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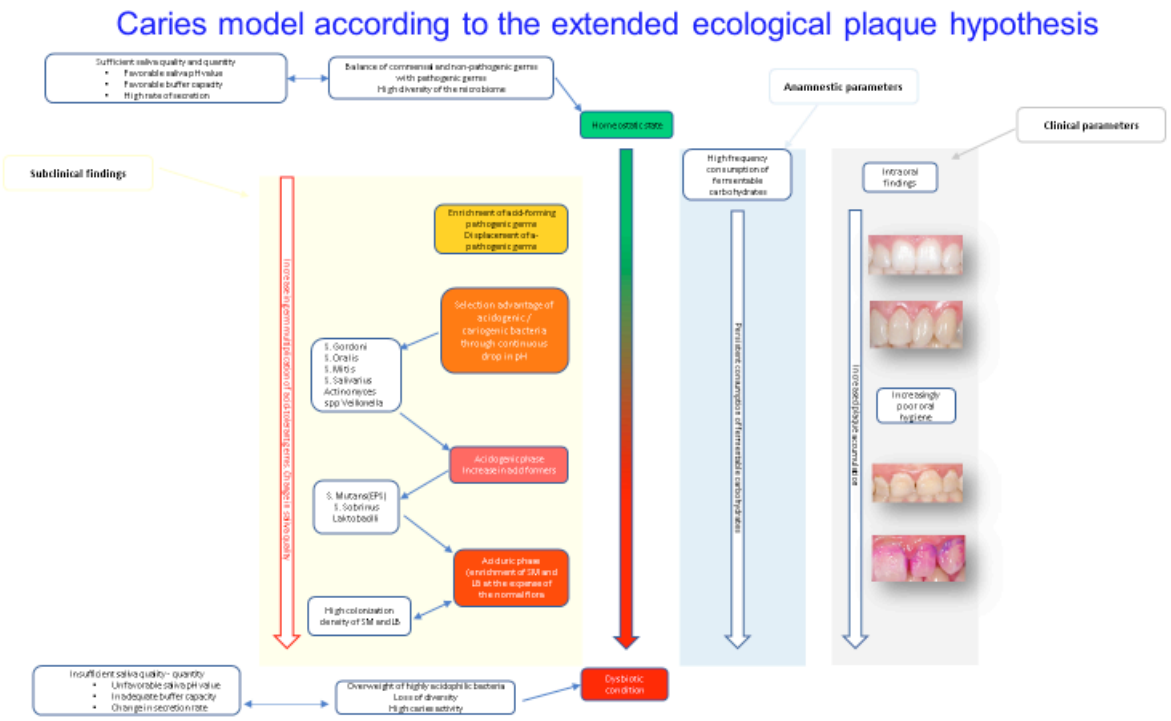
Check up is good -
testing even better!

Saliva diagnostics in the dental office

Technical background and implementation
Dr. Lutz Laurisch

The extended ecological plaque hypothesis

The homeostatic situation of the healthy microbiome is characterized by a balance of potentially pathogenic and non-pathogenic germs - with a pronounced diversity. Continuous consumption of low molecular weight carbohydrates (highlighted in blue) leads to an increase in acidogenic and acidophilic germs, which increasingly displace the non-pathogenic flora. Clinically visible (highlighted in light gray) is the constant increase in plaque and inadequate oral hygiene. Not clinically visible (highlighted in yellow), acid-forming and acid-tolerant germs multiply when the pH value in the plaque is steadily falling. The enamel surface is demineralized; if the pH value persists, the remineralization capacity is exceeded.

