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# Micro Tensile Bond Strength of Adhesive Systems Combined With Flowable Composites

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## Introduction

Previous studies have shown a correlation between bond strength of dentin adhesive systems and different test modalities like shear or tensile bond tests (1). Other investigations focused on the influence of perfusion or specimen preparation (2,3). It is also known that the composite material and colour of this material have a significant influence on bond strength of dentin adhesive systems (4). But until now only low information is available about the correlation between the clinical performance of dentin adhesive systems combined with flowable composites on micro tensile bond strength.

## Objectives

The aim of the present study was to evaluate the difference of microtensile bond strength (m-TBS) of three different composite/ dentin adhesive combinations depending on the additional use of the corresponding flowable composite.

Fig. 1: Standardized preparated classII-cavity.

Fig. 2: Special apparatus used for preparation of standardized cavities.

## Material and Methods

In this study twenty-four freshly extracted third molars were included. All teeth were prepared in a special manner allowing the simulation of dentin perfusion. The specimens were randomly assigned to six experimental groups of four samples each: group A: Excite/ Tetric Ceram; group Af: plus Tetric Flow; group B: Clearfil New Bond/ Tetric Ceram; group Bf: plus Tetric Flow; group C: AdheSE/ Tetric Ceram; group Cf: plus Tetric Flow (Fig. 4 -6). All materials were applied in standardized class II cavities (Fig. 1, 2). After 24 h in water, the specimens were cut perpendicularly with a low-speed diamond saw to obtain sticks with a surface area of 1mm2 (n=15). The m-TBS was measured using a Bencor device in an universal testing machine (Fig. 3).

Fig. 3: Bencor test device mounted in an universal testing machine.

Fig. 4: Dentin adhesives used in the present investigation.


Fig. 5: Dentin adhesives used in the present investigation.

Fig. 6: Dentin adhesives used in the present investigation.

## Results

In all groups microtensile bond strength could be measured. Following m-TBS were evaluated (mean values and standard deviations, printed in MPa): Group A: 18.27 (± 6.09); group Af: 26.82 (± 6.68); group B: 22.82 (± 5.82); group Bf: 24.23 (± 7.95); group C: 20.34 (± 6.89); group Cf: 21.97 (± 6.55) (Tab. 1, Fig. 7). Statistical analysis showed a significant influence of the combination with or without flowable composites on microtensile bond strength ($p < 0.001$, ANOVA). Generally, the additional use of the flowable composite resulted in higher values. In group Af this increase was significant ($p < 0.001$, Tukeys test). Between the groups Af and Bf no significant differences could be detected. The values in group Cf were significantly decreased compared to group Af ($p < 0.001$, Tukey's test).

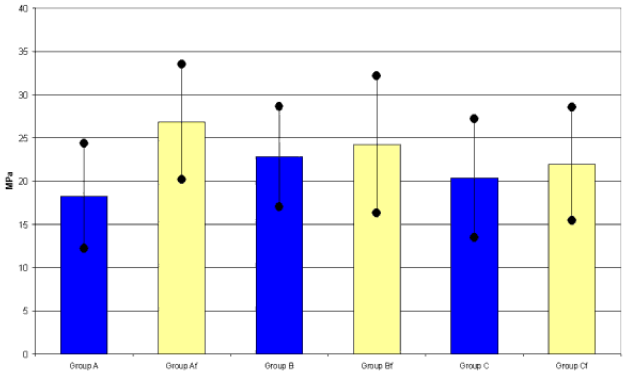


Fig. 7: Mean value and standard deviation within the experimental groups.

| | Group A | Group Af | Group B | Group Bf | Group C | Group CF |
|---|---|---|---|---|---|---|
| **Mean** | 18,27 | 26,82 | 22,82 | 24,23 | 20,34 | 21,97 |
| **Standard deviation** | 6,09 | 6,68 | 5,82 | 7,95 | 6,89 | 6,55 |

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

## Conclusion

Regarding the combinations tested in this study, differences in microtensile bond strength could be observed. Within the limitations of an in vitro investigation it can be concluded that the additional use of flowable composites increased m-TBS only in the case of Excite.

