

A new classification scheme for periodontal and peri-implant diseases and conditions - Introduction and key changes from the 1999 classification

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**A NEW CLASSIFICATION SCHEME FOR PERIODONTAL AND PERI-IMPLANT DISEASES
AND CONDITIONS – INTRODUCTION AND KEY CHANGES FROM THE 1999**

CLASSIFICATION

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ABSTRACT

A classification scheme for periodontal and peri-implant diseases and conditions is necessary for clinicians to properly diagnose and treat patients as well as for scientists to investigate etiology, pathogenesis, natural history and treatment of the diseases and conditions. This paper summarizes the proceedings of the World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions. 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 9-11, 2017, began in early 2015.

An organizing committee from the AAP and EFP commissioned 19 review papers and 4 consensus reports covering relevant areas in periodontology and implant dentistry. The authors were charged with updating the 1999 classification of periodontal diseases and conditions¹ and developing a similar scheme for peri-implant diseases and conditions. Reviewers and workgroups were also asked to establish pertinent case definitions and to provide diagnostic criteria to aid clinicians in the use of the new classification. All findings and recommendations of the workshop were agreed to by consensus.

This introductory paper presents the comprehensive overview for the new classification of periodontal and peri-implant diseases and conditions, along with a condensed scheme, but readers are directed to the pertinent consensus reports and review papers for a thorough discussion of the rationale, criteria and interpretation of the proposed classification. Changes to the 1999 classification are highlighted and discussed. Although the intent of the Workshop was to base the classification on the strongest available scientific evidence, lower level evidence and expert opinion were inevitably used whenever sufficient research data were unavailable.

The scope of this workshop was to align and update the present classification scheme to the current understanding of periodontal and peri-implant diseases and conditions. The workshop did not cover the details of how individual patients are best classified and it is recognized that such a process requires adaptation to the individual health system and setting. 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. It cannot present the wealth of information included in the reviews, case definition papers and consensus reports that guided the development of the new classification and full reference to the individual consensus and case definition papers is necessary to provide a thorough understanding of its use for either case management or scientific investigation. Therefore, it is strongly recommended that the reader use this overview as a simple introduction to these subjects. Accessing this publication online will allow the reader to use the links in this summary and the tables to view directly the source papers.

TABLE 1
CLASSIFICATION OF PERIODONTAL AND PERI-IMPLANT DISEASES AND CONDITIONS 2017

Periodontal Diseases and Conditions								
Periodontal Health, Gingival Diseases and Conditions			Periodontitis			Developmental and Acquired Deformities and Conditions Affecting the Periodontium		
Periodontal Health and Gingival Health	Gingivitis: Dental Biofilm-Induced	Gingival Diseases: Non-Dental Biofilm-Induced	Periodontitis	Acute Lesions Affecting Periodontal Tissues	Periodontitis as a manifestation of systemic diseases	Tooth and Prosthesis Related Factors	Mucogingival Deformities and Conditions	Traumatic Occlusal Forces
Peri-Implant Diseases and Conditions								
Peri-Implant Health		Peri-Implant Mucositis		Peri-Implantitis		Peri-Implant Soft and Hard Tissue Deficiencies		

NB: THIS TABLE WILL BE HYPERLINKED TO THE RELEVANT CONSENSUS PAPER, CASE-DEFINITION AND POSITION PAPER

PERIODONTAL HEALTH, GINGIVITIS, AND GINGIVAL CONDITIONS

The workshop addressed unresolved issues with the previous classification by identifying the difference between the 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 measure to set thresholds and designated 10% bleeding on probing (BOP) as the cutoff differentiating a case of periodontal health from a case of gingivitis. The workshop also characterized periodontal health and gingival inflammation in a reduced periodontium after completion of successful treatment of a periodontitis patient. Specific definitions were agreed with regard to cases of gingival health or inflammation after completion of periodontal treatment based on BOP 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 periodontitis patient. It was accepted that a patient with gingivitis can revert to a state of health, but a periodontitis patient remains a periodontitis patient for life, even following successful therapy, and requires life-long supportive care to prevent recurrence of disease. The workshop also re-organized the broad spectrum of non-plaque-induced gingival diseases and conditions based on primary etiology.

