Topic 8. Periodontium. Eruption and changing of teeth.

Supporting tissues of tooth (periodontium)		
1.	Cementum	Cementum is a thin layer of hard tissue (calcified matrix) that does not have a direct blood supply. The slower growing acellular cementum allows fibers (Sharpey fi bers) from the periodontal ligaments (PDL) to become trapped in the matrix of the cementum to form the tooth attachment. Cementum is much more resistant to reabsorption than bones.
2.	Alveolar bone (alveolar process)	It includes the **alveolar crest**, the **alveolar bone proper**, and **supporting bone**.
3.	Periodontal ligaments (PDL)	They consist of dense fibrous connective tissue with a direct nerve and blood supply. They are located between the cementum and the alveolar bone, which surrounds the tooth root. Fibroblasts are the main cells responsible for the formation of the PDL. The PDL supports the tooth root by forming a strong attachment between the cementum and alveolar bone by Sharpey fbers.
Dongmei CuiJohn P. NaftelJonathan D. FratkinWilliam DaleyJames C. Lynch.: Atlas of Histology, With Functional and Clinical Correlations, Lippincott Williams and Wilkins, 2010		

Periodontal ligaments			
Name of ligament		**Features**	**Functions**
1.	**Alveolar crest group of fibers**	The fibers have a horizontal direction. They are located on the crest of the alveoli and connect adjacent teeth.	1. Supportive 2. Protective 3. Sensory 4. Nutritive
2.	**Horizontal group of fibers**	The fibers have a horizontal direction. They connect tooth root cementum (upper portion of tooth) with alveolar processes of the upper and lower jaws.	

3.	**Oblique group of fibers**	The fibers have a oblique direction. They connect tooth root cementum (middle and lower portions of tooth) with alveolar processes of the upper and lower jaws.	
4.	**Apical group of fibers**	The fibers have a vertical direction. They connect tooth root cementum (apex of root) with lacunas of the upper and lower jaws.	
5.	**Interradicular group of fibers**	They connect parts of tooth roots together. They are only present between multirooted teeth.	
6.	**Ggingival group of fibers**	They attach the gingiva to the hard tissue of the tooth.	

Alveolar bone (alveolar process)		
Structure		**Features and functions**
1.	**Alveolar bone**	It provides support and protection for the tooth root.
2.	**Alveolar bone proper**	It is a thin layer of compact bone which lines the tooth socket and has Sharpey fibers embedded in it. It is remodeled constantly to adapt to stresses and tensions.
3.	**Supporting bone**	It is composed of **compact bone (1)** and **cancellous bone (2)**. The **compact bone** forms the cortical plate, which provides surface strength. The **cancellous bone** makes up the central core of the alveolar bone and contains bone marrow.

