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## **WEAK STATIC MAGNETIC FIELDS REDUCE MUSCULOSKELETAL PAIN, REDUCE EDEMA AND MAY ENHANCE HUMAN SLEEP.**

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**BASIC STUDIES:** *Static magnetic fields (SMF) in the 1-4000G range can have significant therapeutic benefit, particularly for treatment of pain and edema from musculoskeletal injuries and pathologies.*

**CLINICAL STUDIES:** Several double blind clinical studies using static magnets have been reported.

*A single 45 min treatment with 300-500G reduced pain in post-polio patients by 76%. Interestingly, the magnets were placed on pain trigger points and not directly on the pain site. In another study discoloration, edema and pain were reduced by 40-70% over 7 days post suction lipectomy.*

Pads containing arrays of 150-400G ceramic magnets were placed over the liposuction site immediately post operative and left in place for 14 days.

The outcome measures of fibromyalgia (pain, sleep disorders, etc) were reduced by approximately 40% in patients who slept on a mattress pad containing arrays of 800G ceramic magnets over a 4 month period.

A second, more recent, double blind study on fibromyalgia confirmed significant pain reduction.

*90% of patients with diabetic peripheral neuropathy received significant relief of pain, numbness and tingling using 475G alternating pole magnetic insoles in a randomized, placebo-controlled, crossover (vs opposite foot) study.*

*Chronic pelvic pain and disability were significantly decreased using 300-500 G bipolar (concentric circle) magnets over pain pressure points.*

**SLEEP STUDIES:** A recent study assessed the effect of a mattress pad containing arrays of concentric circle magnets on quality of sleep.

*Time Awake was significantly decreased (-34%,  $p=.03$ ) and time in Slow-Wave (Delta) Sleep was significantly increased (+37%,  $p=.005$ ) in subjects over 45 years of age.*

**MECHANISMS:** The promising approaches are: (1) Effects on the binding of substances such as  $Ca^{2+}$  on molecules which regulate the biochemistry of, e.g., vasodilatation or the release of regulatory factors (cytokines) in response to injury. This involves Lorentz force effects on bound ion/water complexes and predicts both thresholds and windows vs field amplitude; (ii) Direct magnetic force effects on molecules with large magnetic susceptibility (diamagnetic effect). This force may displace the position of ionic channels, *thereby preventing a nerve impulse from reaching its destination, i.e., blockage of a sensory signal for pain.*

**CONCLUSIONS:** ...it is clear that static magnetic fields can produce significant therapeutic effects related to pain, edema and peripheral blood circulation. This study was supported in part by the Hot-ace W Goldsmith Foundation.