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# Accuracy of a chair-side test for predicting caries risk compared with established methods

## A pilot study

Key words: caries-risk assessment, follow-up study, children, lactic-acid production

**Summary** Purpose: The aim of this study was to determine the prognostic accuracy of a new chair-side test, determination of lactic-acid production on the tongue, for caries-risk assessment according to caries increment within two years.

Methods: 35 children (6–8 years old) participated in the study. The past caries experience (df-$t_1$, DF-$T_1$), caries at second deciduous molars (df-2.mol), approximal plaque index (API) were the clinical, and salivary counts of mutans streptococci (MS)/lactobacilli (LB) and lactic-acid production on the tongue (LAP) the subclinical predictors recorded at baseline. Two years later, the dental examination was repeated (df-$t_2$/DF-$T_2$). According to the increase in DF-T (ΔDF-T), caries-risk groups (ΔDF-T = 0 versus ΔDF-T ⩾ 0) were built. To assess the prognostic accuracy sensitivity and specificity were calculated. Statistical analysis was performed using Spearman's test for nonparametric correlations.

Results: The DF-T increased from $0.3 \pm 0.8$ to $1.2 \pm 1.6$. 20 children were in the no-caries-risk and 15 in the caries-risk group. The p-value for the correlation of ΔDF-T to API was 0.007 and to LB counts 0.069. The highest sensitivity and specificity levels were found for LB (65%/70%), LAP reached a maximum sensitivity of 33% with a specificity of 55%.

Conclusion: According to the results, because of its insufficient prognostic accuracy the LAP test is not suitable as a sole screening-tool for an accurate caries-risk assessment.

## Introduction

Various clinical and subclinical parameters play an important role in the development of caries lesions, and they have been applied in the caries-risk assessment in children. Variables like the number of decayed, missing and filled teeth/surfaces in primary and permanent dentitions, caries in primary molars and in the fissures of permanent first molars as well as pre-cavity lesions on permanent molars are simple clinical predictors of the future caries activity (Steiner et al. 1992, van Palenstein Helderman et al. 2001b, Leroy et al. 2005a, Motohashi et al. 2006, Zhang & van Palenstein Helderman 2006, Skeie et al. 2006). Behavioural host factors like oral hygiene and dietary habits, especially the frequency of intake of cariogenic food and beverages but also the lack of fluoride supplements were also verified as risk factors in susceptible children (Vanobbergen et al. 2001, Marshall et al. 2003, Leroy et al. 2005b). As the subclinical indicators of caries risk, various salivary properties and the microbiological, organic and inorganic composition of saliva and plaque were determined (Loesche et al. 1975, Zoitopoulos et al. 1997, Vehkalahti et al. 1996, Brambilla et al. 1999, Gábris et al. 1999, Nishikawara et al. 2006).

After demonstration of the implication of lactic-acid producing bacteria, mainly mutans streptococci and lactobacilli in caries initiation and progression, the relation of the numbers of these bacteria in saliva and in plaque to caries prevalence and increment was verified (Loesche et al. 1975, Sullivan et al. 1996, Zoitopoulos et al. 1997, Brambilla et al. 1999, Campus

ET AL. 2000, VAN PALENSTEIN HELDERMAN ET AL. 2001a). Thus, for caries-risk assessment, the quantitative detection of mutans streptococci and lactobacilli in saliva was applied using simplified chair-side techniques (KÖHLER & BRATTHALL 1979, JENSEN & BRATTHALL 1989, DAVENPORT ET AL. 1992, SPLIETH & BERNHARDT 1999, PINELLI ET AL. 2001). Not only have different genotypes and virulence factors been detected in *Streptococcus mutans* in plaque and saliva of caries-free and -active individuals (NAPIMOGA ET AL. 2004), but there are also local variations in the prevalence of cariogenic species, and non-mutans streptococci as well as other acidogenic bacteria can cause a pH-drop (BABAAHMADY ET AL. 1998, SEKI ET AL. 2006). Thus, the sensitivities of the chair-side tests detecting mutans streptococci and lactobacilli were in most of the cases lower than their specificities, identifying more accurately persons with low caries risk (SULLIVAN & SCHRÖDER 1989, VEHKALAHTI ET AL. 1996, SPLIETH & BERNHARDT 1999, LLENA-PUY ET AL. 2000, PINELLI ET AL. 2001).

