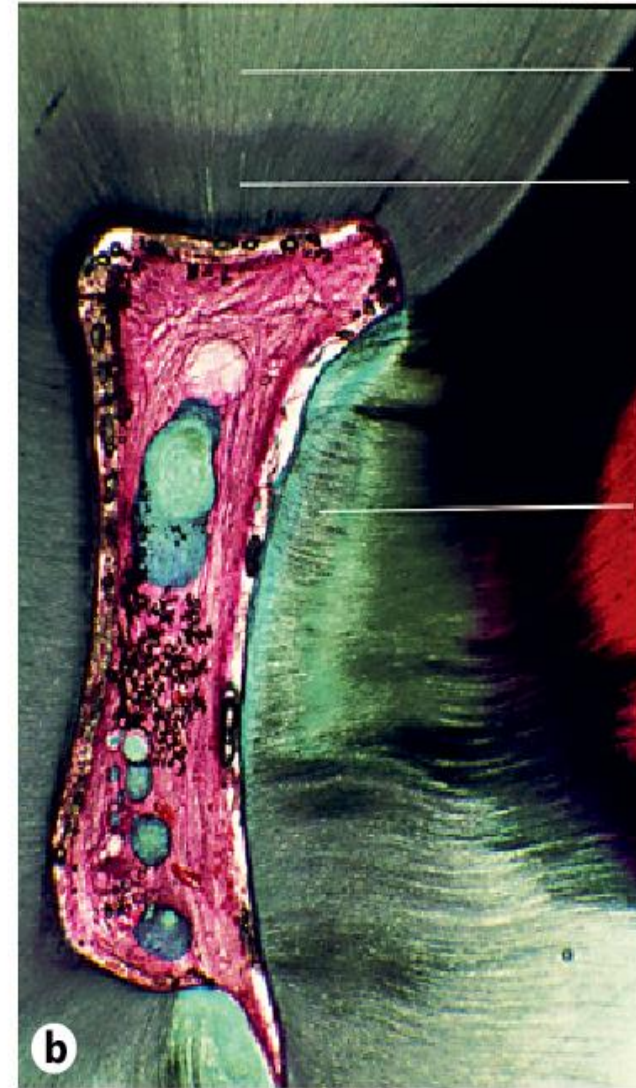


Oral Pathology

Lab (2)

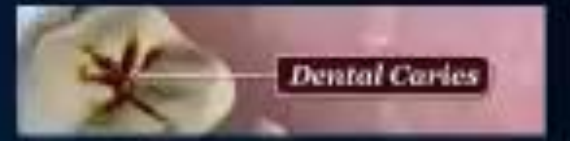
4th stage



Primary dentine

Secondary dentine

Tertiary dentine



Dental Caries



DEFINITION

Dental caries is an infectious microbial disease of the tooth that results in localized destruction and dissolution of calcified tissues.





Dental caries is commonly known as tooth decay.

In the minds of the lay person, and surprisingly even within dentistry, dental caries is often thought of as **holes in the teeth** rather than an **entire disease process.**



AETIOLOGY

- Four major factors involved in etiology:-
- Cariogenic bacteria
- Bacterial plaque
- Susceptible tooth surface
- Fermentable bacterial substrate (sugar)

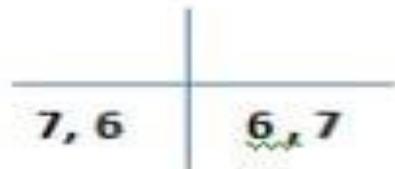


N.B

- **Bacteria** : St. mutans (initiation)
Lactobacilli (Progression)
- Actinomycetes (root caries)
- **Diet** : fermentable CHO
- **PH** : below 5.5 (acidic medium)

Susceptibility of dental caries

The most susceptible



The least susceptible



Then comes after:



