The success of any periodontal treatment depends on accurate initial diagnosis. Traditional clinical measurements used for periodontal diagnosis are often of limited usefulness as they are indicators of previous periodontal disease rather than present disease activity. Hence, there is a need for developing novel diagnostic kits that can detect active disease, predict the disease progression and to evaluate its response to periodontal therapy. Different chair side diagnostic kits are discussed in this review which would be helpful for proper diagnosis, evaluating a disease prognosis and proper treatment planning.

Key words: Periodontal disease, diagnostic, chair side tests
INTRODUCTION

Periodontal disease is an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment and bone loss and is characterized by pocket formation and/or gingival recession. In the past few decades evidences have showed that periodontitis does not affect all people and that it need not progress in a continuous manner and can be a specific problem, the understanding of the nature of the disease has been altered. Despite our increased understanding of the etiology and pathogenesis, the diagnosis and classification of the disease are still based almost entirely on traditional clinical assessments. "Periodontal Diagnosis" is an important tag that a clinician ties on the periodontal disease condition of the patient, capturing all his past experience with the condition in question. The entire constellation of signs and symptoms, along with a detailed history is elicited, documented and interpreted to reach at a diagnosis. Most often an accurate diagnosis is, the very first concrete step towards the planning and execution of an appropriate individualized treatment plan, contributing significantly towards the success of the therapy. Traditional clinical measurements (probing pocket depth, bleeding on probing, clinical attachment loss, plaque index, radiographs) used for periodontal diagnosis are often of limited usefulness in that they are indicators of previous periodontal disease rather than present disease activity.

The 1990s have seen the emergence of a multitude of diagnostic tests based on physical, chemical, microbiological and immunological methodologies. The philosophy behind the emergence of such tests is that the earlier active disease is diagnosed, the less invasive, time consuming, and therefore costly the required treatment, and the better the long term prognosis for patients with destructive disease. Furthermore, with the recognition that risk groups and unpredictable disease patterns exist, the benefits of objective testing for initial diagnosis and for the long-term maintenance of periodontal patients become clear. For periodontal diagnosis, the ideal diagnostic test should be:

1. Quantitative.
2. Highly sensitive method capable of analyzing a single periodontal site in health as well as disease.
3. Reproducible.
4. Highly specific.
5. Simple to perform.
6. A rapid, one or two stage procedure.
8. Versatile in terms of sample handling, storage and transport.
9. Amendable to chairside use.
10. Economical.
11. Dependent upon simple and robust instrumentation.

Several methods have been employed to detect putative periodontopathogens in clinical samples. These include cultural methods, microscopy, immunofluorescent assays, enzyme-linked immunosorbent assays, trypsin-like protease assays, DNA probes and the PCR. Among these tests, chairside periodontal kits provide immediate reports as compared to traditional laboratory procedures. Chairside periodontal test kits can be categorized as:

- Microbiological test kits
- Biochemical test kits
- Genetic kits

MICROBIOLOGICAL TEST KITS

The microbiological tests have the potential to support the diagnosis of various forms of periodontal disease, to serve as indicators of disease initiation and progression and to determine which periodontal sites are at higher risk for active destruction. The bacteriological tests (Microscopy, Culture, Omnigene, Affirm DP and EvaluSite) are mainly aimed at spirochetes, A. actinomy cetemcomitans, P.gingivalis and P.intermedia. Microbial tests can also be used to monitor...
periodontal therapy directed towards the suppression or eradication of periodontopathogenic organisms.

**Omnigene**

These are DNA probe systems for a number of known periodontopathogens subgingival bacteria. A paper point sample of sub-gingival plaque is placed in the container provided and mailed off to the company for assay. Probes are available for the detection of A. actinomycetemcomitans, P. gingivalis, P. intermedia, F. nucleatum, C. rectus, T. denticola and E. corroden. Reports are provided within very short time periods (few hours to few days).

**Evalusite**

Evalusite is a kit that employs a novel membrane-based enzyme immunoassay for the detection of three putative periodontopathogens: Aa, Pg and Pi. A sub-gingival sample is collected using paper points and added to a sample tube. The eluent is then added to the kit, which employs a sandwich-type ELISA (enzyme-linked immunosorbent assay); a pink spot is displayed if the test organism is present. The main weaknesses of this test kit reside in (1) the assumption that the three detected organisms are causing disease; (2) it is a multistage test; (3) it has a subjective calorimetric end point and (4) there is no permanent record of the results.

