PERIODONTAL INDICES

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INTRODUCTION

- Find – Incidence, Prevelance and Severity of disease.
- For which preventive or treatment modality can be planned.
- Describes – status of an individual or group with respect to a condition being measured.

DEFINITIONS

RUSSELL A.L:

A numerical value describing the relative status of a population on a graduated scale with definite upper and lower limits, which is designed to permit and facilitate comparison with other populations classified by the same criteria and methods.

IRVING GLICKMAN:

Epidemiologic indices are attempts to quantitate clinical conditions on a graduated scale, thereby facilitating comparison among population examined by the same criteria and methods.

IDEAL REQUISITES OF AN INDICES

- Clarity, Simplicity, Objectivity
- Validity
- Reliability
- Quantifiability
- Sensitivity
- Acceptability

CLASSIFICATION

- Dental indices:
  - Type I dental index
  - Type II dental index
- Based on direction in which scores can fluctuate.
  - Irreversible
  - Reversible
- Based on extent in oral cavity
  - Full mouth Indices
  - Simplified Indices
- Based on entity:
  - Disease Index
  - Symptom Index
  - Treatment Index
- Special categories:
  - Simple index
  - Cumulative index

USES OF INDICES

- **EPIDEMIOLOGIST**:
  - measure the prevalance, incidence, severity of periodontal diseases.

- **RESEARCHERS:**
  - effectiveness of any particular agents in controling the disease
  - To compare responses to various therapies

- **CLINICIANS:**
  - record various periodontal parameters for treating the periodontal disease.

PERIODONTAL INDICES USES

- ACCESS
  - Degree of inflammation of gingival tissue
  - Degree of Periodontal destruction
  - The amount of plaque accumulated
  - The amount of Calculus present
  - To assess the treatment needs

Armamentarium

- Mouth mirror
- Probe
- Explorer
- Light source

PERIODONTAL PROBE

There are three types of periodontal probes. They are:

3. Calibrated periodontal probes
4. Naber's furcation probe
5. Computer assisted probes

FIRST GENERATION PROBES

- Marquis color-coded probe
- UNC-15 probe
- University of Michigan 'O' probe, with Williams markings
- Michigan 'O' probe
- World Health Organization (WHO) probe
- Naber's Furcation Probe

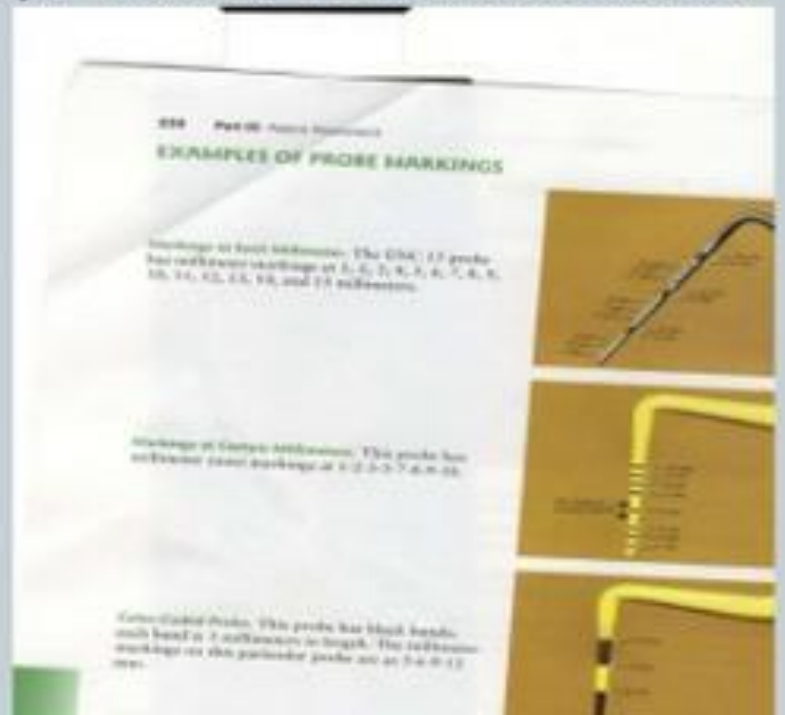
Calibrated probes have blunt, rod shaped working ends that may be circular or rectangular in cross-section.

MARQUIS PROBE

- Calibrations are in 3mm sections, markings are 3,6,9,12mm.

UNC – 15 PROBE

- 15mm long and markings are at each mm and coding at the 5th,10th and 15thmm.
- Millimeter markings at 1,2,3,4,5,6,7,8,9,10,11,12,13,14 and 15 millimeters.

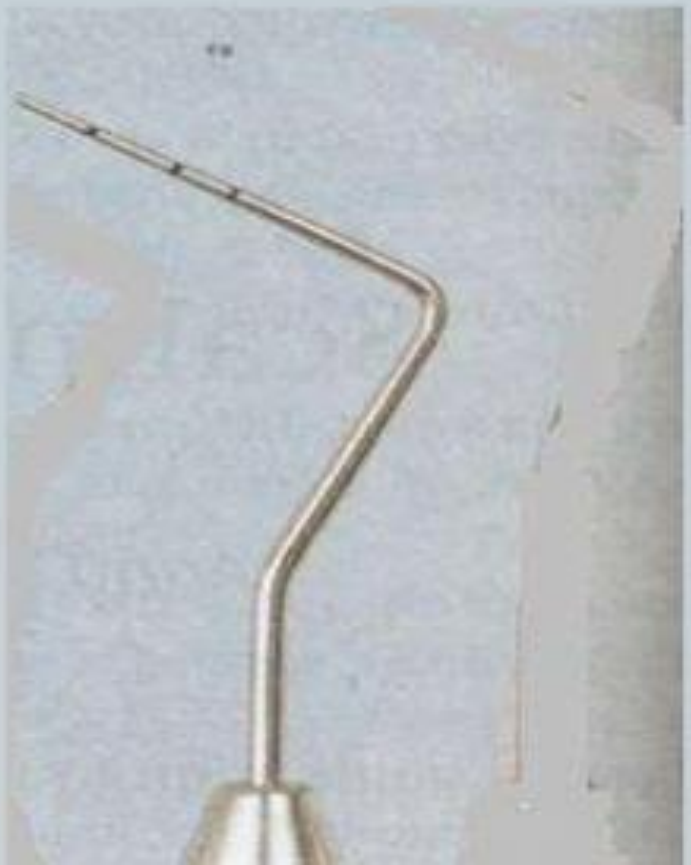


Michigan O – Williams marking Probe

- Markings include 1,2,3,5,7,8 and 9mm with 4mm and 6mm missing.

