CLINICAL COLOR MATCH OF PORCELAIN VISUAL SHADE-MATCHING SYSTEMS

COMMENTARY

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The accurate color match of a single maxillary central incisor has been and remains one of the greatest challenges facing the esthetic restorative dentist.¹ It has always puzzled me how manufacturers determine the color recipe of their respective porcelain visual shade-matching systems, commonly known as shade guides, when they are not even made of porcelain. It must be similar to how Mr. Willy Wonka made his irresistibly delicious chocolate with the aid of the Oompa-Loompas. Unfortunately, there may not be any rhyme, reason, or even science, for that matter, to the methodology of fabrication.² But the daily use of these systems has tremendous clinical responsibility since it aids to service our patients.

Meticulous work by Lloyd Miller in the late 1980s elucidated the deficiencies of such systems as it related to natural tooth color. Miller found that natural teeth were generally higher in chroma and lower in value (darker) than most of the frequently used and popular shade guides of the time.³ This led to the development of the Vita 3D Master system with the collaborative help of Dr. Ed McLaren and the Vident Co. It is interesting to note that one of the most popular shade guides in Miller's study, the Vita Lumin, remains available three decades later, in addition to a variant, the Vita Classic guide.

I find this current article refreshing since the correlation between the accuracy of color reproduction, that is, color match and clinical perception of an acceptable color match by the dentist and patient, has not previously been addressed. The assumption is that a ΔE value < 2.0 is clinically imperceptible may not be clinically noteworthy since in this study it was not measured with comparative optical measurement devices such as a reflectance spectrophotometer (eg, MHT SpectroShade, Verona, Italy) or colorimeter (eg, X-Rite ShadeVision, Grand Rapids, MI, USA). The perceived outcomes determined by subjective criteria between dental professionals (prosthodontists) and patients were of great clinical significance; patients were less critical, discerning, and showed a broader acceptance.

It is not surprising that the Vita 3D Master provided the most shade information to the laboratory technician and resulted in a higher acceptance level of fabricated restorations among the dental professionals in the study. The Vita 3D Master encompasses 26 shades versus the Ivoclar Chromascop's 20 shades and Vita Lumin's 16 shades.

One of the most critical phases of shade matching is shade *communication*, employing standardized clinical photography with shade tabs. Technicians not only need to see a photograph of the selected shade tab but also to visualize other shade references through "value difference" photography.⁴ A photograph of shade tabs significantly brighter and darker should be included as a reference to standardize the color and value of the images to be interpreted in the photographs.

The future of shade-matching research is bright and will focus upon comparative analysis studies employing technologybased measurement devices,⁵ digital photography,⁶ and visual assessment with shade tabs.

REFERENCES

- 1. Paul S, Peter A, Pietrobon N, Hammerle CH. Visual and spectrophotometric shade analysis of human teeth. J. Dent Res 2002; 81:578–592.
- 2. Preston JD. Current status of shade selection and color matching. Quintessence Int 1985; 16:47-58.
- 3. Miller LL. A scientific approach to shade matching. Carol Stream, IL: Quintessence Publishing Co., Inc., 1988.
- Chu SJ, Devigus A, Mieleszko A. Fundamentals of color: shade matching and communication in esthetic dentistry. Carol Stream, IL: Quintessence Publishing Co., Inc., 2004.
- Paul S, Pietrobon N. Conventional visual vs. spectrophotometric shade taking for porcelain-fused-to-metal crowns: a clinical comparison. Int J Periodontics Restorative Dent 2004; 24:223–231.
- 6. Bengel WM. Digital photography and the assessment of therapeutic results after bleaching procedures. J Esthet Restor Dent S21-S32.

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