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## RESEARCH ARTICLE

### APPRAISAL OF THE NEW CLASSIFICATION FOR PERIODONTAL DISEASES

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#### ABSTRACT

The development and evolution of classification systems for periodontal diseases have been largely influenced by paradigms that reflect understanding of the nature of periodontal diseases during a given historical period. Based upon definition from the World Health Organization (WHO), periodontal health should be defined as a state free from inflammatory periodontal disease that allows an individual to function normally and avoid consequences (mental or physical) due to current or past disease. Researchers have provided a foundation to study the etiology, susceptibility traits, pathogenesis, and treatment of diseases in an organized manner by evolving clinicians a way to organize the health care needs of their patients. The workshop was co-sponsored by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP) and included expert participants from all over the world. Planning for the conference, which was held in Chicago on November 9 to 11, 2017, began in early 2015 summarizing the proceedings of the World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions. An organizing committee from the AAP and EFP commissioned 19 review papers and four consensus reports covering relevant areas in periodontology and implant dentistry. The authors were charged with updating the 1999 classification of periodontal diseases and conditions<sup>1</sup> and developing a similar scheme for peri-implant diseases and conditions.

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## INTRODUCTION

Three paradigms that reflected the understanding of the nature of periodontal diseases were noticed during the evolution of periodontal diseases.

**Clinical characteristics paradigm (1870–1920):-** For the period from approximately 1870 to 1920, the researchers had insufficient information about the etiopathogenesis of periodontal diseases. There was a huge dispute about the periodontal diseases; whether they were caused due to local or systemic factors.

**Classical pathology paradigm (1920–1970):-** During this time a new concept developed that periodontal diseases were due to degenerative or dystrophic changes in the periodontium. Around 1970, a different paradigm had begun to dominate thoughts about the nature of periodontal diseases.

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**Infection/ host response paradigm (1970–present):-** After the publication of Robert Koch's postulates (1876), researchers stressed upon the infectious nature of periodontal diseases. W.D. Miller stated three factors which were to be taken into consideration in every case of pyorrhea alveolar were predisposing circumstances, local irritation and bacteria. Miller also recognized that certain systemic conditions could modify the course of the disease. The next major discovery in periodontal microbiology was the preliminary demonstration in 1976–1977 of microbial specificity at sites with periodontitis demonstrating that neutrophils from patients with juvenile periodontitis (periodontosis) had defective chemotactic and phagocytic activities, marking the beginning of dominance of the Infection/Host Response paradigm.

**The New Classification:** The scope of the workshop was to update the classification scheme for current understanding of periodontal and peri-implant diseases and conditions. This introductory overview presents the schematic tables for the new classification of periodontal and peri-implant diseases and conditions and briefly highlights changes made to the 1999

classification (Armitage, 1999) (Table 1). The workshop addressed unresolved issues with the previous classification by identifying the difference between presence of gingival inflammation at one or more sites and the definition of a gingivitis case. It agreed that bleeding on probing should be the primary parameter to set thresholds for gingivitis (Lang, 2018; Trombelli, 2018). The workshop also characterized periodontal health and gingival inflammation in a reduced periodontium after completion of successful treatment of a patient with periodontitis. Specific definitions were agreed to with regard to cases of gingival health or inflammation after completion of periodontitis treatment based on bleeding on probing and depth of the residual sulcus/pocket. This distinction was made to emphasize the need for a more comprehensive maintenance and surveillance of the successfully treated patient with periodontitis. It was made accepted that a patient having gingivitis can revert to a state of health, but a periodontitis patient remains a periodontitis patient for life, even after following a successful therapy, requiring a life-long supportive care to prevent recurrence of disease (Chapple *et al.*, 2018; Holmstrup, 2014). The workshop also reorganized the broad spectrum of non-plaque induced gingival diseases and conditions based on primary etiology (Holmstrup, 2018) (Table:1.1)