A new chair-side test was developed (Clinpro Cario™ L-Pop™, 3M Espe, Seefeld, Germany) to determine the individual caries risk by measuring the lactic-acid production on the tongue as an indicator for metabolic activity of cariogenic bacteria. For the sampling of the saliva, the tongue dorsum was chosen, as a positive relationship between *S. mutans* on the tooth and tongue surfaces was found in young children with high caries activity (TANNER ET AL. 2002). However, in a previous study (AZRAK ET AL. 2008) the authors found only minimal correlations by comparison of the results of this new method with established clinical and subclinical methods of caries-risk assessment in children. The aim of this pilot study was to assess the prognostic accuracy of this new chair-side test for caries-risk assessment according to caries increment within two years in a group of the children, which participated in the first study, and to compare its prognostic accuracy with those of the established clinical and subclinical predictors.

## Materials and Methods

Originally, a group of children (6 to 10 years old) with good general health and without medication during the last three months, attending a primary school, participating regularly in preventive programs offered at the university dental clinic, were examined using different parameters of caries-risk assessment (AZRAK ET AL. 2008). Two years later, 35 of these children (16 girls, 19 boys) who were 6 to 8 years old at baseline and still attended the same primary school, were included in this pilot study for a follow-up examination. The subjects showed no enamel or dentinal disorders. Written informed consent was obtained from the parents of the children.

The baseline data collection for clinical and subclinical caries-risk predictors was described previously (AZRAK ET AL. 2008). As clinical caries-risk predictors, the past caries experience [number of carious and filled teeth in primary (df-$t_1$) and permanent dentition (DF-$T_1$), caries at second deciduous molars (df-*2*.mol), and caries prevalence in mixed dentition ($\Sigma_1$df-t/DF-T)] were selected. The approximal plaque index (API) was determined with a disclosing solution (Plaviso®, Voco, Germany) and was used for the quantitative evaluation of the oral hygiene.

As subclinical predictors, the counts of mutans streptococci (MS) and lactobacilli (LB) in stimulated saliva were chosen (CRT bacteria, Ivoclar Vivadent, Ellwangen, Germany; MS/LB value 1: no bacterial growth, MS/LB value 2: bacterial counts $\leq 10^5$ CFU/ml; MS/LB value 3: bacterial counts: $>10^5$ CFU/ml). The buffering capacity of saliva was omitted from the present study as caries-risk predictor, since no statistically significant difference ($p=0.2229$) between the caries risk groups was found in the previous study.

The children were assigned to three caries-risk groups according to the lactic-acid production on the tongue (Clinpro Cario™ L-Pop™, 3M Espe, Seefeld, Germany): scores 1–3 for low caries risk (LAP 1), 4–6 for moderate caries risk (LAP 2), 7–9 for high caries risk (LAP 3).

Two years later, the dental examination of the 35 children was repeated by the same experienced examiner to determine caries increment. The caries prevalence in the primary (df-$t_2$) and permanent teeth (DF-$T_2$, $\Sigma_2$df-DF-T) was recorded again. Two study groups were built according to the changes in DF-T levels of the children within the past two years ($\Delta$DF-T). Children without a change in DF-T levels ($\Delta$DF-T=0) were assigned to the group "no caries risk" (n-CR), and subjects with an increase in DF-T after two years ($\Delta$DF-T>0) to the group "caries risk" (CR).

For the assessment of the prognostic values (sensitivity and specificity) of various caries-risk predictors used in the study, contingency tables were constructed. Therefore, it was necessary to arrange two risk groups also for the predictors with previously three attributes (API, MS/LB and LAP). Children with an API level $\leq 35\%$ were grouped as low and children with an API level $>35\%$ as high caries-risk. Also for the bacterial counts, two groups were built: children with bacterial counts $\leq 10^5$ CFU/ml were in the low risk, with bacterial counts $>10^5$ CFU/ml were in the high risk group.

For the evaluation of the results of LAP, two different possible combinations were considered. First, the low (LAP 1) and moderate (LAP 2) caries-risk groups were combined as low risk group (LAP 1–6). In the second combination, the moderate (LAP 2) and high (LAP 3) risk groups were combined as high risk group (LAP 4–9).

