

# Growth and Development

**OMFS 562 DS2**

Shadi Javadi, DDS, MS



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# Overview of the Cell and Basic Tissues

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# Learning Objectives

1. Describe major components of the cell and their function
2. Describe the structure, types, and function of epithelium/connective tissues
3. Describe the structure and function of bone
4. Describe the basic structure and function of muscular, nervous, and vascular tissues

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# Outline

- Histology
- Overview of the Cell
- Components of Human Body
- Cell Structure
- Nucleus
- Mitochondria
- Ribosomes
- Endoplasmic Reticulum
- Golgi Complex/ Apparatus
- Lysosomes
- Cytoskeleton
- Cell Division
- Extracellular Material
- Intercellular Junctions: Desmosome, Hemidesmosome
- Basic Tissues
- Tissue Types
- Basement Membrane

- Connective Tissue
- Muscle Tissue
- Nerve Tissue
- Orofacial Structures
- Face and Neck Regions
- Oral Cavity and Pharynx
- Oral Cavity Properties
- Oral Cavity Divisions
- Oral Vestibule
- Jaws, Alveolar Process and Teeth
- Gingival Tissue
- Oral Cavity Proper
- Pharyngeal Divisions
- Clinical Considerations: Oral Vestibules, Oral Mucosa, Alveolar Process, Palate

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# Histology

**Definition:** the study of the microscopic structure and function of cells and their tissues (aka Microanatomy)

**Why do dental professionals need to understand histology?**

They must understand the basic unit (cell) to understand the large concepts of histology in the oral cavity

# Components of Human Body

**Cell:** smallest living unit

e.g.: epithelial, neuron, fibroblast, macrophage

**Tissue:** collection of similar cells

e.g.: epithelium, nervous, muscle, cartilage, bone, blood

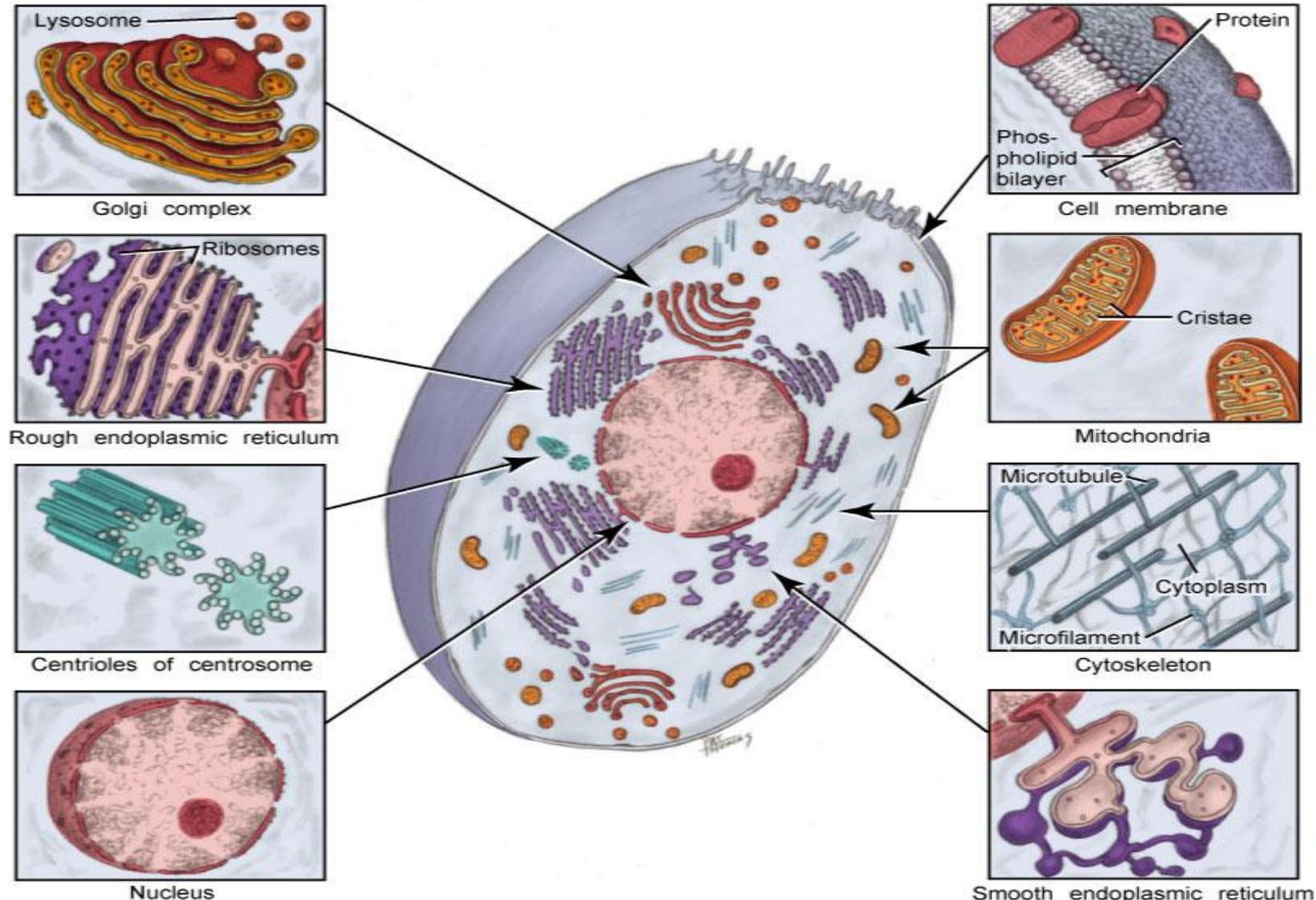
**Organ:** an independent body part formed from tissue

e.g.: skin, brain, heart, liver

**System:** when organs function together

e.g.: Central nervous system (CNS), respiratory system, immune system, cardiovascular systems

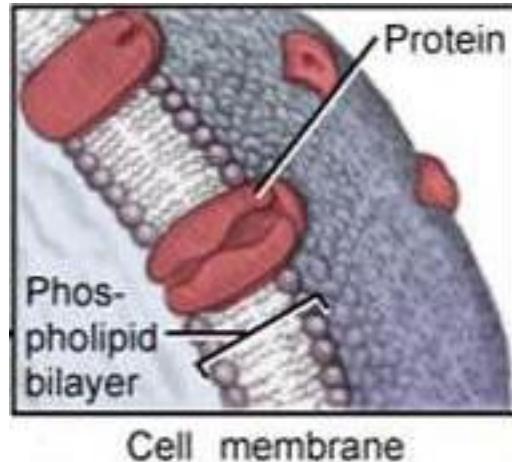
# Overview of Cell



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# Cell Structure



## Cell/Plasma Membrane:

-Bilayer of phospholipids and proteins:

Structural reinforcement, receptors for hormones, neurotransmitters and antibodies

-Selective barrier:

Regulates transport of substances into/out of cell

**Organelles:** Nucleus, mitochondria, ribosomes, endoplasmic reticulum, Golgi complex, lysosomes, cytoskeleton

**Cytoplasm:** semifluid part contained within cell membrane boundary as well as the skeletal system of support or cytoskeleton

Contains: number of structures and cavities or vacuoles

# Nucleus

Found in all cells **except** mature red blood cells and platelets

Mostly single nucleus

M multinucleated: skeletal muscles cells, osteoclasts

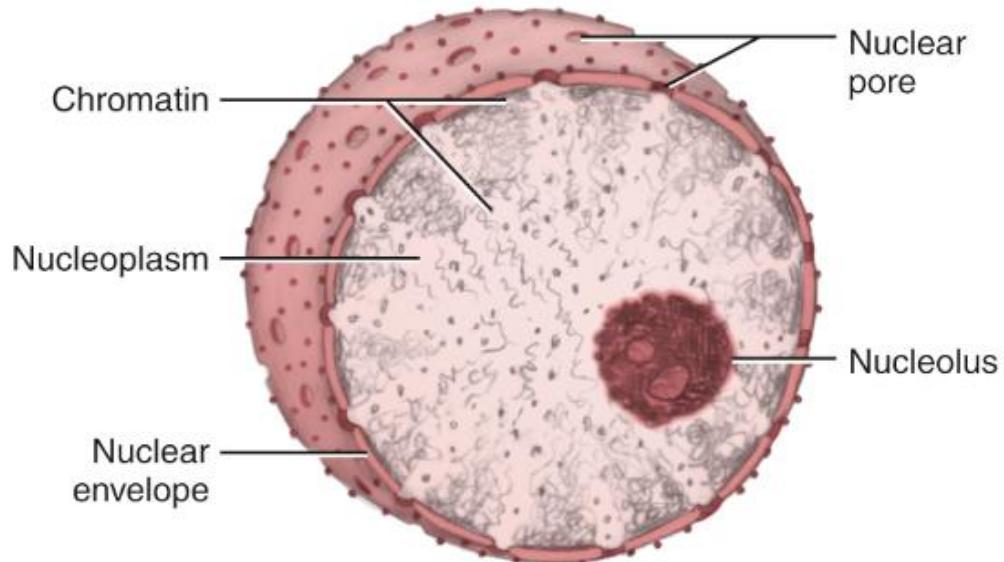
**Contains** DNA in the form of chromatin

Chromatin condenses into Chromosomes during division, then becomes 2 threadlike chromatids joined by a centromere

**Function:** stores genetic code (DNA, RNA), controls other organelles

**Nucleolus:** produces rRNA (ribosomal RNA), and nucleotides of the other RNA's

**Nuclear pores:** communication to cytoplasm



# Mitochondria

Most numerous organelle in the cell

Major source of ATP production

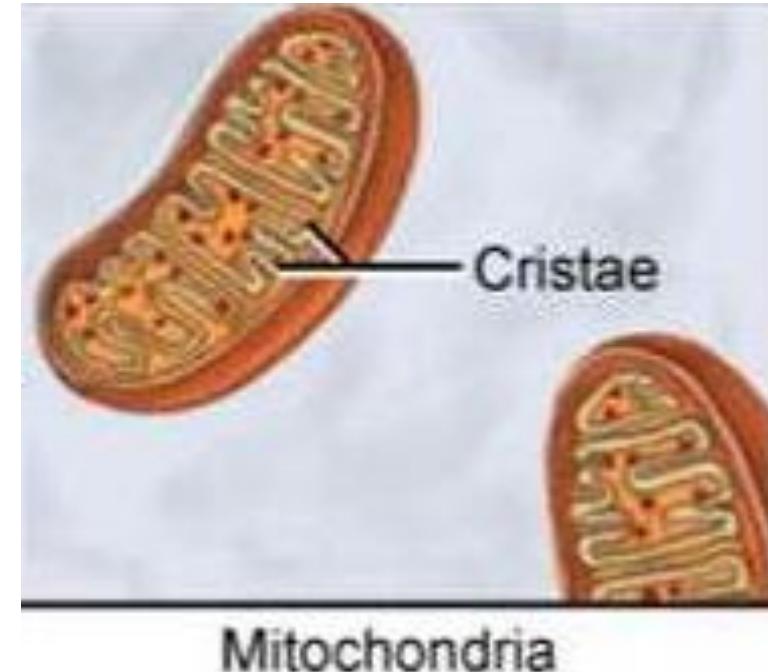
Energy from cellular respiration from Kreb's cycle

Site of many metabolic reactions

Help balance concentrations of:

Water, Calcium, and other ions in cytoplasm

Membrane-bound infoldings increase surface area for protein packing



# Ribosomes

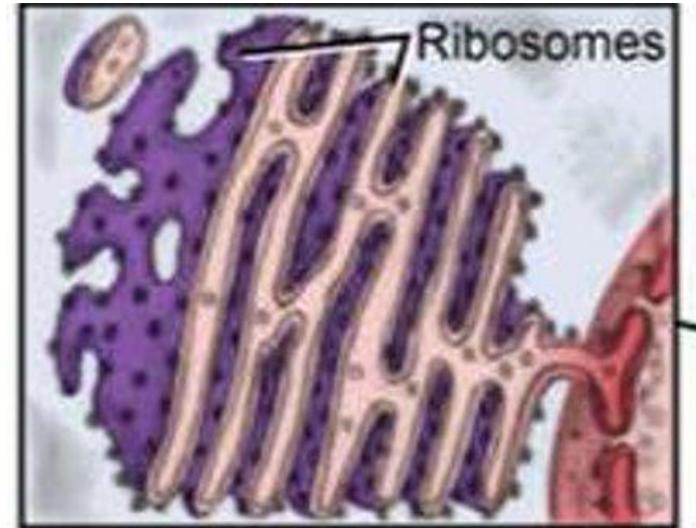
Tiny spheres made in nucleolus from rRNA and proteins

Can be found:

- Free in cytoplasm
- Bound to membranes
- In mitochondria

Position changes depending on what protein they are making

Site of the initiation of protein synthesis



Rough endoplasmic reticulum

# Endoplasmic Reticulum

Parallel membrane-bound channels

All membranes interconnect, continuous with nuclear envelope  
(nuclear envelope surrounds the nucleus)

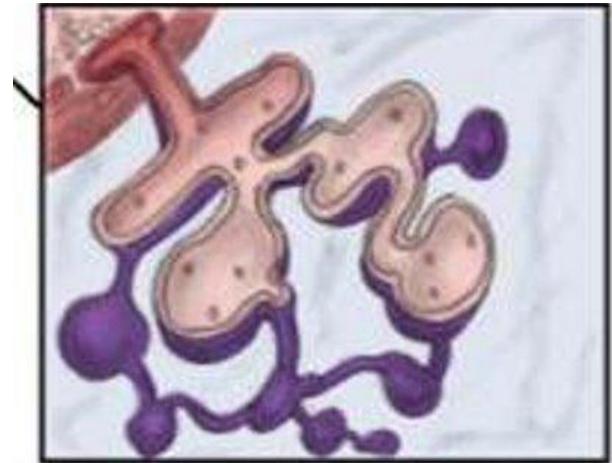
**Two types:**

Smooth (SER)- absence of ribosomes

Rough (RER)- presence of ribosomes

**Function:**

Modification, storage, segregation, transport of proteins



Smooth endoplasmic reticulum

# Golgi Complex/Apparatus

2nd largest organelle

## Structure:

3-20 flattened, smooth-membrane vesicular sacs parallel to each other

## Function:

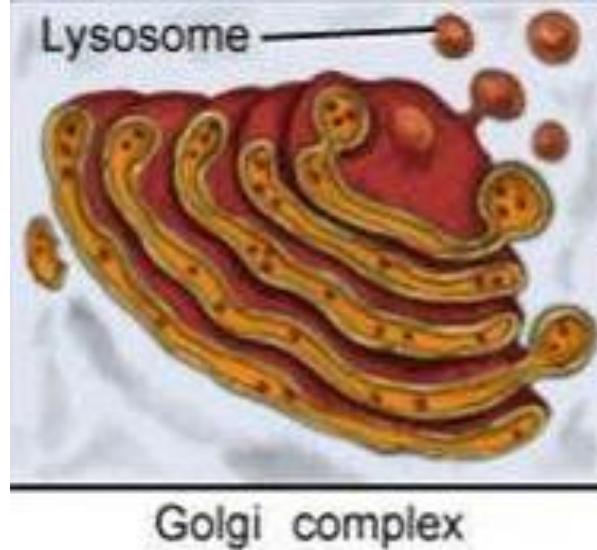
-Segregation, packaging, and transport of proteins from ER

-Vesicles of protein from RER fuse with Golgi complex, transferring protein molecules to be modified

Modifies proteins by adding carbohydrates, forming glycoproteins

After modification, wraps and sends proteins for exocytosis

-Produces lysosomes



# Lysosomes

- Produced by Golgi complex
- Membrane-bound vesicles that develop as a bud that pinches off at the end of Golgi complex's flattened sacs
- Lyse/digest waste and foreign material by phagocytosis
- Function:** Intracellular/extracellular digestion or destruction
- Prominent in macrophages, leukocytes, osteoclasts

# Cytoskeleton

3-dimensional support system for cell Components:

**-Microfilaments:** Delicate, threadlike

Help with overall cell shape

**-Intermediate filaments:** Thick, threadlike

Tonofilament: role in intercellular junctions

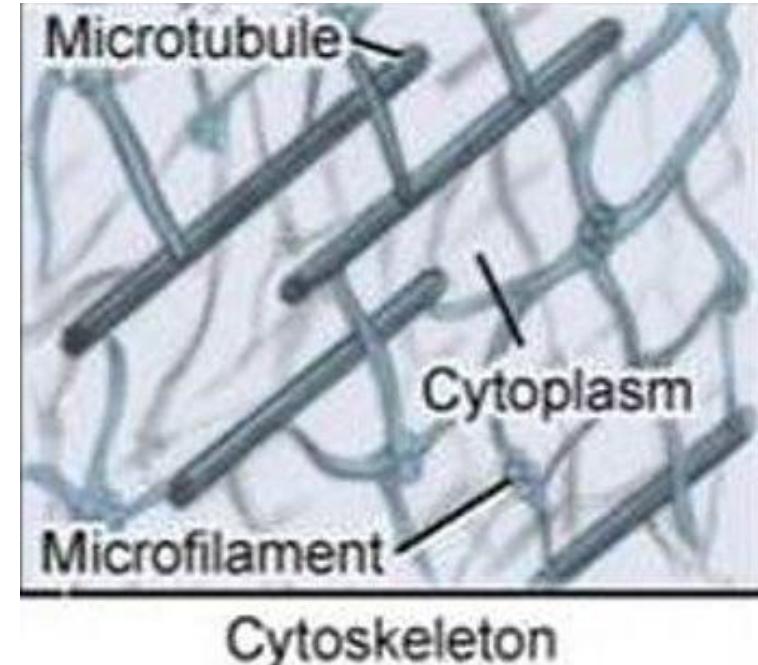
**-Microtubules:** Small tubular structures

Help maintain cell shape and stability

Transport:

**Cilia:** many, short projections

**Flagella:** few, long projections



# Cell Division

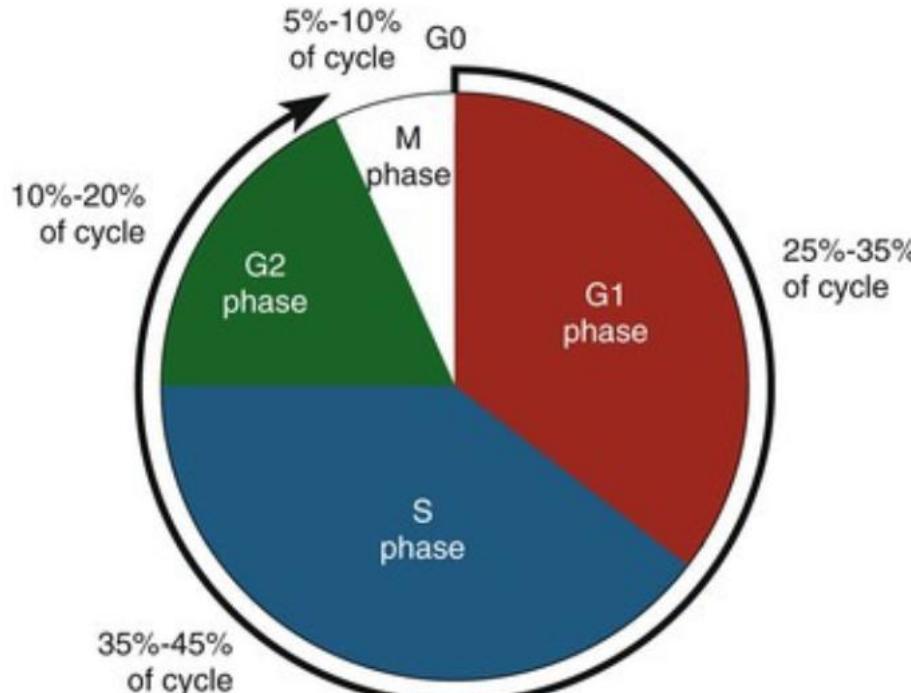


FIGURE 1-40 Periods of the cell cycle indicate relative time needed for each phase. (Modified from Chiego D:

*Essentials of Oral Histology and Embryology: A Clinical Approach*, ed 4, St. Louis, Mosby, 2014.)

- Before cell division, DNA is replicated during interphase; **Interphase has 3 phases: Gap 1, synthesis, Gap 2**
- Following interphase, **mitosis** occurs, cell divides and makes 2 daughter cells—consists of prophase, metaphase, anaphase, and telophase
- Ends with another interphase cycle

# Cell Division

- Prophase (Nuclear membrane disintegrate)
- Metaphase (Centromeres of chromosomes align)
- Anaphase (Centromeres split, migrate to opposite poles)
- Telophase (Division into two daughter cells)
- Interphase (Cell growth)

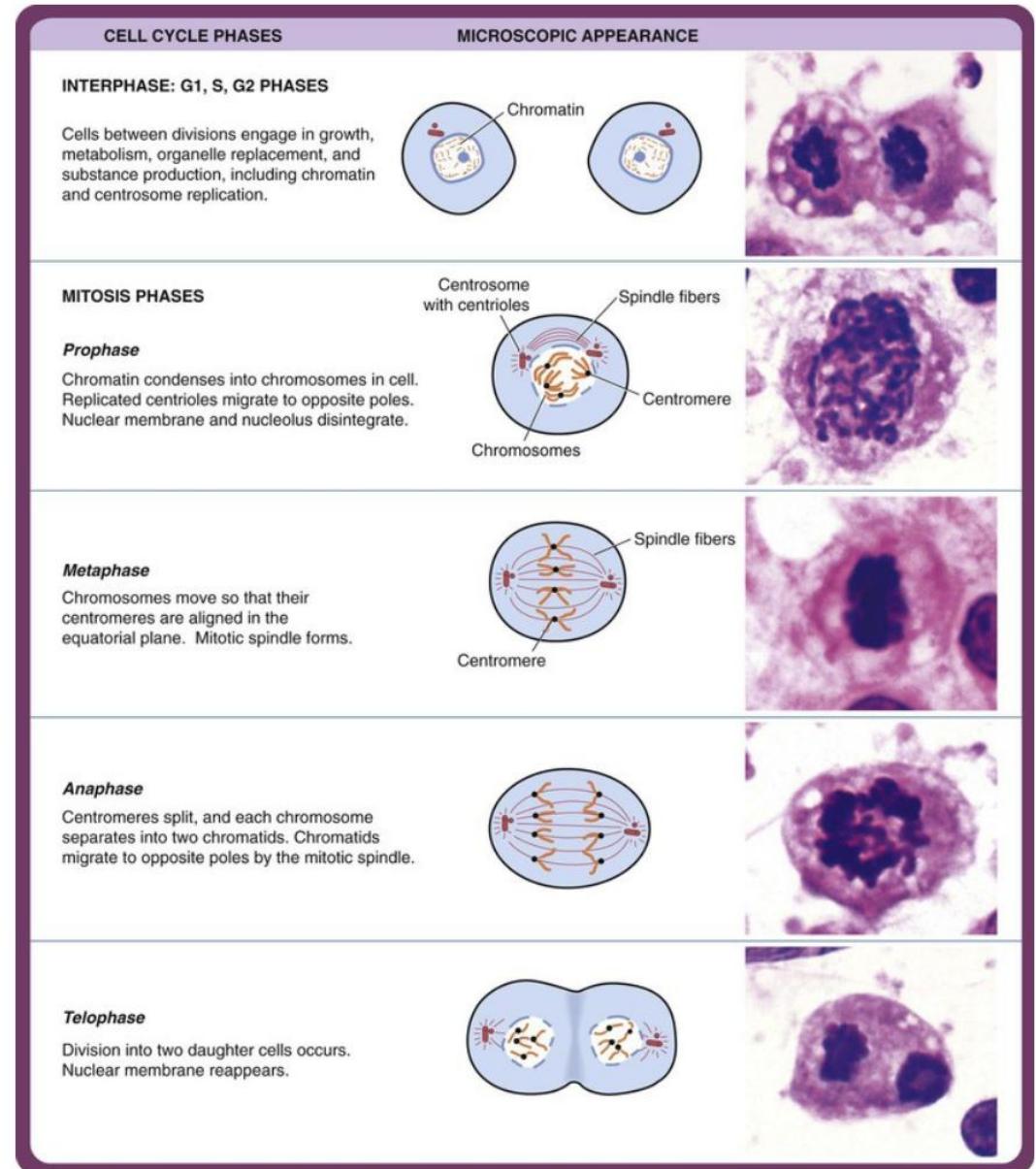


FIGURE 1-41 Mitosis. (From Bath-Balogh M, Fehrenbach M: Illustrated Dental Embryology, Histology, and Anatomy, ed 3, Philadelphia, Saunders, 2011.)

