TATYASAHEB KORE DENTAL COLLEGE AND RESEARCH CENTRE
NEW PARGAON – 416 113

Tal.: Hatkanangale Dist.:Kolhapur (Maharashtra State)

National Dental Commission

INFORMATION REGARDING INSTITUTIONAL COMPLIANCE

4. Clinical Compliance

4.2 Student clinical work registers are updated regularly.

Mahatma Gandhi Charitable Medical Trust, Warananagar

TATYASAHEB KORE DENTAL COLLEGE AND RESEARCH CENTRE, NEW PARGAON

RECOGNISED BY DENTAL COUNCIL OF INDIA, NEW DELHI

AFFILIATED TO MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK

TATYASAHEB KORE DENTAL COLLEGE & RESEARCH CENTRE

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Dt. Kolhapur 416 13

ORAL PATHOLOGY & MICROBIOLOGY

RECORD BOOK

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Mahatma Gandhi Charitable Medical Trust, Warananagar

TATYASAHEB KORE DENTAL COLLEGE AND RESEARCH CENTRE, NEW PARGAON

DEPARTMENT OF
ORAL PATHOLOGY & MICROBIOLOGY

CERTIFICATE

This is to certify that, ~~Shri~~/ Kum. Sharayu Sharadkumar Sankapal *Roll No.* 49 *has satisfactorily carried out the practical work in Oral Pathology & Microbiology as prescribed by the Maharashtra University Of Health Science. Nashik for the year* 2025 - 2026 *Examination.*

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WARANA
HEALTH MOVEMENT
Est : 1992

Staff Encharge

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Study of Stains

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1) Haematoxylin and Eosin:

Principle:

Haematoxylin is a basic dye so it stains the nucleus which is acidic because of presence of nucleic acid i.e. DNA and RNA.

Eosin is acidic so it stains the cytoplasm which is basic in nature.

Result:

Haematoxylin : Blue - Nucleus

Eosin : Pink - cytoplasm, blood vessels, collagen, nuclear fibres, RBCs, Fungal hyphae, connective tissue.

2) Van Gieson Stain:

Principle:

Based on differential staining of collagen fibres and other tissue & size of dye nucleus.

Components: Saturated picric acid solution, 1% aqueous acid fuschin solutions in distilled water, celestine blue.

Result

Epithelium - Yellow

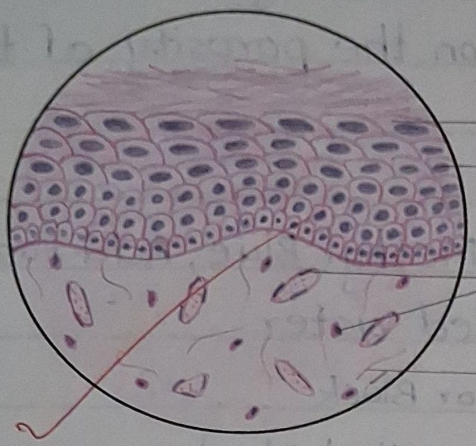
Cell Nuclei - Blue/Black

Collagen - Bright Red

Muscle fibre - Yellow Red

RBC : Red

1) Hematoxylin & Eosin



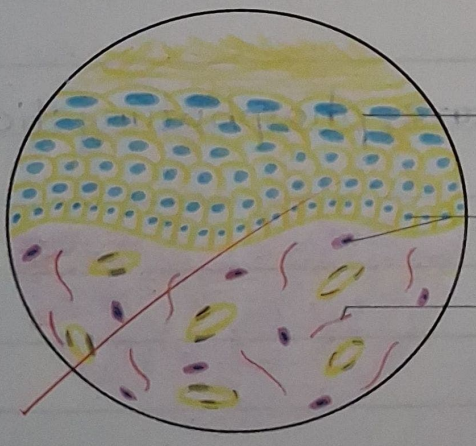
→ Cytoplasm stained with eosin

→ Nucleus of epithelial cells stained with hematoxylin

→ Nucleus of endothelial cell and fibroblast stained with hematoxylin

→ Collagen and ground substance stained with eosin.

2) Van Gieson Stain



→ Epithelium stained yellow

→ Nucleus stained blue/black

→ Collagen stained red

3) Masson Trichome Stain:

This stain is used to stain muscle.

Principle:

Based on differential staining of collagen fibres and other tissue developing upon the porosity of tissue and size of dye molecule.

Components:

Phosphotungstic acid (PTA), Methyl Blue, Acid Fuschin, in glacial acetic acid, distilled water.

Result: Epi Nucleus : Blue or Black

Collagen : Blue (Methyl Blue)

Muscle & RBCs : Red (Acid Fuschin

4) Mallory's Stain:

This stain is used for checking degree of keratinization and used to differentiate Keratin from epithelium

Components:

Prussian blue, orange G mixture, phosphotungstic acid (PTA), distilled water

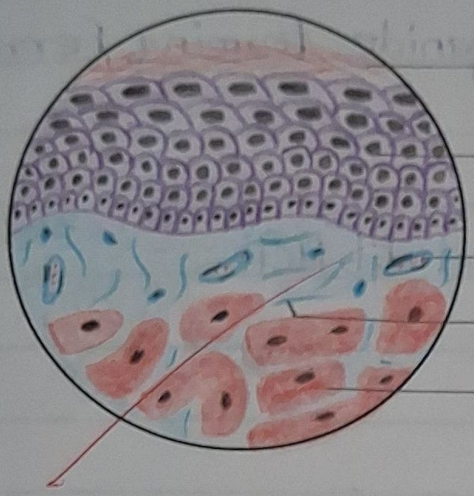
Result:

Keratin : Orange

Nucleus : Blue / Brown

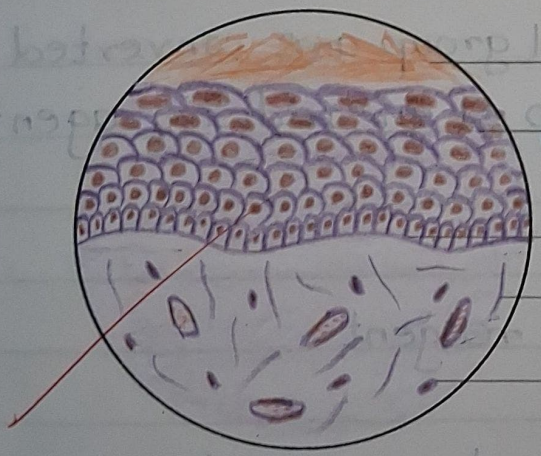
Remaining : Blue with different colour (Contrast structure)

3) Masson Trichrome Stain



- Keratin stained red
- Nuclei stained blue/Black
- Erythrocyte stained red
- Collagen stained blue
- Muscles stained red

4) Mallory's Stain



- Keratin stained orange
- Stratified squamous epithelium
- Basement membrane
- Collagen
- Fibroblast

5. Perl's Prussian Blue :

This stain is used for demonstration of iron.

Principle :

Ferric acid ions present in tissue combine with protein potassium. ferricyanide forming ferric-ferro cyanide.

Components:

Potassium Ferrocyanide and dil. HCl

Result:

Nucleus : Blue

Cytoplasm : Brown

Haemosidrin : Blue

6. Periodic Acid-Sciff Stain :

This stain is demonstrate glycogen and nucleopoly-saccharide

Principle :

Tissue containing 1, 2 glycol group are converted into aldehyde with the help of an oxidising agent to give a magenta colour.

