

## Futurabond U / GrandioSO – 24-month clinical study: Assessment of direct and indirect composite restorations

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**The latest generation of dental adhesives can be used universally. On the one hand, this leaves the dentist free to decide whether to etch the dental hard tissue additionally or not. On the other hand, the universal nature of these adhesives means that they are compatible with all materials used in dentistry, namely composites, metals and various types of ceramics. Moreover, the universal adhesives from VOCO are compatible with all types of methacrylate-based composites, irrespective of whether they are light-curing, chemically curing or dual-curing. This Scientific Report summarises the results of a clinical study designed to run for a total of 24 months, concerning the evaluation of direct and indirect composite restorations with the Nanohybrid composite GrandioSO. The study was conducted by the working group headed by Prof. Dr. Torres at the University of São José dos Campos in Brazil. <sup>[1]</sup>**

In this study, the team led by Prof. Dr. Torres investigated the quality of direct and indirect restorations, i.e., conventional fillings and chairside-fabricated composite inlays. The restorations were assessed based on the FDI criteria; the evaluations were performed shortly after treatment (initial) and after 6, 12 and 24 months respectively. <sup>[2] [3]</sup>

### Study design

30 patients complying with the specified criteria were selected for the study. The criteria included:

- The presence of cavities, fractures or cosmetic requirements
- At least two class II restorations per test subject in the first or second molars
- Contact between the antagonist and the neighbouring teeth
- Vital pulp and no painful symptoms in the tooth to be restored
- Permanent dentition
- Good oral hygiene with no sign of periodontal disease

Each patient was treated with at least two class II restorations. The direct restorations were produced with the light-curing composite GrandioSO in accordance with the rules of the conventional adhesive technique in combination with Futurabond U in selective-etch mode. In the case of indirect restorations, the composite inlays were produced in the chairside technique using GrandioSO and the Die Silicone. They were then luted with the dual-curing luting composite Bifix QM and Futurabond U (selective-etch mode).

The evaluation criteria for this study are divided into aesthetic, functional and biological properties. Each criterion has the following classes: “clinically excellent / very good”, “clinically good”, “clinically satisfactory / adequate”, “clinically unsatisfactory” and “clinically inadequate”. An exact description of each of the classes is given in Table 1. The restorations were evaluated by two independent dentists.

**Table 1:** Explanation of the individual evaluations.

Evaluation	Explanation
<b>Clinically excellent / very good</b>	The quality of the restoration is excellent and satisfies all the quality criteria. The tooth and/or surrounding tissue are sufficiently protected.
<b>Clinically good</b>	The quality of the restoration is very acceptable, although one or more criteria are not ideal. The restoration can be improved to excellent status through reworking, but this is not normally necessary. There is no risk of the tooth or the surrounding tissue being damaged.
<b>Clinically adequate / satisfactory</b>	The quality of the restoration is satisfactory with some weak points, which cannot be resolved without damaging the tooth due to their number or the area where they occur. Nevertheless, no harmful side effects are to be expected.
<b>Clinically unsatisfactory</b>	The quality of the restoration is not acceptable. However, the restoration can be repaired.
<b>Clinically inadequate</b>	The quality of the restoration is unsatisfactory and the filling needs to be replaced.

**Table 2:** Recall overview.

Restorative technique	Number of assessed restorations			
	Initial	6 months	12 months	24 months
	30 patients	30 patients	27 patients	25 patients
Direct	30	30	27	24
Indirect	30	30	27	24
Total restorations	60	60	54	48

## Results

A total of 60 restorations were fabricated for 30 patients. The restorations of all the patients were assessed after the first interval (6 months). 27 of the patients (90 %) presented for the next assessment of their restorations after 12 months. 25 patients attended the final clinical evaluation after the last interval (24 months), which corresponds to a recall rate of 83 %. One direct restoration in a very deep cavity had to be removed and the tooth was subsequently treated endodontically. One indirect restoration was repaired due to a marginal fracture.

The results are shown in Figures 1-3. Figure 1 shows the evaluations of the functional properties, Figure 2 shows the aesthetic properties and Figure 3 shows the biological properties.

After 24 months, all the restorations showed good clinical results for the studied parameters (function, aesthetics and biology) irrespective of whether they were placed directly or indirectly.