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# Extracellular Material

Tissue fluid or interstitial fluid

- Dissolving, mixing, and transporting substances
- Carries out chemical reactions
- Diffuses into cells, osmosis out of cells
- Edema:** excess amount of tissue fluid due to injury

# Extracellular Materials

## Intercellular substance:

- Shapeless, colorless, transparent

- Fills spaces between cells in a tissue

### -Function:

- Barrier

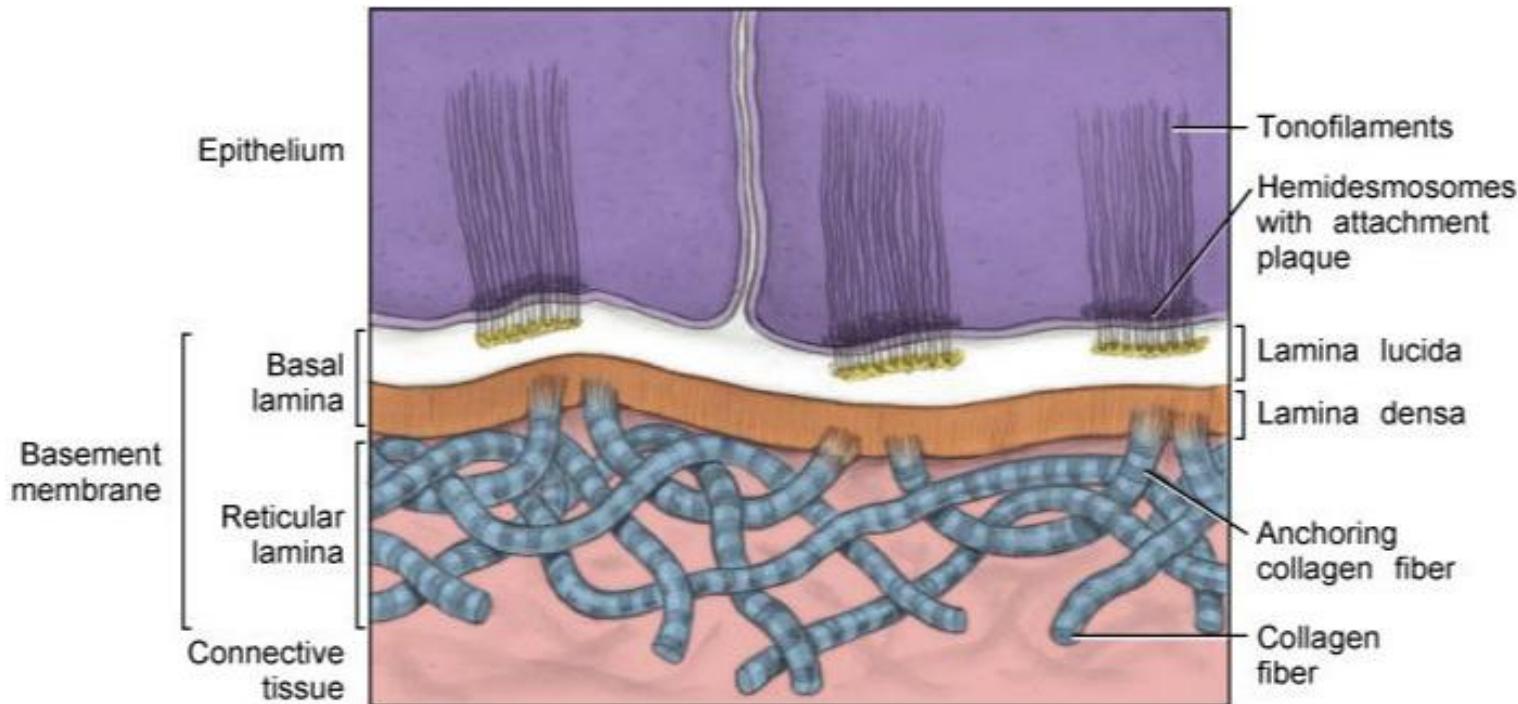
- Medium for exchange of gases and metabolic substances

# Intercellular Junctions

Cell membranes become very close, but they do not touch

-2 types of mechanical attachments:

Hemidesmosomes  
Desmosomes



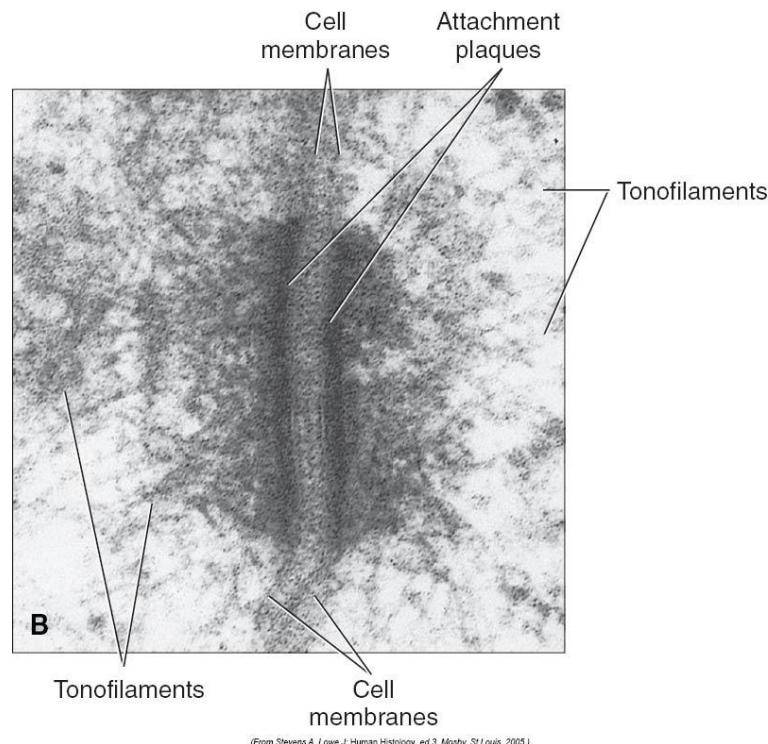
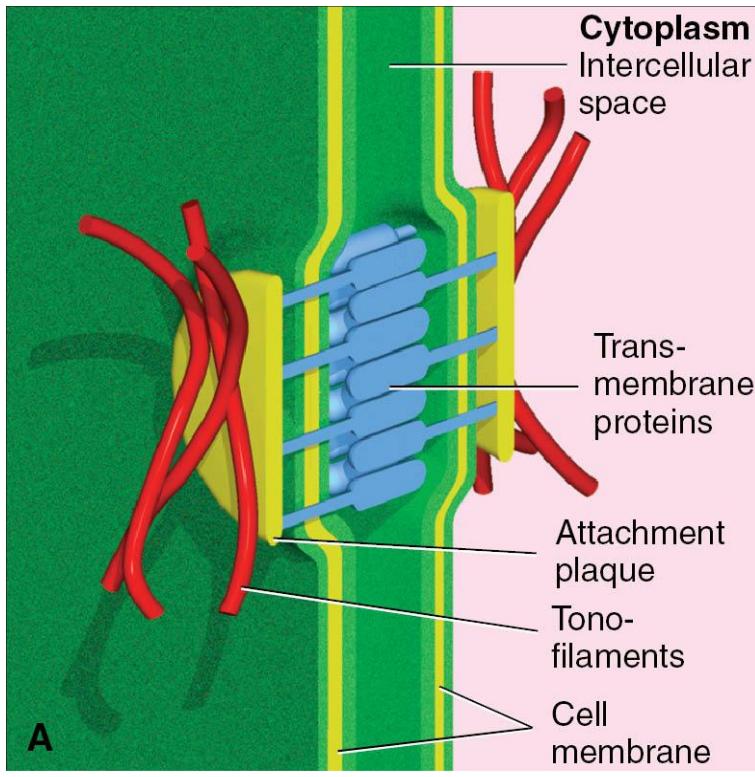
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# Desmosome

- Between cells

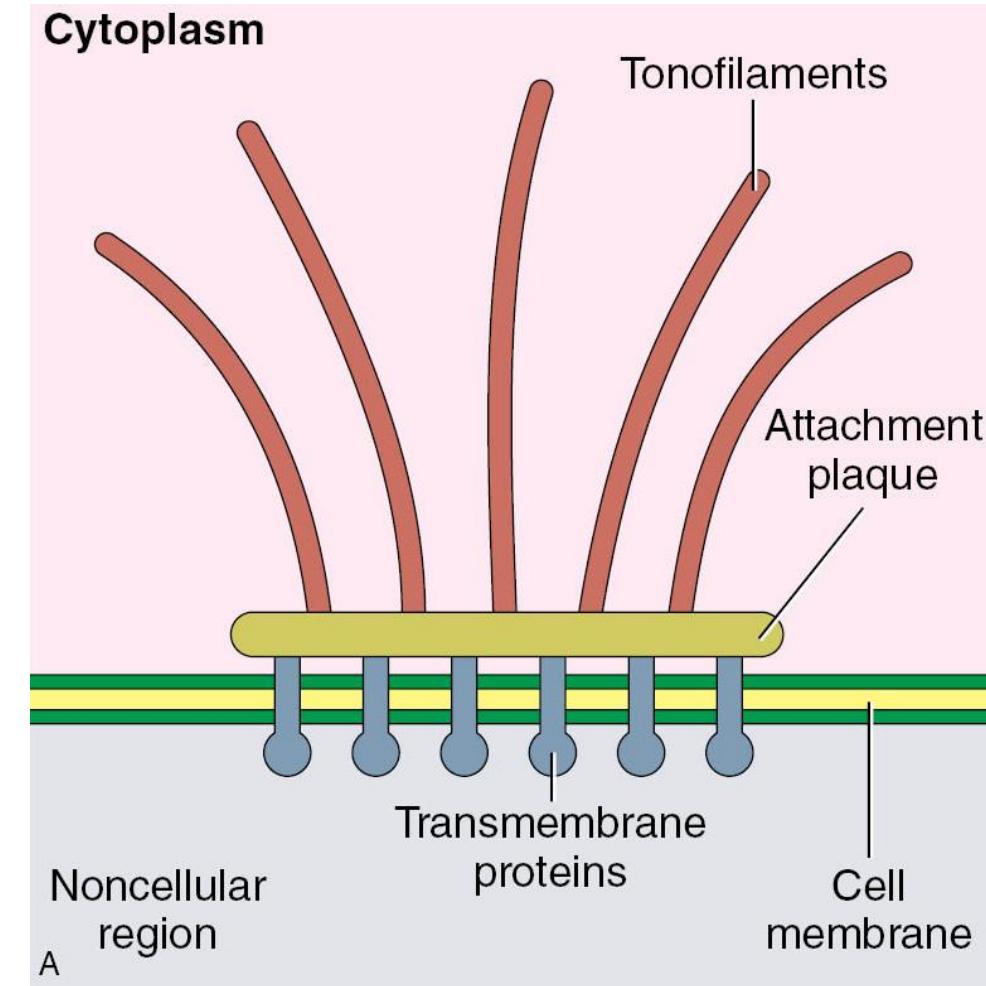
- Are released and then re-attach in new locations as cells migrate- during repair after injury

- Upper layers of the skin or oral mucosa



# Hemidesmosome

- Attachment of cells and non-cellular surfaces
- Epithelium to connective tissue-basement membrane in skin and oral mucosa
- e.g.: between gingival tissue and tooth surface; nails and nail beds

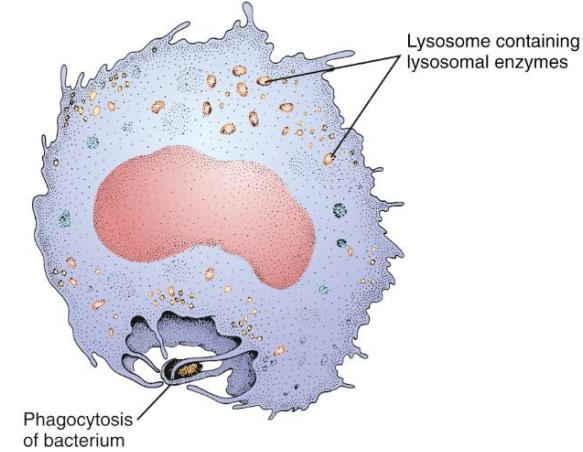


(From Stevens A, Lowe J: Human Histology, ed 3, Mosby, St Louis, 2005.)

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# Cell Interactions with Extracellular Environment



**Exocytosis:** active transport of material from a vesicle within the cell out into extracellular environment

Fusion of a vesicle membrane with cell membrane and subsequent expulsion of the contained material

**Endocytosis:** uptake of materials from the extracellular environment into cell  
Invagination of the cell membrane

Endocytosis can also take the form of **phagocytosis:** engulfing and digesting of solid waste and foreign material by the cell through enzymatic breakdown of the material



# Basic Tissues

Tissues are collections of similar cells

During prenatal development embryonic cell layers differentiate into basic tissues

## Important to know and understand:

- Processes of tissue renewal, repair, and aging
- Pathologic processes

## Regeneration:

- Natural renewal of a tissue
- Teeth do NOT regenerate

## Turnover time:

- Time it takes for newly divided cells to be completely replaced through the tissue

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# Tissue Types

## Epithelium

Simple: squamous, cuboidal, columnar, pseudostratified

Stratified: squamous, cuboidal, columnar, transitional

## Connective

Solid soft: connective tissue proper, specialized

Solid firm: cartilage

Solid rigid: bone

Fluid: blood, lymph

## Muscle

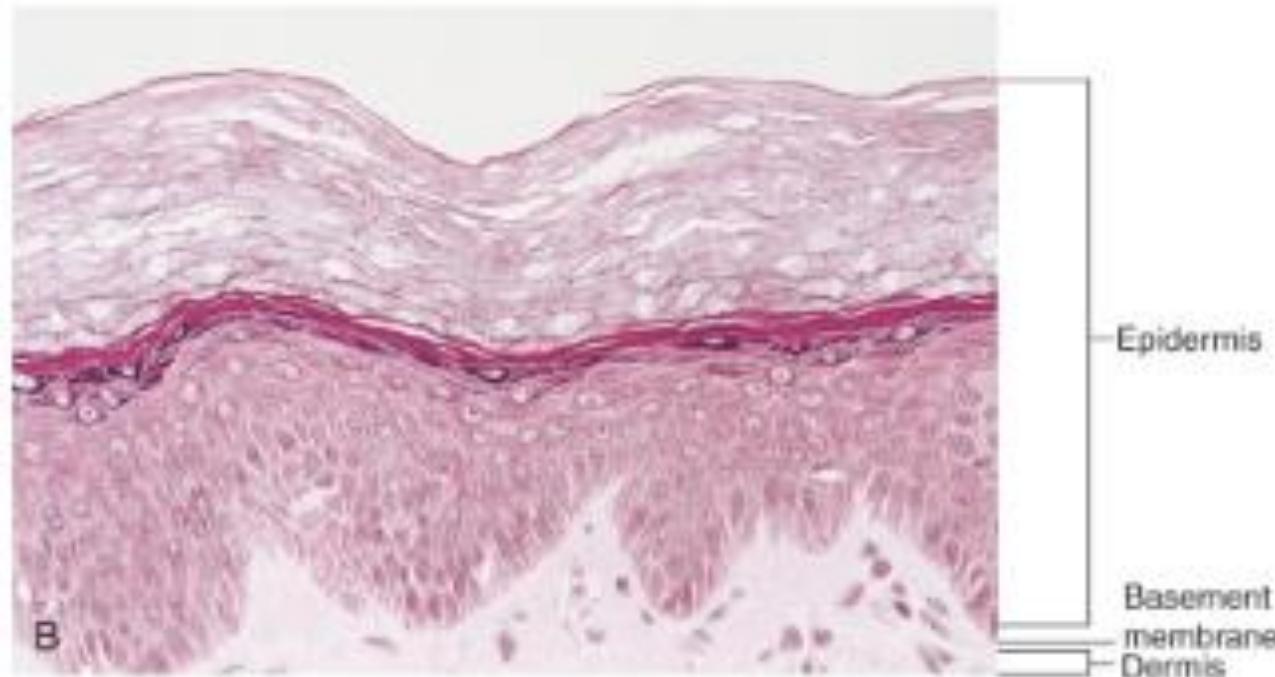
Involuntary: smooth and cardiac

Voluntary: skeletal

## Nerve

Afferent: sensory

Efferent: motor



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# Epithelial Tissue

Covers and lines external and internal surfaces

## Function:

Protective covering/lining from physical, chemical, microbial insult, dehydration, heat loss

Tissue absorption, secretion, sensory

## Derived from embryonic cell layers:

Ectoderm- skin and oral mucosa

Endoderm- respiratory and digestive tract

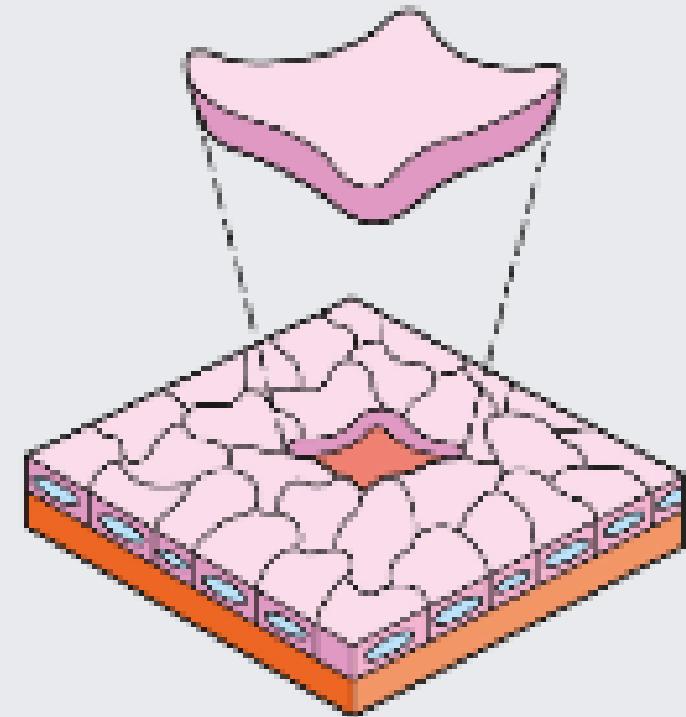
Mesoderm- urinary tract

# Histology of Epithelium

- Highly regenerative
- Cellular differentiation occurs as cell moves to the surface
  - Cells closest to basement membrane are youngest, and least differentiated
- Tightly joined by desmosomes and hemidesmosomes
- AVASCULAR**- no independent blood supply
- Nutrients are obtained by diffusion from nearby connective tissue
- Most epithelial tissues in the body are **stratified squamous epithelium**

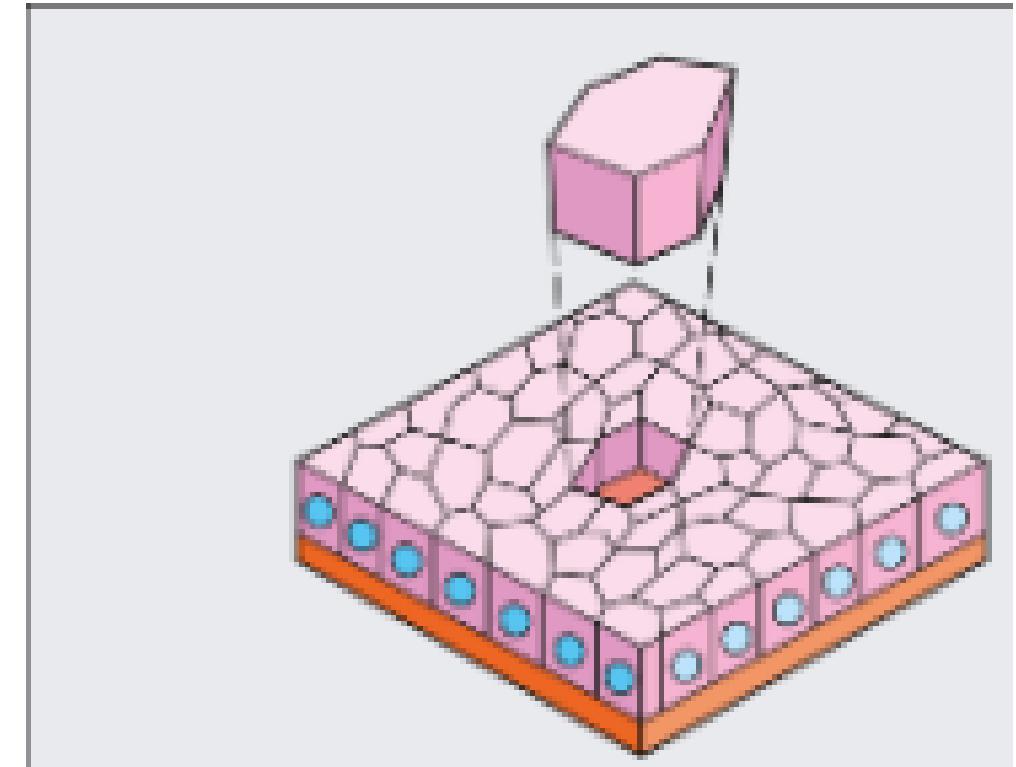
# Epithelial Cell Types

**Squamous cells: flattened cells with cell height much less than cell width (endothelium)**



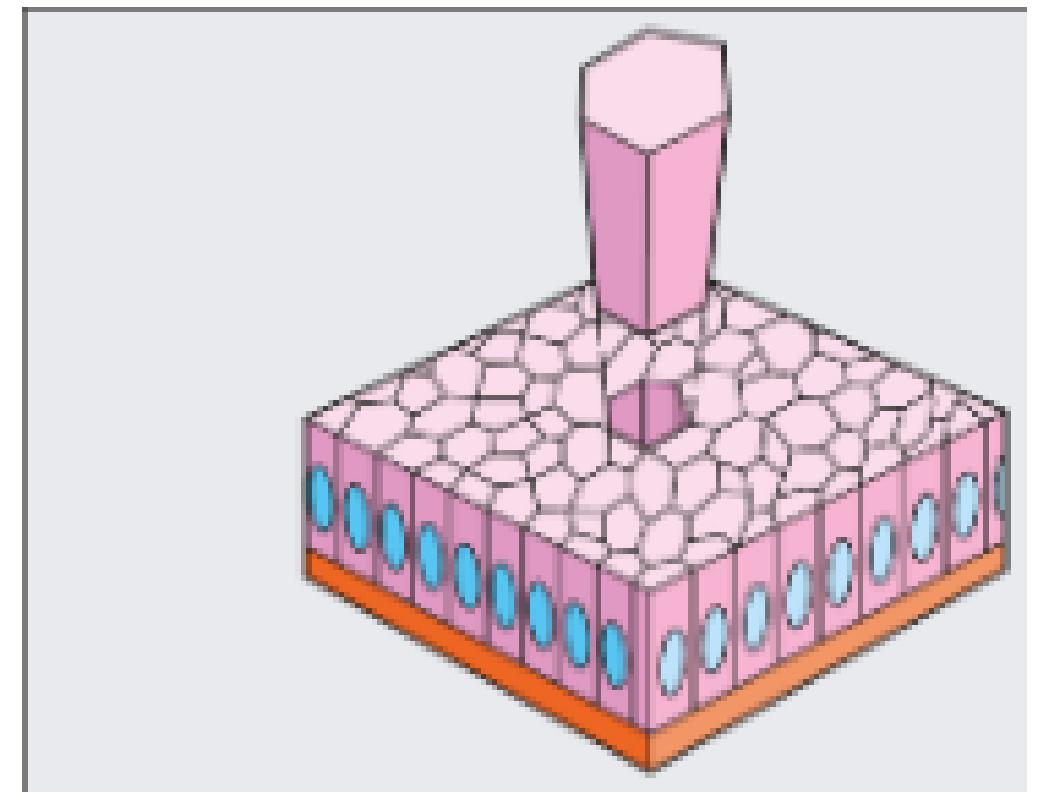
# Epithelial Cell Types

**Cuboidal cells: cube-shaped cells with approximately equal cell height and cell width (salivary gland duct lining)**



# Epithelial Cell Types

**Columnar cells: rectangular cells in which cell height exceeds cell width (salivary gland duct lining)**



# Classification of Epithelial Tissue

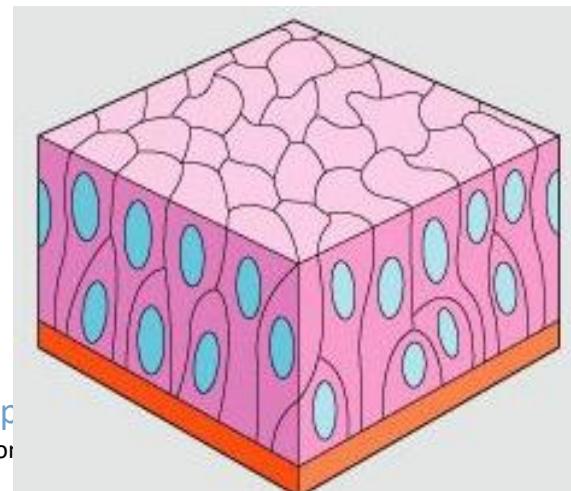
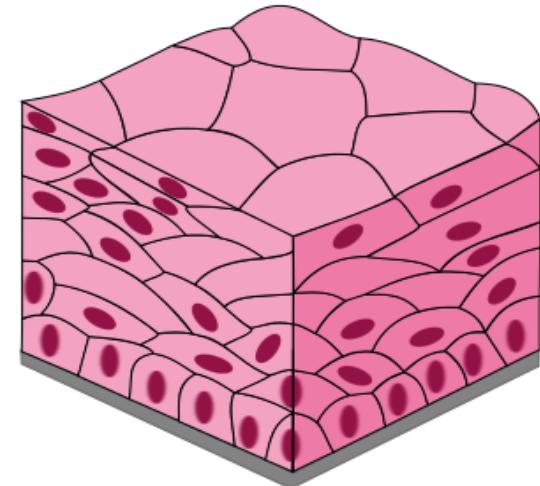
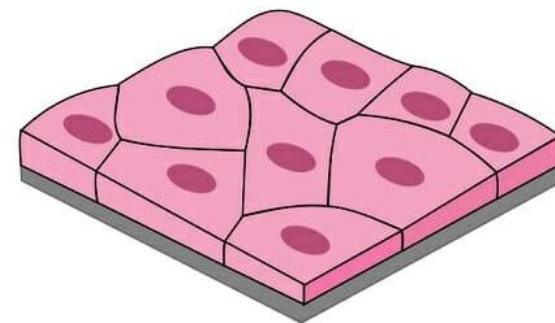
Categories based on their arrangement:

-**Simple:** single layer of epithelial cells

-**Stratified:** two or more layers of cells, lowest layer touches basement membrane

-**Pseudostratified:** falsely appears as multiple cell layers, but all cells touch basement membrane

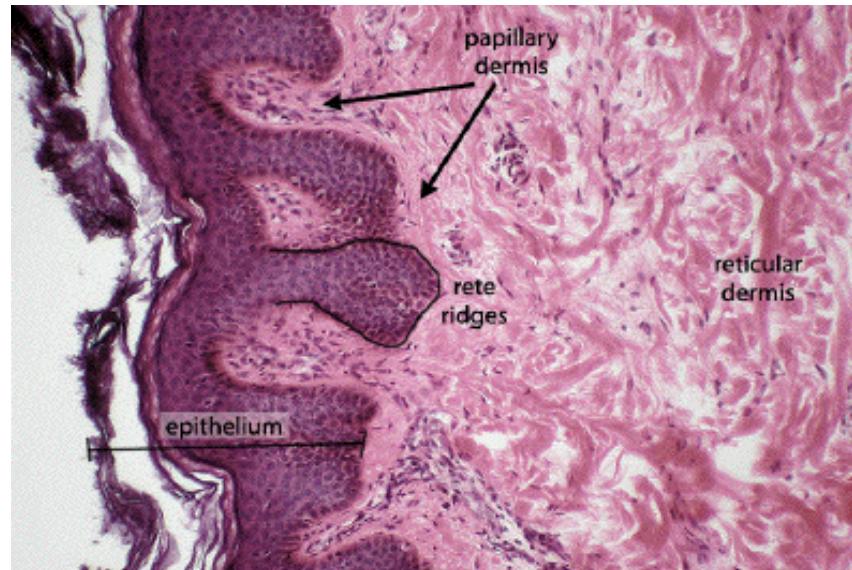
Lines upper respiratory tract, nasal cavity



# Classification of Epithelial Tissue

Categories based on shape

- Simple Squamous- flattened, wider than tall
  - Lines: blood, lymph, heart, etc.
- Simple Cuboidal- cube-shaped, equal height and width
  - Lines: various glands
- Simple Columnar- tall, rectangular
  - Lines: salivary glands ducts, IEE



# Keratin

**Stratified squamous** (most abundant in body) can be:

-Keratinized

Tough, fibrous, opaque, waterproof protein

Epidermis

-Non-keratinized

Various degrees of keratinization depending on the region of the body

Calluses: palms of the hands, bottom of feet

# Epithelial Turnover and Repair

Occurs as the newly formed deepest cells migrate superficially

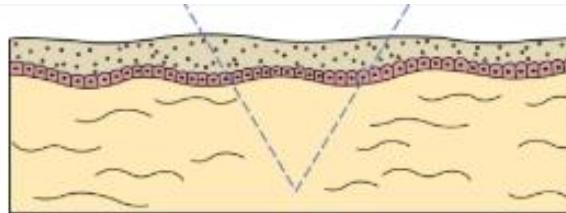
**Turnover time:** time taken for a cell to divide and pass through the entire thickness of tissue

**Epithelium of oral mucosa has higher turnover time than epidermis of the skin**

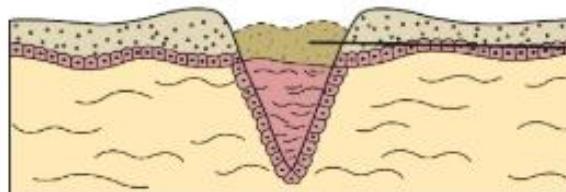
Buccal mucosa (cheek bite): 14 days

Skin: 27 days

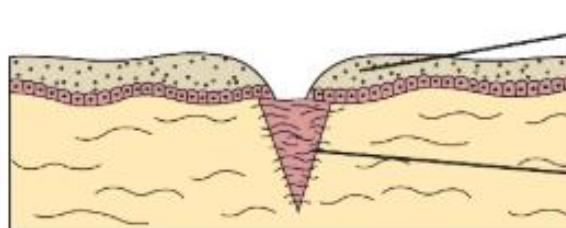
# Epithelial Turnover and Repair



Small injury involving epithelium and connective tissue

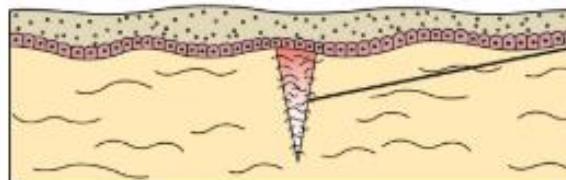


Clot forms



Migrating epithelial cells form a new surface layer

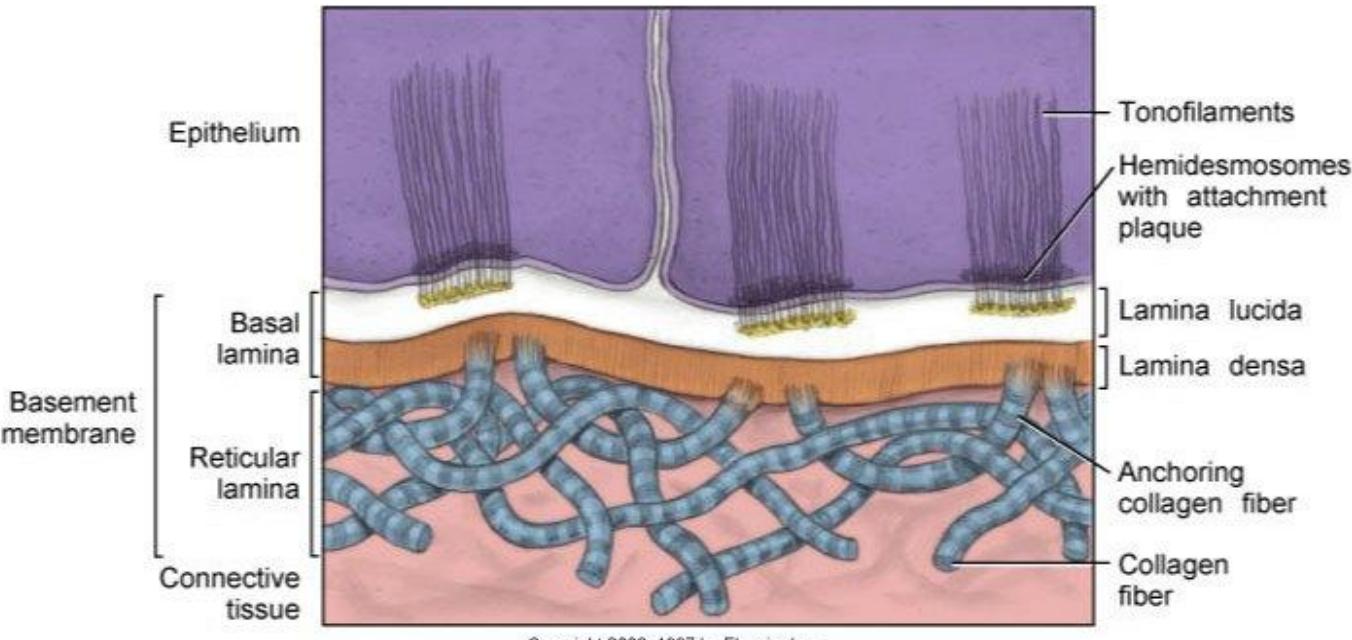
Granulation tissue forms



Tissue remodeling forms scar tissue

# Basement Membrane

- Thin, acellular



- ALWAYS located between any form of epithelium and its underlying connective tissue

- Made up of 2 parts:

- Basal lamina:** most superficial

- Lamina lucida- closer to epithelium

- Lamina densa- closer to connective tissue

- Reticular lamina:** deeper portion

# Connective Tissue

## 3 components:

Cells: fewer and farther apart

Fibers

Intercellular fluid (ground substance)

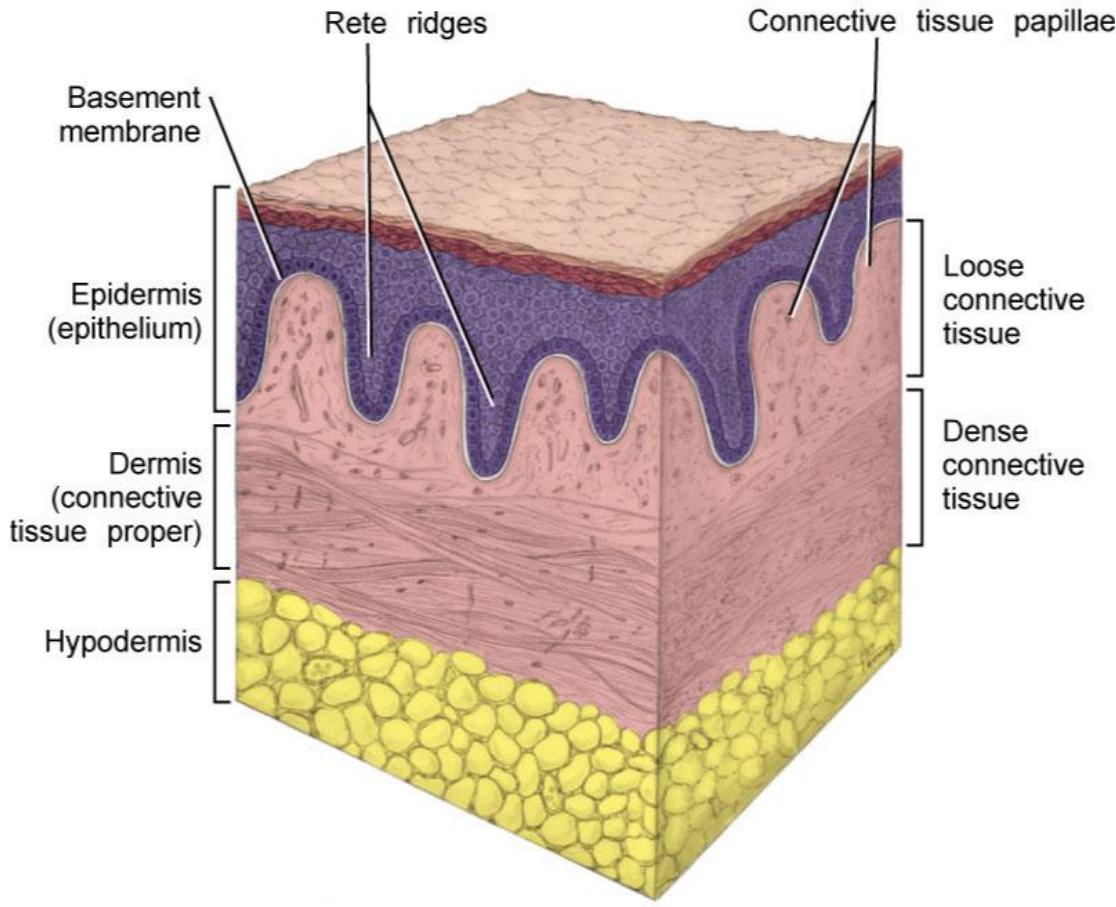
## Vascularized

Own blood supply

Except for cartilage

## Functions:

Support, Attachment, Packing, Insulation, Storage,  
Transport, Repair, Defense



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# Histology of Connective Tissue

**Cells found in CT:**

**-Fibroblast**

Most common cell in connective tissue

Flat, elongated, spindle shaped

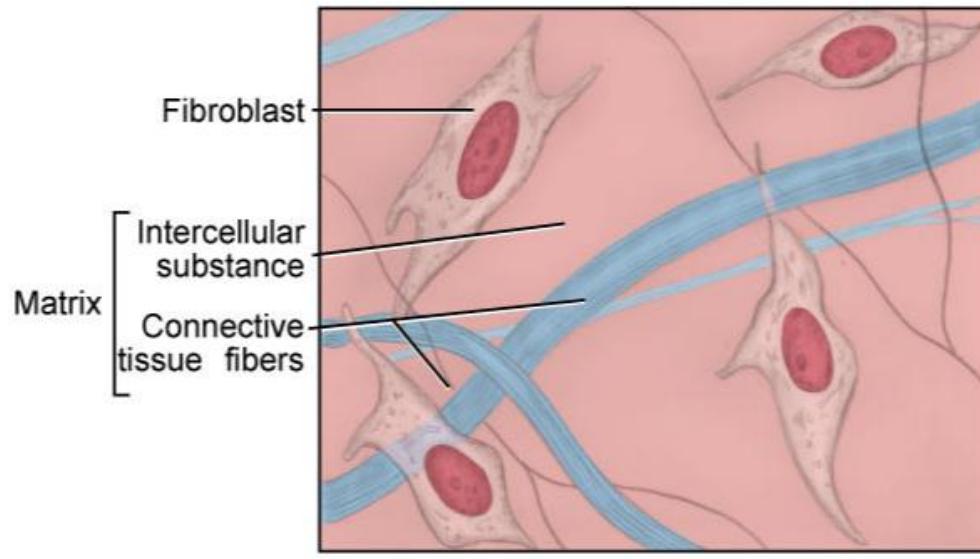
Synthesizes protein fibers

**-Macrophages/monocytes**

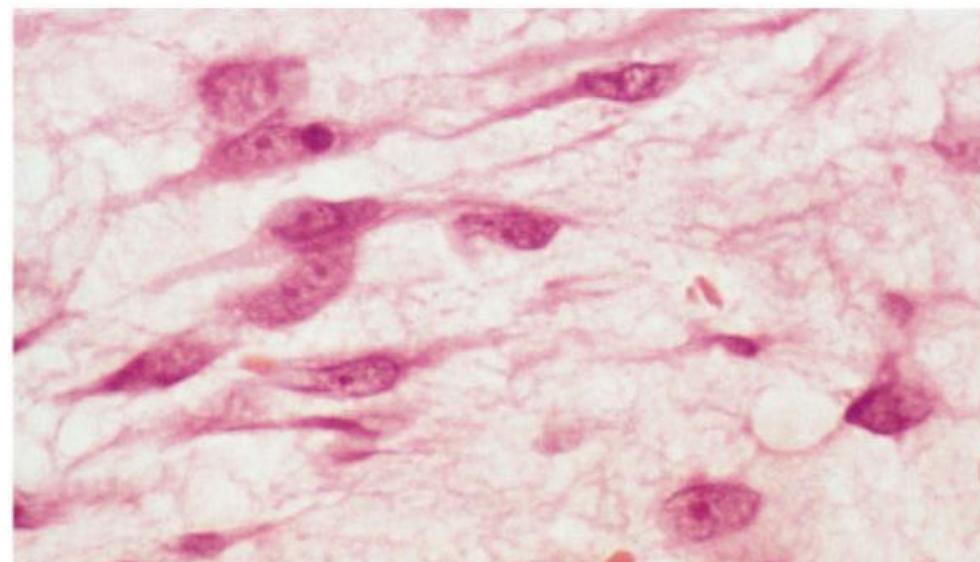
**-Basophils (mast cells)**

**-Lymphocytes (plasma cells)**

**-Neutrophils**



**A**



**B**

(From Stevens A, Lowe J: *Human Histology*, ed 3, Mosby, St. Louis, 2005.)

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# Protein Fibers in Connective Tissue

## Collagen fibers-similar to rope:

- Main connective fiber type in body
- In all connective tissues except blood
- Most common type is type 1
  - Found in dermis of skin, tendons, bone, teeth
- Synthesized by fibroblasts and osteoblasts

## Elastic fibers:

- Ability to stretch and return to original
  - Found in soft palate

## Reticular fibers:

- Used in embryonic development
  - Found in lymph nodes and spleen

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## Collagen Types

Main Types of Collagen	Features with Locations
Type I	Most common type in dermis of skin, skeletal bone, tendons; virtually all connective tissue of the body as well as lamina propria of oral mucosa, dentin, pulp, periodontium, jaws
Type II	In hyaline and elastic cartilage
Type III	In granulation tissue, produced quickly by young fibroblasts before tougher Type I synthesized, thus commonly found alongside Type I; main component of reticular fibers but also found in artery walls, skin, intestines, uterus
Type IV	In basal laminae of basement membrane, eye lens, filtration system of capillaries, kidney's nephron glomeruli

# Classification of Connective Tissue

**Classified by texture:**

**Solid Soft:** Deeper layers of skin and oral mucosa

**Solid Firm:** Cartilage

**Solid Rigid:** Bone

**Fluid:** Blood and lymphatic system

# Soft Connective Tissue

-Classified as:

Loose

Dense

Specialized

-Connective tissue proper: loose and dense layers together

Known as

**Dermis:** CT in skin

**Lamina propria:** CT proper in oral mucosa

Found deep to epithelium and basement membrane

# Connective Tissue Turnover and Repair

- Occurs as a result of fiber production by **fibroblasts**
- Turnover time is **much slower** than epithelium, varies from location
- During injury fibroblasts produce immature connective tissue called granulation tissue
  - Few fibers, lots of blood vessels
  - Appears as a redder, soft tissue that bleeds easily
  - In abundance can interfere with repair process
  - Surgical removal during extractions is common

# Rigid Connective Tissue (Bone)

**-Function:**

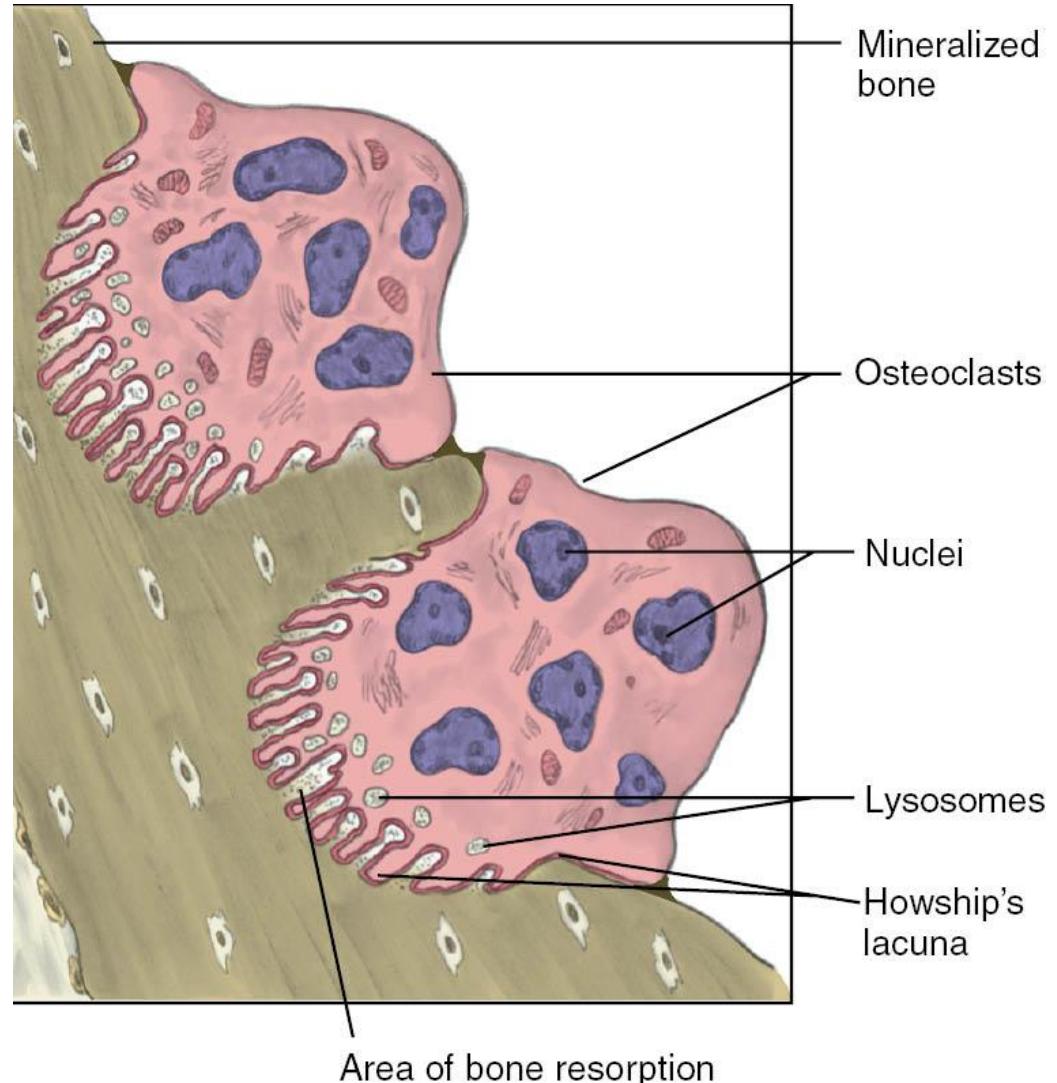
- Protection
- Structural support
- Aids in movement
- Manufactures blood cells
- Mineral storage

