enlightenment

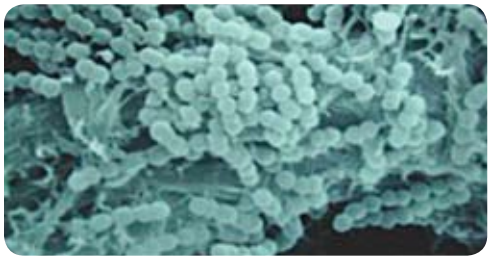
SALIVA-CHECK MUTANS

SALIVA-CHECK MUTANS

is the first chairside diagnostic test for rapid detection of high levels of *Streptococcus mutans*

Measuring *Streptococcus mutans*

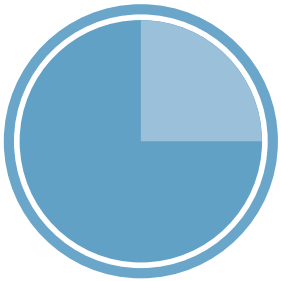
The bacterial species *Streptococcus mutans* has a significant role in the initiation of dental caries. Cavities and pre-cavitation white spot lesions are indicators of active disease, however the disease did not occur without infection by cariogenic bacteria supported by an environment conducive to their propagation. High levels of *S. mutans* in a sample of stimulated saliva is an indicator of a change in the ecology of dental plaque, with a shift to more acid producing and acid tolerant organisms*. Therefore managing dental caries throughout a patient's life, monitoring both the end result of the disease (cavities) and the causative factors is essential.



**Walsh LJ, Tsang AKL. Chairside testing for cariogenic bacteria: current concepts and clinical strategies. International Dentistry 2008; 10(2):12-24*

A good oral health check

A regular visit to a medical practitioner involves the routine checking of key health indicators (eg blood pressure, cholesterol). For many people it is a check that their current good health status has been maintained and an opportunity for the medical practitioner to encourage continued good health practices. The same opportunity exists for dental professionals where simple environmental tests help formulate a clearer picture of a patient's current risk status.



Accurate results in 15 minutes

SALIVA-CHECK MUTANS

is a fast non-invasive test that strengthens your patient relationships by enhancing patient education and motivation.

Accurate results in just 15 minutes

SALIVA-CHECK MUTANS utilises a highly specific immunochromatography process and does not rely upon the growth of bacteria. This means the traditional culture test is no longer necessary and results are available at the same appointment. The test strip contains colloidal gold labelled anti-*S.mutans* antibody that will selectively bind to *Streptococcus mutans* and, upon reaching a certain level of collection, will register as a red line on the test strip. Should a positive result be achieved, the patient has recorded a level of *S.mutans* equal to or above 500,000 colony forming units per ml (cfu/ml) saliva.

As well as the speed of test results, the other important advantage of this technology is the accuracy. There is no "interference" from other bacterial species and correlation testing has reported 90.9% sensitivity and 97.4% specificity* when tested against PCR.

A new era in diagnostics

There continues to be significant research into saliva as a diagnostic fluid and emerging technologies will ensure that the use of saliva diagnostics amongst health professions is going to develop and grow.

Positive result
If a faint or clear red line appears at T side of the test window, it means there are more than 500,000 cfu/ml of *S.mutans* in saliva.

Negative result
If a faint or clear red line does not appear at T side of the test window, it means there are less than 500,000 cfu/ml of *S.mutans* in saliva.

**R&D Department, GC Corporation. Test results on file.*

Diagnostic discovery

There is a growing need from patients to be better educated about their health and this new breed of engaged dental patient takes a more active role in achieving and maintaining good oral health. Diagnostic tools such as SALIVA-CHECK MUTANS form part of a measure of caries risk. Combined with a traffic light system they can help simplify and communicate the essential concepts of dental decay to enlighten and motivate these patients.