## Bibliography


1. May KN, Jr Swift EJ, Bayne SC (1997): Bond strengths of a new dentin adhesive system. Am J Dent 10: 195-198.
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3. Tagami J, Tao L, Pashley DH, Hosoda H, Sano H (1991): Effects of high-speed cutting on dentin permeability and bonding. Dent Mater 7: 240-246.
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## Abbreviations

MPa = Megapascals

*This Poster was submitted by Dr. Katrin Bekes.*


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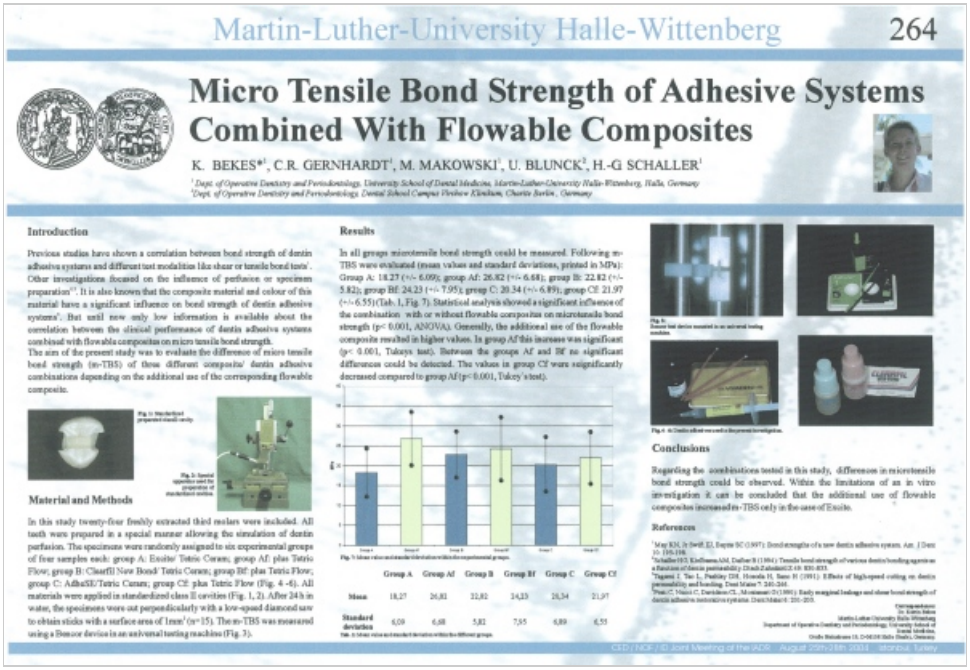
**Poster Faksimile:**



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## Introduction

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The aim of the present study was to evaluate the difference of micro tensile bond strength (m-TBS) of three different composite/ dentin adhesive combinations depending on the additional use of the corresponding flowable composite.



Fig. 1: Standardized prepared class II cavity.



Fig. 2: Special apparatus used for preparation of standardized sticks.

## Material and Methods

In this study twenty-four freshly extracted third molars were included. All teeth were prepared in a special manner allowing the simulation of dentin perfusion. The specimens were randomly assigned to six experimental groups of four samples each: group A: Excite/ Tetric Ceram; group Af: plus Tetric Flow; group B: Clearfil New Bond/ Tetric Ceram; group Bf: plus Tetric Flow; group C: AdheSE/Tetric Ceram; group Cf: plus Tetric Flow (Fig. 4–6). All materials were applied in standardized class II cavities (Fig. 1, 2). After 24 h in water, the specimens were cut perpendicularly with a low-speed diamond saw to obtain sticks with a surface area of 1mm² (n=15). The m-TBS was measured using a Bencor device in an universal testing machine (Fig. 3).

## Results

In all groups microtensile bond strength could be measured. Following m-TBS were evaluated (mean values and standard deviations, printed in MPa): Group A: 18.27 (+/- 6.09); group Af: 26.82 (+/- 6.68); group B: 22.82 (+/- 5.82); group Bf: 24.23 (+/- 7.95); group C: 20.34 (+/- 6.89); group Cf: 21.97 (+/- 6.55) (Tab. 1, Fig. 7). Statistical analysis showed a significant influence of the combination with or without flowable composites on microtensile bond strength ($p < 0.001$, ANOVA). Generally, the additional use of the flowable composite resulted in higher values. In group Af this increase was significant ($p < 0.001$, Tukeys test). Between the groups Af and Bf no significant differences could be detected. The values in group Cf were saignificantly decreased compared to group Af ($p < 0.001$, Tukey's test).



Fig. 7: Mean values and standard deviations within the experimental groups.

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Tab. 1: Mean values and standard deviations within the different groups.



Fig. 5: Bencor test device mounted in an universal testing machine.







Fig. 4: Dentin sticks that were used in the present investigation.

## Conclusions

Regarding the combinations tested in this study, differences in microtensile bond strength could be observed. Within the limitations of an in vitro investigation it can be concluded that the additional use of flowable composites increased m-TBS only in the case of Excite.

## References

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[4] Prati C, Nicoli C, Davidson CL, Montanari G (1998): Early marginal leakage and shear bond strength of dentin adhesive restorative systems. Dent Mater 4: 201-205.

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