MICHIGAN O PROBE

- Markings are at 3, 6, and 8mm.



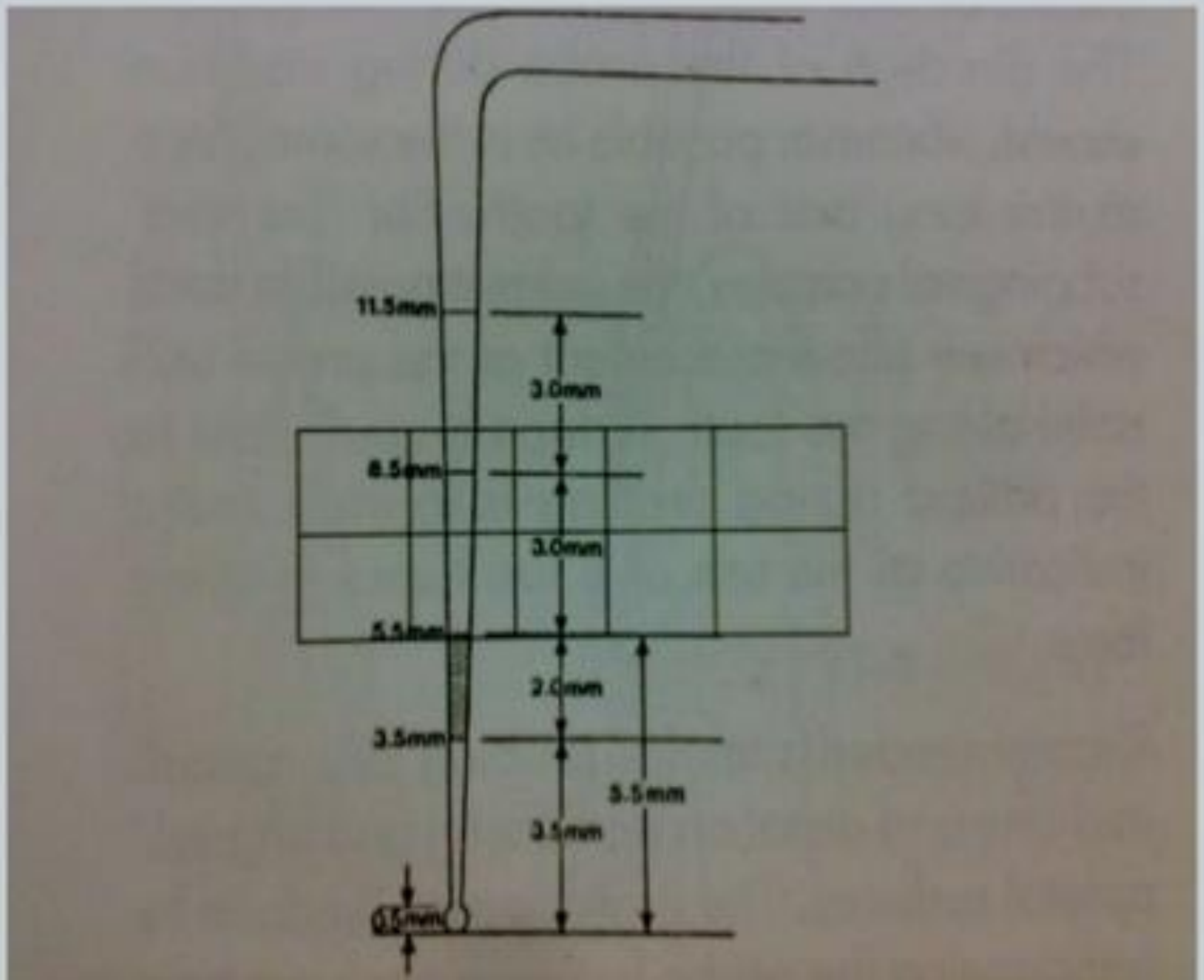
WHO PROBE

- Prescribed in 1978.
- The probe was designed for two purposes:

  -Measurement of pocket depth.

  -Detection of sub gingival calculus.
- Used in the assessment of CPITN (Community Periodontal Index for Treatment Needs)
- Weight = 5 gm.

WHO PROBE



WHO PROBE

- Two variants of WHO Probes are available:
  - **CPITN-E Probe (Epidemiological Probe)**
    Markings at 3.5 and 5.5mm.
  - **CPITN-C Probe(Clinical Probe)**

Markings at 3.5, 5.5, 8.5 and 11.5mm.

These additional lines may be of use when performing a detailed assessment and recording of deep pockets for the purpose of preparing treatment plan for complex periodontal therapy.

NABERS FURCATION PROBE

- It is used to determine the extent of furcation involvement on a multi rooted teeth.
- It has a curved working end for accessing the furcation area.
- The end is blunt so that it will not harm soft tissues.
- Most of the nabers probe do not have markings.
- The depth of insertion of the probe into the furcation area determines the degree of furcation involvement.