The 1989 workshop recognized that periodontitis had several distinct clinical presentations, different ages of onset and rates of progression (Caton, 1989; Consensus report on diagnosis and diagnostic aids, 1989). Various changes have been seen in the periodontal disease such as the 1989 classification which did not include a detailed classification of gingival diseases and lesions. The dental plaque induced gingival diseases can be modified by systemic factors, medications and malnutrition. Non-plaque induced gingival diseases can be from a specific bacteria, virus, fungus of genetic origin, systemic conditions, traumatic lesion or foreign body reaction. Based on these variables the workshop categorized periodontitis as prepubertal, juvenile (localized and generalized), adult, and rapidly progressive. The 1993 European Workshop determined that the classification should be simplified and proposed grouping of periodontitis into two major headings: adult and early onset periodontitis (Proceedings of the 1st European Workshop on Periodontics, 1993). The 1996 workshop participants determined that there was insufficient new evidence to change the classification (Papapanou, 1996). Major changes were made in the 1999 classification of periodontitis (Lindhe, 1999; Lang, 1999), which has been in use for the last 19 years. Periodontitis was reclassified as chronic, aggressive (localized and generalized), necrotizing and as a manifestation of systemic disease.

Since the 1999 workshop, substantial new information kept on emerging from population studies, basic science investigations, and the evidences were made from prospective studies evaluating environmental and systemic risk factors. The analysis of this evidence has prompted the 2017 workshop to develop a new classification framework for periodontitis (Papapanou, 2017). In the last 30 years, the classification of periodontitis has been repeatedly modified in an attempt to align it with emerging scientific evidence. The workshop agreed that, consistent with current knowledge on pathophysiology, three forms of periodontitis can be identified: *necrotizing periodontitis* (Herrera, 2018), *periodontitis as a manifestation of systemic disease* (Albandar, 2018), and the forms of the disease previously recognized as “chronic” or

“aggressive”, now grouped under a single category, “periodontitis” (Papapanou, 2017; Needleman *et al.*, 2018; Fine, 2018; Billings *et al.*, 2018; Tonetti, 2018). In revising the classification, the workshop agreed on a classification framework for periodontitis further characterized based on a multidimensional staging and grading system that could be adapted over time as new evidence emerges (Tonetti, 2018). The term “Adult Periodontitis” created a diagnostic dilemma for clinicians as the form of periodontitis commonly found in adults and adolescents, thus adolescents having this type of periodontitis would be called “adult periodontitis”. Clearly, age-dependent nature of the adult periodontitis designation created problems. Therefore, the term Chronic Periodontitis was given by the workshop participants to characterize this constellation of destructive periodontal diseases. Later, chronic periodontitis was further classified as localized (< 30%) or generalized (> 30 %) based on the sites involved. Severity is based on the amount of clinical attachment loss (CAL) and is designated as- mild (1-2 mm CAL), moderate (3-4 mm CAL) or severe (>5mm CAL). The term “Early-onset periodontitis” (EOP) was used in the 1989 American Academy of Periodontology and 1993 European classifications as a collective designation was renamed using the term “Aggressive Periodontitis. In addition, refractory periodontitis was considered as a separate disease category.

One of the disease categories was “Periodontitis which is associated with systemic disease”. It has been retained in the new classification since it is clear that destructive periodontal disease can be a manifestation of certain systemic diseases. Workshop participants believed that necrotizing ulcerative gingivitis (NUG) and necrotizing ulcerative periodontitis (NUP) are clinically identifiable conditions. However, the group was less certain whether these conditions are a part of single disease process or are they truly separate diseases. Hence the group decided to place both clinical conditions under the single category of “Necrotizing Periodontal Diseases.” The 1989 classification did not include a connection between periodontitis and endodontic lesions. Thus this section was also included in this classification system and was combined as endodontic and periodontic lesions. Although the deformities and conditions listed in this section of the classification are not separate diseases being important modifiers for the susceptibility of periodontal diseases or can dramatically influence outcomes of treatment. In revised classification, this workshop also agreed on a classification framework for periodontitis which was further characterized based on a multidimensional staging and grading system that could be adapted over time as new evidence emerges.<sup>18</sup> Staging is mainly dependent on the severity of disease as well as on the complexity of disease management, while grading provides supplemental information about biological features of the disease, including a rate of disease progression, assessment of the risk for progression, poor outcomes of treatment, and assessment of the risk associated with the disease or its treatment may negatively affect the general health of the patient.<sup>12,18</sup> Staging involves four categories (stages 1 through 4) determined after considering several variables including clinical attachment loss, amount and percentage of bone loss, probing depth, presence and extent of angular bony defects and also furcation involvement, tooth mobility, and tooth loss due to periodontitis. Grading includes three levels (grade A / low risk, grade B / moderate risk, grade C / high risk for progression of the disease). In addition to aspects related to periodontitis progression, general health status, and other

exposures such as smoking or level of metabolic control in diabetes. Thus, grading allows the clinician to incorporate individual patient factors into the diagnosis, which are crucial to comprehensive case management. For complete description of the new classification scheme for periodontitis, the reader is directed to the consensus report on periodontitis<sup>12</sup> and the case definition paper on periodontitis (Tonetti, 2018). (TABLE:1.3)

