

USAGE OF SALIVARY TESTS IN THE DENTAL PRACTICE

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Abstract: Introduction: Salivary tests take a major role in carries risk assesment. Salivary analyses are performed to asses the flow rate, buffering capacity, pH, viscosity and the salivary bacterial level. Material and method: For a better understanding of the direct working manner with the salivary samples in the practice we will describe the working method with one of the commercial kits available on the market, Vivadent Ivoclar: CRT paraffin, CRT buffer, CRT bacteria, referring to a concrete clinical case. Results: After taking the salivary samples and performing the analysis of the results the amount of stimulated saliva/min < 0,7 ml; mutans streptococci $\geq 10^5$; lactobacilli $\leq 10^5$; medium buffer; we identified a high risk for the dental carries disease, so we determined an individual prophylactic treatment plan. Conclusions: Despite their limitation, the salivary analyses can be an important help for the dentist, to establish clinical dental examination sessions, the necessary type of material and the procedures to use during the prophylactic therapy and to set a diagnosis. The results can also be used to promote oral health and motivate the patient.

Cuvinte cheie: teste salivare, prevenția cariei dentare

Rezumat: În cadrul predicției apariției cariei dentare, testele salivare ocupă un loc important. Analizele salivare se fac pentru a evalua debitul, capacitatea de tamponare, ph-ul, vâscozitatea și nivelurile bacteriene salivare. Material și metodă: Pentru o mai bună înțelegere a modului direct de lucru în cabinet cu testele salivare este descris modul de lucru cu unul din kiturile comerciale disponibile pe piață, cel al firmei Vivadent Ivoclar: CRT paraffin, CRT buffer, CRT bacteria, pe un caz clinic concret. Rezultate: După realizarea testelor salivare și analiza rezultatelor cantitatea de salivă stimulată/min < 0,7 ml; streptococ mutans $\geq 10^5$; lactobacili $\leq 10^5$; buffer mediu; se constată încadrarea într-un grup cu risc crescut la carie și se stabilesc detaliile privind individualizarea tratamentului profilactic. Concluzii: În ciuda limitărilor, testele salivare pot fi un bun adjuvant pentru medicul dentist, cu rol important în stabilirea ședințelor de control, a tipurilor de material și procedeele folosite pentru a realiza terapia profilactică și stabilirea prognosticului. Rezultatele pot fi utilizate și pentru promovarea sănătății orale prin motivarea pacientului.

INTRODUCTION

Dental carries prevention methods are known as part of the OMS documents. Their efficiency at population level must no longer be proven. In order to improve the efficiency of these methods at individual level are needed clinical or laboratory tests to asses the individual risk of carries occurrence. Based on these results the prophylactic treatment can be individualized according to the particular needs of the patient.(1)

The dental carries occurrence prediction research is a preoccupation in the medical field of over two decades. Here included are several clinical variables, especially the previous dental caries experience as well as the bacterial and the socio demographic levels.(2) The caries risk analysis can be performed in a qualitative or a quantitative manner. The qualitative data are those obtained through anamnesis, clinical examination, nutrition analysis and through the cariogenic potential of the different alimentary products. The quantitative data are those obtained from saliva and microbiological analysis.

The salivary analysis is performed to asses following parameters: flow rate, buffering capacity, pH, and viscosity. Both stimulated and unstimulated saliva can be used. The

microbial analyses are performed through salivary samples in their culture medium to asses the growth of the mutans streptococci and the lactobacili.(3)

THE AIM OF THE STUDY

The aim of this study is to prove the utility of the salivary tests in developing an individualized prophylactic treatment plan.

MATERIAL AND METHOD

In order to get a better understanding of the working manner in the practice and to get a proper result interpretation we will describe the working manner with one of the commercial kits available on the market, the one of the company Vivadent Ivoclar: CRT paraffin, CRT buffer, CRT bacteria.