-Vascularized, repairs quickly

**-Cells:**

- Osteoblasts (builds)
- Osteocytes
- Osteoclasts (destroys)

**-Osteocytes** are mature osteoblasts in bone



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# Rigid Connective Tissue (Bone)

## -Layers:

### 1. Perosteum-outer part:

Double layered, dense CT sheath

Outer layer: Blood vessels and nerves

Inner layer: Cells make osteoblasts

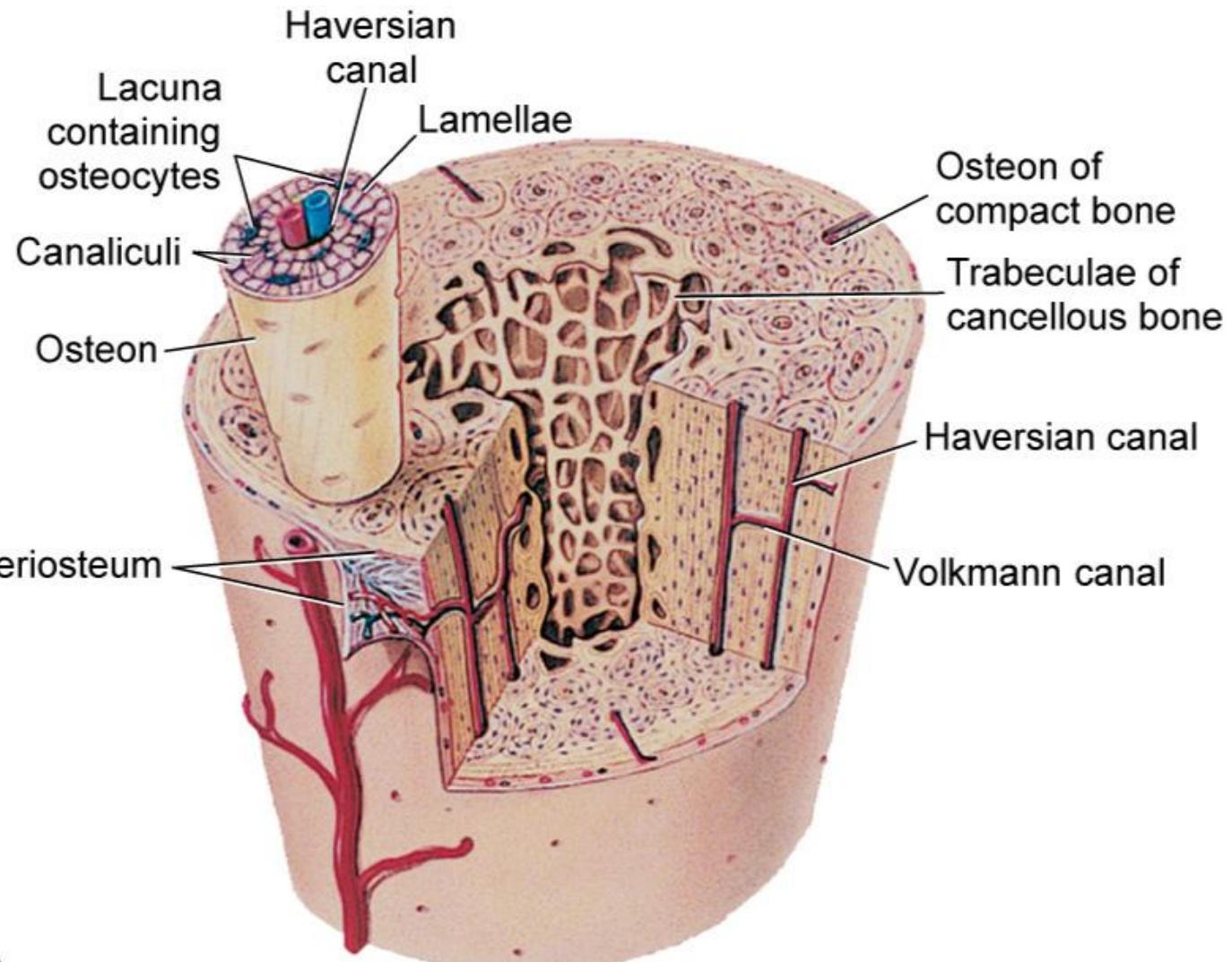
### 2. Compact (cortical): Haversian canal within osteon

Strong, but heavy

### 3. Cancellous (spongy, trabecular):

lattice with soft tissue spaces

Light, not as strong as compact



From Applegate EJ: *The anatomy and physiology learning system*, ed 4, St Louis, 2011, Saunders.

A

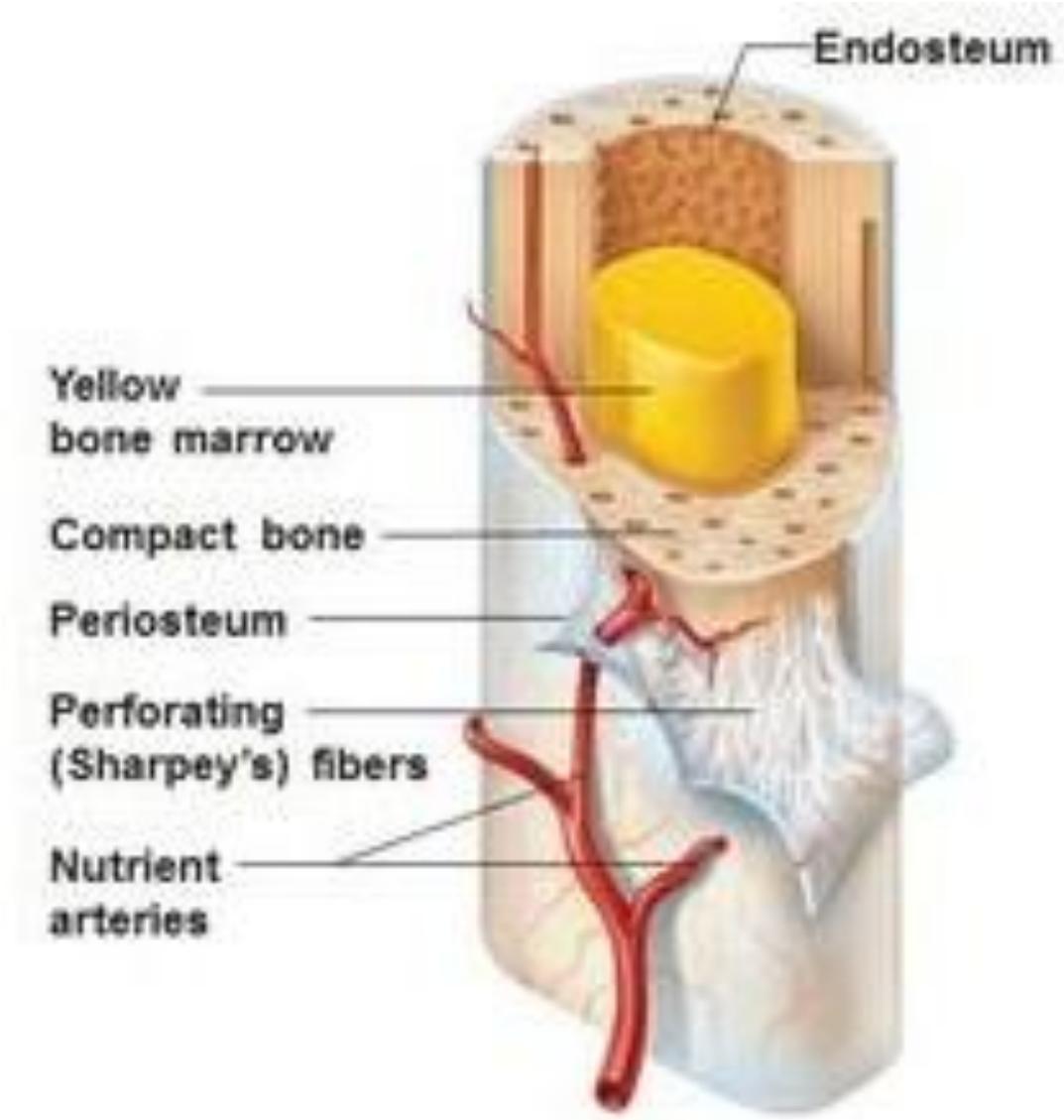
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# Rigid Connective Tissue (Bone)

## Layers:

- Endosteum: lines cavity of bone; very thin
- Bone Marrow: innermost part of bone
  - Gelatinous: where stem cells located, lymphocytes are created, and B cells mature



# Rigid Connective Tissue (Bone)

- Compact and Cancellous
- Each have same cellular components, just different arrangements
- No definitive boundary
  - Located where strength or lightness of weight are needed

Osteon: layers of lamellae (sheets of bone) in compact bone

# Rigid Connective Tissue (Bone)

- Calcium hydroxyapatite:** gives bone hardness

- Also found in enamel, dentin, cementum

- $\text{Ca}_{10}(\text{PO}_4)_{6}(\text{OH})_2$

- Bone is not static, constantly being remodeled or regenerated

- Osteoblasts:** growth and formation of bone

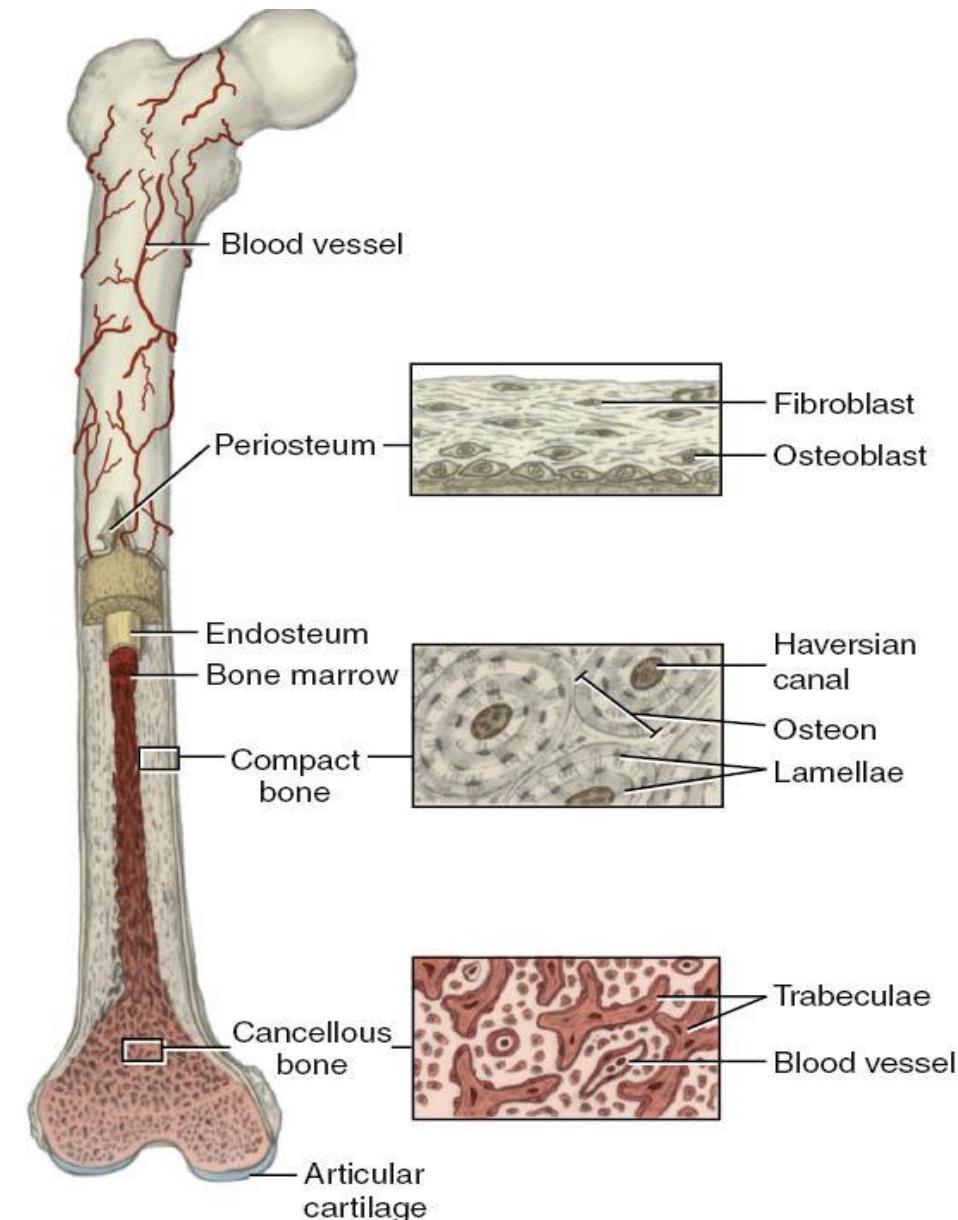
- Osteoclasts:** causes resorption

- Localized resorption:** specific area from infection, mechanical stress or pressure

- Generalized resorption:** entire skeleton because of endocrine

- Clinical considerations:** resorption can occur during periodontal disease and orthodontic therapy

- In health, two processes balance each other, build and resorb



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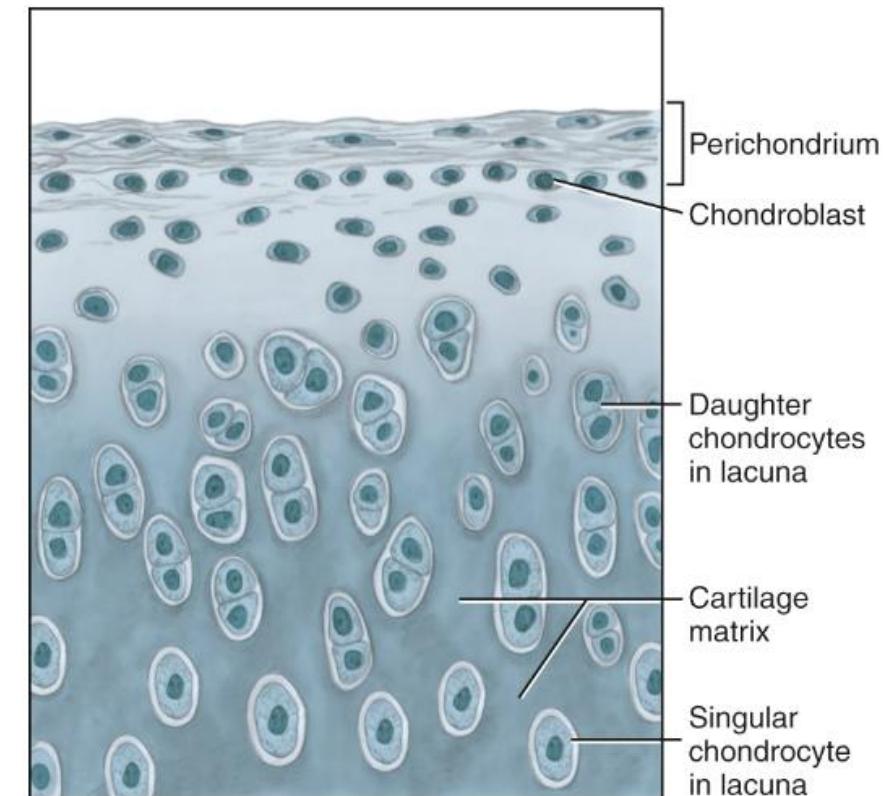
# Firm Connective Tissue (Cartilage)

- Forms temporary skeleton during embryonic development
- Serves as template for bone growth and development
- Presents at articular surfaces (TMJ)
- Some flexibility: NO inorganic or mineralized materials
- AVASCULAR, takes longer to repair
- No nerve supply

## Cells:

Chondroblasts: produce cartilage matrix

Chondrocytes: maintain cartilage matrix



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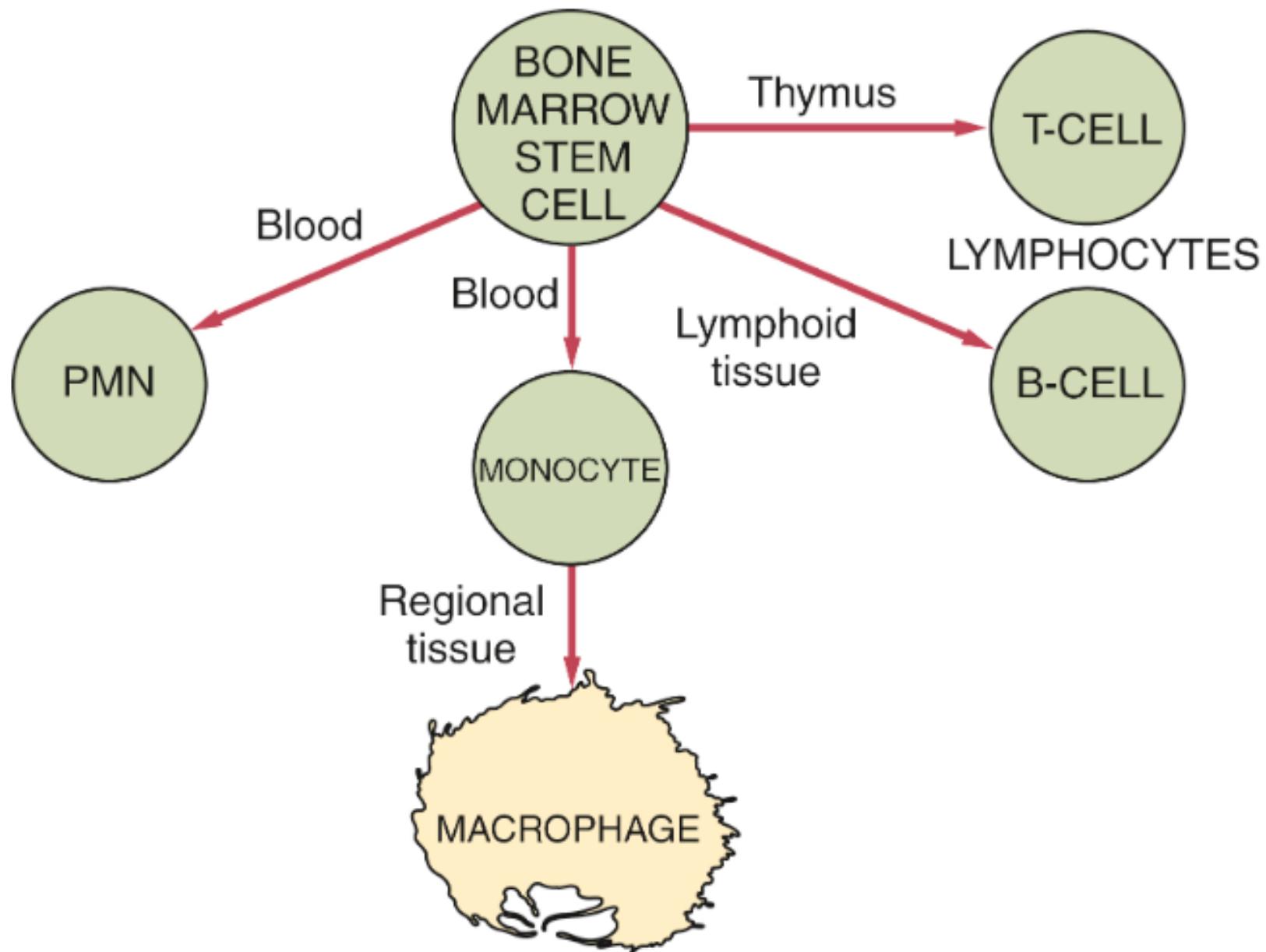
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# Fluid Connective Tissue (Blood)

- Transport medium
- **Types:**
  - RBC (erythrocyte): Transports oxygen and carbon dioxide
  - WBC (leukocyte):
    - **Neutrophil:** 1<sup>st</sup> line of defense with injury or invasion, most common WBC
    - **Lymphocyte:** immune response (periodontal disease)  
Plasma cell: immune response/immunoglobulins/antibody
    - **Monocyte (blood)/Macrophage (tissue):** inflammatory and immune-phagocytosis
    - **Eosinophil, Basophil, Mast cell (tissue):** allergy/hypersensitivity response
  - Platelets: Clotting
  - **Clinical considerations:** platelet tests can be done with physicians to determine coagulation ability. You may want to talk to your patient about bleeding possibility.