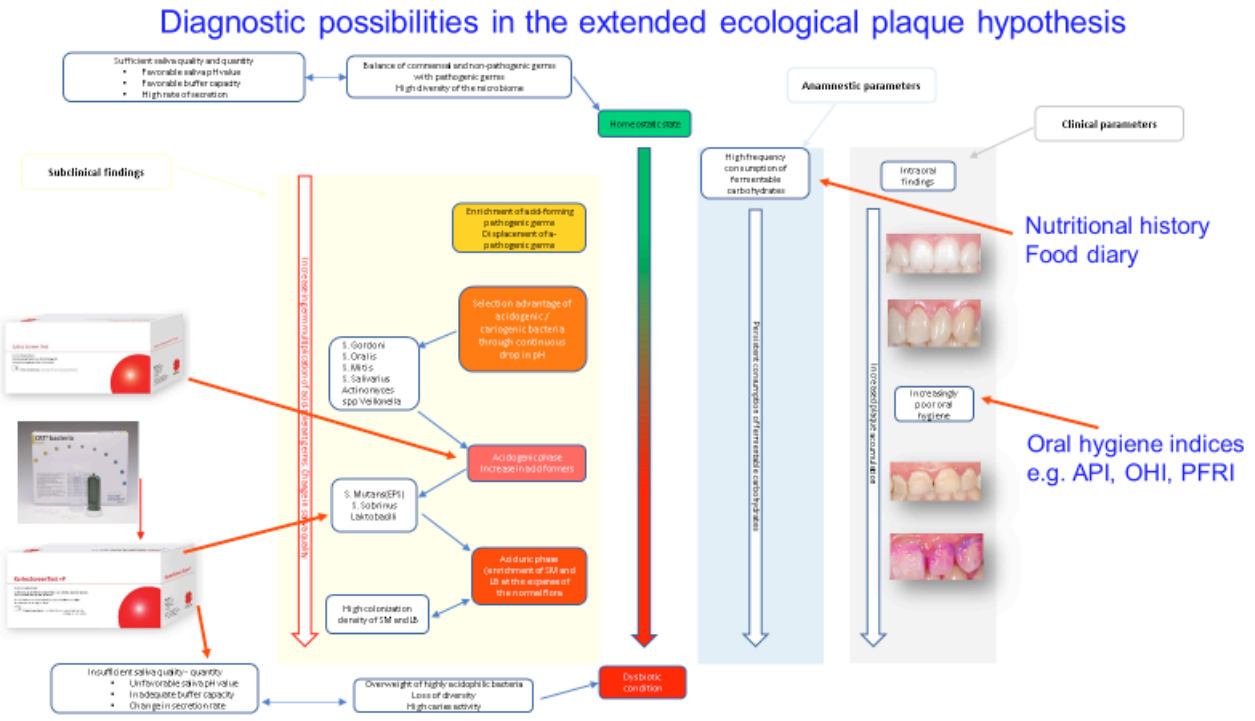


Acid tolerance and the subsequent selection of non-SM with a low pH value seem to play a decisive role in the destabilization of homeostasis in plaque.
According to the lowering of the pH value, a distinction is made between an acidogenic phase (pH value ←6.5 and destabilization of homeostasis), an aciduric phase, in which there is a further selection of acidophilic germs, and the dysbiotic phase (pH value ← 5.5).

