

BIO-ESTHETICS: giving a new face to smile enhancements

Didier Dietschi¹

Bio esthetics is the quintessence of biology, biomechanics and esthetics and aims to more conservative, ethical solutions to a myriad of esthetic deficiencies.

Introduction

A more attractive smile, improved dental esthetics and durable results have been for long intimately linked to ceramic restorations such as veneers and crowns and remain strongly anchored in patients and dental professional minds. Modern composite resin technology has however challenged this assumption because they offer excellent aesthetic

potential and acceptable longevity, with a much lower cost than equivalent ceramic restorations for the treatment of both anterior and posterior teeth.¹⁻³ Moreover, composite restorations allow for minimally invasive preparations or no preparation at all when modifying existing tooth anatomy or assuming the replacement of decayed tissues; this constitutes an unparalleled advantage of “free-hand bonding” also due to its relative simplicity. This rationale has been the foundation of a new concept named „bio-aesthetics“, giving priority to additive, minimally or microinvasive procedures to preserve tooth biology and biomechanics.

While resin composites are universally considered the “standard of care” material for the filling of small to medium class III, IV and V cavities, they can be used today in many more indications such as the correction of small to moderate aesthetic and functional deficiencies^(2,3...+). Recent developments in composite optical properties and physical properties have also significantly contributed to simplifying their application and improving treatment outcome and

¹ Didier DIETSCHI, D.M.D, PhD, Privat-Docent
Senior lecturer, Department of Cariology & Endodontics, School of Dentistry, University of Geneva, Switzerland.
Adjunct Professor, Department of Comprehensive Care, Case Western University, Cleveland, Ohio.
Private practice & Education Center – The Geneva Smile Center, Switzerland

Address for correspondence:

Didier Dietschi
The Geneva Smile Center
2 Quai Gustave Ador
1207 Geneva
SWITZERLAND



Figure 1a and 1b: Preoperative views of a young patient presenting relatively large diastemas distally to lateral incisors. The case is complicated by improper occlusal relationship with lower canines which reduce the space available for restorations.



Figure 1c, 1d and 1e: Post-operative views showing an improved smile configuration using «no-prep» direct composite restoration (inspiro, EdelweissDR). This treatment illustrates the «bioesthetic» philosophy which truly represents a breakthrough in modern restorative dentistry.

predictability.⁴⁻⁶ The aim of this short article is then to demonstrate the potential and multiple applications of composite as a modern aesthetic restorative material in the context of bio-esthetic treatment approach.

This rationale has been the foundation of a new concept named 'bio-aesthetics', giving priority to additive, minimally or microinvasive procedures to preserve tooth biology and biomechanics.

Table 1: Treatment decision process

Parameters	Direct option veneers ..to.. crown	Indirect option
age of the patient	younger	older
size of the decay	smaller	larger
tooth vitality	vital	non-vital
tooth colour	normal	non-treatable discolouration*
facial anatomy	normal	altered
number of restoration	unrelated	unrelated

*using chemical treatments (vital & non-vital bleaching or microabrasion)

Table 2: Modern progressive treatment concept and various types of procedures

Types of procedures	Typical procedures
Non restorative	Esthetic chemical treatments (bleachings, micro-abrasion) Direct bonding
Minimally invasive	Direct bonding Ultra-thin Veneers Modern inlays and onlay techniques
Micro-invasive	Classical veneers, inlay and onlays
Macro-invasive	Crowns and bridges

Revisiting smile rehabilitation concepts: Bio-esthetics

Choosing the right restorative approach (direct or indirect, composite or ceramics) has been debated over decades and finally, the decision largely depends on the practitioner's own education background and experience with each of the aforementioned options. Only "extreme" conditions such as minor aesthetic form and color corrections or extensive decays in non-vital teeth, lead to evident solutions (direct and respectively indirect restorations), while the majority of other cases lie in a "gray zone" which actually makes a pertinent choice more intricate. A simple yet effective approach to this dilemma relies on a sound bio-mechanical analysis of the teeth

potentially involved in the treatment status, combined to the usual functional and aesthetic analysis. Then, having as a prime objective the respect of tooth biology and conservation guides clinician to a logical decisional tree, such as presented in table 1.

The "Bio-esthetic" philosophy actually give priority to chemical color improvements (vital bleaching, non-vital bleaching, micro-abrasion), associated to direct composite restorations and bonded ceramic restorations for more extensive decays, limiting the use of traditional full crowns to existing restoration replacement and a few conditions of extreme tooth fragilization. The progressive treatment concept presented in table 2 then summarizes the modern vision of esthetic restorative dentistry.



Figure 2a and 2b: Preoperative smile of a young patient presenting post-orthodontic enamel hypocalcifications and asymmetrical, shorter central incisors.



