International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2003, Vol 5 No 03, Poster 184

Detection of Smooth Surface Lesions by QLF and Visual Inspection - An in vivo Comparison

Language: English

Authors:
Prof Dr. Roswitha Heinrich-Weltzien, Dr. Jan Kühnisch, Susanne Ifland, Prof. Dr. Dr. Lutz Stößer
Poliklinik für Präventive Zahnheilkunde, ZZMK, Friedrich-Schiller Universität Jena;
PhD Sofia Tranæus
Department of Cariology and Endodontology, Institute of Odontology, Karolinska Institutet, Stockholm;
PhD Monique van der Veen
Department of Cariology Endodontology Pedodontology, ACTA, Amsterdam, The Netherlands.

Date/Event/Venue:
03.-06.07.2002
49th Congress of the European Organisation of Caries Research (ORCA)
Naantali, Finland

Objectives

Evaluation of the detection of smooth surface lesions by the Quantitative Light-induced Fluorescence (QLF) method in comparison with visual inspection (VI)

Fig. 1:
Initial carious lesions on smooth surfaces - clinical situation

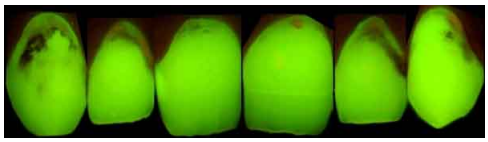


Fig. 2:
Initial carious lesions on smooth surfaces - QLF image

Material and Methods

- 34 fifteen-year-old adolescents were involved in the study.
- Visual examination of 918 buccal and 917 lingual surfaces with aid of compressed air and magnifying glass (3.5x) after professional tooth-cleaning.
- Capturing of fluorescence images of all smooth surfaces by a QLF\\clin.
- Images were stored and analysed with an Inspektor QLF 2.00 programmes.

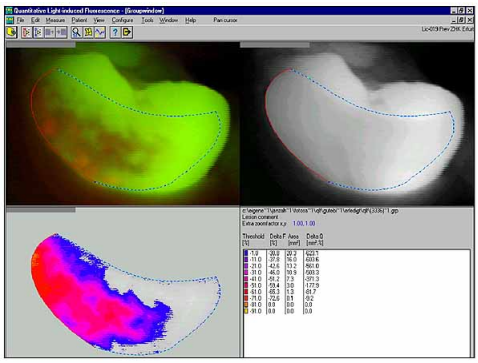


Fig. 3:
Area of enamel lesions detected by QLF and VI

- QLF images were analysed blind by two examiners, presence or absence of a lesion was not marked on the fluorescence images.
- Determination of fluorescence loss (DeltaF) and area (A) of the lesion (mm2) and DeltaQ (DeltaF x A).
- Surfaces scored as sound, filled or with frank lesions by both methods were excluded.
- Mann-Whitney U-test was used for statistical analysis; the confidence interval of 95% was chosen.

Results

1. Table 1 presents the findings of the caries status of 1835 smooth surfaces assessed in the 15-year-olds with a caries experience of 7.7+5.8 D3-4MFS.

Table 1: Caries status of smooth surfaces

	Sound	D_{1-2}	$D_{3-4}F$	Total
Buccal	527	352	39	918
Lingual	745	137	35	917
Total	1272	489	74	1835

2. 17.8% of the buccal/lingual enamel lesions were detected by VI, 53.8% by VI/QLF and 28.4% by QLF, respectively. (Table 2).

Table 2: Diagnostic outcome of detection of smooth surfaces lesion by QLF and VI

	Visual	Visual + QLF	QLF	Total
Bukkal	76	213 (61%)	63	352
Lingual	11	50 (37%)	76	137
Total	87 (17,8%)	263 (53,8%)	139 (28,4%)	489

3. The parameters A, delta-F and delta-Q between smooth surface lesions recorded by both VI/QLF, and QLF only were significantly different.

