

Comparison of the precision of a dental spectrophotometer to an industrial colorimeter.

Rigos¹, M. Kesterke², JH Chen², E. Kontogiorgos³
1. Resident, 2. Assistant Professor, 3. Professor
Texas A&M School of Dentistry, Dallas, TX



TEXAS A&M UNIVERSITY
School of Dentistry

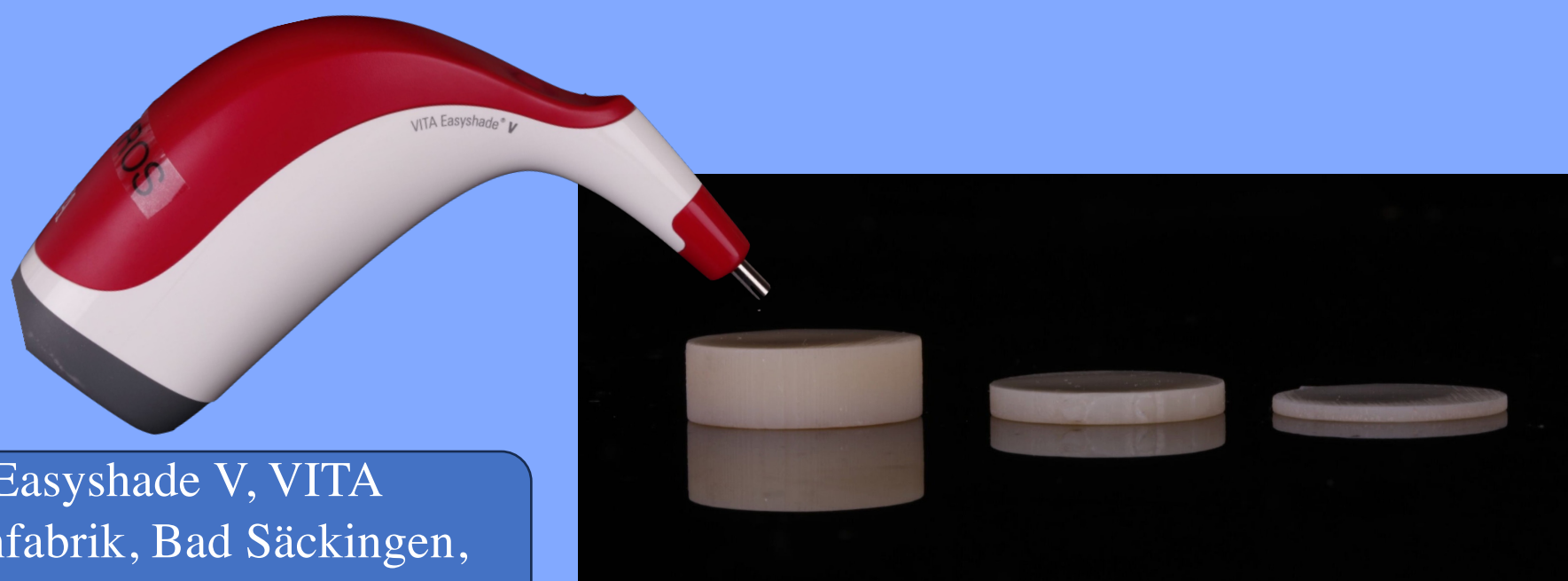


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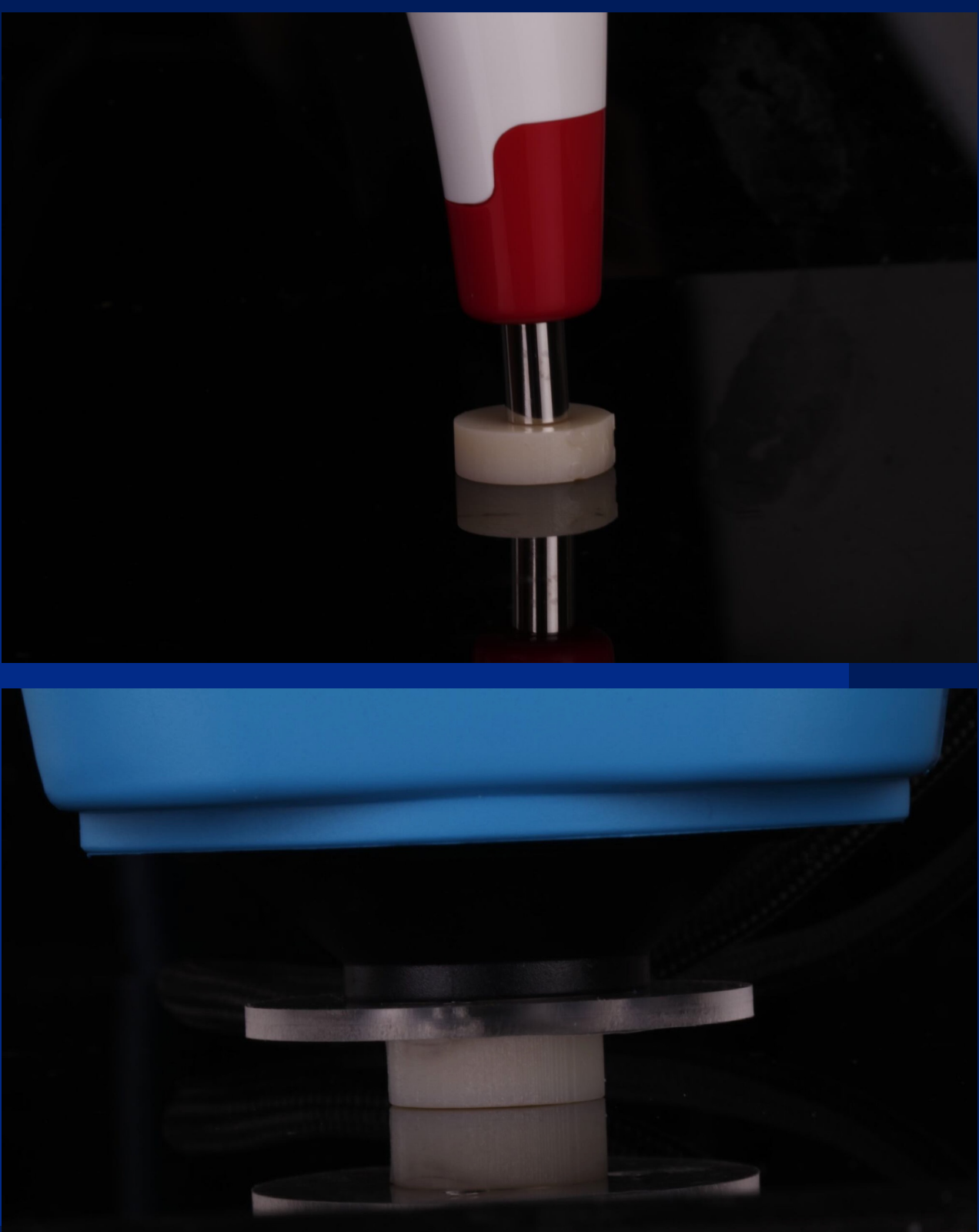
INTRODUCTION