Eruption and shed of teeth

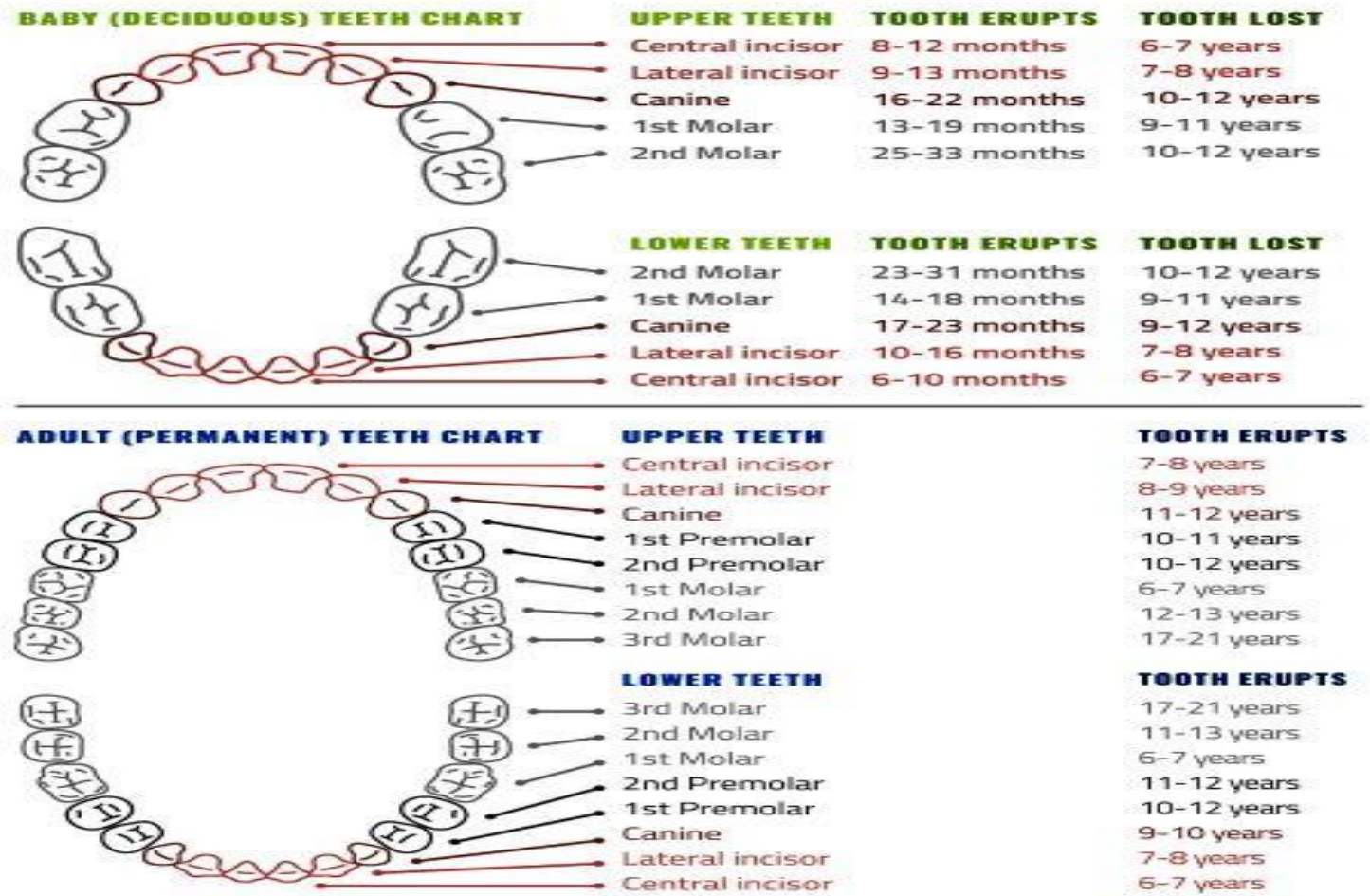
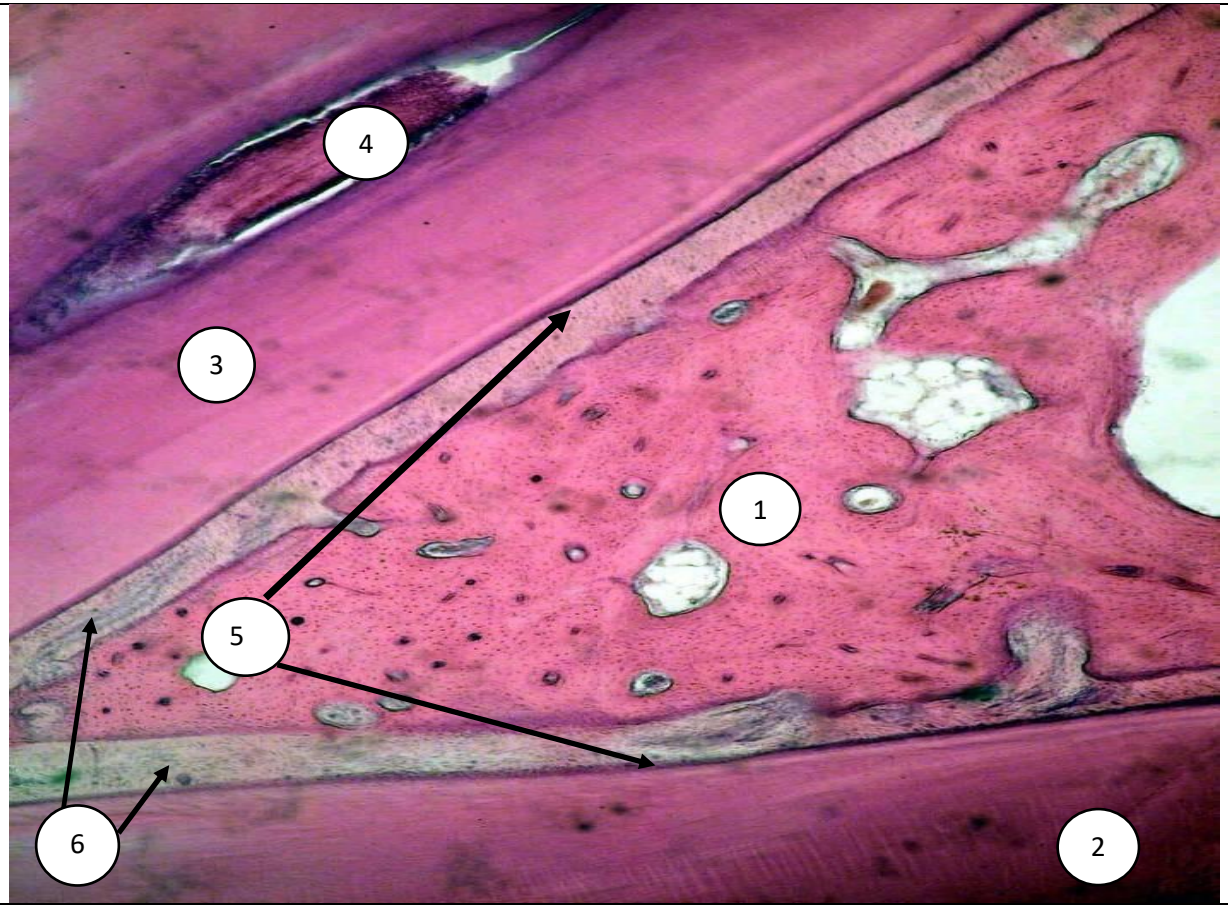