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# Muscle Tissue

## Types:

### -Skeletal (voluntary):

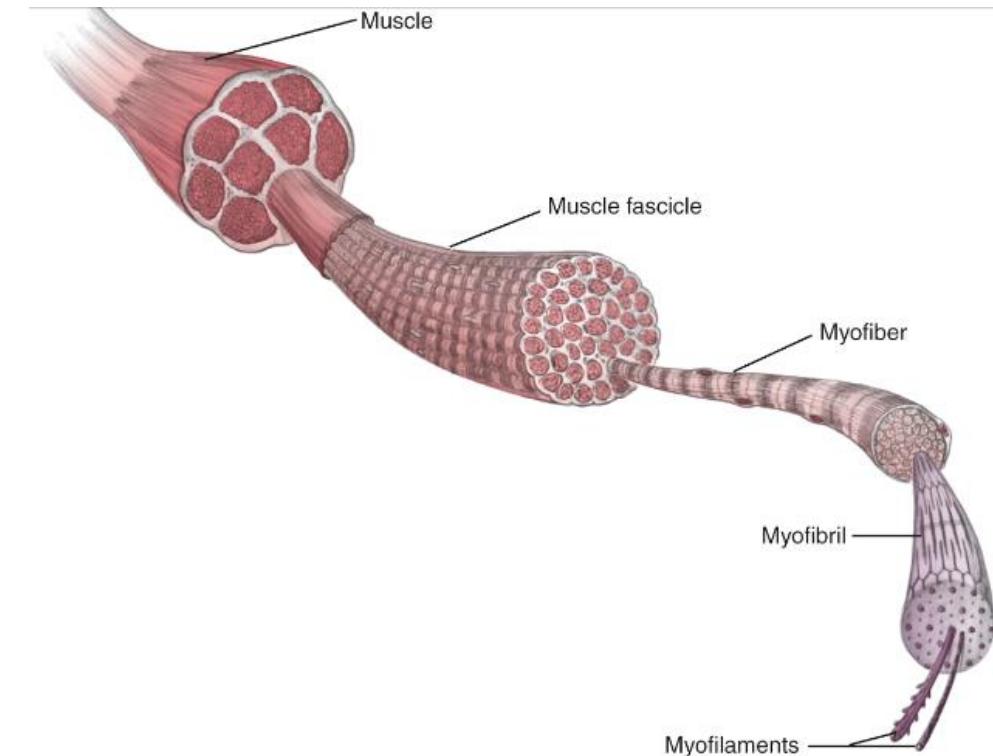
- Mainly attached to bones of the skeleton
- Example: muscles of mastication, facial muscles, tongue muscles

### -Smooth (involuntary):

- Located in organs, glands, linings of blood vessels

### -Cardiac (involuntary):

- Wall of the heart: myocardium



# Nerve Tissue

## Neuron: Cell body, dendrite, axon

- Receives (via dendrite) and sends (via axon) impulses

## Myelin sheath: covers axons

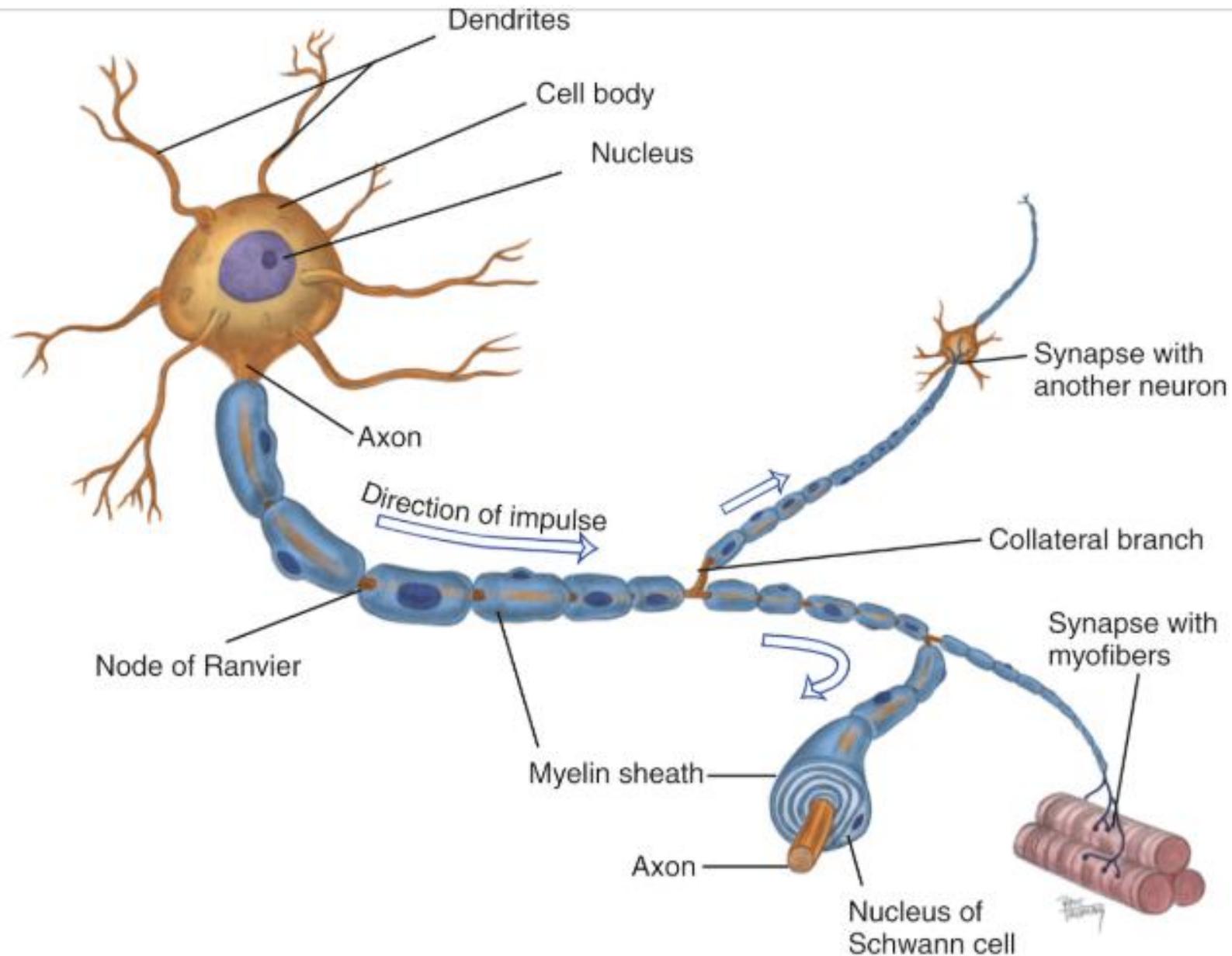
- Phospholipid membrane conducts impulses quickly

## Node of Ranvier:

- Forms a gap between Schwann cells

## Types of Nerves:

- Afferent (sensory): to brain
- Efferent (motor): from brain



# Nerve Tissue

## Nervous system divisions:

- Central nervous system (CNS): brain and spinal cord
- Peripheral nervous system (PNS): spinal and cranial nerves

**PNS:** Somatic nervous system and autonomic nervous system (ANS)

- **Somatic:** conscious control, moves muscles
- **Autonomic:** without conscious control:
  - **Sympathetic:** fight or flight; example: inhibition of salivary gland secretion
  - **Parasympathetic:** rest or digest; example: stimulation of salivary glands

# Orofacial Structures

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# Learning Objectives

- Identify and locate regions/landmarks of the face regions, neck regions, oral cavity and pharynx
- Integrate clinical considerations of anatomy into patient examination and care
- Know key terms relating to the head, neck and oral cavity regions



# Face and Neck Regions

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# Why do you need to understand the face, neck and oral cavity area?

- Dental professionals must be familiar with the surface anatomy of the face and neck
- The superficial features of the face and neck provide essential landmarks for many of the deeper anatomic structures
- To provide comprehensive dental care
- Understand the associated developmental pattern

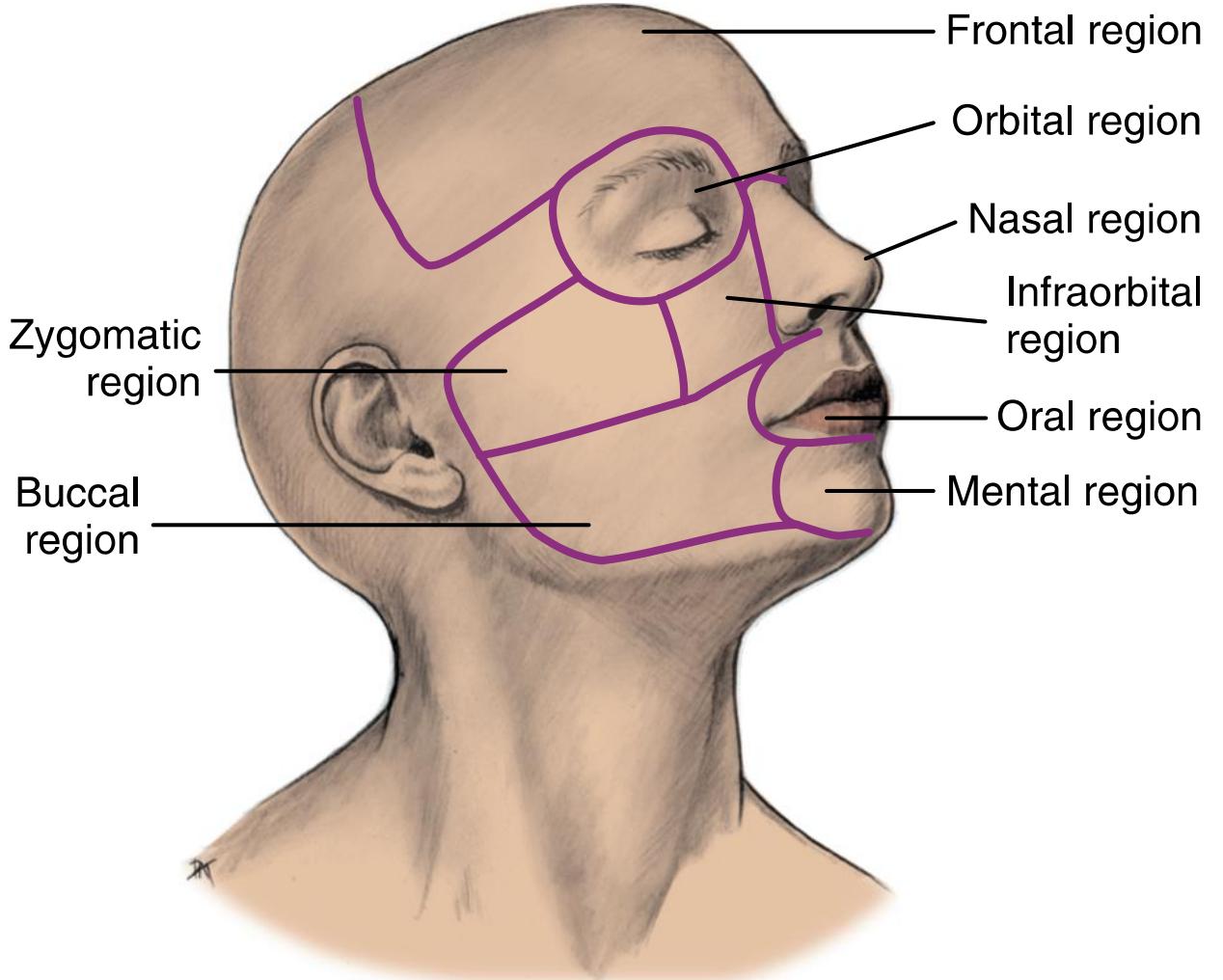


# Face and Neck

- Examination of the head and neck: visualization and palpation
- Gives examiner an idea of the health of deeper tissue
- There are degrees of variation that are considered normal
- Changes in features may signal a significant condition
  - Changes can be from:
    - developmental disturbances, e.g. cleft lip
    - histologic tissue changes, e.g. skin cancer

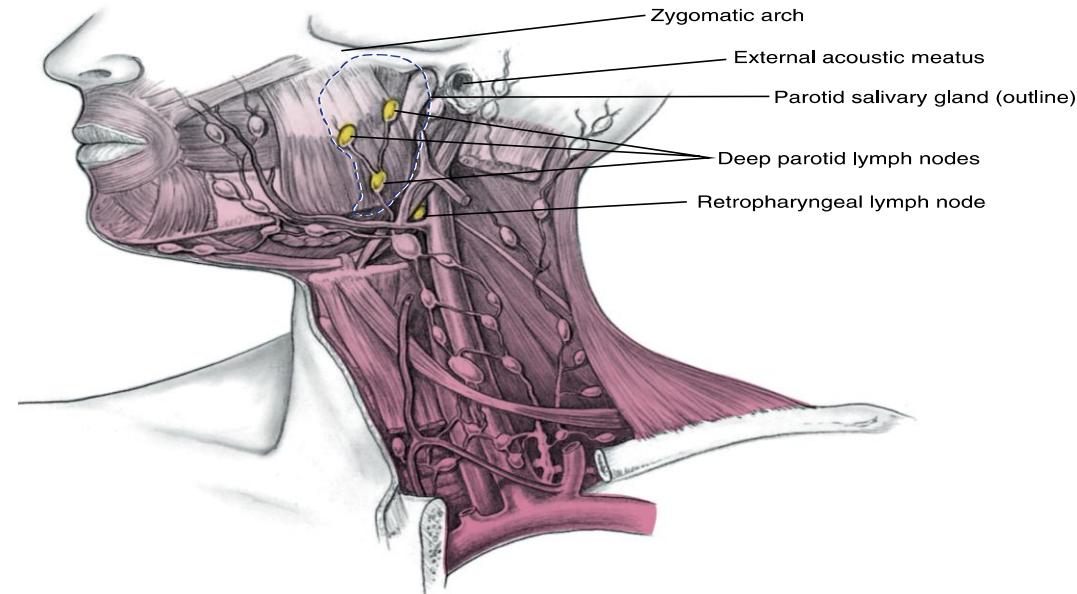
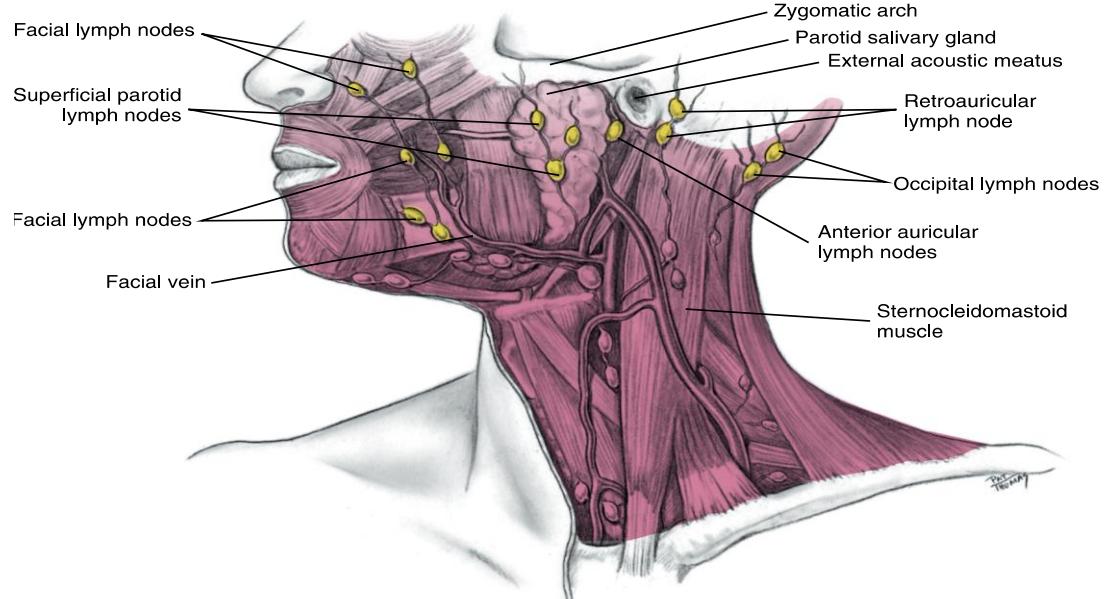
# Face Regions

- frontal
- orbital
- nasal
- infraorbital
- zygomatic
- buccal
- oral
- mental



# Face Regions

- **Lymph nodes:** located in certain areas of face and head, at times can be palpable
- Bean-shaped bodies grouped in clusters along the connecting lymphatic vessels



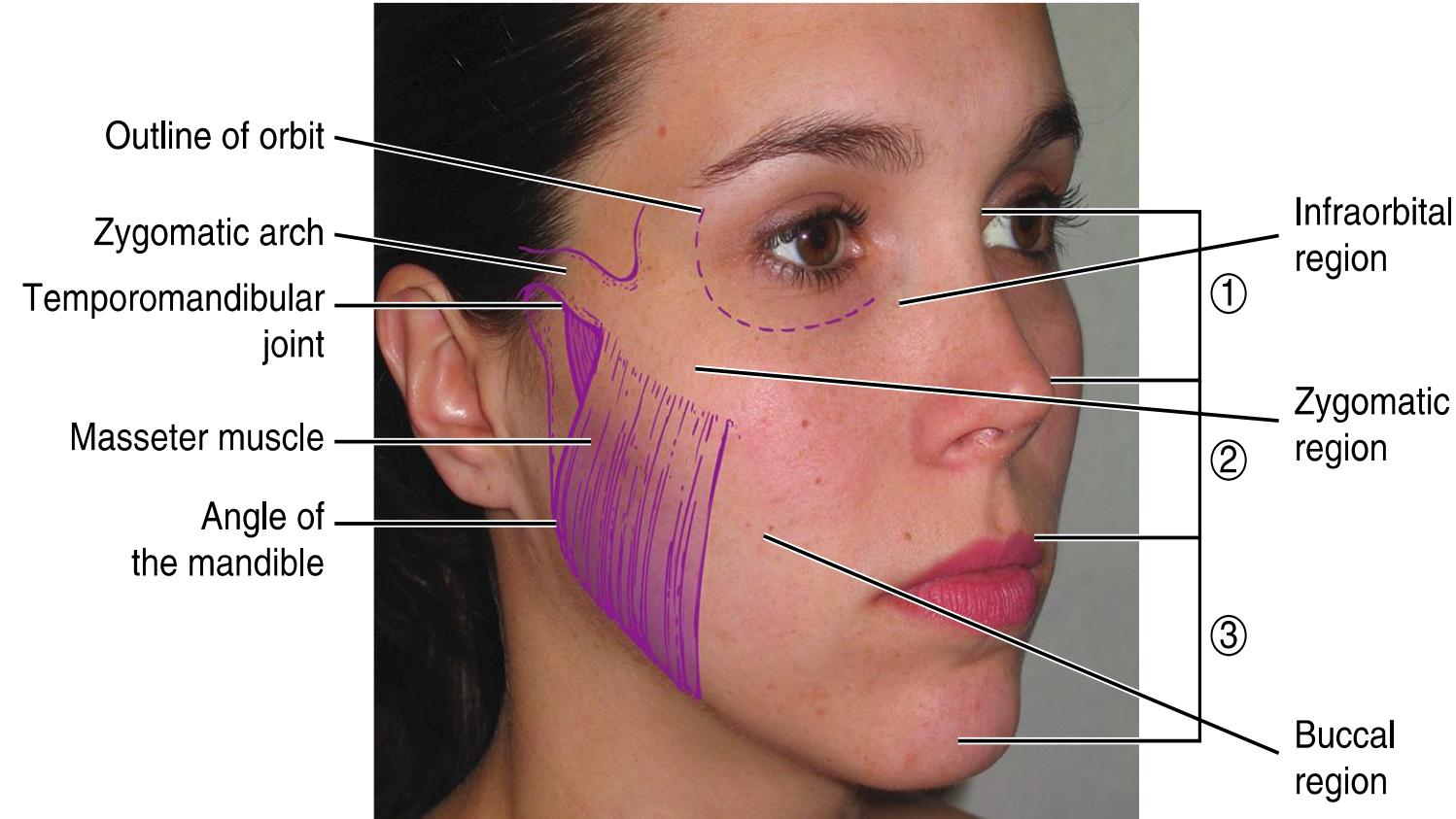
# Frontal, Orbital, Nasal Regions

## Frontal:

Forehead and area above eyes

## Orbital:

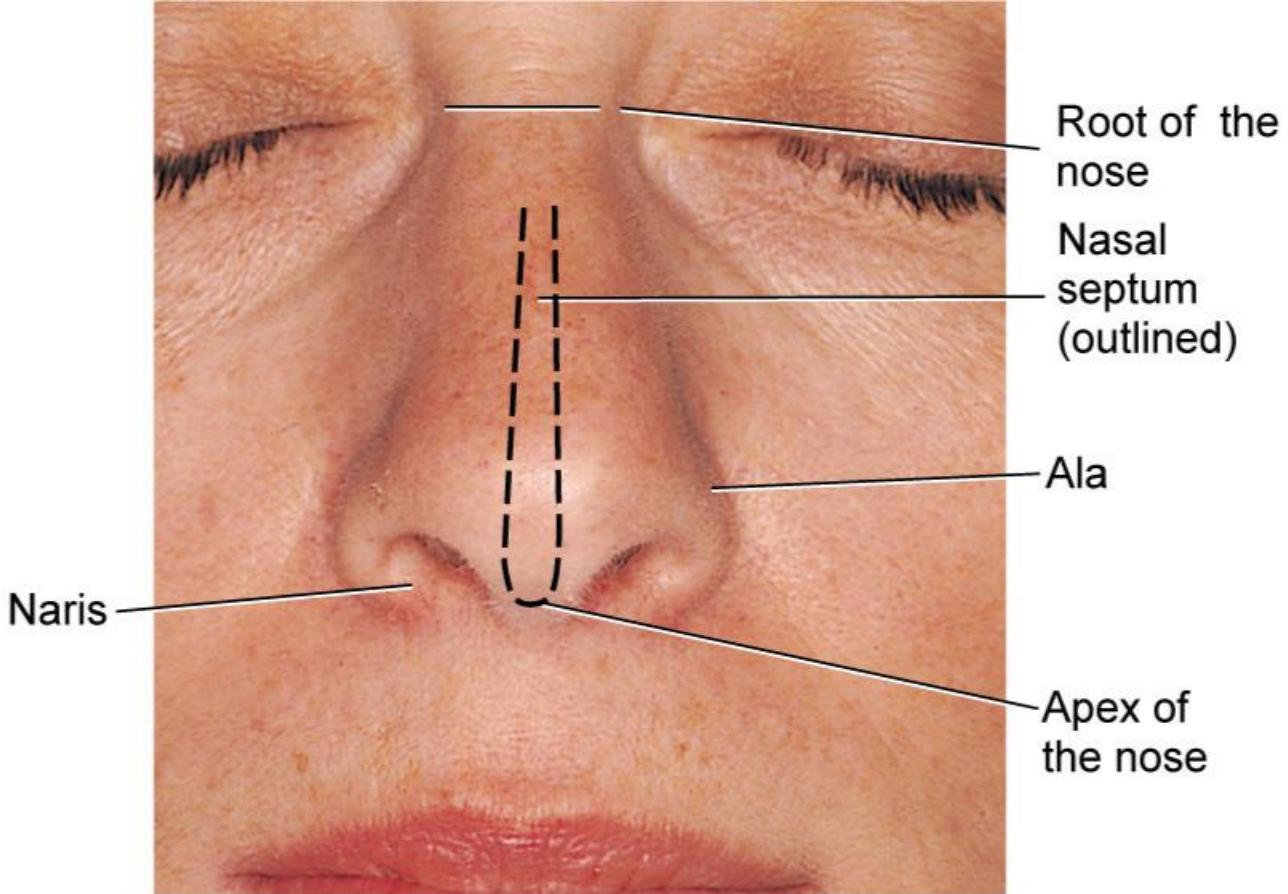
Eyeball and supporting structures contained in the orbit (eye socket)



# Frontal, Orbital, Nasal Regions

## Nasal:

External nose, root of nose, apex of nose, nares (nostril), nasal septum, alae



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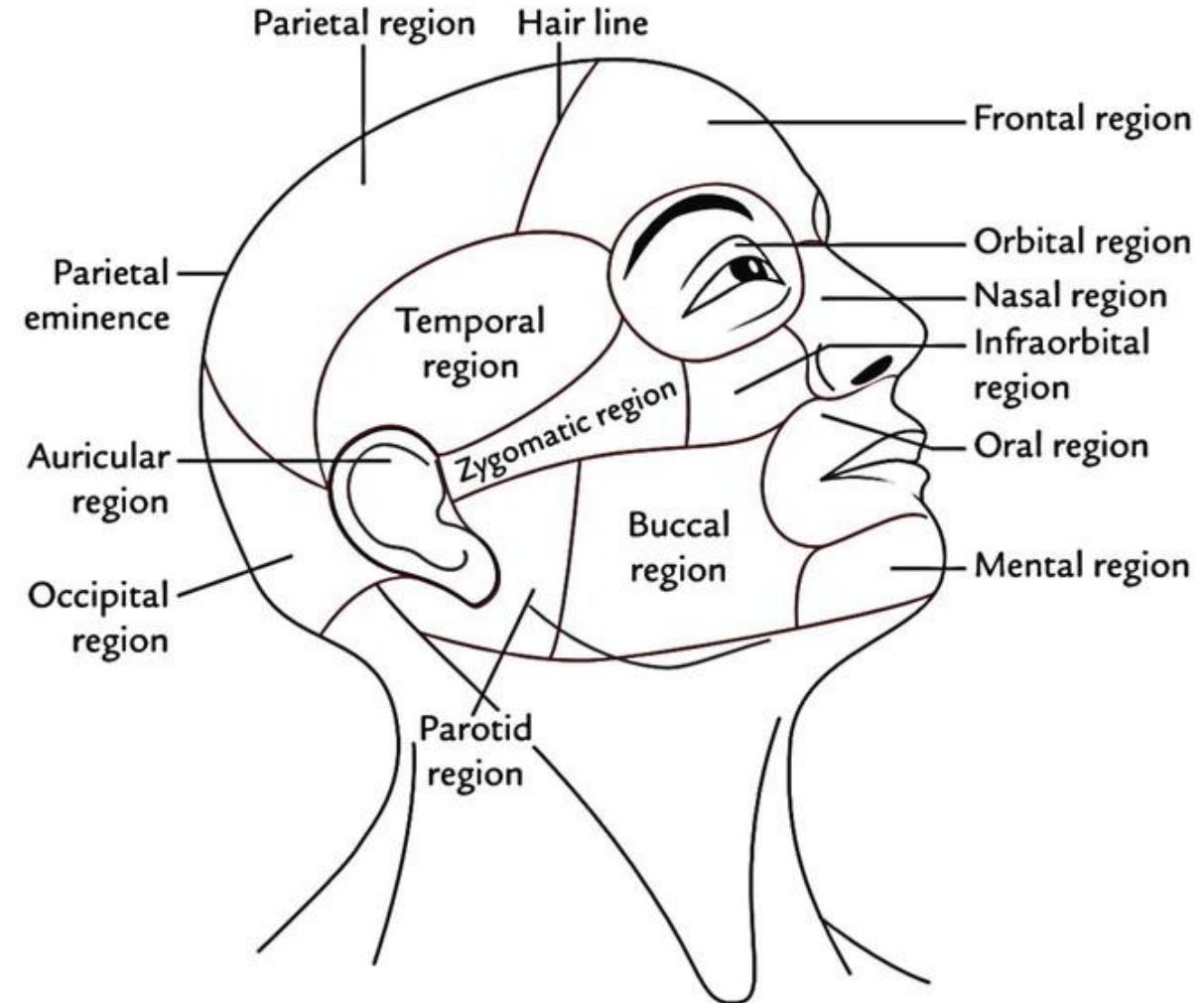
# Infraorbital and Zygomatic Regions

