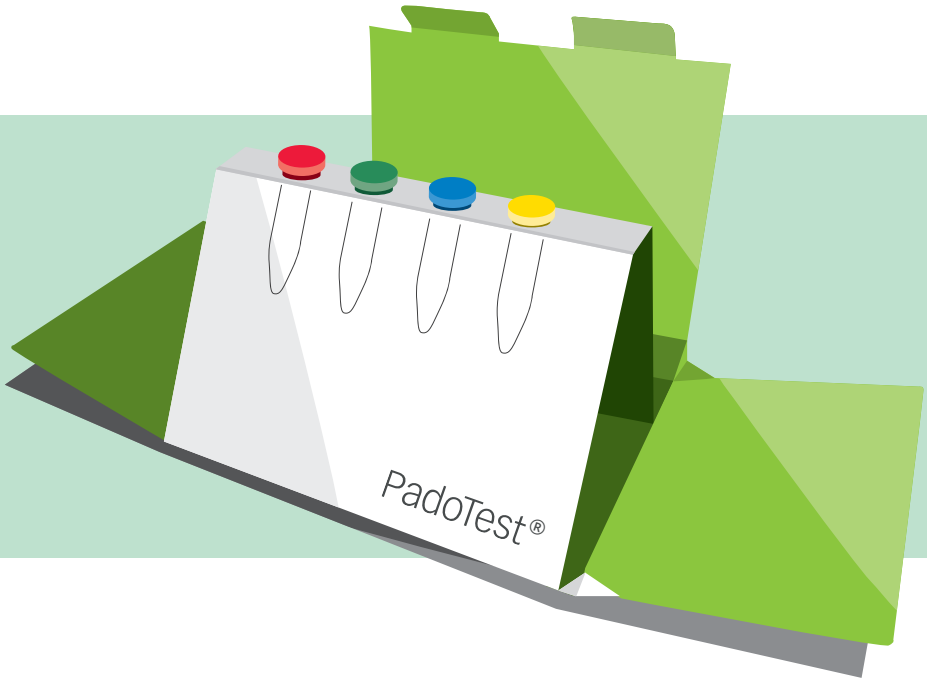
PadoTest®

Periodontal bacteria determination
for patient-oriented therapy.



Expert information

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1. The PadoTest®

With microbe detection and treatment recommendations for sustainable treatment success

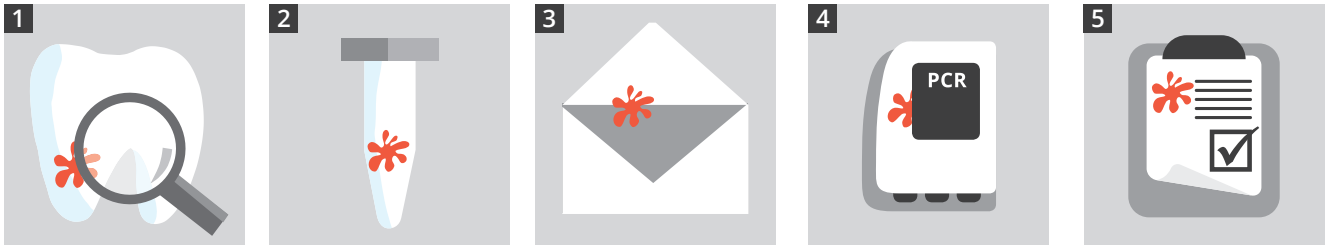
The **PadoTest®** is a microbiological test that simply combines the detection of microbes which cause periodontitis with a treatment recommendation that is understandable for practising dentists. In addition, the **PadoTest®** also comes at an extremely attractive price and can be used very flexibly thanks to the possibility of multi- (pool sample) or single-site tests. Periodontal disease occurs due to a change in the equilibrium of the natural bacterial colonisation (microbiome) in the periodontal pocket. Due to a disproportionate increase in periodontopathogenic bacteria, the original symbiosis of the subgingival bacterial flora increasingly transforms into a dysbiosis. The type, quantity and relative occurrence (association) of specific bacteria characterise the severity of the periodontitis. The **PadoTest®** is used to quantify the presence of relevant periodontopathogenic marker bacteria and enable an assessment of the microbiological equilibrium in the gingival sulcus. Since defined treatment measures are only appropriate when specific bacteria species occur in the respective frequency, a distinction is consequently made between five degrees of severity of periodontitis (types 1 to 5) based on the respective bacterial load. This typing enables targeted, patient-specific treatment to be implemented very easily and quickly, as therapy recommendations and, if necessary, information about the type of antibiotics required, are provided.

The **PadoTest®** is the first commercially available test that detects *Filifactor alocis*.
A total of six of the most revealing marker bacteria for periodontitis as well as the total bacterial count are analysed:

- ***Aa*:** *Aggregatibacter actinomycetemcomitans*
- ***Fa*:** *Filifactor alocis*
- ***Pg*:** *Porphyromonas gingivalis*
- ***Pi*:** *Prevotella intermedia*
- ***Td*:** *Treponema denticola*
- ***Tf*:** *Tannerella forsythia*

The **PadoTest®** – for patient-oriented therapy

Procedure



1. Clinical assessment of the periodontal status
2. Sampling as per instructions
3. Free shipping with the **PadoTest®** box
4. Analysis by means of real-time PCR (2-3 days)
5. Receive your result by mail or online

Fig. 1 The **PadoTest®** procedure

Advantages of the PadoTest®:

- Targeted therapy tailored to the individual patient
- Long-term monitoring of patients
- For patient motivation
- For forensic verification
- Differential diagnosis
- Sensible prescription of antibiotics, i.e.:
  - Avoidance of harmful over-treatment
  - No time-consuming under-treatment
- Quality assurance after periodontal or peri-implant treatment

2. Typing with the PadoTest®

With the **PadoTest®**, the interpretation of the results or the degrees of severity of the periodontitis and consequently the choice of therapy are carried out by means of assignment to specific types. Five types, which differ for the user according to the treatment method, are used for this purpose. The type, quantity and association of the dectected bacteria are used as the basis for type assignment.

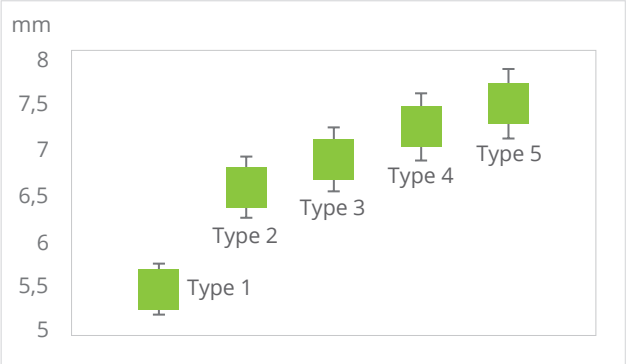


Fig. 2 Pocket depth per type prior to treatment [Bolivar and Wolf (unpublished)]

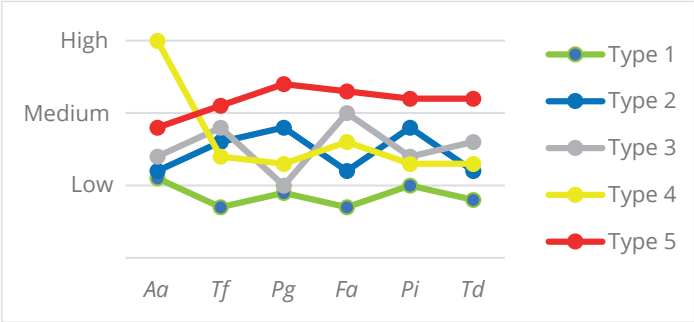


Fig. 3 Bacterial distribution pattern of the five types [Bolivar and Wolf (unpublished)]

Type 1
To be classified as microbiologically ‚satisfactory'. The microbiological situation usually remains stable for a relatively long time and can even improve over time with good hygiene and regular supportive periodontal therapy (SPT).

Type 2
Slightly challenging periodontitis with moderate concentrations of the strict anaerobes *Tf*, *Pg* and *Pi*.

Type 3
Slightly challenging periodontitis with noticeably low involvement of *Pg*.

Type 4
Challenging periodontitis that is dominated by *Aa*.

Type 5
Challenging periodontitis that is dominated by the strict anaerobes.

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Change in pocket types after treatment & therapeutic consequences

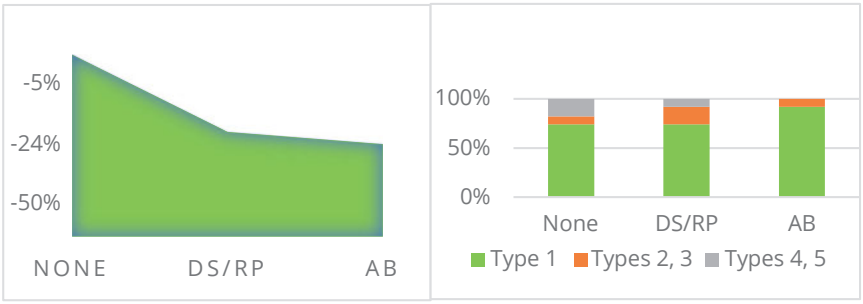
Reduction of pocket depth | Change after treatment