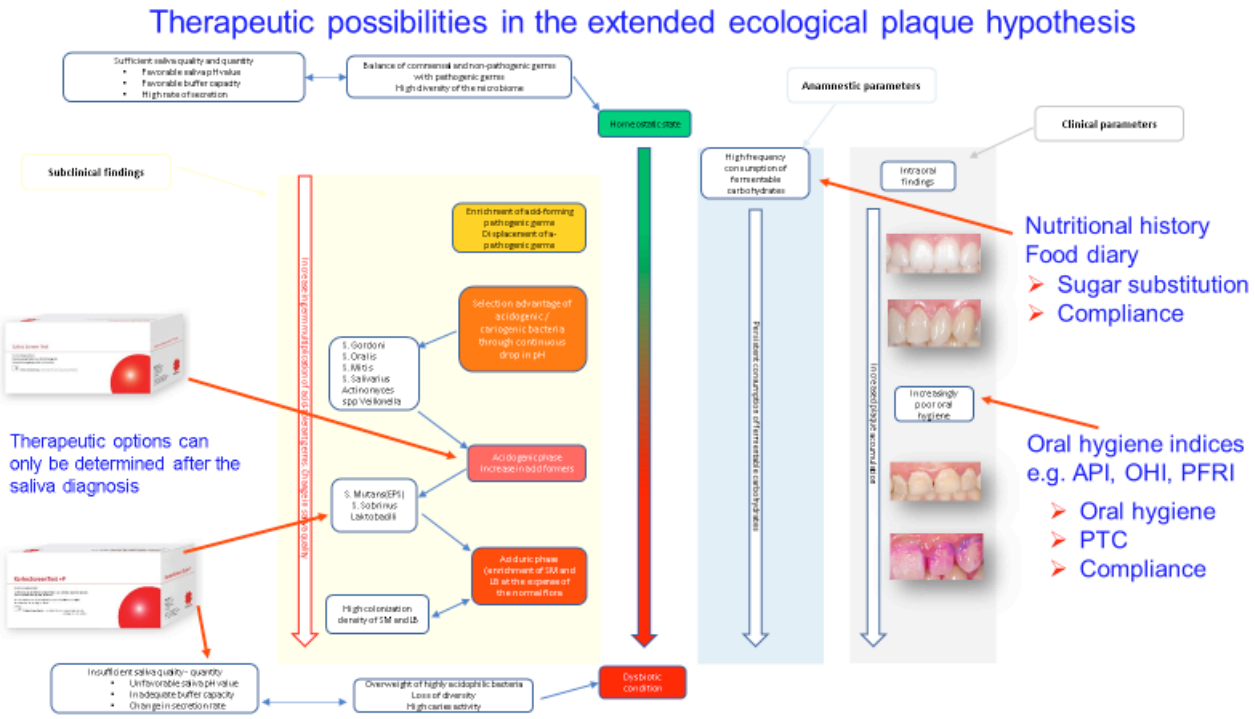
In this acidic environment, SM and other acid-forming bacteria, especially LB, can promote lesion development through excessive growth by maintaining an environment characterized by a persistently low pH value. In this way, LB and SM displace the little-acid-producing non-SM, which initiated the initial lowering of the pH. The plaque is now dominated by strong acid generators with decreasing diversity. Therefore, high proportions of SM and LB can be viewed as biomarkers for areas with particularly rapid caries progression. Ultimately, a dysbiotic condition arises, which is characterized by the fact that the diversity of the microbiome has been lost and acidogenic and aciduric germs dominate in the plaque.
In addition, there may also be unfavorable functional saliva parameters: The secretion rate decreases, the buffer capacity deteriorates and the pH value of the saliva can drop below pH value of 7. In a homeostatic state, this is usually not the case.

The role of SM is not limited to the formation of acid: it is the main actor in the formation of extracellular polysaccharides and thus guarantees undisturbed „quorum sensing" in plaque, since the matrix formed by it protects the biotope on the teeth from the natural defense functions of the Saliva protection factors - secretion rate and buffer capacity.
This means that SM still has a key position in caries risk and caries activity. In addition, it ensures that the acidic environment is maintained, in which LBs can in turn overgrow the system. In fact, LB is able to produce acid up to pH 3, while SM stops producing acid at pH 4 to 5. LB - themselves not actively involved in the build-up of plaque - thus use the pH environment created by SM to promote the progression of caries. Therefore, they are also correspondingly present in active carious lesions.

Implementation in practice
With saliva diagnostics it is possible to determine these subclinical parameters of an acidogenic or also aciduric phase. This extends the diagnostic spectrum: we are not only dependent on the clinical parameters, but can also use the subclinical parameters to make further statements about the current state of the biotope. The differentiation between the acidogenic and aciduric phases also makes it possible to select suitable preventive measures at an early stage.
The acidogenic phase is determined with the SalivaScreenTest, the acidic phase with the KariesScreenTest.



The following figure shows the therapeutic consequences. Based on the determined clinical risk factors, the known prevention strategies are available, such as sugar substitution or professional cleaning measures.



However, the determination of subclinical risk parameters with the SalivaScreenTest or the KariesScreen-Test open up a wide range of preventive services that can then be provided based on diagnosis.

Carrying out the SalivaScreenTest is easy, you don't necessarily need an incubator. Due to the extremely short evaluation time, it is possible to carry out the test at the beginning of a prophylaxis session and to discuss the result and the therapeutic consequences with the patient after one hour at the end of the session.