Components:

Periodic acid and schiff reagent

Result:

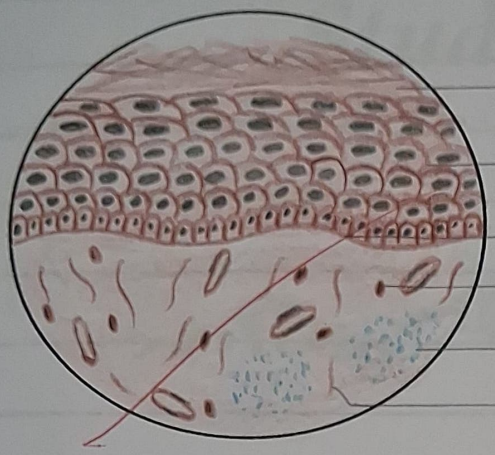
Carbohydrates & fungal hyphae : Magenta

Cytoplasm : Pale blue

Nucleus : Blue

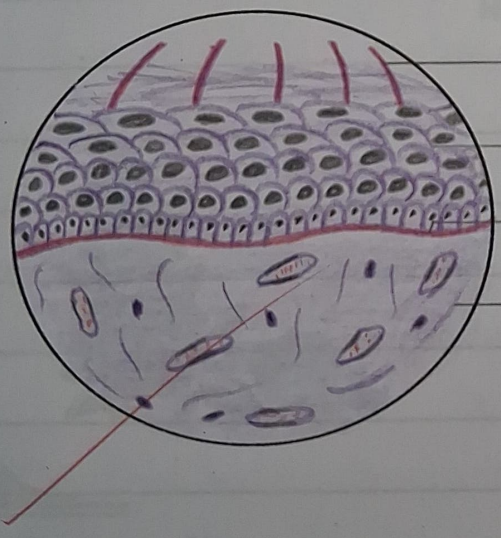
Basement Membrane : Magenta

5) Perl's Prussian Blue



- Keratin
- Stratified Squamous Epithelium
- Basement membrane
- Fibroblast
- Haemosidrin Pigment
- Collagen

6) Periodic acid-Sciff stain



- Candidal hyphae stained magenta colour
- Epithelium
- Basement membrane stained magenta colour
- Connective tissue

Study of Cells

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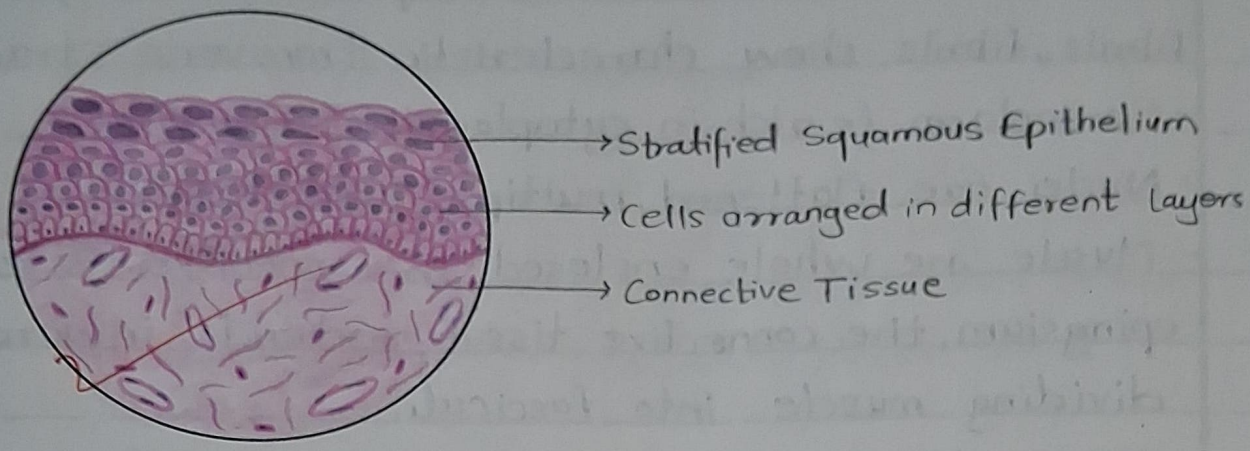
1) Stratified Squamous Epithelium:

- In stratified squamous epithelium, cells are arranged in different layers or strata.
- The basal cells are cuboidal in shape with central nucleus, arranged in single layer on basement membrane.
- The superficial cells are squamous or polyhedral in shape with centrally placed nucleus.
- All these cells are attached to each other by desmosomal junctions.

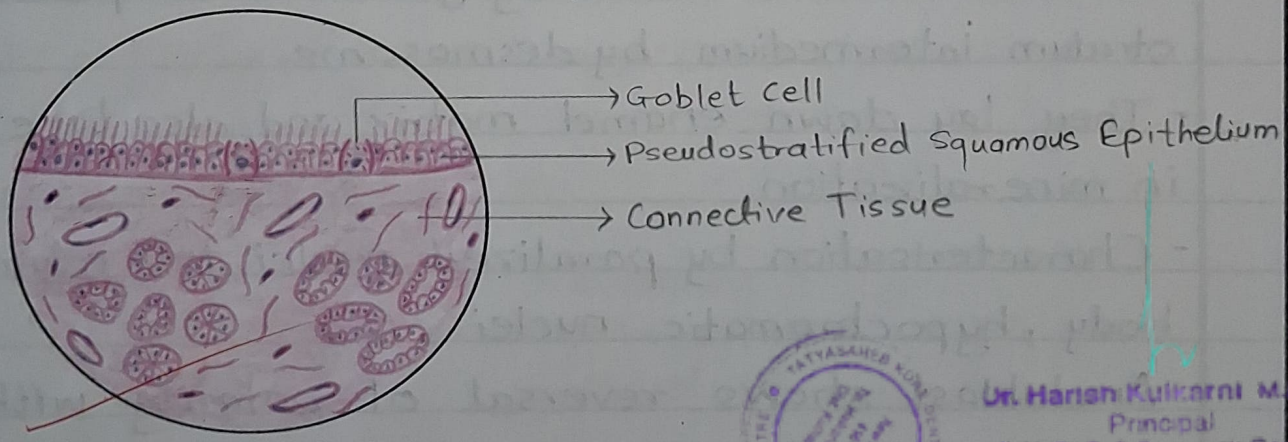
2) Pseudostratified Ciliated Columnar Epithelium:

- The cells of ciliated columnar epithelium are columnar shape of varying size arranged in single layer on basement membrane.
- The nuclei of cells are placed at different levels giving appearance of stratification.
- The cells on superficial aspect have cilia which help in movement of mucous secretion.
- Among columnar cells unicellular secretory organs called goblet cells are also noticed.
- Goblet cells are goblet shaped with basally placed nucleus and apical cytoplasm filled with secretory products.