The patient B.I., 12 years of age comes to the dental office for a routine control, the clinical situation being the one presented in figure 1. The patient must be prepared at least one hour in advance before performing the tests he is not allowed to eat or to drink, to mouth rinse or to brush teeth, to smoke or to chew gum. The stimulation of the salivary flow is done by

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CLINICAL ASPECTS

chewing a paraffin pellet for three minutes. During this time, the saliva is collected in a suitable container and the salivary flow rate is next determined. Saliva samples are taken herefrom to determine the buffer capacity of the saliva and the number of mutans streptococci and lactobacilli in their respective culture medium.

CRT buffer - is used for in vitro diagnosis and for determining the buffer capacity of the saliva

The use of it is done strictly under the supervision of the dentist and/ or of the persons in charge.

Operating times:

1. the patient is made comfortable in the dental chair
2. the patient chews a paraffin pellet in order to stimulate saliva
3. the saliva is collected in a suitable container (the collection is done after 5 minutes, the salivary flow rate is evaluated ml saliva/min).
4. the test is carefully taken out of its pack and the protective paper is removed without touching the yellow end of the test
5. the test is placed on a flat surface, with the yellow absorbent paper on top
6. saliva is applied by means of a dropper on the yellow part of the test. The excessive saliva is left to flow out. Care must be taken not to scratch the indicator. No bubbles are allowed
7. in order to determine the buffer capacity of saliva, the colours obtained at the test will be compared with the ones offered by the producer in the test kit. The comparison is done exactly 5 minutes after the application of saliva on the test.

CRT bacteria is used for in vitro tests, the green surface is used to determine the amount of lactobacilli in the saliva, and the blue one to determine the amount of mutans streptococci in the saliva. Contraindications: during the treatment with antibiotics. After such a treatment at least two weeks must pass in order to make use of the test. If an antibacterial solution is used (mouthwash) at least twelve hours must pass for the test to be performed. The test can be performed only under the supervision of the dentist or of another qualified person.

Operating times:

1. the patient chews a paraffin pellet in order to stimulate saliva,
2. the saliva is collected in a graded container (a very good opportunity to measure the salivary flow rate and to determine the buffer capacity of the saliva)
3. the pack is opened and the lid of the container is opened, too
4. the patient chews a pellet of sodium carbonate (NaHCO₃)
5. carefully remove the protective cover from the culture media, take care not to touch the agar
6. a dropper is used to humidify the two facets (the blue one for the streptococci mutans, and the green one for the lactobacilli)
7. The excessive saliva is left to flow out
8. the test is introduced in a "test tube" with a filetted cover,
9. a marker is used to write the name of the patient and the date the test was made

10. the test is placed in an incubator at 37 degrees, for 48 hours. After taking out the test from the incubator, the density of the streptococci mutans and of the lactobacilli is measured and compared to the evaluations made by the producer. In case of insufficient saliva in the containers a NaHCO₃ a H₂O₂ pellet can be added.

RESULTS

Evaluation CRT Buffer: colour blue shows a high buffering capacity of the saliva, while colour yellow shows a low buffering capacity of the saliva. Green shows a medium buffering capacity, and if another colour occurs, different from the above mentioned, the test must be repeated. **(fig 1)**

Evaluation of the CRT bacteria results: is done compared to the value 10⁵ (CFU/ml) mutans streptococci or lactobacilli, which represents an increased number (over 10⁵ (CFU/ml)) or a small one (below 10⁵ (CFU/ml)) of these bacteria. The reading/interpretation is performed by comparing the culturing media (after 48 hours of incubation, at 37 degrees C) with the prospects received at the beginning of the test. The culturing medium for mutans streptococcus is agar with bacitracin (blue facet) (fig.2), and for the lactobacillus it is agar Rogosa (green facet) (fig.3) In order to make the evaluation easier, the tests can be kept slightly inclined, in the light source.

