

# DIAGNOSING your DIAGNOSTIC probes

CALIBRATE YOUR TEAM TO ENSURE ACCURATE READINGS

BY **GREGORY E. OXFORD**, DDS, MS, PhD

As the population of the United States ages, we have a greater percentage of patients retaining more teeth. The desire to remain actively engaged as we age has led to an increasing desire to maintain a healthy, functional dentition. The major cause of tooth loss in adults is periodontal diseases.<sup>1</sup> The evaluation of the periodontal health status of our patients is very important.

At the present time, the diagnosis and classification of periodontal diseases are almost entirely based on clinical assessments. Clinical probing depths and measurements of attachment loss obtained with periodontal probes are a practical and important method of determining a patient's periodontal status.<sup>2</sup> In fact, the American Academy of Periodontology (AAP) states that part of a comprehensive periodontal evaluation should include probing depths, location of the gingival margin (for determination of clinical attachment levels), and the presence of bleeding on probing.<sup>3</sup>

Supplemental quantitative and qualitative assessments of gingival crevicular fluid and subgingival microflora can potentially provide useful information about the etiology or treatment approach for a particular patient's periodontal disease. However, probing depth and clinical attachment loss measurements obtained with manual periodontal probes remain the primary method used to assess the status of the periodontium and are a practical and valid method for assessing peri-

odontal status.<sup>4</sup>

Periodontal probes have undergone extensive changes since their introduction by G. V. Black.<sup>5</sup> The periodontal probe has evolved from a unidimensional, first-generation manual probe into a more sophisticated computerized instrument. In an effort to increase the accuracy and reproducibility of readings and to improve efficiency, Michigan "O" probe was introduced by Ramfjord<sup>6</sup> and was followed by the development of the pressure-controlled second-generation probes with visual measurement recordings to reduce probing error. Third-generation, controlled-force electronic periodontal probes with direct computer-linked data capture are commercially available and are currently in use by some practitioners.<sup>7</sup> Fourth- and fifth-generation probes are already being developed. An experimental periodontal probe incorporating optical fiber sensor to tap into technological advances to help us be more accurate in our assessment of our patients' disease status is an example.<sup>8</sup>

The selection of a periodontal probe depends on the type of dental practice in which it will be used. For example, a general dental practitioner would require first- or second-generation probes, while third- through fifth-generation probes generally are used in academic and research institutions as well as specialty practices. Cochrane meta-analysis of different periodontal probing studies revealed manual and electronic probes have

similar reliability in the measurement of untreated periodontitis.<sup>4</sup>

Consequently, general practitioners and dental hygiene professionals should feel comfortable that they are operating within the standards of care using a standard manual periodontal probe.

## ACCURACY IS KEY

The importance of the accuracy of our probing, irrespective of our choice of instrumentation, is that we use these measurements for the diagnosis and classification of our patients' periodontal status. There is significant evidence of our less-than-perfect reliability of clinical parameters we obtain and use for the classification, or misclassification, of periodontitis in our patients.<sup>9</sup> As a result, we need to use the best probe for each indication.

Periodontal probes are used to assess the health of the periodontium, for either screening purposes or to evaluate periodontal changes throughout a treatment process. For instance, a WHO (World Health Organization) probe may be an appropriate instrument to use for screening patients in a general practice, but would be less useful when evaluating changes in periodontal status during active periodontal therapy.

Therefore, each probe has characteristic features that make it unique and, in some cases, specific and limited in use. The AAP parameters of care<sup>3</sup> state that evaluation of probing depths and furcation involvements are important in appro-

prate and accurate diagnosis of the patient's periodontal disease status. Thus, we need to use the correct probe to accurately assess the patient's unique periodontal condition. Your armamentarium may include a variety of instruments with their unique, familiar characteristics. You should choose your probe based on your objective. For instance, a diagnostic tray may include a periodontal probe for probing depths, another probe for furcation probing, and, in many cases, a plastic probe for dental implant probing.

When selecting a probe for measuring pocket depth, you should consider selecting a probe that has markings that you are familiar with. Some examples of common markings are shown in Figure 1.

Your entire clinical team should consider using the same probe design to aid in the calibration and accuracy of your measurements. For probing depth measurements, use a probe with discrete millimeter markings to increase accuracy and support calibration.

For example, consider newer probe designs with discrete markings such as a UNC12 or UNC15 probe rather than the Marquis 3-6-9-12 design markings when measuring probing depths, recession, and clinical attachment levels as this may be more accurate<sup>10</sup> (see Figure 2).

