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# Microtensile Bond Strength of Four Self-conditioning Dentin Adhesives

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## Introduction

The bond strengths of resin composites to dentin have been widely investigated in the last years. It is known from dental literature that there is a relationship between bond strength and a moist or perfused dentinal surface (1). Several in vitro studies have shown that adhesion of dentin adhesive systems is mostly reduced when used on moist, wet or physiological perfused dentin (2,3). For newer dentin adhesives, they are known to have higher hydrophilic properties, the presence of moisture might be desirable.

## Objectives

The aim of the present investigation was to evaluate microtensile bond strength with simulated dentin perfusion of four self-conditioning dentin adhesive systems (Xeno III, Clearfil SE Bond, Clearfil Protect Bond, Futurabond NR) in combination with a light-curing composite material (Clearfil AP-X) in vitro.

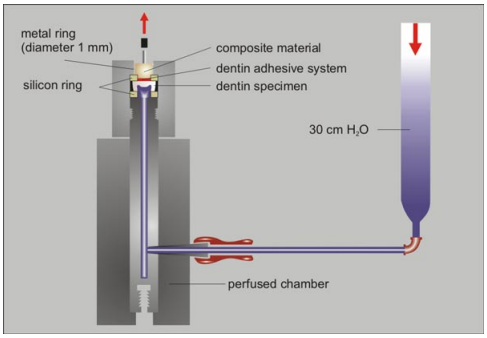


Fig. 1: Special designed apparatus to test tensile bond strength under permanent dentin perfusion.

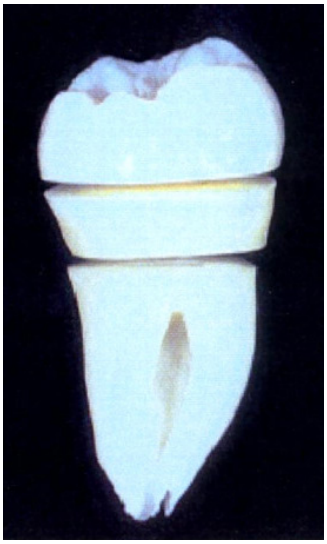

Fig. 2: Cutting a dentinal slab from a specimen.

## Material and Methods

Sixty freshly extracted third molars were included. All teeth were specially prepared allowing the simulation of dentin perfusion (4)(Fig. 1). Dentin specimens with a total thickness of 1.5 mm were obtained under standardized conditions (Fig. 2). The specimens were randomly assigned to four experimental groups: group A: Xeno III; group B; Clearfil SE Bond; group C: Clearfil Protect Bond; group D: Futurabond NR (Fig. 6-9). All materials were applied on a surface area of 0.785mm² as recommended by the manufacturer. Microtensile bond strength (µ-TBS) of the above mentioned adhesive systems was measured 15 minutes after application and light curing of the composite material (colour A2) using an universal testing machine (Fig. 4, 5). Statistical analysis was performed using SPSS 10.0. For each group mean value and standard deviation were calculated. Statistical analysis was performed using ANOVA and Tukey's test.

| | Group A | Group B | Group C | Group D |
|---|---|---|---|---|
| Mean (in MPa) | 27,29 | 32,23 | 19,57 | 35,62 |
| Standard deviation | (±4,16) | (±5,56) | (±2,80) | (±3,97) |

Tab. 1: Mean value and standard deviation within the different groups in MPa.

## Results

For the four test series following microtensile bond strengths were evaluated (mean value and standard deviation in MPa): group A 27.29 (± 4.16), group B 32.23 MPa(± 5.56), group C 19.57 (± 2.80) and group D 35.62 (± 3.97)(Tab. 1 and Fig. 3). Statistical analysis showed a significant influence of the used dentin bonding agent on tensile bond strength ($p < 0.001$, ANOVA). Bond strengths of Futurabond NR (group D) was significantly increased compared to all other groups. Between group A and B no significant differences could be detected ($p < 0.05$, Tukeys test). In group C bond strength was significantly decreased compared to all other groups ($p < 0.05$, Tukeys test).

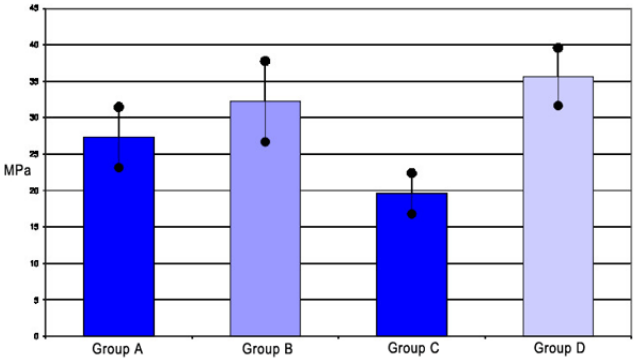


Fig. 3: Mean value and standard deviation within the different groups.