Dental Caries

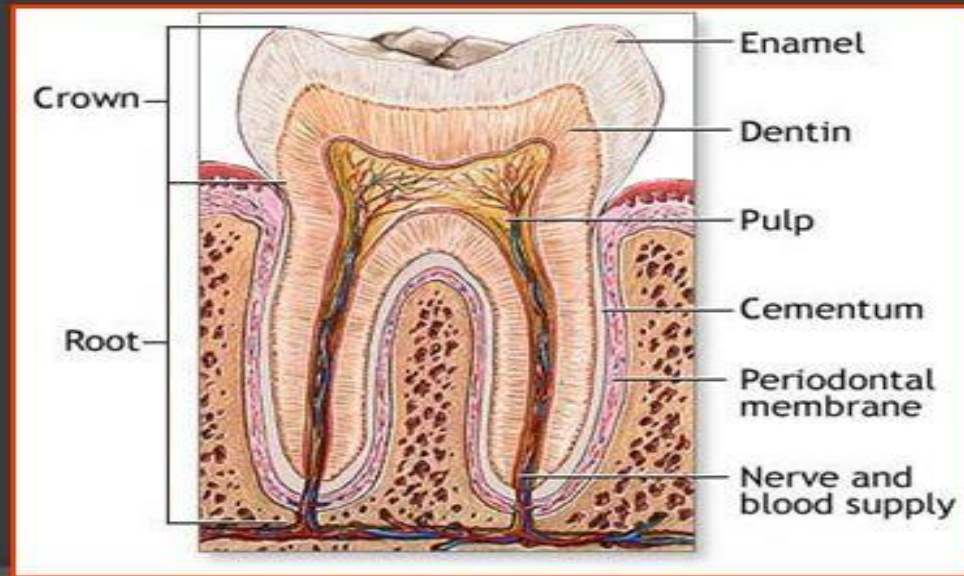
Enamel Caries

Dentin Caries

Cementum Caries
(Root caries)

Smooth surface caries

Pit and fissure caries

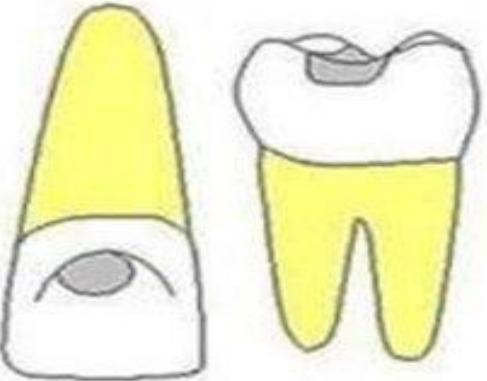
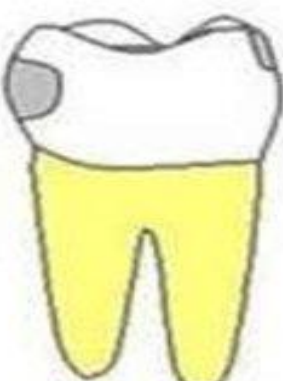
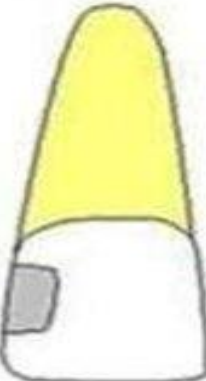

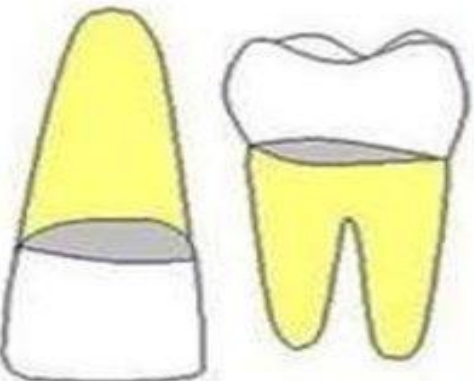


Classification of dental caries

6. Based on the presence of complications:

- -simple
- -complicated

7. Black's classification

Class I	Class II	Class III	Class IV	Class V
 Two diagrams illustrating Class I caries. The first shows a cross-section of a tooth with a cavity on the smooth surface of the crown. The second shows a cross-section of a tooth with a cavity on the smooth surface of the root.	 A diagram illustrating Class II caries, showing a cross-section of a tooth with a cavity on the proximal surface (between the teeth) of the crown.	 A diagram illustrating Class III caries, showing a cross-section of a tooth with a cavity on the proximal surface of the crown that extends into the incisal edge.	 A diagram illustrating Class IV caries, showing a cross-section of a tooth with a cavity on the proximal surface of the crown that extends into the incisal edge and also involves the root.	 Two diagrams illustrating Class V caries. The first shows a cross-section of a tooth with a cavity on the smooth surface of the root. The second shows a cross-section of a tooth with a cavity on the smooth surface of the crown.



CLINICAL

Symptoms and Signs

Caries initially involves only the enamel and produces no symptoms. A cavity that invades the dentin causes pain, first when hot, cold, or sweet foods or beverages contact the involved tooth, and later with chewing or percussion. Pain can be intense and persistent when the pulp is severely involved.



CLINICAL SIGNIFICANCE

- Pulp involvement?
- Reversible or irreversible pulpitis?
- Spread?



Theories

Chemicoplastic theory
(Miller w.D.1980)

Proteolytic theory
(Bodeker C.F.1948)

Chelation theory
(shatz A etal 1957)

'See-saw'
mechanism

CHEMICAL (ACID) THEORY

- In 17th and 18th century, there emerged a concept that teeth are destroyed by acids formed in the oral cavity by fermentation of food particles around the teeth..

PARASITIC (SEPTIC) THEORY

- Microorganisms were associated with the carious process...



ACIDOGENIC THEORY

- W.D Miller was the first well known scientist and investigator of dental caries and published his results in 1882.
- According to him dental decay is a chemoparasitic process
- It is a two stage process there is decalcification of the enamel which also results in the destruction of the dentin. in the second stage there is dissolution of the softened residue of the enamel and dentin.