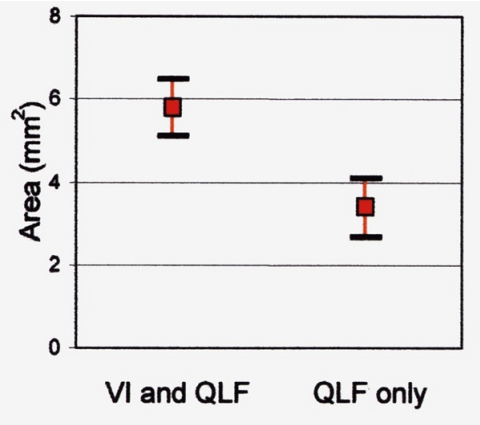


Fig. 4a:
Fluorescence loss of enamel lesions detected by QLF and VI

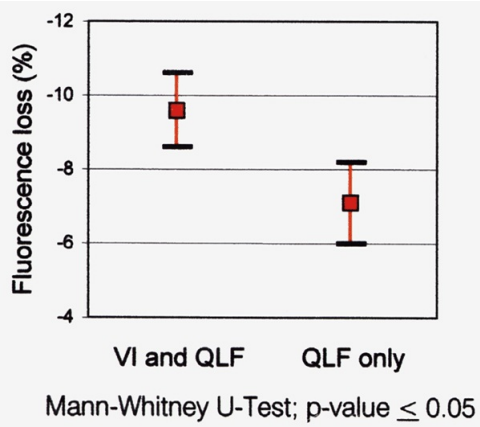


Fig. 4b:
Fluorescence loss of enamel lesions detected by QLF and VI

4. QLF was able to detect smaller enamel lesions with smaller fluorescence loss than lesions recorded by VI/QLF together.

5. Lesion detection by QLF was limited in cases of partially erupted and plaque covered surfaces, and in patients with poor oral hygiene associated with reduced surface size caused by gingivitis (Table 3). Small focal depth on lingual surfaces was a further confounding factor.

Table 3: Only visual detected enamel lesions

QLF-images	N	%
Plaque covered surface	20	23,0
Image out of focus	14	16,1
Image very bright	9	10,3
Gingivitis	44	50,6
Total	87	100

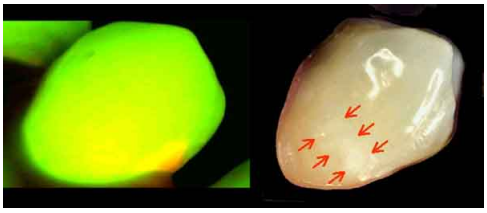


Fig. 5:
Initial carious lesion detected by QLF.

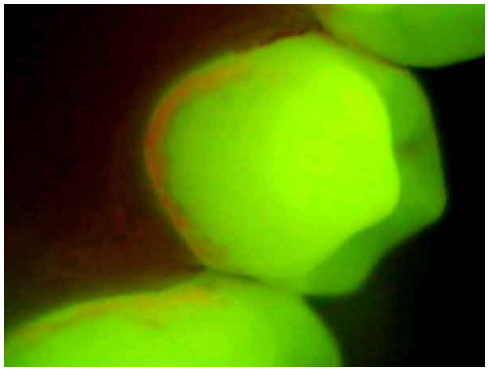


Fig. 6:
Plaque covered initial carious lesion.

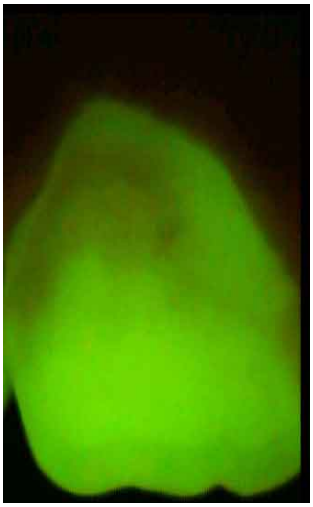


Fig. 7:
Baseline

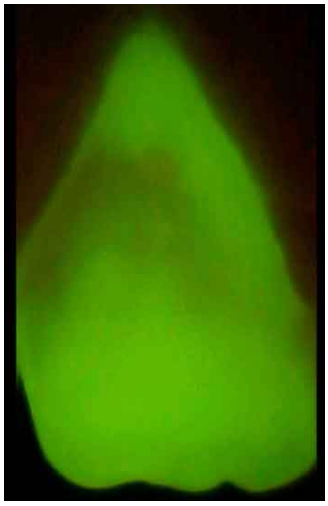


Fig. 8:
Alter 2 Month

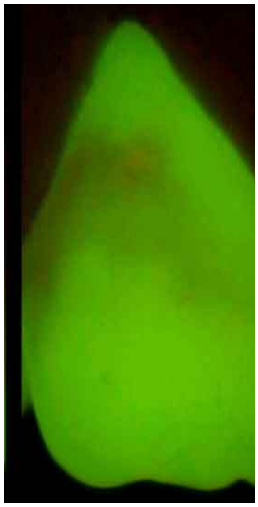


Fig. 9:
Alter 4 Month

Reduction of Ggingivitis in follow of preventive intervention measures.

Conclusions

QLF is a sensitive method for quantification of visual undetected incipient caries lesions. Confounding factors like gingivitis, plaque and the eruption stage of a tooth may obscure lesion detection and should be controlled.

This Poster was submitted by Prof. Dr. Roswitha Heinrich-Weltzien.

