**Bashardoust TS, Houghton P, MacDermid JC and et al. Effects of Low-Intensity Pulsed Ultrasound Therapy on Fracture Healing A Systematic Review and Meta-Analysis. Am. J. Phys. Med. Rehabil. 2012; 91:(4) 349-367.**

**Reviewer:** Linda Metzger 6-10-15

**Design:** Systematic Review and Meta-Analyses

**Objective:** To assess the effects of low-intensity pulsed ultrasound (LIPUS) on bone regeneration and on the stimulation of bone healing compared with placebo for acute fractures in adults.

**Summary of Results:**

- The literature search covered the period from 1966 through June 2010.
- This review included human clinical trial studies including randomized, controlled and non-controlled, and cohort studies.
- Primary outcomes to measure bone healing included radiographic and clinical methods.
- Includes 7 small sized trials with a total of 257 patients that focused on delayed unions and nonunions.
- There is weak evidence that LIPUS supports radiographic healing in delayed unions and nonunions, but it was not possible to pool the data because of a paucity of sufficient studies with similar outcome measures.
- Six of the 7 studies supported LIPUS stimulated bone healing, and one study did not find LIPUS to be effective in the healing process of delayed unions and nonunions.

**Reasons not to Cite as Evidence:**

- All included studies were not RCTs.
- Sample sizes of the included trials were small. All studies had less than 73 total participants with all studies ranging from 13 to 72 total subjects.
- All trials had methodological limitations. Six of the 7 studies did not have a control group. Study quality and risk of bias in the included studies was assessed according to the PEDro quality scales. The quality scores of the included studies were “very low” for 5 studies, “low” for one study, and moderate for one study. Most authors did not use randomization and/or blinding; 2 studies did not use randomization, 4 were unclear, and 6 studies were unclear about blinding. These 6 studies were at high or unclear risk of selection bias, detection bias, and performance bias due to insufficient random sequence generation and lack of blinding.
- The one study that had a low risk of bias and a moderate PEDro score did incorporate randomization and double blinding, but the study was extremely small with only 13 total participants in the treatment and control groups.
- While a potential benefit of ultrasound for the bone healing of delayed unions and nonunions in adults cannot be ruled out, the currently available evidence from 7 clinically heterogeneous trials is insufficient to support the routine use of this intervention in clinical practice.

**Assessment:**

Inadequate for evidence of the effect of low-intensity pulsed ultrasound (LIPUS) as part of the treatment to regenerate and stimulate bone healing in delayed unions and nonunions in acute lower limb fractures in adults.