



A 3D Intraoral Scanner Prototype Used for Caries Detection

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A 3D Intraoral Scanner Prototype Used for Caries Detection

Objectives: This study aimed to assess the *in vitro* performance of a 3D intraoral scanner prototype to detect occlusal caries lesions compared to DIAGNOdent and histological analysis as reference test.

Methods: Freshly extracted permanent posterior teeth (n = 34) were assessed visually and 151 sites (79 carious, 72 sound) on the occlusal surfaces were chosen for examination. The teeth were scanned with an intraoral scanner (prototype based on 3Shape TRIOS intraoral scanner, not commercially available) which emits blue light. A texture representing the fluorescent signal from the tissue was mapped onto the 3D models using specific software. Red (R) and Green (G) color components from the selected sites on the teeth were used to calculate a caries classification function $f(R, G)$. Measurements using DIAGNOdent pen 2190 (KaVo Dental, Germany) were taken on the same selected sites. Histological analysis was conducted independently for each site by applying the following scale: D0, sound; D1, enamel lesion; D2, lesion into 1/3 of dentin; D3, lesion into 2/3 of dentin; D4, lesion into 3/3 of dentin. Sensitivity (SE), Specificity (SP) and area under the ROC curve (Az) were assessed for the different histological levels. For the intraoral scanner system, the optimal cut-off values were used, while for DIAGNOdent, the cut-off values suggested by the manufacturer.

Results: The intraoral scanner system showed SE, SP above 0.73 and Az > 0.85 for the histological levels D1 – D3. DIAGNOdent resulted in similar values for levels D1 and D2; level D3 was not assessed as no cut-off for this histological level was provided by the manufacturer. No SE, SP and Az were calculated for D4 level due to a limited number of lesions.

Conclusions: In conclusion, the two methods showed comparable *in vitro* performance with high SE, SP and Az measures for detection of caries lesions at different stages. Further studies with larger sample size, in particular for dentin lesions, are needed to establish and validate definite cut-offs for the intraoral scanner system.

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SESSION INFORMATION

Oral Session

Keynote Address; Detection, Risk Assessment & Others I

Saturday, 06/22/2019 , 08:00AM - 09:30AM