The statistical evaluation of the data was performed using the SPSS program. Chi-square test was used to compare the findings between the risk groups. The correlations between the caries-risk predictors were analyzed using the Spearman's test for nonparametric correlations. The significance level was set at $p<0.05$.

## Results

At baseline, the 35 children (mean age: 7.6±0.7) had a mean df-$t_1$ of 1.7±3.0 and a mean DF-$T_1$ of 0.3±0.8. The mean number of second molars in the deciduous dentition with dental decay or filling was 0.8±1.3 (df-*2*.mol). 19 children (54%) had a $\Sigma_1$df/DF-T of zero and none of the children had any filled permanent teeth. After two years, the mean df-$t_2$ decreased to 1.4±2.4 due to exfoliation or extractions, and the mean DF-$T_2$ increased to 1.2±1.6. A $\Sigma_2$df/DF-T of zero was recorded in 10 children (29%).

In 20 children (10 girls, 10 boys; $\Delta$DF-T=0) the caries prevalence in the permanent dentition did not change; these children were in the n-CR group. All these children had a good oral hygiene (API $\leq 35\%$). An increase in DF-T was observed in 15 children (6 girls, 9 boys; $\Delta$DF-T>0); these subjects were assigned to the CR group. In this group, 10 children showed a good (API $\leq 35\%$), 3 children a moderate ($35\% < \text{API} \leq 70\%$) and 2 children an insufficient oral hygiene (API>70%).

At baseline the mean df-$t_1$, $\Sigma_1$df/DF-T and API levels of the children in n-CR and CR groups differed statistically significantly ($p<0.05$) (Tab. I). The salivary counts of LB did not differ statistically significantly between the two groups, but the p-value was 0.077. A statistically significant positive correlation was only observed between $\Delta$DF-T and API scores ($p<0.05$); the

**Tab. I The mean values of clinical and subclinical caries-risk parameters in caries-risk groups n-CR (no caries risk; ΔDF-T=0) and CR (caries risk; ΔDF-T>0) at the baseline examination/after two years and the p-values for the differences.**

| Time of examination | Parameter | CR (n=15) | n-CR (n=20) | *p-value* |
|---|---|---|---|---|
| Baseline | $DF\text{-}T_1$ | 0.3±1.0 | 0.2±0.4 | *0.624* |
| | $df\text{-}t_1$ | 2.4±3.5 | 1.3±2.6 | *0.047** |
| | $\Sigma_1$df-t/DF-T | 2.7±4.1 | 1.5±2.6 | *0.029** |
| | df-2.mol | 1.0±1.4 | 0.6±1.2 | *0.196* |
| | API | 40.5±15.8% | 32.0±10.5% | *0.021** |
| | MS | 2.5±0.8 | 2.1±0.7 | *0.191* |
| | LB | 2.6±0.6 | 2.1±0.6 | *0.077* |
| | LAP | 3.4±1.8 | 3.9±2.4 | *0.507* |
| After two years | $D\text{-}T_2$ | 1.5±1.9 | 0 | *0.000** |
| | $F\text{-}T_2$ | 1.0±1.1 | 0.2±0.5 | *0.016** |
| | $df\text{-}t_2$ | 2.3±3.1 | 0.7±1.2 | *0.000** |
| | $\Sigma_2$df-t/DF-T | 4.9±3.2 | 0.9±1.2 | *0.000** |

D-T=number of carious teeth, F-T=number of fillings, df-t/DF-T=number of carious and filled teeth in deciduous/permanent dentition, df-2.mol=number of carious second deciduous molars, $\Sigma_1$df-t/DF-T/$\Sigma_2$df-t/DF-T=number of carious and filled teeth in deciduous and permanent dentition at baseline/after two years, API=approximal plaque index, MS=counts of mutans streptococci in saliva, LB=counts of lactobacilli in saliva, LAP=lactic-acid production on the tongue, scores 1–9
* $p<0.05$, statistically significant Chi square test

**Tab. II p-values for correlations between the ΔDF-T and the parameters measured at baseline; all correlations were positive.**

| Parameters | baseline | *p-values* |
|---|---|---|
| ΔDF-T | $DF\text{-}T_1$ | *0.678* |
| | $df\text{-}t_1$ | *0.613* |
| | df-2.mol | *0.564* |
| | $\Sigma_1$df-t/DF-T | *0.542* |
| | API | *0.007** |
| | MS | *0.163* |
| | LB | *0.069* |
| | LAP | *0.826* |