PROBING TECHNIQUE

- The probe should be inserted parallel to the vertical axis of the tooth and “walked” circumferentially around each tooth to detect the areas of deepest penetration.
- To detect an *interdental crater* the probe should be placed obliquely from both the facial and the lingual surface to explore the deepest point of the pocket located beneath the contact point.
- To detect *furcation involvement* in multi-rooted teeth, use of specially designed Naber’*s* probe allows an easier and more accurate exploration of the horizontal component of furcation lesion.

WHEN TO PROBE

- Probing of pockets is done at various times for diagnosis and for monitoring the course of treatment and maintenance.
- *Initial probing:* Done to determine whether the tooth can be saved or should be extracted.
- *Second probing:* Done to establish accurately the level of attachment and degree of involvement of roots and furcations.

POCKET PROBING

- There are two different pocket depths:

  - The *biologic depth* is the distance between the gingival margin and the base of the pocket (coronal end of junctional epithelium). This can be measured only by histological sections.

  - The *probing depth* is the distance to which the probe penetrates into the pocket.

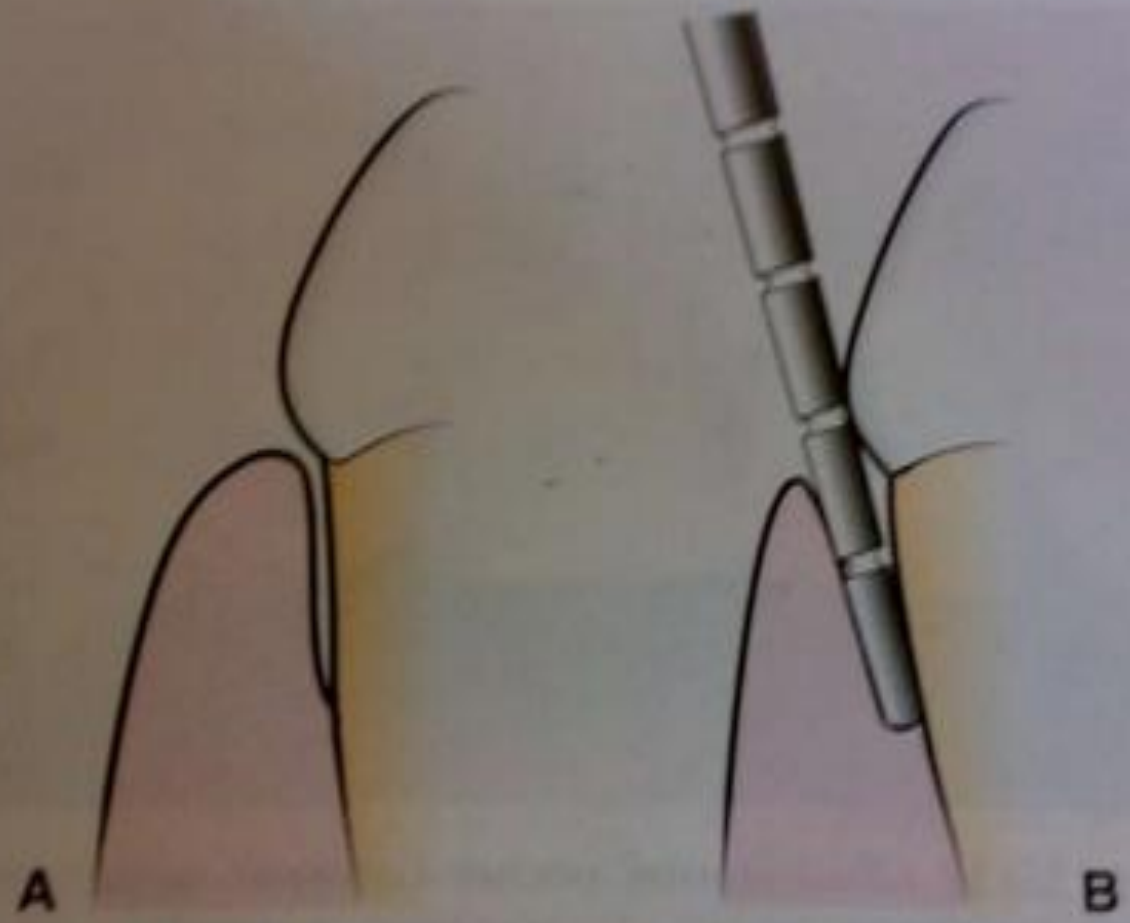


Figure 35-17 **A,** Biologic or histologic pocket depth is the actual distance between the gingival margin and the attached tissues (bottom of pocket). **B,** Probing or clinical pocket depth is the depth of penetration of the probe.

FACTORS AFFECTING PROBING

- Factors affecting probe penetration:
  - Force of introduction.
  - The shape and size of the probe tip.
  - Degree of tissue inflammation.
  - Angle of insertion of probe.
- The depth of penetration of the probe in the connective tissue apical to the junctional epithelium in a periodontal pocket is about 0.3mm.
- The probing forces of 0.75N have been found to be well tolerated and accurate.

THERMAL PROBE

- Thermal probes are sensitive diagnostic devices used for measuring early inflammatory changes in the gingival tissues.
- One of the commercially available system, the PerioTemp Probe enables the calculation of temperature differential (DT, with a sensitivity of 0.1°C) between the pocket probed and its sub gingival temperature.
- This temperature differential is useful because it allows consideration of differences in core temperature between individuals.