## Infraorbital:

-Inferior to the orbital region and lateral to the nasal region

## Zygomatic:

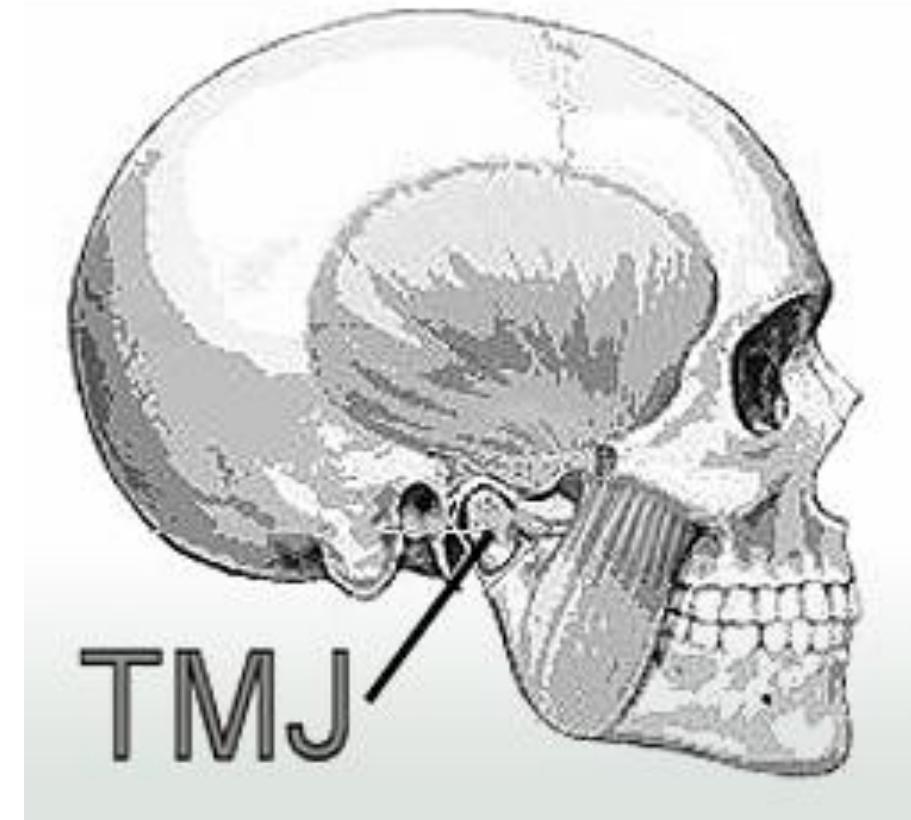
-Lateral to the infraorbital region  
Overlies the zygomatic arch



# Infraorbital and Zygomatic Regions

## Temporomandibular Joint:

- Inferior to zygomatic arch and anterior to external ear
- Upper skull forms a joint with the lower jaw



# Buccal Region

-Soft tissue of the cheek

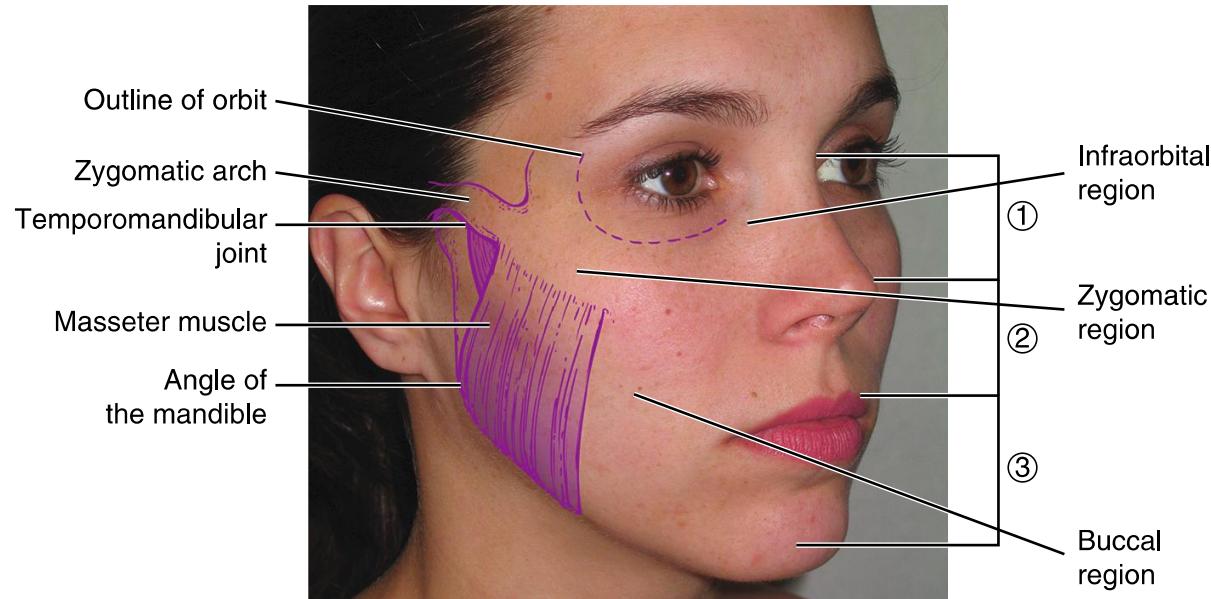
-Mass of fat and muscles:

- **Masseter muscle:** palpated when patient clenches together

-Angle of mandible:

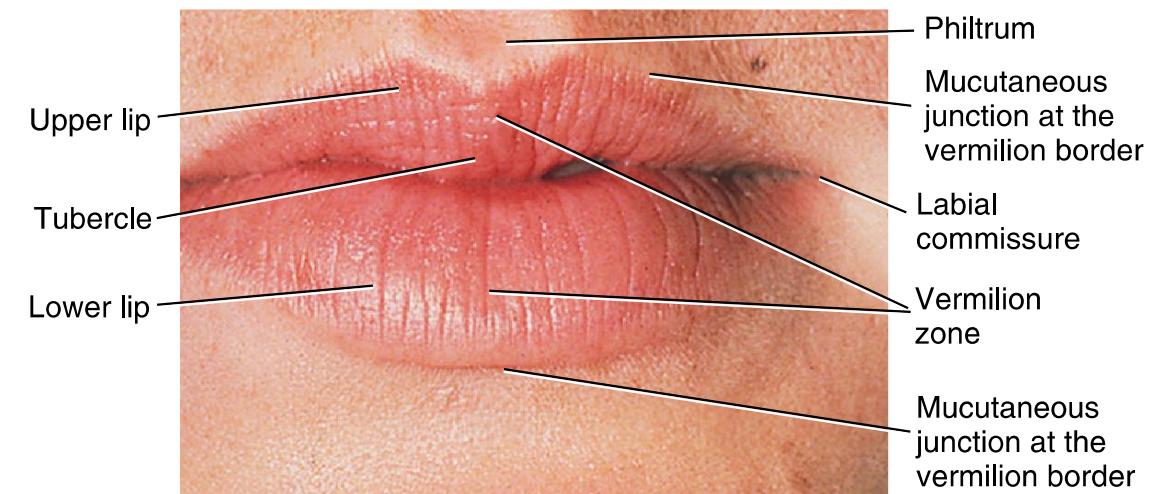
Sharp angle of the lower jaw, inferior to earlobe

-Parotid salivary gland: palpated on the buccal and zygomatic regions



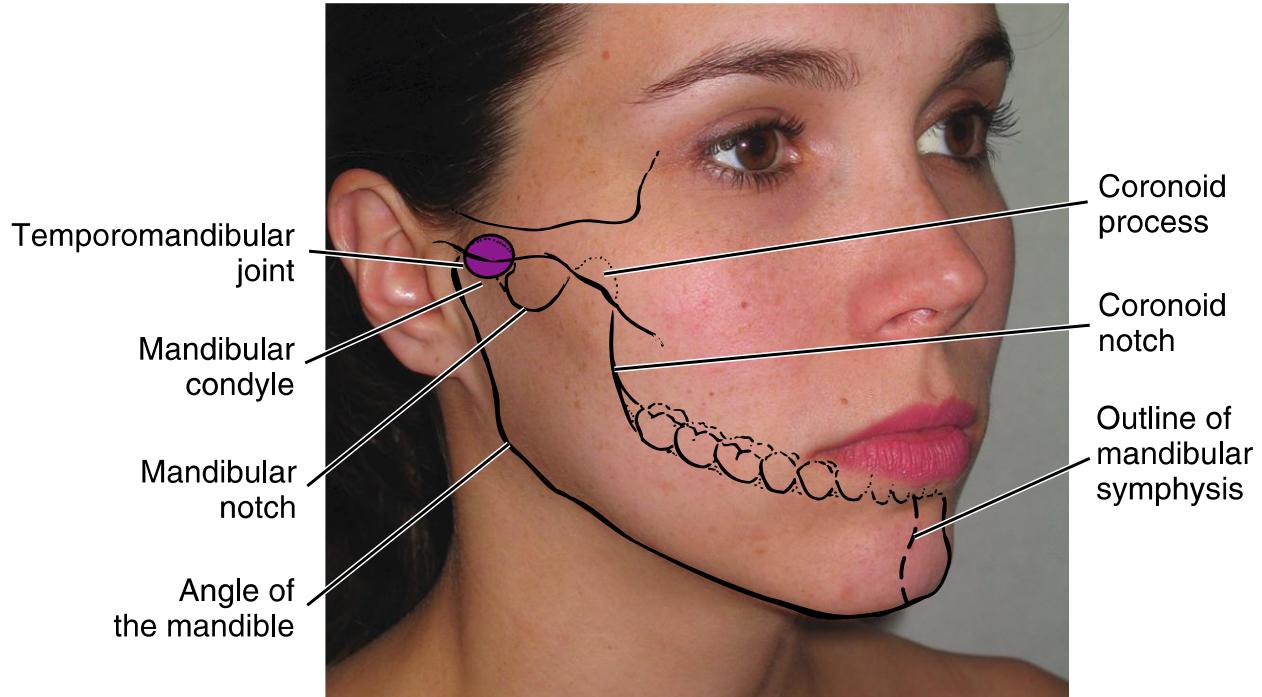
# Oral Region

- **Upper and lower lips:** Mark the gateway of the oral cavity
- **Vermilion zone:** Darker appearance than the surrounding skin
- **Mucocutaneous junction:** Transition zone outlining the lips
- **Philtrum:** Extends from nasal septum downward, vertical groove, midline of upper lip
- **Tubercle of the upper lip:** Where the philtrum terminates in the upper lip
- **Labial commissure:** Where upper and lower lips meet at the corner of the mouth



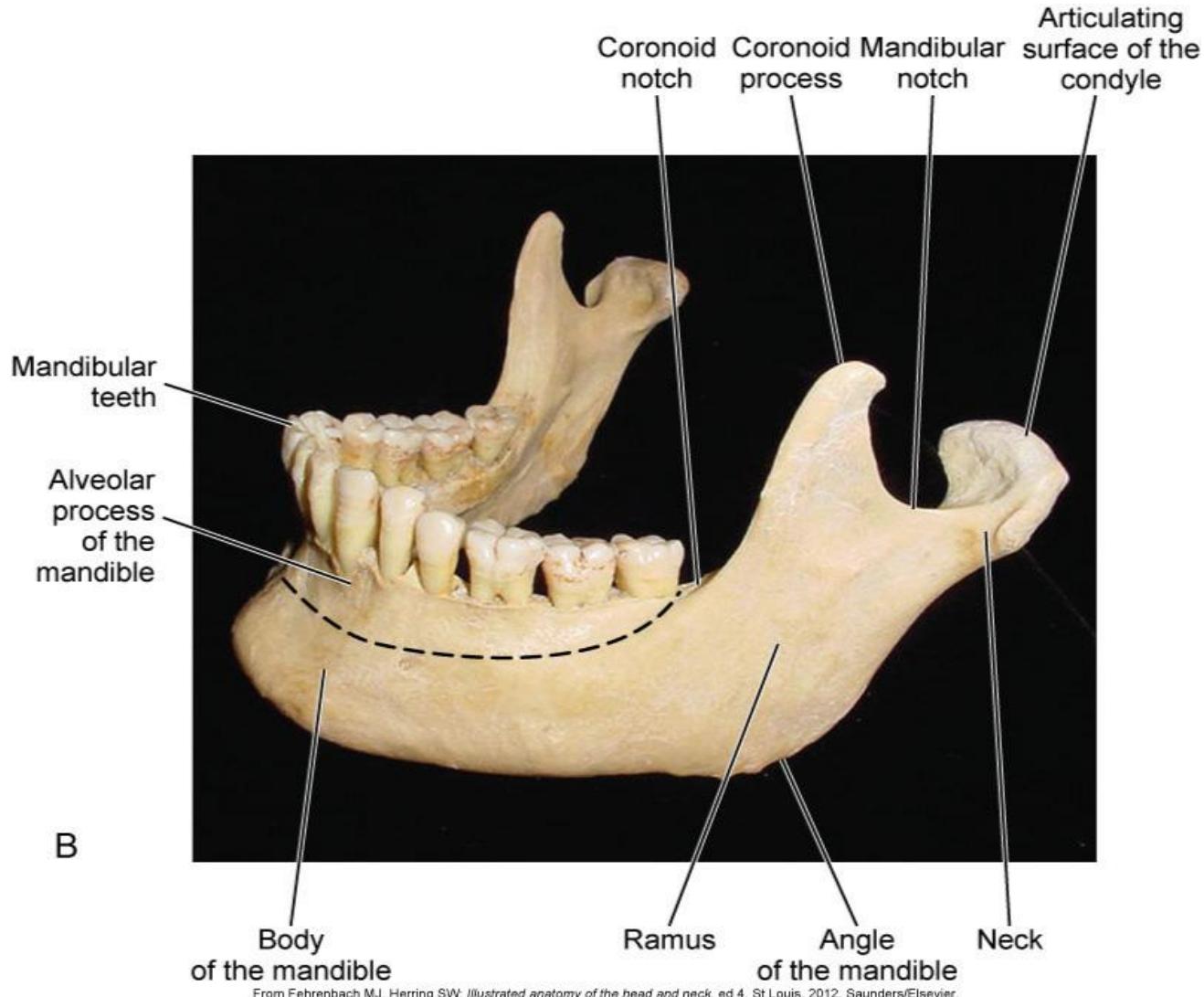
# Mental Region

- **Mandibular symphysis:** Midline of mandible
- **Ramus:** Lateral aspect of mandible, extends up and back from the body of mandible
- **Coronoid process:** Thin, sharp margin, terminates at the anterior border of ramus



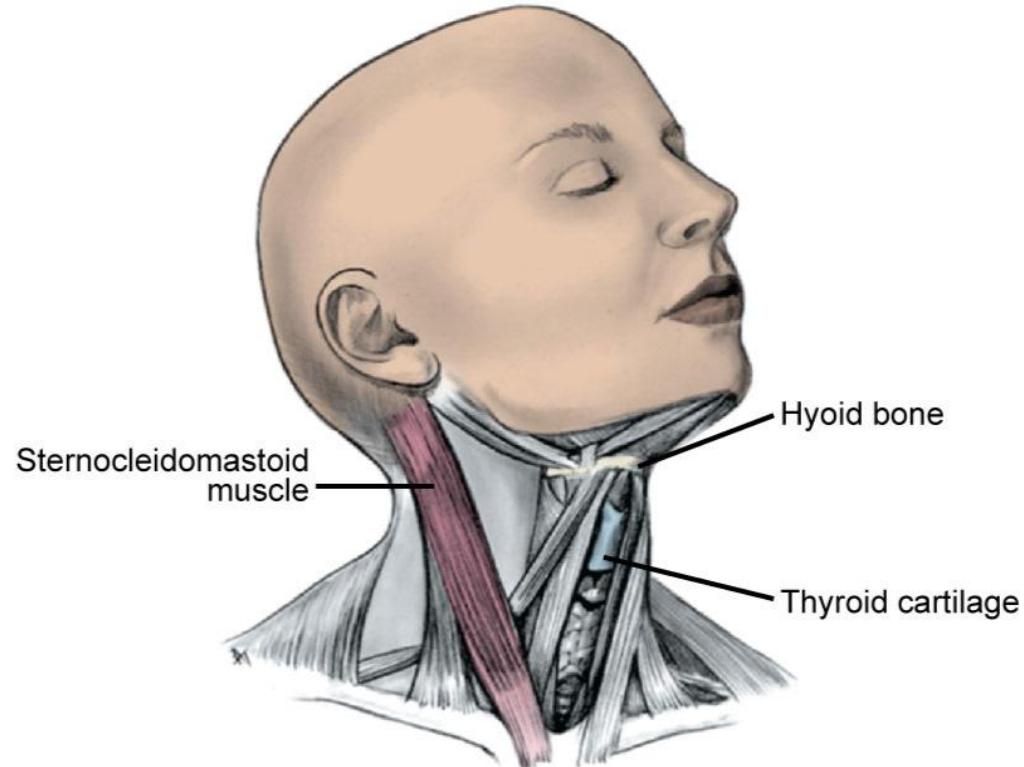
# Mental Region

- **Coronoid notch:** Concave, forward curve, main part of the anterior border of ramus
- **Mandibular condyle/neck:** Projection, posterior border of ramus
- **Mandibular notch:** Depression between coronoid process and condyle



# Neck Region

- Extends from the skull and lower jaw down to the clavicles and sternum
- Contains lymph nodes, muscles, glands
- Any palpable areas of concern should be noted in patient's record



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# Clinical Considerations: Lips

Disruption of the vermillion zone and border:

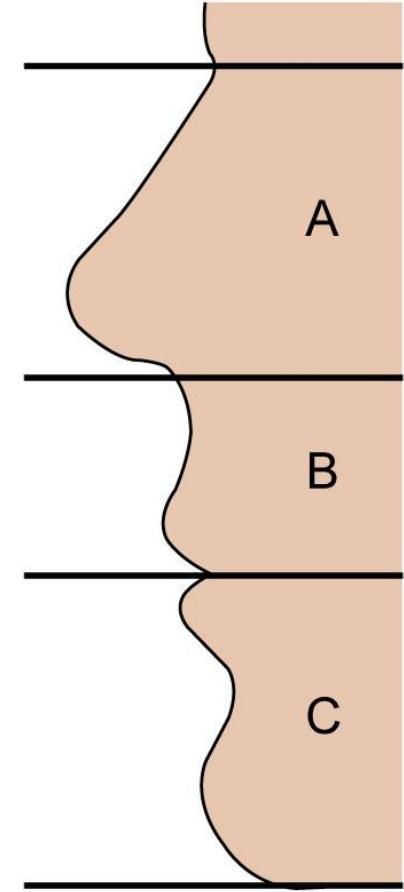
- Due to trauma-scarring
- Due to developmental disturbances-cleft lip
- Due to cellular changes-solar damage or cancer



# Clinical Considerations: Facial Esthetics

## Vertical Dimension of the face:

- The face can be divided into thirds: infraorbital, zygomatic, buccal
- Loss of height can occur with circumstances such as tooth loss
- Used when considering esthetics and smile



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# Oral Cavity and Pharynx

- Variation can be seen in the head and neck, or the oral cavity and pharynx area
- You need to know what is normal and what is of concern



# Oral Cavity Properties

- A dental professional must be committed to improving the oral health for every patient
- To accomplish this, dental professionals must be particularly knowledgeable about their main area of focus, the oral cavity, and the adjacent throat or pharynx
- To visualize this area of focus successfully, it is important to know the boundaries, terminology, and divisions of the oral cavity and pharynx

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# Oral Cavity Divisions

Oral cavity is divided to: vestibules, jaws, alveolar processes, teeth, oral cavity proper

Within each part of the oral cavity are certain surface landmarks.