1. Stratified Squamous Epithelium



2. Pseudostratified Squamous Epithelium



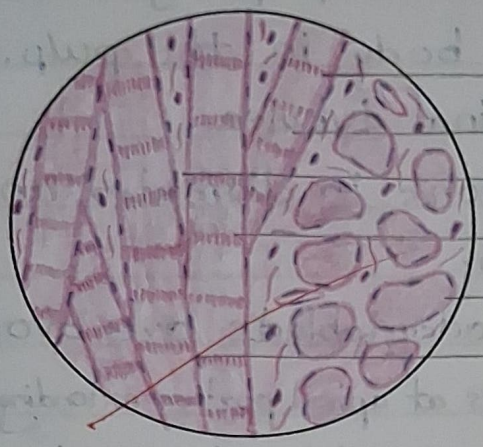
3) Striated Muscles:

- Striated muscle is seen as highly eosinophilic cylinder like structure in hematoxylin and eosin stains.
- Each muscle like fibre is composed of many myofibrils, fibrils show characteristic transverse straitions.
- Sarcoplasm is rich in cytoplasmic organelles.
- Nuclei are flattened, multiple & are located at periphery
- Muscle are whole enclosed in connective tissue called epimysium, the connective tissue extends inwards dividing muscle into fasciculi.
- This extensions are called perimysium from which again septa extend that invests individual muscle fibers

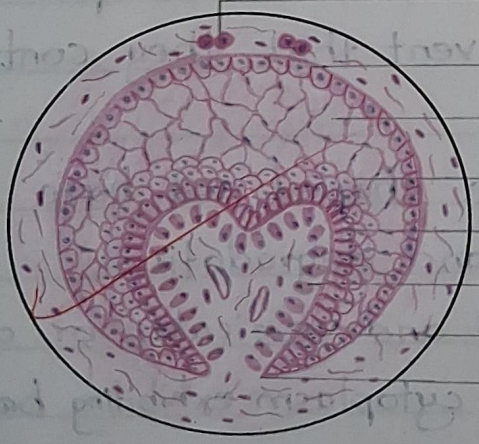
4) Ameloblasts:

- The cells are derived from inner epithelium 4-5 in diameter and 10 um in height.
- Attached to one other by junction complex to stratum intermedium by desmosome.
- They lay down enamel matrix and also take part in mineralization.
- Characterisation by paralized nuclei, tall columnar body, hypochromatic nuclei.
- Ameloblast shows reversal of polarity with nucleus located at proximal end (away from basement membrane)

3. Striated Muscle



4. Ameloblast



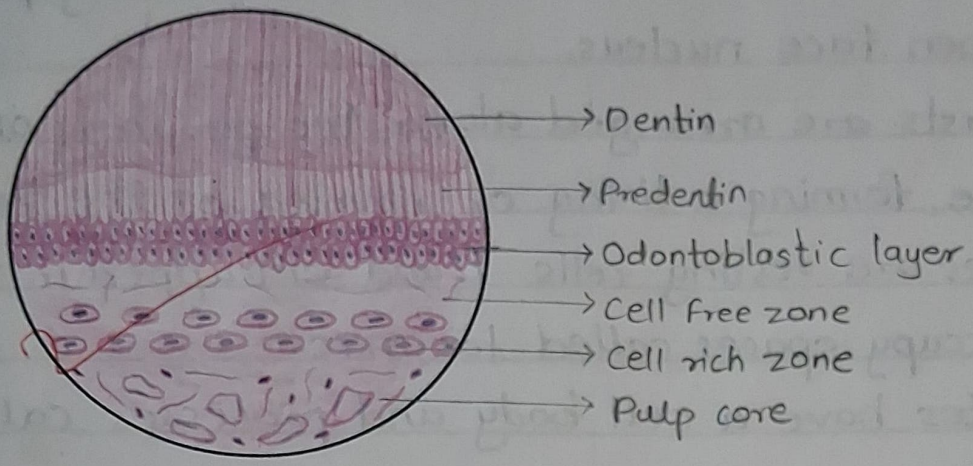
5) Odontoblast

- Odontoblasts are the cells which form dentin.
- These cells are of dental papilla of the tooth germ.
- Odontoblasts are located in the pulp adjacent to the predentin with the cell body in the pulp. and cell processes in the dentinal tubules.
- These cells are 5 to 7 microns in diameter and 25 to 40 microns in length.
- In the root region the odontoblasts are ovoid or spindle shaped. Have process at apical portion extending ind. tub
- They are tall columnar in cortical region, cuboidal in cervical length and flattened in radicular dentin.

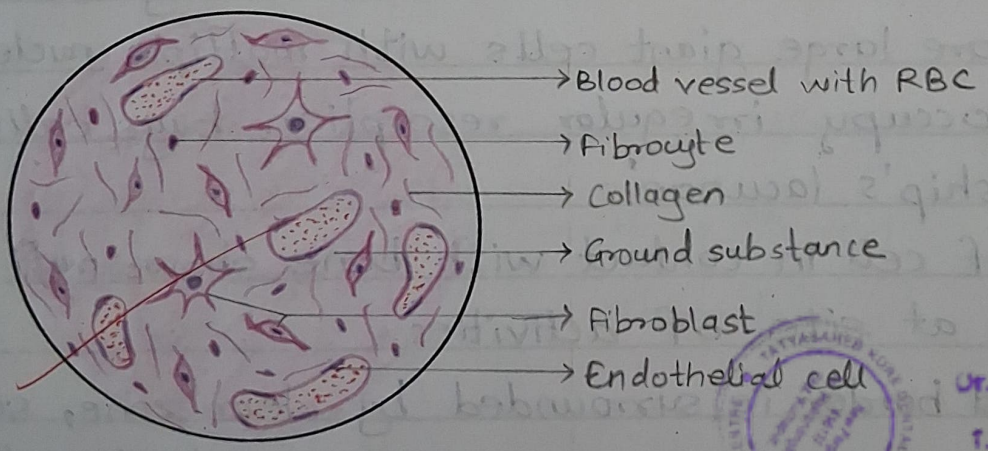
6) Fibroblast, Fibrocyte and Endothelial Cell:

- These are most numerous cells of the pulp. Their function is formation of collagen fibres.
- They are stellate shaped with extensive process of electromagnetic group event that they contain abundant mitochondria.
- Old fibroblast are spindle shaped and have dual function of synthesis and degradation.
- Fibroblast has large, round and vesicular or open form of nucleus & abundant cytoplasm exhibiting basophilia
- fibrocytes are spindle shaped with flat deeply staining, close face nucleus.
- Both are arranged parallel to collagen fibrers.

5. Odontoblast



6. Fibroblast, Fibrocyte and Endothelial Cells



7) Osteoblast, Osteocyte

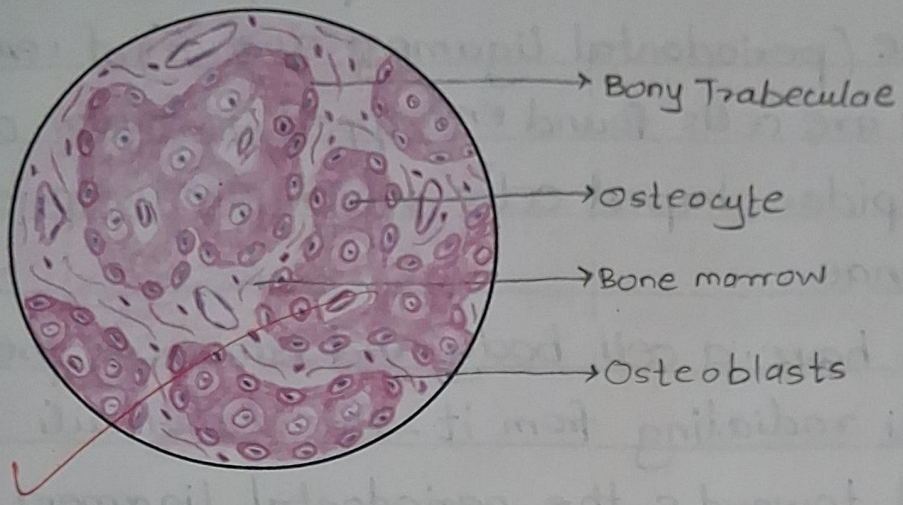
Osteoblasts are synthetic cells of bone that help in formation of bone, by matrix deposition and mineralization.

