Dental Caries-Histopathology

Lecture 3 B

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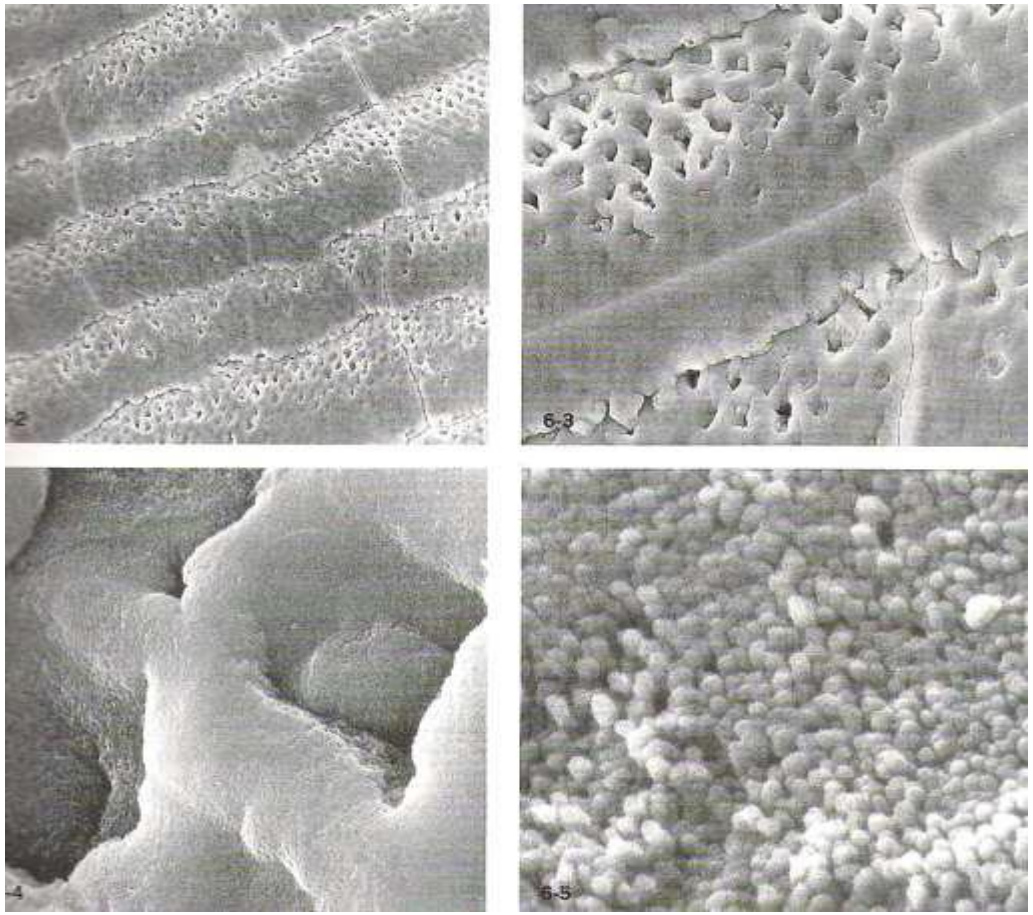
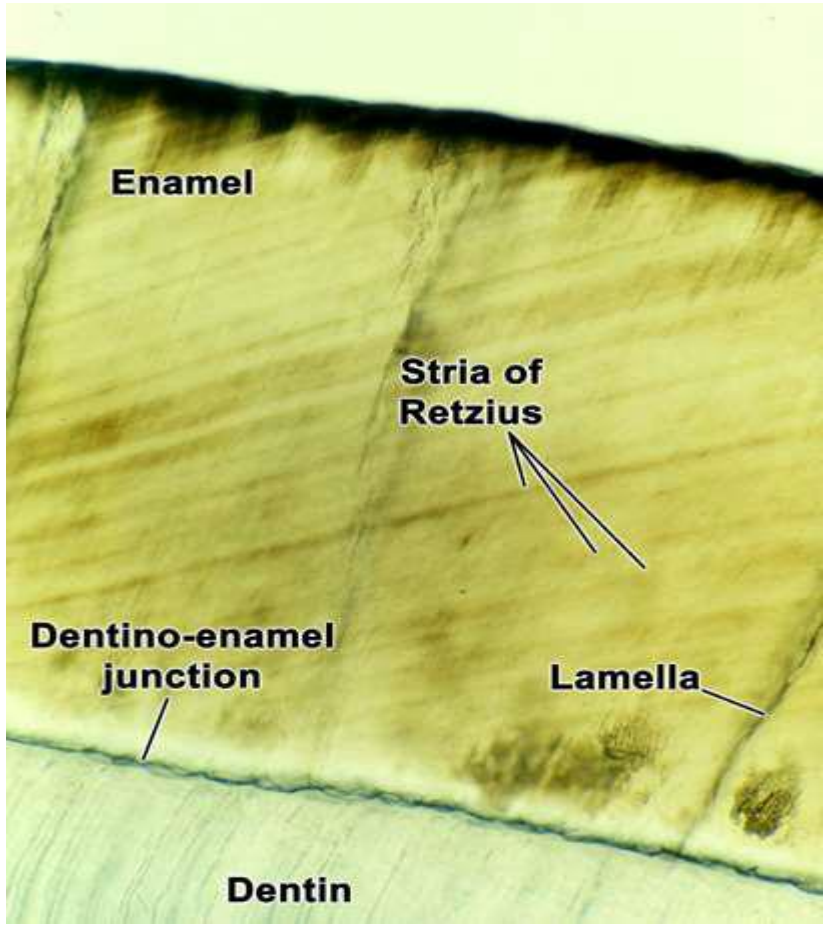
Basic structure of enamel