Fig. 1
https://dentistryfortheentirefamily.com/difference-between-baby-adult-teeth/

Blood supply of periodontal ligaments		
Name of blood vessels		**Features**
1.	**Alveolar arteries**	They are branches of the **infraorbital artery** and **maxillary artery**.
2.	**Dental arteries**	They are branches of **alveolar arteries**.
3.	**Supraperiosteal artery**	They are branches of **dental arteries.** They are located above alveolar crest.
4.	**Interdental artery**	They are located between the roots parts of multirooted teeth.



Interradicular bone
Magnification X 40, hematoxylin-eosin staining.

On the preparation there are roots of two adjacent teeth. Between the roots there is interradicular bone (1).
You can see the dentin of both teeth (2), (3)**,** the pulp cavity of the first tooth (4). Laterally from the dentin there is cement (5). There is a periodontium (6) between the interradicular bone and the roots.

VOCABULARY

Periodontium – is a connective tissue composed of four parts: cementum, periodontal ligament, alveolar bone and gingival tissue. The functions of the periodontium include retention of the tooth, prevention of exposure to oral microflora, as well as ensuring the attachment of the tooth to the bone.

Cementum - is a mineralized tissue covering the entire root surface. Cementum has historically been classified into cellular and acellular cementum by inclusion or non-inclusion of cementocytes. Generally, acellular cementum is thin and covers the cervical root, whereas thick cellular cementum covers the apical root.

Periodontal ligament - is a component of the periodontium that allows for the teeth to be attached to the surrounding alveolar bone via the cementum. PDL fibers also transmit and absorb forces between the teeth and alveolar bone. Heavily anastomosed, the PDL ensures the vitality of the surrounding cells. Nutrients are transmitted through three blood vessel types: gingival vessels, perforating vessels, and apical vessels. Well innervated, the PDL involves nociception, mechanoreception, and reflexes. The PDL contains progenitor cells which can differentiate into osteoblasts. These cells are believed to be for physiological maintenance and repair of the alveolar bone.

Alveolar bone - the alveolar process is that bone of the jaws that contains the sockets (alveoli) for the teeth and consists of outer cortical plates, a central spongiosa, and bone lining the alveolus. The cortical laminae and the bone covering the alveolus are joined at the alveolar crest, most often 1.5-2.0 mm lower than the cemento-enamel junction of the tooth it encircles. The bone lining the socket is specifically referred to as bundle bone, because it is this bone that provides attachment for the ligament fiber bundles and has its likely origin from the dental follicle. It is perforated by many foramina, which transmit nerves and vessels, and is therefore sometimes referred to as the cribriform plate.

Dentogingival junction – the epithelium of the junction is divided into sulcular (cervicular) epithelium, a continuation of oral epithelium, and junctional epithelium, derived from dental epithelium. Junctional epithelium forms the epithelial attachment of gingiva to tooth structure using hemidesmosomes.

Gingival sulcus - is the natural space located between the surface of the tooth and the surrounding gum or gingival tissue. The gingival sulcus is lined by the sulcular epithelium. The depth of the sulcus is surrounded by two different entities

which include: apically by the gingival fibers of the connective tissue attachment and coronally by the free gingival margin. A healthy depth is three millimeters or less.

Links:
https://www.ncbi.nlm.nih.gov/books/NBK570604/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390338/
http://www.uky.edu/~brmacp/oralhist/module8/lab/imgshtml/image15.htm

TESTS

1. Sensitive nerve endings in the form of **glomeruli are found in the periodontal bundles along their fibers**. What role do these receptors play?
Touch receptors
Thermoreceptors
Pain receptors
Chemical receptors
Mechanical receptors

2. The excess filling in a cavity led to an overestimation of occlusion. This caused **pain during bite due to periodontal injury. What kind of nerve endings in the periodontum are involved in feeling pain**?
Free nerve endings
Absence of capsule
Presence of capsule
Axo-muscle
Synapses

3. A study was conducted t determine the tissue structures belonging to the tooth. What tissue belongs to the **periodontum**?
Dense regular connective tissue
Loose connective tissue
Bone tissue

Reticular tissue
Adipose tissue

4. A 43 year old patient for **a long time has not had enough vitamin C in his diet**. What is the pathology of the supporting apparatus of the tooth to be expected in the first place?
Periodontum disorder
Keratinization of gingival epithelium
Gingival pockets formatia
Alveolar bone transformation
Disorder of sulcus epithelium

5. During examination of a **child's oral cavity a pediatrician found 8 incisors**. The child's development corresponds to his age. How old is the child?
10-12 month
6-7 month
7-8 month
12-15 month
16-20 month

Links:
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