- They are cuboidal or ovoid cells with centrally placed ovoid open face nucleus.
- Osteoblasts are arranged along the periphery of bony trabeculae, forming a lining or rimming of the trabeculae
- Osteocytes are resting cells found entrapped in the bo
- They occupy spaces called lacunae.
- Osteocytes have a cell body and processes called canaliculi.
- Cells are ovoid or flat with close faced nucleus and scanty cytoplasm.

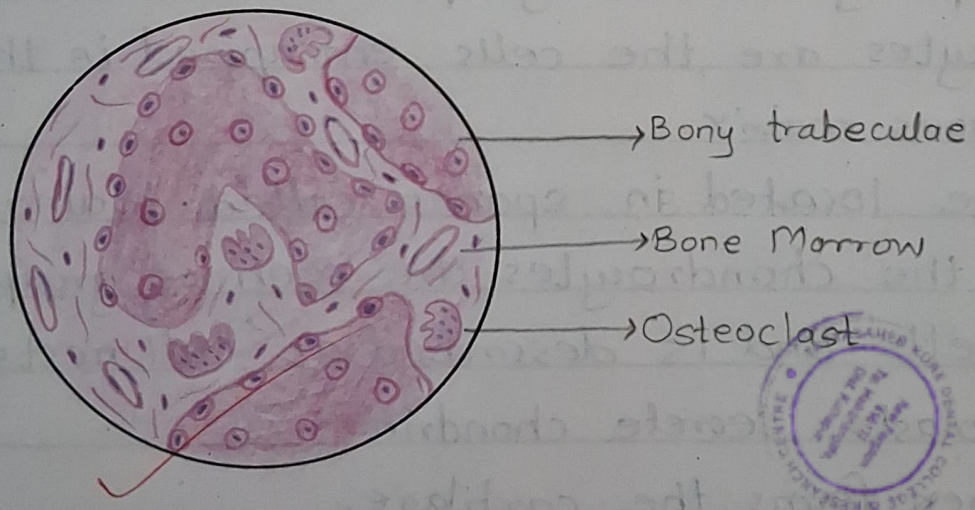
8) Osteoclasts

- Osteoclasts are the cells which resorb the bone.
- Osteoclasts are derived from circulating monocytes.
- They are large giant cells with multiple nuclei.
- They occupy irregular resorption bays called 'Howship's lacunae'.
- Part of cell in contact with bone shows ruffled border at site of activities.
- Ruffled border is surrounded by clear zone, some of them having no organelle but only has fine granules cytoplasm with microfilaments.
- They are derived from circulating monocytes and also they are large giant cells.

7. Osteoblasts, Osteocytes.



8. Osteoclasts



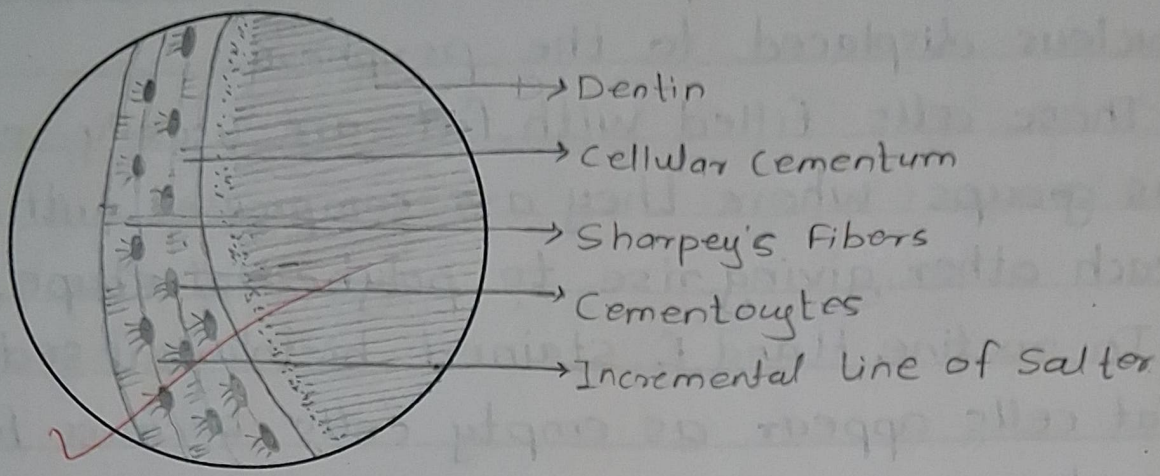
9) Cementocytes

- Cementoblasts are cells forming cementum and are derived from dental follicle of tooth germ.
- These cells are cuboidal in shape and line the outer surface (periodontal ligament surface) of cementum.
- Cementocytes are cells found entrapped in cellular cementum
- They are spider shaped cells which lie in spaces called lacunae.
- These cells have a cell body and numerous processes or canaliculi radiating from it. The canaliculi are directed towards the periodontal ligament which is the source of their nutrition.

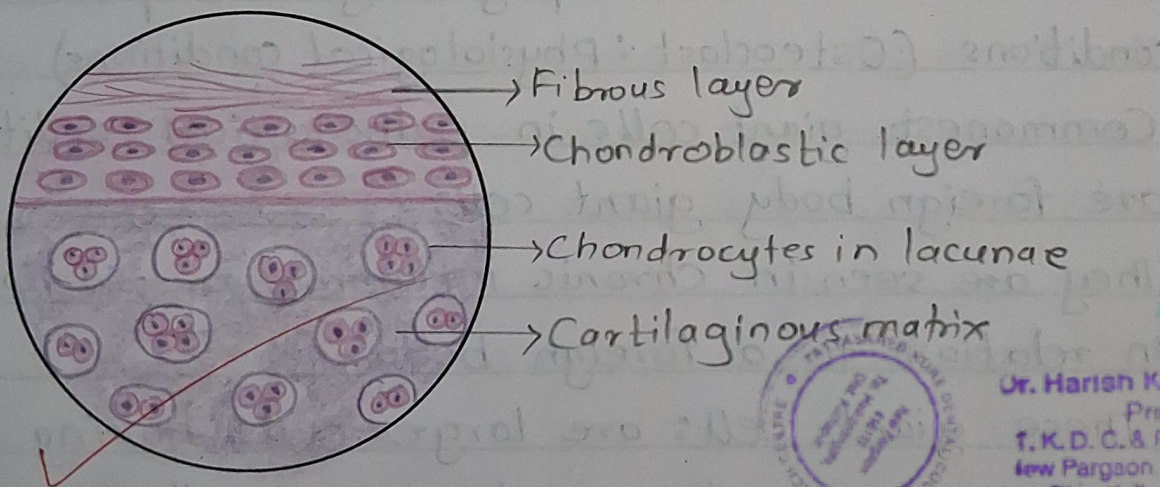
10) Chondroblasts and Chondrocytes

- Chondroblasts are cartilage forming cells. They appear as flattened or epithelial cells and are located at the periphery of cartilage parallel to the surface.
- Chondrocytes are the cells entrapped in the cartilaginous matrix.
- They are located in spaces called lacunae.
- Usually the chondrocytes are seen as groups of 2-4 cells and is described as 'cell nests'.
- Chondroblasts secrete chondrin.
- It it then forms the cartilage.