Our current understanding of caries

- A (thin) dental plaque biofilm is normal
- A catastrophic change in the biofilm is responsible for the disease. The dominant process is typically carbohydrate metabolism driving a change in pH which creates a shift in oral microflora
- Changes in oral microflora can be influenced by a variety of factors including reduced saliva flow, high frequency of carbohydrate, low oral pH, low fluoride exposure, poor oral hygiene
- A cariogenic biofilm is dominated by bacteria that are aciduric (prefer acidic environments), acidogenic (acid producing) and produce extracellular polysaccharides (thick plaque)

Who should I test?

Whilst all patients are at risk of caries and therefore could benefit from testing, there are certain times when testing may be even more important. From a population perspective, children and the elderly are at most risk of caries.

Patients with low salivary flow

Saliva is a patient's natural mode of protection from demineralisation and when the level of protection is reduced the risk of caries progression will increase. Saliva flow can be impaired due to pathology or drug use (both prescription and non-prescription).

Patients with an acidic diet or low oral pH

An acidic oral environment will favour the growth of aciduric bacteria within a biofilm which in turn could drive an ecological shift from non-cariogenic to cariogenic biofilm.

Patients with a high frequency of fermentable carbohydrate

Diet plays a significant role in the caries process and a high frequency will encourage the proportional growth of *S.mutans* within a biofilm.

Patients undergoing periodontal treatment

These patients are at elevated risk of root surface caries and high levels of *S.mutans* are associated with risk of root surface caries.

Prior to extensive restorative treatment

What has caused the loss of tooth structure that has led to the patient requiring extensive restorative work? Will the same problem compromise the success of any new restorative treatment?

New patients

Caries risk fluctuates throughout a patient's life and being able to set a reference point is helpful for future risk assessment.

Patients who are about to become parents, or care providers for very young children.

The transmission path of *S.mutans* from parent/carer to child is well documented. The traditional path is mother to child and therefore the oral health of pregnant women and new mothers has an additional importance.

SALIVA-CHECK MUTANS

Questions & Answers

Q. What are the patient instructions I should give prior to undertaking the SALIVA-CHECK MUTANS test?

A. Please do not smoke, consume food or drink, brush your teeth or use a mouth wash for at least one hour prior to the scheduled appointment time.

Q. If a patient is taking antibiotics will this affect the results?

A. Potentially yes – so we would recommend testing a patient under normal conditions of health, preferably one month after completion of any antibiotic treatment.

Q. Are there any significant variations in *S.mutans* levels depending on the time of day the test is undertaken?

A. No. Providing the conditions above are adhered to there will be no significant difference in results due to timing.

Q. Can I use a swab to collect the saliva sample?

A. Yes. A swab may be the preferred collection device for certain patients – eg younger children or special needs patients. There is no significant difference in accuracy of results using either of these methods of collection.

Q. What should I do if a patient gets a positive result?

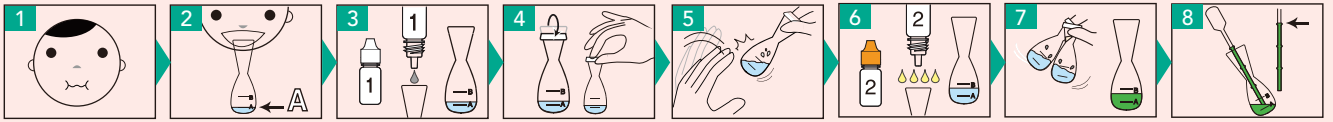
A. A personalised oral program should be prepared with the objective of modifying the ecology of the cariogenic biofilm. Options include:

- Optimising oral hygiene techniques
- Increasing oral pH
- Increasing bioavailable calcium and phosphate
- Increasing fluoride
- Introducing antibacterial strategies
- Reducing frequency of fermentable carbohydrates

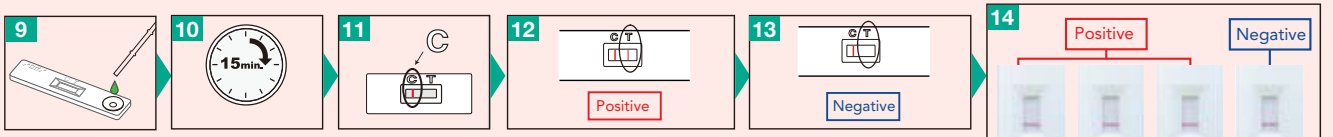
Q. How does the test strip work?

