Synopsis of Original Research Paper

Mathematical analysis of gradation of natural teeth using a spectral imaging device

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Recently, dental CAD/CAM materials with gradation have been developed and are expected to be used in the aesthetic zone. In clinical practice, it is essential for dental prothesis to match the transparency and color tone of natural teeth in order to achieve good aesthetics. However, there have been no studies that have mathematically evaluated the change in color tone (gradation) of the entire crown of a natural tooth. The aim of this study is to analyze the gradation of natural teeth of L*a*b* values by functionalization. The maxillary right central incisor of 35 adults without a history of dental treatment, caries, and staining were selected as experimental subjects. The L*a*b* values of 30 points from the cervical to the incisal region were calculated using a spectral imaging device, and linear, quadratic, cubic, exponential, and logarithmic functions were approximated for each L*, a*, and b* value. About L* and b* values, the cubic function was the best fit for all subjects. About a* value, the cubic function was the best fit for 29 subjects and the exponential function was the best fit for 6 subjects. In this research, the gradation from the cervical to the incisor region of the maxillary central incisor was mathematically analyzed. The results of this study were considered to be useful for the evaluation of the gradation of natural teeth and for the development of new dental CAD/CAM materials with a gradation similar to that of natural teeth.