A NEW CLASSIFICATION OF PERIODONTITIS

The 1989 workshop recognized that periodontitis had several distinct clinical presentations, different ages of onset and rates of progression^{3,4}. Based on these variables the workshop categorized periodontitis as prepubertal, juvenile (localized and generalized), adult and rapidly progressive. The 1993 European Workshop felt that the classification should be simplified and proposed grouping of periodontitis into two major headings: adult and early onset periodontitis. The 1996 workshop participants determined that there was insufficient new evidence to change the classification.⁵ Major changes were made in the 1999 classification of periodontitis^{6,7,8} 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 has emerged from population studies, basic science investigations and the evidence 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.

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*, *periodontitis as a manifestation of systemic diseases*, and the forms of the disease previously recognized as “Chronic” or “Aggressive”, now grouped under a single category “Periodontitis”. 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. **Staging** is largely dependent upon the severity of disease at presentation as well as on the complexity of disease management, while grading provides supplemental information about biological features of the disease, including a history based analysis of the rate of disease progression, assessment of the risk for further progression, anticipated poor outcomes of treatment, and assessment of the risk that the disease or its treatment may negatively affect the general health of the patient..^{9,10} Staging involves four categories

(Stages 1-4) and is 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 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) and encompasses, 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 a complete description of the new classification scheme for periodontitis, the reader is directed to the consensus report on periodontitis⁹ and the case definition paper on periodontitis¹⁰.

With regards to periodontitis as a manifestation of systemic diseases, the new classification of periodontitis has been updated with regard to systemic diseases and conditions that affect the periodontal supporting tissues (Albandar et al. 2018). It is now recognized that there are systemic disorders that have a major impact on the loss of periodontal tissues by influencing periodontal inflammation, systemic disorders that influence the pathogenesis of periodontal diseases, and other disorders that can result in loss of periodontal tissues independently of periodontitis (Jepsen, Caton et al. 2018).

CHANGES IN THE CLASSIFICATION OF PERIODONTAL DEVELOPMENTAL AND ACQUIRED DEFORMITIES AND CONDITIONS

MUCOGINGIVAL CONDITIONS

The new case definitions related to gingival recession are based on interproximal loss of clinical attachment and also incorporates the assessment of the exposed root and cemento-enamel-junction (Cortellini & Bissada 2018). The consensus report presents a new classification of gingival recession that combines clinical parameters including the gingival phenotype as well as characteristics of the exposed root surface (Jepsen, Caton et al. 2018). In the consensus report the term periodontal biotype was replaced by periodontal phenotype.

OCCLUSAL TRAUMA AND TRAUMATIC OCCLUSAL FORCES

Traumatic occlusal force, replacing the term excessive occlusal force, is the force that exceeds the adaptive capacity of the periodontium and/or the teeth. Traumatic occlusal forces can result in occlusal trauma (the lesion) and excessive wear or fracture of the teeth¹². There is lack of evidence from human studies implicating occlusal trauma in the progression of attachment loss in periodontitis¹⁴.

PROSTHESIS AND TOOTH RELATED FACTORS

The section on prostheses related factors was expanded in the new classification¹². 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 attachment¹⁵.

A NEW CLASSIFICATION FOR PERI-IMPLANT DISEASES AND CONDITIONS

A new classification for peri-implant health, peri-implant mucositis and peri-implantitis 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 in order 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 appropriate for population studies¹⁶.

PERI-IMPLANT HEALTH

Peri-implant health was defined both clinically and histologically. Clinically, peri-implant health is characterized by an absence of visual signs of inflammation and bleeding on probing. Peri-implant health can exist around implants with normal or reduced bone support. It is not possible to define a range of probing depths compatible with peri-implant health.

PERI-IMPLANT MUCOSITIS

Peri-implant mucositis is characterized by bleeding on probing and visual signs of inflammation. While there is strong evidence that peri-implant mucositis is caused by plaque biofilm, there is very limited evidence for non-plaque biofilm induced peri-implant mucositis. Peri-implant mucositis can be reversed with measures aimed at eliminating the plaque biofilm.

