

## Classification of diseases and conditions affecting the periodontium

Classification of diseases is necessary to separate conditions into different categories so aid in clinical and laboratory diagnosis and specific treatment. In light of this fact, a classification can be consistently defined by the differences in the clinical manifestations of diseases and conditions. **The current classification of periodontal diseases is based** on their **extent** (generalized versus localized), **severity** (slight, moderate, or severe), **rate of progression** (aggressive versus chronic), and **localization** (i.e., contained within the gingiva, as in gingivitis, or further involving periodontal bone loss, as in periodontitis).

In **1997** the American Academy of Periodontology responded to the need of developing of new classification of periodontal disease and formed a committee to plan and organize an international workshop to revise the classification system for periodontal diseases. On **1999**, the International Workshop for a Classification of Periodontal Diseases and Condition was held and a new classification was agreed upon (**Table 1**).

**Table 1:- The classification of periodontal diseases and conditions in 1999.**

<b>1999 Classification of Periodontal Diseases and Conditions</b>	
<b>Gingival Diseases</b>	Plaque-induced gingival diseases Non-plaque-induced gingival lesions
<b>Chronic Periodontitis</b>	Localized Generalized
<b>Aggressive Periodontitis</b>	Localized Generalized

<b>Periodontitis as a Manifestation of Systemic Diseases</b>	
<b>Necrotizing Periodontal Diseases</b>	Necrotizing ulcerative gingivitis (NUG) Necrotizing ulcerative periodontitis (NUP)
<b>Abscesses of the Periodontium</b>	Gingival abscess Periodontal abscess Pericoronal abscess
<b>Periodontitis Associated With Endodontic Lesions</b>	Endodontic–periodontal lesion Periodontal–endodontic lesion Combined lesion
<b>Developmental or Acquired Deformities and Conditions</b>	A- Localized tooth-related factors that predispose to plaque induced gingival diseases or periodontitis. B- Mucogingival deformities and conditions around teeth. C- Mucogingival deformities and conditions on edentulous ridges. D- Occlusal trauma.

The classification of periodontal diseases was studied again in **2017/ 2018**. In November 2017, the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP), discuss the reclassification of periodontal health, periodontal disease, and peri-implant disease (**Table 2**).

**Table 2:-The classification of periodontal and peri-implant diseases and conditions in 2017.**

<b>2017 classification of periodontal and peri-implant diseases and conditions</b>	
<b>I. Periodontal health, gingival diseases, and conditions</b>	<p><b>A-</b> Periodontal and gingival health.</p> <p><b>B-</b> Gingivitis: dental biofilm induced.</p> <p><b>C-</b> Gingival diseases: non- dental biofilm induced.</p>
<b>II. Periodontitis</b>	<p><b>A-</b> Necrotizing periodontal diseases.</p> <p><b>B-</b> Periodontitis.</p> <p><b>C-</b> Periodontitis as a manifestation of systemic disease.</p>
<b>III. Other conditions affecting the periodontium</b>	<p><b>A-</b> Systemic diseases or conditions affecting the periodontal supporting tissues.</p> <p><b>B-</b> Periodontal abscesses and endodontic- periodontal lesions.</p> <p><b>C-</b> Mucogingival deformities and conditions.</p> <p><b>D-</b> Traumatic occlusal forces.</p> <p><b>E-</b> Tooth and prosthesis- related factors.</p>
<b>IV. Peri-implant diseases and conditions</b>	<p>Peri-implant health.</p> <p>Peri-implant mucositis.</p> <p>Peri-implantitis.</p> <p>Peri-implant soft and hard tissue deficiencies.</p>

**The largest change in the reclassification** is relating to the diagnosis of periodontitis. The new classification system requires the clinician to not only diagnose periodontitis and whether it is localized or generalized but to also comment on the **stage and grade** of the disease, to reflect on whether the disease is stable, in remission, or unstable, and finally to list the identified risk factors. The distribution of localized or generalized is still based on <30% of sites affected or >30% of sites affected. The **only risk factors** included in the World Workshop paper were diabetes, specifically **uncontrolled diabetes, and smoking**.

### **What Are the Major Changes in the New Classification System?**

1. For the first time, the new classification system defines periodontal health and gingivitis for patient with:


**Intact periodontium**


**Reduced periodontium due to causes other than periodontitis**

**Reduced periodontium due to periodontitis**

2. “**Chronic and aggressive periodontitis**” terminologies have been removed because there is very little evidence to support their existence as separate entities.

