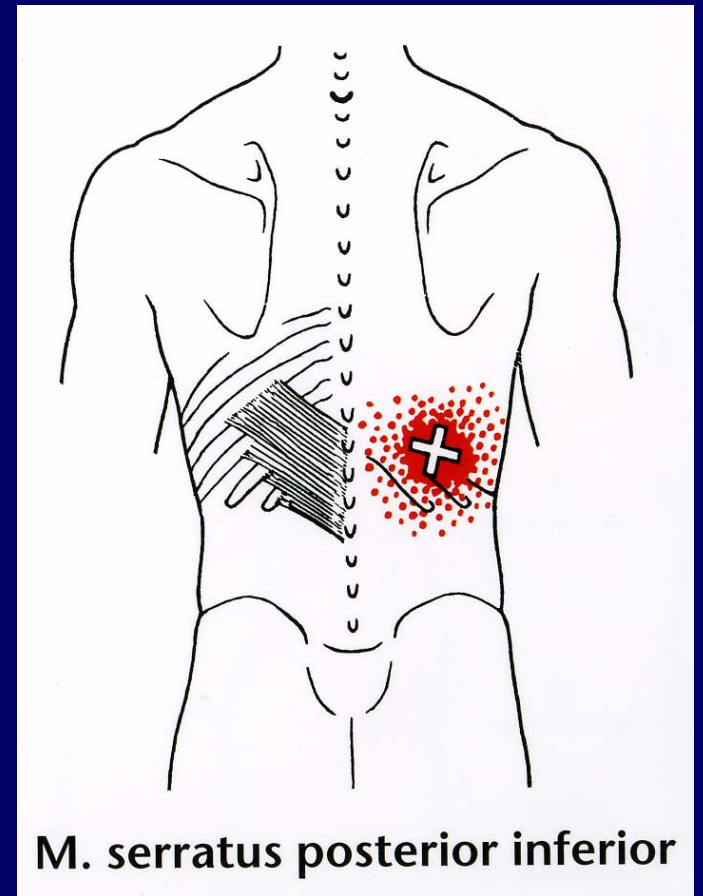
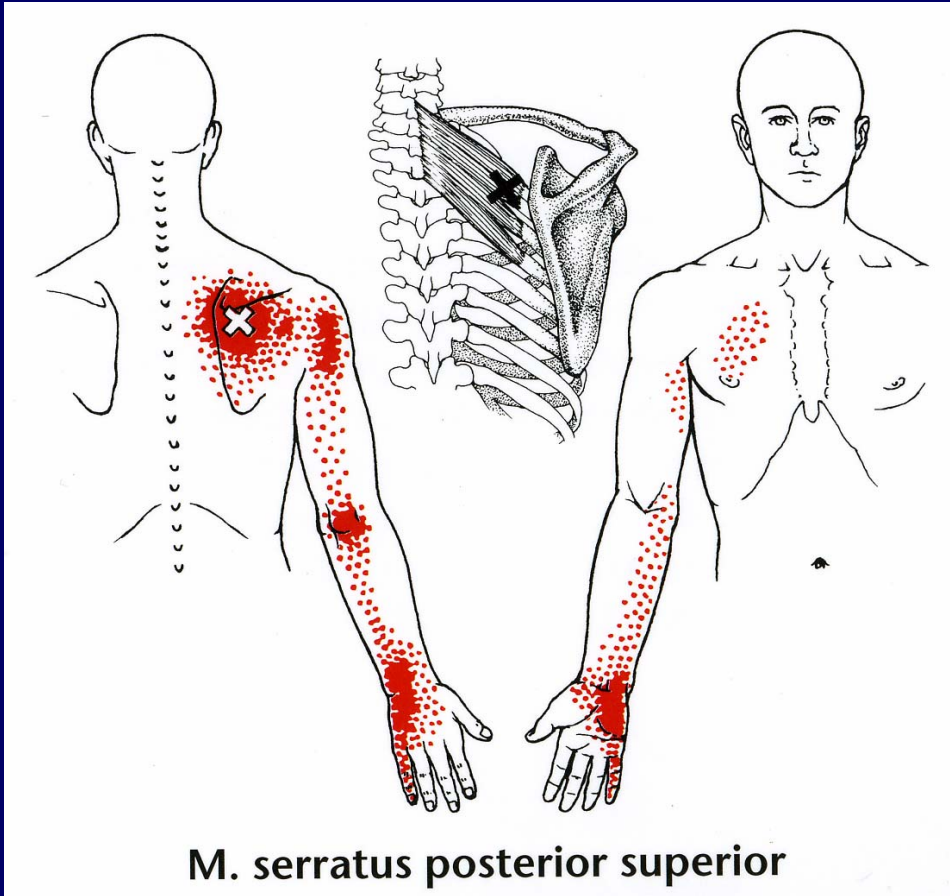


