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Determination of the acid-formation potential of the saliva compared to commercial test kits and the saliva microbiome

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Aim:
To determine the acid-formation potential of the saliva by using a new type of saliva test in comparison to commercial saliva tests and the composition of the saliva microbiome.

Materials and Methods:
A clinical controlled cross-sectional study was carroes out by means of two groups: (1) naturally healthy subjects without caries-experience (n=25;DMFT=0) and (2) subjects with at least one active carious lesion (n=25;DMFT→0). A detailed intraoral examination, bleeding (BI) and plaque (PI) indices were obtained. The acid -formation potential was measured according to the pH-difference after 1 hour. Number of mutans streptococci, lactobacilli and the buffering capacity were assessed. Intergroup comparisons were performed by Mann-Whitney-U-Test. The diagnostic value of acid-formation potential was evaluated by "Receiver-Operating-Characteristic"-method and calculation of the "Area Under the Curve" (AUC-value). The saliva microbiome was analyzed by next generation sequencing.

Results:
A significant difference was found between the groups for pH-difference, while the caries group showed a higher mean value after 1 hour (Healthy=1.07,Caries=1.42;p=0.03536). The AUC-value was in a desirable range (0.6712; 1=ideal). Furthermore, a significantly increased occurrence of mutans streptococci (p=2.71e-05; AUC=0.8312) and lactobacilli (p=2.374e-05; AUC=0.8344) were found in the caries group. The oral hygiene indices showed a significantly higher BI (p=0.00563) and an PI (p=0.00129) in the caries group. With regard to the buffering capacity no difference was shown between the two groups. The composition of the saliva microbiome of subjects with active caries indicates a higher Ð-diversity and richness. A significant increase was seen for Alloprevotella, Prevotella, Campylobacter and Veillonella, in the naturally healthy group. While the genera Fretibacterium, Lactobacillus, Spirochaetes, Synergistetes and Leptotrichia increased significantly in the caries group.

Conclusion:
The acid-formation potential of the saliva seems to be a valid method to assess the individual caries risk and corresponds well to the number of mutans streptococci/lactobacilli and the saliva microbiome.