УДК 61:615.1(062)(476-25)
ББК 52я73
А 43
ISBN 978-985-21-1258-1

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UNIVERSAL ADHESIVES IN RESTORATIVE DENTISTRY

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The essential goal of any adhesive restoration is to achieve a tight and long-lasting adaptation of the restorative material to enamel and dentin. The key challenge for new dental adhesives is to be simultaneously effective on two dental substrates of conflicting nature. Universal adhesives have been described by some manufacturers and opinion leaders in 2012 as: ideally a single-bottle, no-mix, adhesive systems that can be used in total-etch, self-etch, or selective-etch mode depending on the specific clinical situation and personal preferences of the operator. Additionally, manufacturers typically state that universal adhesives can be used for the placement of both direct and indirect restorations and are compatible with self-cure, light-cure, and dual-cure resin-based cements. It is further stated that universal adhesives can be used not only to bond to dentin and enamel, but as adhesive primers on substrates such as zirconia, noble and non-precious metals, composites, and various silica-based ceramics. In principle, this would enable bonding to these surfaces without the need for dedicated and separately placed primers such as silane and various products marketed as metal and zirconia primers.

Fundamental differences of universal adhesive systems are the following: 1) pH level (2.3-3.2) - soft and ultra-soft; 2) the presence of adhesive functional monomers in the composition. These are phosphoric acid esters that have the potential to chemically bond with metals, zirconia, and dental hard tissues by forming insoluble salts; 3) better balance between hydrophilic, hydrophobic and functional monomers. High hydrophilicity of the 7th generation systems was the reason for the instability of the hybrid layer. Universal adhesives are more hydrophobic after polymerization; 4) availability of various acid etching techniques (total, selective and self-etching); 5) possibilities of application for indirect dental restorations. But not all universal adhesive systems can be used as a primer for metals, zirconia and ceramics. The user should read the manual carefully.

Ideal adhesion and sealing of enamel are only feasible with adhesives that rely on enamel phosphoric acid etching. Clinical studies have reported that self-etch strategy results in poor retention rate compared to etch&rinse and selective enamel etching. At the same time phosphoric acid etching of dentine can reduce the potential chemical bonding between the functional monomer and dentin hydroxyapatite. Therefore, the strategy of selective enamel etching seems to be optimal for universal adhesives. Application of adhesive in self-etching mode with scrubbing movements increases its efficiency. Universal adhesives may also need extra solvent drying time to ensure removal of the residual water in the interface. So it is recommended to extend the evaporation time up to 15 seconds using gentle air drying from a dental air syringe.

Thus, universal adhesive systems are extremely versatile and more user-friendly dental adhesives that have a wide range of clinical indications and simplify the work of a dentist. Before using a universal adhesive system, its characteristics and application features in various clinical situations should be studied in detail in order to obtain the best treatment result.