Trigger points – cervicale spine

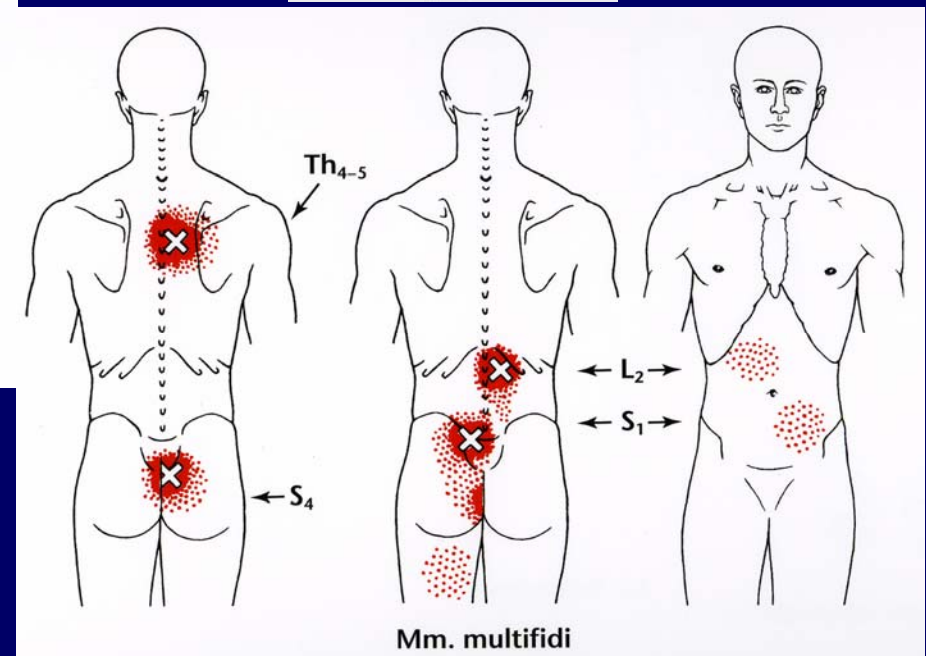
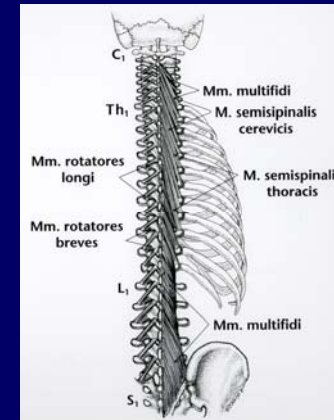
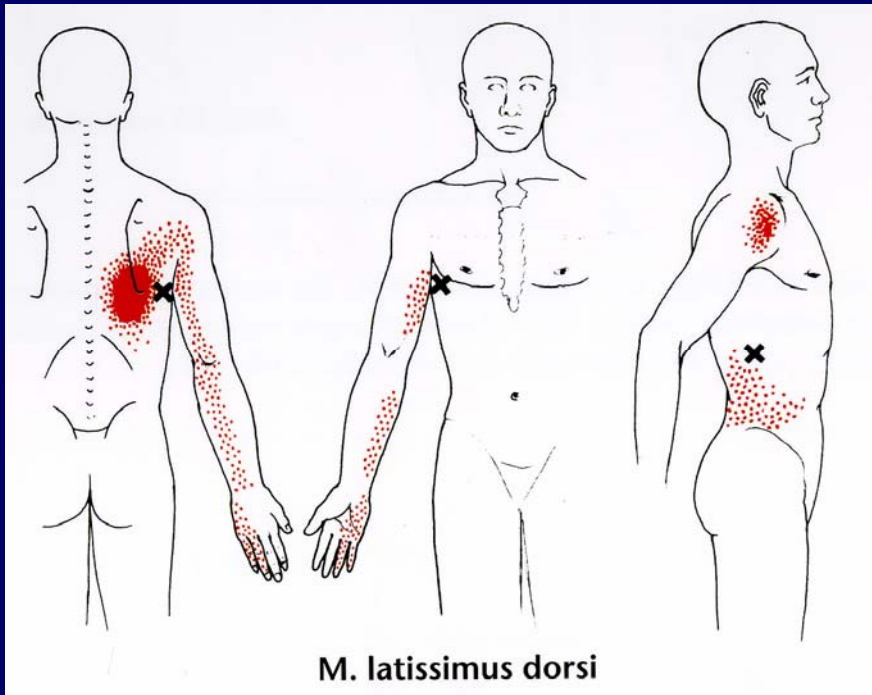


