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# Gingival retraction cord

## PRODUCT NAME AND MANUFACTURER

**Product name:** Hemodent Gingival Retraction Cord

**Manufacturer:** Premier Dental Products Co., 3600 Horizon Drive, Box 61574, King of Prussia, Pa. 19406-0974, 1-610-239-6000, or 1-888-773-6872, "www.premusa.com"

Hemodent Gingival Retraction Cord is made of cotton and impregnated with astringent, a buffered solution of 10 percent aluminum chloride. Hemodent cord is available in twisted and braided styles and comes in medium-thin (#9) and medium-heavy (#3) weights. The #9 is 84 inches of cord impregnated with 76.86 milligrams of aluminum chloride (approximately 0.9 mg per inch). The #3 is 84 inches of cord impregnated with 157.5 mg of aluminum chloride (approximately 1.8 mg per inch).

## CONSIDERATIONS FOR ACCEPTANCE

The Council on Scientific Affairs evaluated the Hemodent Gingival Retraction Cord for safety and efficacy according to the ADA Provisions for Acceptance. The use of gingival retraction cords with 5 to 10 percent aluminum chloride has been shown to be safe and effective.<sup>1-3</sup>

## INDICATIONS AND USE

Hemodent cord is indicated for all kinds of gingival retraction before impressions are taken or restorations are placed. Hemodent cord may be used dry or soaked with additional astringent. Cut cord may be stored in astringent solution for up to three months. It is suggested that placement start at the interproximal gingival crevice, where there usually is more tissue, and continue circumferentially.

## MECHANISM OF ACTION

Aluminum chloride is used commonly in gingival retraction because of its ability to cause contraction and shrinkage of tissue. Aluminum compounds act as hemostatic agents and astringents. These actions of aluminum chloride result from



its ability to precipitate protein, constrict blood vessels and extract fluid from tissues.<sup>4</sup> Aluminum chloride is highly soluble in water, freely soluble in alcohol and soluble in glycerin.<sup>5</sup>

## BENEFITS AND CONSIDERATIONS

Hemodent cord contains aluminum chloride that is buffered to prevent irritation of the gingival tissue. Aluminum chloride has no contraindications and minimal side effects.<sup>6</sup> However, irritation and even permanent tissue destruction can result from improper use of retraction cords. Retraction cords never should be forced into the sulcus. Use of cord impregnated with aluminum chloride is reported to be the safest and most effective method of gingival retraction.<sup>7</sup>

1. Woychesshin FF. An evaluation of the drugs used for gingival retraction. *J Prosthet Dent* 1964;14:769-76.
2. Ramadan FA, El-Sadeek M, Hassanein ES. Histopathologic response of gingival tissues to hemodent and aluminum chloride solutions as tissue displacement materials. *Egypt Dent J* 1972;18:337-52.
3. Mokbel AM, Mohammed YR. Local effect of applying aluminum chloride on the dento-gingival unit as a tissue displacement material: part I. *Egypt Dent J* 1973;19:35-48.
4. Burrell KH, Glick M. Hemostatics, astringents and gingival retraction cords. In: Ciancio SG, ed. *ADA guide to dental therapeutics*. 2nd ed. Chicago: American Dental Association; 2000:104-18.
5. Council on Dental Therapeutics of the American Dental Association. Hemostatics and astringents. In: *Accepted dental therapeutics*. 40th ed. Chicago: American Dental Association; 1984:334-41.
6. Cloyd S, Puri S. Using the double-cord packing technique of tissue retraction for making crown impressions. *Dent Today* 1999;18:54-9.
7. Azzi R, Tsao T, Carranza F Jr., Kenney EB. Comparative study of gingival retraction methods. *J Prosthet Dent* 1983;50:561-5.

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# Gingival retraction

Controlling blood, crevicular fluid, water and saliva while taking impressions is critical. Water and saliva can be controlled by air spray. Blood and crevicular fluid can be controlled by retraction cords, hemostatic agents, electrosurgery or rotary gingival curettage.<sup>1</sup>

Retraction cords displace gingival tissue mechanically; they also can have a chemical action when impregnated with astringents and vasoconstrictors that cause tissue contraction and hemostasis. Electrosurgery creates a trough around the tooth by removing superficial cell layers from the gingival sulcus' inner lining through application of an electric current. Rotary gingival curettage removes the sulcular epithelium with a high-speed diamond bur. Azzi and colleagues<sup>2</sup> studied the effect of retraction cords, electrosurgery and rotary gingival curettage on gingival recession and loss of attachment in dogs. They found that cords had the smallest effect on the gingiva and rotary curettage had the largest effect.