TYPE 1

Microbiological development: Positive with mechanical treatment

Pocket depth: Improvement through mechanical treatment

Antibiotics: Little influence on pocket depth or microbiology

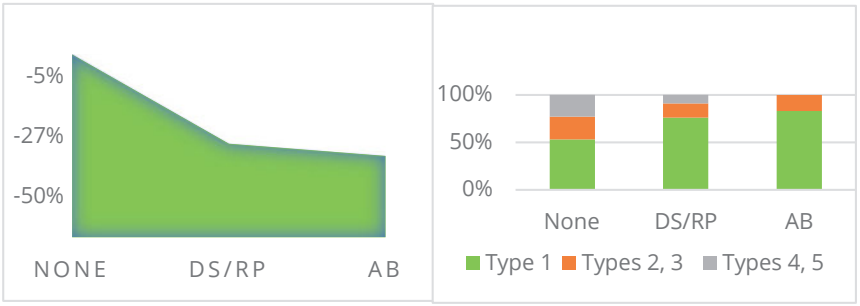


TYPE 2

Microbiological development: Positive with mechanical treatment

Pocket depth: Improvement through mechanical treatment

Antibiotics: Little influence on pocket depth or microbiology

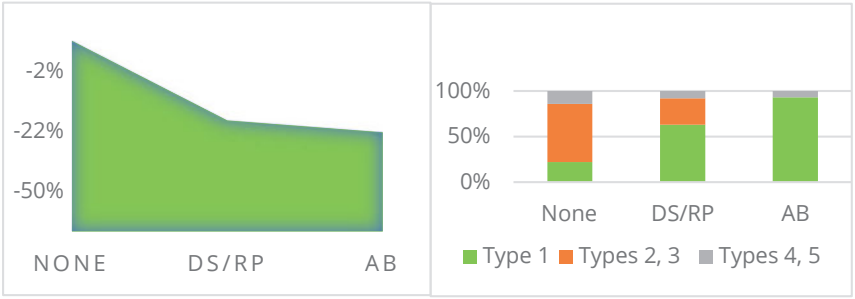


TYPE 3

Microbiological development: Moderate with mechanical treatment

Pocket depth: Improvement through mechanical treatment

Antibiotics: Little influence on pocket depth; positive influence on microbiology

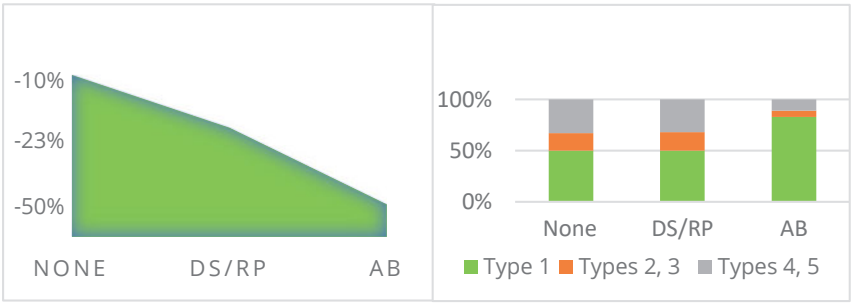


TYPE 4

Microbiological development: Moderate with mechanical treatment alone

Pocket depth: Moderate influence of mechanical treatment without antibiotics

Antibiotics: Positive influence on pocket depth and microbiology



TYPE 5

Microbiological development: Moderate with mechanical treatment alone

Pocket depth: Moderate influence of mechanical treatment without antibiotics

Antibiotics: Positive influence on pocket depth and microbiology

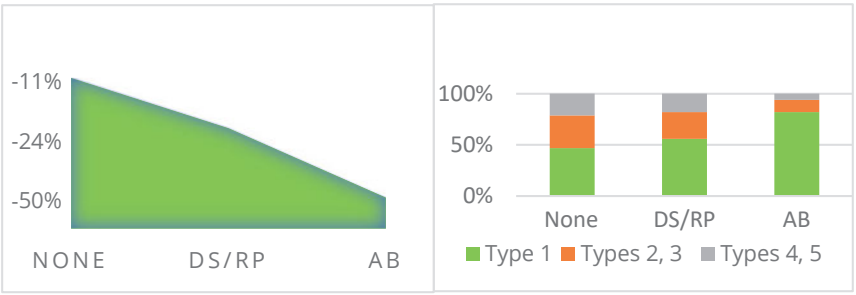


Fig. 4 Change in pocket types after treatment [Bolivar and Wolf (unpublished)]

DS/RP = deep scaling/root planing (now: subgingival instrumentation)

3. Which bacteria does the PadoTest® detect?

The PadoTest® analyses six periodontitis marker bacteria and the total bacterial count.

Aggregatibacter actinomycetemcomitans (Aa)

Aa is a facultative anaerobe that cannot be reliably eliminated through subgingival instrumentation, as it can invade the surrounding tissue. It occurs frequently in aggressive, but also in chronic, periodontitis. The pathogenicity of *Aa* is caused by virulence factors such as leukotoxin, chemotaxis inhibitory factor, fibroblast inhibition, bone-resorbing toxin, collagenase and lipopolysaccharide endotoxin. Such virulence factors foster the colonisation and establishment of the bacterium in the oropharyngeal space. Consequently, host defence is impaired, the tissue is destroyed and factors that could heal the inflamed tissue are suppressed. Studies have additionally shown that *Aa* can also settle in the coronary arteries and cause endocarditis.
Aa cannot be reliably eliminated with subgingival instrumentation alone. The antibiotic of choice for reducing *Aa* is amoxicillin. If *Aa* occurs in higher quantities together with obligate anaerobes, an antibiotic combination must be prescribed in addition to subgingival instrumentation.
Antibiotics of choice: metronidazole + amoxicillin or ornidazole + amoxicillin

Filifactor alocis (Fa)

Fa has only recently been identified as a germ associated with periodontitis (‚a new emerging periodontal pathogen', W. Aruni *et al.* 2015). It is a gram-positive, obligately anaerobic bacterium that is extremely difficult to cultivate. *Fa* occurs in subgingival samples in chronic periodontitis as well as generalised, aggressive periodontitis, and is significantly associated with periodontal supportive tissue loss. *Fa* causes chronic inflammation and induces the production of pro-inflammatory cytokines, which lead to the apoptosis of gingival epithelial cells. Compared to the highly pathogenic periodontal bacteria *Pg*, *Td* and *Tf*, *Fa* revealed the third-highest prevalence in patients with generalised, aggressive periodontitis, and the second-highest prevalence in patients with chronic periodontitis. *Fa* is found predominantly in the biofilm regions that come from the middle or even the apical part of the pocket (Schlafer, 2014). *Fa* is always closely intertwined with other periodontal bacteria and has a symbiotic relationship with *Pg*, for example, which can result in a structural increase in biofilm.
Fa is relatively resistant to oxidative stress and reveals numerous virulence factors (15 different proteases, Microbial Surface Components Recognizing Adhesive Matrix Molecules).
Antibiotic of choice (if subgingival instrumentation is not sufficient): metronidazole

Porphyromonas gingivalis (Pg)

Pg is a strict anaerobe and is often found in cases of severe periodontitis. It populates the periodontium more consistently than *Aa*, for instance, which is more likely to be found in individual locations. Membrane-associated proteases are regarded as the most important virulence factor of *Pg*. These cleave fibrinogen, for instance, leading to bleeding on probing (BOP) and the release of haemin and iron. The latter serve as a source of nutrition for *Pg* and therefore contribute to the multiplication of the germ. Proteases also enable *Pg* to penetrate and destroy surrounding tissue. If *Pg* is present in large quantities, it cannot usually be controlled solely through subgingival instrumentation due to its tissue invasiveness.
Antibiotic of choice: metronidazole or ornidazole
If large quantities of *Pg* occur together with *Aa*, an antibiotic combination must be prescribed in addition to subgingival instrumentation.
In this case, metronidazole + amoxicillin or ornidazole + amoxicillin are the antibiotics of choice.

Prevotella intermedia (Pi)

Pi is an obligately anaerobically growing bacterium and is detected as a (co-)pathogen in mainly mixed-infection dentoalveolar infections. *Pi* is referred to as an early marker germ that creates the anaerobic environment necessary for the settlement of the main periodontal germs by metabolising residual sugar in the sulcus. In moderate concentrations, *Pi* can be treated by means of subgingival instrumentation.
Antibiotic of choice (with a high microbial count): metronidazole

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Tannerella forsythia (Tf)

Tf is a strict anaerobe and is found in significantly higher numbers in active pockets than in inactive ones. *Tf* has also been discovered in cases of recurrent periodontitis and is associated with refractory periodontitis. There is a close relationship between the simultaneous occurrence of *Tf* and *Td*. The virulence factors of *Tf* are relatively similar to those of *Aa*. *Tf* can usually be removed with subgingival instrumentation.
Antibiotic of choice (if really necessary): metronidazole or ornidazole

Treponema denticola (Td)

Td is a short, strictly anaerobic spirochete that is usually associated with *Pg* and with periodontal destruction. Like *Pg*, *Aa*, *Pi* and Capnocytophaga spp., *Td* produces tissue-destroying proteases, hyaluronidases, phosphatases and phospholipases. *Td* is useful as a marker when evaluating the success of refractory pocket treatment and can be treated through subgingival instrumentation in moderate concentrations.
Antibiotic of choice (with a high microbial count): metronidazole or ornidazole

Total Bacterial Load (TBL) oder Gesamtkeimzahl

The determination of the TBL or the total bacterial count enables an assessment of the total microbiological burden and provides information about the severity of the disease. The TBL in the periodontally diseased sulcus may be around 18 times higher than in the healthy sulcus. Not only the absolute number of pathogenic germs in the sample is therefore crucial for a treatment decision, but also their share of the total bacterial count (Marker Load (ML)).

Total Marker Load (TML)

The concentration of periodontopathogenic germs in the sulcus increases as the disease progresses. The share of these marker bacteria in the total bacterial count (TML) therefore enables an assessment of the subgingival equilibrium and thus a better overall therapeutic assessment for the patient. The ‚speedometer' enables the dentist and the patient to see at a glance the direction in which the microbiological status of the subgingival flora develops during treatment.