**Periodontal Health:** The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (http://www.webcitation.org/74HG4LjO1)”. Following this framework, periodontal health is defined as the absence of clinical inflammation associated with gingivitis, periodontitis, or any other periodontal conditions, and may include patients who have had a history of successfully treated gingivitis or periodontitis, or other periodontal conditions, and who have been and are able to maintain their dentition without signs of clinical gingival inflammation (Chapple, 2017). According to the WHO health framework (http://www.webcitation.org/74HG4LjO1) the absence of inflammatory periodontal disease allows an individual to function normally and avoid the consequences (mental or physical) associated to present or past disease.<sup>4</sup> four levels of periodontal health have been proposed, depending on whether (1) the periodontium (attachment and bone level) is structurally and clinically sound or reduced, (2) the ability to control local and systemic modifying factors, as well as (3) the relative treatment outcomes. These levels are: (1) pristine periodontal health, characterized by total absence of clinical inflammation, and physiological immune surveillance on a periodontium with normal support; (2) clinical periodontal health, characterized by an absence or minimal levels of clinical inflammation in a periodontium with normal support; (3) periodontal disease stability, characterized as a state in which the periodontitis has been successfully treated and clinical signs of the disease do not appear to worsen in extent or severity despite the presence of a reduced periodontium; and (4) periodontal disease remission/control, characterized as a period in the course of disease when symptoms become less severe but may not be fully resolved with a reduced periodontium (Chapple, 2017; Caton, 2018). It should be noted that “pristine periodontal health” characterized by no attachment loss, no bleeding on probing (BOP), no sulcular probing >3 millimeters (mm) in the permanent dentition and no redness, clinical swelling/ edema a rare entity, especially among adults. Therefore, minimal levels of clinical inflammation observed in “clinical periodontal health” is compatible with a patient classified as periodontally healthy.

**There are three major determinants of clinical periodontal health. These include**

#### Microbiological determinants

- supragingival plaque; and
- subgingival biofilm compositions.

#### 2. Host determinants

- Local predisposing factors
- Periodontal pockets;
- Dental restorations;
- Root anatomy;

- Tooth position; and
- Crowding.
- systemic modifying factors
- Host immune function;
- Systemic health; and iii. genetics.

#### Environment determinants

- Smoking;
- Medications;
- Stress; and
- Nutrition.

In order to attain or maintain clinical periodontal health, clinicians should not underestimate predisposing and modifying factors for each patient and should recognize when these factors can be fully controlled or not. Predisposing factors are any agent or condition that contributes to the accumulation of dental plaque (e.g., tooth anatomy, tooth position, restorations), while modifying factors are any agent or condition that alters the way in which an individual responds to subgingival plaque accumulation (e.g., smoking, systemic conditions, medications). Many factors are determined controllable (e.g., removal of overhangs, smoking cessation, good diabetes control) while others are not (e.g., genetics, immune status, use of critical medications).

#### A new classification for peri-implant diseases and conditions (Berglundh *et al.*, 2018)

A new classification for peri-implant health (Araujo, 2018) peri-implant mucositis (Heitz-Mayfield, 2018) and peri-implantitis (Schwarz, 2018) was developed by the workshop. An effort was made to review all aspects of peri-implant health, diseases, and relevant aspects of implant site conditions and deformities to achieve a consensus for this classification that could be accepted worldwide. Case definitions were developed for use by clinicians for individual case management and also for population studies (Berglundh, 2018; Renvert *et al.*, 2018).