Figure 2c: A free-hand mockup was made to assess the ideal length for an optimal smile configuration.



Figure 2d: Post-treatment view showing better smile balance and harmony, following micro-abrasion (to remove white spots) and direct bonding (inspiro).

New shading approach: the natural layering concept

To achieve perfect direct restorations has been for long and

hypothetical aim due to the imperfect optical properties of many composite resins systems. So far, the over-simplification (mono-incremental) as well as over-complexity



Figure 3a: Preoperative views of a young patient showing enamel hypocalcifications and asymmetrical tooth forms.

Figure 3b and 3c: Shade selection is performed using a special dual-laminate shade guide which grants color predictability (inspiro).

Figure 3d and 3e: A partial mockup (teeth #11 & #12) is made to assess the impact of planned restorations on the smile configuration.



Figure 3f and 3g: Rubber dam is placed to provide an optimal working environment. The full smile (premolar to premolar) is visible to facilitate procedures and especially to keep control of the smile line configuration.



Figure 3h: A conservative preparation of the white spots is made to provide a minimum space for color correction (1-1.5mm).

Figure 3i: A first layer of dentin shade is placed to cover residual discolored area and provide a correct chroma (body i2, inspiro).



Figure 3j: The second layer is placed with an achromatic enamel providing proper translucency and opalescence (skin white, inspiro).

Figure 3k: Further form correction are made with the same enamel shade (no dentin is needed as layers are not thicker than 1-1.25mm).

(multi-incremental) of shading systems has tremendously limited the benefit of direct composite restorations. Even today, the complexity of some systems is often associated to shading concepts mimicking ceramic systems (which are applied in totally different layer thicknesses) or the influence of over-meticulous clinicians who compensated

deficient composite optical properties with intricate layering concepts. The use of the natural tooth as a model and the identification of respective dentine and enamel optical characteristics (tristimulus $L^*a^*b^*$ colour measurements and contrast ratio) has then been a landmark in developing better direct tooth coloured



Figure 3l: Detailed view of the corrected central and lateral incisors, using minimally invasive approach with direct composite.



Figure 3m: Post-operative showing a more harmonious smile configuration and uniform tooth color.



Figure 3n: 2Y view showing no alteration of these partial composite restorations.



3o



3p

Figure 3o and 3p: Anatomical details of the restoration micro-morphology and surface smoothness which proved stable over 2 years of clinical function (inspiro, EdelweissDR).

materials⁷⁻⁹. The 'natural layering concept' is then a simple and effective approach to creating highly aesthetic direct restorations which has become a reference in the field of composite restorations.

So far, the over-simplification (mono-incremental) as well as over-complexity (multi-incremental) of shading systems has tremendously limited the benefit of direct composite restorations.

References

1. Macedo G, Raj V, Ritter AV. Longevity of anterior composite restorations. *J Esthet Restor Dent* 2006;18:310-311.
2. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. The 5-year clinical performance of direct composite additions to correct tooth form and position. II. Marginal qualities. *Clin Oral Investig*. 1997;1:19-26.
3. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. The 5-year clinical performance of direct composite additions to correct tooth form and position. I. Esthetic qualities. *Clin Oral Investig*. 1997;1:12-8.
4. Dietschi D, Ardu S, Krejci I. A new shading concept based on natural tooth color applied to direct composite restorations. *Quintessence Int*. 2006;37:91-102.
5. Magne P, So WS. Optical integration of incisoproximal restorations using the natural layering concept. *Quintessence Int*. 2008;39:633-43
6. Dietschi D. Optimizing smile composition and esthetics with resin composites and other conservative esthetic procedures. *Eur J Esthet Dent*. 2008;3:14-29.
7. Cook WD, McAree DC. Optical properties of esthetic restorative materials and natural dentition. *J Biomat Mat Res* 1985;19:469-488.
8. Dietschi D, Ardu S, Krejci I. Exploring the layering concepts for anterior teeth. In Roulet JF and Degrange M, Editors: *Adhesion – The silent revolution in Dentistry*. Berlin, Quintessence Publishing, 2000:235-251.
9. Dietschi D, Ardu S, Krejci I. A new shading concept based on natural tooth color applied to direct composite restorations. *Quintessence Int* 2006;37:91-102.
10. Ubassy G. *Shape and color: the key to successful ceramic restorations*. Quintessenz Verlags, Berlin;1993.
11. Dietschi D. Free-hand composite resin restorations: a key to anterior aesthetics. *Pract Periodont & Aesthetic Dent* 1995;7:15-25.
12. Dietschi D. Free-hand bonding in esthetic treatment of anterior teeth: creating the illusion *J Esthet Dent* 1997;9:156-164.
13. Dietschi D. Layering concepts in anterior composite restorations. *J Adhesive Dent* 2001;3:71-80.