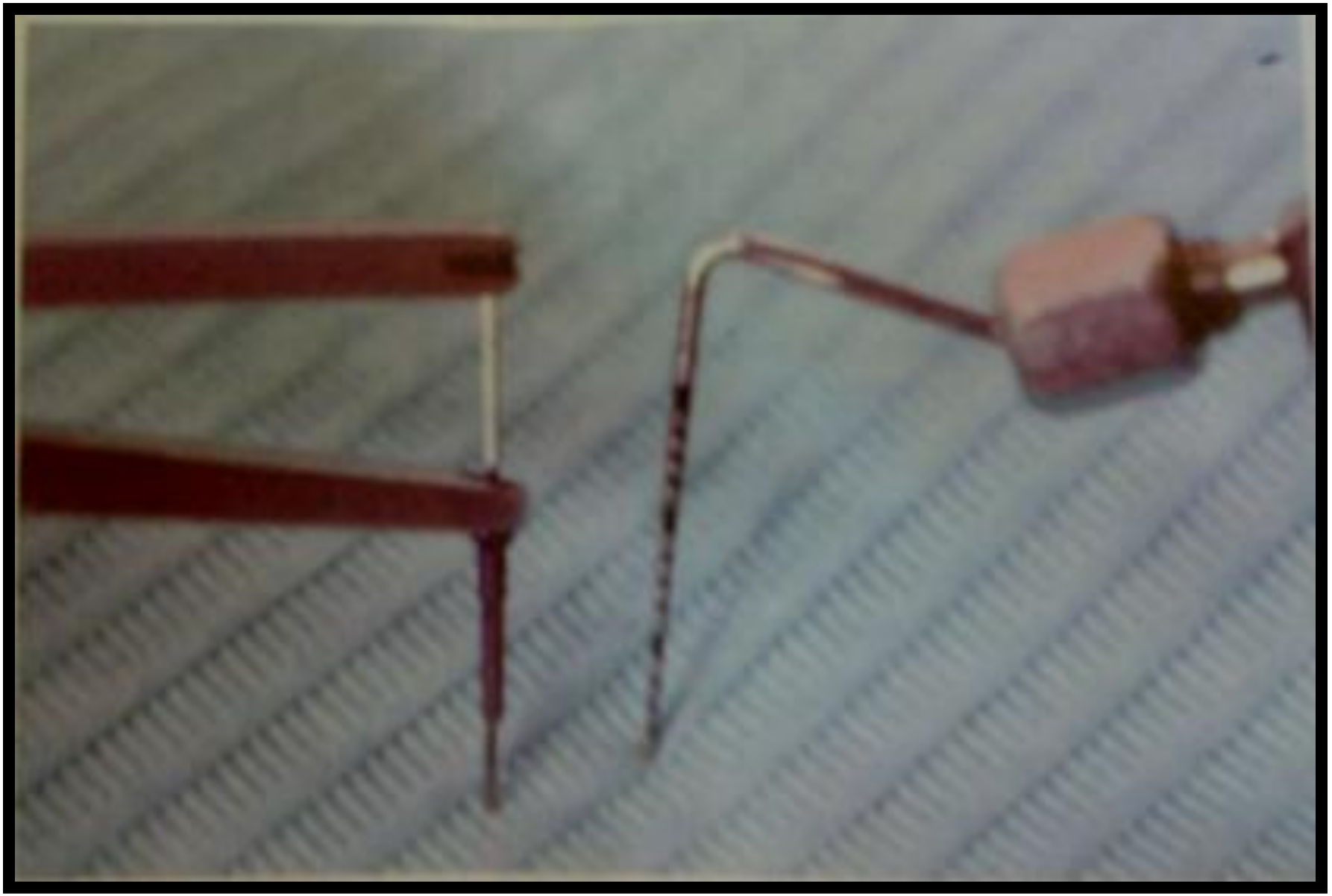
Figure 37-2 Thermal periodontal probe system: Perio-Temp electronic monitor. (Courtesy Abiodent, Danvers, Mass.)

THERMAL PROBE

- Sub gingival temperature at diseased sites is increased compared with healthy sites.
- There always exists a natural antero - posterior temperature gradient existing within the dental arches.
- Mandibular sites were reported to be warmer than the maxillary sites.
- Temperature increases with probing depth due to increase in cellular and molecular activity caused by increased periodontal inflammation with increasing probing depth.

PRESSURE SENSITIVITY PROBE

- To overcome the limitations of conventional probing system, pressure-sensitive probes are developed which have standardized, controlled insertion pressure.
- With forces up to 30 g, the tip of the probe seems to remain within the junctional epithelium, and the forces up to 50 g are necessary to diagnose periodontal osseous defects.



FLORIDA PROBING SYSTEM

- The Florida Probing System was developed using the NIDCR criteria.
- This automated probe system consists of probe hand piece, digital readout, foot switch, computer interface and computer.
- The end of the probe tip is 0.4mm in diameter which reciprocates through a sleeve, and the edge of the sleeve provides a reference by which measurements are made.

Handpiece for assessing probing pocket depths

Handpiece for assessing relative clinical attachment levels

Measuring device inserted in sulcus

Probing unit

FLORIDA PROBING SYSTEM

- These measurements are made electronically and transferred automatically to the computer when the foot switch is pressed.
- Constant probing force is provided by coil springs inside the probe hand-piece and digital readout.
- Advantages:
  - Precise electronic measurements
  - Computer storage of data
  - Constant probing force

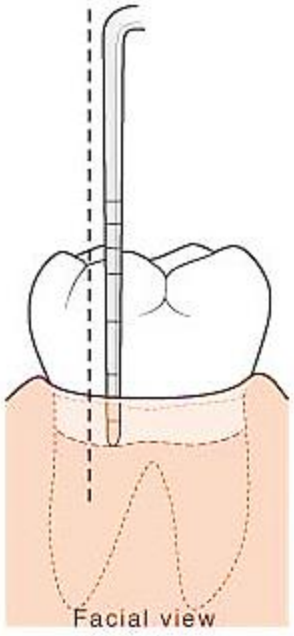
FLORIDA PROBING SYSTEM

- Disadvantages:

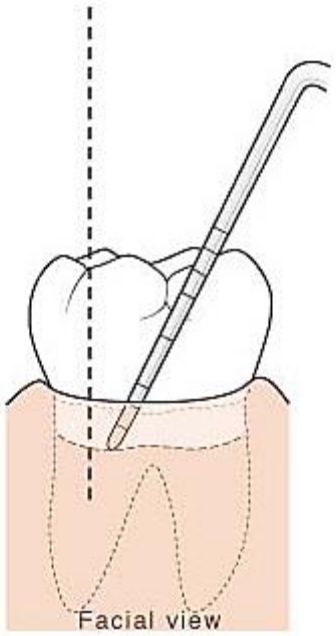
  - Lack tactile sensitivity.