Additionally, the accuracy in the production of periodontal probes from commercially available periodontal probes has been evaluated for millimeter marks and probe tip diameter standardization. Hu-Friedy periodontal probe marks in one comparative study were found to be more accurately manufactured.<sup>11</sup>

The accuracy of probing depths is also greatly affected by a multitude of factors such as probe type and design,<sup>12,13</sup> location and angulation of the probe, pressure of probing,<sup>14</sup> presence of calculus and restorations, inflammation, malaligned teeth, etc.<sup>15</sup> The use of specific typodont models to calibrate within an office is useful for clinician training prior to use, facilitating accuracy (see Figure 3).

Another means of achieving more intra-office reliability is to limit the clinicians who take the probing measurements. For example, the hygiene team members in our practice perform probings as part of their routine maintenance therapy; however, the periodontist completes a full-mouth probing annually for patients of record. This limits inter-examiner variability and may allow for less variability and more accuracy.

When measuring furcation involvements, select a furcation probe based on the furcation classification system that you are using in your office. The most widely used furcation measurement or grading system was described by Glickman.<sup>16</sup> Glickman grades degree of furcation involvement on a scale of zero to four

Fig. 1



Fig. 2

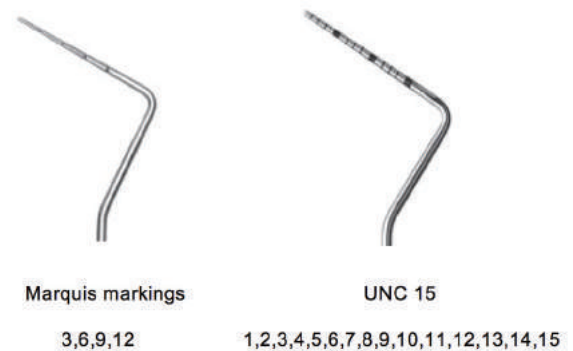


Fig. 3

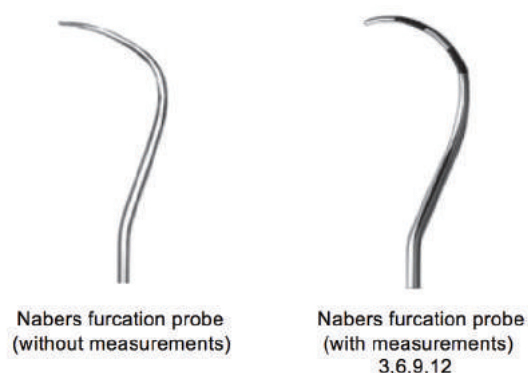


Using a typodont to calibrate intra-office clinicians

and does not measure furcation entrance distance in millimeters but rather by the subjective evaluation of the degree of attachment loss through the furcation.

Alternatively, Hamp et al.<sup>17</sup> measure the degree of furcation involvement by the millimeters which the probe enters into the furcation system. Consequently, if using Hamp for furcation measurements, it would require the use of a probe that allows measurements in millimeters as shown in Figure 4. Again, consistency within the practice provides more reliability and accuracy.

Fig. 4



## IMPLANT MEASUREMENTS

When selecting a probe for measuring pocket depth around a dental implant, you should select a plastic probe. Dental implant surfaces are typically titanium and can be easily scratched or nicked, producing surface irregularities that may provide a foundation for bacterial attachment.

The AAP standards of care regarding periodontal maintenance of dental implants states that implant management “must have periodic evaluation of implants, surrounding tissues and oral hygiene are vital to the long-term success of the dental implant. Considerations in the evaluation of the implant are: presence of plaque/calculus; clinical appearance of peri-implant tissues; radiographic appearances of implant and peri-implant structures; occlusal status, stability of prostheses and implants; probing depths; presence of exudate or bleeding on probing and modification of maintenance interval as needed.”<sup>18</sup>

Clearly, there is a need to probe around dental implants. The common practice to minimize probing of dental implants is also appropriate. Be cognizant that the soft tissue attachment of periodontal tissues to the implant is significantly different than to a tooth. As a result, repeated probings around a dental implant is discouraged. Get in, measure, and get out when the situation is healthy, but probe if you must. The frequency of probings is less clear and is more a factor of the clinical evaluation of the peri-implant soft tissues.

Periodontal probing of soft tissue depths, furcations, and around dental implants with manual probes remains the mainstay of our clinical diagnostic methods. The future of disease diagnosis is, however, on the cusp of changing and may utilize many technological advances.

One such advance is the emergence of probes that assess periodontal disease activity noninvasively with subtraction radiography to

evaluate quantitative and qualitative changes in periodontal architecture even before clinical changes are evident. Many of the logistical problems associated with subtraction radiography are being overcome, and this powerful diagnostic tool may soon come into widespread use.

Future developments in this and other imaging techniques are likely to have a profound effect on our approach to the diagnosis of periodontal diseases. Until then, probe on. But do it judiciously and with a well-calibrated team and well-calibrated instruments. **RDH**

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