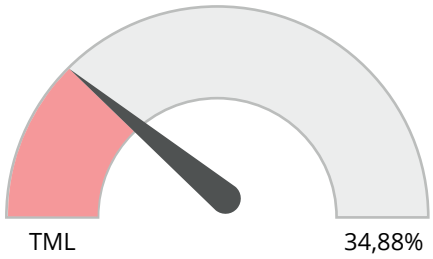

Fig. 5 Visualisation of the total marker bacterial load in the **PadoTest®** result

4. Analysis method

Various techniques can be used to detect and quantify microorganisms in the subgingival biofilm. Each technique has its own characteristics in terms of specificity and sensitivity.
Real-time PCR (polymerase chain reaction) is most frequently used in bacterial taxonomy and identification in scientific studies. This method – which is also the basis of the **PadoTest®** – ensures that the bacterium being sought is detected even in minute quantities, as germ-specific nucleic acid sequences are detected in the sample material in each case. Detection is carried out quantitatively with a detection limit of 10^2 bacteria.
The **PadoTest®** uses DNA as the analysis material. In a multiplex PCR, all six periodontal bacteria are simultaneously amplified and placed into relation with the total bacterial count. The unsurpassed accuracy of this analysis method therefore provides an accurate picture of the bacterial status in the gingival sulcus and has also been validated using the gold standard Next Generation Sequencing (NGS).

5. PadoSero

Aa serotype analysis – avoidance of unnecessary antibiotic administration

Aggregatibacter actinomycetemcomitans (Aa) is one of the key bacteria in the aetiology of periodontitis. It is now known that *Aa* can be subdivided into seven strains (‚a' to ‚g') due to the structural characteristics of its polysaccharide antigens (Takada *et al.* 2010). In addition, serotype ‚b' can also be subdivided into various clones, including the highly virulent clone JP2 (Haubek *et al.* 2007).

The distribution patterns of the serotypes differ amongst humans depending on the geographical location, ethnic origin and periodontal status of the patients (Brígido *et al.* 2014). Serotypes ‚a', ‚b' and ‚c' are globally dominant, whereas serotypes ‚d', ‚e' and ‚f' occur more rarely (Kim *et al.* 2009). Serotype ‚a' has been detected with a prevalence of 25% (Jentsch *et al.* 2012). The prevalence of the recently identified serotype ‚g' is not yet known. *Aa*-positive patients are usually infected with only one serotype, and more rarely with two or more (e.g. Yang *et al.* 2004). Various follow-up studies also showed that colonisation with one serotype is remarkably persistent (Saarela *et al.* 1992, 1999).

The pathogenicity *Aggregatibacter actinomycetemcomitans* is largely attributable to the effect of specific virulence factors on the immune system and tissue breakdown. A comparative study on multiple genes encoding virulence factors mainly associated serotype ‚b' with periodontal diseases and serotype ‚a' with healthy conditions (Umeda *et al.* 2013). Two of the virulence factors that have been studied particularly intensively are known to vary between the various *Aa* strains: leukotoxin and cytolethal distending toxin. In particular, clone JP2, which belongs to serotype ‚b', produces high quantities of leukotoxin due to a 530 bp deletion in the leukotoxin promoter region. This highly pathogenic clone is particularly widespread amongst the population of northern and western Africa (Höglund Åberg *et al.* 2014), but can be transmitted through close contact (Haubek *et al.* 2007).

Each *Aa* serotype can be treated mechanically through subgingival instrumentation and/or with various antibiotics. Nevertheless, antibiotics should be administered restrictively, since they also always kill symbiotic bacteria and can contribute to the spread of resistances.

Because of this, we have optimised our therapy recommendations such that the adjuvant administration of antibiotics is only advised in cases in which it promises to improve the clinical or microbiological situation. The treatment of serotypes ‚b' to ‚c' is therefore based on the administration of antibiotics and/or mechanical treatment. Especially in the presence of the highly virulent JP2 clone of serotype b, antibiotic support for AIT and screening of other family members should be carried out. While serotype ‚a' occurs with a higher prevalence (25%), it is less virulent. The presence of this serotype therefore does not necessitate antibiotic administration, but can be treated through subgingival instrumentation and improved oral hygiene.

Unnecessary antibiotic administration can therefore be reduced by up to 25% through *Aggregatibacter actinomycetemcomitans* serotyping.

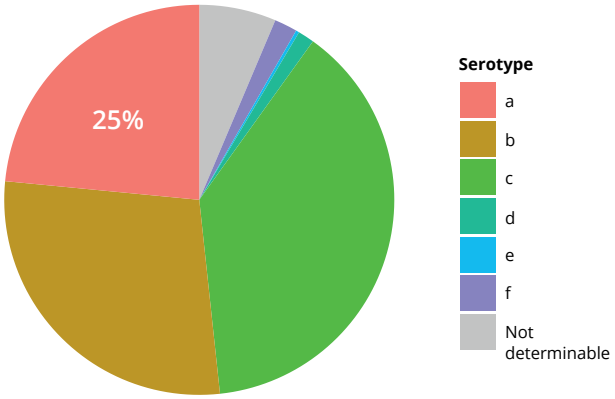

Fig. 6 Distribution of the serotypes of *Aggregatibacter actinomycetemcomitans (Aa)*

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Therapy recommendations

Serotype a – subgingival instrumentation + monitoring
No antibiotic therapy indicated, as serotype a belongs to the ‚green complex' (Socransky *et al.* 1998). Generally not virulent (Kawamoto *et al.* 2009, Umeda *et al.* 2013) and associated with periodontally healthy patients. *The causal infection and inflammation are combated by means of subgingival instrumentation.*

Serotypes b and c – subgingival instrumentation, monitoring + antibiotics
Associated with a significant risk of coronary heart disease (Pietiäinen *et al.* 2018). Increased risk of alveolar bone loss (Melgar-Rodríguez *et al.* 2015).
Antibiotic recommendation: amoxicillin, 3 × 500 mg daily, 7 days

Serotypes d, e and f – subgingival instrumentation, monitoring + antibiotics
Due to very low prevalence (Kim *et al.* 2009, Chen *et al.* 2010, Mínguez *et al.* 2014), systematic antibiotic therapy is only indicated depending on the clinical picture.
Antibiotic recommendation (with poor clinical picture): amoxicillin, 3 × 500 mg daily, 7 days

Flow chart

The ‚**PadoSero**' option is only invoiced on detection of *Aa* and can therefore always be selected!

PadoSero on detection of *Aa*

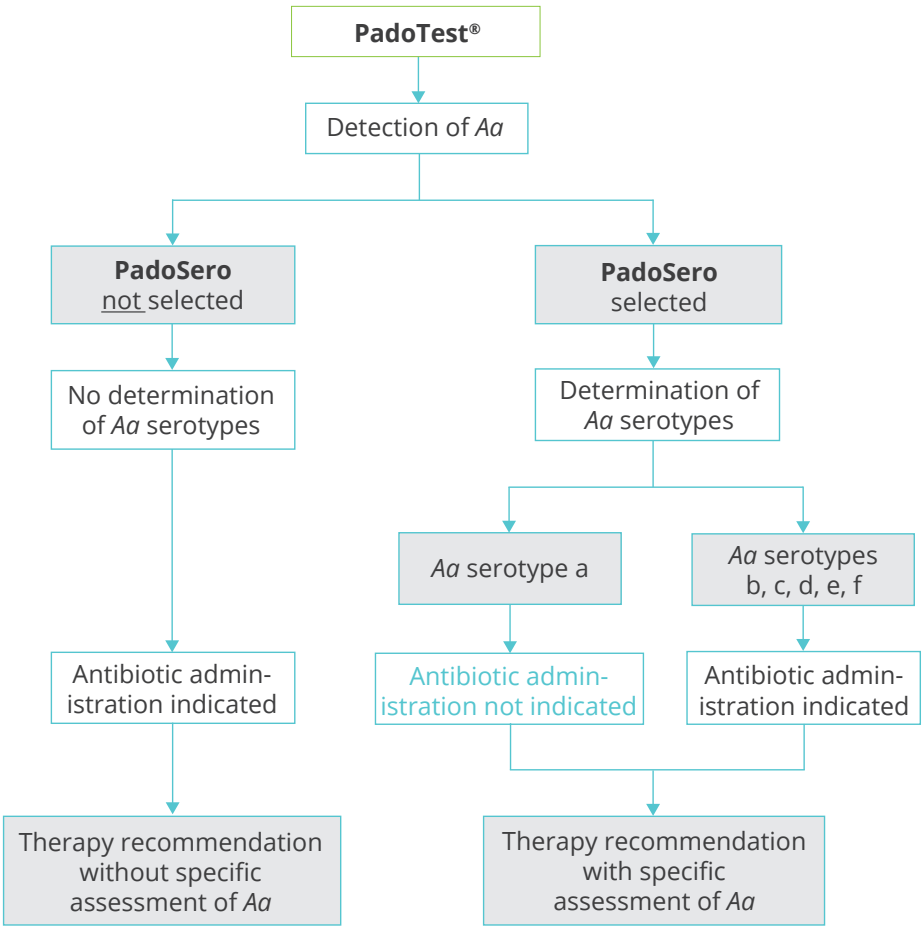

Fig. 7 Flow chart as a decision-making aid

Example result of marker germ *Aa* serotype a

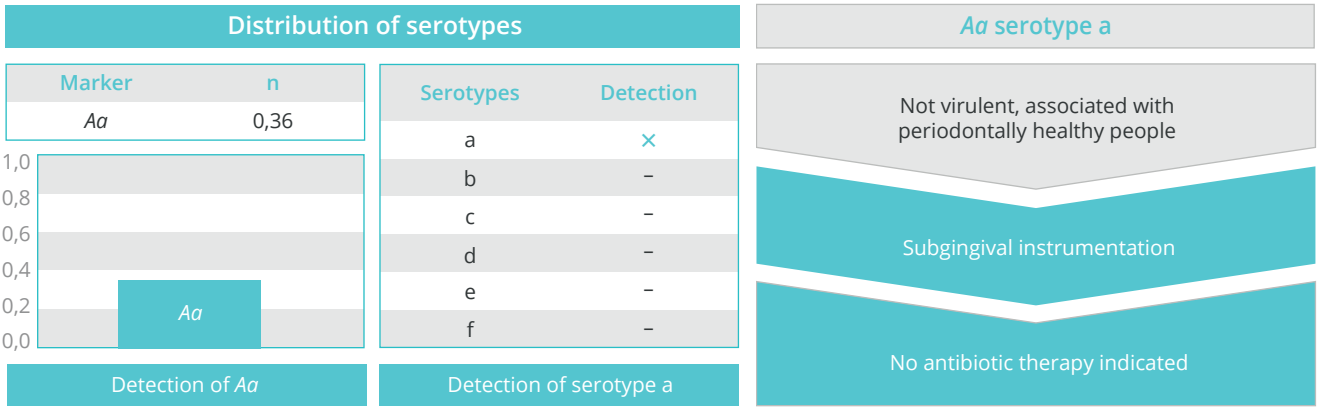

Fig. 8 Excerpt of an **PadoSero** result

The **PadoSero** takes slightly longer to process, as serotyping is only carried out on detection of *Aa*.

