*LLIS stands out as a microhybrid composite resin with nanometric particles, for direct use for restorations on anterior and posterior teeth. It has a simplified color system, offering 16 tones distribute into opaques of Enamel, Dentin, and Incisor (translucent), according to the Vita® or standard color scale for easy identification.*

*The resin provides high capacity for achieving shine and smoothness in polishing because it has load particles that vary in size from 40 nm to 4 µm, with an average size of 0.8 µm. Their excellent mechanical properties are also due to the load content being approximately 78% by weight and 57.5% by volume. In addition to the aesthetic potential, Llis is easy to apply due to its excellent viscosity, allowing for the professional to sculpt it accurately.*

*These and other characteristics make Llis resin an excellent choice for direct restorations, constituting a strong ally in your daily clinical practice.*


# CHARACTERISTICS & ADVANTAGES

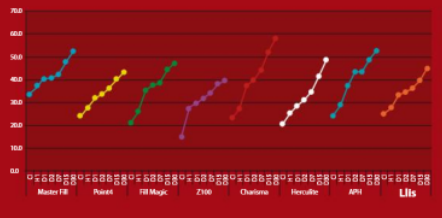
- Microhybrid resin with nanometric particles indicated for anterior and posterior teeth;
- Average particle size of 0.8 µm;
- Percentage of load 78% by weight and 57.5% by volume;
- Contraction tension of polymerization of 2% (approx.);
- Elastic modulus of 13 GPa (approx.);
- Available in 16 colors distributed into 3 levels of opacity: enamel, dentin, and incisal;
- Colors with high fidelity to the Vita® Classic scale;
- Has opalescence and fluorescence for greater naturalness of the restorations;
- Excellent viscosity: easy sculpting and adaptation in cavities;
- Ease of finishing and polishing;
- High radiopacity for easier radiographic follow-up;
- Ergonomic syringe with flip-top lid facilitates handling with just one hand.

Combining high standard raw material with a simplified color system, Llis resin achieves amazing results, providing more gloss, aesthetics and resistance to everyday restorations.

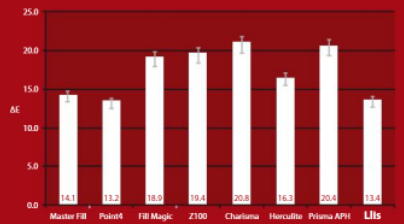
# SCIENTIFICALLY PROVEN QUALITY

## EVALUATION OF THE STAIN RESISTANCE OF VARIOUS COMPOSITE RESINS

*Stain resistance is one of the most important characteristics of aesthetic restorative materials. Composite resins with a high rate of staining require more frequent replacement, which can produce greater dental wear due to the repeated interventions with drills for removal of the tooth material. For the test, samples (n=10) in a disc format of 8 different commercial brands of resins were obtained. Finishing and pre-polishing (Diamond Pro discs, FGM) were performed on the samples and these were submerged in a coffee solution for 30 days, taking 6 color readings with a reflectance spectrophotometer (Vito Easy Shade Advance, Vident, US) during this period.*
*Thus, we obtained the color variation at each reading (Graph 1) and the total color variation (Graph 2) that reflects the difference between the first reading (before the staining with coffee) and the last reading (after 30 days of immersion in coffee).*