Fig. 4: Special designed apparatus mounted in a universal testing machine.

Fig. 5: Experimental device after loading until fracture.


Fig. 6: Used dentin adhesive system: Xeno III.


Fig. 7: Used dentin adhesive system: Clearfil SE Bond.


Fig. 8: Used dentin adhesive system: Clearfil Protect Bond.


Fig. 9: Used dentin adhesive system: Futurabond NR.

## Conclusions

Regarding the limitations of an in vitro study it can be concluded that all self-conditioning dentin adhesives showed promising results. Therefore, the clinical use of self-conditioning adhesive systems might be a good alternative to the established total-etch systems.

## Literature

1. Perdiago J, Swift EJ, Cloe BC (1993): Effects of etchants, surface moisture, and resin composite on dentin bond strengths. Am J Dent 6: 61-64.
2. Tao L, Pashley D (1989): The relationship between bond stregths and dentin permeability. Dent Mater 5: 133-139.
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## Abbreviations

MPa = megapascals
mm = millimeter
µTBS = microtensile bond strength

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

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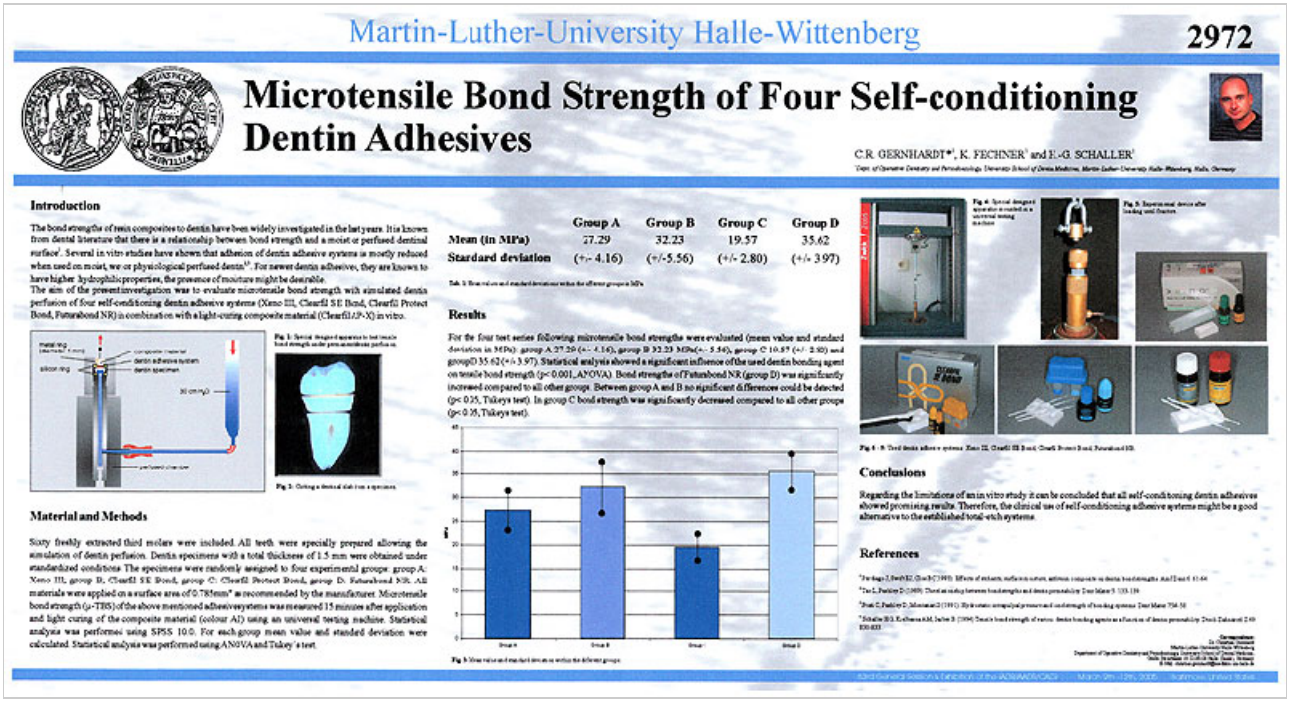
**Poster Faksimile:**



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C.R. GERNHARDT*, K. FECHNER and E.-G. SCHALLER

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## References