ACIDOGENIC THEORY

- In the first stage there is destruction is done by the acid attack where as the dissolution of the residue is carried by the proteolytic action of the bacteria's
- This whole process is supported by the presence of carbohydrates microorganisms and dental plaque



PROTEOLYTIC THEORY

The evidence given by the acidogenic theory was considerable but it was not conclusive, and alternative explanation was given in the form of proteolytic theory.

- Workers like "Heider, Bodecker (1878) and Abbott (1879) contributed considerably to this theory

- There has been evidence that the organic portion of the tooth plays an important role in the development of dental caries
- There are some enamel structures which are made of organic material such as enamel lamellae and enamel rods
- These structures prove to be the pathways for the advancing microorganisms.
- It has been established that enamel contains 0.56% of organic matter of which 0.18% is keratin and 0.17% is a soluble protein
- Microorganisms produce proteolytic enzymes, which destroy the organic matrix of enamel, loosening the apatite crystals....so they are eventually lost and tissue collapses...

PROTEOLYSIS CHELATION THEORY

Some of the minor flaws of the acidogenic and the proteolytic theory were addressed in the proteolysis chelation theory.

- *This theory was put forward by Schatz and his co-workers in 1955.*

CHELATION

It is a process in which there is complexation of the metal ions to form complex substance through coordinate covalent bond which results in:

*poorly dissociated /or
weakly ionized compound*

Example of chelation reaction:

Hemoglobin in which 4 pyrrole nuclei are linked to iron by a similar bond

- Chelation is independent of the PH of the medium.
- The bacterial attack on the surface of the enamel results in the breakdown of the protein, chiefly keratin and results in the formation of soluble chelates with calcium which decalcify enamel even at neutral PH..
- Mucopolysaccharides may also act as secondary chelators.

CARIES DETECTION METHODS

Visual
Examination

Radiographic
Examination

VISUAL EXAMINATION OF DENTAL CARIES

- The first clinical sign of caries: a *chalky and matte whitish surface*.
 - this white spot is a porous surface that can easily be stained into brown or black discoloration by chromogens from foods; thus, a caries lesion can be seen either as a white or as a brown/black spot lesion.
- MOST COMMON METHOD OF CARIES EXAMINATION.



TYPES OF DENTAL CARIES

- Gv blanks classification of caries class I , II , III , IV , V and VI
- Rampant caries
- Recurrent caries
- Arrested caries
- Root or cemental caries
- Baby bottle caries

