



## **Pit and Fissure Sealants**

### Full Summary

#### **Description and Use:**

Sealants are either resin-based materials or glass ionomer cements applied to the occlusal (biting) surface of the tooth, covering the pits and fissures that are susceptible to decay. Sealants are indicated for children and adults who are at a moderate or high risk of developing dental caries or have incipient caries in pits and fissures. Moderate and high risk levels for caries in children and adults take into account the history of new, incipient or recurrent caries, salivary flow, regularity of dental visits and fluoride exposure, among other factors[1]. Sealant restorations are indicated for carious lesions that have not advanced into the dentin in occlusal surfaces of permanent molars, pre-molars and primary molars[2].

#### **Application:**

Visual identification of the lesion after cleaning and drying the tooth is sufficient to detect early non-cavitated lesions. Use of explorers is not necessary and can damage the tooth surface. Recent radiographs can be used if available, but they should not be obtained for the sole purpose of placing sealants. [3, 4]. Most studies on sealing in incipient decay found that sealing caries is associated with a reduction in viable bacteria counts and reduced probability of bacteria[5]. The area to be sealed must be cleaned first with a hand piece or toothbrush. Avoid using paste that contains fluoride or oil. Then rinse with water.[6] Resin-based sealants require the area to be dry for the sealant to be retained properly; therefore, rubber dams and/or cotton rolls are used to isolate the area and then it is dried with compressed air. Next, if the sealant is resin-based, etchant is applied to the area for about 60 seconds, rinsed and dried. The sealant is then painted onto the etched occlusal surface of the tooth and hardened by free-radical polymerization using visible light or by letting the sealant self-cure. Lastly, the surface is wiped with cotton to remove unpolymerized resin once the sealant has set. Glass ionomer cements do not require etching of the tooth surface and are not as moisture sensitive and are therefore easier to apply[2, 4].



### **Effectiveness and Efficacy:**

Effectiveness of pit and fissure sealants for caries prevention has been well established.[4] Sealants have been shown to reduce caries in children and adolescents, and incidence of new caries is reduced with high preventive fractions even several years after treatment, given that they are regularly checked. A meta-analysis conducted by the Cochrane Collaborative[7] reported a reduction in caries incidence of 87% at one year, 78% at two years, 70% at 3 years and 60 % at 4 years based on 5 split mouth studies[8-13] and one parallel study[14] comparing resin-based sealed teeth to unsealed teeth. The 9-year parallel study conducted by Bravo et al found that 27% of sealed surfaces were decayed after 9 years compared to 77% of surfaces without sealant.[14] Placement of sealants over non-cavitated lesions has been shown to reduce the progression of these lesions in children, adolescents and young adults. The results of the CDC Dental Sealant Systematic Review Work Group's meta-analysis[15] showed that the median annual percentage of non-cavitated lesions progressing was 2.6% in sealed teeth compared to 12.6% in unsealed (6 studies were included; 1 prospective cohort[16], 1 retrospective cohort[17] and 4 randomized controlled trials[18-21]). The prevented fraction was 71.3% up to 5 years after placement. Resin-based sealants are believed to have a higher retention rate than glass ionomer cements but the CDC and Cochrane reviews found that evidence was conflicting[4, 7, 15, 22, 23] The studies included in the Cochrane Collaborative review on this topic were conflicting. 4 studies [24-27] found that resin-based sealants have a higher retention rate, 3 studies[28-30] found that both resin-based and glass ionomer sealants have low retention rates, and 1 study[31] reported that both types of sealant have high retention rates. Although glass ionomer cements are able to release fluoride, it has not been shown that they are more effective than resin-based sealants in preventing caries. Overall, both materials show equal effectiveness.

### **Recommendations and Community Programs:**

The CDC's Task Force on Community Preventative Services strongly recommended school-based or school-linked pit and fissure sealant delivery programs but made no recommendation for or against other community level interventions (state-



wide or community-wide sealant promotion programs) because of a lack of high quality research on their effectiveness.[32] A total of 10 school-based studies were included in the task force's meta-analysis comparing caries experience of children who received sealants to those who did not. The school-based sealant programs were associated with a median relative decrease in caries of 60%[32]. Those programs where sealants were applied in school (school-based) compared to those in which the sealants were applied either in school, a private dental practice or clinic setting (school-linked) had a greater decrease in caries (65% vs. 37%, respectively).

### **Cost Effectiveness:**

There is conflicting evidence supporting the cost-effectiveness of sealants in prevention of caries. A systematic review[33] including 4 studies[34-37] found that evidence is inconclusive due to the low quality of the studies. Some studies have shown that sealants are cost-effective,[38, 39] especially in children who are at high risk of caries. Overall, it appears that the literature is lacking randomized controlled trials to determine if sealants are cost-effective. The cost of sealant programs is decreased if sealants can be applied by a hygienist alone instead of a dentist using the four-handed technique. No studies directly compare the use of the 2-handed technique compared to the 4-handed[40]. Griffin et al's multivariate analysis using data from 11 sealant retention studies found that the retention of sealants if applied using 2 people instead of one is increased by 9% when controlling for other factors.[40, 41]



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