

Introduction to Periodontology

Why Teeth Fall Out – and How We Prevent It

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Learning Outcomes

By the end of this lecture, students should be able to: Demonstrate comprehensive understanding of periodontal anatomy, disease processes, and clinical significance.

1

Define Key Terms

Accurately define **periodontium** and **periodontology**, distinguishing between the anatomical structures and the clinical discipline.

2

List Components

Systematically list and identify the four primary components of the periodontium on both diagrams and clinical images.

3

Describe Functions

Describe the five essential functions of the periodontium, explaining how each contributes to tooth retention and oral health.

4

Distinguish Conditions

Accurately distinguish between a healthy periodontium, gingivitis, and periodontitis using clinical and radiographic features.

5

Identify Risk Factors

State the main local and systemic risk factors and explain how they modify the onset, progression, and severity of disease.

6

Appreciate Importance

Understand the critical importance of periodontology in maintaining natural dentition and supporting all dental disciplines.

Clinical Hook: Why Teeth Fall Out

Common causes of adult tooth loss: Understanding why teeth are lost is fundamental to preventing it.

Dental Caries

Tooth decay causing cavitation and destruction of tooth structure.

Prevention: Fluoride, diet control, fillings

Periodontal Disease

In adults, periodontal disease is a MAJOR cause of tooth loss.

Trauma & Others

Accidents, severe trauma, congenital absence, or iatrogenic causes.

Note: Less common than caries or periodontal disease

Critical Question for Students:

"Which do you think is more common in adults: caries or periodontal problems?"

Examination Point: "Most common cause of tooth loss in adults" and "Definition concept of periodontal disease" are frequently tested MCQ topics.

Definitions: Periodontium & Periodontology



Periodontium

The **specialized supporting tissues** surrounding and investing the teeth.

Includes Four Components:

- 1 Gingiva (gums)
- 2 Periodontal Ligament (PDL)
- 3 Cementum
- 4 Alveolar Bone



Periodontology

The **branch of dentistry** that studies and treats the periodontium in health and disease.

Also Called:

Syn. Periodontics

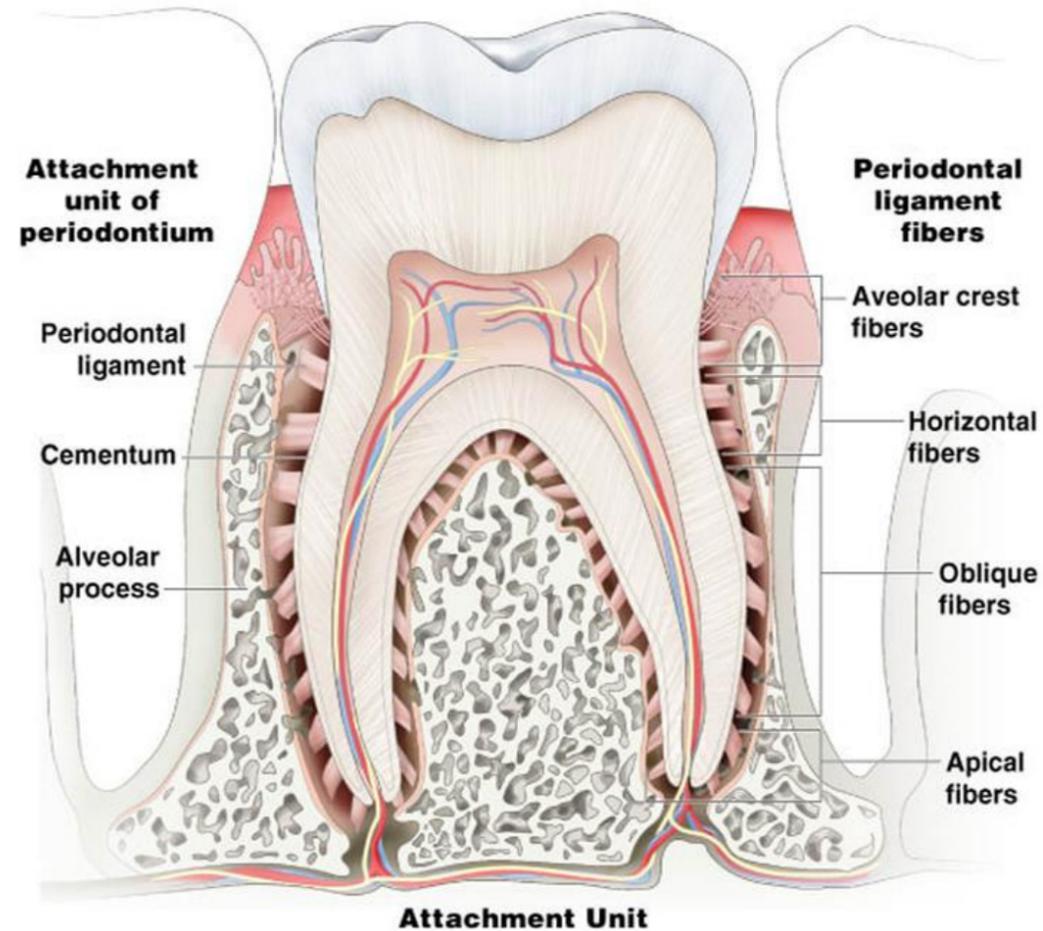
The specialty concerned with prevention, diagnosis, and treatment of diseases affecting the supporting tissues of teeth.