ΔDF-T=caries increment within two years, df-t/DF-T=number of carious and filled teeth in deciduous/permanent dentition, df-2.mol=number of carious second deciduous molars, API=approximal plaque index, MS=counts of mutans streptococci in saliva, LB=counts of lactobacilli in saliva, LAP=lactic-acid production on the tongue
* $p<0.05$, statistically significant

**Tab. IV Contingency tables for clinical caries-risk predictors using the caries-risk groups (n-CR=no caries risk; ΔDF-T=0 and CR=caries risk; ΔDF-T >0).**

| Predictor | CR (n=15) | n-CR (n=20) |
|---|---|---|
| API <35% | 10 (67%) | 20 (100%)* |
| API ≥35% | 5 (33%)# | 0 (0%) |
| $df\text{-}t_1=0$ | 8 (53%) | 12 (60%)* |
| $df\text{-}t_1>0$ | 7 (47%)# | 8 (40%) |
| $DF\text{-}T_1=0$ | 13 (86%) | 17 (85%)* |
| $DF\text{-}T_1>0$ | 2 (14%)# | 3 (15%) |
| df-2.mol =0 | 9 (60%) | 13 (65%) |
| df-2.mol >0 | 6 (40%) | 7 (35%) |

# True positive caries risk, correctly identified by the caries-risk predictor (sensitivity)
* True negative caries risk, correctly identified by the caries-risk predictor (specificity)
API=approximal plaque index, df-t/DF-T=number of carious and filled teeth in deciduous/permanent dentition, df-2.mol=number of carious second deciduous molars

**Tab. III Spearman correlation coefficients (Rho) and p-values for significant correlations between the parameters measured; all correlations were positive.**

| Parameter | | Rho | *p-values* |
|---|---|---|---|
| MS | LB | 0.592 | *0.000** |
| LB | API | 0.388 | *0.023** |
| $df\text{-}t_1$ | API | 0.345 | *0.042** |
| $\Sigma_1$df-t/DF-T | API | 0.572 | *0.000** |
| $DF\text{-}T_2$ | API | 0.409 | *0.015** |
| $DF\text{-}T_2$ | LB | 0.337 | *0.051* |
| $\Sigma_2$df-t/DF-T | LB | 0.395 | *0.021** |
| $\Sigma_2$df-t/DF-T | MS | 0.321 | *0.064* |
| $\Sigma_2$df-t/DF-T | API | 0.677 | *0.000** |

MS=counts of mutans streptococci in saliva, LB=counts of lactobacilli in saliva, API=approximal plaque index, df-t/DF-T=number of carious and filled teeth in deciduous/permanent dentition
* $p<0.05$, statistically significant

correlation of ΔDF-T to the salivary counts of LB at the baseline had a p-value of 0.069 (Tab. II). The API levels were correlated statistically significantly with the $df\text{-}t_1$, $DF\text{-}T_2$ and the salivary counts of LB ($p<0.05$) (Tab. III). The p-value of the correlation of $DF\text{-}T_2$ with the salivary counts of LB was 0.051. The positive correlation between the salivary counts of MS and LB was statistically highly significant ($p<0.001$).

The contingency tables created with the clinical predictors and risk groups demonstrated for API scores and $DF\text{-}T_1$ specificity levels of 100% and 85%, but API was able to identify correctly only 33% and DF-T1 14% of children with caries risk (sensitivity) (Tab. IV). The caries prevalence of the second deciduous molars and of the primary dentition identified 40% (df-*2*.mol)/47% ($df\text{-}t_1$) of the subjects correctly as children with caries risk (sensitivity) with specificity levels of 65% (df-*2*.mol)/60% ($df\text{-}t_1$). Using the subclinical predictors, the salivary counts of MS and LB, 60% (MS) and 67% (LB) of the children with caries risk (sensitivity) and 65% (MS) and 70% (LB) of the children without caries risk (specificity) were identified correctly (Tab. V).