9. Cementocytes



10. Chondrocytes and Chondroblasts



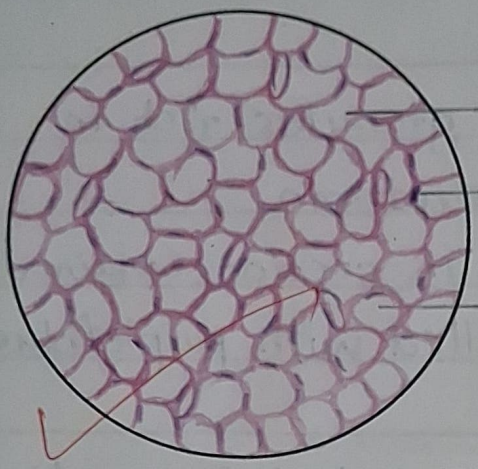
11) Adipose cells

- These are the cells those synthesize and store fat.
- These cells are spherical or ovoid with a flattened nucleus displaced to the periphery.
- These cells filled with fat are usually seen as groups where they are compressed with each other giving rise to polyhedral shape.
- In routine H and E stained histological sections fat cells appear as empty cells because fat is dissolving during processing.
- Fat cells are stained by a special stain called Sudan III.
- Fat cells are distributed in the submucosal tissue.

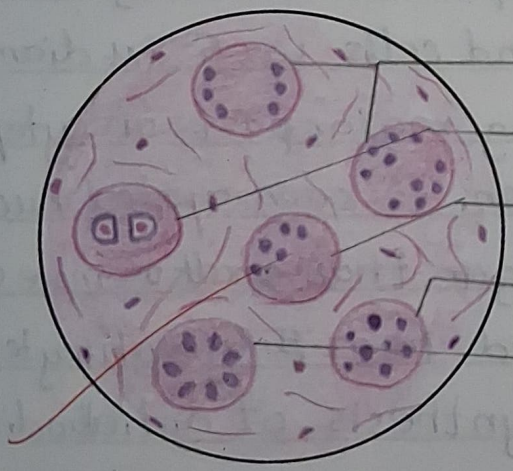
12) Giant Cells

- Large and/or multinucleated cells are called giant cell
- Giant cells can be seen physiological or pathological conditions. (Osteoclast : Physiological conditions)
- Commonest giant cells in pathological conditions are foreign body giant cells.
- They are seen in chronic inflammatory reactions in relation to a foreign body.
- These giant cells are large cells having multiple nuclei dispersed in the cytoplasm.

11. Adipose Cells



12. Giant Cells



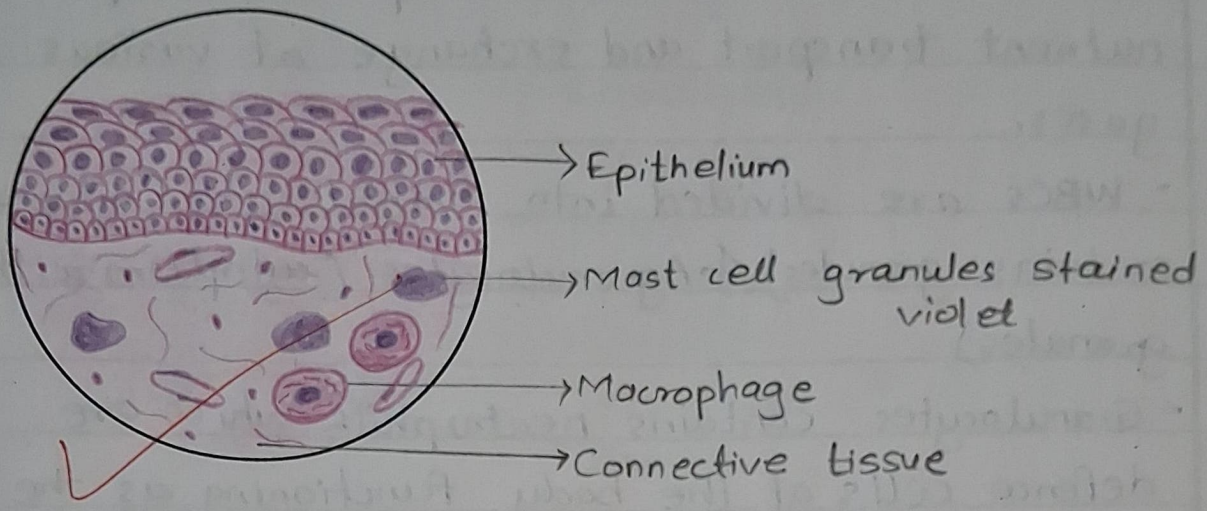
13) Macrophages, Mast Cell

- Mast cells are connective tissue cells, widely distributed in the oral mucosa.
- Mast cells are round or oval with small centrally placed nucleus.
- The cytoplasm contains granules rich in histamine, heparin and serotonin.
- These cells can be seen in sections stained by toluidine blue as cells filled with purple/blue violet coloured coarse granules.
- Mast cells are concerned with inflammation and immune response.

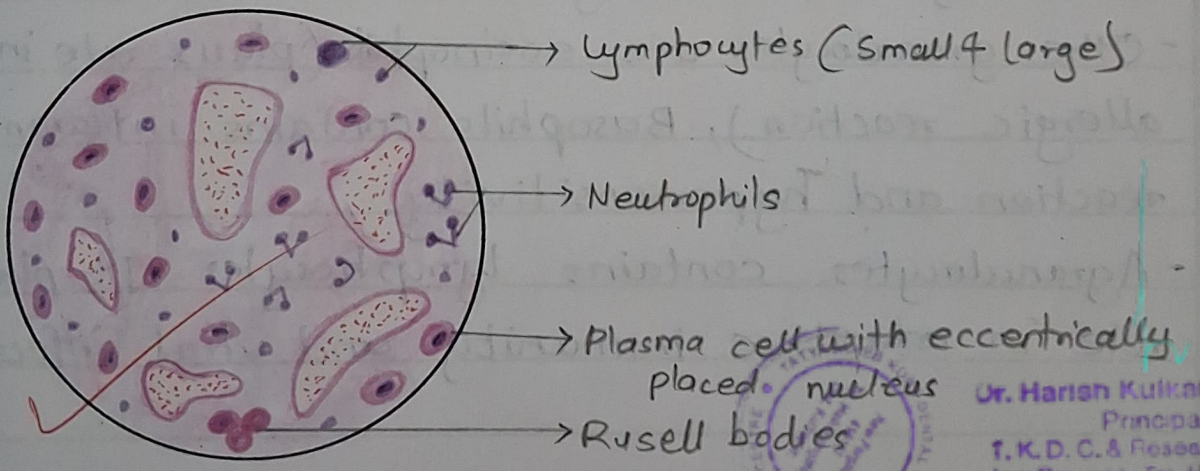
14) Lymphocytes, Plasma Cells

- Lymphocytes are defence cells of the body belonging to the group of chronic inflammatory cells.
- Lymphocytes can be large / small according to size.
- Small lymphocytes are round cells w. 6-8μ diameter.
- Nucleus is round occupying major part of cytoplasm.
- Only a thin rim of cytoplasm is seen around nucleus.
- Large lymphocytes are larger than small w. more cytopla
- Plasma cells are derived from B lymphocytes & are specialized for the synthesis of antibodies, thereby imparting resistance to the body against diseases.
- They are oval in shape w. basophilia of cytoplasm and eccentric, oval or round nucleus.