A. The SALIVA-CHECK MUTANS test device contains a highly specific antibody that reacts only with *S.mutans* in saliva. The result is that *S.mutans* is captured and rendered visible as a red line.

Step-by-step procedure



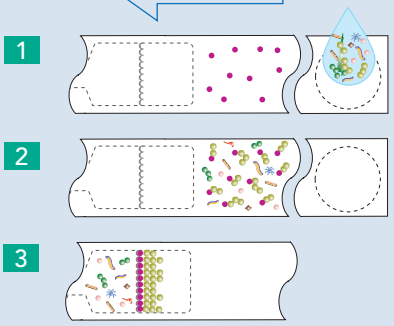
1. Chew the gum for 1 min.
2. Collect the saliva into the mixing container to line A.
3. Add 1 drop of Reagent #1.
4. Fold the opening and hold tightly.
5. Tap the container more than 15 times for 10 sec.
6. Add 4 drops of Reagent #2.
7. Shake for a few seconds. Saliva sample becomes green.
8. Take 3 scales of saliva sample with the pipette.

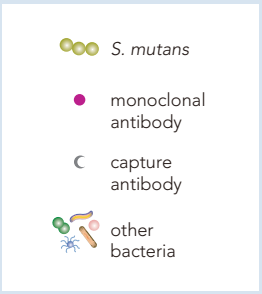


9. Dispense the saliva sample in the sample window of the test device.
10. Allow to stand for 15 minutes at room temperature.
11. Make sure a red thick line appears on the C window.
12. Result positive – a thin red line appears on T window.
13. Result negative – no line appears on T window.
14. The result is regarded as positive even if the line at the test (T) window is very pale.

Diagnostic mechanism

Flow of saliva





1. Saliva added to the sample window of the device flows towards the T side of the test window, reacting with monoclonal antibodies specific only to *S. mutans*
2. At test line, the "capture" antibodies for the *S. mutans* monoclonal antibody are applied.
3. When the monoclonal antibodies that have reacted and combined with the *S. mutans* reach the test line, they alone are then captured and a visible red line results. The density of colour is related to the quantity of *S. mutans* detected.

Integrating new diagnostic tools into clinical assessment procedures using STEM (System for Total Environmental Management)

After completing a patient interview a systematic and comprehensive assessment for caries risk can be undertaken:

1. Measure the resting salivary flow rate prior to reclining the patient or performing any manipulations of the oral soft tissues. This can be done by turning the lip over to expose the inner (wet) side and timing the production of saliva droplets. Fig. 1.

2. Collect samples of dental plaque to determine biofilm cariogenicity using GC Plaque Check + pH. Fig. 2.

Fig. 1

Fig. 2

High risk

Medium risk

Low risk

Reference source: A System for Total Environmental Management (STEM) of the oral cavity and its application to dental caries control. 2008 Laurence J Walsh. ***International Dentistry SA- Australasian Edition Vol 3, No.1***

3. Evaluate saliva by measuring resting pH and viscosity, and stimulated flow, pH and buffering capacity using the GC Saliva Check BUFFER kit. The function and characteristics of resting and stimulated saliva are different and, by evaluating both, the test results become a useful diagnostic and communication tool. Figs. 3 and 4.

4. The sample of stimulated saliva collected is also used for microbial analysis of Streptococcus mutans using SALIVA-CHECK MUTANS. Fig. 5.

5. Examination of soft tissues.

6. Examination of hard tissues with particular attention to:
   - ringbarking patterns of cervical caries
   - caries developing in unusual sites which normally have strong salivary protection
   - lack of calculus build up close to major salivary gland ducts.

7. Plaque staining using a 2-tone disclosing gel, to indicate areas of immature and mature plaque biofilm and persisting oral hygiene problems. Fig. 6.

