

東北大学大学院歯学研究科
インターフェイス口腔健康科学
第19回学術フォーラム
Forum for Interface Oral Health Science

Phase separation with self-etch adhesives
- Analysis of the phenomenon and reflections about
adhesives' compositions -

Dr. Werner J. Finger

ケルン大学歯学部(ドイツ)

平成18年11月20日(月) 17:00~18:00
歯学部A1セミナー室(歯学部基礎棟1階)

Abstract:

This presentation addresses the phenomenon of phase separation, common with a number of all-in-one self-etch adhesives, reviewing some joint research efforts with colleagues from the Division of Operative Dentistry at the Graduate School of Dentistry in Sendai. Supposedly, manufacturers of such adhesives include, on an empirical base, considerable amounts of water as ionization medium for the functional acidic monomers. Since water is detrimental to the quality of the adhesive polymer a clinically important step is, to remove solvent and water as much as possible prior to light activation and curing. Our investigations have shown that considerably longer air-drying times than indicated by manufacturers are mandatory to obtain high strength adhesive layers. Upon volatilization of part of the organic solvent of self-etch adhesives, the solutions separate into two distinct phases, a water-rich one with minor amounts of hydrophilic monomer dissolved, and a monomer-rich homogeneous phase that still includes about 10% of water in solution. When phase separation occurs in the bottle provided, there is a major risk that the applied adhesives composition is different from the originally supplied product. If however, the non-modified adhesive separates into two phases after dispensing in a dish, stirring prior to application is a safe measure to avoid adverse effects on the bond achieved. Current research indicates that it is feasible to design self-etch, highly effective adhesives containing very little water in a homogeneous monomer mixture.

Since bonding quality also depends on the interaction between adhesives and resin composites, another research task was to study such interactions by cross testing of four adhesives with three resin composites. In contrast to the common perception that polymerization contraction of the resin composite is the determining factor, this study could prove that the main parameter for successful bonding is the polymerization contraction stress. New resin composite monomers, curing by cationic ring-opening polymerization might open a gateway to predictable and safe bonding with self-etch adhesives.

連絡先: 第19回モデレーター 小松 正志 (内線 8340)
研究推進企画室長 高田春比古 (内線 8305)
副研究科長 高橋 信博 (内線 8294)