13. Macrophage, Mast Cell



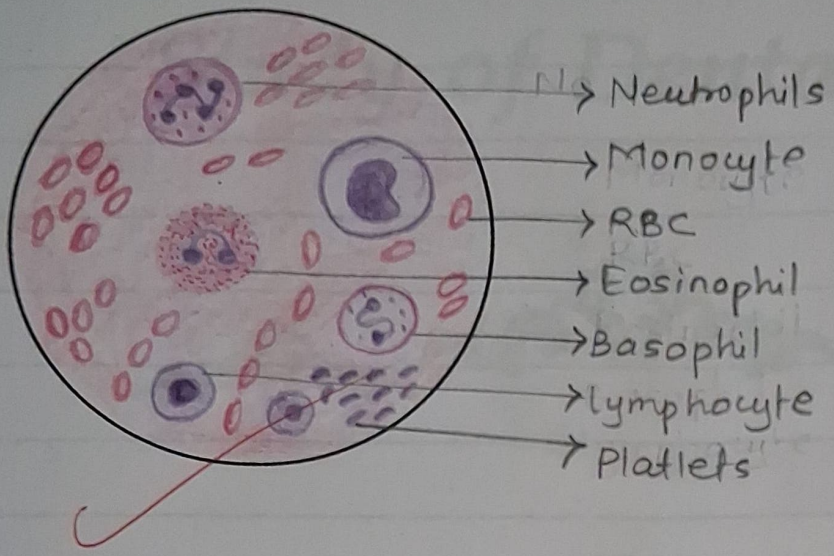
14. Lymphocytes, Plama cells.

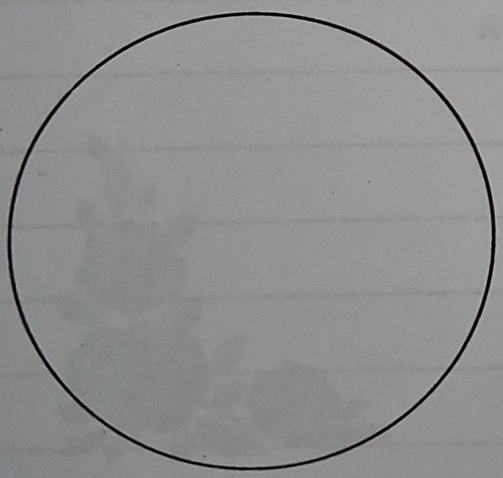


15) Peripheral Blood Smear

- It is used to evaluate different type of blood cells like RBCs, WBCs and platelets.
- RBCs are biconcave in shape and help in nutrient transport and exchange of various gases.
- WBCs are divided into Granulocytes (cytoplasm contains granules) & Agranulocytes (cytoplasm without granules).
- Granulocytes contains neutrophils which are defence cells of the body functioning as the first line of defence against invading microorganisms.
- They are active in acute infections and thereby belong to group of aute inflammatory cells.
- Neutrophils are 7 to 9 microns in diameter, have 3-5 lobes of nuclei & cytoplasmic granules, containing various enzymes.
- Othe granulocytes are eosinophils (plays role in allergic reaction), Basophils contains inflammatory reaction and hypersensitivity.
- Agranulocytes contains lymphocytes. It plays role in adaptive immunity and viral infection.

15. Peripheral Blood Smear





Study of Dental Caries

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Enamel Caries

Caries in pit and fissures spread in a triangular pattern with the base towards the dentinoenamel junction and apex towords surface.

- In smooth surface caries spread follows a triangle pattern, the base is towards the surface of enamel and apex towards the DEJ.

- Microscopically both shows four zones:

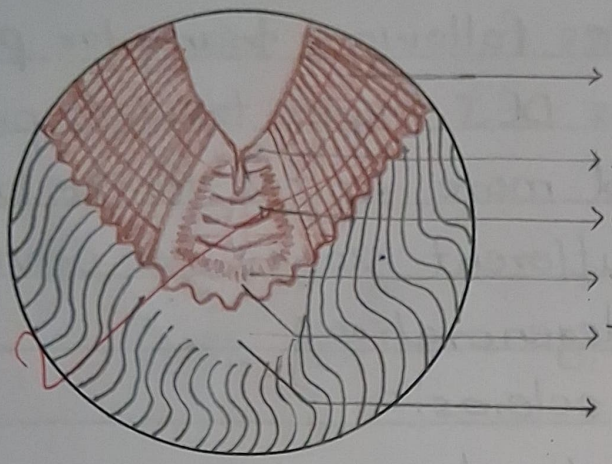
1. Translucent zone: This zone is the innermost zone at the advancing end of the caries. This zone is not always present.

2. Dark zone: is the zone immediately above the translucent zone and this appears slightly dark in the section. Dark zone is always present & shows positive birefringence under polarized light.

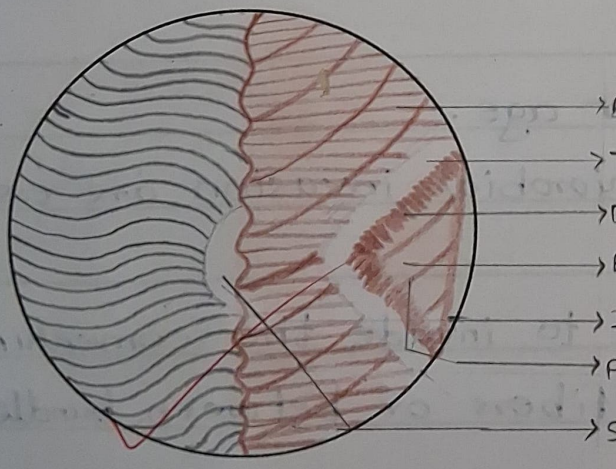
3. Body of the lesion: This zone occupies the major pattern/portion of caries lesion and this is the area of maximum demineralization. In this zone striae of Retzius appears more prominent.

4. Surface zone: This is the intact zone of 40 microns thickness at the surface of enamel caries lesion.

Enamel Caries (Pit & fissure)



Enamel Caries (Smooth Surface)



Dentinal Caries

- Once the caries process spreads to dentin, the microorganisms invade the dentinal tubule and release acids.
- The spread of caries follows a triangular pattern w. the base towards DEJ & apex towards pulp.
- Apex will be located more apical to the base
- Microscopically 5 different zones are seen

1. Zone of fatty degeneration
2. Zone of dentinal sclerosis
3. Zone of demineralization
4. Zone of decomposed dentin
5. Zone of bacterial invasion

Cemental Caries

- It is soft progressive lesion that is found anywhere on root surface that has lost connective tissue attachment.
- Mostly found in older age.
- Dental plaque and microbial invasion are essential cause of progression.
- Microorganism appear to invade the cementum either along Sharpey's fibers or between bundle of fibres.
- Commonly affected teeth are premolar and maxillary canine.

