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TIPS FROM OUR READERS

Color-to-grayscale conversion using a smart phone camera for value comparison

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Color has 3 different dimensions: hue, value, and chroma.[1] Hue describes the dominant color of an object. Value is often referred to as lightness and is the measurement of the lightness or darkness of a color. Chroma refers to the degree of saturation of a particular hue. To select tooth shade, value should be chosen first and then chroma and hue are determined later.[1] Among many different methods of evaluating tooth shade, comparison of a series of values with several shade tabs is the most common method,[2] especially as value selection is less affected by color vision deficiency than hue or chroma.[3] Color-to-grayscale conversion can help the clinician perceive only the value component of the tooth and shade tabs because the conversion can remove all other color components.[4] Color-to-grayscale conversion is defined as converting color images to grayscale and can produce perceptually reasonable grayscale results.[5] Usually the color-to-grayscale conversion is made with graphic software after making pictures.[4] However, the use of a smart phone will instantaneously allow the color-to-grayscale conversion.

The purpose of this article was to demonstrate how to use the color-to-grayscale conversion function of a smart phone camera for value comparison. In addition, this technique can be used for external staining procedures when a subtle difference needs to be adjusted in the clinic.

PROCEDURE

1. Select 2 shade tabs (Vita Toothguide 3D-Master; Vita North America) which are close in value

Figure 1. Comparison of clinical values using color-to-grayscale feature of smart phone camera. Note proposed tooth shade in this patient was maxillary left central incisor in order to achieve shade match with both central incisors.

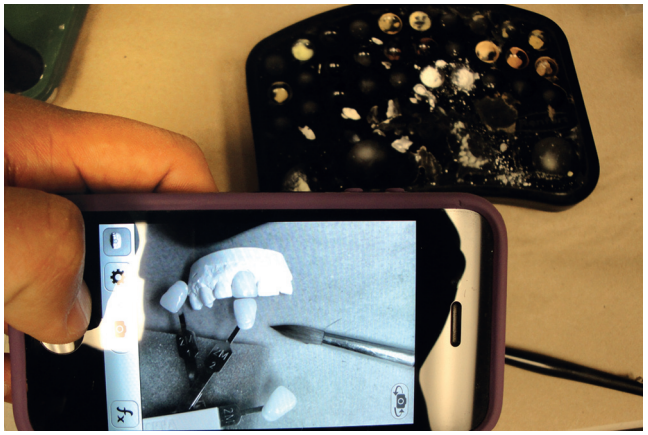

Figure 2. Comparison of laboratory values using color-to-grayscale feature of smart phone camera.

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to the tooth value before the color-to-grayscale conversion.[6]

2. Turn on the smart phone camera (iPhone 4; Apple Inc) and click the camera icon. Select the color conversion feature and click the "Mono" section to perform the color-to-grayscale conversion. With this setting, compare the shade tabs and the proposed tooth shade to select the closest value (Fig. 1). Note that, with other smart phones, the stems will be slightly different.
3. Compare the value of the dental prosthesis and that of the shade tab with the color-to-grayscale conversion function (Fig. 2). Use the color-to-grayscale conversion feature to assist with shade matching with external staining if needed.

REFERENCES

1. Powers JM, Sakaguchi RL. Craig's restorative dental materials. 13th ed. Philadelphia: Elsevier; 2011:55-7.
2. Joiner A. Tooth color: a review of the literature. J Dent 2004;63:3-12.
3. Davison SP, Myslinski NR. Shade selection by color vision-defective dental personnel. J Prosthet Dent 1990;63:97-101.
4. Kanan C, Cottrell GW. Color-to-grayscale: does the method matter in image recognition? PLoS One 2012;7:e29740.
5. Cadik M. Perceptual evaluation of color-to-grayscale image conversions. Pacific Graphics 2008;27:1745-54.
6. Chu SJ, Devigus A, Paravina RD, Mieleszko AJ. Fundamentals of color: shade matching and communication in esthetic dentistry. 2nd ed. Hanover Park: Quintessence Publishing Co; 2011:51-5.

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