Pits and fissure caries



Cervical caries



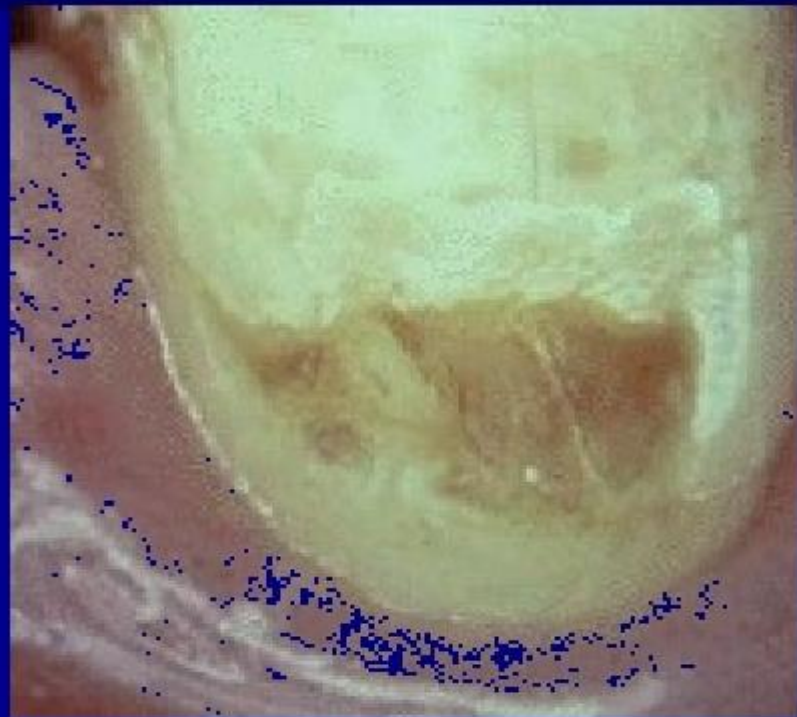
Rampant caries



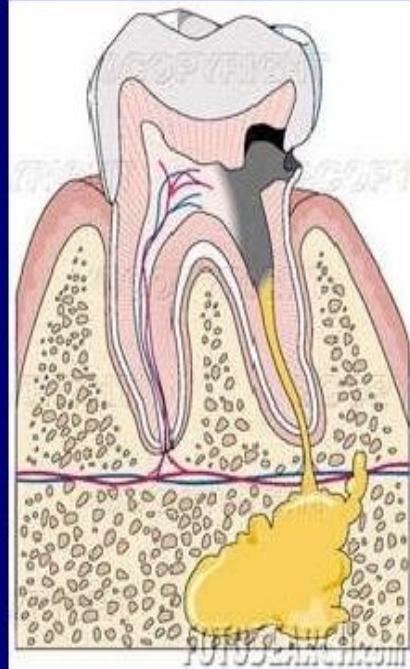
Recurrent caries



Arrested caries