**The exception is the classical localized juvenile (aggressive) periodontitis.**

Staging  Classify the severity and extent of the disease.

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

3. A major change has occurred in the classification of mucogingival deformities and conditions. For example, with regard to gingival recessions, the previous classification was more descriptive in nature and involved an assessment of a defect’s relation to the mucogingival junction and radiographic assessment of

interdental bone. The current classification is evidence-based and classifies recessions based on predictability of recession coverage using contemporary periodontal plastic surgery procedures.

4. A classification category for peri-implant diseases and conditions has been included for the first time in a periodontal classification system.

### **Periodontal health ,gingival diseases and conditions**

**The periodontal health** 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. Based on available methods to assess gingival health and inflammation, which can be simply, objectively accurately defined and graded using a **bleeding on probing score (BOP%)**, assessed as the proportion of bleeding sites when stimulated by a standardized (dimensions and shape) periodontal probe with a controlled (**0.25 N**) force to the apical end of the sulcus. **So gingival health can be classified into:**

**1- Clinical gingival health on an intact periodontium:-** is characterized by the absence of bleeding on probing, erythema and edema, patient symptoms, and no attachment and bone loss. **Physiological bone levels range** from 1.0 to 3.0 mm apical to the cemento-enamel junction.

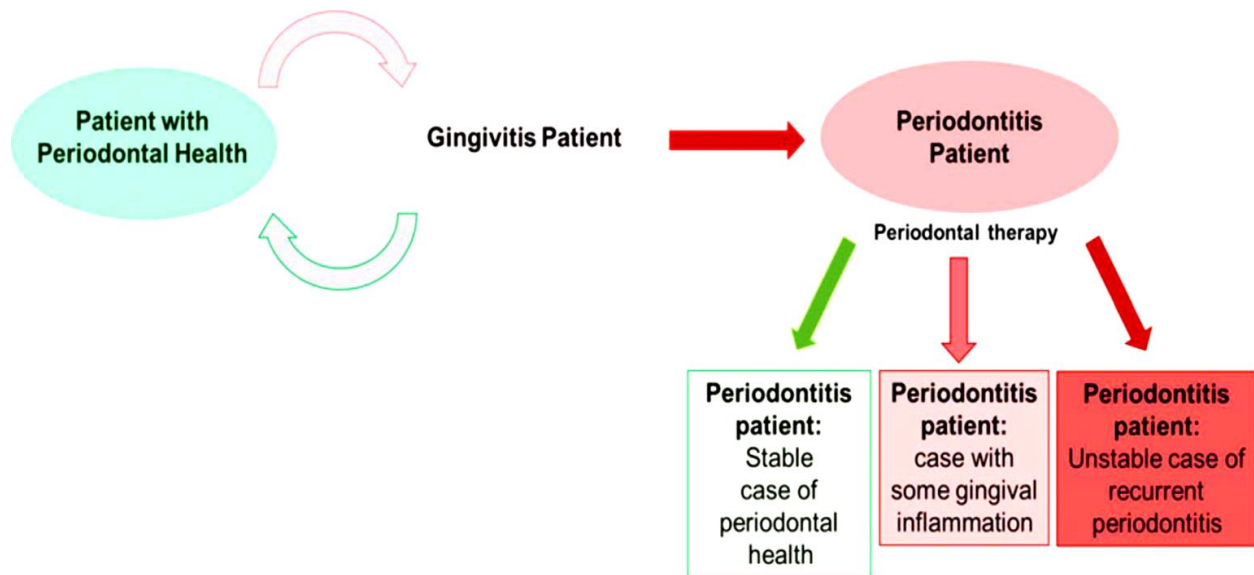
**2-Clinical gingival health on a reduced periodontium that include:**

**A-Stable periodontitis patient:** Characterized by an absence (or minimum) bleeding on probing (less than 10%), in the presence of reduced clinical attachment and bone levels. while probing pocket depth  $\leq 4$  mm provided that there is no pseudo pockets and no bleeding on probing at site with 4mm pocket depth. However, it should be recognized that successfully treated and stable periodontitis patients **remain at increased** risk of recurrent progression of periodontitis.

**B-Non-periodontitis patient (e.g. gingival recession, crown lengthening)**

Characterized by the presence of reduced clinical attachment and bone levels ,with probing pocket depth  $\leq 3$  mm. There is **no** evidence for increased risk of periodontitis.