Correspondence address:
Prof. Dr. Roswitha Heinrich-Weltzien
Poliklinik für Präventive Zahnheilkunde
Friedrich-Schiller Universität Jena
Nordhäuserstr. 74
99089 Erfurt
Germany

Poster Faksimile:

Detection of Smooth Surface Lesions by QLF and Visual Inspection - An in vivo Comparison

55

R. Heinrich-Weltzien[a*], J. Kühnisch[a], S. Ifland[a], S. Tranæus[b], M. van der Veen[c], L. Stößer[a]

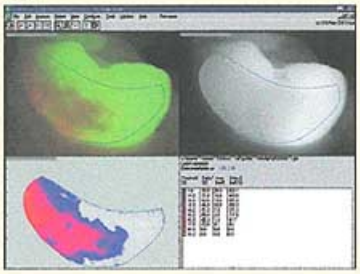
[a]Department of Preventive Dentistry, University of Jena, Germany,
[b]Department of Cariology and Endodontology, Institute of Odontology, Karolinska Institutet, Stockholm, Sweden,
[c]Department of Cariology Endodontology Pedodontology, ACTA, Amsterdam, The Netherlands

AIM

Evaluation of the detection of smooth surface lesions by the Quantitative Light-Induced Fluorescence (QLF) method in comparison with visual inspection (VI)

MATERIAL AND METHODS

- 34 fifteen-year-old adolescents were involved in the study
- Visual examination of 918 buccal and 917 lingual surfaces with aid of compressed air and magnifying glass (3.5x) after professional tooth-cleaning
- Capturing of fluorescence images of all smooth surfaces by a QLFIclin.
- Images were stored and analysed with an Inspektor QLF 2.00 programmes



- QLF images were analysed blind by two examiners, presence or absence of a lesion was not marked on the fluorescence images.
- Determination of fluorescence loss (ΔF) and area (A) of the lesion (mm²) and ΔQ (ΔF * A).
- Surfaces scored as sound, filled or with frank lesions by both methods were excluded.
- Mann-Whitney U-test was used for statistical analysis; the confidence interval of 95% was chosen.

RESULTS

1. Table 1 presents the findings of the caries status of 1835 smooth surfaces assessed in the 15-year-olds with a caries experience of 7.7+5.8 $D_{3-4}MFS$.
2. 17.8% of the buccal/lingual enamel lesions were detected by VI, 53.8% by VI/QLF and 28.4% by QLF, respectively. (Table 2).

Table 1: Caries status of smooth surfaces

	Sound	D_{1-2}	$D_{3-4}F$	Total
Buccal	527	352	39	918
Lingual	745	137	35	917
Total	1272	489	74	1835

Table 2: Diagnostic outcome of detection of smooth surfaces lesion by QLF and VI

	Visual	Visual + QLF	QLF	Total
Buccal	76	213 (61%)	63	352
Lingual	11	50 (37%)	76	137
Total	87 (17.8%)	263 (53.8%)	139 (28.4%)	489

3. The parameters A, ΔF and ΔQ between smooth surface lesions recorded by both VI/QLF, and QLF only were significantly different (Figure 1).

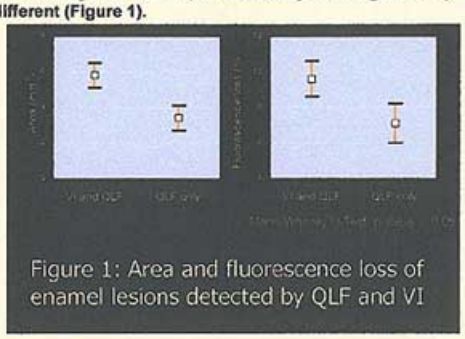
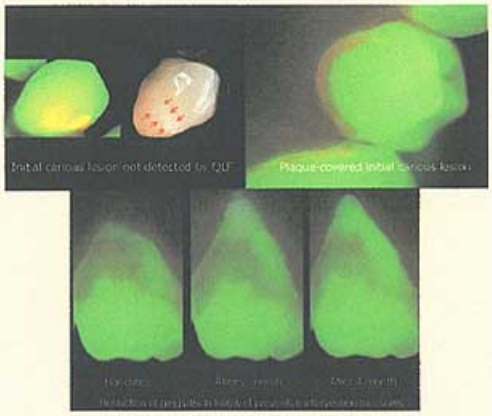


Figure 1: Area and fluorescence loss of enamel lesions detected by QLF and VI

4. QLF was able to detect smaller enamel lesions with smaller fluorescence loss than lesions recorded by VI/QLF together.
5. Lesion detection by QLF was limited in cases of partially erupted and plaque covered surfaces, and in patients with poor oral hygiene associated with reduced surface size caused by gingivitis (Table 3). Small focal depth on lingual surfaces was a further confounding factor.

Table 3: Only visual detected enamel lesions

QLF-images	N	%
Plaque-covered surface	20	22.0
Image out of focus	14	16.1
Image very bright	9	10.3
Gingivitis	44	50.6
	87	100.0



CONCLUSION

QLF is a sensitive method for quantification of visual undetected incipient caries lesions.

Confounding factors like gingivitis, plaque and the eruption stage of a tooth may obscure lesion detection and should be controlled.