  - Underestimation of deep probing depths by the automated probe.

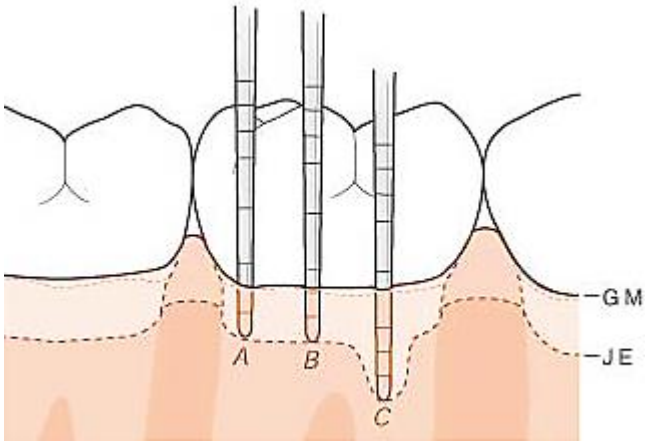
HOW TO PROBE



Parallel to long axis of tooth

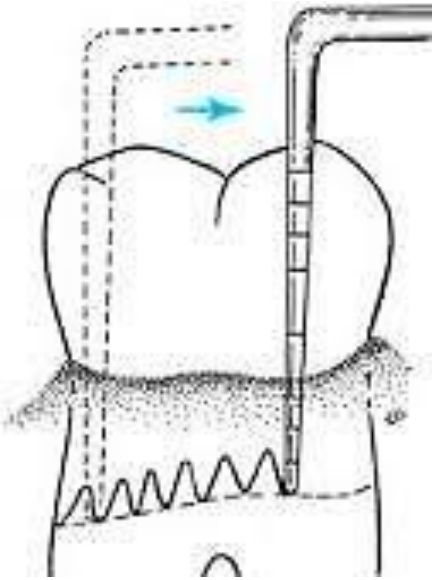


Not Parallel to long axis of tooth

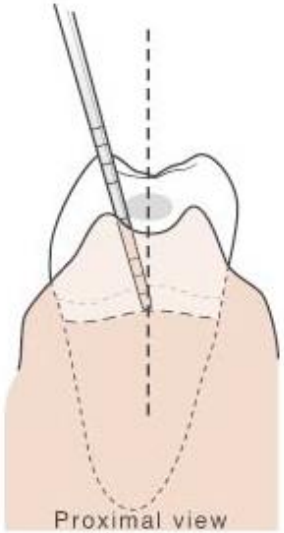


Record the deepest pocket

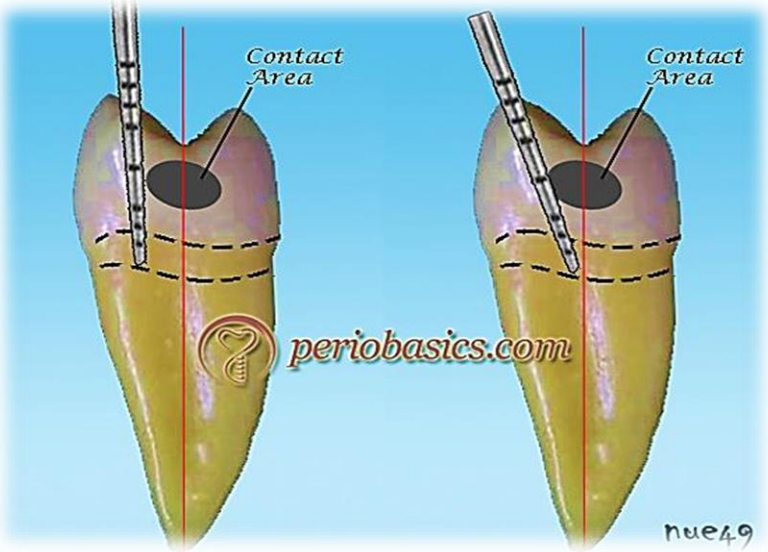
METHOD OF PROBING



WALKING THE PROBE



ANGULATION BELOW CONTACT POINT



SEQUENCE FOR PROBING

- Insert at the distofacial line angle
- Begin to probe Site
- Walk the probe onto the proximal surface.
- Assess beneath the contact area
- Reinsert at the distofacial line angle

LIMITATIONS OF PERIODONTAL PROBING

- Incorrect angulation of the probe
- Interference from the calculus on the tooth or root surface
- Presence of overhanging restoration
- Amount of pressure applied probe
- Errors in reading the probe
- Errors in data recording
- Errors in calculation of attachment level

CLINICAL ATTACHMENT

CLINICAL ATTACHMENT LEVEL
CLINICAL ATTACHMENT LOSS
RELATIVE ATTACHMENT LEVEL

RELATIVE ATTACHMENT LOSS

- If the CEJ is not present due to a restoration, or difficult to determine, it can be recorded from margin of a restoration or a stent and the recording thus made is referred as Relative attachment level (RAL).