Astringents impregnated in retraction cords include aluminum chloride, ferric sulfate, alum (potassium aluminum sulfate) and zinc chloride. Alum and ferric sulfate may be irritating and even corrosive at high concentrations, while increased concentrations of zinc chloride may damage bone and tissue permanently.<sup>3</sup> The least irritating cords contain buffered aluminum chloride, which may be left in the sulcus for up to 15 minutes without permanent damage.<sup>4</sup>

Weir and Williams<sup>5</sup> reported that soaking retraction cords in aluminum chloride solution enhances hemostasis. This led Runyan and colleagues<sup>1</sup> to study whether soaking cords in aluminum chloride solution has any effect on the ability of the cord to absorb moisture. They found that presoaking had no effect on fluid absorption and, therefore, may be a worthwhile adjunct.

Gingival retraction cords containing epinephrine effectively control bleeding; however, from 24 to 92 percent of the epinephrine may be absorbed systemically.<sup>6</sup> Epinephrine-impregnated retraction cord contains 8 percent racemic epinephrine. One study estimated the concentration of epinephrine absorbed systemically to be equivalent to approximately 3.9 cartridges of local

anesthetic containing 1:100,000 *l*-epinephrine.<sup>7</sup> This estimate is considerably lower than previous estimates because the authors calculated the actual amount of releasable epinephrine in the cord before retraction, which was found to be approximately one-half that of the labeled amount; based their final estimate on the more biologically active *l*-epinephrine; and found that presoaking in aluminum chloride removed approximately 25 percent of the racemic epinephrine in the cord.

There are conflicting reports on whether epinephrine absorbed from retraction cords has any adverse physiological effects.<sup>7-11</sup> The potential epinephrine reactions that can occur following systemic absorption include increased anxiety after cord placement, limb tremor, diaphoresis, headache, florid appearance, tachycardia and elevated blood pressure.<sup>6</sup> However, there are many variables that make it difficult to predict the physiological effect. These variables include the concentration of epinephrine absorbed from the cord; the length of time the cord is in the sulcus; the condition of the gingival tissue; the presence of crevicular fluid or saliva; individual patient response; and drug interactions with tricyclic antidepressants, nonselective  $\beta$ -adrenergic antagonists, certain general anesthetics and cocaine.<sup>10,11</sup> Therefore, recommendations have been made to either limit or avoid use of such epinephrine-impregnated retraction cords.<sup>7,10,11</sup> ■

1. Runyan DA, Reddy TG Jr., Shimoda LM. Fluid absorbency of retraction cords after soaking in aluminum chloride solution. *J Prosthet Dent* 1988;60:676-8.
2. Azzi R, Tsao T, Carranza F Jr., Kenney EB. Comparative study of gingival retraction methods. *J Prosthet Dent* 1983;50:561-5.
3. Cloyd S, Puri S. Using the double-cord packing technique of tissue retraction for making crown impressions. *Dent Today* 1999;18:54-9.
4. Reiman M. Exposure of subgingival margins by nonsurgical displacement. *J Prosthet Dent* 1976;36:649-54.
5. Weir DJ, Williams BH. Clinical effectiveness of mechanical-chemical tissue displacement methods. *J Prosthet Dent* 1984;51:326-9.
6. Malamed SF. Physical evaluation and the prevention of medical emergencies: vital signs. *Anesth Pain Control Dent* 1993;2:107-13.
7. Kellam SA, Smith JR, Scheffel SJ. Epinephrine absorption from commercial gingival retraction cords in clinical patients. *J Prosthet Dent* 1992;68:761-5.
8. Hatch CL, Chernow B, Terezhalmay GT, Van Ness M, Hall-Boyer K, Lake CR. Plasma catecholamine and hemodynamic responses to the placement of epinephrine-impregnated gingival retraction cord. *Oral Surg Oral Med Oral Pathol* 1984;58:540-4.
9. Houston JB, Appleby RC, DeCounter L, Callaghan N, Funk DC. Effect of *r*-epinephrine-impregnated retraction cord on the cardiovascular system. *J Prosthet Dent* 1970;24:373-6.
10. Pallasch TJ. Vasoconstrictors and the heart. *J Calif Dent Assoc* 1998;26:668-73.
11. Yagiela JA. Adverse drug interactions in dental practice: interactions associated with vasoconstrictors. *JADA* 1999;130:701-9.