

## Bond Strength of a Self-Etch Adhesive Used with Various Composites

**Language:** English

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### Introduction

A number of new self-etch adhesives have been developed to simplify clinical bonding procedure (Fig. 1). The efficiency of these simplified bonding systems is still controversial (1). Most of the published reports used these dentin adhesives as recommended by the manufacturer and in combination with one composite material (2-4). Actually, these self-etching dentin adhesive systems are also available as dual-curing systems. However, the adhesive properties of the new, all-in-one systems used as light-curing and dual-curing system have not yet been extensively reported.

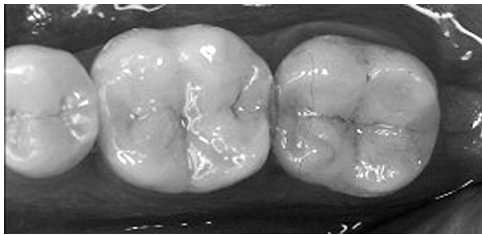


Fig. 1: Adequate filling after four years in situ (Tetric Ceram).

### Objectives

The aim of this study was to evaluate microtensile bond strength of a self-etching and dual-curing dentin adhesive (Futurabond DC) in combination with different light- and self-curing resins (Rebilda, Grandio, Tetric Ceram, Clearfil Core, Multicore) on perfused dentin in vitro.

### Material and Methods

105 freshly extracted molars, stored in saline for a maximum of fourteen days after extraction were included. All teeth were specially prepared allowing the simulation of dentin perfusion. Dentin specimens with a total thickness of 3.5 mm were obtained under standardized conditions. The specimens were randomly assigned to seven experimental groups of fifteen samples each:

- Group 1: Futurabond DC/ Rebilda (light-curing),
- Group 2: Futurabond DC/ Grandio (light-curing),
- Group 3: Futurabond DC/ Tetric Ceram (light-curing),
- Group 4: Futurabond DC/ Rebilda (self-curing),
- Group 5: Futurabond DC/ Clearfil Core (self-curing),
- Group 6: Futurabond DC/ MultiCore (self-curing),
- Group 7: AdHeSE/ Multicore (self-curing).

Microtensile bond strength was measured 15 minutes after application on a universal testing machine (Fig. 2-9).

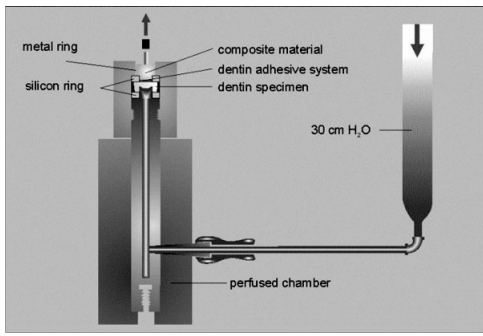


Fig. 2: Special designed apparatus to test tensile bond strength under permanent dentin perfusion.

Fig. 3: Experimental device after loading until fracture.



Fig. 4: Dentin adhesive system Futurabond DC used in this investigation.



Fig. 5: Dentin adhesive system AdheSE used in this investigation.



Fig. 6: Composite material Rebilda DC used in this investigation.



Fig. 7: the composite material Grandio used in this investigation.



Fig. 8: The composite material MultiCore HB used in this investigation.



Fig. 9: The composite material Clearfil Core used in this investigation.

## Results

For the seven test series following microtensile bond strengths were evaluated (mean value and standard deviation in Mpa). Group 1: 12.44 ( $\pm$  3.32); group 2: 24.51 ( $\pm$  5.16); group 3: 14.34 ( $\pm$  3.69); group 4: 8.87 ( $\pm$  1.01); group 5: 23.53 ( $\pm$  6.27); group 6: 3.79 ( $\pm$  1.12); group 7: 21.19 ( $\pm$  3.73).

The results of all groups are presented in table 1 and graphically expressed in figure 10.

Futurabond DC in combination with Grandio (group 2) and Clearfil Core (group 5) showed the highest bond strengths ( $p < 0.05$ , Bonferroni-Holm). Focusing on the self-polymerizing resins, significant lower bond strengths were observed in group 4 (Rebilda) and 6 (Multicore) compared to group 5 (Clearfil Core) ( $p < 0.05$ , Bonferroni-Holm).

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
<b>Curing modus</b>	light	light	light	self	self	self	self
<b>Bond Strength</b>	12.44	24.51	14.34	8.87	23.53	3.79	21.19
<b>Standard deviation</b>	3.32	5.16	3.69	1.01	6.27	1.12	3.73

Tab. 1: Microtensile bond strength of all groups in megapascals.