👤 A periodontist is a dental specialist who has completed additional training in this field.

📌 **Examination Point:** The exact wording of these definitions and the components of the periodontium are frequently tested. Know them precisely.



Components of the Periodontium



1 Gingiva (Gums)

Part of oral mucosa that **covers the alveolar process** and surrounds cervical portion of teeth.

2 Periodontal Ligament (PDL)

Fibrous connective tissue between root cementum and alveolar bone, serving as attachment and shock absorber.

3 Cementum

Calcified tissue covering the root surface, providing attachment for PDL fibres.

4 Alveolar Bone

Part of jaws that **forms and supports the tooth sockets (alveoli)**, providing the foundation.

 **Clinical Note:** These four tissues work together as an integrated functional unit. Disease affecting one component inevitably impacts others.



Functions of the Periodontium

The periodontium performs five essential functions that work together to maintain tooth integrity and oral health.



Supportive

Anchors teeth securely in the jaws, providing stability during function.



Protective

Physical barrier against mechanical, thermal, and microbial insults.



Sensory

Tactile, pressure, and pain perception (primarily via PDL innervation).



Nutritive

Blood supply to PDL and adjacent structures maintains vitality.



Remodelling

Continuous adaptation of bone and PDL to functional demands.

Gingiva: The Protective Barrier

Definition

Part of the oral mucosa that **covers the alveolar process** and surrounds the cervical portion of the teeth.