- **MICROSCOPIC FEATURES of early enamel caries:**

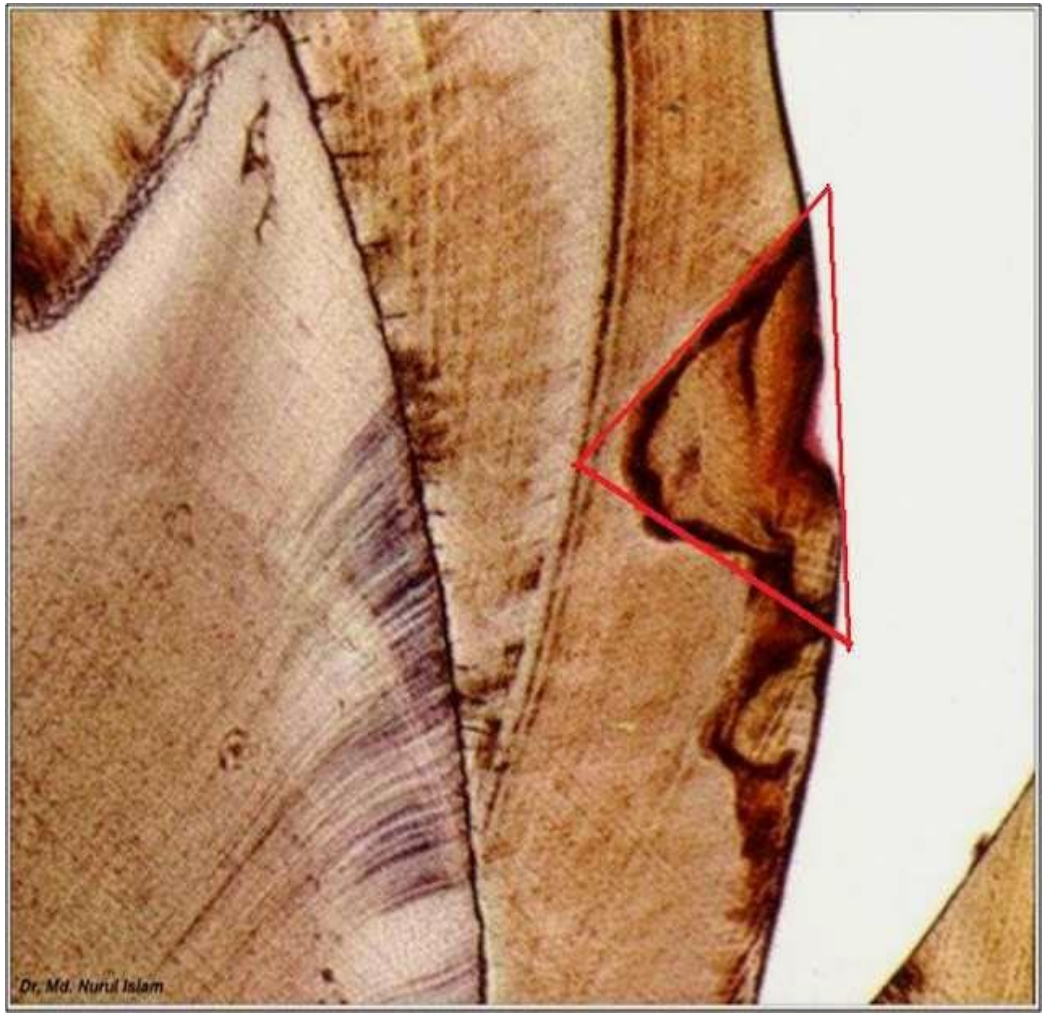
Histological features of early enamel caries