**Peri-implant health:** Peri-implant health was defined both clinically and histologically (Araujo, 2018). Clinically, peri-implant health is characterized by an absence of visual signs of inflammation and bleeding on probing. Peri-implant health existing around an implant can be normal or reduced associated with bone support. It is not possible to define a range of probing depths compatible with peri-implant health (Berglundh, 2018; Renvert, 2018).

**Peri-implant mucositis:** Peri-implant mucositis is characterized by bleeding on probing and visual signs of inflammation (Heitz-Mayfield, 2018). While there is strong evidence that peri-implant mucositis is caused by plaque, there is very limited evidence for non-plaque induced peri-implant mucositis. Peri-implant mucositis can be reversed following measures aiming for the eliminating of plaque.

**Peri-implantitis:** Peri-implantitis was defined as a plaque-associated pathologic condition occurring in the tissue around dental implants, characterized by inflammation in the peri-implant mucosa and subsequent progressive loss of supporting bone (Schwarz, 2018). Peri-implant mucositis is assumed to precede peri-implantitis. Peri-implantitis is associated with poor plaque control and a history of severe periodontitis.



## CLASSIFICATION OF PERIODONTAL AND PERI-IMPLANT DISEASES AND CONDITIONS 2017

Periodontal Diseases and Conditions										
<b>Periodontal Health, Gingival Diseases and Conditions</b> Chapple, Mealey, et al. 2018 Consensus Rept <a href="#">link</a> Trombelli et al. 2018 Case Definitions <a href="#">link</a>			<b>Periodontitis</b> Papapanou, Sanz et al. 2018 Consensus Rept <a href="#">link</a> Jepsen, Caton et al. 2018 Consensus Rept <a href="#">link</a> Tonetti, Greenwell, Kornman. 2018 Case Definitions <a href="#">link</a>			<b>Other Conditions Affecting the Periodontium</b> Jepsen, Caton et al. 2018 Consensus Rept <a href="#">link</a> Papapanou, Sanz et al. 2018 Consensus Rept <a href="#">link</a>				
Periodontal Health and Gingival Health	Gingivitis: Dental Biofilm-Induced	Gingival Diseases: Non-Dental Biofilm-Induced	Necrotizing Periodontal Diseases	Periodontitis	Periodontitis as a Manifestation of Systemic Disease	Systemic diseases or conditions affecting the periodontal supporting tissues	Periodontal Abscesses and Endodontic-Periodontal Lesions	Mucogingival Deformities and Conditions	Traumatic Occlusal Forces	Tooth and Prosthesis Related Factors
Peri-Implant Diseases and Conditions										
Berglundh, Armitage et al. 2018 Consensus Rept <a href="#">link</a>										
Peri-Implant Health			Peri-Implant Mucositis			Peri-Implantitis			Peri-Implant Soft and Hard Tissue Deficiencies	

Table 1 Jack G. Caton, Garv Armitage, Tord Berglundh et al. A new classification scheme for periodontal and peri-implant diseases and conditions – Introduction and key changes from the 1999 classification. J ISP 2018

**Periodontal Health and Gingivitis:  
Consensus Report**  
 Chapple, Mealey, et al. 2018  
*Active link to consensus report*

**Gingival Diseases: Case Definitions and  
Diagnostic Considerations**  
 Trombelli, Tatakis, et al. 2018  
*Active link to case definitions*

## PERIODONTAL HEALTH, GINGIVAL DISEASES/CONDITIONS

### 1. Periodontal health and gingival health

Lang & Bartold 2018 [link](#)

- a. Clinical gingival health on an intact periodontium
- b. Clinical gingival health on a reduced periodontium
  - i. Stable periodontitis patient
  - ii. Non-periodontitis patient

### 2. Gingivitis – dental biofilm-induced

Murakami et al. 2018 [link](#)

- a. Associated with dental biofilm alone
- b. Mediated by systemic or local risk factors
- c. Drug-influenced gingival enlargement

### 3. Gingival diseases – non-dental biofilm induced

Holmstrup et al. 2018 [link](#)

- a. Genetic/developmental disorders
- b. Specific infections
- c. Inflammatory and immune conditions
- d. Reactive processes
- e. Neoplasms
- f. Endocrine, nutritional & metabolic diseases

**Peri-implant Diseases and Conditions  
Consensus Report**  
Berglundh, Armitage et al. 2018  
[Active link to consensus report](#)