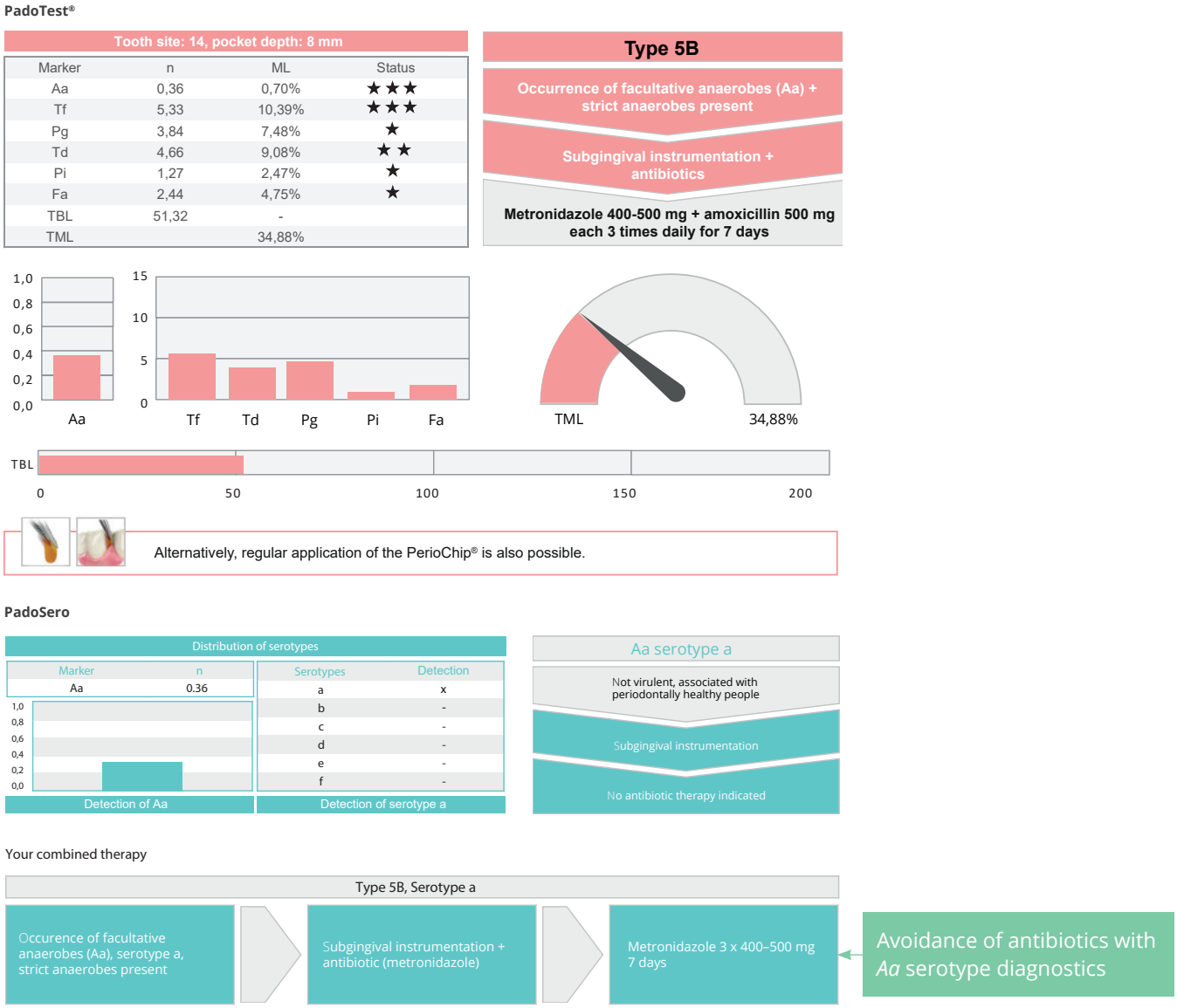

Fig. 9 Example of a combined **PadoTest®** + **PadoSero** result

The additional ‚**PadoSero**' analysis results in forgoing amoxicillin in a clinically severe type 5B with serotype a of the *Aa* marker.

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6. The right time for the PadoTest®

- Prior to treatment as a decision-making aid for targeted, patient-specific therapy
- After treatment to check success
- As reinfection prophylaxis during recall
- For clarifying chains of infection

Sampling time:

- *For a treatment decision:* Prior to treatment, on re-evaluation of the hygiene phase to enable antibiotic administration directly after mechanical therapy if necessary
- *To check success:* At the earliest 4 (optimally 7) weeks after the respective treatment step

The following must always be observed when performing the PadoTest®:

- No sampling directly after subgingival instrumentation
- No use of mouthwash 24 hours before taking a smear sample
- Antibiotic administration due to another disease must be completed at least 4 weeks prior to sampling

7. Implementation

The **PadoTest®** kit box can be used to perform both an **PadoTest®** single-site test and an **PadoTest®** multi-site test. An **PadoTest®** kit box contains:

- 4 colour-coded test tubes
- 5 sterile paper points
- 1 order form incl. **PadoSero**
- Instructions for use

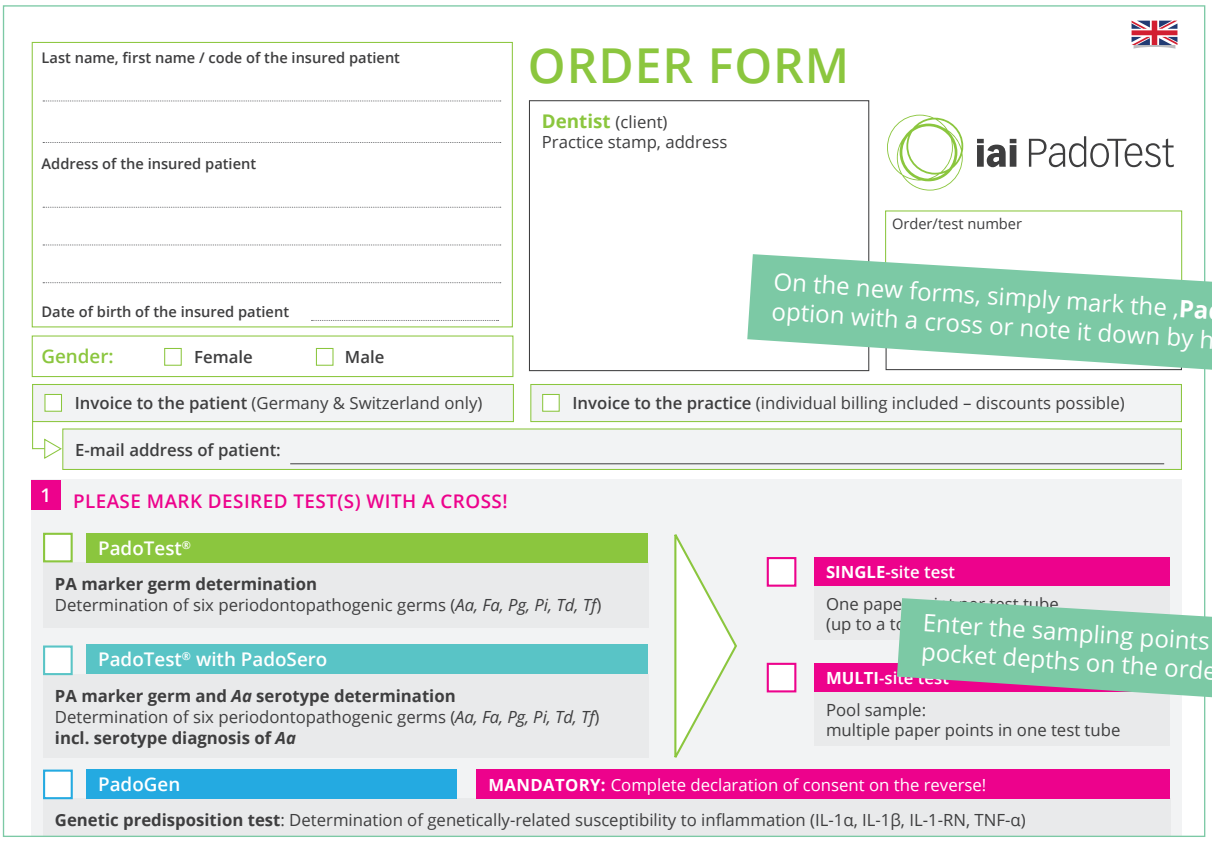

Fig. 10 Simplified illustration of the **PadoTest®** order form

The samples are returned in the **PadoTest®** kit box postage-paid and without an additional envelope. After approximately 2 working days the result can be called up on the **PadoTest®** homepage (www.institut-iai.ch). Mailing usually takes one to two days longer.