Figure no. 1. Determining the buffering capacity of the saliva by comparing it to the prospects of the producer, medium buffer



Figure no. 2. Determining the amount of lactobacilli, by comparing it to the prospects of the producer. Below 10⁵ (CFU/ml) lactobacilli



Table no. 1. Odontal status, C – carries, M – marmoration, () – tooth in eruption

	C		C		M		C		C				
17	16	15	14	13	12	11	21	22	23	24	25	26	(27)
(47)	46	45	44	43	42	41	31	32	33	34	35	36	37
	C												

CLINICAL ASPECTS

Figure no. 3. Determining the amount of mutans streptococi by comparing it to the prospects of the producer . Over 10^5 (CFU/ml) lactobacilli

In the case of our patient the results are as follows mutans streptococci $\geq 10^5$, lactobacilli $\leq 10^5$, medium buffer, amount of stimulated saliva/min $\leq 0,7$ ml. Based on these results the patient is classified in the group of people with a high risk of carries. Based on these results an individual prophylactic treatment plan is developed for the patient. Besides the standard prophylactic measures special standard prophylactic measures are taken, such as those mentioned in table 2.(4)

Table no. 2. Supplementary prophylactic treatment indications

RECCOMENDED TREATMENT PLAN
Rigorous registration history of the illness
Repeated "bite-wing" radiographs for the early detection of the proximal carries
Local fluorine applications 4-6x/year
Topical applications of chlorhexidin
Nutritional counselling
Fluorine tooth paste, cleaning of the interdental spaces
Solutions/fluorine gel
Chlorhexidin based solutions
Bicarbonate based solutions
Equilibrated diet
"strong" food
Sweets and chewing gum with sugar substitutes

DISCUSSIONS

Caries diagnosis and treatment means in a traditional understanding the detection and restoration of the cavity. Being a symptomatic treatment, the ethologic factors will not be taken into consideration. Incipient carious lesions can be detected through various inspection methods, radiographs, bacteriological tests, medium conditions.(5)

The most important role of the saliva is the remineralization of an incipient caries lesion. The protective effects of the saliva together with the therapeutic agents can act together to lower the risk for dental caries.(7)

The salivary factors involved in the prevention of dental caries lesions are salivary flow rate, buffering capacity, ph and viscosity using stimulated saliva. Salivary flow rate is the most important parameter affecting the caries susceptibility. (6) A low salivary flow rate will determine an impaired oral clearance of microorganisms and food remnants. This means a low ph and a low buffering capacity. The calcium and phosphate

content is very low with a reduced amount of saliva, which means, the remineralization capacity of the caries is rather limited. A reduced salivary flow rate means stimulated saliva below 0,7ml/min, and unstimulated saliva 0,1ml/min.

The buffering capacity of saliva means its capacity to reduce acidity. There are two buffering systems, the phosphates in unstimulated saliva and the bicarbonates in stimulated saliva. A ph smaller or equal to 4 means that the buffering capacity of the saliva is very low.

The viscosity of saliva reflects the water content and affects the oral clearance rate. Usually the capacity to string out for saliva when using a mouth mirror is 2,5 cm.

The microbial analysis is done through saliva samples and assesses the growth of mutans streptococi and lactobacilli. The commercial kits contain culturing media for both microorganisms and require the incubation into another laboratory. The reference level of units building colonies (CFU) at both organisms in saliva is in our case 10^5 (CFU/ml). New commercial products are available, based on species specific monoclonal antibodies, the results being obtained within 30 min.

The data obtained from the salivary analysis must be evaluated together with other tests such as dietary analysis or hygiene. A high level of mutans streptococci is evident in most incipient lesions. This is because it is associated with the presence of a persistent dental plague. The lactobacilli proliferate in retentive areas being responsible for cavitations but they persist in high numbers even after the treatment of caries because of a nutrition with a high intake of carbohydrates.(3)

CONCLUSIONS

În ciuda limitării lor, testele salivare pot fi un bun adjuvant pentru medicul dentist, cu rol important în stabilirea ședințelor de control, a tipurilor de material și procedee folosite pentru a realiza terapia profilactică și stabilirea prognosticului.

Rezultatele pot fi utilizate și pentru a motiva pacientul în ideea promovării sănătății orale.

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