MEASUREMENT OF CAL - STENT

- A custom made stent and UNC-15 probe were used. The stent was made with the cold cure acrylic by the sprinkle method.
- It covered the occlusal/incisal 1/3 rd on the buccal and the lingual side.
- The thickness of the stent was about 2-3 mm.
- The vertical grooves were made on the stent on buccal and lingual side using straight fissure bur no. 556 and air-rotor handpiece to guide the UNC-15 probe at selected sites.
- The stent was made to fit on the occlusal/incisal surfaces of the teeth and the measurements were made using the UNC-15 probe by placing it in the groove made on the stent.
- Recording of CEJ location was made using a UNC-15 (Hu-Friedy) probe, before (Close CEJ) and after (Open CEJ) the reflection of the flap from the lower edge of the stent in those subjects who were indicated for flap surgery, at baseline.

BASIC PERIODONTAL EXAMINATION

DETAILED PERIODONTAL CHART

DPC – Detailed Periodontal Chart

- Used to measure pocket depths.
- A pocket measuring probe/ Williams probe is used.

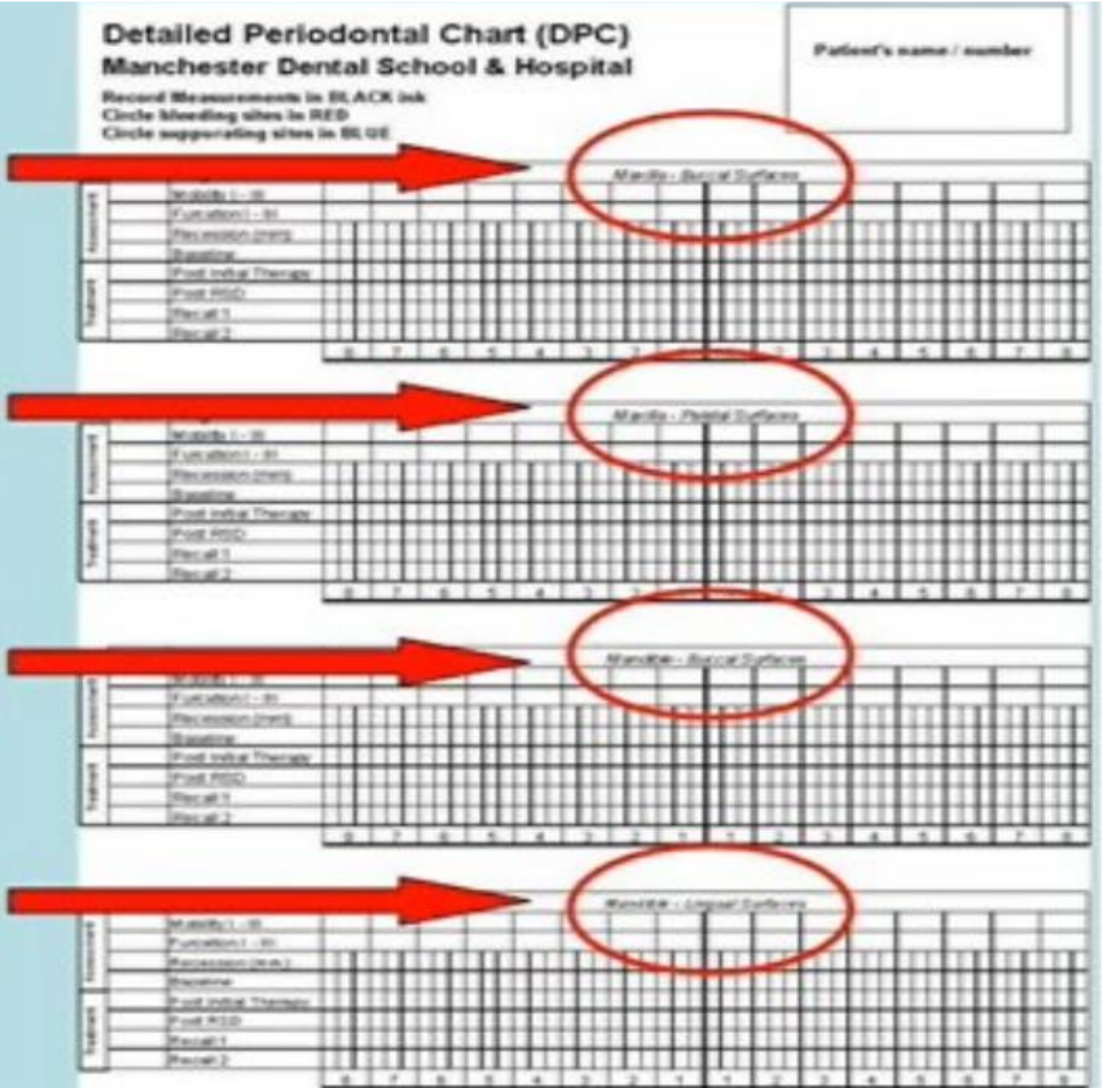
- Main components to record:
  - Pocket depth (mm)
  - Mobility
  - Recession (mm)
  - Bleeding on probing
  - Furcation