•Loss of inter-rod substance

•prominent enamel-rods

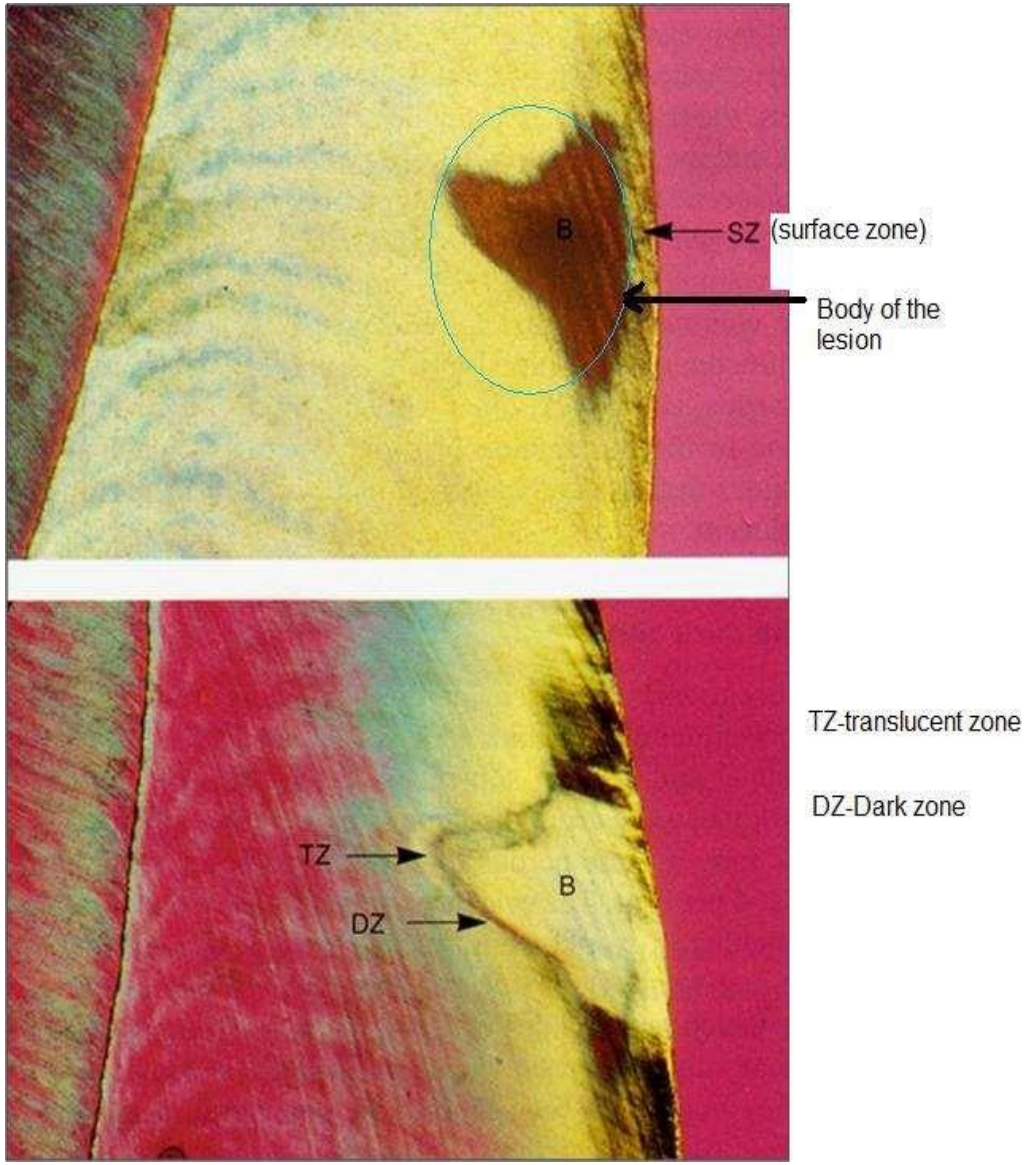
•Appearance of transverse striations of enamel rods due to segmental demineralization