Tab. V Contingency table for subclinical caries-risk predictors and lactic-acid production on the tongue dorsum using the caries-risk groups (n-CR=no caries risk; ΔDF-T=0 and CR=caries risk; ΔDF-T >0).

| Predictor | CR (n=15) | n-CR (n=20) |
|---|---|---|
| MS ≤ $10^5$ CFU/ml | 6 (40%) | 13 (65%)* |
| MS > $10^5$ CFU/ml | 9 (60%)# | 7 (35%) |
| LB ≤ $10^5$ CFU/ml | 5 (33%) | 14 (70%)* |
| LB > $10^5$ CFU/ml | 10 (65%)# | 6 (30%) |
| LAP (1–6) | 14 (93%) | 15 (75%)* |
| LAP (7–9) | 1 (7%)# | 5 (25%) |
| LAP (1–3) | 10 (67%) | 11 (55%)* |
| LAP (4–9) | 5 (33%)# | 9 (45%) |

# True positive caries risk, correctly identified by the caries-risk predictor (sensitivity)
* True negative caries risk, correctly identified by the caries-risk predictor (specificity)
MS=counts of mutans streptococci in saliva, LB=counts of lactobacilli in saliva, LAP=lactic-acid production on the tongue

When combining low (LAP 1) and moderate risk groups (LAP 2), 75% of the children were correctly identified as subjects without caries risk, but only 7% as children with caries risk (Tab. V). When combining the moderate (LAP 2) and high (LAP 3) risk groups, 55% of the children were correctly identified as subjects without caries risk, and the percentage of children correctly identified as belonging to the caries-risk group increased to 33%.

## Discussion

For the present study, the increase in caries prevalence of the permanent dentition within two years was chosen for determination of the caries risk in children. Although the development of only one lesion within two years is not necessarily an indicator of high caries risk, the occurrence of dental decay in a newly erupted tooth is a clear sign for future caries development.

Numerous investigations demonstrated a significant impact of caries experience in the primary dentition, especially in the second deciduous molars, on the caries incidence in the permanent dentition (Hänsel Petersson et al. 2002, Li & Wang 2002, Leroy et al. 2005a, Zhang & Van Palenstein Helderman 2006, Skeie et al. 2006). However, in the present study the caries increment in the permanent dentition within two years did not correlate with the caries prevalence in both dentitions and also not with the number of affected second deciduous molars at baseline. This lack of correlation in the present pilot study might be explained by the fact that caries was detected visually, without differentiating cavitation levels and considering the location and number of affected surfaces, and also by the low number of subjects. Despite these missing correlations, the df-$t_1$ and $\Sigma_1$df/DF-T values differed statistically significantly between the study groups.

The oral hygiene, determined by means of the API, was the only clinical predictor in the present study, which had a positive, statistically significant correlation with ΔDF-T and with the caries prevalence in the permanent dentition after two years. Leroy et al. (2005a/b) showed that not only plaque indices but also the self-reported oral hygiene habits were relevant factors for cavity formation in the first permanent molars. Vanobbergen et al. (2001) verified also the relevancy of the occlusal and buccal plaque indices in predicting the caries increment. An association between high caries prevalence in the deciduous molars and poor oral hygiene and rate of cavity formation in permanent first molars was demonstrated (Leroy et al. 2005a). No peak in cavity formation in permanent molars was found in the presence of good oral hygiene. Therefore, also the good oral hygiene of the children in this pilot study, which was dominant even in the caries-risk group, can be the reason for the missing correlations between the past caries experience and caries risk.

The counts of MS and LB in stimulated saliva in the present study correlated significantly with each other, as expected (Beighton et al. 1996, Brambilla et al. 1999). Contrary to findings by Beighton et al. (1996) and Brambilla et al. (1999), the salivary levels of both cariogenic bacteria were not correlated with the caries prevalence at baseline. However, the correlation of salivary LB counts with caries prevalence of the mixed dentition ($\Sigma_2$df/DF-T) after two years was statistically significant ($p<0.05$), and with the final caries prevalence of the permanent dentition (DF-$T_2$) marginally significant ($p=0.051$). The salivary counts of MS was correlated only marginally ($p=0.064$) with the final caries prevalence of the mixed dentition ($\Sigma_2$df/DF-T). In accordance with these findings, Sánchez-Pérez et al. (2004) demonstrated in 8–10-year-old children a significant difference in lactobacilli counts of stimulated saliva between the low and high caries-risk groups, and found the caries experience after 18 months in mixed dentitions marginally associated with the salivary lactobacilli counts at baseline. Hänsel Petersson et al. (2002) found significant associations between the caries increment and the counts of lactobacilli and mutans streptococci in saliva in 10–11-year-old children. However, Tukia-Kulmala & Tenovuo (1993) in the same age group reported high intra- and inter-individual variations in counts of mutans streptococci and lactobacilli in saliva, postulating a developing dentition, behavioural and hormonal changes as well as dietary factors as reasons for the differences in salivary factors. Although Twetman et al. (1994) found in 4-year-old children a positive correlation between the salivary MS levels and caries increment, Granath et al. (1994) found in the same age group a better explanatory potency for lactobacilli counts than for salivary mutans streptococci, in accordance with the present results.

