

Stuck On Caries: Do Adhesives Work? (1/03)

Bonding of self-etch and total-etch adhesives to carious dentin. Yoshiyama M, Tay FR, Doi J, Nishitani Y, Yamada T, Itou K, Carvalho RM, Nakajima M, Pashley DH. J Dent Res 2002;81:556-560.



In addition to retaining sound, healthy dentin, the goal of conservative dentistry is to remove the highly-infected, denatured dentin (infected dentin) while preserving intact, bacteria-free, remineralizable dentin (affected dentin). Unfortunately very little research has been done to determine the ability of today's adhesives to bond to infected and affected dentin. This study used microtensile bond strength testing and ultrastructural examination by transmission electron microscopy to evaluate the ability of a total-etch adhesive and a self-etch adhesive to bond to these types of dentin. The authors used sixteen extracted human molars with carious dentin for the study. After selective grinding and examination to identify infected versus affected carious areas, they used a total-etch product (Single Bond, 3M ESPE) or an experimental self-etch product (ABF System, Kuraray) to bond to each type of carious dentin and to sound, noncarious dentin. Microtensile bond strength testing revealed that the mean bond strengths of the adhesives to infected dentin was significantly lower than to affected dentin. The bond strength to sound dentin was significantly higher than the other

two. The adhesives did not show a difference from each other. Ultrastructural examination revealed that for both adhesives, the hybrid layer was thicker but more porous in caries-affected dentin than in sound dentin. **The authors concluded that the tested adhesives performed more poorly when applied to carious dentin than to sound dentin, and recommended against their being used in those cases.**

DIS Comment: This type of study has obvious relevance to the clinical situation, where adhesives are used to bond resin-based materials to teeth that are carious. Some dentists believe in aggressively removing all carious dentin (both affected and infected), while others choose a more limited approach by removing the soft, moist, infected dentin while leaving the harder, affected dentin. Regardless, it is often difficult or impossible to distinguish between the two types, so at times we are all bonding to affected and infected dentin. Therefore, it is important that we know how today's adhesives perform when used to bond to carious dentin. Unfortunately, this laboratory study found that they perform relatively poorly. These results are probably due to the altered nature of carious dentin, because it is less heavily mineralized, more porous, and softer than sound dentin. As pointed out by the authors, the clinical import of their work is somewhat lessened by the fact that in most clinical cases, we have sound dentin and enamel surrounding the carious dentin, so better results than those seen in the study are probably produced.