•Accentuation of incremental striae of Retzius

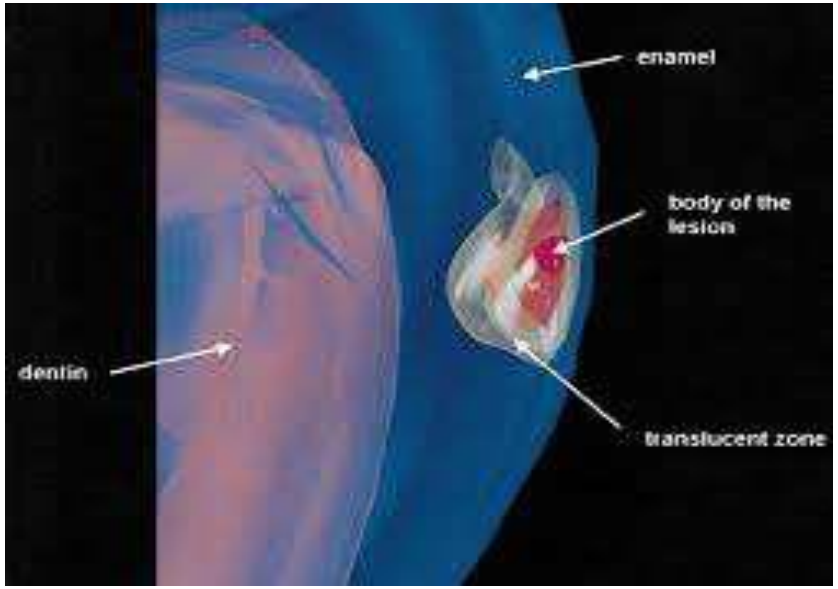


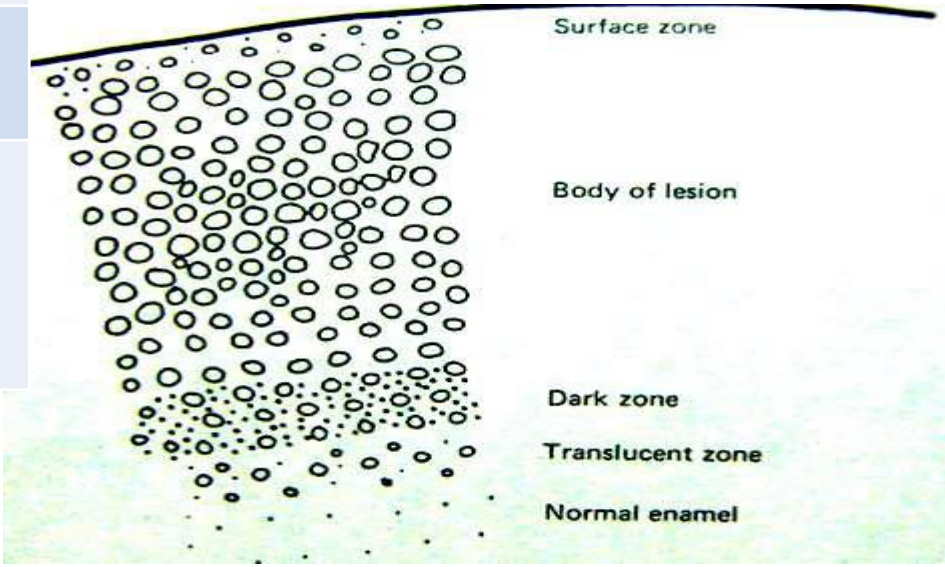
H/F of Advanced enamel caries

- Classified on the basis of pore volume and mounting media used
- Zone 1 – Translucent zone
- Zone 2 – Dark zone
- Zone 3 – Body of lesion
- Zone 4 – Surface zone
- These zones are from the dentin towards the outer enamel surface



Zone	Key
Translucent	1% mineral loss Deepest area of demineralisation Broader in progressing lesion Narrow in arrested or remineralised lesion
Dark	2-4% mineral loss Areas of remineralisation can be formed Narrow in progressing lesion Broad in arrested or remineralised lesion
Body	5-25% mineral loss Broader in advancing lesion
Surface	1% mineral loss Area of remineralisation from minerals diffusing from deeper layers or from mineral content in plaque Little thicker in arrested lesions