No differences in results of lactic-acid production on the tongue dorsum were found between the caries-risk groups; both risk groups had the same caries-risk levels according to the colour chart. The good oral hygiene of the children can be the explanation for this result. Gerardu et al. (2006) employed the new chair-side test for monitoring the changes in acidogenicity of the tongue microflora after use of an antimicrobial toothpaste and mouthwash, and found that the lower LAP levels were associated with improved oral hygiene. Marotti & Staedtler (2007) confirmed the usefulness of this method by monitoring the effect of an antimicrobial mouth rinse.

The results of this new chair-side test in the present study showed no correlations to the clinical or to the subclinical predictors. The results of Seemann et al. (2007) support these findings: they found no significant changes in salivary counts of mutans streptococci and lactobacilli in children after regular daily tongue cleaning for two weeks. Gerardu et al. (2006) compared the lactic-acid production in tongue biofilm and plaque samples using the same test and could not find any correlations.

The sensitivity and specificity were applied for the comparison of the prognostic accuracy of various caries-risk predictors used in the study. DF-$T_1$ showed in the present study with 14% the lowest and df-$t_1$ with 47% the highest sensitivity as clinical caries-risk predictors. The highest specificity was determined for API with 100% and for DF-$T_1$ with 85% indicating them as good clinical predictors for identifying children with low caries risk. In earlier studies, sensitivities between 12 and 93% and specificities between 28 and 100% were found for the caries experience in primary and permanent dentitions and in primary molars as well as for oral hygiene scores (Vanobbergen et al. 2001, Zero et al. 2001, Li & Wang, 2002, Skeie et al. 2006, Zhang & Van Palenstein Helderman 2006). The very low sensitivity of the DF-$T_1$ found in the present study was probably due to the early stage of mixed dentition at baseline with low numbers of erupted permanent teeth; the mean DF-T of the children was similarly low (0.2±0.4/0.3±1.0) in both risk groups. Despite the maximum specificity, API presented with 33% still a very low sensitivity. Its high specificity (100%) can be explained by the predominance of children with good oral hygiene in the small study group.

By means of the subclinical predictors, the counts of MS and LB in stimulated saliva, more than 60% of the children in both caries-risk groups could be identified correctly. The sensitivities of salivary counts of these cariogenic bacteria in predicting caries risk in earlier studies varied between 41 and 82%, and the specificities between 59 and 85% (Wilson & Ashley 1989, Sullivan & Schröder 1989, Vehkalahti et al. 1996, Splieth & Bernhardt 1999, Pinelli et al. 2001, Pienihäkkinen et al. 2004). In comparison to clinical predictors, the sensitivities and specificities of these microbiological tests are higher and closer in number, indicating them as being more reliable for detecting the caries risk. As an indicator of caries-causing bacteria, LAP levels using both distributions had sensitivities which were much lower than those found for salivary counts of cariogenic bacteria. When combining the low and moderate risk groups, LAP had only a sensitivity of 7% with a specificity of 75%. If moderate and high-risk groups of LAP were combined, the sensitivity increased to 33% with a specificity of 55%. Thus, like API and DF-$T_1$, LAP seems to be a better parameter to identify children without caries risk.

In the present study the caries increment (ΔDF-T) was marginally significantly correlated to salivary counts of LB, for which a sensitivity of 65% was reached. LAP was only able to identify 33% of the caries-risk children correctly. The determination of the lactic-acid production was shown to be a good monitoring instrument for antimicrobial procedures (Gerardu et al. 2006, Marotti & Staedtler 2007). According to the results, the LAP test cannot be used as a sole screening tool for an accurate caries-risk assessment. However, this new chair-side test might be useful as a supplementary screening tool for caries-risk assessment.