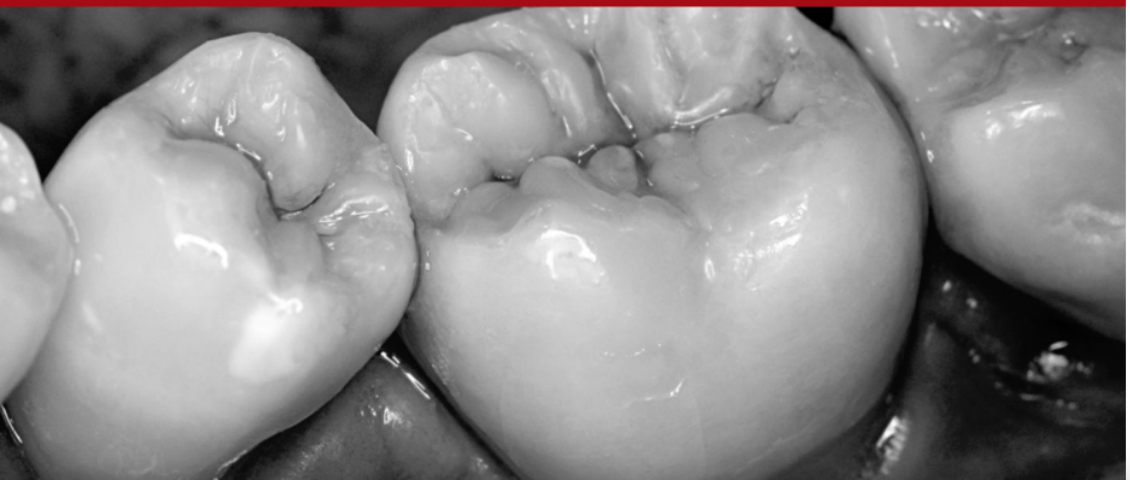



*Graph 1: Average of color variation by commercial brand of composite resin and time of exposure to staining (CI = initial, H1 = first hour, D1 = first day, D2 = second day, D7 = seventh day, D15 = fifteenth day, and D30 = thirtieth day). Authors: Oliveira Junior, O.B.; Silva Junior, M.E. and Oliveira, M.R.M. FOAr UNESP, 2015.*

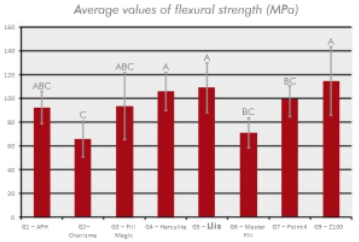



*Graph 2: Level of staining by coffee of different composite resins after experimental period. Authors: Oliveira Junior, O.B.; Silva Junior, M.E. and Oliveira, M.R.M. FOAr UNESP, 2015.*

**It can be seen that Llis (FGM) has a low value of in vitro staining, which favors aesthetic longevity of restorations with the composite.**



## EVALUATION OF THE FLEXURAL STRENGTH OF VARIOUS COMPOSITE RESINS



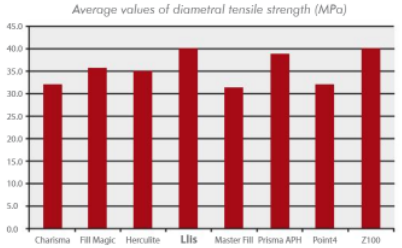

*Graph 3: Average and standard variation (in MPa) of flexural strength of composite resins subjected to this test on a mechanical testing machine. Different letters indicated a statistical difference (p<0.05). Authors: Silva Junior, M.E.; Pereira, K.F.; Kuga, M.C.; Andrade, M.F.; Compos, E.A. FOAr UNESP, 2015.*

*Masticatory forces present a mechanical challenge to composite resins, so it is very important for these materials to have high flexural strength, aimed at stability of the restoration over the long-term.*
*The 3-point flexion test was conducted according to ISO standard 4049:2009, on a universal testing machine (EMIC DL 2000, EMIC) with a load cell of 500N and speed of 0.5 mm/min applied to the specimens until fracture, when the reading was obtained. 8 commercial brands were tested.*

**It can be concluded that Llis resin (FGM) has high flexural strength, contributing to its good mechanical performance.**

## EVALUATION OF THE DIAMETRAL TENSILE STRENGTH OF VARIOUS COMPOSITE RESINS

*Tensile strength is a basic mechanical property that ensures a restorative material serves the functions for which it was designed in an adequate, safe manners and for a reasonable time. In the oral cavity, composite resin restorations are subjected to masticatory forces that can generate tensile stresses, which can result in failures of these restorations.*
*Thus, one of the conditions for clinical success of the restorations is a high tensile strength.*
*Diametral tensile strength is a traditional testing method for materials, determined through the application of a compressive force on the long axis (diameter) of a cylinder, producing tensile fracture.*
*To conduct the study, eight different brands of composite resin in color A2 were used. 10 specimens 2.00 mm in height and 6.00 in diameter were used for each group. These were subjected to the diametral tensile test on a universal testing machine (EMIC DL 2000, São José dos Pinhais, Paraná, Brazil). The load was applied vertically on the lateral portion of the cylinder, at a velocity of 0.5 mm/min, producing tension perpendicular to the vertical plane, passing through the center of the specimen. After each compression test, the fracture load (F), in Newtons (N), was recorded and the diametral tensile strength (σt), in MPa, was calculated using the formula:*
*σt = F/πr2, where: F= Force (N), π= 3,1416, r= radius. The variance analysis test (ANOVA - 1 criterion) was applied to the averages of diametral tensile strength, according to the Tukey test. The significance level adopted for all the tests was 5%.*