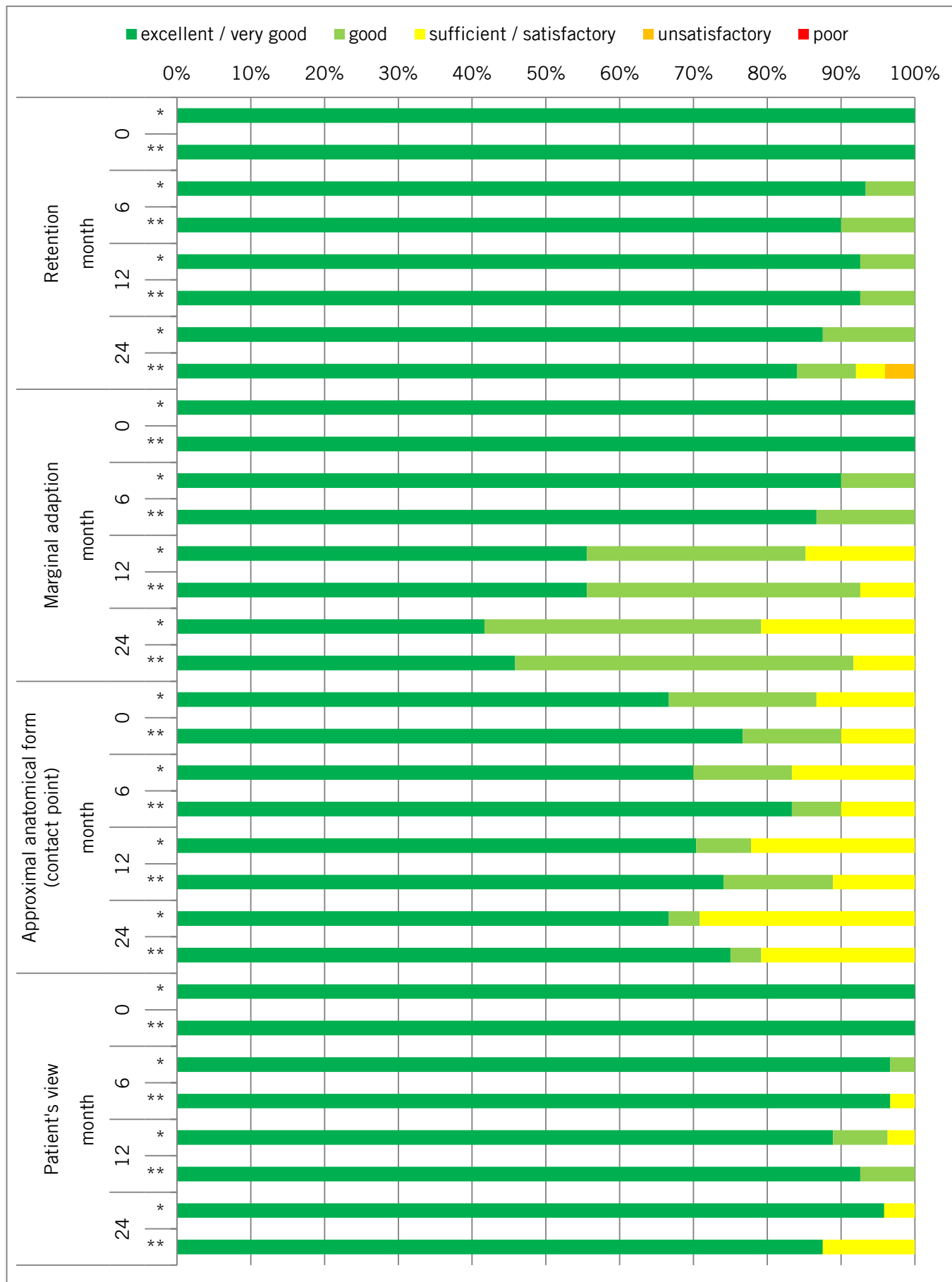


Figure 1: Functional properties of the direct (\*) and indirect (\*\*) restorations.