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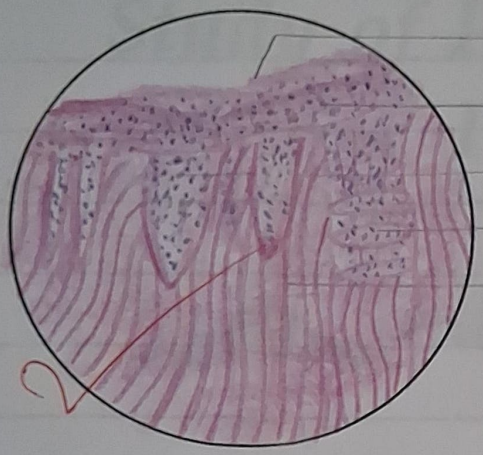
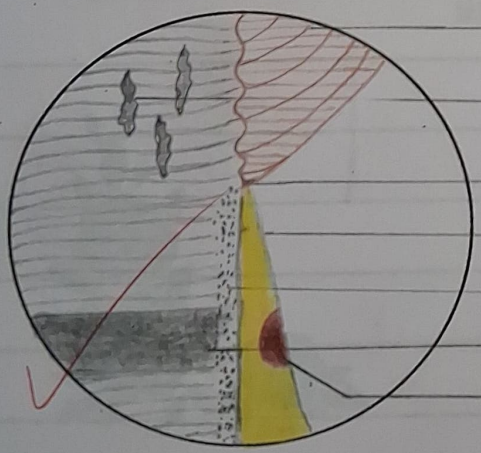
Dentinal Caries



- Decomposed dentin
- Microorganisms in dentinal tubules
- Miller's foci of liquefaction Degeneration
- Transverse cleft
- Dentin

Cemental Caries



- Enamel
- Interglobular Dentin
- Cementoenamel Junction
- Cementum
- Tome's Granular Layer
- Dead Tracts
- Cemental caries

Study of Pulp & Periapical Diseases

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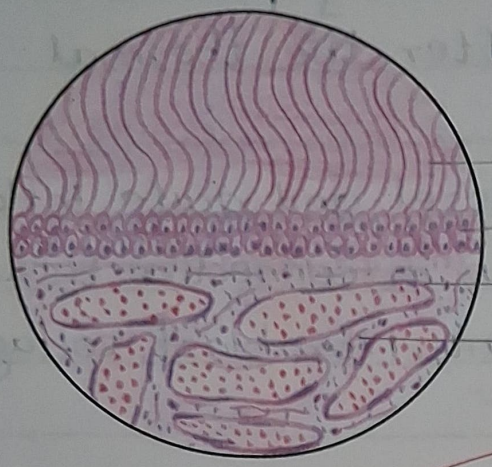
1. Pulp Hyperemia (Focal Reversible Pulpitis)
- Acute inflammatory reaction in pulp limited to the coronal pulp.
- It is characterized by multiple dilated blood vessels filled with RBCs.
- Pulp may also show edematous changes, extravasation of RBCs and a few inflammatory cells.
- Thrombus may be due to haemoconcentration due to transduction of fluid from vessels.
- Self strangulation of pulp may occur as a result of increased atrial Pressure occluding vein of apical foramen.

2. Acute Pulpitis with Abscess formation
- An abscess is localized collection of pus which consist of healthy granulation tissue.
- It is seen as an empty space surrounded by inflammatory cells.
- Acute inflammatory cells are seen in fibrocellular connective tissue in pulp.
- There may be localized destruction of pulpal tissue and formation of pulp abscess.
- Pulp abscess contains pus arising from break-down of leukocytes, bacteria and tissue.
- Adjacent pulpal tissue may show hyperemic changes

Pulp Hyperemia (Focal Reversible Pulpitis)



Acute Pulpitis with Abscess formation

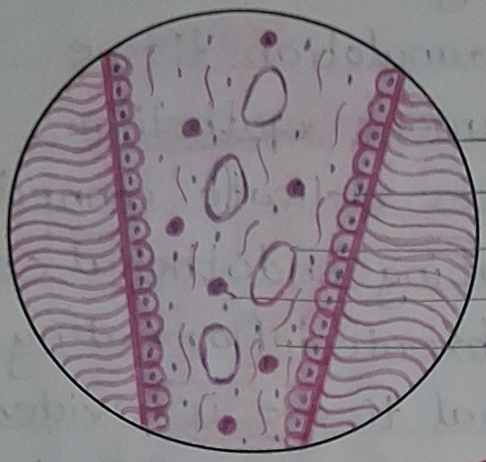
3. Acute Pulpitis

- It is an intermediate sequelea of focal irreversible pulpitis characterized by presence of pain that persist even after the thermal stimulus disappeared.
- Enlarged dilated blood vessel and acute inflammatory cells can be seen in connective tissue.
- Normal pulpal tissue element, fibroblast, collagen fibers are also seen.

4. Chronic Pulpitis

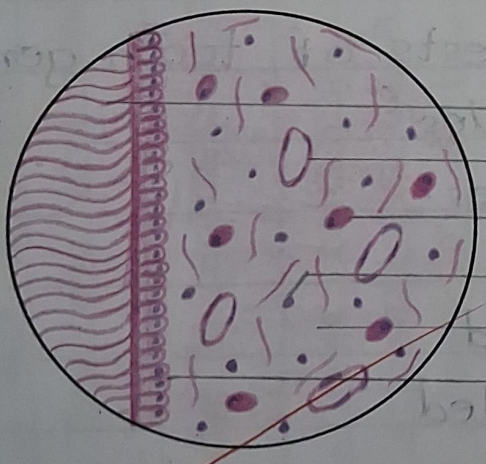
- It is long standing inflammation of dental pulp characterized by presence of chronic inflammatory cells can be seen in connective tissue, pulp abscess, formation and degeneration of odontoblasts.
- Dilated blood vessels are also seen in connective tissue.
- Infiltration of chronic inflammatory cells, predominantly lymphocytes and plasma cells.
- May resembles granulation tissue.

Acute Pulpitis



- Dentin
- Odontoblast
- Dilated Blood vessel
- Acute inflammatory cell
- Fibrocellular connective tissue

Chronic Pulpitis



- Dentin
- Prominent Blood vessels
- Plasma cell
- Lymphocytes
- Fibrous connective tissue
- Odontoblast

5. Chronic Hyperplastic Pulpitis (Pulp Polyp)

- It is condition seen in younger individual due to high tissue reactivity.
- Pulp polyp present as granulation tissue covered by stratified squamous epithelium.
- Granulation tissue comprises delicate connective tissue exhibiting proliferating endothelial cells, budding capillaries and chronic inflammatory cells.
- Continuity with the pulpal tissue is evident which also shows inflammatory cell infiltration.
- Inflammatory cells infiltrate : lymphocytes & plasma cell

