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Degree of Conversion of Luting Cements: Two Curing Protocols Compared

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Objective: Comparison of the degree of conversion (DC) of luting agents, subjected to two different curing protocols.

Materials and Methods: Six luting resin agents were tested: Hri Flow (MF) and pre-heated Hri Micerium light cure (MH); Nexus Third Generation light cure (NX3L) and dual-cure (NX3D); RelyX Ultimate dual cure (RXU) and Veneers light cure (RXL). For each material, ten samples (0.2 mm-thick) were made and divided into two groups (n=5): in group P1 samples were cured for 40 sec; in P2 for 5 sec, after 20 sec, were cured for 40 sec, using in contact Elipar DeepCure S (1470 mW/cm²). In curing phases, a pre-polymerized composite (Filtek Supreme) 2.0 mm-thick disk was used. Kinetic of curing was evaluated, using FT-NIR Spectrometer. Spectra were obtained in the first 5 min of the curing phase and at day 1, 2, 7, 14 and 28. The heights of specific bands were calculated: peak at 6166 cm⁻¹ (A), related to carbon double bonds, and at 5993 cm⁻¹ (B) corresponding to the aromatic ring. Each band height ratio B/A was converted in DC. One-way ANOVA and Tukey HSD were performed, with p<0.05.

Results: In the first 5 min, DC increases. At the end of 5 min, DC of P1 was in decreasing order as follows: MH>MF>NX3L>RXL>RXU>NX3D (p<0.05). In P2: MF=MH>NX3L=RXL>RXU>NX3D (p<0.05). All the luting agents reached more than 50% DC after 1 day, in both protocols. In each measurement, the light cured luting cements had higher DC values than the dual cured ones. P1 and P2 were not statistically different for each time point, but the DC significantly increased after 7 days and continued to increase up to 28 days.

Conclusions: The tested P2 can be safely used by clinicians to lute indirect restoration, simplifying the removal of cement excesses, particularly in the interdental space.

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Keywords: resin cements; kinetics; luting agents; degree of conversion