Types of Gingiva

1 Marginal / Free Gingiva

Unattached portion surrounding tooth

2 Attached Gingiva

Firmly bound to underlying bone

3 Interdental Papilla

Fills space between teeth

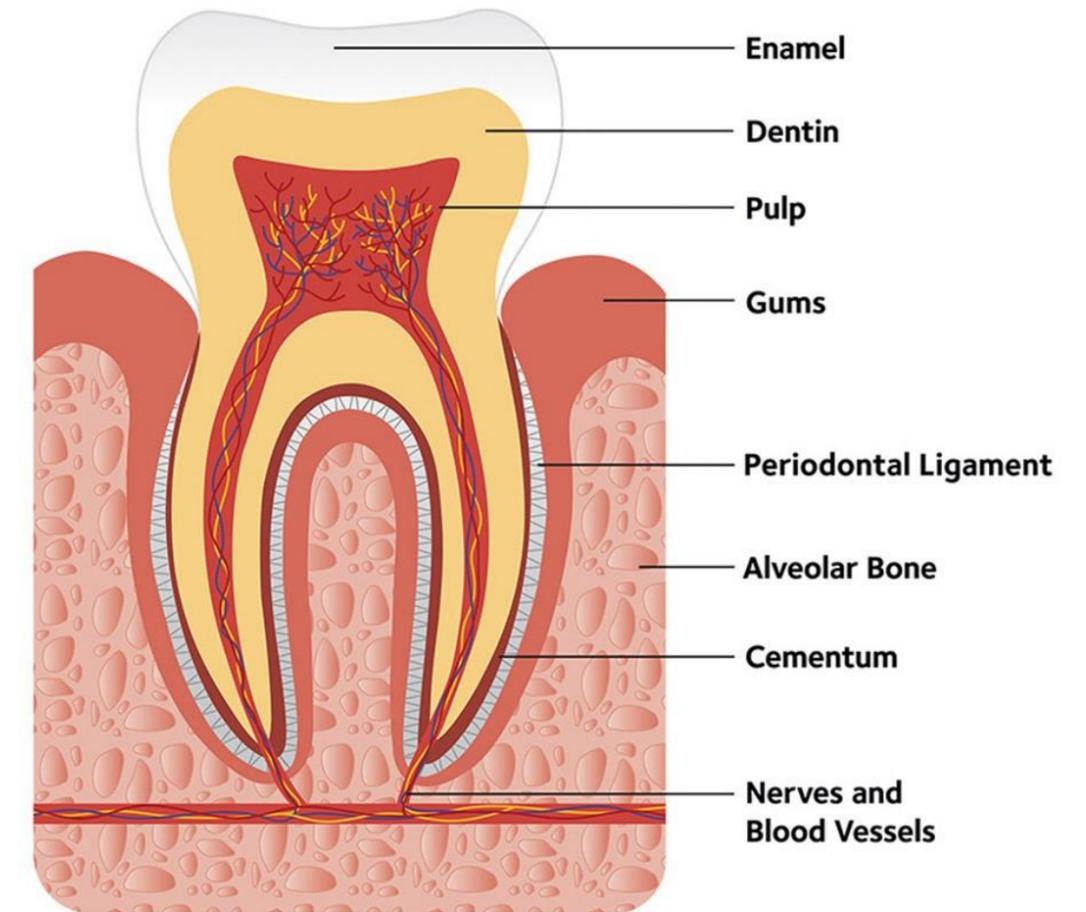
✓ Clinical Features of Healthy Gingiva

Colour: Coral pink

Contour: Knife-edged

Consistency: Firm

Stippling: Present



🦷 Clinical Significance

- First line of defense
- Changes indicate disease
- Assessment is critical

❖❖ Periodontal Ligament (PDL): The Shock Absorber

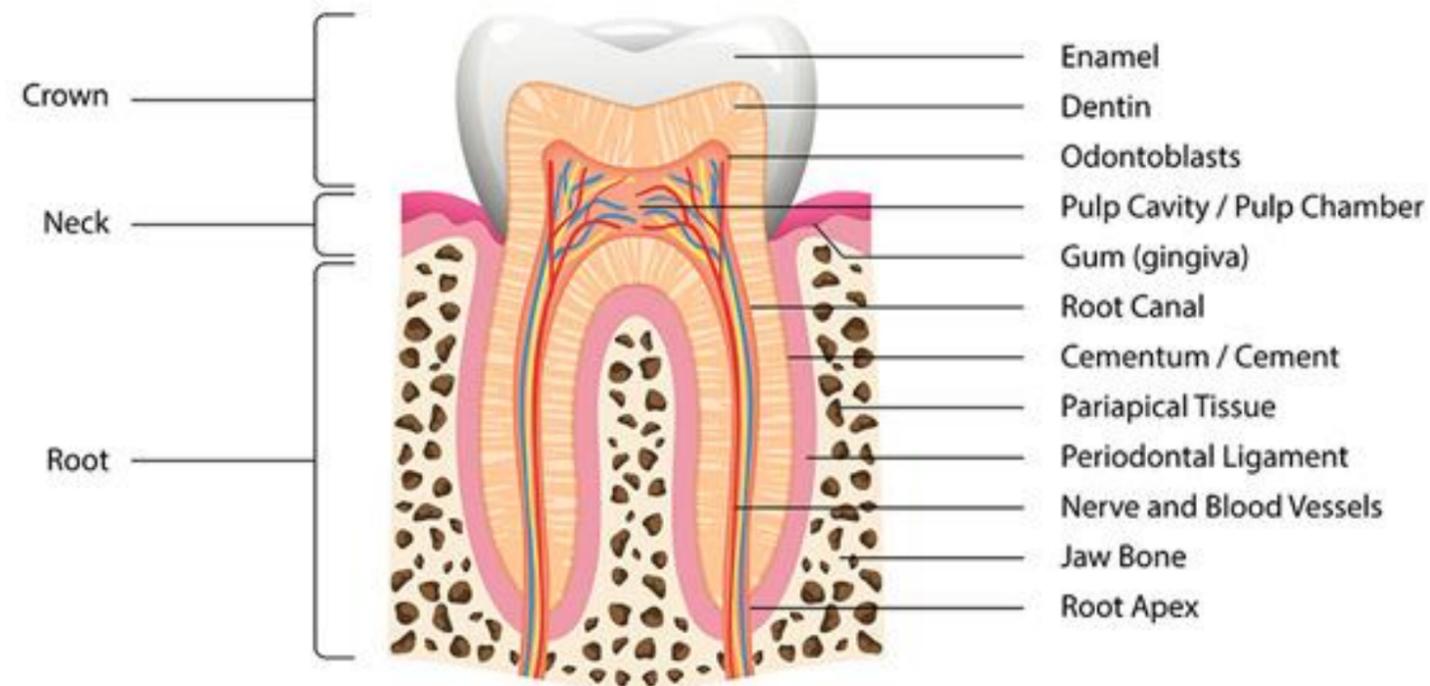
Definition

Thin, soft **connective tissue** between root cementum and alveolar bone.

Width: About **0.15–0.38 mm**

Extremely thin but incredibly strong!

Tooth Anatomy



⚙️ Functions of PDL

1. Attachment