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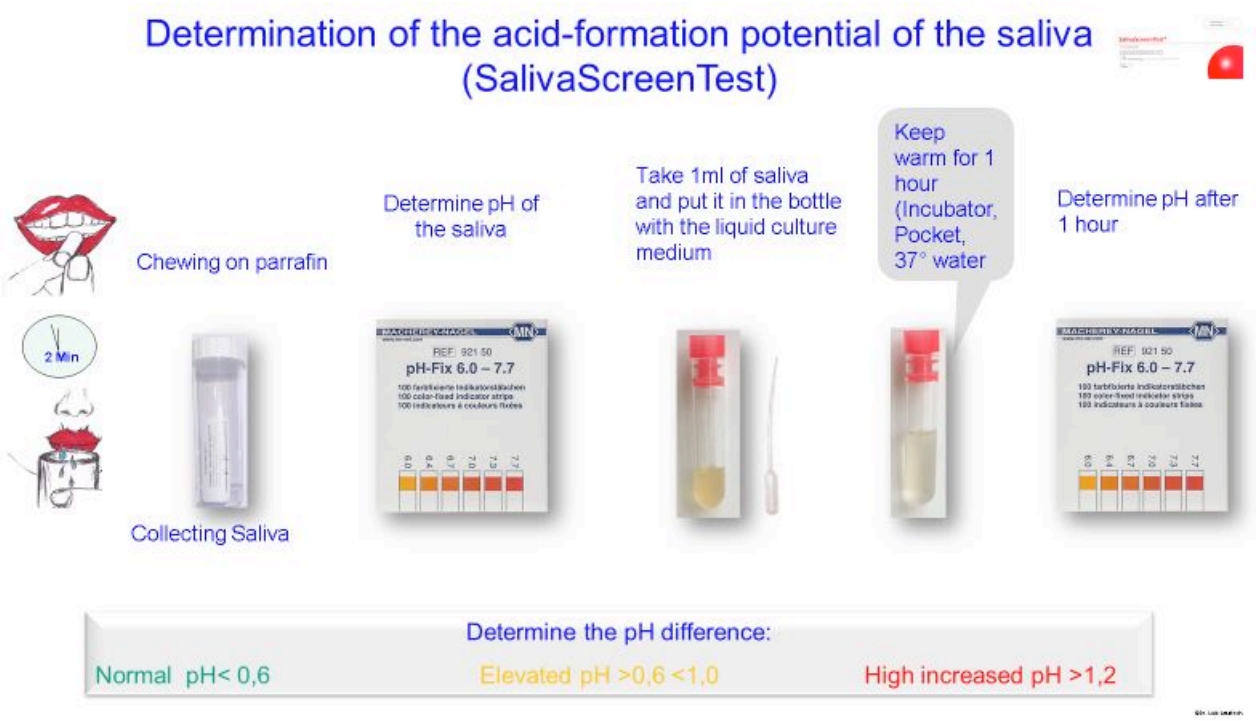
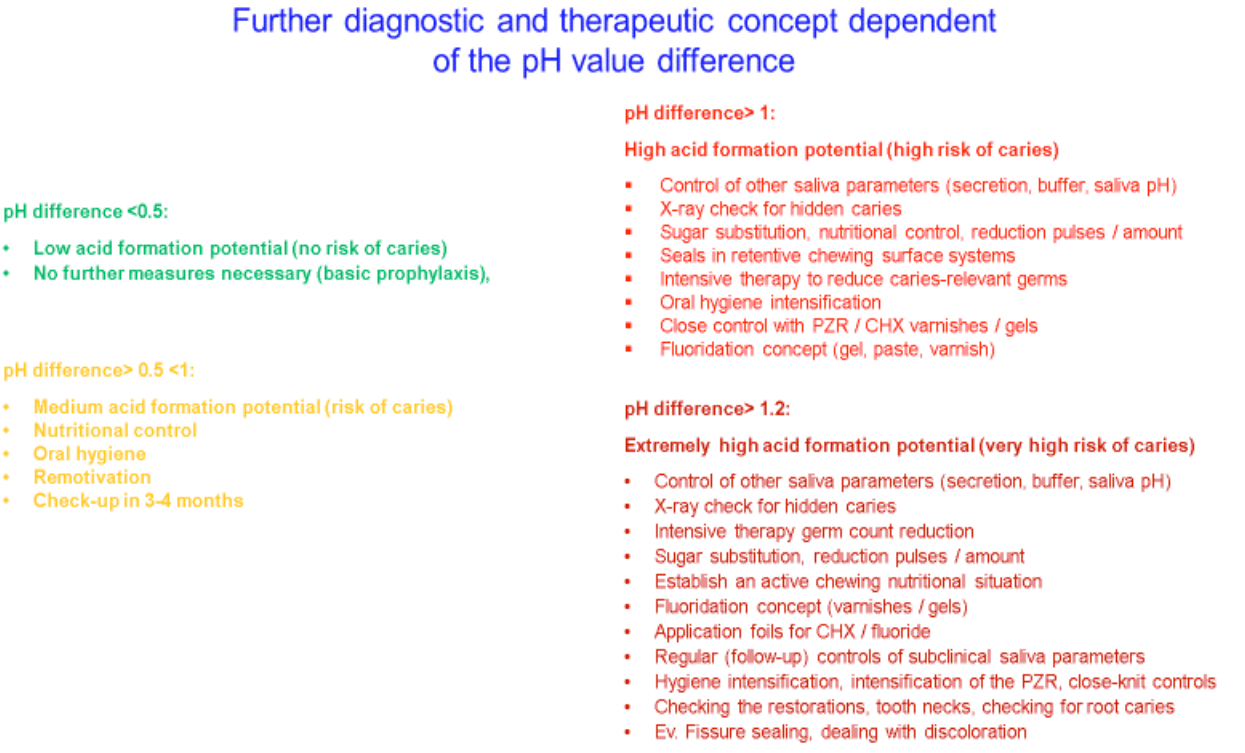