Please have the patient sign the informed consent section on the rear of the order form.

PadoTest® single-site test

In the **PadoTest®** single-site test, the smears for the selected pockets are evaluated separately, thus avoiding the addition of individual pocket results.

Execution: each paper point is supplied in a separate test tube.

Fig. 11 Test tubes available in the **PadoTest®**: red, green, blue and yellow

Indications for the **PadoTest®** single-site test

- For precise analysis and typing
- With residual pockets
- With recurrences
- For antibiotic-critical patients (no addition!)
- Prior to implantation

PadoTest® multi-site test

In the **PadoTest®** multi-site test (pool sample), all of the samples that are taken are evaluated together. This is the most inexpensive variant and provides a very good overview of the overall status.

Execution: all paper points (up to four) are placed in one test tube.

Indications for the **PadoTest®** multi-site test:

- To assess the overall status
- To check success
- In supportive periodontal therapy (SPT)

Sampling

Essentially, samples should only be taken from pockets that are ≥ 4 mm.

In generalised periodontitis, subgingival sampling from the deepest pocket per quadrant is the most efficient method and provides a representative picture of bacterial colonisation.[1] In localised periodontitis, individual pockets can also be selected and analysed.

It must be noted that *Aa* can escape from the periodontal pocket into the surrounding tissue and thus evade detection. When analysing four tooth sites, however, the probability of detecting *Aa* is nevertheless high. Prior to sampling, remove supragingival plaque with a non-fluffing cotton pellet without penetrating the pocket. Dry the sampling point with air.

Use sterile tweezers to insert a paper point down to the bottom of each pocket and leave it there for 10 to 15 seconds. Then place the paper point(s) into a test tube and seal the lid tightly.

No sampling from pockets with PUS. This ‚clogs' the surface of the paper points and only a very few bacteria are collected. If no other deep pocket is present, the samples can be removed using a curette and this can then be wiped off with the paper point. Then place the paper point into a test tube.

1 A. Mombelli *et al.*, Black-pigmenting Gram-negative bacteria in periodontal disease. II. Screening strategies for detection of *Porphyromonas gingivalis*, J Periodont Res 1991; 26:308-313

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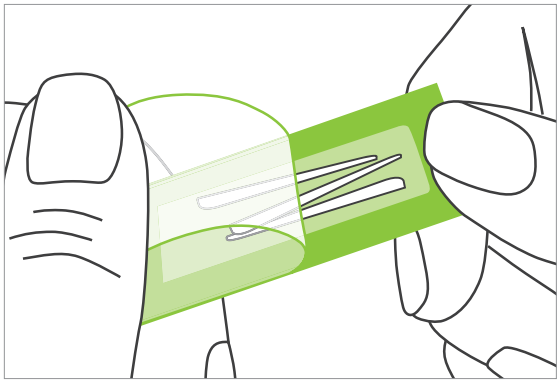
Sample collection

1. Order
Fill in all of the forms legibly using a pen. Note the test number of the form in your documents.

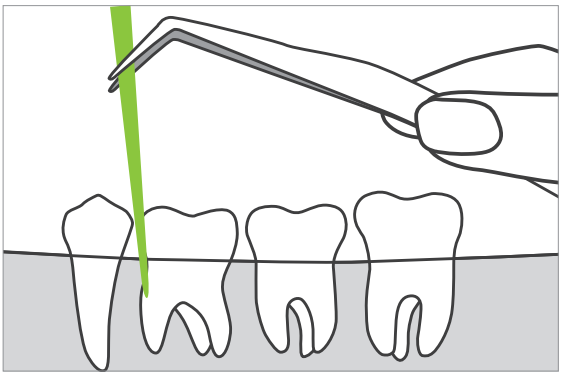


2. Preparation
Take the paper points and select the sampling point(s) for the samples.

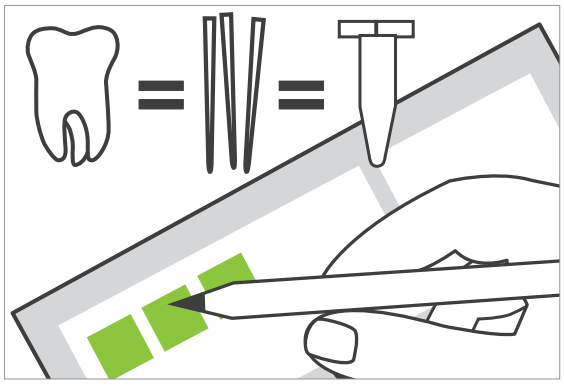
2a. PadoTest® multi-site test
Samples from several gingival sulci are summarised in one analysis. Simply place all of the paper points used into one test tube.

2b. PadoTest® single-site test
Separate analyses of up to four different gingival sulci. Each paper point is supplied in a separate test tube.

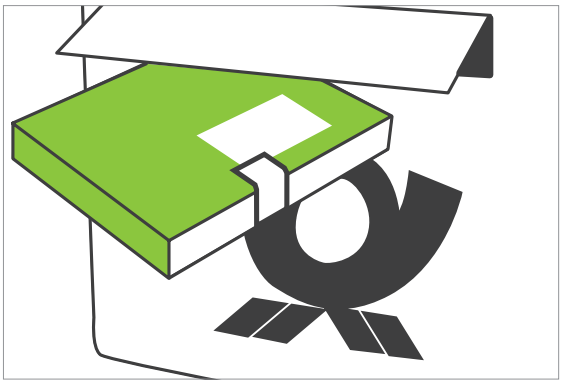
Prior to sampling: remove supragingival plaque and dry the sampling point (not professional tooth cleaning).



3. Sampling
Use sterile tweezers to insert a paper point down to the bottom of each gingival sulcus and leave it there for 10 to 15 seconds.



4. Summarisation
Note the sampling point and pocket depth for the respective test tube on the order form. *Note: select the ‚**PadoSero**' option (serotype analysis on detection of Aa).*



5. Shipping
Send in the samples and documents postage-paid in the **PadoTest®** kit box and obtain the result online (after registration) and by post (if desired).

Fig. 12 Sample collection and shipping of the **PadoTest®**

8. Evaluation

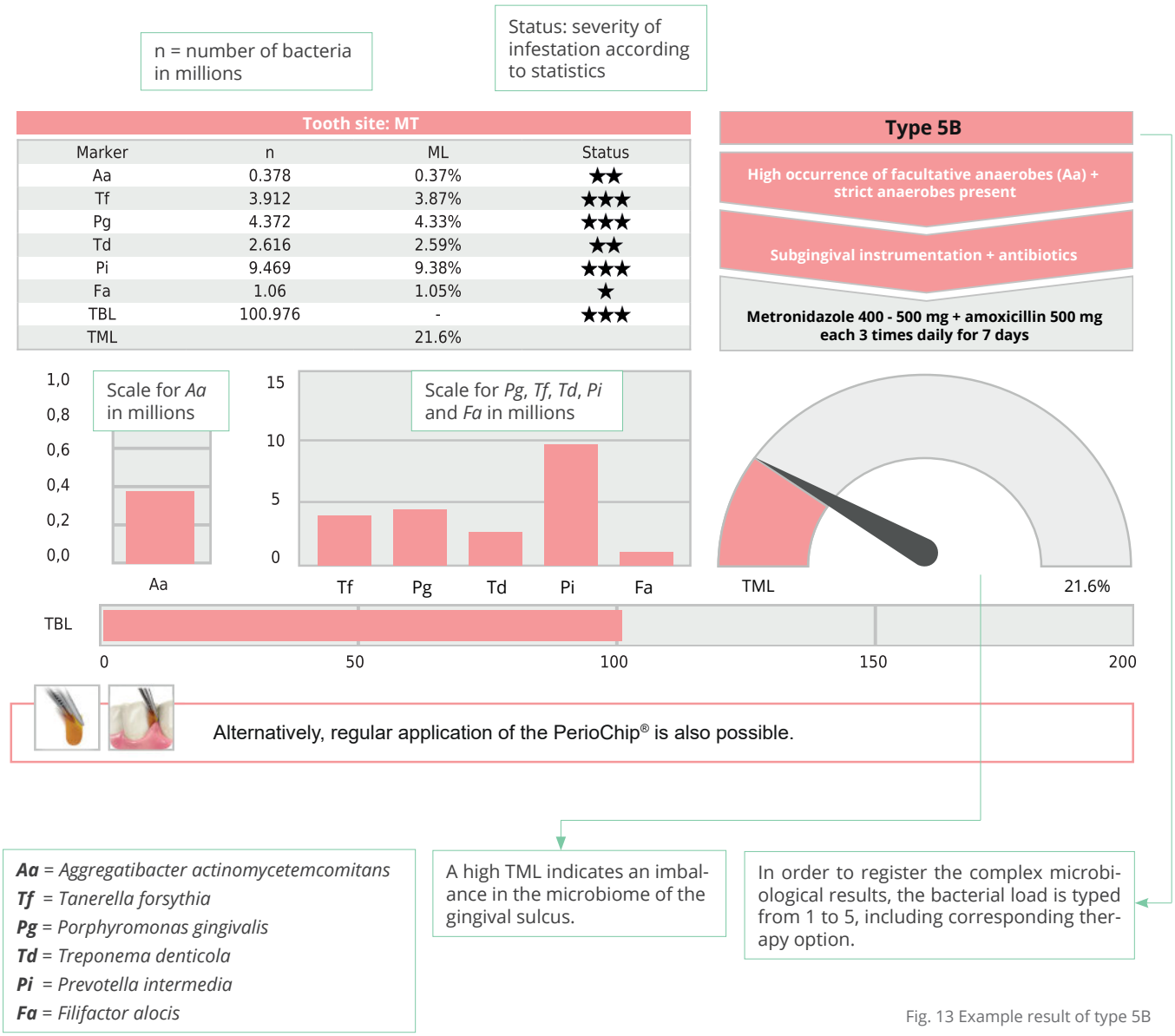


Fig. 13 Example result of type 5B

TBL: Total Bacterial Load. The total bacterial count is increased in the case of periodontitis.
TML: Total Marker Load. Percentage of pathogenic bacteria in the total bacterial count. A TML of 2% already indicates a risk patient.
ML: Marker Load. Percentage of the respective bacteria in relation to the total bacterial count.