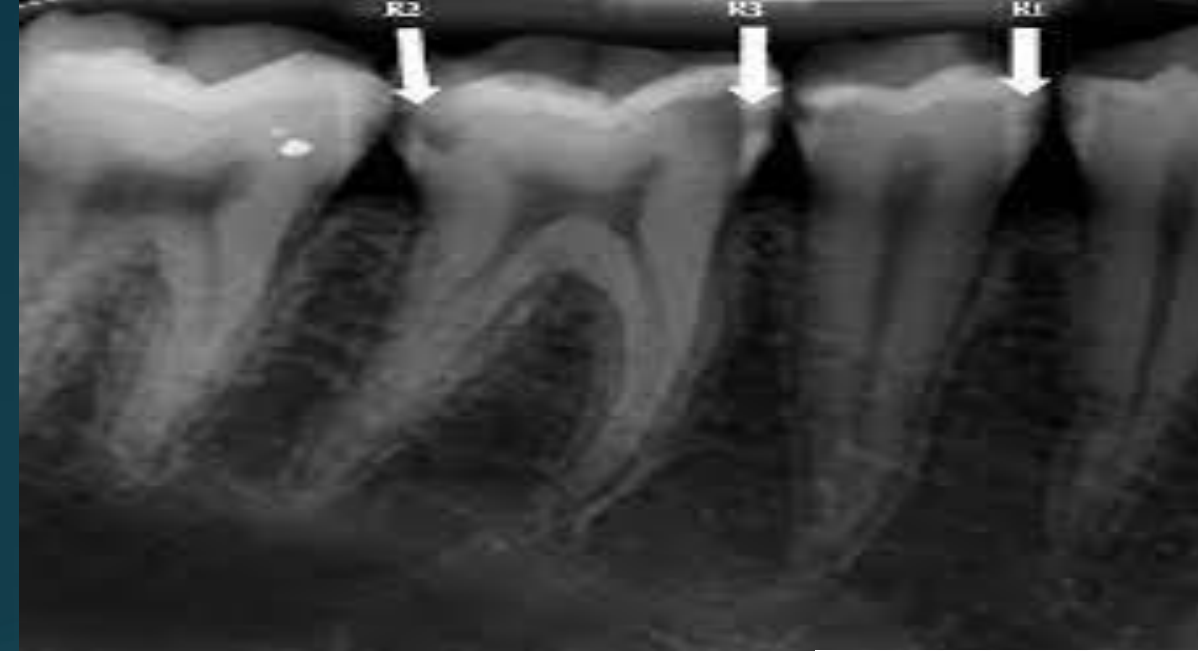


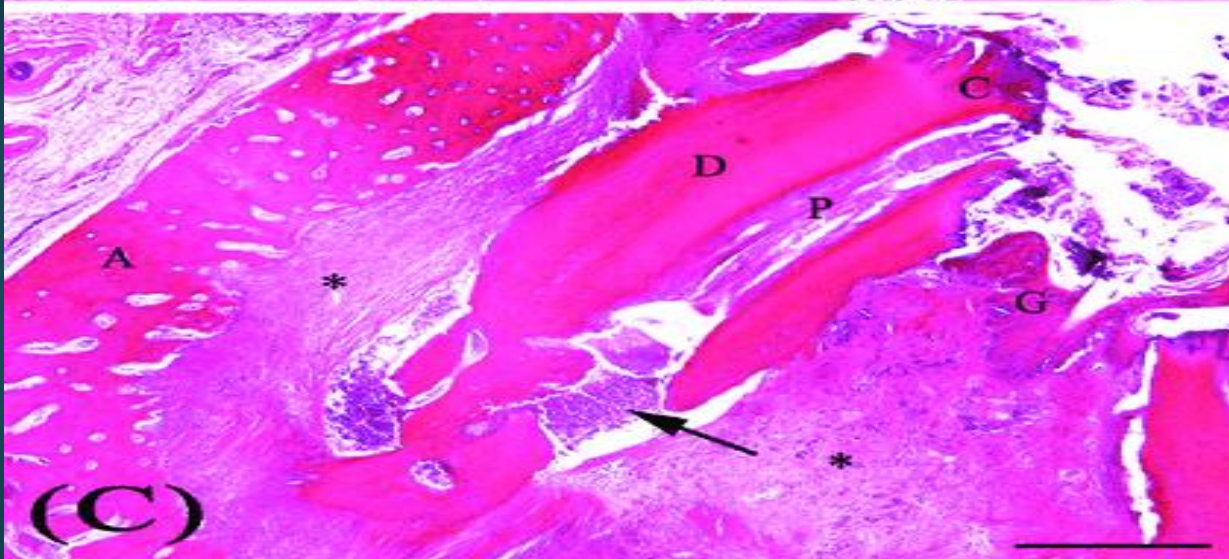
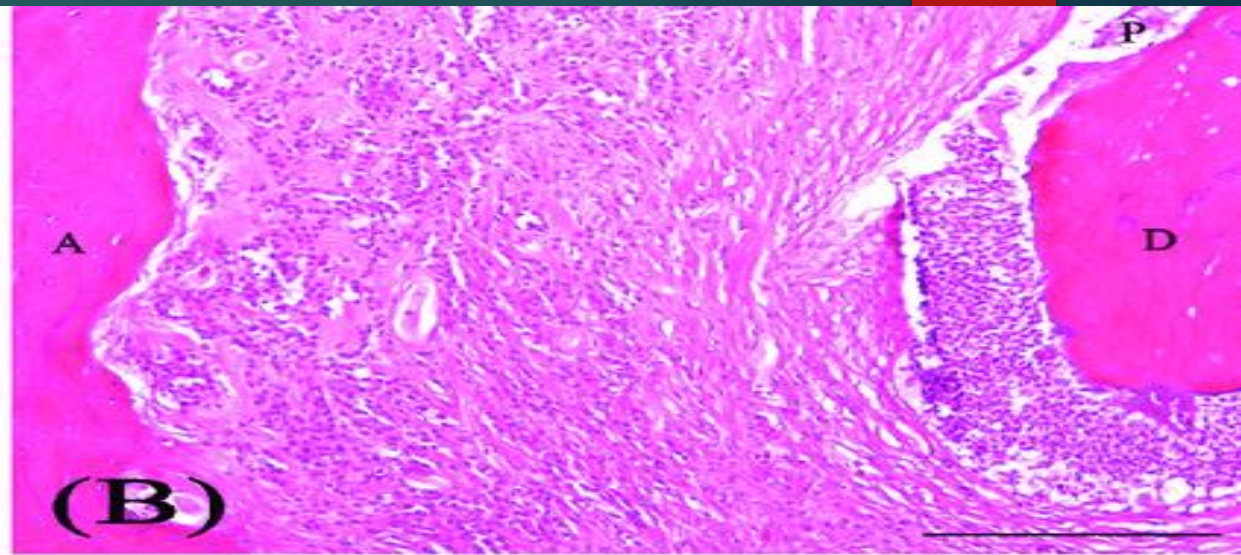
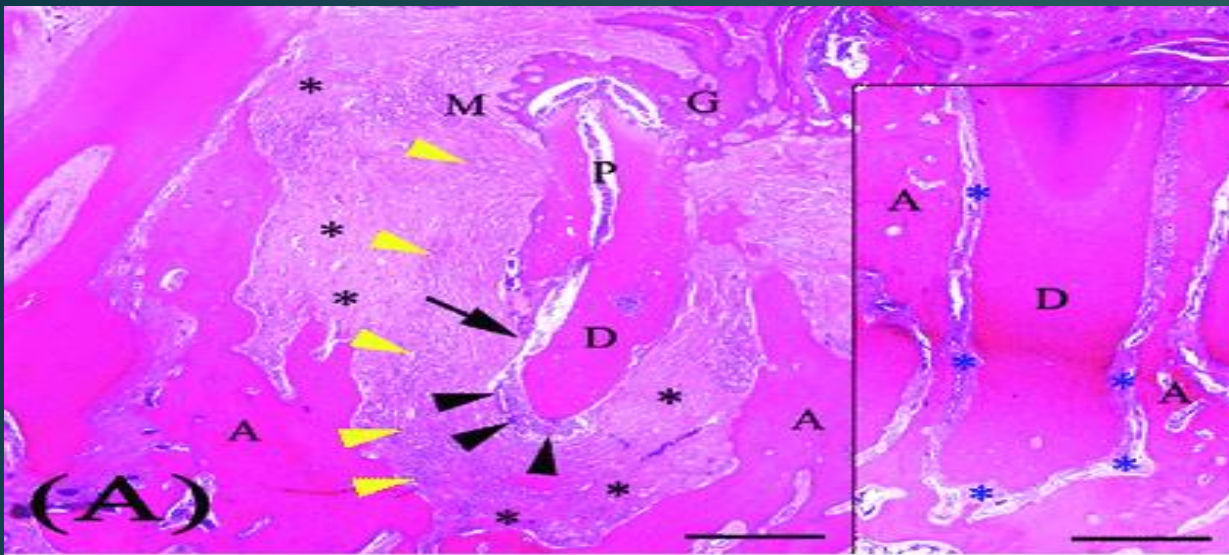
Root or cemental caries