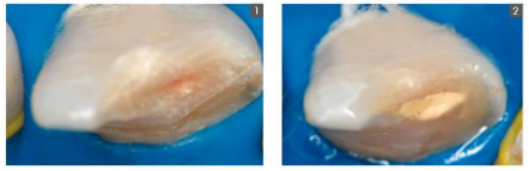

*Graph 4: Averages of diametral tensile strength (MPa) Authors: Martins, L.M.; Silva Junior, M.E.; Bertocco, V.P.L. UFAM, 2015.*

*According to standard number 27 from the ADA (American Dental Association), the minimum value for diametral tensile strength must be 24 to 34 MPa. Llis had one of the highest diametral tensile strength values (40 MPa), and is suitable for application on restorations of regions subjected to higher tensile stresses.*

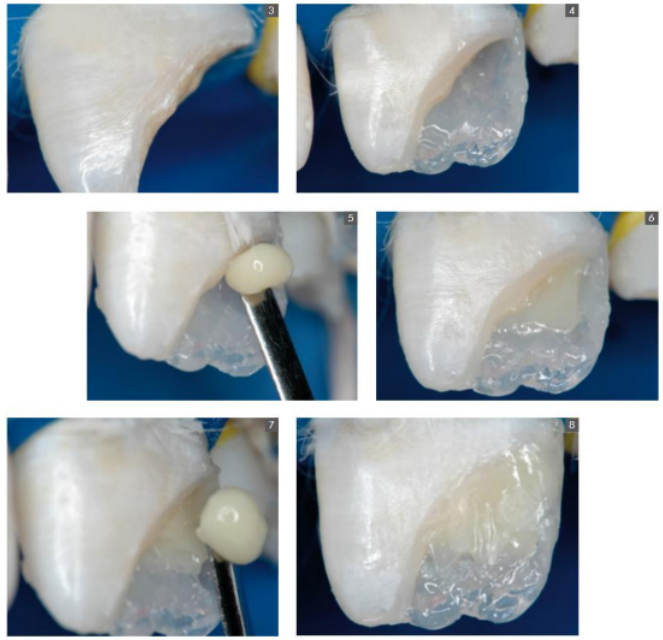

# RESTORATION OF FRACTURED ANTERIOR TEETH.

The patient had extensive fracturing of teeth 21 and 22 due to trauma. The pulp tissue had not be compromised, which precluded the need for endodontic intervention. As this was a complete fracture, different resin opacities had to be employed to create a more natural three dimensional effect. When the work was completed, the patient was satisfied with the result and received the information about the necessary care for maintenance of the restoration's longevity.

## TREATMENT




1 and 2. Initial view of the case, detailing the fracture of tooth 21, pulp tissue, without exposure, was protected by calcium hydroxide cement;




3. Chamfering, acid etching and adhesive application were performed on the surface;

4. The palatal enamel was reestablished with Llis Incisal (translucent);

5 and 6. Start of the creation of the dentinal body with Llis DA3.5;

7. Creation of the dentinal body of the medial third with Llis DA3;

8. Note the integration of the dentin masses;

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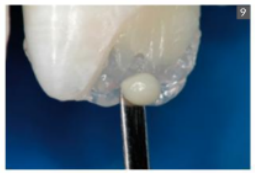
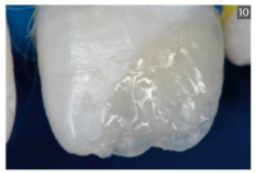
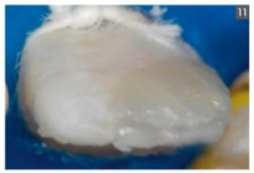
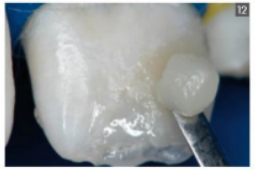
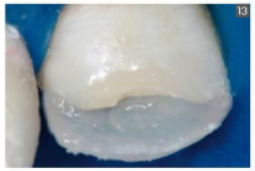




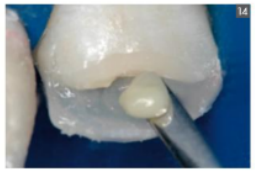
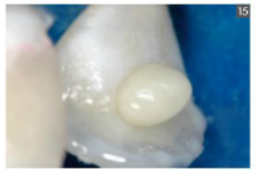
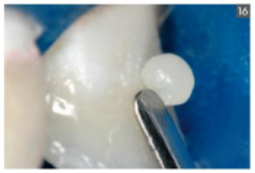



9. On the incisal third, Llis DA2 was applied;

10. Dentin stratification provided by the different dentin chroma;

11. Incisal view showing the space to be used by the enamel resin;

12. Application of the surface layer of Llis EA1;

13. On tooth 22, after beveling and implementation of the hybrid layer, the palatal enamel was prepared with Llis Incisal (translucent);

14. Llis resin DA3.5 as used for preparation of the dentin body;

15. The medial and incisal thirds received Llis DA2;

16. As a surface layer, the vestibular enamel was created with Llis EA1;

17. With dental hydration resumed, result after finishing with Diamond Pro sanding discs (FGM) and polishing with Diamond Flex felt discs (FGM) and Diamond Excel diamond paste (FGM).