Status

Evaluation of the respective microbial load: **the more ★★ (stars), the greater the bacterial load of the analysed gingival sulcus(i)**

Status	Meaning
-	Not detected, or normal bacterial count
(★)	Detection limit or slightly increased bacterial count
★	Bacterial count increased
★★	Bacterial count high
★★★	Bacterial count very high

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9. Therapy

The following basically applies: to achieve the best possible effect, always administer antibiotics in adjuvant form and directly after mechanical therapy.

Type 1	No antibiotic necessary + maintain monitoring: microbiologically satisfactory
Type 2A	Subgingival instrumentation + maintain monitoring: slight occurrence of strict anaerobes
Type 2B	Subgingival instr. + antibiotics optional (metronidazole + amoxicillin): slight occurrence of facultative anaerobes (*Aa*) + strict anaerobes
Type 3A	Subgingival instr. + antibiotic (metronidazole): increased occurrence of strict anaerobes, facultative anaerobes (*Aa*) absent
Type 3B	Subgingival instr. + antibiotics (metronidazole + amoxicillin): increased occurrence of strict anaerobes + facultative anaerobes (*Aa*)
Type 4A	Subgingival instr. + antibiotic (amoxicillin): facultative anaerobes (*Aa*) very extensively increased, strict anaerobes absent
Type 4B	Subg. instr. + antibiotics (metronidazole + amoxicillin): facult. anaerobes (*Aa*) very extensively increased + slight occ. of strict anaerobes
Type 5A	Subgingival instr. + antibiotic (metronidazole): high occurrence of strict anaerobes, facultative anaerobes (*Aa*) absent
Type 5B	Subgingival instr. + antibiotics (metronidazole + amoxicillin): high occurrence of facultative anaerobes (*Aa*), strict anaerobes present

Green range: therapy threshold without indication of antibiotics

As of type 2B, regular application of the **PerioChip®** can also be considered as an alternative to administering systemic antibiotics.

Overview

Type 1 – no antibiotic necessary + monitoring
The microbiological situation usually remains stable for a long time. Improvement is possible with good oral hygiene and regular SPT. Monitor *Fa*, as it is assumed that this bacterium could play an important role in the development of periodontitis.
CAVE: Watch out for *Aa*! Can occur very rarely in small quantities.
If the clinical picture is very poor: amoxicillin or doxycyclin.[1] Monitoring at short intervals.

Type 2 – subgingival instrumentation + monitoring
CAVE: Watch out for *Aa*! Can occur very rarely in small quantities.
If the clinical picture is very poor: amoxicillin or doxycyclin.[1]

Type 3 – subgingival instrumentation + monitoring, antibiotics if necessary
Antibiotics improve the microbiological picture, but only slightly reduce the pocket depth.
Therefore, in the case of a poor clinical picture or *Aa*, antibiotics if necessary (with *Aa*: doxycyclin or amoxicillin; with *Aa* and strict anaerobes: doxycyclin or metronidazole and amoxicillin).[1]

Type 4 – subgingival instrumentation, monitoring + antibiotics
Antibiotics of choice: amoxicillin or ciprofloxacin + metronidazole or doxycyclin alone.
With very low numbers of *Fa, Td, Tf, Pg* and *Pi* (strict anaerobes): possibly avoid metronidazole (ornidazole/clindamycin) and administer amoxicillin or ciprofloxacin alone (fewer undesired side-effects and less strain on the patient).[1]

Type 5 – subgingival instrumentation, monitoring + antibiotics
If *Aa* is absent (facultative anaerobe): possibly avoid amoxicillin (or ciprofloxacin) and administer metronidazole (ornidazole/clindamycin) alone (fewer undesired side-effects and less strain on the patient).[1]
CAVE: Since *Aa* can invade the tissue from the periodontal pocket and thus evade detection, an antibiotic combination (see above) or doxycyclin alone should be prescribed due to reasons of safety if fewer than four tooth sites are analysed.
CAVE: Multi-site test: the biofilms from the various pockets are mixed. A type 5 could be a cumulative type 2, in which case subgingival instrumentation would be sufficient.

1 As of a pocket depth of 5 mm, regular application of the PerioChip® can also be considered as an alternative.

Type	1	2	3	4	5
Subgingival instrumentation	–	●	●	●	●
Antibiotics (AB)	–	–	(●)	●	●

Note on the PadoTest® single-site test:
If the analysis result reveals different types, the therapy is always aimed at the worst type.

Antibiotic dosages[1]

Active substance	Dosage for adults
Amoxicillin 500 mg	3 x 500 mg daily, 7 days
Metronidazole 400-500 mg	3 x 400-500 mg daily, 7 days
Ornidazole 500 mg (instead of metronidazole)	2 x 500 mg daily, 10 days
Clindamycin 300 mg (instead of metronidazole)	4 x 300 mg daily, 7 days
Ciprofloxacin 250 mg (instead of amoxicillin)	2 x 250 mg daily, 10 days
Doxycyclin 100 mg	1st day 200 mg, then 1 x 100 mg daily, 18 days
Preparation combinations	
Metronidazole 400-500 mg[2] + amoxicillin 500 mg	3 x 400-500 mg + 3 x 500 mg daily, 7 days
Metronidazole 400-500 mg + ciprofloxacin 250 mg[3]	2 x 400-500 mg + 2 x 250 mg daily, 7 days

- Amoxicillin: effective against facultative anaerobes such as *Aa*
  - *CAVE:* Penicillin allergy
- Ciprofloxacin: effective against facultative anaerobes such as *Aa*
  - *CAVE:* Not in pregnant and lactating women or children and adolescents up to the end of the growth phase
- Metronidazole, ornidazole, clindamycin: effective against strict anaerobes (*Tf, Td, Pg, Pi, Fa*)
  - *CAVE:* Metronidazole has an Antabuse effect: do not drink alcohol during medication. This effect is not pronounced with ornidazole (not available in Germany).
- Doxycyclin: effective against facultative and strict anaerobes
  - *CAVE:* Can trigger photosensitivity. Avoid sunlight or other UV radiation during medication

Doxycyclin, metronidazole, ornidazole and ciprofloxacin are contraindicated during pregnancy. The alternative, clindamycin, should only be used specifically for anaerobic infections.

PerioChip®

- 2.5 mg insert with 36% chlorhexidine digluconate

As regards further contraindications as well as interactions with other drugs, please note the information specified by the manufacturer.

1 According to van Winkelhoff *et al.* 1989 and/or Beikler, T., Karch, H., Flemmig, T. F. 2003 and/or Mombelli A. *et al.* 2005
2 Can be replaced with clindamycin; dosage, see above
3 Combination can be replaced with doxycyclin; dosage, see above

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10. Service

One order unit contains 8 **PadoTest®** kit boxes; these can be used for both an **PadoTest®** single-site test and for an **PadoTest®** multi-site test.

PadoTest® Service

- The **PadoTest®** kit boxes are free. The test kit boxes are also used for the postage-free return of the samples.
- The analysis result includes therapy recommendations.
- All orders, results and invoices can be called up online at www.institut-iai.ch. If desired, results and invoices can also be sent by post.
- Invoices can also be sent directly to patients. The analysis results are always sent to the dental practice.
- If invoices are sent to the dental practice: the invoices are created as a collective invoice at the beginning of the following month. Itemised statements for each patient are attached.
- Free **PadoTest®** patient brochures and discussion guideline cards can be requested for the discussion with the patient.

For further information or questions, feel free to contact us on our **free hotline 00800-32326262** or by calling **+41-326855462**. You can also send us an e-mail at **iai@padotest.ch** or obtain information on our website **www.institut-iai.ch.**

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11. Case examples

Type 1

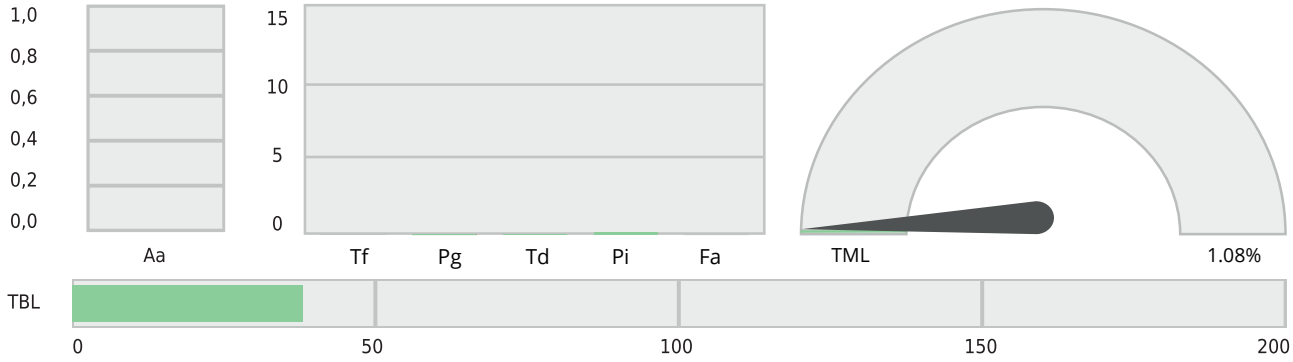
Tooth site: MT			
Marker	n	ML	Status
Aa	-	-	-
Tf	-	-	-
Pg	0.004	0.01%	-
Td	0.07	0.18%	(★)
Pi	0.308	0.81%	(★)
Fa	0.03	0.08%	(★)
TBL	38.16	-	★★★
TML		1.08%	

