

Widening Applications of Magnet Therapy

Magnet therapy is ancient. People as far back as Cleopatra have employed magnets to promote health and relieve pain. Today, the popularity of magnet therapy is undeniable, with people in the United States spending approximately \$500 million per year on magnets for pain. Magnet therapy is the second most common complementary medical approach chosen among human patients with peripheral neuropathy, rheumatoid arthritis, osteoarthritis, and fibromyalgia. Now, animals can benefit from magnet therapy as well (to the extent that they may be effective), with products adapted specifically to their size and anatomic requirements. For example, there are magnetic blankets, beds, wraps, and boots for animals of all sizes. Some companies sell small magnetic field generators that hang from the collar. Magnet products for animals come with hefty price tags (\$300 to \$5000 each) that match their claims, the veracity of which remain largely unverified.

Magnets come in two types. One type, called “static” or “permanent”, frequently contains iron, steel, rare-earth elements, or alloys. The magnetic field remains constant. Static magnets must touch or be near the body to deliver maximal effects, as even if the gauss (strength) ratings of a static magnet ranges in the hundreds, the magnetic field strength within an inch away may be in the low double digits. Static magnet suppliers may claim that their products are uniquely effective because of a certain arrangement of magnetic polarity – i.e., in concentric circles, checkerboard patterns, or stripes. If one accepts the idea that magnets improve circulation maximally when placed perpendicular to vessels, then when polarities lay in varying directions, the resultant fields will be perpendicular to at least some vessels.

Accumulating research shows that magnets act in more ways than simply improving blood flow, though the exact mechanisms remain unknown. Researchers evaluating cutaneous microcirculation in rabbits have shown that static magnetic fields can significantly enhance vasodilation, but they can also drive vasoconstriction, depending on the pre-treatment neurotransmitter-driven tone of the vessels. Thus, magnets may influence vascular tone more through a mechanism involving modulation rather than a by unidirectional effect of vasodilation.

More research is available on the second type of magnet therapy – pulsed electromagnetic field (PEMF) therapy. PEMF instruments create magnetic fields when electrical current flows through coils of metal wire; more turns of the coil or number of coils can create stronger magnetic fields. Unlike static magnets which produce a permanent magnetic field, PEMF generators only establish a magnetic field when current is flowing through the coils. The on-off frequency of the PEMF generator determines the rate of pulsation.

The main application of PEMF therapy is for the treatment of pain, including neuropathic pain. PEMF increases pain thresholds in a manner consistent with an analgesic response. In part, these analgesic effects are opioid-mediated, as naloxone attenuates, but does not ablate, PEMF-induced analgesia. Although critics claim that the pain-relieving effects of magnets are placebo-driven, evidence from well-designed studies demonstrating analgesia benefits is beginning to appear. Furthermore, experts in rehabilitation medicine are finding increasingly creative uses for magnets that go far beyond analgesia.

Both static and pulsing electromagnetic fields (PEMF) have beneficial effects on bone formation and healing after fractures and osteotomies. In 1979, the FDA approved the use of magnets for treatment of poorly healing (non-union) bone fractures. PEMF application may promote bone union by electric current induction, which changes the permeability of ions across cell membranes, affecting the activity of intracellular cyclic adenosine monophosphate (cAMP) and cyclic guanosine monophosphate (cGMP). The magnetic force also appears to accelerate osteoblast differentiation by activation of p38 phosphorylation. By delivering magnetic stimulation to brain or peripheral nerve sites, functions that were lost begin to recover. Repetitive extracorporeal magnetic stimulation delivers a noninvasive form of electrical stimulation that involves no probes or even contact with the skin surface. For example, repetitive extracorporeal magnetic stimulation for urinary incontinence in humans now offers a safer and more comfortable alternative. Research designed to test this method of neural re-education first involved dogs. Other research on dogs shows that magnetic stimulation can also induce evacuation of the rectum and urinary bladder in dogs with lesions of their pelvic ganglia without adverse effects. Other applications include tendonitis, wound healing, osteoarthritis, and impaired neural function or spasticity from central nervous system diseases such as multiple sclerosis and spinal cord damage.

While questions remain about the safety and efficacy of magnet therapy, the World Health Organization suggests that available evidence indicates an absence of adverse effects on human health from exposure to static magnetic fields up to 2 Tesla (1 Tesla = 20,000 gauss.) Nevertheless, it would be wise to avoid magnet therapy in pregnant animals, as the effects of magnets on fetuses are unknown. Likewise, magnets may interfere with pacemaker, neurostimulator, and insulin pump function. The magnet literature further advises avoiding magnet placement over drug delivery patches, in the event that vasodilation occurs underneath the patch and thereby alters the rate of drug delivery.

Finally, as with herbs and nutraceuticals, lack of manufacturing regulations for magnet producers allow for the sale of products that may vary in strength from the label claims. In short, *caveat emptor*.