CLINICAL CASE

# POSTERIOR TEETH


## REPLACEMENT OF AMALGAM RESTORATIONS WITH COMPOSITE RESIN.

The patient presented with the chief complaint of dissatisfaction with the amalgam restorations on teeth 35 and 37.

After the clinical and radiographic exam, we opted for replacement with composite resin restorations.

Initially, a prophylaxis was done, and then absolute isolation of the operative field. The amalgam restorations were removed using a spherical diamond tip, and then an internal cleaning of the cavities was done with glycine powder for prophylaxis.

The cavity preparations were etched with phosphoric acid at 37% (Condac 37, FGM) for 30 seconds on the enamel and 15 seconds on the dentin. After rinsing for the same period of time as for etching, drying was done with filter paper for control of the moisture on the dentin and drying of the enamel.

The adhesive procedure is a fundamental step for the clinical success and longevity of composite resin restorations. Thus, good diffusion of the adhesive on the demineralized dentin after acid etching is of utmost important for preventing problems of postoperative sensitivity and for improving the adhesion of the dentin substrate. The application of the adhesive under agitation has proven very effective for obtaining these good results in adhesion. To that end, a sonic vibration system was used in this clinical case for application of the adhesive system (Ambar, FGM) and light-curing for 20 seconds.

The restorative procedure was conducted using the incremental technique, starting with color EA3 of Llis composite resin (FGM), with a chroma greater than the composite resin that will be used as a final layer. In this case, the last later was conducted with color EA1 (Llis, FGM). The option of not using dentin colors in this clinical case is due to the depth of the cavities not being very significant.

To develop the correct morphology and the function of the dental elements to be restored, two factors can be highlighted: prior knowledge of the occlusal anatomy and morphology, and use of instruments that allow the professional to handle the composite resin adequately. Figures 13, 14, and 15 highlight the instruments used in this clinical case for adaptation and characterization of the occlusal morphology of the last layer of Llis composite resin (FGM) in color EA1.

The use of pigments, although an optional step, allows the restoration to be characterized more naturally and also mimics it along with the dental element. In this clinical case, pigments in brown colors were used in the main sulcus and white was used on the cuspid sections.

The final light-curing aims to improve the degree of polymerization of the last layer, which is inhibited by the presence of oxygen. In this case, a water soluble gel was used to achieve effective polymerization of the restoration. After rinsing to remove the gel, the appearance of the restoration before finishing and polishing can be seen in figures 18 and 19. Figure 20, 21, and 22 highlight the images of the final view of the restoration after removal of the absolute isolation and polishing.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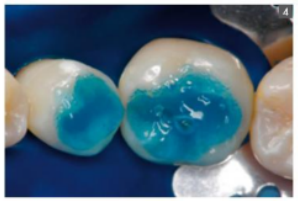
**ADRIANO SAPATA**
Specialist in Restorative Dentistry from UNG and Masters in Restorative Dentistry from UNG

## TREATMENT



1. Appearance after absolute isolation and prophylaxis of the operative field;

2. Removal of the amalgam restoration;


3. Application of the phosphoric acid (Condac 37, FGM) on the enamel for 30 seconds;

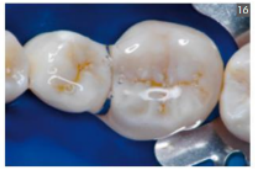
4. Application of the phosphoric acid (Condac 37, FGM) on the dentin for 15 seconds;




5. Rinsing of the cavity to remove the phosphoric acid;

6. Drying of the cavity with filter paper, keeping the dentin slightly moist;

7. After drying, appearance of the dry enamel and slightly moist dentin;





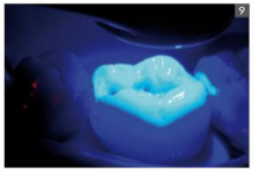




16. Application of water soluble gel for more effective polymerization of the last layer;

17 and 18. Final appearance immediately before removal of the absolute isolation;

19 to 21. Final view of the restorations after finishing and polishing.