**Periodontal Manifestations of Systemic  
Diseases and Developmental and  
Acquired Conditions: Consensus Report**  
Jepsen, Caton et al. 2018  
[Active link to consensus report](#)

## PERI-IMPLANT DISEASES AND CONDITIONS

### 1. Peri-implant health

Araujo & Lindhe 2018 [link](#)

### 2. Peri-implant mucositis

Heitz-Mayfield & Salvi 2018 [link](#)

### 3. Peri-implantitis

Schwarz et al. 2018 [link](#)

### 4. Peri-implant soft and hard tissue deficiencies

Hammerle & Tarnow 2018 [link](#)

Renvert et al. 2018 Case Definitions [link](#)

**Table 1.2 Peri-implant diseases and conditions**

**Periodontitis Consensus Report**  
Papapanou, Sanz et al. 2018  
[Active link to consensus report](#)

**Staging and Grading of Periodontitis:  
Framework and Proposal of a New  
Classification and Case Definition**  
Tonetti, Greenwell, Kornman 2018  
[Active link to case definitions](#)

## FORMS OF PERIODONTITIS

### 1. Necrotizing Periodontal Diseases

Herrera et al. 2018 [link](#)

- Necrotizing Gingivitis
- Necrotizing Periodontitis
- Necrotizing Stomatitis

### 2. Periodontitis as Manifestation of Systemic Diseases

Jepsen, Caton et al. 2018 Consensus Rept [link](#)

Albandar et al. 2018 [link](#)

*Classification of these conditions should be based on the primary systemic disease according to the International Statistical Classification of Diseases and Related Health Problems (ICD) codes*

### 3. Periodontitis

Fine et al. 2018 [link](#)

Needleman et al. 2018 [link](#)

Billings et al. 2018 [link](#)

#### a. Stages: Based on Severity<sup>1</sup> and Complexity of Management<sup>2</sup>

Stage I: Initial Periodontitis

Stage II: Moderate Periodontitis

Stage III: Severe Periodontitis with potential for additional tooth loss

Stage IV: Severe Periodontitis with potential for loss of the dentition

#### b. Extent and distribution<sup>3</sup>: localized; generalized; molar-incisor distribution

#### c. Grades: Evidence or risk of rapid progression<sup>4</sup>, anticipated treatment response<sup>5</sup>

- Grade A: Slow rate of progression
- Grade B: Moderate rate of progression
- Grade C: Rapid rate of progression

<sup>1</sup> Severity: Interdental clinical attachment level (CAL) at site with greatest loss; Radiographic bone loss & tooth loss

<sup>2</sup> Complexity of management: Probing depths, pattern of bone loss, furcation lesions, number of remaining teeth, tooth mobility, ridge defects, masticatory dysfunction

<sup>3</sup> Add to Stage as descriptor: localized <30% teeth, generalized > 30% teeth

<sup>4</sup> Risk of progression: direct evidence by PA radiographs or CAL loss, or indirect (bone loss/age ratio)

<sup>5</sup> Anticipated treatment response: case alternatives, smoking, hyperalvemia

**Table 1.3 Forms of Periodontitis**

The onset of peri-implantitis occurs prior following implant placement indicated by a radiographic data. Peri-implantitis, in the absence of treatment, seems to progress in a non-linear accelerating pattern.

**Hard and soft tissue implant site deficiencies:** Normal healing following tooth loss results in diminished dimensions of the alveolar ridge resulting in hard and soft tissue deficiencies. Larger ridge deficiency occurs at sites which is associated with severe loss of periodontal support, traumatic extraction, endodontic infections, fracture of roots, thin buccal bone plates, poor tooth position, injury and pneumatization of the maxillary sinuses. Other factors also affect the ridge are associated with medications and systemic diseases which reduces the amount of naturally formed bone, tooth agenesis, and pressure due to prostheses (Hämmerle, 2018) (Table:1.2).