## Orientational Terms:

- **Facial:** structures closest to the facial surface
- **Labial:** facial structures closest to the lips
- **Buccal:** facial structures close to the inner cheek
- **Lingual:** structures closest to the tongue
- **Palatal:** lingual structures closest to the palate

# Oral Vestibule

Horseshoe-shaped spaces between lips/cheeks and teeth

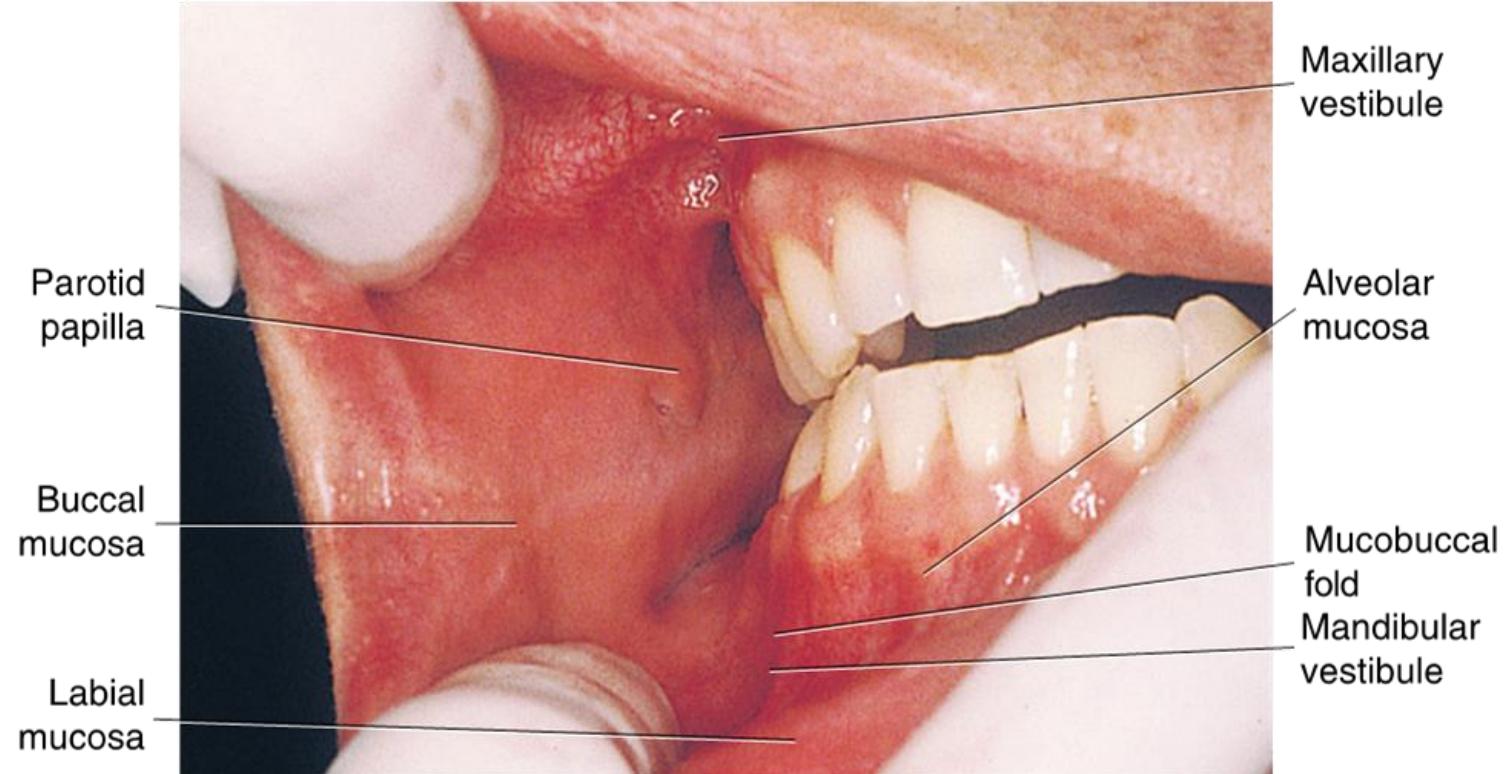
**Mucosa:** mucous membrane

Oral (lines vestibule)

Labial (lines lips)

Buccal (lines inner cheek)

-continuous tissue



# Jaws, Alveolar Process, Teeth

**Maxilla:** upper jaw

Non-movable

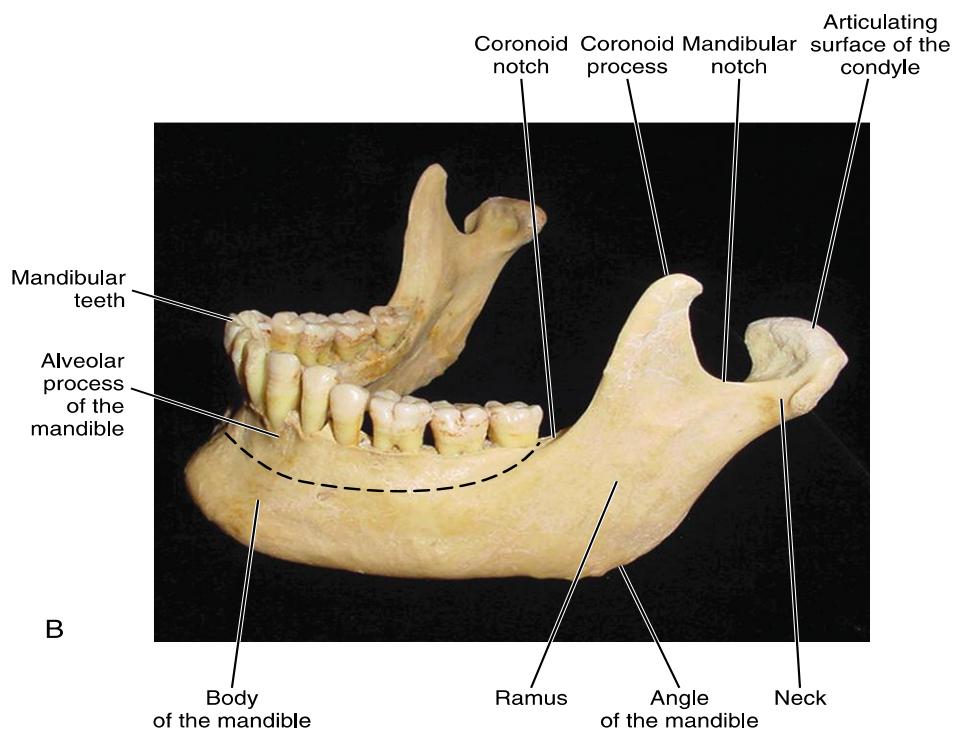
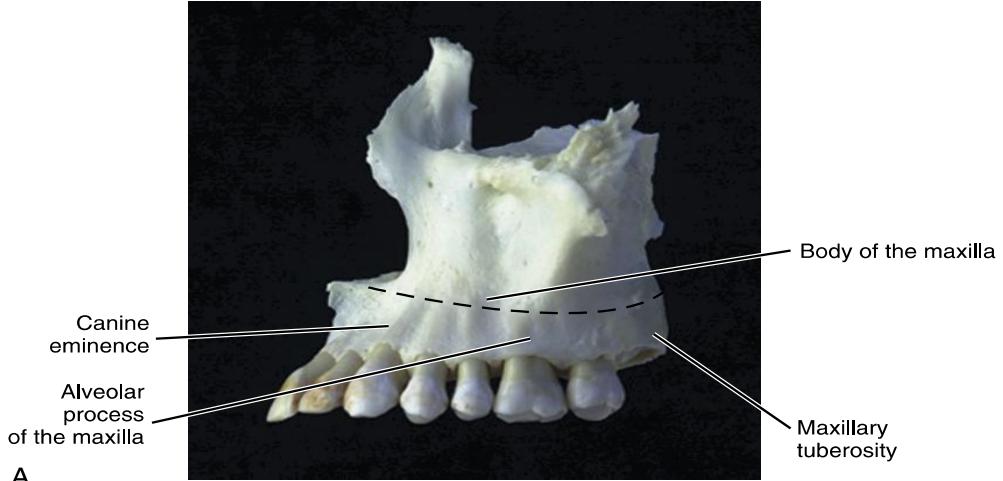
Contains maxillary sinuses

**Mandible:** lower jaw

Movable articulation with temporal bone at TMJ

**Alveolar process:** Contains each tooth socket (alveolus)

**Teeth:** Consists of crown, root, pulp



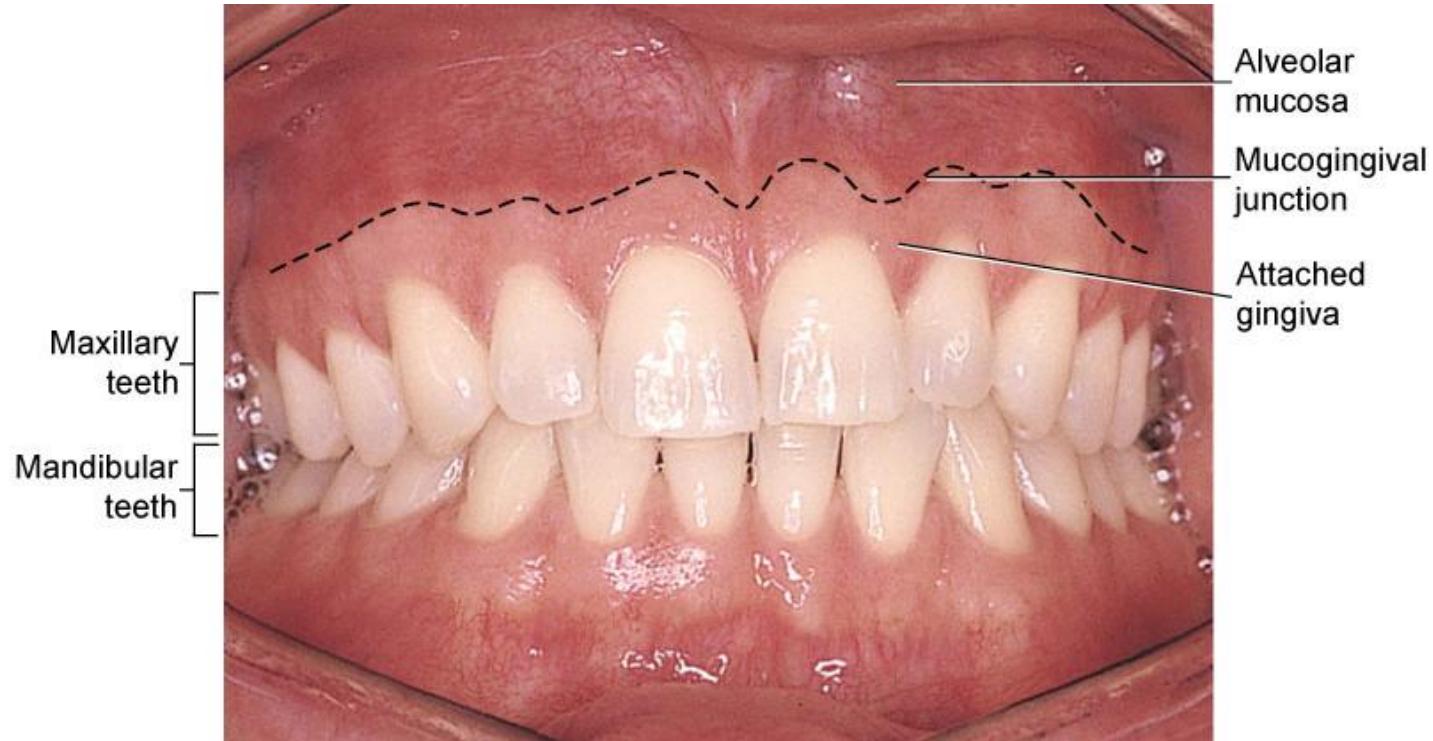
# Gingival Tissue

## Gingiva:

- Surrounds maxillary and mandibular teeth in the alveoli
- Covers the alveolar processes
  - Attached gingiva is adhered to alveolar process

**Alveolar mucosa:** Movable redder mucosa

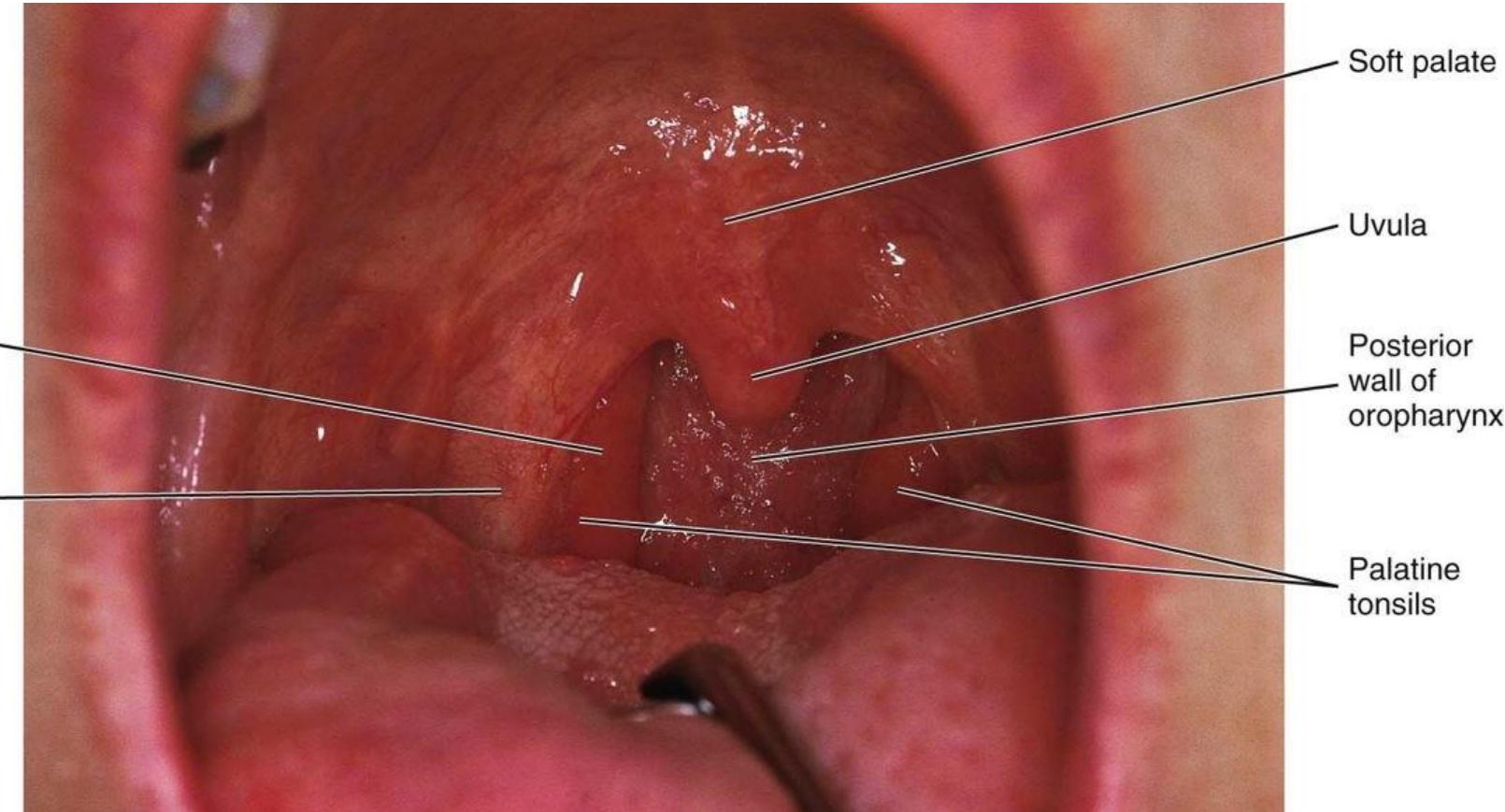
**Mucogingival Junction:** Line of demarcation between attached gingiva and alveolar mucosa



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# Oral Cavity Proper

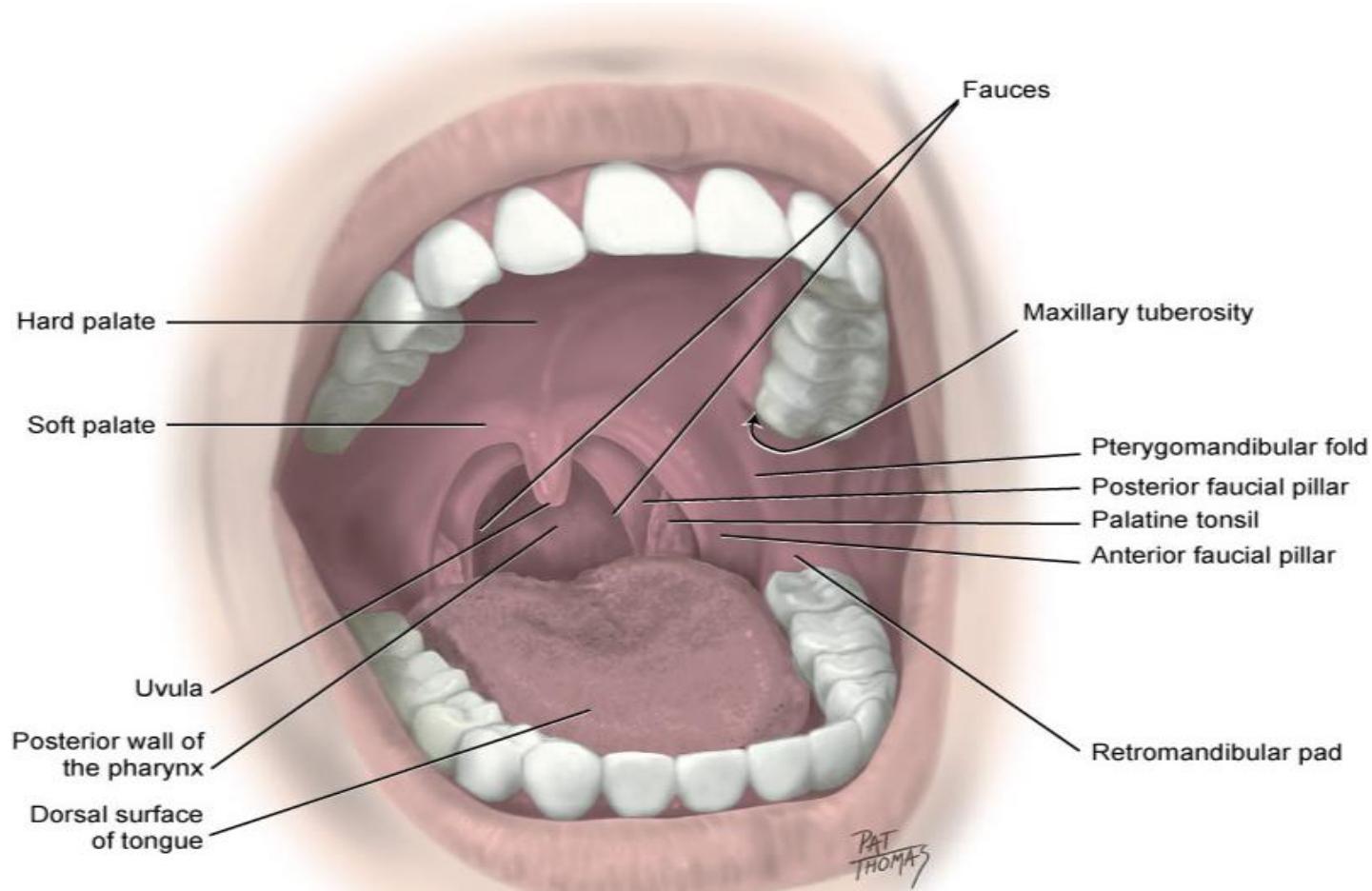
- The inside of the mouth
- Enclosed anteriorly by maxillary and mandibular arches
- Posteriorly, opens into the pharynx (throat) through the fauces



# Oral Cavity Proper

- **Fauces:** formed from anterior and posterior faucial pillars

-Palatine tonsils are located between the pillars

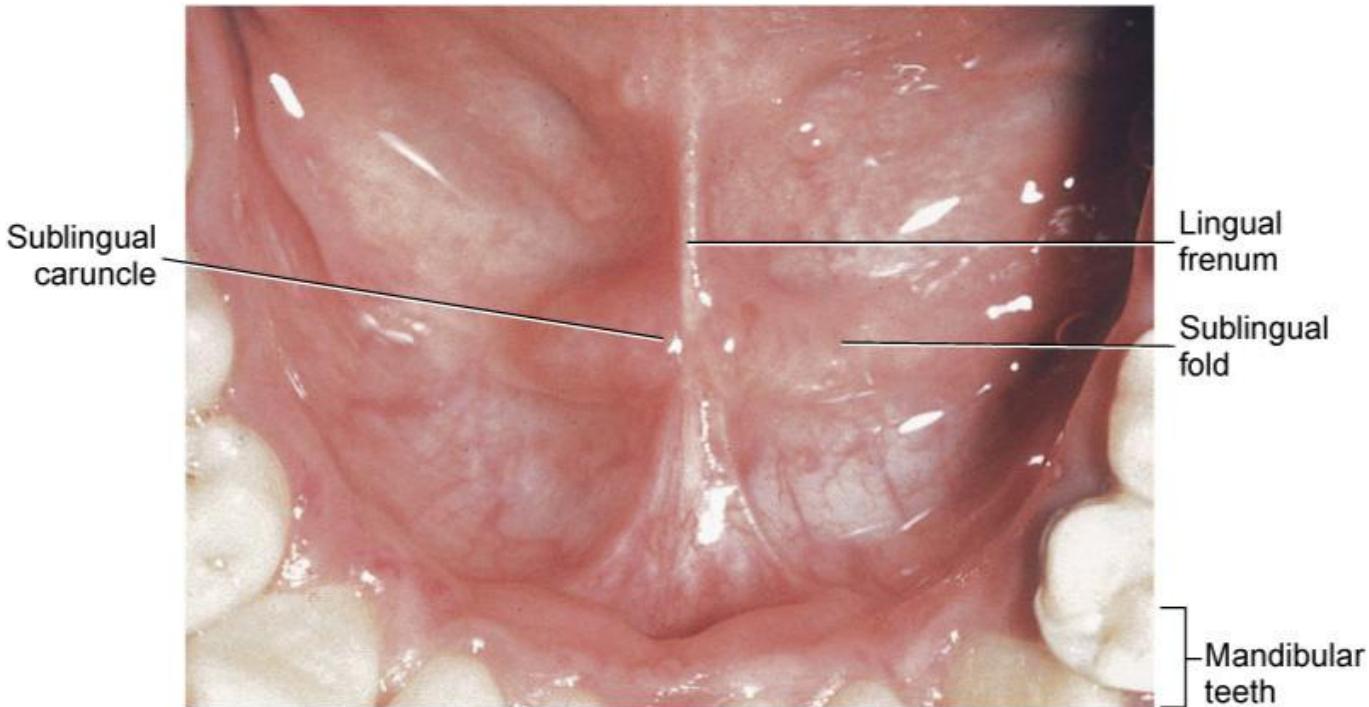


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# Oral Cavity Proper

## Floor of the Mouth:

- Inferior to the ventral of the tongue
- Lingual frenum-midline fold of tissue
- Sublingual fold- V shape from frenum to FOM
- Sublingual caruncle-papilla that contains opening for the sublingual and submandibular glands' ducts

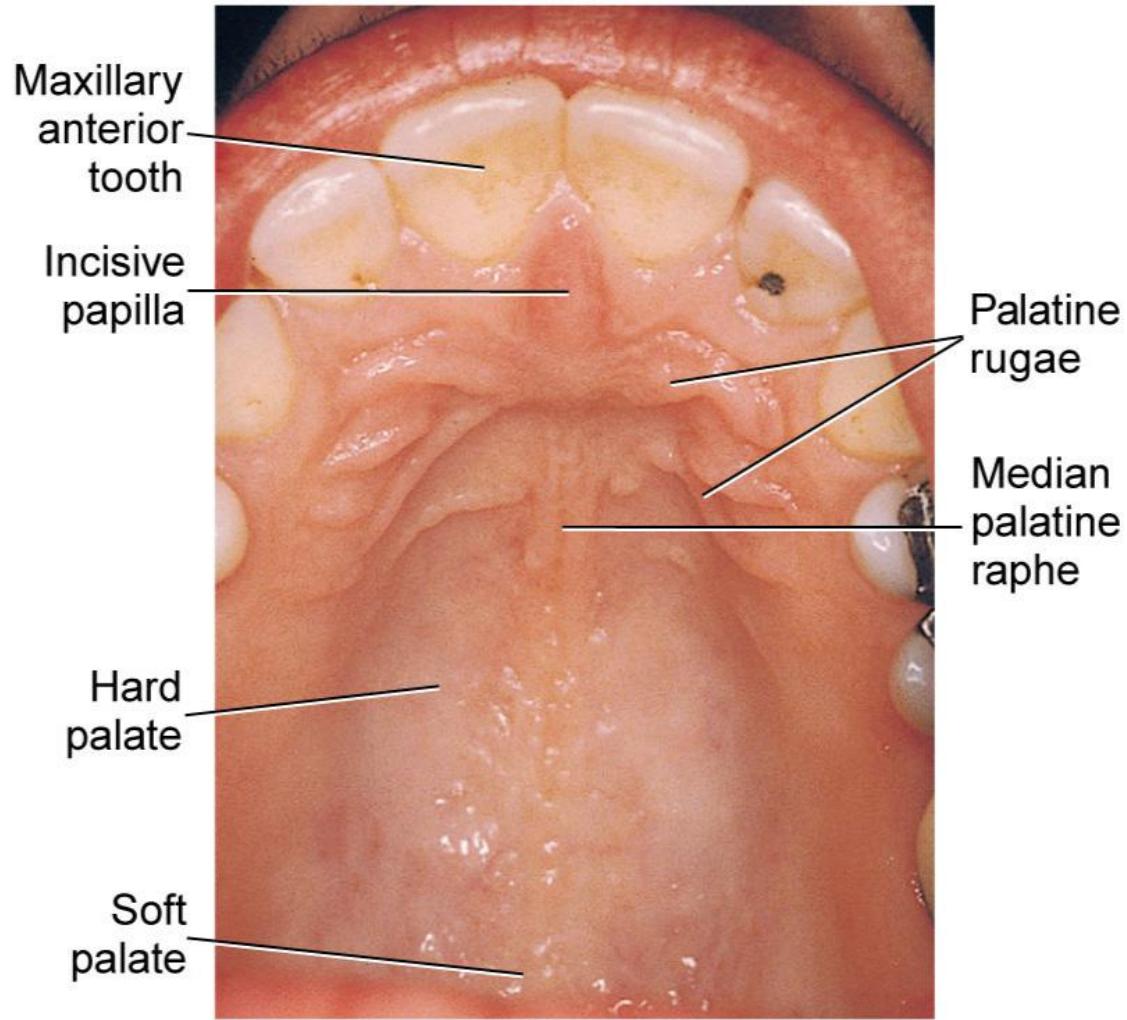


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# Oral Cavity Proper

**Palate:** roof of the mouth:

- Separates the oral cavity from nasal cavity
- Anterior(hard) and posterior(soft)
- Median palatine raphe (midline)