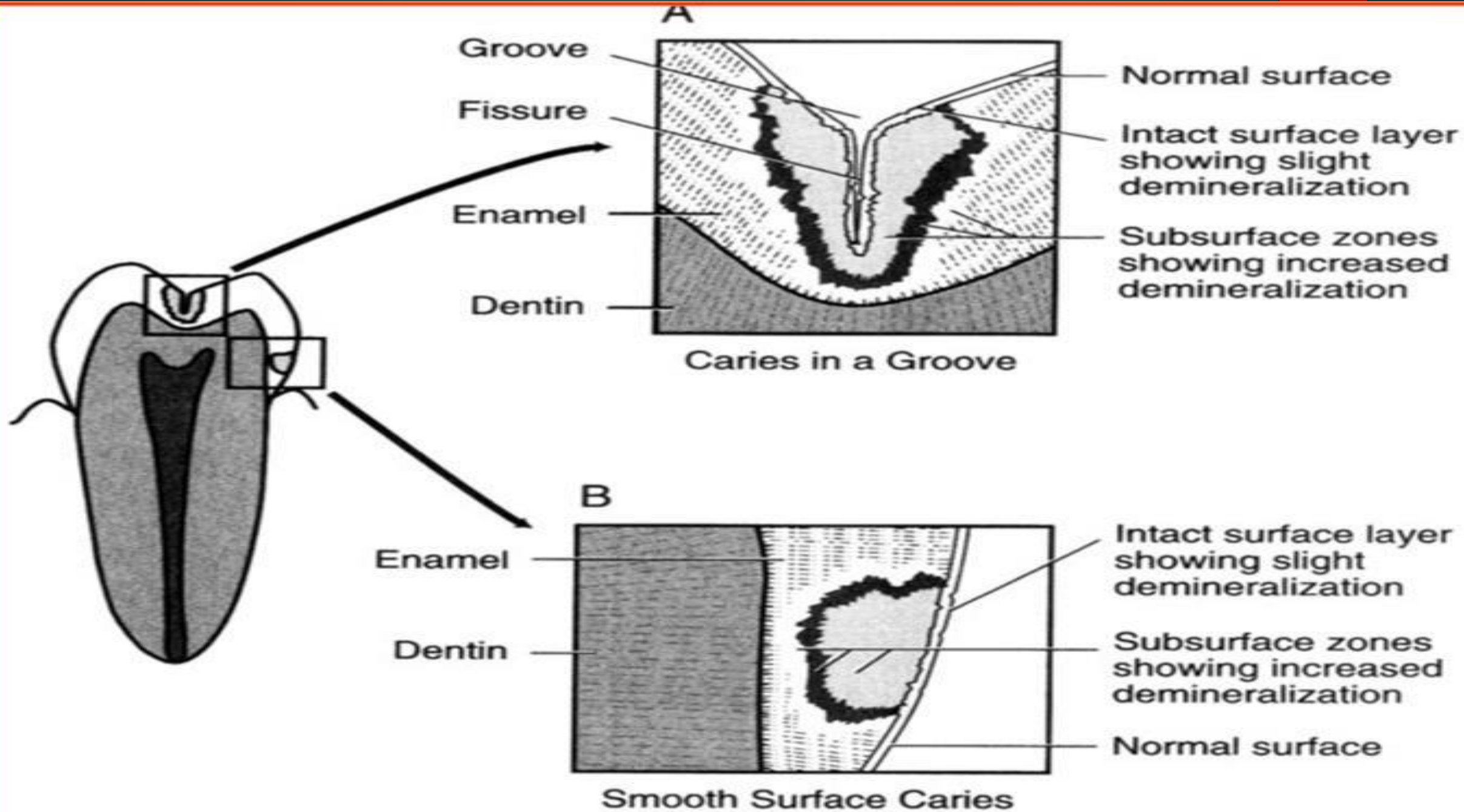
Nursing bottle caries