Shade matching is a process of critical importance for esthetic looking restorations. Spectrophotometers and colorimeters are useful instruments that quantify color by measuring the three color components of light. **Spectrophotometers** measure the amount of light that passes through an object, whereas **colorimeters** function by measuring the amount of light absorbed by an object.



METHODS

3D printed resin material discs of there thicknesses (1, 2 and 5mm) with a standardized surface were fabricated (Dentca TM, Torrance, CA, USA). Their L*a*b* color values were measured against a black and a white background (10 measurements). **Intraclass Correlation Coefficient was calculated to compare repeatability/presicion.**



RESULTS

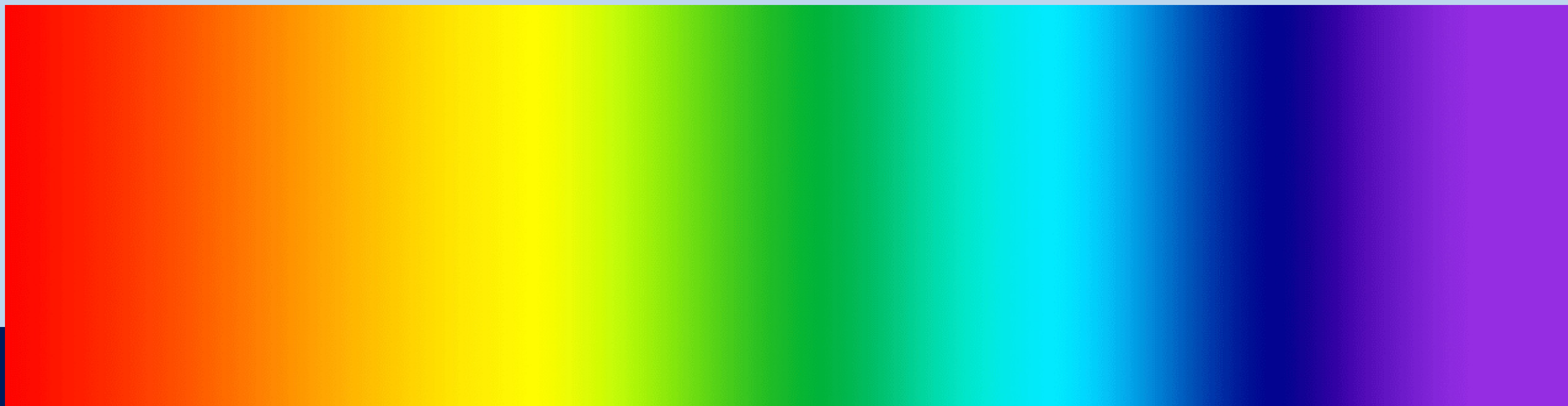
Both instruments were determined to possess acceptable repeatability as the Intraclass Correlation Coefficient was calculated to be over 0.9 for both the Spectrophotometer and the Colorimeter.

Intraclass Correlation Coefficient	MATERIAL THICKNESS					
	5 mm		2 mm		1 mm	
	WHITE	BLACK	WHITE	BLACK	WHITE	BLACK
COLORIMETER	1.000	1.000	1.000	1.000	1.000	1.000
SPECTROPHOTO METER	0.994	0.994	0.999	0.987	0.999	0.999

Generally, when ICC is between 0.81 and 0.99 there is **an almost perfect agreement** in the measurements of an instrument.

DISCUSSION

A previous study found that the color measurements of the same sample are correlated when measured by different instruments, although there are statistical differences between them.¹ In addition, another study found that two different Easyshade V devices, even though they produce highly repeatable measurements, they can yield different values for the same sample.² Different spectrophotometers have been found to present low inter-device agreement.³ Ideally, both instrumental and visual methods should be used for color matching.⁴ The findings of the present study are in agreement with previous studies.



CONCLUSION

In conclusion, within the limitations of this study, both devices can be precisely used for the quality control of the shade of dental restorative materials. **The use of the more economical colorimeter cannot be excluded as an alternative solution.**



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