Pits and fissures carries

- Fissures are diverse in shape and size
- Carious lesion starts at both side of fissure rather than at the base, penetrating nearly perpendicular to the DEJ.
- Lesion is cone-shaped with base towards dentine and apex towards enamel surface

CARIES OF DENTIN

Begins with the natural spread of the process along the DEJ and rapid involvement of the dentinal tubules. The dentinal tubules act as tracts leading to the pulp (path for micro-organisms).

Caries advances more rapidly as dentin provides much less resistance to acid attack .

Early Dentinal Changes:

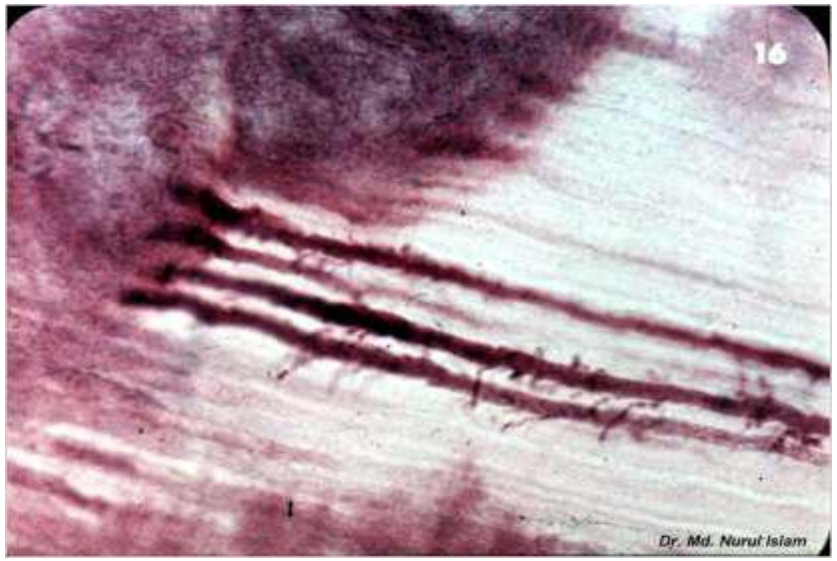
-initial penetration of the dentin by caries dentinal sclerosis,

-calcification of dentinal tubules and sealing off from further penetration by micro-organisms,

-more prominent in slow chronic caries.