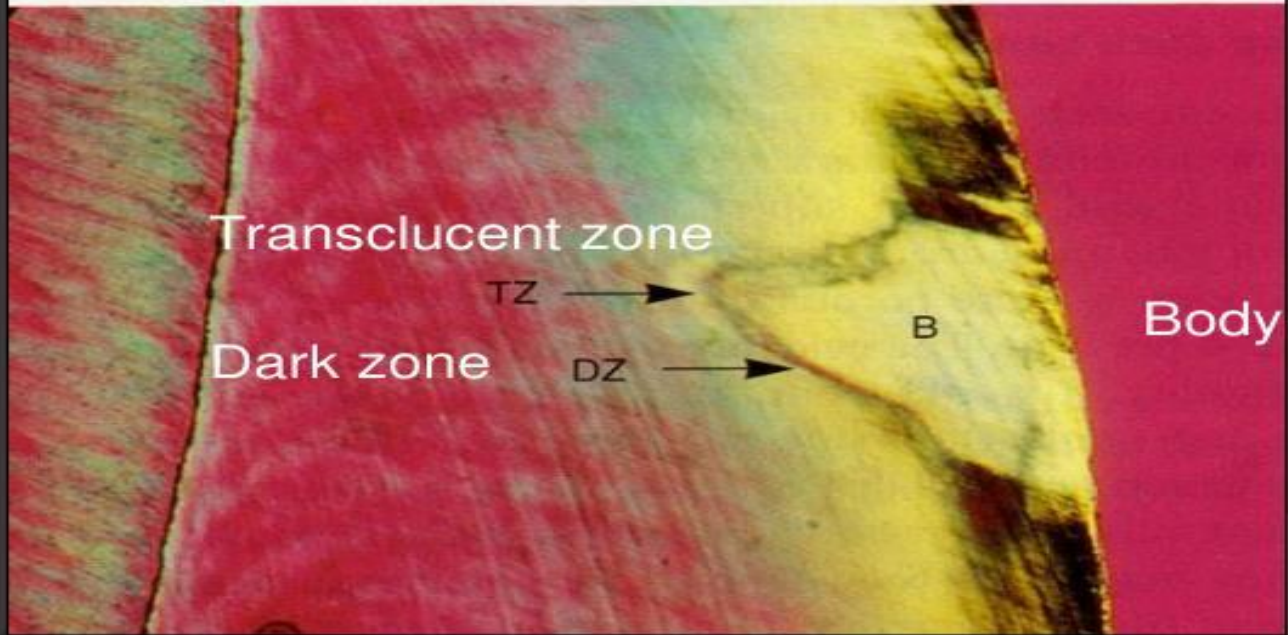
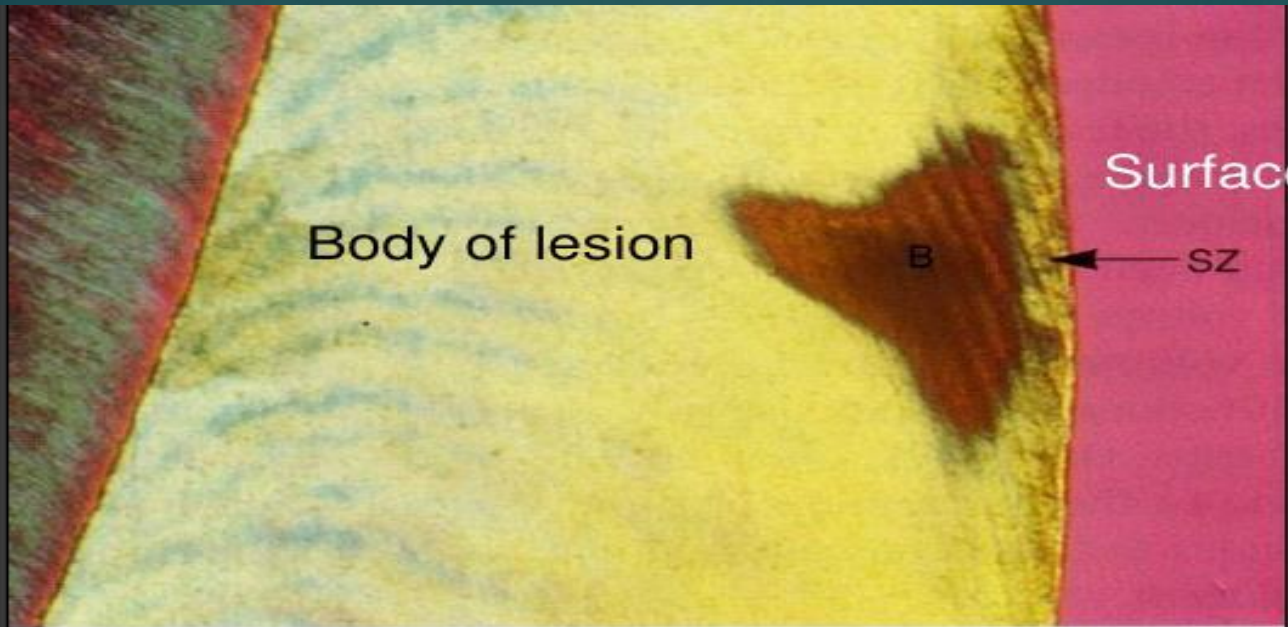


