**Interaction of fluorescence of resin cements with glass ceramics**

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INTRODUCTION

Dental ceramics are today known for their natural appearance and durability of the chemical and optical properties. Besides this three primary optical properties, there are other secondary properties that affect the overall appearance of the restoration. These include translucency, opalescence and fluorescence. Fluorescence is defined as the absorption of light by a substance and subsequent emission of light at a greater wavelength, when a shorter wavelength is used as an illuminant. In order to give the aesthetic rehabilitation a natural appearance, the ceramic restorations must have a similar fluorescence in terms of color and intensity to the natural teeth, not only under natural light but also under different light sources. This color of the ceramic restorations and the very core of the prepared tooth will affect the appearance of the restoration. However, not only these parameters influence the final result but also the cement used for rehabilitation. Nowadays, cement systems include several shades since final adjustment of color is often obtained by changing the color of the cement.

**MATERIALS AND METHODS**

Two self-adhesive resin cements were used: (RelyX Unicem 2 Automix color A2 VITA (RA2) and Translucant (RT); 3M ESPE, Seefeld, Germany) and SpeedCem Transparent color (SCT) and Yellow (SCY) (Vivadent, Schaan, Liechtenstein). Ingots of pre-fabricated glass-ceramic (IPS e.max Press HT A2 (IPS); Vivadent, Schaan, Liechtenstein) and resin discs (Fibre Supreme XTE AS Body, 3M ESPE) were used; as well as study groups (n=48) of the samples cemented (RA2 0.5; RT 0.5; SCT 0.5; SCY 1; SCT 1; SCY 1; SCY 1; SCT 1; SCY 1; SCY 1; SCT 1; SCY 1; SCY 1; SCT 1; SCY 1; SCY 1; SCT 1; SCY 1; SCY 1; SCT 1). Subsequently, the ceramic cylinders were cut with a 12mm diameter and thicknesses of 0.5mm (RA2 1, RT 0.5, RT 1, SCT 1 and SCY 1) and 1mm (RT 0.5, RT 1, SCT 0.5 and SCY 0.5) with a microscope (Leica MD 110; Leica, Bensheim, IL, USA) at a speed of 200 rpm, with refrigeration, in order to obtain 10 samples per group for a total of n = 10. (Fig 1). The resin disks were produced using a silicone mold with a diameter of 12mm and thickness of 1mm, polished by an operator (Espe S19 LED; 3M ESPE, Seefeld, Germany) for 20 seconds, according to the manufacturer's instructions, in a total of n = 80. To ensure a uniform surface roughness the samples were polished with sandpaper grit 1200 SiC (Buehler, Ltd, Lake Bluff, IL, USA) and the surface roughness measured with an atomic force microscope (AFM, Veeco CP-III), obtaining topographical images (40x40 µm²) in contact mode. The ceramic discs were cemented to the composite resin by the cements in study, with a constant pressure of 50 Newtons (N) for 30 seconds and polymerized for 40 seconds with a light-curing unit (Curing light 500 LE; 3M ESPE, Seefeld, Germany). This light polymerization was regularly checked with radiometer (Domino-Kern, Orange, CA, USA). After polymerization the samples were stored for 24 hours in dry and protected from light environment, prior to testing. Fluorescence spectra were obtained on a SPEX Fluorolog spectrometer/fluorimeter 220 (Fig. 2) All spectra were obtained at a wavelength of 380nm at room temperature (Fig. 3). For statistical analysis Student's t-test and one-way ANOVA were used, for a significance of p<0.05.

**RESULTS**

Within the same group of each cement's manufacturer and equal values (RA2, RT SCT and SCY), groups with different ceramic thicknesses showed significant differences in the intensity of fluorescence emission. By the results obtained in this study, it was found that the intensity of fluorescence emission of resin cements can influence the behavior of the final ceramic restoration, in terms of fluorescence. These results were statistically significant to a thickness of 0.5 mm. Although they were not to a thickness of 1 mm, there was a tendency for a difference in intensity of fluorescence emission.

**CONCLUSION**

Within the limitations of this study, the two null hypotheses were rejected, since the fluorescence emission intensity of resin cements influenced the fluorescence behavior of glass-ceramic and the thickness of the ceramic influenced the fluorescence interaction of the resin cement with the glass-ceramic. The alternative hypothesis: the fluorescence of the resin cement affects the fluorescence intensity of the glass-ceramic with the thickness of the ceramic does not influence the fluorescence interaction of the resin cement with the glass-ceramic.

**REFERENCES**

3 Buehler, Ltd, Lake Bluff, IL, USA. The purpose of the current study was to evaluate the evaluation intensity of fluorescence between resin cement and ceramic, changing the thickness of the ceramic. As null hypothesis we have: the fluorescence of the resin cement does not affect the fluorescence emission of the glass-ceramic and the fluorescence of the glass-ceramic is constant. As alternative hypotheses: the thickness of the ceramic influences the fluorescence interaction of the resin cement with the glass-ceramic.

**OBJECTIVE**

In order to give the aesthetic rehabilitation a natural appearance, the ceramic restorations must have a similar fluorescence in terms of color and intensity to the natural teeth, not only under natural light but also under different light sources. This color of the ceramic restorations and the very core of the prepared tooth will affect the appearance of the restoration. However, not only these parameters influence the final result but also the cement used for rehabilitation. Nowadays, cement systems include several shades since final adjustment of color is often obtained by changing the color of the cement.