Attaches tooth to bone via Sharpey's fibres

2. Shock Absorption

Distributes occlusal forces to prevent damage

3. Sensory Feedback

Pressure and pain perception

4. Repair & Remodelling

Participates in tooth movement and repair

Cementum: The Root Covering

Definition

Specialized **calcified tissue** covering the root dentin.



Avascular

No blood supply



No Innervation

No nerve supply

Types of Cementum

1 Acellular Cementum

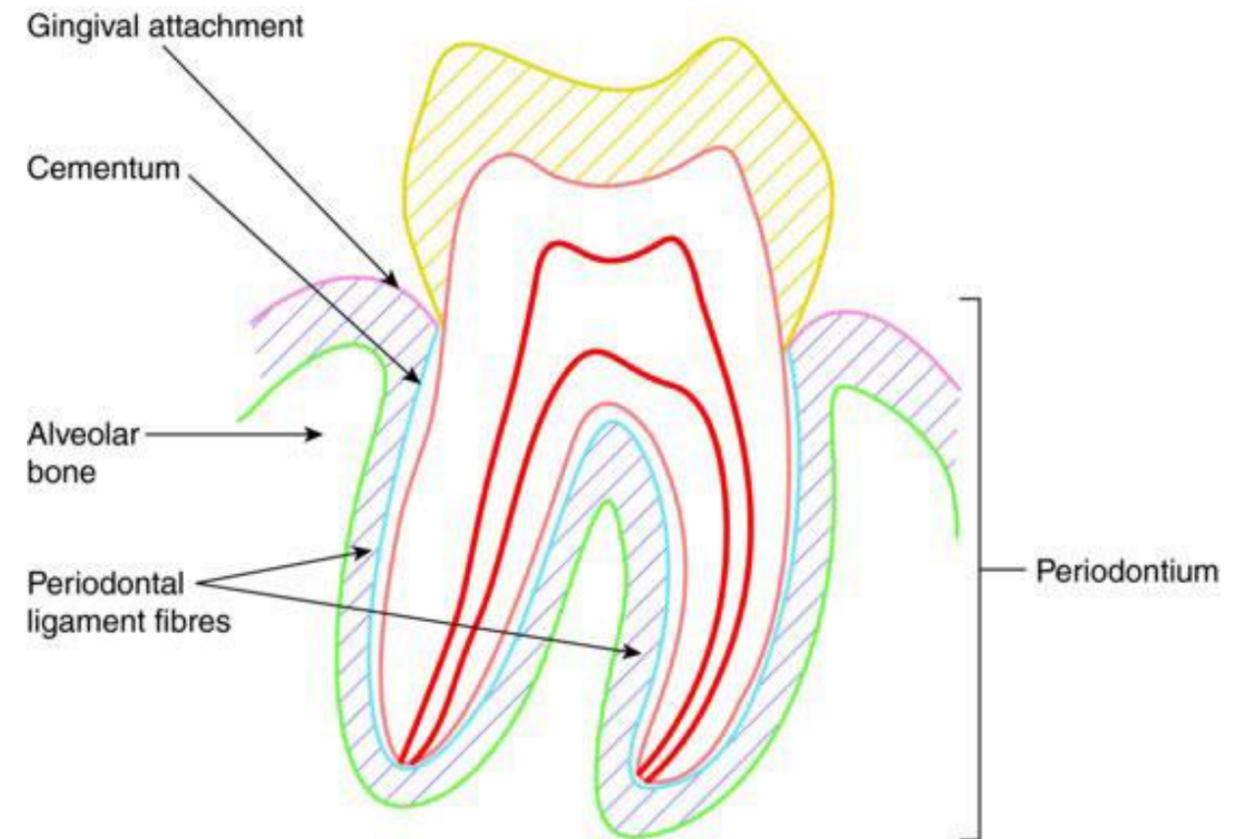
Location: Cervical 2/3 of root

Characteristics: No cells, formed before tooth eruption

2 Cellular Cementum

Location: Apical 1/3 of root

Characteristics: Contains cementocytes, formed throughout life



Functions of Cementum



1. PDL Attachment

Provides attachment for PDL fibres (Sharpey's fibres)