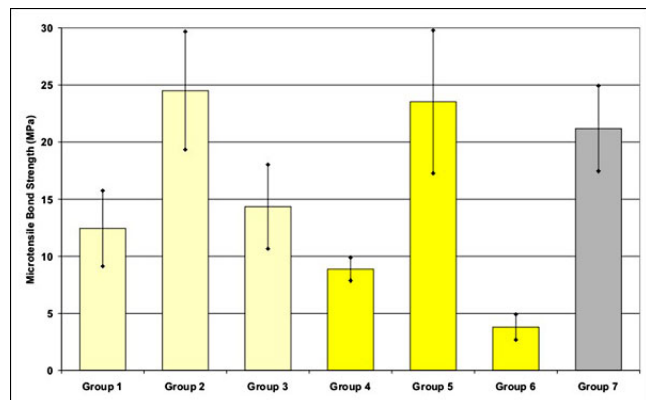


Fig. 10: Graphically expression of the results (Mean values and standard deviation in MPa).

## Conclusions

It can be concluded that all bonding agents used in this study were able to establish bond strength on perfused dentin. Futurabond DC used with light-polymerizing resins showed well bond strengths in all groups (1, 4, 5). In combination with self-polymerizing resins different bond strengths were evaluated.

## Literature

1. Frankenberger R, Tay FR: Self-etch vs etch-and-rinse adhesives: effect of thermo-mechanical fatigue loading on marginal quality of bonded resin composite restorations. *Dent Mater* (2005) 21:397-412.
2. Guéders AM, Charpentier JF, Albert AI, Geerts SO: Microleakage after thermocycling of 4 etch and rinse and 3 self-etch adhesives with and without a flowable composite lining. *Oper Dent* (2006) 31:450-5.
3. Ishikawa A, Shimada Y, Foxton RM, Tagami J: Micro-tensile and micro-shear bond strengths of current self-etch adhesives to enamel and dentin. *Am J Dent* (2007) 20:161-6.
4. Hurmuzlu F, Ozdemir AK, Hubbezoglu I, Coskun A, Siso SH: Bond strength of adhesives to dentin involving total and self-etch adhesives. *Quintessence Int* (2007) 38:E206-12.

*This Poster was submitted by Dr. Christian Gernhardt.*

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## Introduction

A number of new self-etch adhesives have been developed to simplify clinical bonding procedure. The efficiency of these simplified bonding systems is still controversial<sup>1</sup>. Most of the published reports used these dentin adhesives as recommended by the manufacturer and in combination with one composite material<sup>2</sup>. Actually, these self-etching dentin adhesive systems are also available as dual-curing systems. However, the adhesive properties of the new, all-in-one systems used as light-curing and dual-curing system have not yet been extensively reported. The aim of this study was to evaluate microtensile bond strength of a self-etching and dual-curing dentin adhesive (Futurabond DC) in combination with different light- and self-curing resins (Reblida, Grandio, Tetric Ceram, Clearfil Core, Multicore) on perfused dentin *in vitro*.



Fig. 1: Adequate bonding after four years in vivo (Tetric Ceram)

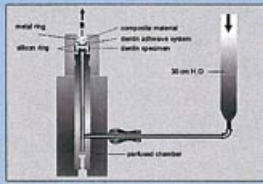


Fig. 2: Experimental device after loading until fracture.

Fig. 3: Special designed apparatus to test tensile bond strength under permanent dentin perfusion.



## Material and Methods

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Fig. 4: Dentin adhesive systems and composite materials used in this investigation.

## Results

For the seven test series following microtensile bond strengths were evaluated (mean value and standard deviation in Mpa). The results of all groups are presented in table 1 and graphically expressed in figure 10.

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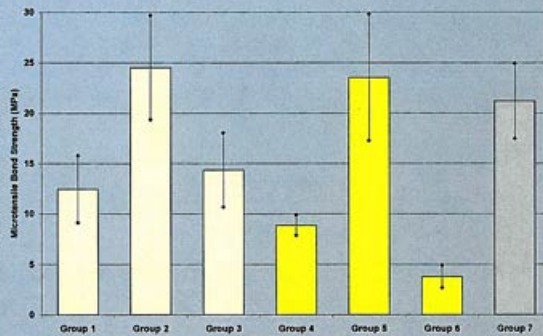


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