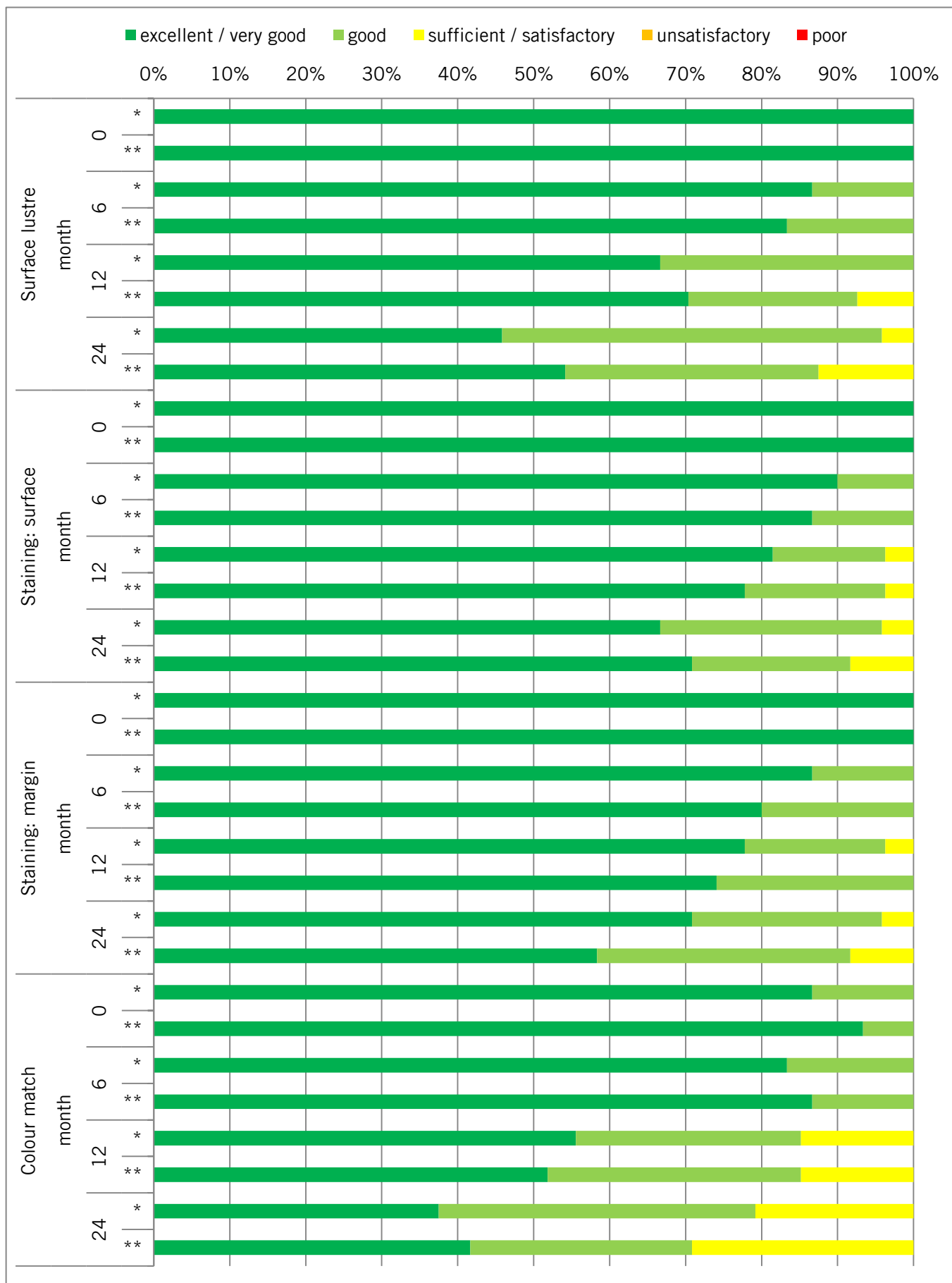


Figure 2: Aesthetic properties of the direct (\*) and indirect (\*\*) restorations