The transition from periodontal health to gingivitis is **reversible** following treatment that resolves gingival inflammation. The transition to periodontitis results in attachment loss which is **irreversible**. Optimal periodontal therapy can restore gingival health on a reduced periodontium, or may result in mild marginal gingival inflammation at shallow probing pocket depths ( $\leq 3$  mm). However, a history of periodontitis places patients at **high risk** of recurrent periodontitis and such patients require careful site-specific monitoring during periodontal maintenance programs (**Fig.1**).



**Fig. 1:-The transition from periodontal health to gingivitis and periodontitis.**

## Gingival diseases

**There are broadly two categories of gingival disease:**

- ☒ Dental plaque biofilm-induced gingivitis
- ☒ Non-dental plaque-induced gingival diseases

Depending on whether dental plaque biofilm-induced gingival inflammation occurs on an intact or reduced periodontium, or in a patient diagnosed with periodontitis, gingivitis can be further classified as:

- ❖ Gingivitis on an intact periodontium.
- ❖ Gingival inflammation on a reduced periodontium in a successfully treated periodontitis patient.
- ❖ Gingivitis on a reduced periodontium in a non-periodontitis patient (e.g., recession, crown lengthening).

### **1- Gingivitis on an intact periodontium**

Gingival inflammation associated with **BOP score**  $\geq 10\%$ , **probing pocket depth**  $\leq 3\text{mm}$  assuming **no** pseudo pocket , **no** attachment loss and **no** radiographic bone loss.

### **2-Gingival inflammation on a reduced periodontium in a successfully treated periodontitis patient ( remission periodontitis)**

Gingival inflammation associated with **BOP score**  $\geq 10\%$ , **probing pocket depth**  $\leq 4\text{mm}$  assuming **no** pseudo pocket , with **presence** of attachment loss and radiographic bone loss, the patient will be diagnosed as **remission periodontitis**.

### **3- Gingivitis on a reduced periodontium in a non-periodontitis patient (e.g., recession, crown lengthening)**

A patient with a reduced periodontium but without a history of periodontitis (e.g. gingival recession, crown lengthening) and a **BOP score**  $\geq 10\%$  would be diagnosed as a “gingivitis on a reduced periodontium , **probing pocket depth**  $\leq 3\text{mm}$  assuming **no pseudo pocket** , with **possible** presence of attachment loss and radiographic bone loss.

### **The Classification of dental plaque biofilm-induced gingivitis**

#### **A. Associated with dental plaque biofilm alone**

#### **B. Mediated by systemic or local risk factors:-**

##### **i. Systemic risk factors (modifying factors)**

- (a)** Smoking
- (b)** Hyperglycemia
- (c)** Nutritional factors
- (d)** Pharmacological agents
- (e)** Hematological conditions
- (f)** Sex steroid hormones:-

Puberty

Menstrual cycle

Pregnancy

Oral contraceptives



**ii. Local risk factors (predisposing factors)**

(a) Dental plaque biofilm retention factors (e.g., prominent restoration margins)

(b) Oral dryness

**C. Drug-influenced gingival enlargement**

**The diagnostic criteria for gingivitis**

**The clinical signs of inflammation** are erythema, edema, pain (soreness), heat, and loss of function.

**These may be marked clinically in gingivitis as:**

- A. Swelling, seen as loss of knife-edged gingival margin
- B. Bleeding on gentle probing
- C. Redness
- D. Discomfort on gentle probing

**The symptoms a patient may report include:**

- A. Bleeding gums (metallic/altered taste)
- B. Pain (soreness)
- C. Halitosis
- D. Difficulty eating
- E. Appearance (swollen red gums)
- F. Reduced oral health-related quality of life

**Note:-**

- Radiographs cannot be used to diagnose gingivitis
- Localized gingivitis is defined as 10%-30% bleeding sites; generalized gingivitis is defined as > 30% bleeding sites.

