Adhesives: Three Bottles, Two Bottles, One Bottle, No Bottle!

Dear Reader,

Adhesives are high-performance and high-tech products. As Prof. D. Pashley stated at the "4th European Symposium on Adhesive Dentistry" (see page 333), by bonding to dentin, dentists are performing tissue engineering: We produce a scaffold which is then penetrated by resins. Everyone knows that bond strengths of 20 to 30 MPa to dentin is achievable today with dental adhesives. Do you know how good a performance this is? Prof. Hickel has described it very well: Imagine you would install a "relax hook" on the ceiling of your office, where you could suspend yourself for a few minutes to completely relax. As a reader of the *Journal of Adhesive Dentistry*, you would rather use an adhesive than drill a hole and use a dowel. Assuming your weight is 75 Kg and your adhesive yielded 20 MPa, how large is the bonding surface needed to withstand the stress induced by your body weight? Let us calculate: 20 MPa = 20,000,000 N/m^2 = 20 N/mm^2 $\cong$ 2 Kg/mm^2 $\rightarrow$ to support 75 Kg you need 75/2 = 37.5 mm^2. This is a round spot of only 7 mm diameter!

The current trend is toward simpler and faster, which means one liquid to do it all. However, such an "all-in-one" adhesive must be acidic, which is a chemical nightmare: acidic solutions hydrolize monomers, with the result that either effectiveness or shelf life are poor. It is therefore better to mix such an adhesive right before application, which is not simplified application anymore. New delivery tools are required. Squeezing blisters is a primitive approach, coating the applicator brush with one component is already a smarter solution. For the future, I see disposable, nanotechnology-based applicators which will mix the ready-to-use solution during application.

There is another concern: There are more and more allergic reactions reported among users of adhesives (dentists and dental nurses). Therefore, we need application tools which are safe from this aspect: no smeary bottles and lids anymore, since the monomers, especially HEMA, may diffuse rather quickly through rubber or nitrile gloves (see Congress Report page 333). For this purpose there are already "click boxes", which allow dispensing of the adhesive without touching the bottle. Here too there is a lot of potential for improvement.

Dear reader, the future of adhesives lies not in fewer bottles, but in smart application tools that follow the basic rule: safe for anyone: the patient, the dentist, and the dental nurses.

Professor Jean-François Roulet