

# Visual vs Instrumental methods for the monitoring of Dental Bleaching

Diana Dudea<sup>1</sup>, Cristina Gasparik<sup>1</sup>, Razvan Ghinea<sup>2</sup>, Alexandra Iulia Irimie<sup>1</sup>, Ioana Vlas<sup>1</sup>, Diana Mada<sup>1</sup>, Bogdan Culic<sup>1</sup>, Maria del Mar Perez<sup>2</sup>

1. Department of Prosthetic dentistry and Dental materials, Faculty of Medicine and Pharmacy Iuliu Hatieganu, Cluj-Napoca, Romania
2. Department of Optics, University of Granada, Spain.  
Corresponding author Diana Dudea ddudea@umfcluj.ro

Keywords: dental bleaching, spectrophotometer, spectroradiometer, whiteness index

Dental bleaching is a common procedure in dentistry, aiming to confer a whiter aspect to the teeth, in generalized or isolated dental discoloration. The materials of choice are mainly based on peroxides, and their mechanism is still controversial. Not only the dental structures, but also the restorative materials are subjected to color changing when such methods are applied. There are two major directions of research concerning bleaching: efficiency of the whitening protocol and the side effects of the materials involved.

In order to monitor the efficiency of dental bleaching, two methods are available: visual comparison of the dental substrate with tabs of dental shade guides, before and after whitening process; although clinicians use different variants of shade-guides, it is recommended Bleachguide 3D Master shadeguide, which was designed in this respect; the number of shade guide units (SGU) between the initial and final status indicate the efficiency in bleaching. This method is, however, subjective and less precise to be used in research.

Instrumental measurements of the substrate, in different moments of the bleaching protocol, allow to calculate either the color difference in CIEL\*a\*b\* or CIEDE2000 systems or to assess the “level of white”, using Whiteness indices.

The presentation is an overview of the methods, used by the authors, to measure the color components of different substrates (teeth, sections of enamel and dentine, composite resins, ceramics), when bleaching action was evaluated. Both systems- visual, based on shade guides, and instrumental (spectrophotometers, spectroradiometers) are detailed, and the results provided by these methods are discussed, in comparison. Moreover, the calculation of the results were based on either color differences  $\Delta E^*ab$  and DE2000, or on a recently introduced Whiteness index for dentistry (WID).