The following figure shows the possible therapeutic consequences that can be derived from the result of the test procedure.



In cases of increased pH decrease, further diagnostic measures are required. These bacterial and functional saliva parameters are determined using the KariesScreenTest + P.

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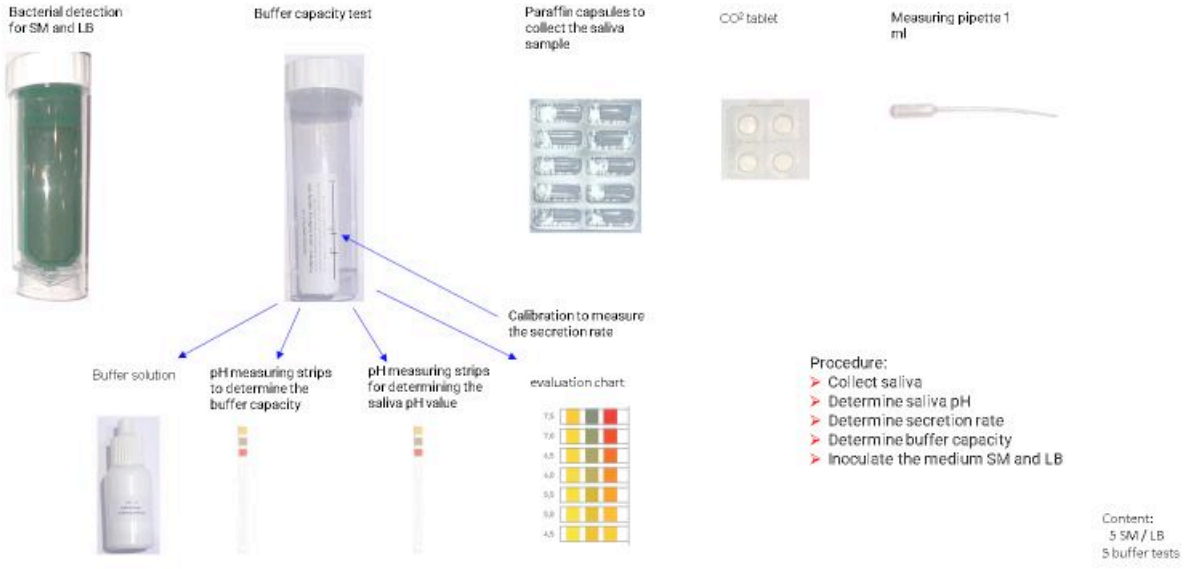
Contents of the KariesScreenTest + P

The KariesScreenTest + P enables the determination of the bacteriological and functional saliva parameters and thus enables early detection of the bacterial shift from homeostasis to a dysbiotic state.



The possibilities of saliva diagnostics expand the risk assessment based solely on a clinical examination by a large amount of information. These not only have a diagnostic value, but also allow us, after carrying out preventive measures, to classify the resulting changes in the risk to the patient and to evaluate them accordingly.

The knowledge of subclinical salivary parameters is therefore important information to better and more accurately classify the disease or health status of a patient.