2. Dentin Protection

Protects underlying dentin from resorption



3. Repair & Adaptation

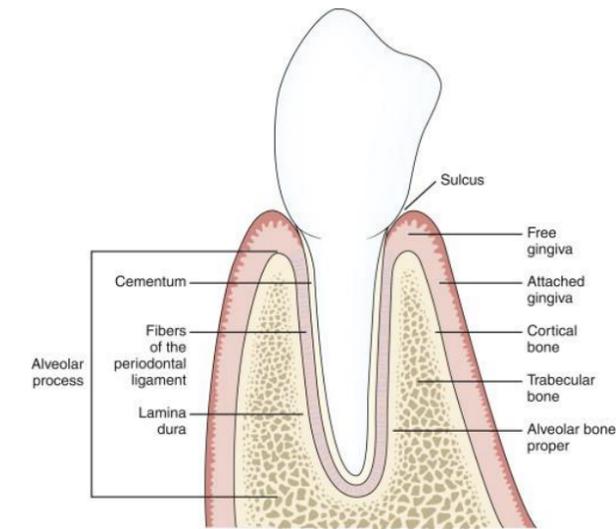
Involved in repair and adaptation of root surface

Alveolar Bone: The Dynamic Foundation

Definition

Part of the maxilla and mandible that **forms the tooth sockets (alveoli)** and supports the teeth.

Key Concept: Alveolar bone is **highly dynamic** and undergoes continuous remodelling.



Components of Alveolar Bone

1 Alveolar Bone Proper

Also called: Lamina dura (radiographic term)

Function: Thin, compact bone lining the tooth socket

2 Supporting Bone

Components: Cortical plates (outer) + Spongy bone (inner)

Function: Provides structural support and protects

Dynamic Nature

Continuous Remodelling

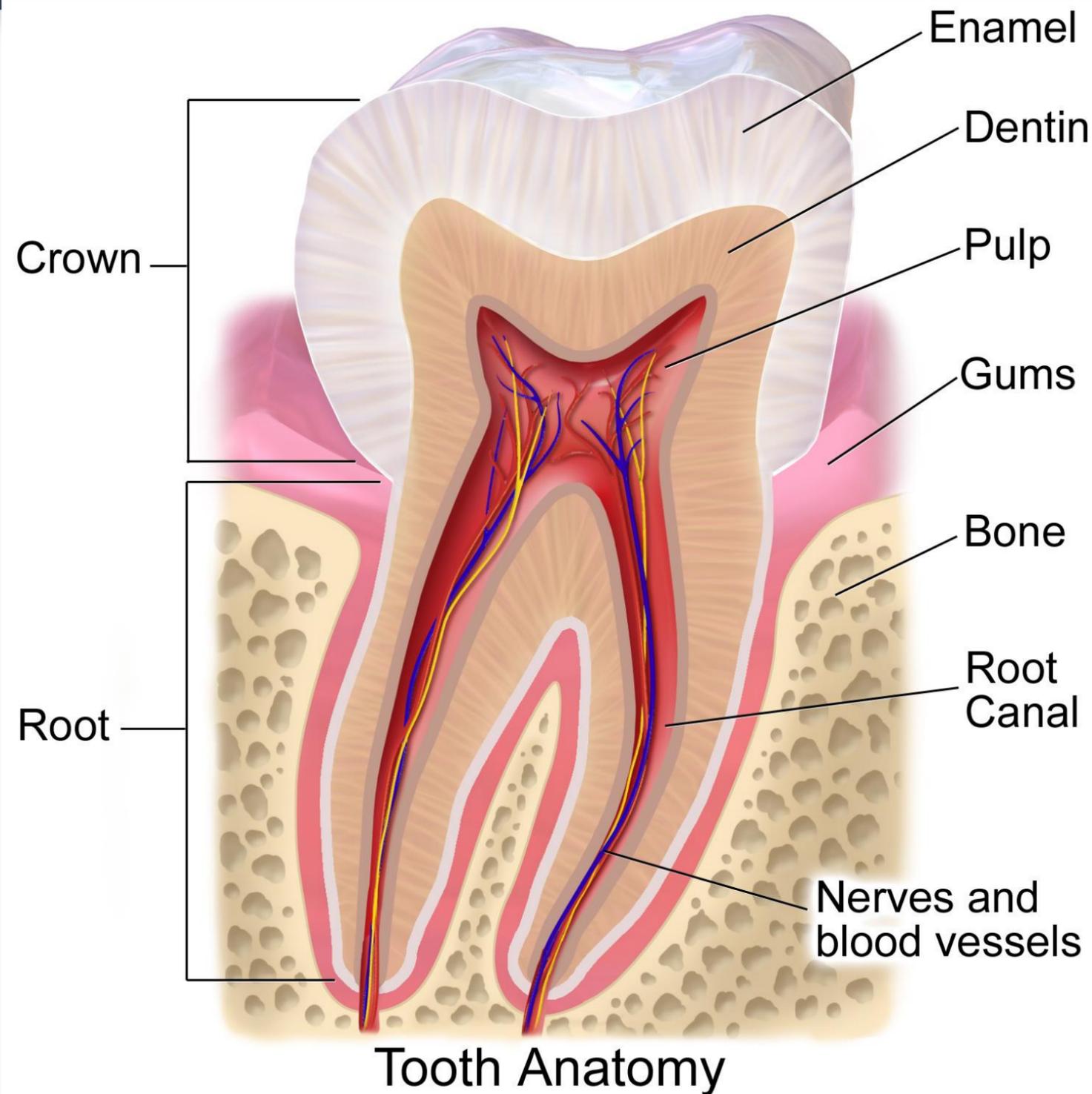
Adapts to functional demands throughout life