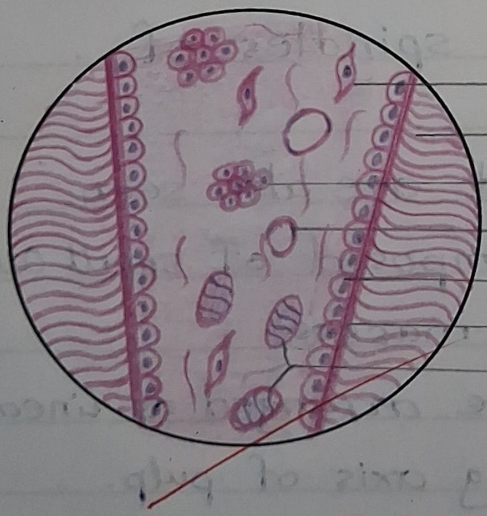
6. True Pulp Stone

- These are masses of calcified tissue also called as 'True Denticles'.
- They arises from cell rests of tooth germ and shows dentinal tubules.
- They are of three types:
  1. Free
  2. Attached
  3. Embedded

Pulp Polyp

- Stratified squamous epithelium covering the polyp
- Carious tooth
- Granulation tissue
- Pulpal tissue

True Pulp Stone



- Fibroblast
- Dentin
- Undifferentiated Mesenchymal cells
- Blood vessel
- Odontoblast
- Predentin
- True pulp stone

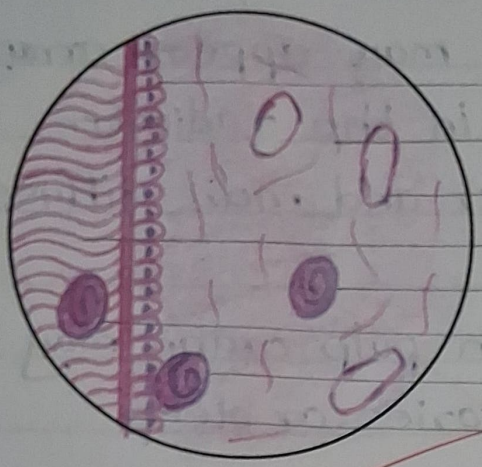
7. False Pulp Stone

- False denticles are localized masses of calcified tissue having a laminated structure made of concentric layers of calcium deposited around a central nidus, which could be dead cells.
- They do not have a tubular structure or structural resemblance to dentin.
- They are larger than the true denticles and may fill the entire pulp chamber
- Types : free pulp stone
  Attached pulp stone
  Embedded pulp stone

8. Diffused Calcification:

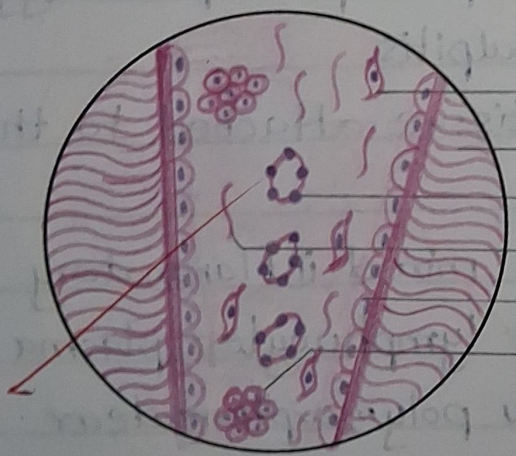
- These areas may seen in pulpal tissue along with collagen fiber bundles.
- They appear as linear spindles of calcification material.
- Degenerated Odontoblast are also seen.
- Diffuse calcification is composed of small calcified particles with a few layer masses
- The calcified structures are arranged as linear strands parallel to the long axis of pulp.
- They are found to be closely associated with blood vessels with an orientation parallel to the vessels and nerve. Seen only in radicular pulp.

False Pulp Stone



- Odontoblast
- Collagen
- Blood vessel
- Dentin
- Free Pulp stone
- Embedded Pulp Stone
- Attached Pulp stone
- Predentin

Diffused Calcification



- Fibroblast
- Dentin
- Diffused Calcification
- Collagen
- Odontoblast
- Undifferentiated Mesenchymal Cells

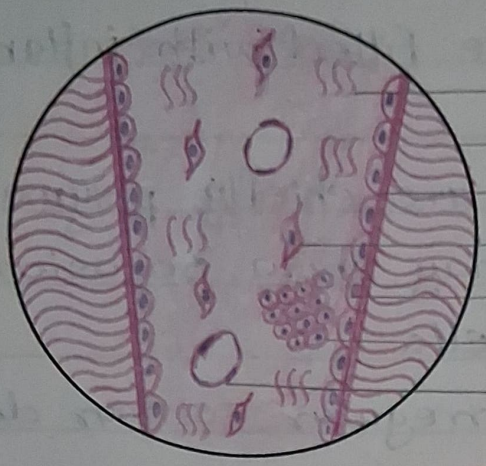
9. Pulp fibrosis:

- In the aging pulp, accumulation of diffused fibrillar component of wall as well as bodies of collagen fiber may appear arranged longitudinally in bundle in the radicular pulp in a random manner and more diffusely arranged in coronal pulp.
- The increase in fiber in pulp organ may be due to trauma, dental caries or deep restoration.
- Localized fibrosis may occur as a scaring effect.

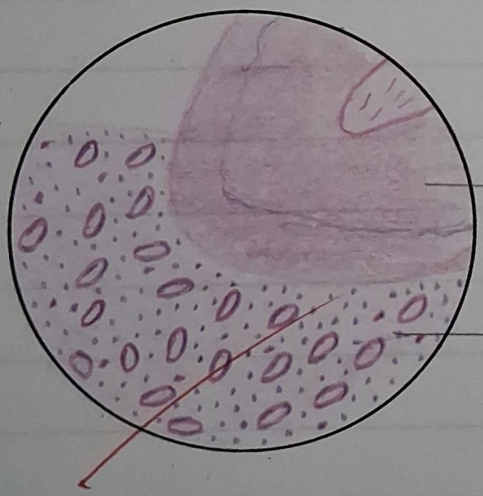
10. Periapical Granuloma (Chronic Apical Periodontitis)

- It is one of the common periapical pathology seen in associated with pulpitis.
- It comprises granulation tissue attached to the root apex.
- Granulation tissue exhibits mixed inflammatory cell infiltrate consisting of lymphocytes, plasma cells, histiocytes and a few polymorphonuclear leukocytes. A few giant cells, cholesterol clefts, Russell bodies and a few epithelial cell rests of Malassez are also seen in granulation tissue.

Pulp Fibrosis



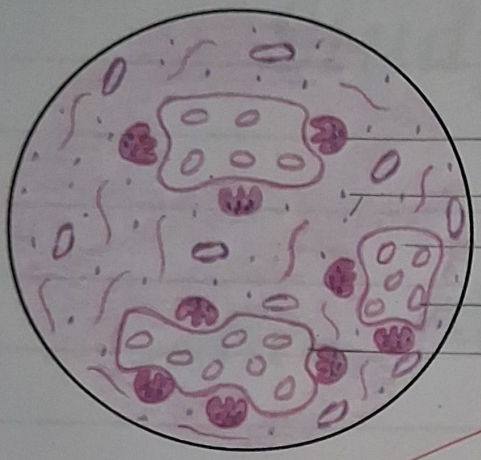
Periapical Granuloma



11. Osteomyelitis:

- Osteomyelitis is an inflammation of bone and bone marrow contents.
- The medullary spaces are filled with inflammatory exudate.
- The inflammatory cells are chiefly polymorphonuclear leukocytes, but may show occasional lymphocytes and plasma cells.
- Bone trabeculae shows irregular contour due to osteoclast resorption.

Osteomyelitis



→ Osteoclast
→ Inflammatory Cells
→ Empty space
→ Empty lacunae
→ Necrotic bone having irregular margin