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The Radiopacity of Some Commercial Endodontic Sealer.

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Endodontic sealers must to be radiopaque allowing to individuate them during radiological examination with regard tooth hard tissues. The ANSI/ADA Specification N° 57 establishes that radiopacity of these materials would be determined by means of a comparison of a disk of the material to an aluminum step wedge, 9 mm high, having incremental steps of 1 ±0,01 mm thickness. The material tested were: RSA (Roeco), Rocanal R4 Condensation (La Maison Dentaire Sa), N2 Universal (Hager & Werken GmbH & Co), Bioseal (Ogna). The sealers were prepared according to manufacturer specification and placed in 20 stainless steel ring molds (Ø10 ±0.01 mm, height 1 ±0.01 mm). Five specimens were performed for each sealer tested. An x-ray machine capable of producing radiation at 70 kV and 10mA was used in conjunction with 5 radiographic films (31 x 41 mm) of speed group D (Ultra Speed, Kodak), as specified in ISO 3665, to obtain a radiograph of the test specimens and the aluminum step wedge. The aluminum used for beam filtration and step wedge was a 1100 alloy (a 98% Al alloy) in accordance with ASTM Specification B209. For each radiograph the aluminum step wedge was placed on the center of each film and 4 (one for each sealer tested) specimens were placed around the Al step wedge. The focal length chose was 300 mm. According to specification N° 57 the radiopacity of the endodontic sealers must to be not less than the equivalent to 3 mm of aluminum. The radiographs were then digitalized and analyzed by means an analytical imaging software (Image Pro Plus 4.1, Media Cybernetics). The results showed the following decreasing degree of radiopacty: N2 Universal, Rocanal R4 Condensation, RSA, Bioseal. We can conclude that most of the materials analyzed showed a good raiopacity excepting Bioseal which had a radiopacity insufficient according to ANSI/ADA Specification N° 57.

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Measure of the Thickness of Four Endodontic Sealers.

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The viscosity, of the endodontic sealers (ES), is an important physical parameter to evaluate the capability of such materials to be clinically introduced into the root canals. According to ANSI/ADA Specification N°57 two test are suitable for studying the viscosity of ES: flow and film thickness. In the present research the film thickness of four ES was evaluated, the materials tested were: RSA (Roeco) (**RSA**), Rocanal R4 Condensation (La Maison Dentaire Sa) (**RR4**), N2 Universal (Hager & Werken GmbH & Co) (**N2U**), Endomethasone C (Ogna) (**EC**). The procedure establishes that a small amount of the material, mixed according to manufacturer's directions shall be placed between two glass plates having a contact surface area of 200 mm² and an uniform thickness exceeding 5 mm . At 180s after the start of mixing, a load of 150N shall be carefully applied vertically onto the top glass plate, ensuring that the material fills the entire area between the top and bottom glass plate. Ten minutes after the commencement of mixing, the thickness of the sealer film shall be measured, in our case by means a micrometer assembled on a stereo-microscope (Lomo MBC-10). Six film thickness tests were performed, for each ED under examination, obtaining the following results expressed in micron: **RSA** = 9,3 (±1,01); **RR4** = 95 (±12); **N2U** = 50 (±23); **EC** = 40 (±19,1). Highly significant differences were found among the materials tested as analyzed by one way ANOVA (p = 0,000) and Student-Newman-Keuls' test with exception of **N2U** and **EC** (p>0.05).We can conclude that **RSA**, **EC** and **N2U** show a film thickness compatible with ANSI/ADA specification N° 57, while **RR4** exhibits a too high value.

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Chemical Micro-Analysis of Enamel Before and After Interaction with Some Glass-inomers Cements.

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In the present *in vitro* study the capability of ion uptake by human enamel in close contact with some glass ionomer cements (GIC) has been investigated. Twelve freshsly extracted human third molars have been root deprived. The crowns were divided into two halves by means a diamond saw. The enamel surfaces were then polished by means wet pumice and rotary brushes. The GIC tested were: RelyX Luting Cement (3M) (**RL**); Vitremer Core Build up (shade A3 Vita, 3M) (**VA3**); Fuji IX GP (shade A3 Vita, GC Corporation) (**F9**).One half for each crown was used as control, while on the other half the enamel surface was covered by one of the materials tested (three crowns for each GIC). The GIC were prepared and manipulated according to manufacturer instructions. After hardening, the specimens were immersed in deionised water (pH 6,4), contained in separated thermostatic tubs at 37° C for 14 days. The water of each tub was changed every 24 hours to avoid their ionic saturation. After water storage the samples were included in epoxy resin and then cut in two halves. The two parts were then applied on as many glasses for microprobe analysis. The samples were abraded with decreasing grain silica carbide papers and polished with diamond abrasive pastes (5-3µm) until 30 µm of thickness (LaboSystem, Struers), and then coated with a carbon layer 20 nm thick (K 950, Emitech). The device adopted for the micro-analysis was a Camebax Micro-Beam (Cameca). The following conditions of analysis were adopted for all samples: 15 Kvolt (wire tension of acceleration); 30 mA (current of the electronic bundle); 2 µm (diameter of the electronic bundle). In each sample, 4 measurements were recorded 4 µm far from the enamel surface. The distance from a measurement and the other one was 1 mm. The elements detected were: Na, P, F, Si, Al, Ca, Mg, S, O. The results showed, within the limits of this study, no significant differences about chemical composition of enamel before and after treatment by the GIC analyzed, as tested by ANOVA.

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Structure and setting reaction time of two glass-ionomer cements.

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It is now well-known that glass-ionomer cements (GIC) are susceptible to attack by moisture during the initial setting period. To increase the strength of these materials, manufacturers offer (among many others) conventional GIC with mechanical mixing for a better material cohesion or resin-modified GIC with manual mixing, the early polymerization of the resinous matrix making these materials less moisture sensitive.

The aim of this work was to compare the setting reaction time, during one month, of two GIC

- Vivaglass Cem® (Vivadent), a conventional GIC with mechanical mixing,
- Rely X Luting Cement® (3M), a resin-modified GIC with manual mixing,

and to evaluate the influence of mixing type on their setting reaction time.

Scanning electron microscopy (SEM) was used to determine the cohesion of each GIC. The setting reaction was studied using three experiments : water diffusion, dissolution kinetics of ions, Vickers hardness measurements.

Rely X presents a less dense structure than Vivaglass Cem. Ten days are necessary for the samples to be saturated in water with a coefficient of dissolution $D = 2{,}2.10^{-11} m^2 s^{-1}$ for Rely-X and $D = 50.10^{-11} m^2 s^{-1}$ for Vivaglass Cem. Ionic dissolution kinectic slowed up after ten days. In water maximal value of hardness was reached after five to seven days.

In spite of structure and mixing type differences, this study shows that both GIC have an equivalent setting time (seven to ten days) and need the same protective measure against water attack.