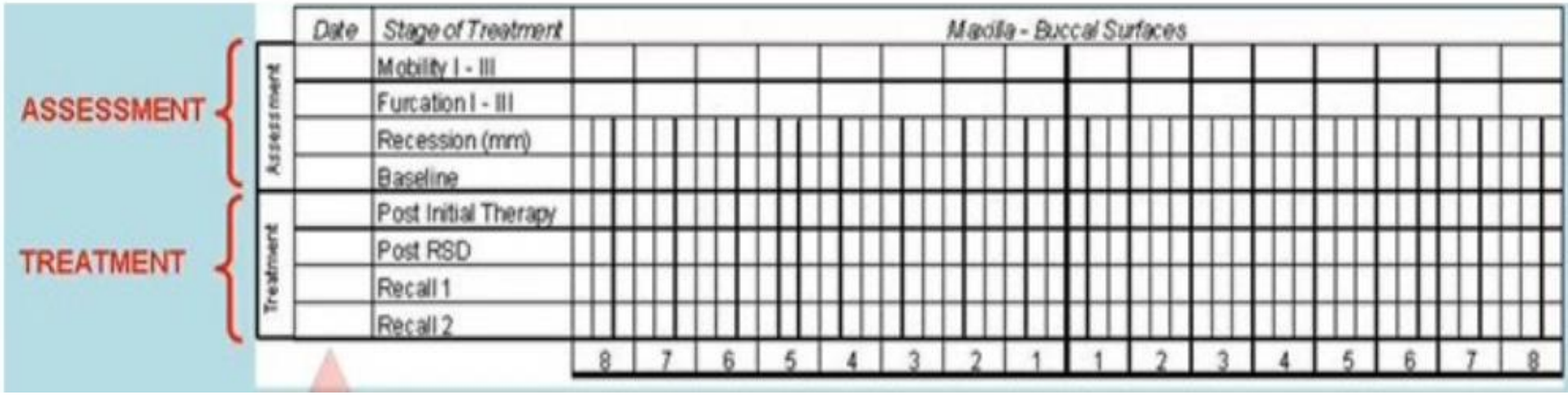
Maxillary Buccal Surfaces

Maxillary Palatal Surfaces

Mandibular Buccal Surfaces

Mandibular Lingual Surfaces




ASSESSMENT
TREATMENT
Assessment
Treatment
Date
Stage of Treatment
Maxilla - Buccal Surfaces
Mobility I - III
Furcation I - III
Recession (mm)
Baseline
Post Initial Therapy
Post RSD
Recall 1
Recall 2
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

Mobility

- Two Blunt Instruments are used to asses a tooth's mobility. E.g End of mirror and probe
- To quantify Mobility, Millers index of mobility is used:
- Grade 0 – Normal Physiological mobility (<1mm)
- Grade 1 – Movement up to 1mm in horizontal plane
- Grade 2 – Movement greater than 1mm in horizontal plane
- Grade 3 – Severe mobility greater than 2mm or vertical mobility

Recession

- To measure the recession of a individual tooth, a pocket measuring probe must be used.
- The probe is placed onto the tooth and the distance between the cemento-enamel junction and the gingival margin is measured. This is the amount of recession that has occurred on that tooth.

Baseline Pocket Depth

- The pocket measuring probe is inserted into the gingival crevice.
- The distance from the base of the pocket and the gingival margin is measured.
- In addition, if the site bleeds on probing, circle the score in red and if the site has suppuration (pus) circle the score in blue or black.

What happens from the results of the DPC

- The DPC allows the operator to find sites in the mouth requiring attention.
- Sites with pockets greater than 5mm will require RSD.
- Subsequent Pocket Depths can be measured after treatment to assess the success of treatment.
- You can work out clinical attachment loss (CAL) using the date collected:

  baseline pocket depth + recession = CAL

- CAL represents the true loss of PDL due to periodontal disease

INDICES

- Oral hygiene index
- Gingival index
- Periodontal index

OHI INDEX

- JOHN C.GREENE AND JACK R VERMILLION - 1960

OHI SIMPLIFIED (OHI-S)

JOHN C.GREENE AND JACK R VERMILLION - 1964

Plaque index

Silness J & Loe H -1964

Loe H – 1967.

Quigley – Hein index

Modified by Turesky et al

NEW METHOD OF PLAQUE SCORING (NMPS)

GINGIVAL INDEX

PMA INDEX

GINGIVAL INDEX

MODIFIED GINGIVAL INDEX

INDICES USED TO ASSESS GINGIVAL INFLAMMATION

Papillary Marginal Attachment (PMA) Index by Schour and Massler (1944)

A gingival unit is divided into **three** component parts:

i. **Papillary** gingiva (P)

ii. **Marginal** gingiva (M)

iii. **Attached** gingiva (A)

The **presence or absence of inflammation** on each gingival unit is recorded as 1 or 0 respectively.

The P, M, A numerical values **for all the teeth are added separately** and then **added together** to express the PMA index score per person. The developers of this index eventually added a **severity component** for assessing gingivitis, the papillary units (P) were scored on a scale of 0 to 5, and the marginal (M) and attached gingival were scored on a scale of 0 to 3

CALCULATION

P	
M	
A	

ADD ALL
P =
M=
A=

PMA SCORE = P+M+A

USES:

IN CLINICAL TRIALS
FOR EPIDEMIOLOGICAL SURVEY

Gingival Index by Loe H and Sillness J (1963)

Method

The severity of gingivitis is scored on all **surfaces of all teeth, or selected teeth**, or on **selected surfaces of all teeth, or, selected teeth**. The tissues surrounding each tooth are divided into **four gingival scoring units**:

- Distal facial papillae,
- Facial margin,
- Mesial facial papillae,
- Entire lingual gingival margin.

Scoring criteria:

0 — No inflammation
1 — Mild inflammation, no bleeding elicited on probing
2 — Moderate inflammation, bleeding on probing
3 — Severe inflammation

The **scores around each tooth** are added and **divided by four** to arrive at the score for that particular tooth.

Total **all the teeth scores** and divide it by the **number of teeth**. This provides the gingival index score per person.

0.1 to 1.0 — Mild gingivitis
1.1 to 2.0 — Moderate gingivitis
2.1 to 3.0 — Severe gingivitis

USES:

- Determine prevalance and severity of gingivitis.
- Assessment of severity of gingivitis n individual tooth.
- For preventive or therapeutic agents

GINGIVAL BLEEDING INDEX

Indices of Gingival Bleeding

Sulcular bleeding Index by Muhlemann and Son (1971)

Four gingival units are scored systemically for each tooth:

the **labial** and **lingual** marginal gingiva (M units)

the **mesial** and **distal** papillary gingiva (P units).