## Zusammenfassung

Ziel: Ziel der vorliegenden Studie war es, die Vorhersagegenauigkeit einer neuen Methode, der Bestimmung der Milchsäureproduktion auf der Zunge (LAP), für die Kariesrisikobestimmung entsprechend dem Karieszuwachs innerhalb von zwei Jahren zu prüfen.

Methoden: 35 Kinder (6–8 Jahre alt) nahmen an der Studie teil. Die frühere Kariesaktivität (df-$t_1$, DF-$T_1$), die Anzahl der kariösen zweiten Milchmolaren (df-*2*.mol), der Approximal-Plaque-Index (API) waren die klinischen und die Anzahl der Mutans-Streptokokken (MS)/Laktobazillen (LB) im Speichel und LAP die subklinischen Parameter, die bei der Eingangsuntersuchung erfasst wurden.

Zwei Jahre später wurden die Kinder erneut klinisch untersucht (df-$t_2$/DF-$T_2$). Nach der Zunahme in DF-T (ΔDF-T) wurden Kariesrisikogruppen (ΔDF-T=0 versus ΔDF-T⩾0) definiert. Um die Vorhersagegenauigkeit zu bestimmen, wurden Sensitivität und Spezifität berechnet. Für die statistische Analyse wurde der Spearmantest für nichtparametrische Korrelationen angewendet.

Ergebnisse: Der DF-T stieg von 0,3±0,8 auf 1,2±1,6 an. 20 Kinder befanden sich in der Gruppe ohne, 15 in der mit Kariesrisiko. Der p-Wert für die Korrelation von ΔDF-T mit dem API lag bei 0,007 bzw. mit der Anzahl der LB im Speichel bei 0,069. Die jeweils höchste Sensitivität und Spezifität wurde für LB (65%/70%) gefunden, LAP erreichte maximal eine Sensitivität von 33% mit einer Spezifität von 55%.

Schlussfolgerung: Die Ergebnisse weisen darauf hin, dass LAP aufgrund seiner unzureichenden Vorhersagegenauigkeit als alleinige Diagnosetechnik nicht für die genaue Prognose des Kariesrisikos geeignet ist.

## Résumé

Objectif: Le but de cette étude était de déterminer l'exactitude du pronostic d'une nouvelle méthode, la mesure de la production de l'acide lactique sur la langue (LAP), pour évaluer le risque carieux selon l'accroissement de la carie en l'espace de deux ans.

Méthodes: 35 enfants (6 à 8 ans) ont participé à cette étude. Le bilan préalable de la carie (df-$t_1$, DF-$T_1$), le nombre de lésions carieuses dans les deuxièmes molaires temporaires (df-*2*.mol), l'indice de la plaque interproximale (API), étaient les indicateurs cliniques. Le nombre de mutans streptocoques (MS) et de lactobacilles (LB) dans la salive, ainsi que la production de l'acide lactique sur la langue, mesurés à l'investigation primaire, étaient les indicateurs subcliniques. Après deux ans, l'examen dentaire a été répété (df-$t_2$/DF-$T_2$). Selon l'accroissement de DF-T (ΔDF-T), les enfants ont été classés en deux groupes (ΔDF-T=0 versus ΔDF-T⩾0). La sensitivité et la spécificité ont été calculées pour déterminer l'exactitude du pronostic. L'analyse statistique a été exécutée avec le test de Spearman pour les corrélations non paramétriques.

Résultats: Le DF-T a augmenté de 0,3±0,8 à 1,2±1,6. Le groupe sans risque carieux comprenait 20 enfants, tandis que le groupe avec risque carieux en comprenait 15. Une corrélation statistiquement significative (p=0,007) a pu être établie entre ΔF-T et API, et entre ΔF-T et le nombre de LB. La valeur de p était de 0,069. Les niveaux de sensitivité et de spécificité les plus élevés ont été trouvés pour le nombre de LB (65%/70%); LAP a atteint une sensitivité maximale de 33% avec une spécificité de 55%.

Conclusion: Les résultats montrent que LAP ne convient pas comme outil de dépistage unique pour la détermination précise du risque carieux, vu le manque d'exactitude de pronostic.

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