## **The classification of non-dental plaque biofilm -induced Gingival diseases**

### **A. Genetic/developmental disorders**

- i.** Hereditary gingival fibromatosis

### **B. Specific infections**

- i.** Bacterial origin

- (a)** Neisseria gonorrhoeae (gonorrhea)
- (b)** Treponema pallidum (syphilis)
- (c)** Mycobacterium tuberculosis (tuberculosis)
- (d)** Streptococcal gingivitis

- ii.** Viral origin

- (a)** Coxsackie virus (hand-foot-and-mouth disease)
- (b)** Herpes simplex I & II (primary or recurrent)
- (c)** Varicella zoster (chicken pox & shingles)
- (d)** Human papilloma virus (squamous cell papilloma; verruca vulgaris)

- iii.** Fungal origin

- (a)** Candidosis
- (b)** Other mycoses, e.g., histoplasmosis, aspergillosis

### **C. Inflammatory and immune conditions**

- i.** Hypersensitivity reactions

- (a)** Contact allergy
- (b)** Plasma cell gingivitis
- (c)** Erythema multiforme

- ii.** Autoimmune diseases of skin and mucous membranes

- (a)** Pemphigus vulgaris
- (b)** Pemphigoid
- (c)** Lichen planus
- (d)** Lupus erythematosus
  - Systemic lupus erythematosus
  - Discoid lupus erythematosus

- iii.** Granulomatous inflammatory lesions (orofacial granulomatoses)

- (a)** Crohn's disease

## **D. Reactive processes**

### **i. Epulides**

- (a) Fibrous epulis
- (b) Calcifying fibroblastic granuloma
- (c) Vascular epulis (pyogenic granuloma)
- (d) Peripheral giant cell granuloma

## **E. Neoplasms**

### **i. Pre-malignancy**

- (a) Leukoplakia
- (b) Erythroplakia

### **ii. Malignancy**

- (a) Squamous cell carcinoma
- (b) Leukemic cell infiltration
- (c) Lymphoma
  - Hodgkin
  - Non-Hodgkin

## **F. Endocrine, nutritional & metabolic diseases**

### **i. Vitamin deficiencies**

- (a) Vitamin C deficiency (scurvy)

## **G. Traumatic lesions**

### **i. Physical/mechanical trauma**

- (a) Frictional keratosis
- (b) Mechanically induced gingival ulceration

### **ii. Chemical (toxic) burn**

### **iii. Thermal burn**

## **H. Gingival pigmentation**

### **i. Melanoplakia**

### **ii. Smoker's melanosis**

### **iii. Drug-induced pigmentation (antimalarials, minocycline)**

### **iv. Amalgam tattoo**

## Periodontitis

Periodontitis is a chronic multifactorial inflammatory disease associated with plaque biofilms and characterized by progressive destruction of the tooth-supporting apparatus. Its **primary features** include the loss of periodontal tissue support, manifested through clinical attachment loss (CAL) and radiographic bone loss (RBL), presence of periodontal pocketing and gingival bleeding. Periodontitis is a major public health problem due to its high prevalence, as well as because it may lead to tooth loss and disability, negatively affect chewing function and aesthetics, and impair quality of life.

Recently, based on pathophysiology, three clearly different forms of periodontitis have been identified according to new classification system proposed by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP) in 2017:

### 1. Periodontitis

### 2. Periodontitis as a manifestation of systemic disease

### 3. Necrotizing periodontal diseases

#### 1. Periodontitis: Classified according to different form of **staging and grading**.

☒ **Staging** aims to classify the severity and extent of a patient's disease based on the measurable amount of damaged tissue as a result of periodontitis. Initial stage should be determined by using **clinical attachment loss (CAL)**. If CAL is not available, **radiographic bone loss (RBL)** should be used (**Table 3**). Tooth loss due to periodontitis may modify the stage. The extent and distribution for each stage described as molar/ incisor pattern or localized if the involved sites < 30% or generalized if the involved site  $\geq 30\%$ .

Periodontitis		Stage I	Stage II	Stage III	Stage IV
<b>Severity</b>	Interdental CAL (at site of greatest loss)	1 – 2 mm	3 – 4 mm	≥5 mm	≥5 mm
	<b>RBL</b>	Coronal third (<15%)	Coronal third (15% - 33%)	Extending to middle third of root	Extending to apical third of root
	Tooth loss (due to periodontitis)	No tooth loss	No tooth loss	≤4 teeth	≥5 teeth
<b>Extent and distribution</b>	Add to each stage descriptor	<b>For each stage, describe extent as:</b> <input checked="" type="checkbox"/> Localized (<30% of teeth involved); <input checked="" type="checkbox"/> Generalized; or <input checked="" type="checkbox"/> Molar/incisor pattern			

**Grading** aims to indicate the rate of periodontitis progression, responsiveness to standard therapy, and potential impact on systemic health. Grading or rate of progression can be estimated by measurement the percentage of radiographical bone loss divided by the age of patient (**% bone loss / patient's age**).