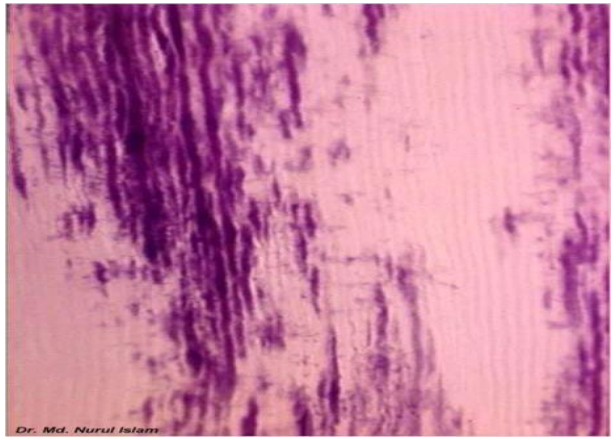
•**MICROSCOPIC CHANGES: (mechanism)**
Caries advancement proceeds through 3 stages
•Acids demineralize the dentin
•Organic matter degenerates
•Loss of structural integrity & bacterial invasion

1st mild stimuli –defense reaction of dentin-tubular sclerosis/TRANSPARENT ZONE
•Dentin demineralization-when lesion reaches DEJ
• In the earliest stages, when only few tubules are involved,microorganisms may be found penetrating the tubules Pioneer Bacteria.

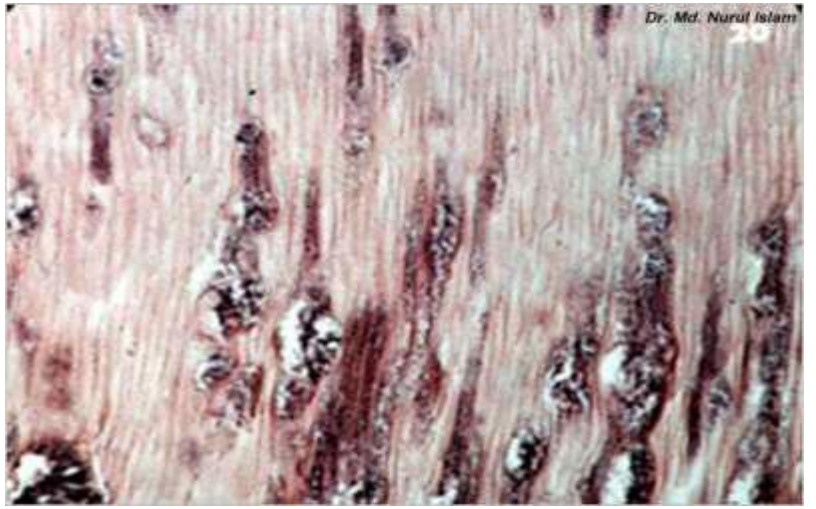


Bacterial invasion through the dentine

• This initial decalcification involves the walls allowing them to distend as the tubules are packed with microorganisms.
• Each tubule is seen to be packed with pure forms of bacteria, eg., one tubule packed with coccal forms the other tubule with bacilli.

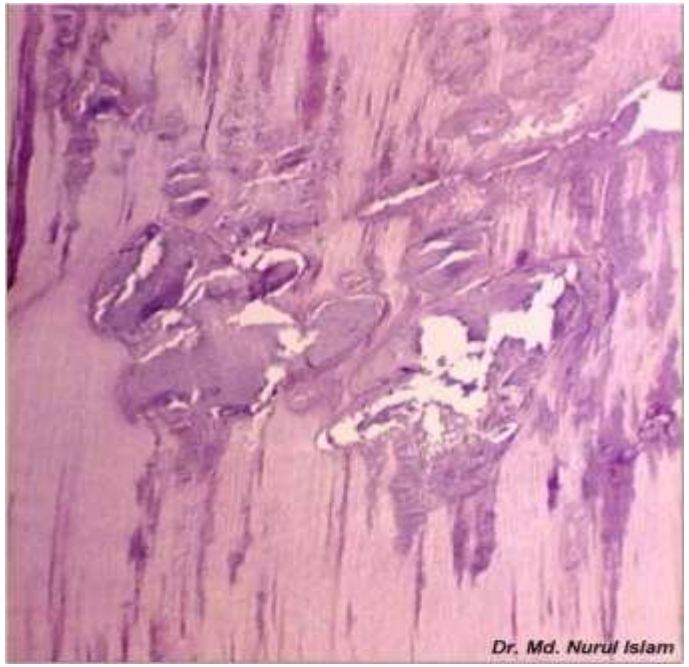


-decalcification of walls, confluence of the dentinal tubules, tiny "liquefaction foci", described by Miller are formed by the focal coalescing and breakdown of dentinal tubules.
These are ovoid areas of destruction parallel to the course of the tubules which filled with necrotic debris and increase in size by expanding. The adjacent tubules are distorted and their course is bent due to this expansion.