PERI-IMPLANTITIS

Peri-implantitis was defined as a plaque biofilm-associated pathological condition occurring in the tissue around dental implants, characterized by inflammation in the peri-implant mucosa and subsequent progressive loss of supporting bone¹⁶. Peri-implant mucositis is assumed to precede peri-implantitis,. Peri-implantitis is associated with poor plaque control and with patients with a history of severe periodontitis. The onset of peri-implantitis may occur early following implant placement as indicated by radiographic data. Peri-implantitis, in the absence of treatment, seems to progress in a non-linear and accelerating pattern.

HARD AND SOFT TISSUE IMPLANT SITE DEFICIENCIES

Normal healing following tooth loss leads to diminished dimensions of the alveolar process/ridge that result in both hard and soft tissue deficiencies. Larger ridge deficiencies can occur at sites associated with severe loss of periodontal support, extraction trauma, endodontic infections, root fractures, thin buccal bone plates, poor tooth position, injury and pneumatization of the maxillary sinuses. Other factors affecting the ridge can be associated with medications and systemic diseases reducing the amount of naturally formed bone, tooth agenesis and pressure from prostheses.¹⁷

CONCLUSIONS

This overview introduces an updated classification of periodontal diseases and conditions and a new classification of peri-implant diseases and conditions. The publication as a whole represents the work of the worldwide community of scholars and clinicians in periodontology and implant dentistry. This paper presents an abbreviated overview of the outcome of the consensus workshop, and the reader is encouraged to review the entire publication to receive comprehensive information about the rationale, criteria and implementation of the new classifications.

REFERENCES

1. Armitage GC. Development of a classification system for periodontal diseases and conditions. *Ann Periodontol* 1999; 4:1-5.
2. Chapple ILC, Mealey B, et al. Periodontal health and gingival diseases/conditions. *J Periodontol* 2018; 89: in press.
3. Caton JG. Periodontal diagnosis and diagnostic aids. *Proceedings of the World Workshop in Clinical Periodontics*. Chicago: The American Academy of Periodontology, 1989, 1-22.
4. The American Academy of Periodontology. *Proceedings of the World Workshop in Clinical Periodontics. Consensus Report on Diagnosis and Diagnostic Aids*. Chicago: The American Academy of Periodontology, 1989, 1/23-1/32.
5. Papapanou PN. Periodontal Diseases: Epidemiology. *Ann Periodontol* 1996; 1:1-36.
6. Lindhe J, et al. Consensus Report: Chronic Periodontitis. *Ann Periodontol* 1999; 4:38.
7. Lang N, et al. Consensus Report: Aggressive Periodontitis. *Ann Periodontol* 1999; 4:53.
8. Lang N, et al. Consensus Report: Necrotizing Periodontal Diseases. *Ann Periodontol* 1999; 4:78.
9. Papapanou PN, Sanz M, et al. Consensus Report: Periodontitis. *J Periodontol* 2018; 89: in press.
10. Tonetti MS, Greenwell H, Kornman KS. Periodontal Case Definition: Framework for staging and grading the individual periodontitis case. *J Periodontol* 2018; 89: in press.
11. Cairo F, Nieri M, Cincinelli S, et al. The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. *J Periodontol* 2010; 38:661-666.
12. Jepsen S, et al. Consensus Report: Periodontal manifestations of systemic diseases and developmental and acquired conditions. *J Periodontol* 2018; 89: in press.
13. Cortellini P, Bissada NF. Mucogingival conditions around the natural dentition. *J Periodontol* 2018; 89: in press.
14. Fan J, Caton JG. Occlusal trauma and excessive occlusal force. *J Periodontol* 2018; 89: in press.
15. Ercoli C, Caton JG. Prostheses and tooth related factors. *J Periodontol* 2018; 89: in press.
16. Berglundh T, Armitage G, et al. Consensus Report: Peri-implant diseases and conditions. *J Periodontol* 2018; 89: in press.
17. Hammerle CHF, Tarnow D. The etiology of hard and soft tissue deficiencies at dental implants: a narrative review. *J Periodontol* 2018; 89: in press.