Resorption When Teeth Lost

Progressive resorption occurs after tooth extraction or in advanced periodontal disease

✓ Healthy Periodontium: A Summary

Integration of all components working together to maintain periodontal health and tooth stability.



1 Gingiva

- ✓ Healthy colour (coral pink)
- ✓ Knife-edged margins
- ✓ No bleeding on probing

2 Sulcus Depth

Shallow: 1-3 mm

3 PDL

Intact structure with normal width

4 Cementum

Completely covered and undamaged

5 Alveolar Bone

Crest close to CEJ (1-2 mm apical)

Starting Point: Dental Plaque & Calculus

Periodontal disease starts with microbial accumulation. Understanding plaque and calculus is essential for prevention and treatment.

Dental Plaque

Soft, sticky biofilm of microorganisms on tooth and gingival surfaces.

Formation Process:

- 1 Pellicle formation (salivary proteins)
- 2 Early colonizers attach (Gram+ cocci)
- 3 Late colonizers join (Gram- rods)
- 4 Mature biofilm forms (anaerobic)

Time frame: Forms rapidly after cleaning; if not removed → matures in 24-48 hours

Calculus (Tartar)

Mineralized plaque that has hardened due to deposition of calcium and phosphate salts.

Key Characteristics:

- Provides **rough surface** that retains more plaque
- **Cannot be removed** by brushing or flossing
- Two types: **Supragingival** (above gum) & **Subgingival** (below gum)

Removal: Requires professional scaling and root planing

Critical Concept

Plaque is the **PRIMARY** etiological factor in most periodontal diseases. Calculus is secondary but perpetuates disease.

Gingivitis: Reversible Inflammation

Definition

Inflammation of the **gingiva** without loss of attachment or bone.

i Key Point: Inflammation is **CONFINED** to gingiva only

Etiology (Cause)

Primary cause: **Plaque accumulation** at the gingival margin

Mechanism: Bacterial toxins → inflammatory response → clinical signs

Clinical Features

1. Redness (Erythema)

Change from coral pink to red

2. Swelling (Edema)

Loss of knife-edged margin

3. Bleeding

On brushing or gentle probing

4. Tenderness

Possible discomfort

Reversibility

Gingivitis is **REVERSIBLE** with good oral hygiene and professional cleaning.

