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%.

Table 1

Ageing	Shade								
	Control	A2	A3	B2	B3	C2	C3	D2	D3
No	637.6 ± 55.1A,B	548.4 ± 130.3A,B,C	504.2 ± 120.4A,B,C	685.3 ± 57.3A	605.8 ± 70.7A,B	612.3 ± 119.2A,B	505.3 ± 115.3A,B,C	414.1 ± 242.0B,C	619.9 ± 27.2A,B
Yes	440.3 ± 69.3A,B,C	572.0 ± 168.6A,B,C	460.8 ± 109.4A,B,C	579.8 ± 97.3A,B,C	490.4 ± 114.1A,B,C	582.6 ± 74.9A,B,C	338.4 ± 149.2C	559.9 ± 51.6A,B,C	416.3 ± 74.8B,C

Results: Mean flexural strength values and standard deviations as a function of the shade and ageing are shown in the Table 1. Ageing did not significantly affect the strength results for any of the colors tested, although a numeric decrease in the strength values was noted for several experimental groups. The color of the specimens affected the strength values, since for non-aged specimens, the flexural strength obtained for shade B2 (685.3 ± 57.3 MPa) was significantly higher than that obtained for shade D2 (414.1 ± 242.0 MPa). However, the effect of color on the strength of the specimens was not noticed for aged specimens.

Conclusions: The in vitro ageing protocol did not affect the flexural strength of the translucent Y-TZP for any of the shades tested. The coloring solutions used to produce specimens with different shades interacted with the material microstructure and affected the flexural strength of the translucent Y-TZP, since for two different shades of non-aged specimens (B2 and D2), the flexural strength was significantly different.

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Effects of pigments on the translucency of dental composite resins

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Purpose/Aim: The objectives of this study were to examine the effects of different colored pigments on the translucency of experimental dental composite resins.

Materials and methods: 12 samples of composite resins with different pigment concentrations, ranging from 0% to 0.08% (red, yellow and red + yellow mixed) were fabricated ($N = 3$) and cured. All the samples were polished to a 1.00 mm (±0.1 mm) thickness. Total (TT) and diffuse (DT) translucency were measured using a spectrophotometer with an integrating sphere across the visible spectrum (380–700 nm). CIE L*a*b* values were measured using the CIE L*a*b* Pecol software from the spectrophotometer data and colour difference was also measured using this equation $\Delta E^*ab = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2] \times 0.5$.

Results: Statistical analysis by One-way ANOVA followed by Tukey's test showed that there was a statistically significant difference in the translucency between composites with no pigments and the composites with increasing concentrations of the pigments. The translucency decreased with an increase in the concentration of the pigments. However after a certain concentration, the translucency of the pigment ceased to get affected and attained a plateau. The yellow and red pigments as well as the mixtures of the two showed the same pattern.

Conclusions: Addition of pigments affects the translucency of the resins composites to some extent and the translucency decreases initially, but with an increase in the concentration of the pigments, the translucency becomes unaffected. The addition of yellow pigment causes a significant change in b^* value whilst L and a^* only show, small changes. Thus the predominant shift in color is towards the yellow. The addition of red pigment causes both, a change in a^* and b^*, thus producing a shift towards red and also yellow.

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Restorative interface and resin infiltration analysis of nanogel-modified dental adhesives

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Purpose/Aim: The integrity of a dental restoration relies on the extent of resin infiltration into demineralized dentin and sealing of tubules from resin-hydrolyzing pulpal fluid. Combining resins with internally cross-linked, surface-functionalized nanogels offers control of their hydrophobic character, improvements in mechanical properties and reduced shrinkage stress. The study (i) examined the infiltration and sealing capacity of a nanogel-modified adhesive and (ii) monitored the movement of such adhesives through a demineralized dentin matrix in real time using two-photon microscopy.

Materials and methods: A model BisGMA/HEMA 40:60 wt% adhesive was prepared. Nanogels comprised of HEMA and BisGMA were labeled with a Polyfluor 570 fluorescent probe and added to the resin at 40wt%. Human molars were restored using nanogel-modified and nanogel-free resins, and 2-photon microscopy revealed detailed morphology of the interfaces. (ii) Dentin discs were demineralised in EDTA for 2 weeks. 100 μl nanogel-modified resin was deposited onto the disc surface and 2-photon microscopy was used to monitor fluorescent signals at the disc undersurface.

Results: The modification of the resin with nanogels had a dramatic positive impact on its tubule-sealing properties. The modified resins fully permeated demineralized dentin, the visualization and quantification of which was achieved using 2-photon microscopy.