failure mode (chi-square, $p = 0.008$), while using higher concentration resulted in highest amount of type I failure. In absence of cariogenic challenge (control), no difference was observed between the different concentrations of MADQUAT. In opposite, adhesives containing 10% of MADQUAT resulted in lowest demineralization around the bracket, while no difference was observed between the other concentrations when the specimens were submitted to cariogenic challenge. Except for the concentration of 10%, the cariogenic challenge significantly increased the demineralization around the brackets.

Conclusions: MADQUAT was effective to reduce the ΔS only when added to adhesive at concentration of 10% despite the reduction on bond strength.

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Shear bond strength and antibacterial properties of different luting cements

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Purpose/Aim: The purpose of this *in vitro* study was to compare four different kinds of dental luting cement's [Conventional glass ionomer cement (GIC), Resin modified GIC, Glass Carbomer and Dual Cure Resin Cement] shear peel bond strength, assess the remnant characteristic and antibacterial characteristics.

Materials and methods: In the shear peel bond strength test part of the study, stainless steel bands were cemented to 80 extracted permanent molar teeth randomly by using one of four tested cements (20 per group). The force needed for debanding was evaluated by using a universal testing machine. The amount of cement remaining on the teeth after band removal was scored. The antibacterial effect of cements on selected bacteria (*S. mutans* and *C. albicans*) was tested with agar diffusion test.

Results: Molar bands cemented with Dual cure resin cement showed the highest and bands cemented with Glass carbomer cement showed the lowest shear peel bond strength among all luting cements. Conventional GIC specimens failed mostly at the enamel/cement interface. As for the antibacterial effects, resin modified GIC cement group was the only cement which showed antibacterial effect on *C. albicans*. All cements showed some antibacterial effect on *S. mutans*, dual cured resin cement being the least effective.

Conclusions: The findings show that different types of luting cements may be preferred according to the characteristics of the individual.

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BisGMA/TEGDMA based material with antibacterial activity

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Purpose/Aim: The aim of this study was to develop a composite material with antibacterial activity using MMT loaded with chlorhexidine (CHX). For that it was used a BisGMA/TEGDMA matrix, and added low concentration of MMT/CHX. The aim was to evaluate the drug release capacity of MMT, and not to provide reinforcement.

Materials and methods: Six experimental composites were made with organic matrix of BisGMA/TEGDMA in equal proportions by weight. The composites received organophlizated montmorillonite with or without CHX. The concentrations were 2.5%, 5% or 10% by volume. Degree of conversion (DC) was evaluated using FTIR (peak 6165 cm^{-1}; $n = 5$). Specimens for flexural properties ($10 \times 2 \times 1$ mm) were half immediate tested (24 h) and half storage (2 months). Elastic modulus (E) and flexural strength (FS) was measured using the three point bending test ($n = 10$). Inhibition halo was used to test the antibacterial activity against *Staphylococcus aureus*, *Streptococcus mutans*, and *Porphyromonas gingivalis* ($n = 5$ for each bacteria). The inhibition of biofilm formation (BF) was evaluated by inserting polymerized disc of composite in to a culture media colonized with *Streptococcus mutans* ($n = 10$). For this test a control group of a commercial composite was also tested. The release of CHX was measured using ultraviolet (255 nm) during 10 days ($n = 5$). The data of degree of conversion was analysed using Kruskal–Wallis/Mann–Whitney, and the other variables using

Table 1 – Shear Peel Bond Strength values for tested materials.

Cement	N	Mean (MPa)	Std. Dev.	Median	Int. range	Min	Max
Ketac-Cem	20	1.20[a,*]	0.36	1.19	0.52	0.45	1.75
Unitek Multicure Glass Ionomer	20	1.19[a]	0.33	1.17	0.41	0.68	1.97
Glass Carbomer	20	0.97[b]	0.42	0.94	0.52	0.25	2.10
Rely X	20	1.84[c]	0.67	1.65	1.15	0.83	3.25

* Different letters indicate significant difference ($P < 0.05$). Lower-case letters indicate differences in vertical directions.

two-way ANOVA/Tukey, always considering a global level of significance of 5%.

Results: Data for DC ranged from 46% to 60%, the group with 10% MMT/CHX presented a statistically lower value than the others. Data for E and FS at 24 h the 10% concentration presented the higher values, but after 2 months of storage this concentration showed the lower values of all when the CHX was present. For the three bacteria tested the composites with CHX loaded presented inhibition of growth for all concentration, except for 2.5% that did not inhibited the growth of *P. gingivalis*. BF was lower for the groups with CHX, but when compared to the commercial composites, all groups presented BF, even those without CHX loaded. All concentrations presented release off CHX during all the 10 days analyzed.