1. Grade A (slow): **<0.5**
2. Grade B (moderate): **0.5– 1.0**
3. Grade C (rapid): **>1.0**

**(Grade is assessed on the worst affected tooth).**

**Distribution**

- Molar– incisor pattern (added in 2017 classification).
- Localized <30% of teeth.
- Generalized ≥30% of teeth.

**☒ Assessment of current periodontal status**

**Currently stable:** BOP <10%, PPD <4mm, no BOP at 4mm sites.

**Currently in remission:** BOP >10%, PPD <4mm, no BOP at 4mm sites.

**Currently unstable:** PPD >5mm or PPD >4mm and BOP.

**☒ Risk factors**

1-Smoking.

2-Uncontrolled diabetes.

**Example of a diagnosis statement**

Generalized periodontitis stage III grade B currently unstable with smoking as a risk factor.

## **II. Periodontitis as a manifestation of systemic diseases :**

A variety of systemic diseases and conditions can affect the course of periodontitis or have a negative impact on the periodontal attachment apparatus

### **Classification of systemic diseases and conditions that affect the periodontal supporting tissues :-**

**A. Systemic disorders that have a major impact on the loss of periodontal tissues by influencing periodontal inflammation :-**

#### **1-Genetic disorders**

##### **1.1-Diseases associated with immunologic disorders:**

- Down syndrome
- Leukocyte adhesion deficiency syndromes
- Papillon-Lefèvre syndrome
- Chediak-Higashi syndrome
- Severe neutropenia
- Primary immunodeficiency diseases
- Cohen syndrome

##### **1.2 -Diseases affecting the oral mucosa and gingival tissue:**

- Epidermolysis bullosa
- Plasminogen deficiency

##### **1.3- Diseases affecting the connective tissues:**

- Ehlers-Danlos syndromes (types IV, VIII)
- Systemic lupus erythematosus

##### **1.4- Metabolic and endocrine disorders:**

- Glycogen storage disease
- Hypophosphatasia

#### **2-Acquired immunodeficiency diseases:**

- Acquired neutropenia
- HIV infection

#### **3- Inflammatory diseases:**

- Inflammatory bowel disease

**B. Systemic disorders that influence the pathogenesis of periodontal diseases :**

- ❖ Diabetes mellitus
- ❖ Obesity
- ❖ Osteoporosis
- ❖ Arthritis (rheumatoid arthritis, osteoarthritis)
- ❖ Emotional stress and depression
- ❖ Smoking (nicotine dependence)
- ❖ Medications

**C. Systemic disorders that can result in loss of periodontal tissues independent of periodontitis:**

**1-Neoplasms**

**1.1-Primary neoplastic diseases of the periodontal tissues**

- Oral squamous cell carcinoma
- Odontogenic tumors

**1.2-Secondary metastatic neoplasms of the periodontal tissues**

**2-Other disorders that may affect the periodontal tissues**

Langerhans cell histiocytosis

Hyperparathyroidism

Systemic sclerosis (scleroderma)



### **III. Necrotizing periodontal diseases:**

**A.** Necrotizing gingivitis

**B.** Necrotizing periodontitis

**C.** Necrotizing stomatitis

**Necrotizing gingivitis:** This is an infection characterized by gingival necrosis presenting as 'punched-out' papillae, with gingival bleeding, and pain. Fetid breath and pseudomembrane formation may be secondary diagnostic features. Fusiform bacteria, *Prevotella intermedia*, and spirochetes have been associated with gingival lesions. Predisposing factors may include: emotional stress, poor diet, cigarette smoking, and HIV infection.

**Necrotizing periodontitis:** This is an infection characterized by necrosis of gingival tissues, periodontal ligament, and alveolar bone. These lesions are most commonly observed in individual with systemic conditions including HIV infection, severe malnutrition, and immunosuppression.

**Necrotizing stomatitis :** is a very severe and aggressive form of necrotizing periodontal disease showing extensive damage in the oral cavity tissue and bone destruction. In necrotizing stomatitis, after the oral mucosal membranes are destroyed, the entire mouth is involved due to spread of infection.