





# Evaluation of the adhesive properties and enzymatic activity in the hybrid layer of a universal system loaded with 0.2% CU and 5% ZNO Nanoparticles. Ex vivo randomized clinical trial

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## Resume

**Objetivo.** To evaluate the adhesive properties and collagen-degrading enzymatic activity of the hybrid layer in a randomized ex vivo clinical model, using a universal adhesive system loaded with 0.2% Cu and 5% ZnO nanoparticles.

**Methods.** From 13 volunteers, a total of 26 teeth (premolars and/or molars) were used. Each patient had 3x3x2 mm cavities made in each tooth and an adhesive with 0.2% Cu nanoparticles and 5% ZnO was used, and an adhesive without NP as a control. Then the cavity was sealed with composite, after 30 days the extractions were made. The teeth were preserved in serum and tests were performed to assess adhesion: microtraction, degree of conversion, and nano-leakage. In situ zymography was performed to assess the activities of the MMPs in the hybrid layer.

**Results.** Microtensile bond strength test did not show significant differences between the control and experimental groups  $p > 0.05$ . No significant differences were observed in the evaluation of the degree of conversion between the control and experimental groups  $p > 0.05$ . The evaluation of the decrease in the activity of MMPs was significant between the control and experimental groups  $p < 0.001$ .

**Conclusions.** The addition of Cu 0.2% and ZnO 5% NPs to a universal dental adhesive does not affect its adhesion properties and decreases the enzymatic activity of collagen degradation of the hybrid layer, in a randomized ex vivo clinical model.

**Key words.** Universal adhesive systems, Nanoparticles, Microtensile bond strength, Degree of conversion zymography, matrix metalloproteinases.

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