Universal / Multi-Mode Adhesives in descriptive review: Innovative or traditional systems?

Introduction

Recently appeared on the market simplified adhesive systems (AS) designated as Universal (UAS) or "Multi-Mode" adhesives (MM) These AS can be used under Etch&rinse (ER), Self-Etch (SE) mode or with enamel selective etching.

Objectives

Descriptive review of UAS regarding labeling (composition, solvent, acidity), advantages over ER and SE systems and performance evidences.

Methods

Literature search in MEDLINE/PubMed, Science Direct was conducted, between the years 2010-2015, with the keywords: "Dentin/Enamel bonding agents", "self-etch adhesives", "etch & rinse adhesives", "universal adhesives", "multimode adhesives", "simplified adhesives". Fifty articles were identified. Methodology included publications of meta-analysis, narrative/systematic review, in-vitro and clinical trials.

Results

Seventeen publications were selected: one meta-analyse, one systematic review, 3 in vitro and two clinical trials. UAS labelling/ph solvent were registered (Table 1): Scotchbond Universal (3MESPE); Futurabond U (Voco); Clearfil Universal Bond (Kuraray); Xeno Select (Dentsply); All-Bond Universal (Bisco); G-Bond Plus (GC); Adhese Universal (Ivoclar Vivadent); Peak Universal Adhesive (Ultradent). In most UAS, the solvent is ethanol with or without water; classified as moderate (pH 1-2), mild (pH 2.5) in acidity. Main advantage associated with versatility of instructions for use (ER and/or SE) (Table 2). UAS effectiveness appears to depend on the chemical composition. Further clinical and laboratory trials should be conducted to evaluate the effectiveness of these universal adhesive systems.

Universal Adhesive (UAS) | COMPOSITION* | pH† | ACIDITY | SOLVENT
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Scotchbond Universal | BISGMA, HEMA, decamethacrylate dimethacrylate, ethanol, water, viame 2-propanol, 2-methyl, 10-deacedol and phosphoric (H3PO4) | 2.7 (ultramild) | Ethanol, water
Futurabond U (Voco) | Liquid 1: acidic adhesive monomer (HEMA), BISGMA, HEMA, initiator, catalyst, UDMA | 2.3 (mild) | Ethanol
Clearfil Universal Bond (Kuraray) | 10-MBD, BISGMA, HEMA, ethanol, hydrophilic aliphatic dimethacrylate, colloidal silica, camphorquinone, silane coupling agent, accelerators, initiators, water | 2.5 (mild) | Ethanol, water
Xeno select (Dentsply) | Bis-functional acrylic, Ethyl 2,3-dihydroxy phosphoric 5,2-disaccharip, acrylic acid, isobutyric acid, T-butanol | 2.5 (ultramild) | 20% (moderate) T-butanol, 80% water
All-Bond Universal (Bisco) | 10-MBD, BISGMA, HEMA, ethanol, water, initiators | 2.5-3 (ultramild) | Ethanol, water
G-Bond Plus (GC) | Acetone, 2-methyl ethyl ketone, Methacrylic acid, 2,5-3,5 (ultramild) | 1.5 (moderate) | Acetone, water
Adhese Universal (Ivoclar Vivadent) | BISGMA, ethanol, 1,5,3,5 dimethacrylate, methacrylated phosphoric acid, water, camphorquinone, 2,4-dinitrobenzyl methacrylate | 2.5-3 (ultramild) | Ethanol
Peak Universal Adhesive | Methacryl acid, methacryl acid, HEMA, camphorquinone, | 2.2 (moderate) | Ethanol

Table 1 – UAS Monomer/solvent composition: Acidity (pH) classification (Tay and Peñalver, 2001) et al in Sezinando A. (2014)); Strong > pH; Intermediately strong or moderate: > pH; Mild: pH; Ultra-mild: pH<2.5

Conclusions

Universal Adhesive Systems (UAS) do not greatly differ from traditional ER/SE systems; Chemical interaction is a crucial characteristic of UAS to enhance dentin-resin interfaces; Simplified performance to some SE, but less than some ER adhesives especially in enamel.

References

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Clinical Implications

UAS although versatile in application do not match technological innovation when compared to traditional ER and SE. As innovation requires bio-protective and bio-promoter effects in the enamel and dentin.

Keywords

Dentin/Enamel bonding agents Self-etch adhesives Etch & Rinse adhesives Universal Adhesives Multi-mode adhesives Simplified adhesives