## PERIODONTAL MANIFESTATIONS OF SYSTEMIC DISEASES AND DEVELOPMENTAL AND ACQUIRED CONDITIONS

### 1. Systemic diseases or conditions affecting the periodontal supporting tissues

Albandar et al. 2018 [link](#)

### 2. Other Periodontal Conditions

Papapanou, Sanz et al. 2018 [link](#)

Herrera et al. 2018 [link](#)

- Periodontal Abscesses
- Endodontic-Periodontal Lesions

### 3. Mucogingival deformities and conditions around teeth

Cortellini & Bissada 2018 [link](#)

- Gingival phenotype
- Gingival/soft tissue recession
- Lack of gingiva
- Decreased vestibular depth
- Aberrant frenum/muscle position
- Gingival excess
- Abnormal color
- Condition of the exposed root surface

### 4. Traumatic occlusal forces

Fan & Caton 2018 [link](#)

- Primary occlusal trauma
- Secondary occlusal trauma
- Orthodontic forces

### 5. Prostheses and tooth-related factors that modify or predispose to plaque-induced gingival diseases/periodontitis

Ercoi & Caton 2018 [link](#)

- Localized tooth-related factors
- Localized dental prostheses-related factors

**Table 1.4 Periodontal Manifestations Of Systemic Diseases And Developmental And Acquired Conditions**

**GINGIVAL HEALTH:** Gingival health (GH) is usually associated with an inflammatory infiltrate and host response in relatively stable equilibrium (Lang, 2018). GH in a patient with intact periodontium is diagnosed by (1) no probing attachment loss, (2) no radiographic bone loss (RBL), (3) <3 mm of PPD, and (4) <10 percent BoP (Chapple, 2017). GH can be restored following treatment of gingivitis and periodontitis. The diagnostic criteria for GH in a patient following treatment of gingivitis are the same as those just mentioned. These same clinical features also are observed on a reduced periodontium following successful treatment of periodontitis. Gingivitis is a reversible disease characterized by an inflammation of the gingiva that does not result in clinical attachment loss (CAL) (American Academy of Periodontology, 2001).

Gingivitis is highly prevalent among children and adolescents (Lang, 2018; Chapple *et al.*, 2017) and a necessary prerequisite for the development of periodontitis and progressive connective tissue attachment and bone loss (Murakami, 2018). Controlling gingival inflammation is considered the primary preventive strategy for periodontitis, as well as the secondary preventive strategy for recurrence of periodontitis. Even though there is a predilection of attachment loss to occur at inflamed sites of the gingiva, not all affected areas are destined to progress to periodontitis. This is because the inter-relationship between health, gingivitis, and periodontitis is highly dependent on the host's susceptibility and immune-inflammatory response. Nevertheless, clinicians must understand their crucial role in ongoing management of gingivitis for their patients of all ages with and/or without a history of periodontal disease.

## Staging and Grading Periodontitis



The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions resulted in a new classification of periodontitis characterized by a multidimensional staging and grading system. The charts below provide an overview. Please visit [perio.org/2017wwdc](http://perio.org/2017wwdc) for the complete suite of reviews, case definition papers, and consensus reports.

### PERIODONTITIS: STAGING

Staging intends to classify the severity and extent of a patient's disease based on the measurable amount of destroyed and/or damaged tissue as a result of periodontitis and to assess the specific factors that may attribute to the complexity of long-term case management.

Initial stage should be determined using clinical attachment loss (CAL). If CAL is not available, radiographic bone loss (RBL) should be used. Tooth loss due to periodontitis may modify stage definition. One or more complexity factors may shift the stage to a higher level. See [perio.org/2017wwdc](http://perio.org/2017wwdc) for additional information.

	Periodontitis	Stage I	Stage II	Stage III	Stage IV
Severity	Interdental CAL (at site of greatest loss)	1 – 2 mm	3 – 4 mm	≥5 mm	≥5 mm
	RBL	Coronal third (<15%)	Coronal third (15% - 33%)	Extending to middle third of root and beyond	Extending to middle third of root and beyond
	Tooth loss (due to periodontitis)	No tooth loss		≤4 teeth	≥5 teeth
Complexity	Local	<ul style="list-style-type: none"> <li>Max. probing depth ≤4 mm</li> <li>Mostly horizontal bone loss</li> </ul>	<ul style="list-style-type: none"> <li>Max. probing depth ≤5 mm</li> <li>Mostly horizontal bone loss</li> </ul>	In addition to Stage II complexity: <ul style="list-style-type: none"> <li>Probing depths ≥6 mm</li> <li>Vertical bone loss ≥3 mm</li> <li>Furcation involvement Class II or III</li> <li>Moderate ridge defects</li> </ul>	In addition to Stage III complexity: <ul style="list-style-type: none"> <li>Need for complex rehabilitation due to:               <ul style="list-style-type: none"> <li>Masticatory dysfunction</li> <li>Secondary occlusal trauma (tooth mobility degree ≥2)</li> <li>Severe ridge defects</li> <li>Bite collapse, drifting, flaring</li> <li>&lt; 20 remaining teeth (10 opposing pairs)</li> </ul> </li> </ul>
Extent and distribution	Add to stage as descriptor	For each stage, describe extent as: <ul style="list-style-type: none"> <li>Localized (&lt;30% of teeth involved);</li> <li>Generalized; or</li> <li>Molar/incisor pattern</li> </ul>			