Conclusions: Within the limitation of this study it can be concluded that: all concentrations tested presented release of CHX and reduced BF. All concentration presented antibacterial activity for the three bacteria tested, except for 2.5% that did not inhibited the growth of *P. gingivalis*. The concentration of 10% resulted in a reduction of DC and the flexural properties after 2 months of storage.

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Light transmittance through esthetic monolithic CAD/CAM materials

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Purpose/Aim: To determine the amount of light (360–540 nm) passing various monolithic CAD/CAM-materials, in dependency of material thickness, initial curing unit irradiance, and exposure distance (distance between curing unit and specimen's surface).

Materials and methods: Nine different CAD/CAM monolithic materials were selected: TC: TelioCAD (PMMA-based), VCT: VITA CAD-Temp (PMMA-based and 10% filled with prepolymers), TEC: exp. nanocomposite (filled composite), LU: LAVA Ultimate (filled composite), VE: VITA ENAMIC (interpenetrating network ceramic), VM: VITA Mark II (feldspar ceramic), IEC: IPS EmpressCAD (leucite glass-ceramic), IEM: IPS e.max CAD (lithium disilicate glass-ceramic), and CD: CeltraDuo (zirconia-reinforced lithium silicate ZLS). CAD/CAM blocks were cut using a low-speed diamond saw in 1 and 2 mm thick slices ($n = 10$) resulting in 180 specimens.

The transmitted irradiance was assessed in real time by means of a Spectrometer and a blue-violet LED unit (VALO; Ultradent Products Inc), which was used in three curing programs (standard power, high power, and plasma). The curing unit was placed directly on specimen's surface as well as at 2 and 4-mm distances from it. Data were analyzed using a multivariate analysis and 1-way ANOVA with post-hoc Scheffé test ($p < 0.05$).

Results: The highest influence on the transmitted irradiance was exerted by the curing mode ($nP^2 = 0.991$), closely followed by specimen thickness ($nP^2 = 0.989$), CAD/CAM material ($nP^2 = 0.966$), and exposure distance ($nP^2 = 0.904$). All binary combinations of the above-mentioned parameters were also significant ($p < 0.05$). The highest transmitted irradiance was measured for VM and LU, followed by VCT and IEC, while the lowest values showed VE, followed by IEM and CD. The highest transmitted irradiance was recorded by exposing the material to the plasma mode, followed by the high and standard power modes. The transmitted irradiance related to the incident irradiance amounted only 16% to 39.2% by passing 1-mm thick slices, while only 4.5% to 19.4% for 2-mm thick slices. Fewer difference were measured when the curing unit was placed at 0 or 2-mm from the specimen's surface, while the transmitted irradiance was lower at an exposure distance of 4-mm.

Conclusions: Transmitted irradiance through VITA ENAMIC restorations might not allow for sufficient light passing through the material. Less light-sensitive dual-curing cements must therefore be used for cementation.

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WITHDRAWN

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Effect of shade and ageing on strength of translucent Y-TZP

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Purpose/Aim: To evaluate the effect of shade and ageing on the strength of a translucent yttria-stabilized tetragonal zirconia (Y-TZP) for monolithic restorations.

Materials and methods: A granulated Y-TZP powder (Zpex, Tosoh) was used to produce translucent zirconia specimens. Pigmentation of specimens was achieved by combining seven commercial dyeing solutions (Lava Frame Shade, 3M-ESPE), which were mixed according to manufacturer's instructions to achieve eight distinct shades (Table 1) of the Vita Classical guide (Vita Zahnfabrik). A control group without pigmentation was also tested. The ceramic powder was pressed to form discs (2.0 mm in thickness/12 mm in diameter) by uniaxial pressing (112 MPa/30 s) with subsequent cold isostatic pressing (200 MPa/30 s). These discs were pre-sintered (furnace N1100, Jung) at 900 °C for 2 h (heating rate: 5 °C/min). Presintered discs were immersed in a staining solution for 2 min. After pigmentation, final sintering occurred at 1500 °C for 1 hour (heating rate: 8 °C/min, Furnace Hot Spot 110, Zircar). The biaxial flexural strength was determined using the piston-on-three-balls design, in distilled water (37 °C at 0.5 mm/min). Flexural strength was calculated according to ASTM-F-39478. Half of the specimens of each shade ($n = 10$) had their strength measured after being aged in an autoclave (AHCM-10, Sercon) for 5 h at 134 °C/2 bars. The data were analyzed by means of two-way analysis of variances and Tukey's test with global significance level of 5%.