Type 1

Microbiologically satisfactory

No antibiotic required

Maintain monitoring



Type 2A

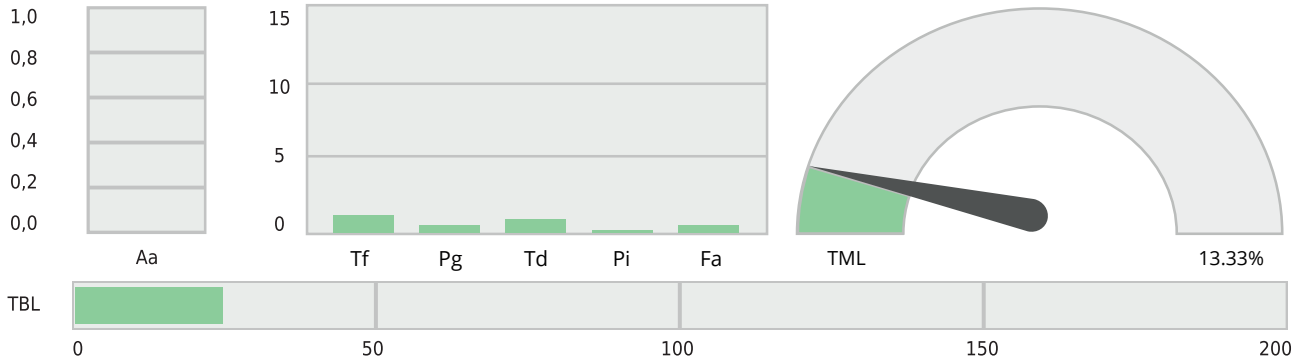
Tooth site: 14, 26, 36, 46, pocket depth: 7mm 7mm 8mm 8mm			
Marker	n	ML	Status
Aa	-	-	-
Tf	1.197	4.89%	(★)
Pg	0.478	1.95%	-
Td	0.896	3.66%	(★)
Pi	0.19	0.78%	-
Fa	0.499	2.04%	(★)
TBL	24.46	-	-
TML		13.33%	

Type 2A

Slight occurence of strict anaerobes

Subgingival instrumentation

Maintain monitoring



Type 2B

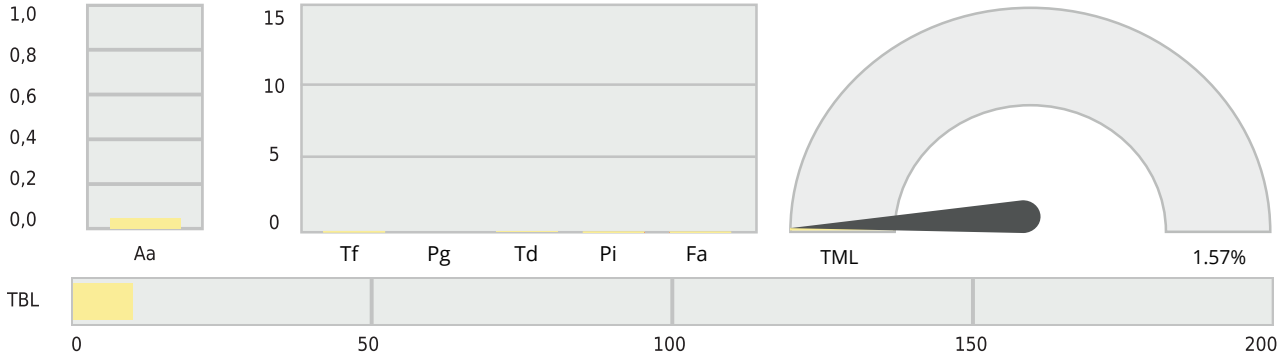
Tooth site: 12, pocket depth: 6mm			
Marker	n	ML	Status
Aa	0.047	0.47%	(★)
Tf	0.054	0.54%	-
Pg	-	-	-
Td	0.034	0.34%	-
Pi	0.013	0.13%	-
Fa	0.008	0.08%	-
TBL	9.975	-	-
TML		1.57%	

Type 2B

Slight occurrence of facultative anaerobes (Aa) + strict anaerobes

Subgingival instrumentation + antibiotics (optional)

Metronidazole 400 - 500 mg + amoxicillin 500 mg each 3 times daily for 7 days



Alternatively, regular application of the PerioChip® is also possible.

Type 3A

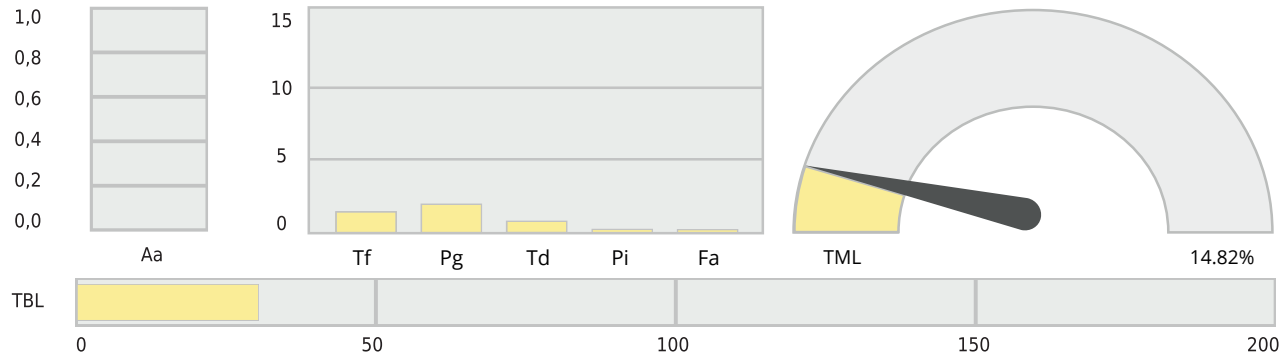
Tooth site: MT			
Marker	n	ML	Status
Aa	-	-	-
Tf	1.399	4.64%	★
Pg	1.91	6.34%	★
Td	0.758	2.52%	(★)
Pi	0.208	0.69%	-
Fa	0.191	0.63%	-
TBL	30.126	-	(★)
TML		14.82%	

Type 3A

Increased occurrence of strict anaerobes, facultative anaerobes (Aa) absent

Subgingival instrumentation + antibiotic (if necessary)

Metronidazole 400 - 500 mg 3 times daily for 7 days



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Type 3A

Tooth site: 16, 24, 31, 43, 46

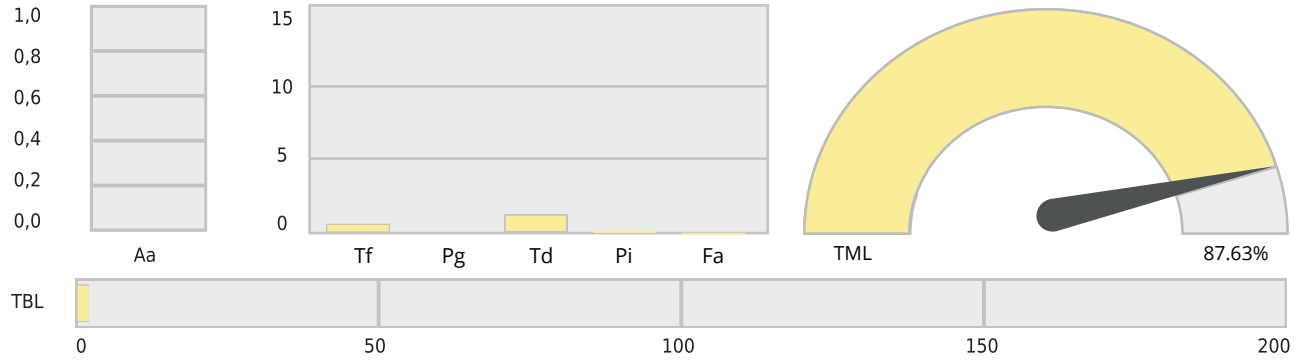
Marker	n	ML	Status
Aa	-	-	-
Tf	0.521	25.05%	(★)
Pg	-	-	-
Td	1.186	57.06%	★
Pi	0.075	3.6%	-
Fa	0.039	1.9%	-
TBL	2.079	-	-
TML		87.63%	

Type 3A

Increased occurrence of strict anaerobes, facultative anaerobes (Aa) absent

Subgingival instrumentation + antibiotics (if necessary)

Metronidazole 400 - 500 mg 3 times daily for 7 days



Alternatively, regular application of the PerioChip® is also possible.

Type 3B

Tooth site: 16m, 21p, 35l, 47m, pocket depth: 5mm, 1mm, 5mm, 8mm

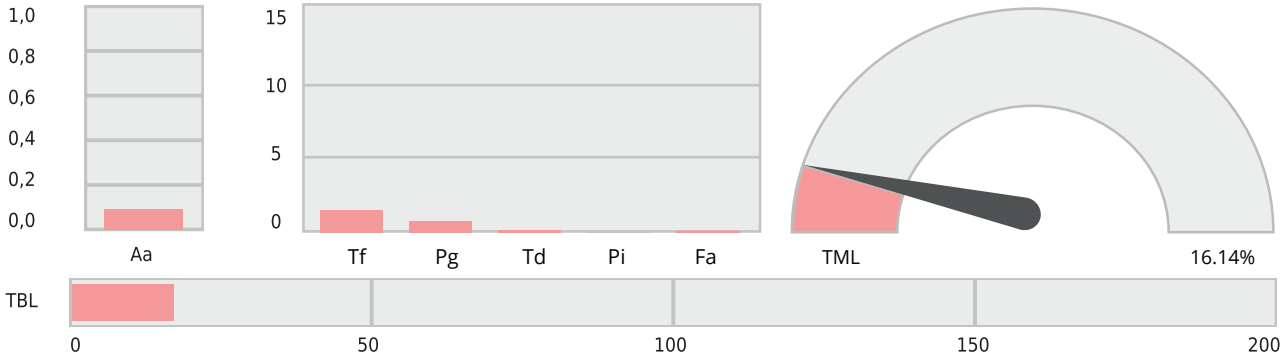
Marker	n	ML	Status
Aa	0.092	0.55%	(★)
Tf	1.548	9.17%	★
Pg	0.789	4.67%	(★)
Td	0.192	1.14%	-
Pi	-	-	-
Fa	0.104	0.62%	-
TBL	16.889	-	-
TML		16.14%	

Type 3B

Increased occurrence of strict anaerobes + facultative anaerobes (Aa)

Subgingival instrumentation + antibiotics (if necessary)

Metronidazole 400 - 500 mg + amoxicillin 500 mg each 3 times daily for 7 days



Alternatively, regular application of the PerioChip® is also possible.