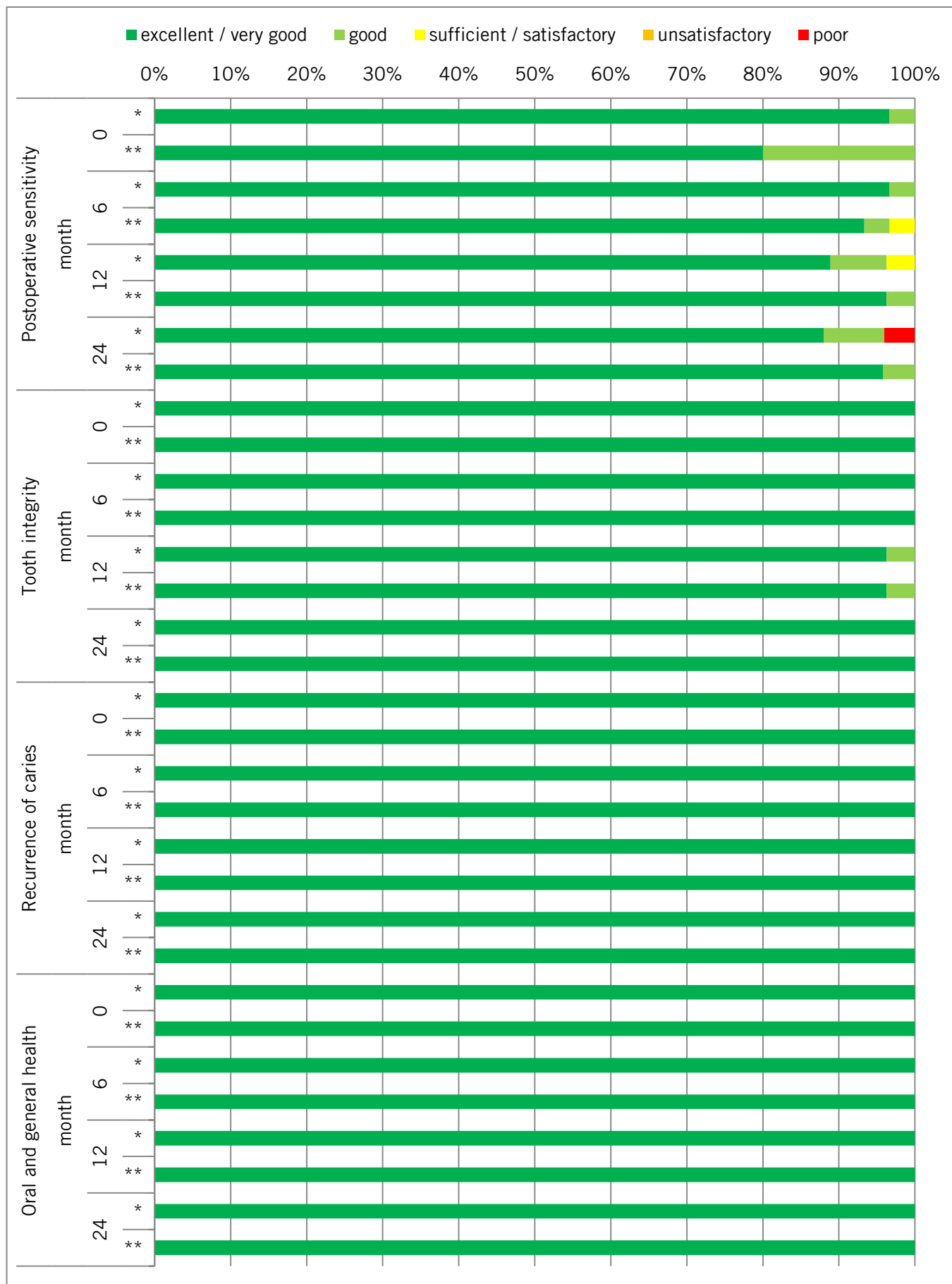


Figure 3: Biological properties of the direct (\*) and indirect (\*\*) restorations.

**Conclusion:** In combination with the nanohybrid composite GrandioSO, Futurabond U achieves excellent results with both direct and indirect restorations, which once again proves that Futurabond U and GrandioSO can be used together for all applications. The free choice of whether to use the etching technique and the wide range of indications paired with the good clinical results displayed here confirms once more the outstanding quality of Futurabond U and GrandioSO and their versatile range of applications.

- [1] Torres CRG , *Clinical evaluation of direct and indirect composite restorations using the chairside technique*, Report to VOCO, Universidade Estadual Paulista Júlio de Mesquita Filho, São José dos Campos, São Paulo, **2015**.
- [2] Hickel R, Roulet JF, Bayne S, Heintze SD, Mjor IA, Peters M, et al. *Recommendations for conducting controlled clinical studies of dental restorative materials*. Clin Oral Investig **2007**;11(1):5-33.
- [3] Hickel R, Peschke A, Tyas M, Mjor I, Bayne S, Peters M, et al. *FDI World Dental Federation: clinical criteria for the evaluation of direct and indirect restorations-update and clinical examples*. Clin Oral Investig **2010**;14(4):349-66.