

Poster Presentation - Research Supported by P&G

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273 Inter-operator Tooth Color Measurement in Twins using Digital Imaging

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Objectives: This research evaluated the inter-operator measurement reproducibility in twins using a digital imaging system to measure tooth color. **Methods:** Two operators (experienced and naive) collected tooth color from 9 sets of healthy twins on a single day. Images were captured under fixed polarized lighting conditions using a high resolution digital camera (JVC CCD) with a zoom lens using a standard method. For each image, maxillary anterior tooth pixels were classified and counted, and average L*a*b* tooth colors were derived using standard formulas. Intra-class correlations (ICC) and 95% lower confidence bounds (LCB) were calculated using a 0-to-1 scale, where 0 represented no agreement and 1 represented perfect agreement. **Results:** The 18 subjects ranged from 16-28 years of age, and all image pairs were included in the analyses. Inter-operator tooth pixel count, a measure of alignment, differed by 0.32%. For color, the experienced operator had means (SD) of 15.51 (1.81) for b*, 74.49 (1.83) for L* and 4.42 (0.76) for a*. The naive operator exhibited appreciable reproducibility, with means (SD) of 15.51 (1.76), 74.46 (1.80) and 4.41 (0.74) for b*, L* and a*, respectively. The inter-operator pixel count ICC (95% LCB) was 0.93 (0.86). For color, the ICC (95% LCB) was 0.99 (0.98) for b* yellowness, 0.98 (0.97) for L* lightness, and 0.99 (0.97) for a*. Adjusting for differences due to gender and age, between-family variance for L*a*b* tooth color accounted for 60.5% to 92.0% of the variability, within-family variance accounted for 7.3% to 38% of the variability and 0.7% to 1.7% was residual or unexplained variance. **Conclusions: This research demonstrates digital image analysis yields highly reproducible clinical measurement of tooth color between systems operators.**

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325 Comparison of Overnight and Daytime Plaque using Digital Image Analysis

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Objectives: Digital plaque image analysis was used to instrumentally compare the levels of overnight and daytime plaque area coverage observed during routine use of a regular anticavity toothpaste and standard manual brush. **Methods:** After IRB approval and informed consent, overnight plaque was measured, subjects brushed once normally, and then daytime plaque accumulation was later measured after normal diet and daytime activity. For measurement, subjects rinsed with 5 mL of a 1240 ppm fluorescein rinse and expectorated. Immediately thereafter, cheek retractors were inserted, and a digital image was collected under standardized lighting conditions. Subjects were provided a regular anticavity dentifrice (Crest® Cavity Protection) and standard manual toothbrush. Image analysis was used to objectively measure fluorescein-disclosed overnight plaque and throughout the day on the anterior facial tooth surfaces with additional measurements over a 3 week period. A repeated measures model was used to combine measurements amongst weeks and to compare overnight and daytime plaque levels. **Results:** The study population (N=21) ranged from 25-83 years of age, with females comprising 65% of participants. Estimated mean (SE) percent area coverage was 18.6 (2.01) for overnight plaque and 16.3 (1.81) for daytime plaque. Percent area coverage was significantly ($p<0.002$) higher on average for overnight plaque relative to daytime. Plaque area coverage was highly correlated from week to week ($r=0.87$), and there was no interaction ($p=0.42$) between time of day and week. **Conclusions: Overnight and daytime plaque area coverage is highly correlated, and while overnight (undisturbed) plaque levels are generally higher, daytime plaque accumulation is appreciable after routine oral hygiene with a standard manual toothbrush and regular toothpaste.**