M. sternocleidomastoideus

Trigger points – spine



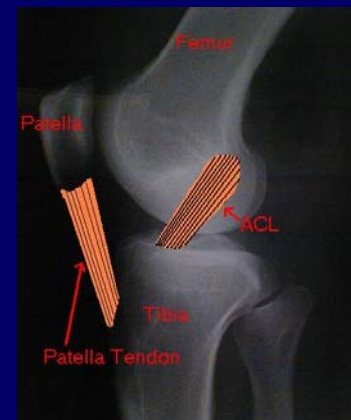
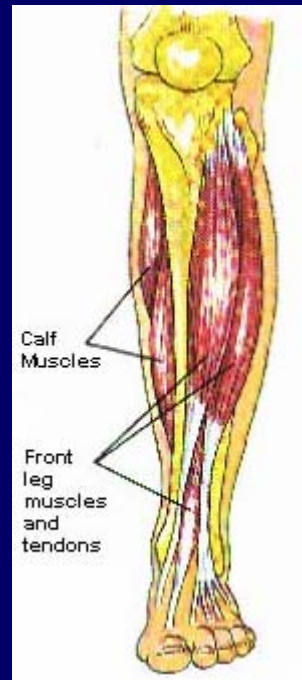
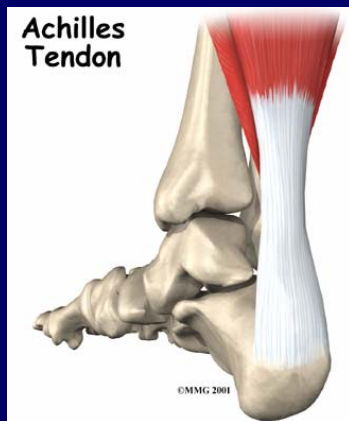
Trigger points - spine



Trigger points

**If you trigger, take
care of the lungs !**

More indications of rSWT



Contraindications

Treating children

Pregnancy

Local infection

Neoplasma

Delayed blood supply

Pacemaker

**Special care by using rSWT near to:
Lung, bowel, vessels and nerves**

Is it necessary to use local anaesthesia?

LA reduces positive effects of rSWT.

No LA is to use.

Painfree application without LA

Sonogel (rich of cavitation)

White vaseline (poor of cavitation)

Castor oil (free of cavitation)

Look into the future

Benefits

- Procedure for outpatients
- No anaesthesia
- Not invasiv
- Low side effects
- Treatment with only little pain
- No additional medicaments
- High rates of healing
- Improved quality of living

Headache

Shoulder

Neck

Wrist

Elbow

Knee

Low Back

Shin, Ankle
or
Foot

