



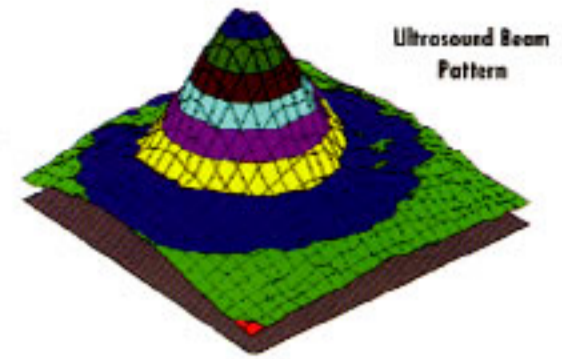
# ULTRASOUND TREATMENT GUIDELINES CHRONIC INFLAMMATION

Ultrasound (US) can be used in a pulsed mode at low intensity to promote tissue repair or in continuous mode at higher intensities as a mechanism of producing heat in tissues.

High density tissues (tendon, joint capsule, ligament, fibrous adhesion, nerve trunks) absorb more energy from an US field than low density tissues (tissue fluids, fat, muscle). Absorbed energy is converted to heat, which means that the higher absorptive capacity of dense structures in a sound field results in their preferential heating.<sup>1</sup>

Ultrasound can increase deep tissue temperatures by 4°-5°C. Simultaneously it causes a 4°-5°C increase in temperature of skin and subcutaneous tissue. Subjective warmth is, therefore, a good indicator of deep heating.

If the treatment goal is to elongate shortened structures<sup>2</sup> US should be followed by 10-15 minutes of passive stretching.+



Ultrasound Beam Pattern

## Ultrasound Guidelines by Ethne Nussbaum, M Ed, PT

### CHRONIC SUPRASPINATUS TENDINITIS

**PROBLEM:** History > 3 months of painful arc on elevation; reduced AROM; tenderness; possibly calcific bodies

**POSITION:** Seated, arm supported in extension over padded chair-back.

**TREATMENT AREA:** Supraspinatus tendon and attachment - lateral border of the acromion to greater tuberosity.

**GOAL:** Considerable increase in pain-free range and gradual improvement in function.

**ADJUNCTIVE TREATMENT:** Stretching activities immediately following US, minimum duration: 10-15 minutes.

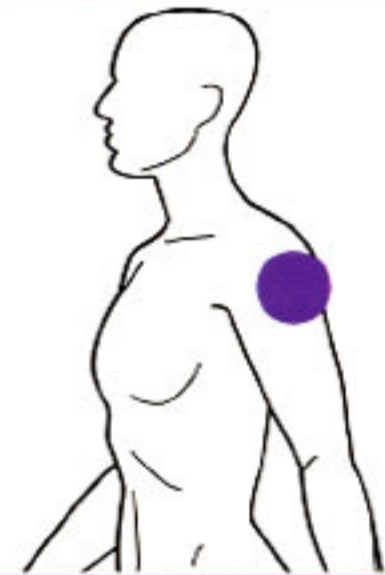
**FREQUENCY:** 1 MHz for average-sized person. 3 MHz for very bony individuals.

**MODE:** Contact treatment, gel/lotion couplant.

**INTENSITY:** Continuous output, > 0.8 W/cm<sup>2</sup> (SA), sufficient for subjective sensation of warmth. Reduce intensity or change to 3 MHz if pain is experienced.

**DURATION:** Approx 8 minutes.

**REGIMEN:** 3x initial week, then 2x week, 8-12 treatments.



### CHRONIC SWELLING INTERPHALANGEAL (PIP/DIP) JOINT

**PROBLEM:** History of trauma - fracture/dislocation/sprain; indurated swelling; stiffness.

**POSITION:** Seated, hand on table/in water bath.

**TREATMENT AREA:** Area of swelling - palmar, dorsal, medial and lateral aspects of finger.

**GOAL:** Resolution of swelling, increased range and function.

**FREQUENCY:** 1 MHz **TRANSDUCER SIZE:** 1-2 cm<sup>2</sup>

**ADJUNCTIVE TREATMENT:** Stretching activities immediately following US.

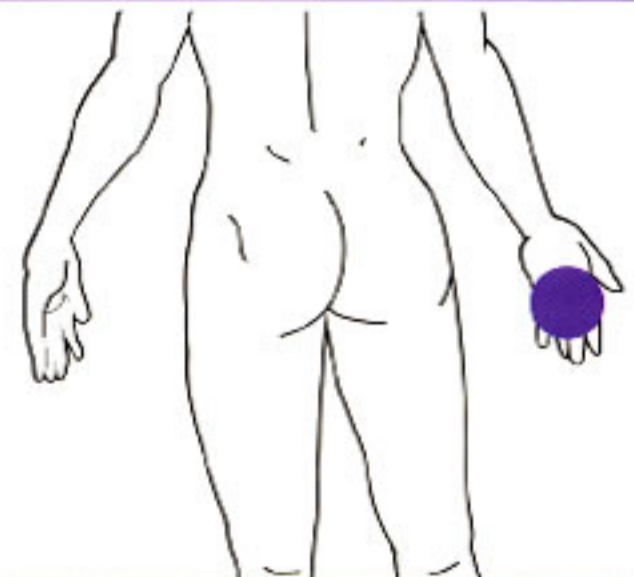
**SPECIAL CONSIDERATIONS:** US in contact is more effective. Water conducts heat away from tissue and limits subcutaneous heating (N.B. patient will not feel warmth).

**MODE:** Contact treatment, gel/lotion couplant OR water bath, transducer parallel to contour of finger 1-2 cm from the skin.