Scoring criteria:

0 — Normal appearing gingiva, **no bleeding** upon probing

1 — No color or contour changes, but **bleeding** on probing

2 — Bleeding on probing, color change (reddening), **no edema**

3 — Bleeding on probing, color change, **mild inflammatory** edema

4 — Bleeding on probing, color change, **severe inflammatory** edema.

5 — Spontaneous bleeding on probing, color change, **very severe**

inflammatory edema with or without ulceration.

PERIODONTAL INDEX

INDICES USED TO MEASURE PERIODONTAL DESTRUCTION

Russell's Periodontal Index by Russell AL (1956)

To estimate deeper periodontal disease by measuring the presence or absence of the gingival inflammation and its severity, pocket formation and masticatory function.

All the teeth present are examined. All of the gingival tissues surrounding each tooth are assessed for gingival inflammation and periodontal involvement

Scoring Criteria

0.. **Negative**

1.. **Mild Gingivitis** (inflammation in the free gingiva, but this area does not circumscribe the tooth)

2.. **Gingivitis** (Inflammation completely circumscribing the tooth, but there is no apparent break in the epithelial attachment)

4.. Used when **radiographs are available** (There is early notch-like resorption of alveolar crest)

6.. **Gingivitis with pocket formation** (horizantal bone loss involving the entire alveolar crest, upto half the length of the tooth root)

8.. **Advanced destruction with loss of masticatory function** (advanced bone loss involving more than one-half of the length of tooth root, infrabony defects, widening of periodontal ligament, root resorption.

$$\text{PI score per person} = \frac{\text{Sum of individual scores}}{\text{Number of teeth present}}$$

Clinical Conditions and Periodontal Scores		
Clinical conditions	*Group PI scores*	*Stage of disease*
Clinically-normal supportive tissues	0 to 0.2	
Simple gingivitis	0.3 to 0.9	
Beginning of destructive–periodontal disease	0.7 to 1.9	Reversible
Established destructive periodontal disease	1.6 to 5.0	Irreversible
Terminal disease	3.8 to 8.0	Irreversible

Periodontal Disease Index by Sigurd P Ramfjord (1959)

CAL relative to the cementoenamel junction is recorded.

Only six selected teeth are scored for assessment of the periodontal status of the oral cavity, which are 16, 21, 24, 36, 41, 44.

The **first step** is scoring of the **gingival status**. Changes in color, consistency, contour; evidence of ulceration of gingiva is evaluated by a periodontal probe

The **next step** is recording of the crevice depth related to a cementoenamel junction. For this purpose a **University of Michigan 0 probe** is used.

Distance from free gingival margin to the bottom of the gingival crevice or pocket on the buccal and mesial aspect of the each tooth.

Scoring Criteria

0 — **Absence** of inflammation
1 — **Mild to moderate** inflammatory gingival changes not extending all around the tooth
2 — **Mild to moderately severe gingivitis** extending all around the tooth
3 — **Severe gingivitis**, characterized by marked redness, tendency to bleed and ulceration
4 — **Gingival crevice** in any of the four measured areas (mesial, distal, buccal, lingual), extending apically to the CEJ, but **not more than 3 mm**
5 — **Gingival crevice** in any of the four measured areas extending apically, **3-6 mm from the CEJ**
6 — **Gingival crevice** in any of the four measured areas extending apically **more than 6 mm from the CEJ**

INDICES USED TO MEASURE PLAQUE ACCUMULATION

Plaque Component of Periodontal Disease Index by Ramfjord

The index is used on the **six teeth** selected by **Ramfjord** (teeth number 3, 9, 12, 19, 25 and 28) after staining with **Bismarck brown** solution.

The criteria is to measure the presence and extent of plaque on a scale of 0 to 3, looking specifically at all **interproximal facial and lingual surfaces** of the index teeth.

The scoring criteria

0 — **No** plaque present.

1 — Plaque present on some but **not all interproximal**, buccal and lingual surfaces of the tooth.

2 — Plaque present on **all interproximal** buccal and lingual surfaces, but covering **less than one half of the surfaces**.

3 — Plaque extending over **all interproximal**, buccal and lingual surfaces, and covering **more than one half** of these surfaces.

Community Periodontal Index of Treatment Needs (CPITN)

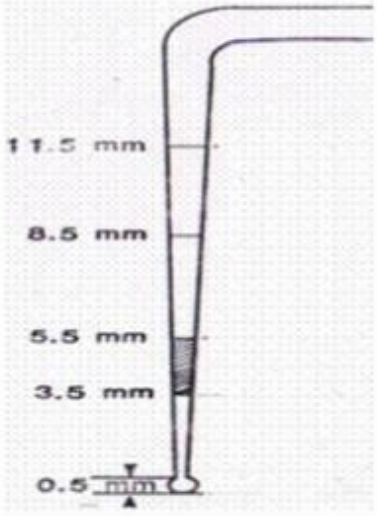
The mouth is divided into six parts (sextants).

The examination done by special probe (WHO probe).

The score is identified by examination of specified index teeth or all teeth.

WHO Numbering			*American Equivalent*		
17, 16	11	26, 27	2, 3	8	14, 15
47, 46	31	36, 37	31, 30	25	18, 19

The worst findings from these teeth surfaces are recorded. WHO probe is used.



C P I

score	criteria
0	No periodontal disease.
1	Bleeding on probing.
2	Calculus with plaque seen or felt by probing.
3	Pathological pocket 4 – 5 mm.
4	Pathological pocket 6 mm or more.
x	When only 1 tooth or no tooth are present.

TN

score	criteria
0	No need for treatment.
1	Personal plaque control (OHI).
2	Professional plaque control (scaling and polishing).
3	Deep scaling , root planning, surgical procedure.

INDEX FOR PERI IMPLANT CONDITION

CONCLUSION