Treatment: No permanent damage; complete resolution possible

Stage 1: Initial Periodontitis



Crown Gum Tissue Bone Inflammation Plaque

Stage 2: Moderate Periodontitis



Crown Gum Tissue Bone Inflammation Plaque

Stage 3: Severe Periodontitis with potential for additional tooth loss



Crown Gum Tissue Bone Inflammation Plaque

Stage 4: Advanced Periodontitis with extensive tooth loss and potential for loss of the dentition



Crown Gum Tissue Bone Inflammation Plaque



Periodontitis: Destructive Disease

Definition

Chronic inflammatory disease of supporting tissues, leading to progressive loss of attachment and alveolar bone.

Key Characteristics

1. Destruction of PDL

Breakdown of ligament fibres

2. Loss of Alveolar Bone

Progressive bone resorption

3. Periodontal Pockets

Deepening sulcus > 3mm

4. Gingival Recession

Apical migration of gingival margin

5. Tooth Mobility

Increased movement due to bone loss

Pathogenesis

Complex interaction between plaque biofilm and host response, influenced by risk factors.

Two Phases:

- 1. Bacterial Challenge:** Plaque accumulation triggers inflammation
- 2. Host Response:** Immune-inflammatory response causes tissue destruction



1
Healthy Teeth & Gums

2
Gingivitis

3
Early Periodontitis

4
Moderate Periodontitis

5
Advanced Periodontitis



≠ Gingivitis vs Periodontitis: Key Differences

Feature	Gingivitis	Periodontitis
Inflammation Location	Confined to gingiva	Involves PDL and alveolar bone
Attachment Loss	No	Yes - Loss of clinical attachment
Bone Loss	No	Yes - Alveolar bone loss
Reversibility	Reversible	Partly irreversible
Age Prevalence	Common in all ages	More common in adults (>35 years)
Pocket Depth	1-3 mm (sulcus)	>3 mm (periodontal pocket)
Tooth Mobility	No	May be present
Treatment Goal	Eliminate inflammation	Control progression, regenerate if possible





Importance of Periodontology for Dentists

Periodontology is the foundation for almost every dental discipline. A healthy periodontium is prerequisite for all dental treatment.



Maintaining Natural Dentition

Primary goal: Preserve natural teeth for life through prevention and treatment of periodontal disease.

Why it matters: Natural teeth are superior to any prosthetic replacement



Successful Restorative Treatment

Prerequisite: Healthy periodontium is essential for longevity of fillings, crowns, bridges, and other restorations.

Rule: No restorative treatment on inflamed periodontium



Implant Longevity

Foundation: Dental implants require healthy periodontal environment and maintenance for success.

Concept: Peri-implantitis is similar to periodontitis



Importance of Periodontology for Dentists

Periodontology is the foundation for almost every dental discipline. A healthy periodontium is prerequisite for all dental treatment.



Periodontist as a Specialist

When to refer: Complex cases requiring specialized surgical expertise.

1. Non-Surgical Therapy

Scaling, root planing, antimicrobial therapy

2. Surgical Procedures

Flap surgery, regenerative therapy

3. Mucogingival Surgery

Grafting procedures, recession coverage

4. Implant Surgery

Placement, bone grafting, site development



Foundation for All Dentistry



Periodontology is the Foundation

Every dental discipline builds upon healthy periodontal tissues. Without periodontal health, all other dental treatments are compromised.

Integrated Approach:

- Orthodontics requires healthy periodontium
- Endodontics: Perio-endo lesions
- Oral surgery: Extractions, grafting
- Prosthodontics: Foundation for prostheses



Recap: Key Concepts

Master these five core concepts to build a strong foundation in periodontology.

1 Periodontium = Four Components

Gingiva

PDL

Cementum

Alveolar Bone

2 Gingivitis vs Periodontitis: The Critical Distinction

Gingivitis

Inflammation **without** attachment/bone loss • **Reversible**

Periodontitis

Inflammation **with** attachment/bone loss • **Irreversible**

3 Plaque is the Primary Etiological Factor

Dental plaque (biofilm) is the initiating cause of most periodontal diseases.
Calculus is mineralized plaque that perpetuates disease by retaining more plaque.

☰ Recap: Key Concepts

Master these five core concepts to build a strong foundation in periodontology.

4 Risk Factors Modify Disease

Local

Calculus, poor restorations, malalignment

Systemic

Smoking, diabetes, genetics

5 Periodontology is Crucial for Practice

Foundation for all dentistry: Maintains natural teeth, supports restorative work, enables implant

success.

Every dental discipline requires healthy periodontium.