**INTENSITY:** Continuous output, > 1.0 W/cm<sup>2</sup> (SA), sufficient for subjective sensation of warmth.

**DURATION:** Approx. 8 minutes

**REGIMEN:** 3x weekly until swelling resolves.





# ULTRASOUND TREATMENT GUIDELINES-CHRONIC INFLAMMATION

## MUSCLE GUARDING SPASM - TRAPEZIUS

**PROBLEM:** Painful muscle tightness secondary to neck pain of mechanical origin; neck stiffness.

**POSITION:** Seated; rolled towel in low back; arms supported on a lap pillow.

**TREATMENT AREA:** Superior fibres trapezius / sternocleidomastoid muscles.

**GOAL:** Relaxation of muscle spasm/decreased pain via sedative effect of mild heat on cutaneous receptors.

**FREQUENCY:** 1 or 3 MHz

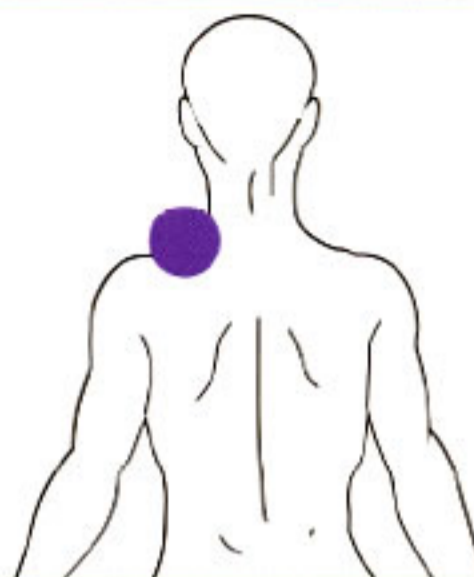
**MODE:** Contact treatment, gel/lotion couplant.

**INTENSITY:** Continuous output,  $> 1.0 \text{ W/cm}^2$ , sufficient for subjective sensation of warmth.

**DURATION:** 8-10 minutes, longer if sternocleidomastoid involved.

**REGIMEN:** Repeat only if muscle spasm persists.

**ADJUNCTIVE TREATMENT:** Gentle AROM or hold-relax technique.



## CHRONIC PLANTARFASCIITIS

**PROBLEM:** Pain on prolonged standing / walking; tight plantar fascia; tender medial tubercle calcaneus; calcaneal spur.

**POSITION:** Lying prone or supine, or seated.

**TREATMENT AREA:** Area of muscle / fascia attachment to calcaneus and plantar fascia.

**GOAL:** Decreased pain on weight-bearing

**FREQUENCY:** 1 MHz

**MODE:** Contact treatment, gel/lotion couplant

**INTENSITY:** Continuous output,  $> 0.8 \text{ W/cm}^2$ , sufficient for subjective sensation of warmth.

**DURATION:** 8-10 minutes

**REGIMEN:** 3x initial week, then 2x week, 8-12 treatments.

**ADJUNCTIVE TREATMENT:** Foot exercise for intrinsic muscles. Excessive pronation is frequently a contributing factor in plantar fasciitis; biomechanical correction may be required.

**SPECIAL CONSIDERATION:** Cooling tissues prior to/after US application will neutralize the effect of heating dose US. Ice is suitable for at-home pain control.



## FRACTURED PATELLA - SURGICAL REPAIR

**PROBLEM:** 6-8 weeks post joint aspiration / wiring patella; indurated swelling anterior aspect knee; immobile patella; restricted knee flexion / terminal extension.

**POSITION:** Knee supported in maximum flexion.

**TREATMENT AREA:** Strips lateral, medial and proximal to the patella.

**GOAL:** Reduction in swelling; patella mobility

to increase flexion/extension.

**FREQUENCY:** 1 MHz

**MODE:** Contact treatment, gel/lotion couplant

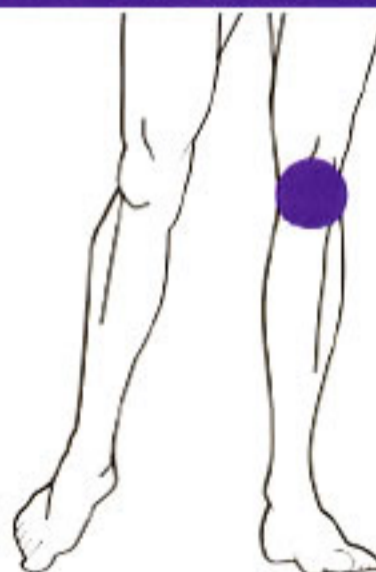
**INTENSITY:** Continuous output,  $> 1.0 \text{ W/cm}^2$ , sufficient for subjective sensation of warmth.

**DURATION:** Each strip approx. 5 minutes.

**REGIMEN:** 3x week until swelling resolves.

**ADJUNCTIVE TREATMENT:** Stretching activities immediately following US, minimum duration 10-15 minutes.

**SPECIAL CONSIDERATIONS:** Check popliteal fossa - dependent swelling becomes organized during immobilization. Restrict ice application for post-exercise pain to 5 minutes - longer duration will counteract treatment benefit.



\*SA = Spatial-average intensity

+Passive movements (including oscillatory movements into resistance), assisted stretches (manual/slings/pulleys/other) and other techniques (PNF/springs/manual resistance) are some of the options for stretching shortened tissues.

References: 1. Lehmann JR et al: Selective heating effects of ultrasound in human beings. Arch Phys Med Rehabil 47:481, 1970

2. Lehmann JR et al: Ultrasound: considerations for use in the presence of prosthetic joints. Arch Phys Med Rehabil 61: 502, 1980.

NOTE: These protocols are only guidelines and are not intended to imply that there are not other approaches to these conditions. Optimum treatment is always based on individual patient evaluation. The practitioner is advised to check individual patients for indications and contraindication before applying ultrasound.