Type 4A

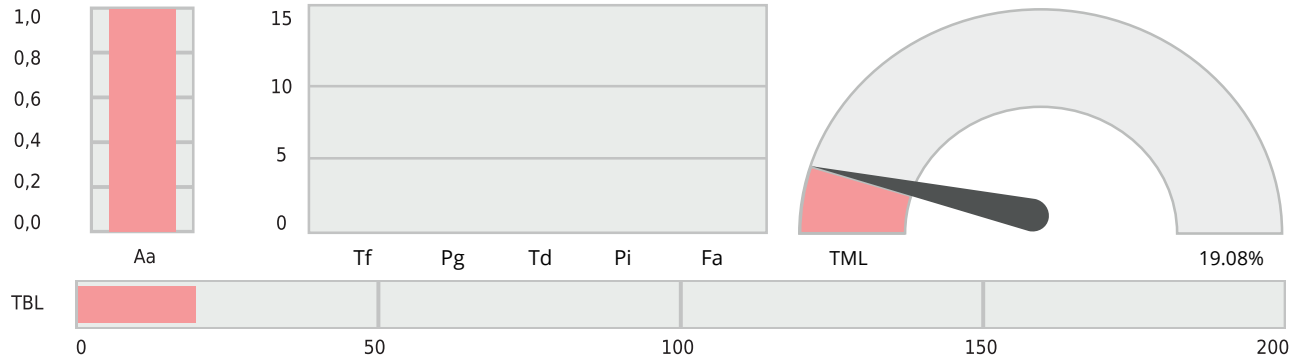
Tooth site: MT 16, 26, 36, 46, pocket depth: 6mm, 6mm, 6mm, 6mm			
Marker	n	ML	Status
Aa	3.725	19.08%	★★★
Tf	-	-	-
Pg	-	-	-
Td	-	-	-
Pi	-	-	-
Fa	-	-	-
TBL	19.518	-	-
TML		19.08%	

Type 4A

Facultative anaerobes (Aa) very extensively increased + strict anaerobes absent

Subgingival instrumentation + antibiotic

Amoxicillin 500 mg
3 times daily for 7 days



Alternatively, regular application of the PerioChip® is also possible.

Type 5A

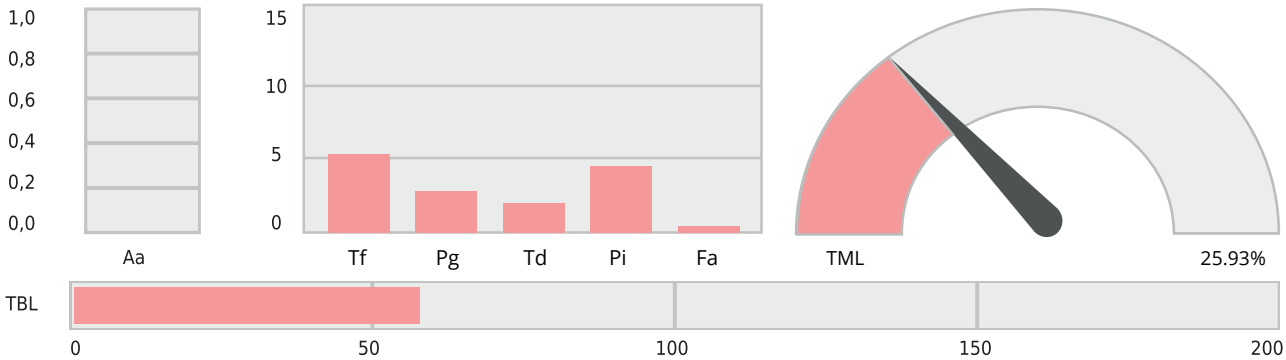
Tooth site: MT 12, 26, 34, 47			
Marker	n	ML	Status
Aa	-	-	-
Tf	5.234	9.09%	★★★
Pg	2.8	4.86%	★★
Td	1.964	3.41%	★★
Pi	4.478	7.77%	★★★
Fa	0.46	0.8%	(★)
TBL	57.601	-	★
TML		25.93%	

Type 5A

High occurrence of strict anaerobes, facultative anaerobes (Aa) absent

Subgingival instrumentation + antibiotic

Metronidazole 400 - 500 mg
3 times daily for 7 days



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Type 5A

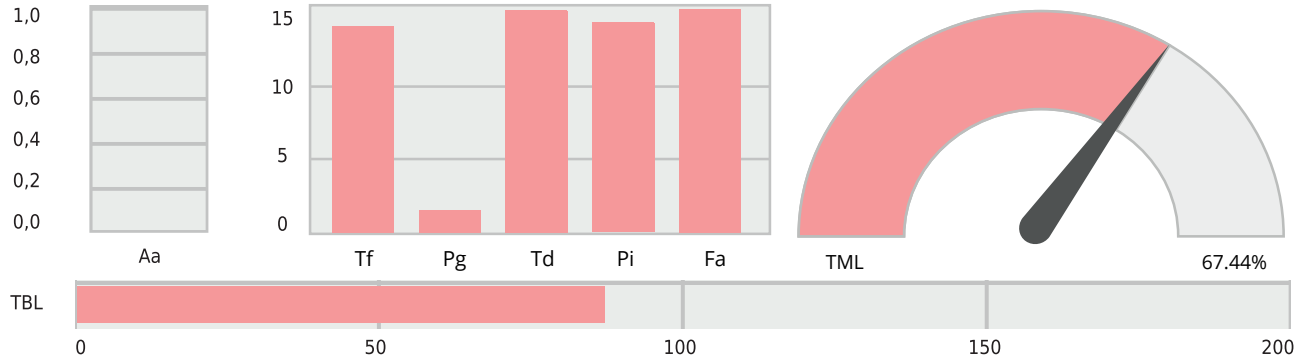
Tooth site: MT 17mp, 27mp, 37mv, 46ml, pocket depth: 11mm, 7mm, 6mm, 8mm			
Marker	n	ML	Status
Aa	-	-	-
Tf	13.751	15.74%	★★★
Pg	1.507	1.73%	(★)
Td	14.833	16.98%	★★★
Pi	13.987	16.01%	★★★
Fa	14.843	16.99%	★★★
TBL	87.375	-	★★
TML		67.44%	

Type 5A

High occurrence of strict anaerobes, facultative anaerobes (Aa) absent

Subgingival instrumentation + antibiotic

Metronidazole 400 - 500 mg 3 times daily for 7 days



Alternatively, regular application of the PerioChip® is also possible.

Type 5B

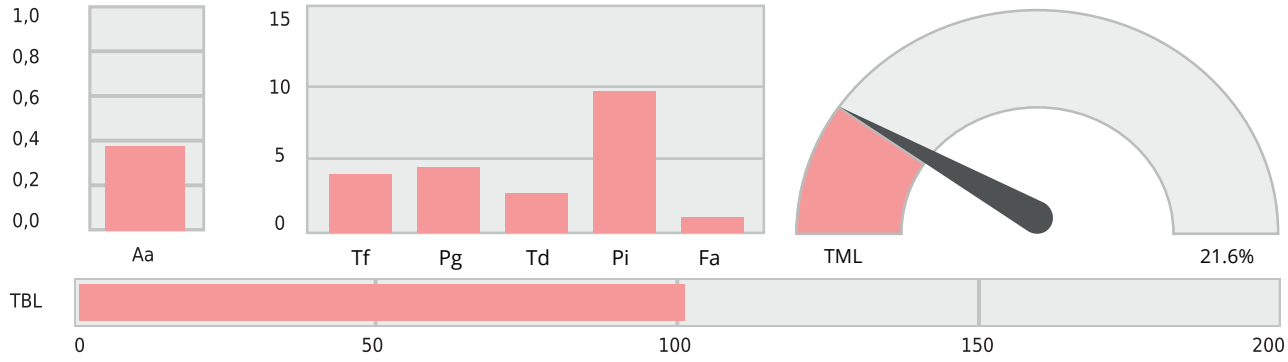
Tooth site: MT			
Marker	n	ML	Status
Aa	0.378	0.37%	★★
Tf	3.912	3.87%	★★★
Pg	4.372	4.33%	★★★
Td	2.616	2.59%	★★
Pi	9.469	9.38%	★★★
Fa	1.06	1.05%	★
TBL	100.976	-	★★★
TML		21.6%	

Type 5B

High occurrence of facultative anaerobes (Aa) + strict anaerobes present

Subgingival instrumentation + antibiotics

Metronidazole 400 - 500 mg + amoxicillin 500 mg each 3 times daily for 7 days



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12. References

General information about periodontitis

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Comments

- * *Bacteroides forsythus* is the obsolete name of *Tannerella forsythia*
- ** *Actinobacillus actinomycetemcomitans* is the obsolete name of *Aggregatibacter actinomycetemcomitans*

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