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Fluoride Varnish – An Overview

What Is Fluoride Varnish?

Most fluoride varnishes are lacquers containing 5% sodium fluoride in a colophony/resin base. Because there are significant differences in fluoride varnish preparations, making comparisons between brands can be difficult. Fluoride varnish provides a temporary but highly concentrated dose of fluoride to the tooth surface. The varnish holds fluoride close to that surface for a longer period of time than other concentrated fluoride products. Highly concentrated fluoride products such as fluoride varnish must be applied by a healthcare professional in most states.

How Do Fluorides Prevent Dental Decay?

For all tooth surfaces, there is a continuous cycle of demineralization and remineralization of tooth enamel. Tooth decay is an infectious, transmissible disease caused by bacteria colonizing on the teeth and producing acid that dissolves enamel, resulting in greater demineralization. If unchecked, bacteria continue destroying tooth structure, eventually infecting the soft pulp tissue and causing pain. All fluorides act to slow demineralization and boost remineralization.

Fluorides work in at least four different ways to protect teeth from tooth decay. Fluoride is incorporated in tooth structure when small amounts are swallowed daily while the teeth are forming. Fluoride becomes concentrated in the outer enamel surfaces when applied after teeth erupt into the mouth. Dental plaque and saliva act as fluoride reservoirs to enhance the remineralization process. Fluorides interfere with the decay-causing bacteria colonizing on teeth and reduce their acid production, thus slowing demineralization.

Fluorides are delivered to the teeth in different dosages and in a variety of ways. They can be delivered topically or systemically. Low doses of topical fluoride are found in most over-the-counter toothpastes and optimally fluoridated water. These methods of fluoride delivery have the advantage of being inexpensive and widely accessible and, therefore offer caries-preventive benefits at low cost. Higher doses are found in prescription-only strength rinses, in some toothpastes and in dietary fluoride supplements (pills or liquids) that are used at home. By state licensing regulations, high-dose topical fluoride gels and varnishes must be applied by health professionals, which contributes to their greater costs for benefits. Using a fluoride supplement or drinking optimally fluoridated water provides both topical and systemic effects.

While swallowed fluorides are incorporated into tooth structure before eruption and are effective in strengthening tooth enamel, the topical fluoride actions of low dose fluorides appear to be responsible for the greater proportion of reductions in tooth decay. One recent study suggests the strongest caries-preventive effect is produced by a high pre-eruptive fluoride exposure supplemented by a high exposure at maturation and/or post-eruption. High-dose fluorides are similar to low-dose fluorides in how they prevent tooth decay. Repeated exposure is necessary to maintain a high concentration on tooth surfaces, but a repeated cycle of exposure/reapplication is needed less often for high-dose fluorides. When an adequate balance of remineralization and demineralization is maintained with low-doses of fluoride, high-dose fluorides may not provide any additional protection. A low level of fluoride maintained in plaque and enamel can prevent or control dental caries throughout life.

Fluoride varnish works by increasing the concentration of fluoride in the outer surface of teeth, thereby enhancing fluoride uptake during early stages of demineralization. The varnish hardens on the tooth as soon as it contacts saliva, allowing the high concentration of fluoride to be in contact with tooth enamel for an extended period of time (about 1 to 7 days). This is a much longer exposure compared to other high-dose topical fluorides such as gels or foams, which is typically 10 to 15 minutes. The amount of fluoride deposited in the tooth surface is considerably greater in demineralized versus sound tooth surfaces. Thus, the benefits of fluoride varnish are greatest for individuals at moderate-risk or high-risk for demineralization or tooth decay.