**Perioscan®**

Perioscan is a diagnostic test kit that utilizes the BANA (N-benzyol-DLarginine-2-naphthylamide)-hydrolysis reaction, developed to detect bacterial trypsin-like proteases in the dental plaque. A trypsin-like activity has been identified in strains of P. gingivalis, T. denticola, T. forsythia and some Capnocytophagiastrains. BANA is an example of a substrateconjugated beta-nepthylamine (p-NA), which is hydrolyzed by this trypsin-like enzyme to release free p-NA. The latter is a chromophore and reacts with a variety of dyes (e.g. Fast-Garnet GBC) to produce colored products. Subgingival plaque is collected and placed on a BANA-containing strip, which is then folded to contact a second strip containing the “Fast-Black” dye reagent. The folded card is placed inside an oven for 15 min at 55°C and any blue-black color that appears is scored positive for the above species. The sensitivity of the method has recently been improved. The main disadvantage of this technique is that it relies upon plaque sampling and assumes that the test organisms identified as being present signify active disease. This is known not to be the case for all patients and sites. Furthermore, results are qualitative and rely upon the operator’s
assessment of the calorimetric end point. One of the potential difficulties of this test is that it may be positive at clinically healthy sites and might remain so after treatment.

BIOCHEMICAL TEST KITS

Biochemical test kits used in periodontics analyze the gingival crevicular fluid (GCF).

Perio 2000 System

Various pathogenic bacteria (T. denticola, P. gingivalis, P. intermedia, and T. forsythia) are able to produce sulfates, thereby producing significant levels of these volatile sulphur compounds can directly degrade periodontal structures aggravating periodontitis. Hence, Diamond Probe/Perio 2000 system is designed to display the sulfide level digitally at each site.\(^{13}\)

Prognostik

This test is an assay for elevated levels of elastase in crevicular fluid. The presence of elevated levels of elastase in the crevicular fluid may thus be indicative of active disease sites.\(^{14}\) Although a relationship between elastase levels in crevicular fluid and periodontal disease activity has been reported, the position is still far from clear.\(^{1}\)

Periocheck

It is the rapid chairside test for neutral proteases in GCF such as elastases, proteinases, and collagenases.\(^{14}\) The levels of these enzymes in GCF have been noted to increase with the development of gingivitis as well as sites of established periodontitis. However, limited longitudinal studies evaluated the utility of these markers as indicator of periodontal disease.

Perioguard

This commercial test kit is based on detection of aspartate aminotransferase (AST) which is released from dead cells of periodontium to the gingival crevicular fluid (GCF). The test kit consists of a tray with two test wells for each tooth and appropriate reagents for conducting the test.\(^{15}\)

Pocket Watch

The pocket watch was developed as a simple method of analyzing AST at the chairside.\(^{14}\) AST activity determined by pocket watch provides
not only an index of cell death but also the extent of the destructive pockets.

**GENETIC TEST KITS**

Various gene polymorphisms are considered to be risk factors for the initiation or progression of periodontal disease. In 1997, Kornman et al. found an association between the polymorphism in the genes encoding for interleukin-1α and interleukin-1β and increased severity of periodontitis. Identification of the genetic polymorphism is difficult but now some chairside kits are available for its detection.

**Periodontal Susceptibility Test**

**Genetic Susceptibility Test (PST)**

Periodontal susceptibility test is the first and only genetic test that analyzes two interleukin 1 (IL 1) genes for variations that identify an individual’s susceptibility to overexpression of inflammation and risk for periodontal disease. The initiation and development of the disease may not be due to IL 1 genetic susceptibility, but rather it may lead to earlier or more severe disease. This test does not provide information for just a single disease or is it useful to ascertain a diagnosis of a specific disease. The IL 1 genetic test can be used to differentiate certain IL 1 genotypes associated with different levels of inflammatory responses to identify individuals at risk for severe periodontal disease even before age 60.

**CONCLUSION**

The availability of chair side diagnostic kits will aid in early diagnosis and treatment. The newer commercially available chairside tests offer exciting prospects in general practice. In certain situations, these supplemental tests may be particularly valuable in establishing the endpoint of therapy before placing patients on a periodontal maintenance program. Further research and developments are required in this field. The novel tests need to be validated according to gold standards such as alveolar bone loss in large numbers also being of economic value to both patient and practitioner.

**REFERENCES**