Table 1.5 Staging of periodontitis



### PERIODONTITIS: GRADING

Grading aims to indicate the rate of periodontitis progression, responsiveness to standard therapy, and potential impact on systemic health.

Clinicians should initially assume grade B disease and seek specific evidence to shift to grade A or C. See [perio.org/2017wwdc](http://perio.org/2017wwdc) for additional information.

	Progression	Grade A: Slow rate	Grade B: Moderate rate	Grade C: Rapid rate	
Primary criteria <i>Whenever available, direct evidence should be used.</i>	Direct evidence of progression	Radiographic bone loss or CAL	No loss over 5 years	<2 mm over 5 years	≥2 mm over 5 years
	Indirect evidence of progression	% bone loss / age	<0.25	0.25 to 1.0	>1.0
		Case phenotype	Heavy biofilm deposits with low levels of destruction	Destruction commensurate with biofilm deposits	Destruction exceeds expectations given biofilm deposits; specific clinical patterns suggestive of periods of rapid progression and/or early onset disease
Grade modifiers	Risk factors	Smoking	Non-smoker	<10 cigarettes/day	≥10 cigarettes/day
		Diabetes	Normoglycemic/no diagnosis of diabetes	HbA1c <7.0% in patients with diabetes	HbA1c ≥7.0% in patients with diabetes

The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions was co-presented by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP).

Table 1.6 Grading of periodontitis

**PERIODONTITIS:** Currently, there is an insufficient evidence to support the notion that chronic and aggressive periodontitis are two pathophysiologically different diseases. Due to concerns from clinicians, researchers, educators, and epidemiologists regarding their ability to properly distinguish between chronic and aggressive periodontitis, the 2017 World Workshop members proposed grouping these two previously forms of periodontitis into a single category simply referred to as periodontitis (Papapanou, 2017; Tonetti, 2018). The clinical entity previously referred to as aggressive periodontitis due to its rapid rate of progression is now characterised as Grade C periodontitis and representing an extreme end of disease rates.

Periodontitis is a multifactorial, microbially-associated, host-mediated inflammatory disease characterized by progressive destruction of the periodontal attachment apparatus. Loss of periodontal tissue support is the basic feature of periodontitis detected as CAL by circumferential assessment of an erupted teeth using a proper standardized periodontal probe with reference to CEJ. Clinically, a patient is characterized as a periodontitis case if (1) interdental CAL is detectable at ≥2 non-adjacent teeth; or (2) buccal or oral CAL ≥3 mm with pocketing >3 mm is detectable at ≥2 teeth. Furthermore, the CAL cannot be attributed to non-periodontal causes such as: (1) gingival recession of traumatic origin; (2) dental caries



extending in the cervical area of the tooth; (3) the presence of CAL on the distal aspect of a second molar is usually associated with malposition or extraction of a third molar; (4) an endodontic lesion draining through the marginal periodontium; and (5) the occurrence of a vertical root fracture.

**Systemic diseases associated with loss of periodontal supporting tissues (Albandar, 2018):** The new classification of periodontal diseases and conditions also includes systemic diseases and conditions that affect the periodontal supporting tissues.<sup>14</sup> It is recognized that there are many rare systemic disorders, such as Papillon Lefèvre Syndrome- generally resulting in the early progression of severe periodontitis. Such conditions are grouped as “Periodontitis as a Manifestation of Systemic Disease”, and classification should be based on the primary systemic disease.<sup>14</sup> Other systemic conditions, such as neoplastic diseases, may affect the periodontal apparatus independent of dental plaque bio film-induced periodontitis,<sup>30</sup> and such clinical findings should also be classified based on the primary systemic disease and be grouped as “Systemic Diseases or Conditions Affecting the Periodontal Supporting Tissues”.