8. Application of the Ambar adhesive (FGM) using a sonic vibration system;

9. Photoactivation of the adhesive system;

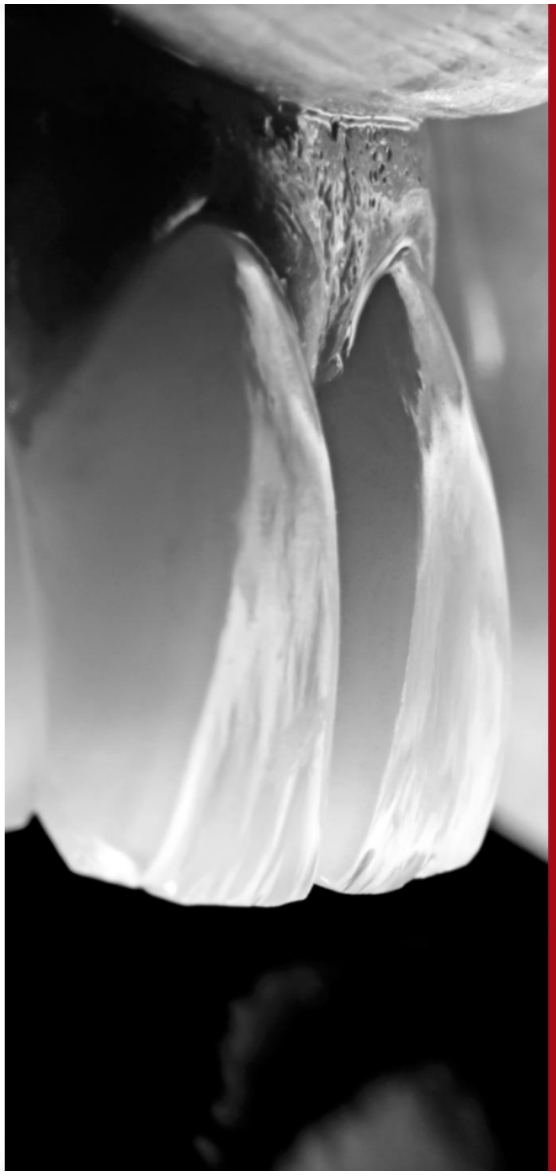
10. Insertion of Llis resin EA3 (FGM) on the vestibular cusps;

11. Insertion of Llis resin EA3 (FGM) on the palatal cusps;

12 and 13. Creation of pits and fissures;

14. Marginal adaptation of Llis resin EA1 (FGM);

15. Insertion of light-curable pigment in white and brown for characterization of the occlusal face;



# SOLUTIONS THAT VALUE RESULTS

To highlight the result provided by Llis resin, also try the Diamond line with products for finishing and polishing of restorations, as well as Ambar Universal adhesive for enamel and dentin.

**DIAMOND FLEX**
Flexible felt discs

- Flexibility that enables polishing on irregular and angled surfaces
- Quick fit that facilitates coupling to the drill chuck
- No metal parts on the disc surface, reducing risk of damage to restorations

**DIAMOND PRO**
Flexible sanding discs

- Enable complete finishing: 4 grits which allow everything from abrasion to pre-polishing
- Quick fit that facilitates coupling to the drill chuck
- No metal parts on the disc surface, reducing risk of damage to restorations

**DIAMOND**
Felt discs

- No metal parts
- Quick fit that facilitates coupling to the drill chuck

**DIAMOND MASTER**
Complete kit for finishing and polishing of restorations

- Complete solution for finishing and polishing
- Better cost X benefit

**DIAMOND EXCEL**
Micronized diamond-based polishing paste with extra-fine grit

- Universal polishing paste
- High hardness of the particles
- Medium viscosity and non susceptible to the action of heat
- Does not run
- It can be used with all restorative materials
- Easy to remove

**DIAMOND R**
Aluminum oxide-based polishing paste with extra-fine grit

- Medium viscosity
- Not susceptible to the action of heat
- Does not run, facilitating handling
- Pleasant mint flavor
- Easy to remove

**DIAMOND AC I & II**
Aluminum oxide-based polishing paste available in two grits

- For finishing and pre-polishing of resins
- Medium viscosity
- Not susceptible to the action of heat
- Does not run, facilitating handling
- Their formulas combine the properties of Carbowax and high-hardness abrasives
- Easy to remove