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# Oral Cavity Proper

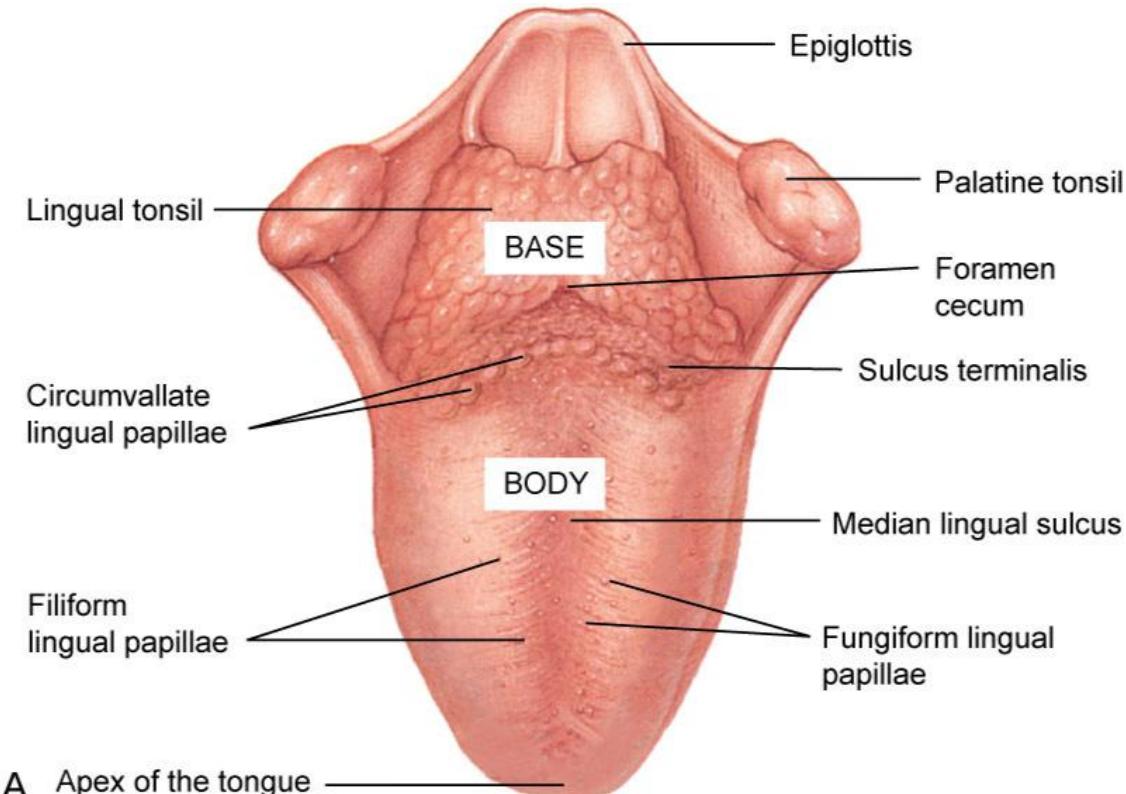
## Tongue:

- Base, body, apex
- Lingual papilla-elevated structures on dorsal and lateral sides

Base attaches the tongue to the floor of the mouth

Body is the anterior 2/3 of the tongue

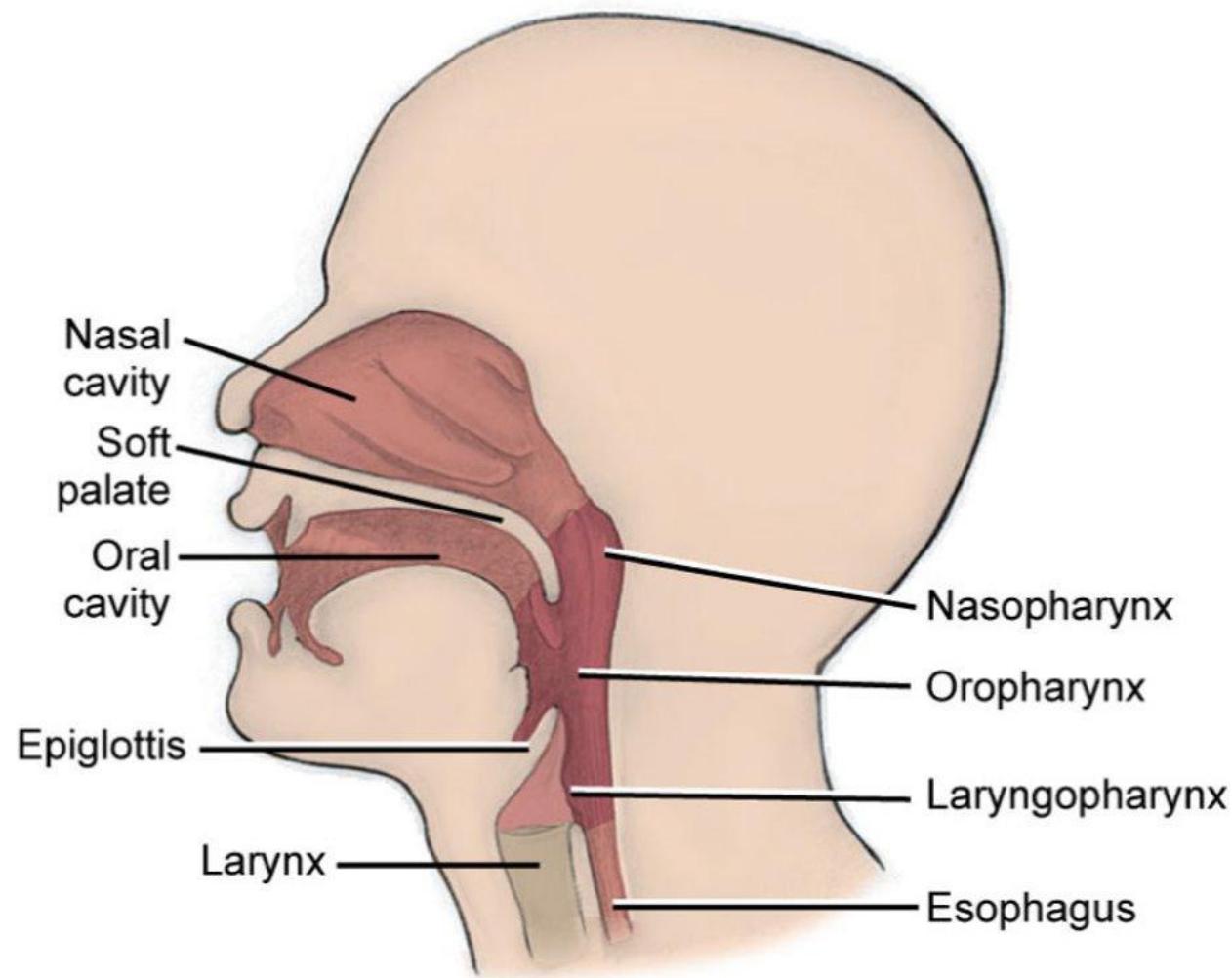
Apex is the tip of the tongue



# Pharyngeal Divisions

-**Pharynx** has 3 divisions:

- **Nasopharynx:** superior to the level of soft palate; continuous with nasal cavity
- **Oropharynx:** between soft palate and opening of larynx
- **Laryngopharynx:** most inferior divisions, close to laryngeal opening



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# Oropharynx Examination

- Mouth mirror is gently placed (mirror side down) on the middle of the tongue, and patient is asked to say “ah”
- The oropharynx is visually inspected when the soft palate and hard palate are examined
- Pharyngeal reflex (gag reflex): a reflex contraction of the back of throat or pharynx, evoked by touching the soft palate. Prevents something from entering pharynx except as part of swallowing and prevents choking



- The afferent limb of the reflex is supplied by glossopharyngeal nerve (CN IX), which inputs to nucleus solitarius and spinal trigeminal nucleus, and the efferent limb is supplied by Vagus nerve (CN X) from the nucleus ambiguus.
- Absence of gag reflex:** a symptom of severe medical conditions, such as **damage to glossopharyngeal or Vagus nerve, or brain death**. Studies indicate that up to **one third of healthy people do not have a gag reflex**.
- Palatal and pharyngeal tissue should be pink or pigmented in relation to normal coloration of patient's skin (yellowish hue in soft palate area), well hydrated, devoid of lesions.
- Atypical findings:** red dots or petechiae, palatal torus, food burns, red dots on a white background from nicotinic stomatitis; bifid uvula; prominent tonsillar tissue; scarring from third molars' surgical removal; inflammation on soft palate from postnasal drip.
- Abnormal findings:** denture stomatitis; pigmented, red or white, ulcerated lesions may indicate oral cancer; child abuse trauma; sagging palatal tissue resulting from stroke related facial paralysis; tonsillitis or tonsillar masses on tonsils

# Clinical Considerations: Oral Vestibules

- Many of the local anesthesia injections for patient pain control and hemostasis are administered at the height or depth of the mucobuccal fold



# Clinical Considerations: Oral Mucosa

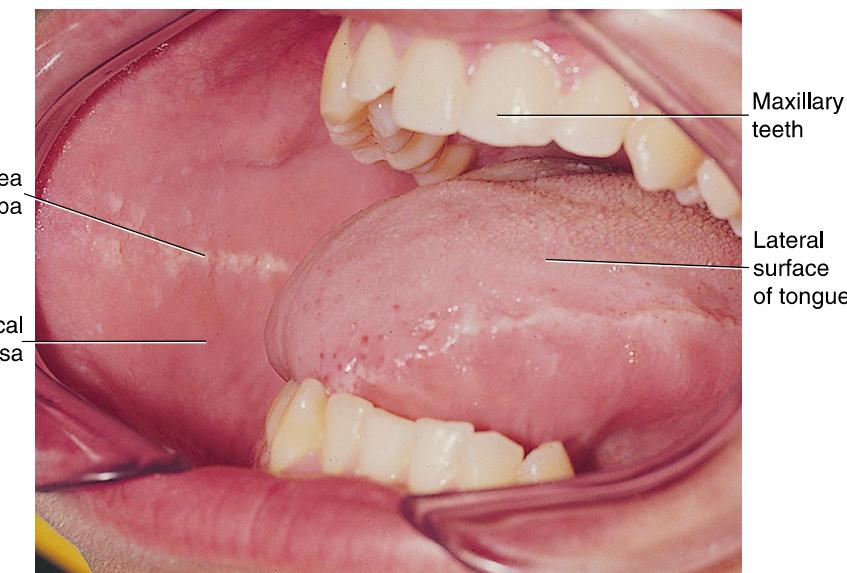
**Fordyce Granules:** common variation on the **labial** and **buccal** mucosa

- Small, yellowish elevations
- Misplaced sebaceous gland tissue



**Linea Alba:** common variation on the **buccal** mucosa

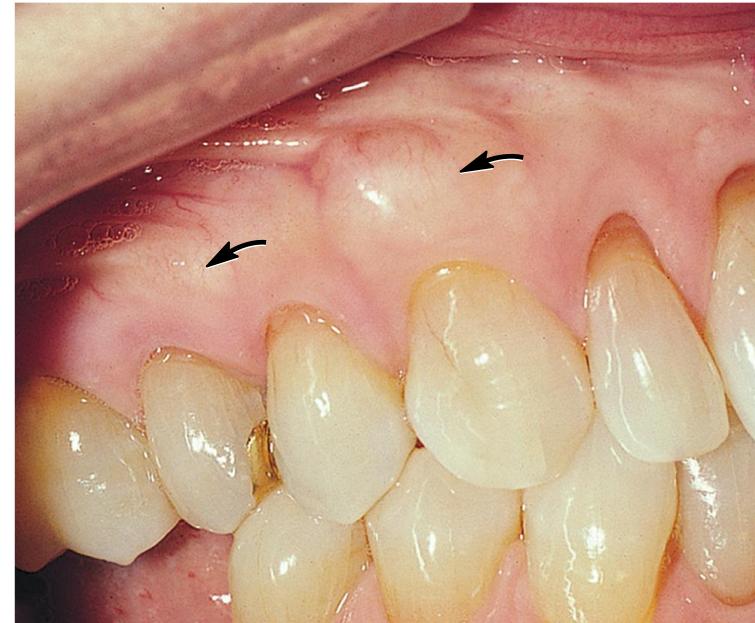
- white ridge of hyperkeratinization extending horizontally at the level where teeth occlude



# Clinical Considerations: Alveolar Process

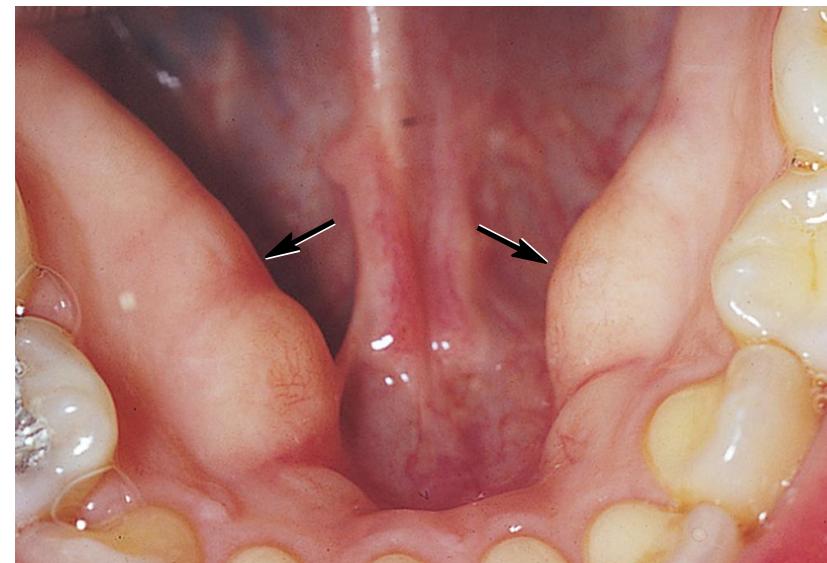
**Exostoses:** bone growths on the **facial** surface of alveolar process of maxillary/mandibular arches

May interfere with radiograph analysis, restorative, periodontal treatments



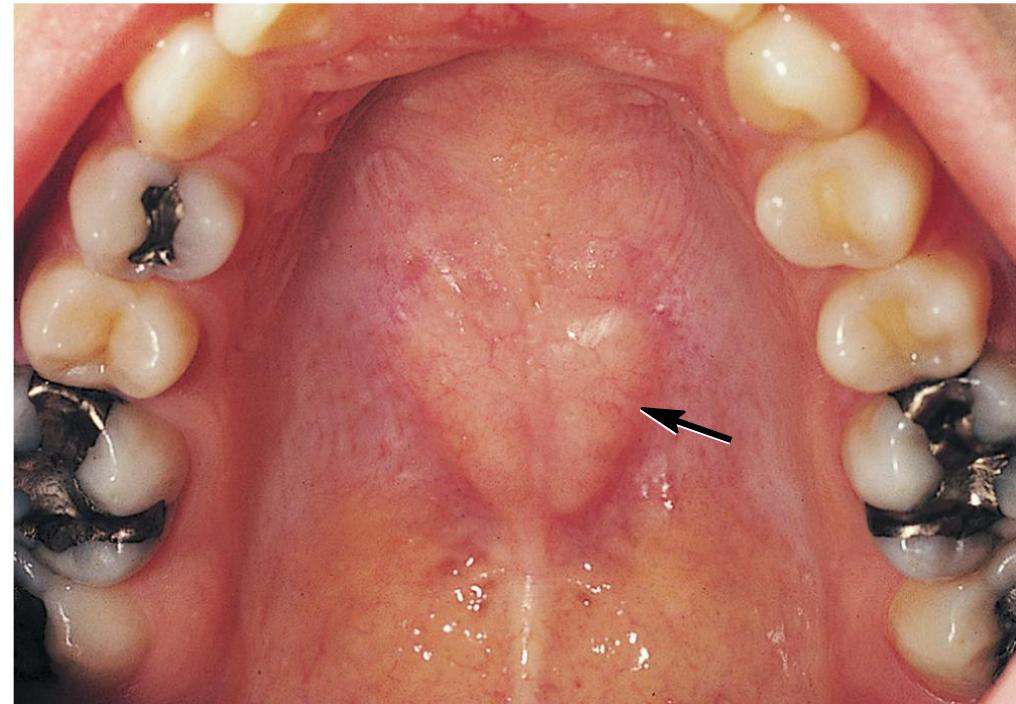
**Mandibular Tori:** bone growth on the **lingual** of the mandibular arch

May interfere with speech, oral hygiene procedures, radiographs, prosthesis treatments

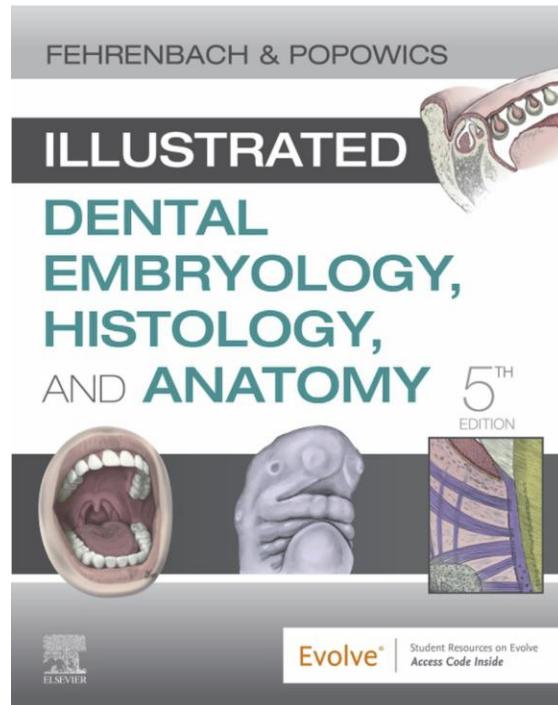
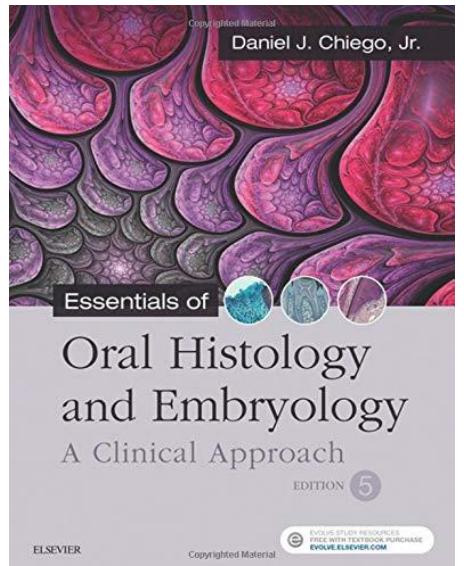
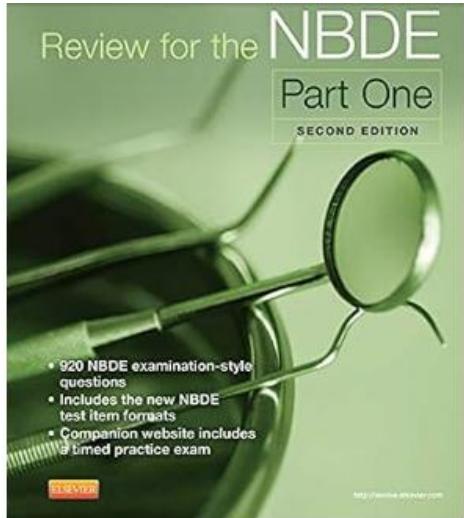


# Clinical Considerations: Palate

- **Palatal Torus:** bony growth on the midline of hard palate
- May interfere with prosthesis fabrication, radiographs

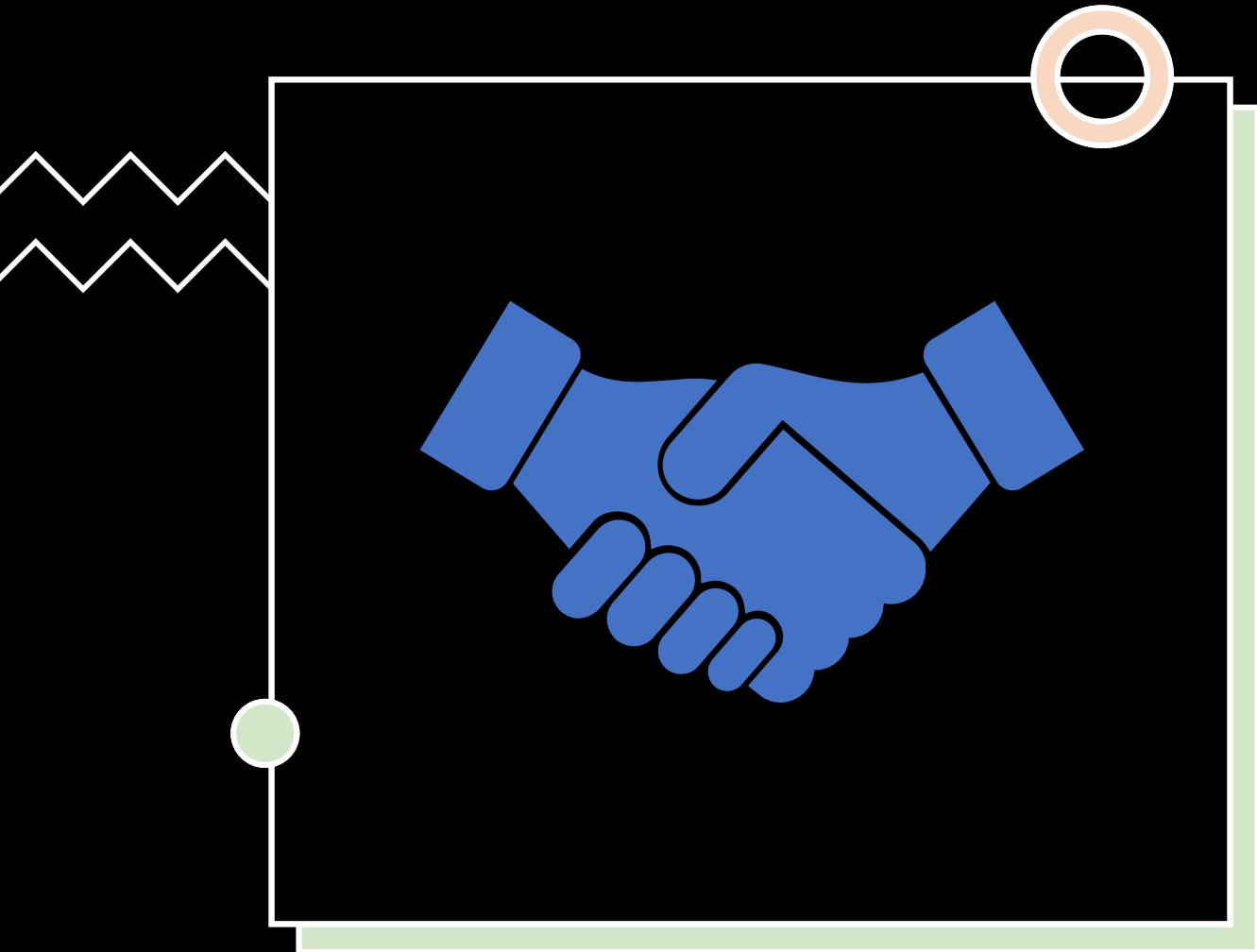


# References



[Extracellular matrix: Video, Causes, & Meaning | Osmosis](#)  
[Cell cycle: Video, Causes, & Meaning | Osmosis](#)  
[Cell-cell junctions: Video, Causes, & Meaning | Osmosis](#)  
[Cartilage histology: Video, Causes, & Meaning | Osmosis](#)  
[Cartilage structure and growth: Video, Causes, & Meaning | Osmosis](#)  
[Epithelial Tissue: What Is It, Where It's Found, and More | Osmosis](#)  
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Many Thanks to  
Professor Miranda