8. Thorough cleaning to remove all plaque and dye stain to help improve the accuracy of hard tissue diagnosis.

Fig. 3

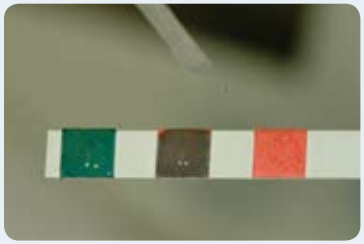


Fig. 4

Fig. 5

Fig. 6

9. Each tooth surface is classified and new carious lesions (white spots, cavitations, and recurrent lesions) charted.

10. A conventional high intensity visible blue curing light can be used to irradiate the tooth, and viewed through an orange protective Perspex shield (or orange protective glasses) so that both pre-white spot and white spot lesions can be seen as dark areas on the yellow fluorescent background of sound tooth structure.

11. Evaluate approximal smooth surfaces through mirror/blunt probe examination and bitewing radiographs, recognizing that the correlation between radiographic appearance and cavitation is not ideal.

12. Collate all the information. The Traffix light/ Matrix chart is a useful method of recording this information. Fig. 7.

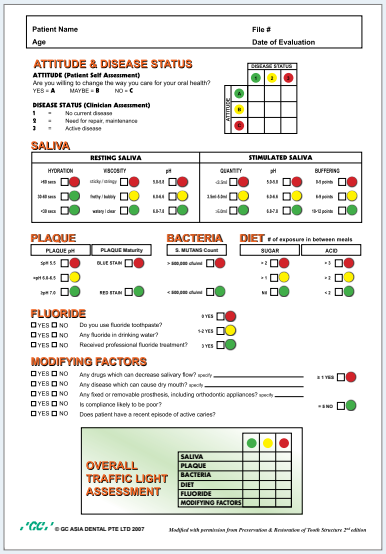


Fig. 7

Fig. 8

Personalised Advice Regarding Home Care

The clinician is now in a position to provide personalised oral health advice, which aims to target one or more aspects of the oral environment. The Oral Health Prescription form is a useful method of recording and communicating this information. Fig. 8.

Reference source: A System for Total Environmental Management (STEM) of the oral cavity and its application to dental caries control. 2008 Laurence J Walsh. ***International Dentistry SA- Australasian Edition Vol 3, No.1***

For many patients GC Tooth Mousse or GC Tooth Mousse Plus will be a key component of a personalised home care prescription. GC Tooth Mousse and GC Tooth Mousse Plus contain RECALDENT™ (CPP-ACP) which has a number of different modes of action to help patients:

- Buffer pH challenges from cariogenic plaque
- Increase levels of calcium and phosphate in plaque
- Interact with fluoride (CPP-ACFP) to significantly increase plaque fluoride content*
- Promote remineralisation
- Modify bacterial composition to form a less cariogenic plaque

In addition GC Tooth Mousse and GC Tooth Mousse Plus will help provide comfort for patients with xerostomia and cervical sensitivity, as well as counter the negative impact of a low pH oral environment.

Results of 4 week treatment with GC Tooth Mousse

*Either use GC Tooth Mousse Plus which contains 900ppmF, or use GC Tooth Mousse in conjunction with a F containing toothpaste

SALIVA-CHECK MUTANS

Contents:
10 test kits:
- *S. mutans* test device (1),
- Paraffin gum (1),
- Pipette (1),
- Mixing container (1)

1 bottle Reagent # 1 (2ml)
1 bottle Reagent # 2 (4ml)

Optional (sold separately):
Collection swab (10 pieces)

Plaque - Check +pH

Contents:
- Plaque - Check +pH solution (1)
- Plaque - Check neutralizing solution (1)
- Plaque disclosing gel (1)
- Disposable dispensing dish (20)
- Disposable plaque collection instrument (40)

Saliva - Check BUFFER

Contents:
- pH test strips (20)
- Saliva collection cup (20)
- Paraffin gum (20)
- Pipette (20)
- Buffer test strip (20)

GC Asia Dental Pte Ltd
Changi Logistics Centre
19 Loyang Way #06-27 Singapore 508724
Tel +65 6546 7588 Fax +65 6546 7577
www.gcasia.info