There are, however, common systemic diseases, such as uncontrolled diabetes mellitus, with variable effects that modify the course of periodontitis (Jepsen, 2017). These appear to be part of the multifactorial nature of complex diseases such as periodontitis and are included in the new clinical classification of periodontitis as a descriptor in the staging and grading process. Although common modifiers of periodontitis may substantially alter disease occurrence, severity, and response to treatment, current evidence does not support a unique pathophysiology in patients with diabetes and periodontitis (Sanz, 2018) (Table:1.4).

### Changes in the classification of periodontal developmental and acquired deformities and conditions

**Mucogingival conditions:** The new case definitions related to treatment of gingival recession are based on interproximal loss of clinical attachment and also incorporate the assessment of the exposed root and cemento-enamel junction. The consensus report presented a new classification of gingival recession that combines all clinical parameters such as, the *gingival phenotype* as well as exposed root surface (Cortellini, 2018). In the consensus report the term *periodontal biotype* was replaced by *periodontal phenotype* (Jepsen, 2018).

**Occlusal trauma and traumatic occlusal forces:** *Traumatic occlusal force*, replaced the term *excessive occlusal force*, defined as the force exceeding the adaptive capacity of the periodontium and the teeth. Traumatic occlusal forces can result in occlusal trauma (the lesion) and excessive wear or fracture of the teeth (Jepsen, 2018). There is lack of evidence from human studies implicating occlusal trauma in the progression of attachment loss in periodontitis (Fan, 2018).

**Prosthesis- and tooth-related factors:** The section on prostheses-related factors was expanded in the new classification. The term *biologic width* was replaced by *supracrestal attached tissues*. Clinical procedures involved in the fabrication of indirect restorations was added because of new data indicating that these procedures may cause recession and loss of clinical attachment (Ercoli, 2018).

**Staging and grading system (Tonetti, 2018):** In revising the classification, the workshop agreed on a classification framework for periodontitis, which is further characterized by a multidimensional staging and grading system that should be adapted over time as new evidence emerges (Table:1.5,1.6)

### Recommendation

- Periodontal disease in children is of great interest in pediatric dentistry and a problem that should not be ignored. Therefore, it is critical that pediatric dental patients receive a periodontal assessment as part of their initial and periodic dental examinations. Early diagnosis of periodontal diseases ensured greatest opportunity for successful and proper treatment, primarily by reducing all etiological factors, and establishing appropriate therapeutic measures, and developing an effective periodic maintenance protocol.
- Pediatric dentists are often the front line in diagnosing periodontal conditions in children and adolescents and in great position to treat or refer and coordinate, collaborate, and/or organize the patient care activities between two or more health care providers to ensure that the appropriate treatment is delivered in a timely fashion. Therefore, clinicians should become familiarized with the current classification of periodontal diseases and conditions, including gingivitis, in order to properly diagnose patients affected by these problems.
- Monitoring gingival health or inflammation is best documented by the parameter of bleeding on probing since it is considered the primary parameter to set thresholds for gingivitis and the most reliable for monitoring patients longitudinally in clinical practice. Clinicians are encouraged to start probing regularly when the first permanent molars are fully erupted and the child is able to cooperate for this procedure in order to establish a baseline, detect early signs of periodontal disease, and prevent disease progression.
- Probing prior to the eruption of the first permanent molars is encouraged in the presence or suspicion of any clinical and/or radiographic signs of periodontal disease. For patients with special health care needs receiving dental treatment under sedation and/or general anesthesia, clinicians are encouraged to utilize this opportunity to perform the periodontal probing.

### Conclusion

This overview introduced an updated and an appropriate classification of periodontal diseases and conditions and a new classification of peri-implant diseases and conditions. The publications will further represents the work of the worldwide community of scholars and clinicians in the field of periodontology and implant dentistry. This paper also presents an abbreviated overview for the outcome of the consensus workshop, and the reader will always be encouraged to review the entire publication to receive a comprehensive information about the rationale, criteria and implementation of the new classification systems.

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