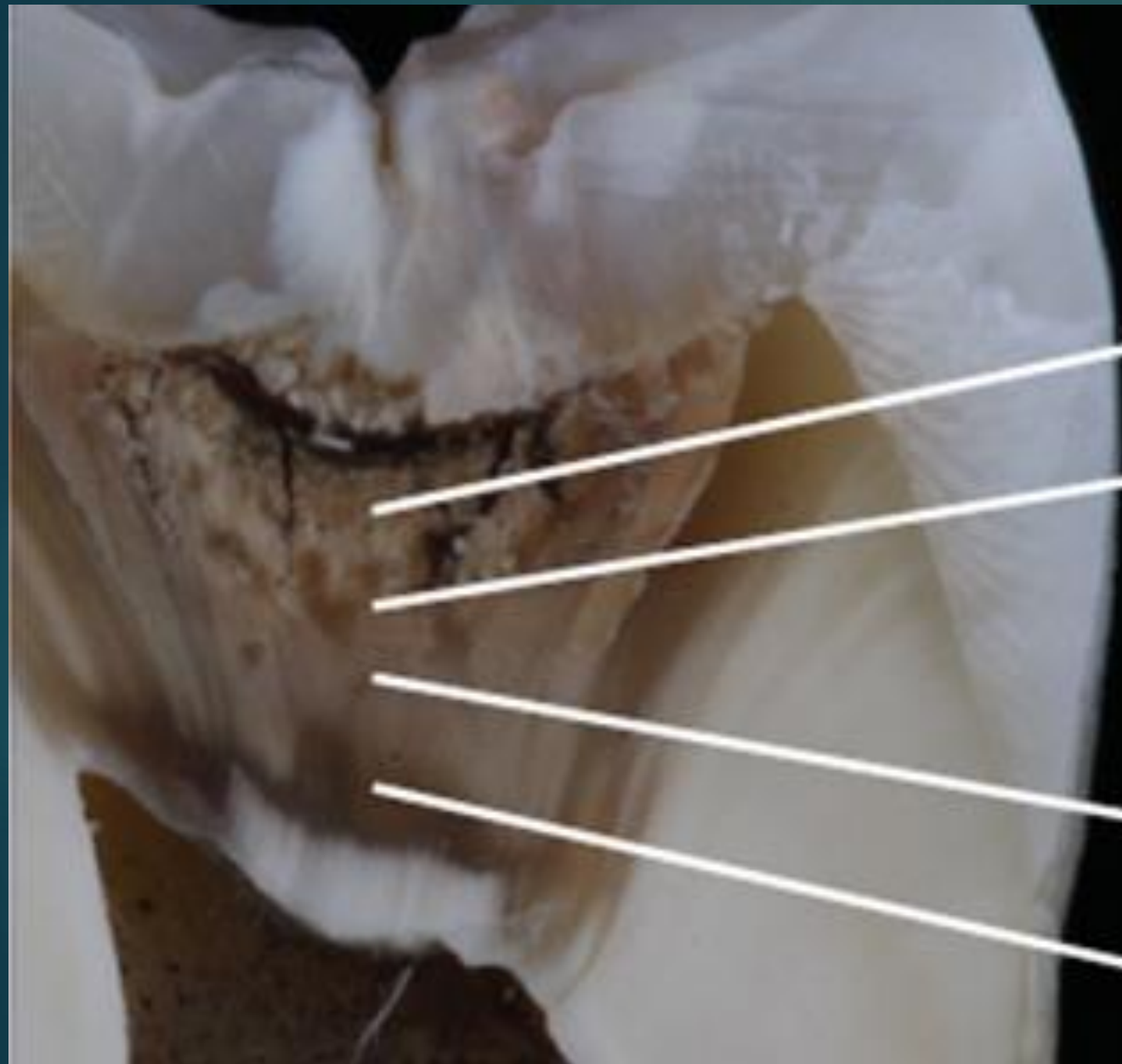




Histologic features of molar caries and alveolar bone resorption in mandibular molars of WBN/KobSlc rats. A, alveolar bone; C, dental caries; D, dentin; G, gingiva; P, dental pulp. (A) Mandible of a male WBN/KobSlc rat corresponding to the M1 molar area of Figure 1 A. Note the extensive granulation tissue surrounding the dental root, corresponding to a grade 4 radiolucent area in Figure 1 A. Granulation tissue (*) contains inflammatory cells and epithelial cord with downward elongation from the surface of gingiva along the dental root (M). Microabscess (arrowheads) formed in the apical part of the tooth and neutrophil accumulation continued into the dental pulp through the foramen apical dentis (arrow). Bar, 500 μ m. Inset shows histopathologic features of normal periodontal tissue surrounding intact dental root. Bar, 500 μ m. (B) Higher magnification of the apical area shown in Figure 4 A. Bar, 100 μ m. (C) Histopathologic features of a mandible containing the M1 molar of a male WBN/KobSlc rat. Note the abscess in the apical part of tooth (arrow) adjacent to inflammation of the pulp and crown caries. *, Inflammatory granulation tissue and fibrous connective tissue in enlarged space between root of tooth and alveolar bone. Bar, 500 μ m.







Affected dentin

Necrotic zone

Contaminated zone

Infected dentin

Demineralized zone

Translucent zone