

THE EFFECT OF ORAL IRRIGATION WITH A MAGNETIC WATER TREATMENT  
DEVICE ON PLAQUE AND CALCULUS

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(Condensed Version)

Key words: irrigation; magnetic water treatment device; adherence; supragingival calculus reduction; stern layer; divalent cations.

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Abstract. Calculus formation on tooth surfaces is analogous to the formation of lime and scale deposits in plumbing. Magnetic water devices have been shown to significantly reduce scale deposits in industry; therefore an oral irrigator with a magnetic water device may have a similar effect on calculus. To test this hypothesis, a double blind clinical study was established using 64 irrigators, 30 of which had their magnetic devices removed. 54 patients with heavy supragingival calculus were given irrigators at random after prophylaxis. Instructions were given to irrigate twice a day, particularly the lower 6 anterior teeth. The patients were also told not to floss these 6 teeth which were to be the study teeth. They were examined after 3 months and measurements were taken of the accretions adhering to the study teeth. No attempt was made to determine whether the adhering material was hard or soft so it must be assumed that at least some of the measured material was also plaque. The measurements of the group using an irrigator with a magnetic device showed a 44% greater reduction in calculus volume ( $p < 0.0005$ ) and a 42% greater reduction in area ( $p < 0.0001$ ) over the group using an unmagnetic irrigator. There appears to be a statistically significant difference in supragingival accretion volumes between conventional irrigation and using an irrigator with a magnetic water treatment device.

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Adherence of supra-gingival calculus and its accompanying bacterial plaque to the surfaces of teeth has been implicated as a possible factor in initiating periodontal diseases. Tooth brushing has been universally accepted as the standard method of oral hygiene to control the formation of supra-gingival calculus. Standard oral hygiene procedures have greatly improved dental health, but periodontal diseases are still common and pose a tremendous health care expense (Sheiham 1991).

Many studies have demonstrated that the use of irrigation devices may be an effective means to reach into areas inaccessible to tooth brushing. The addition of agents such as chlorhexidine and fluoride have increased this effectiveness (Flint et al, 1988, Vignarajah et al, 1989, Wikesjo et al, 1989, Landet et al, 1986). An other method of increasing the effectiveness of irrigation may be through the use of magnets.

The application of magnetic water treatment devices has been used in Eastern Block countries and China for over twenty-five years (Hibben 1973). Grutsch & McClintock (1984) demonstrated a positive corrosion and deposit control by the use of magnetically-treated water at an AMOCO refinery. Kronenberg (1985) described the observations of reduced formation of new hard lime scale deposits and the elimination of old lime scale deposits. A Baylor research team (McAtec et al, 1985) under contract from the American Petroleum Institute concluded that "the passage of conducting solutions (tap water) through a magnetic treatment device generates voltages and currents which result in an electrolysis reaction, producing nucleation centers that favor precipitation of scaling salts in the bulk of the solution rather than on the walls of plumbing."

Certain theories have been proposed to explain mechanisms of adherence of calculus. It has been shown that amphipatic substances change the charge of the tooth surfaces, which can effect the