Bacterial invasion through the dentine

• The destruction of dentin by decalcification and then proteolysis
occurs in numerous focal areas- leading to a necrotic mass of dentin of a leathery consistency.
• Clefts present in the carious dentin that extends at right angles to the dentinal tubules, accounts for the peeling off of dentin in
layers while excavating.
Mechanism of formation of Clefts - not known
• May follow course of incremental lines or
• May result from coalescence of liquefaction of adjacent tubules
• Also may rise by extensive proteolytic activity along interconnecting lateral branches of odontoblastic processes



Shape of the lesion is triangular with the apex towards the pulp and the base towards the enamel.

Zone 1; Zone of Fatty Degeneration of Tome's Fibers,(next to pulp)

-due to degeneration of the odontoblastic process. This occurs before sclerotic dentin is formed

and makes the tubules impermeable.

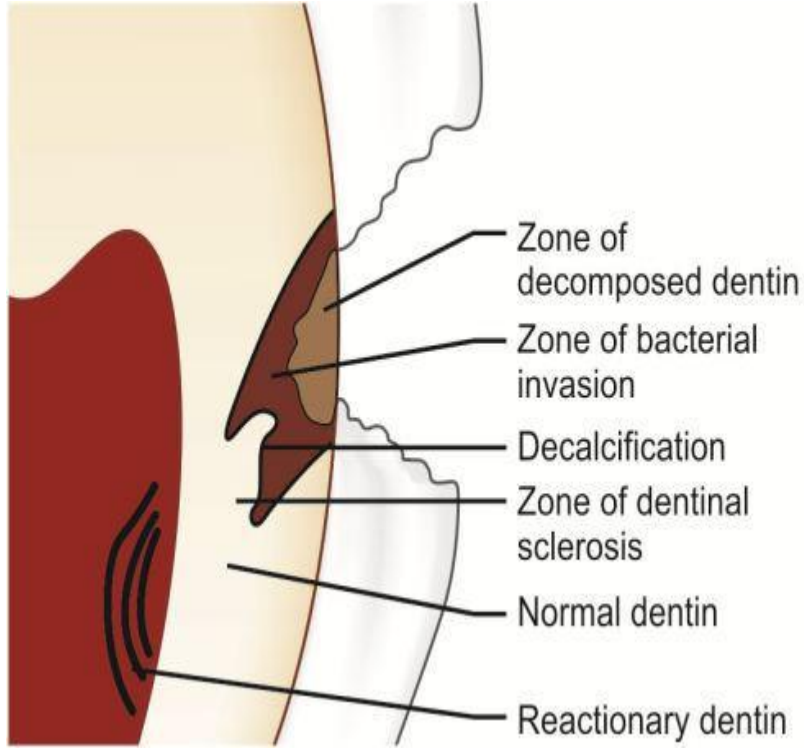
Zone 2; Zone of dentinal sclerosis,

-deposition of Ca salts in the tubules.

Zone 3; Zone of decalcification of dentin

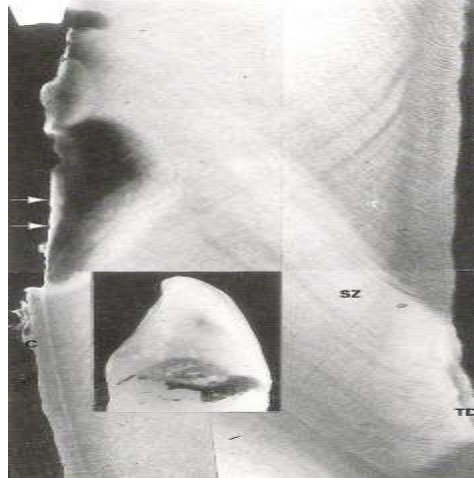
Zone 4; Zone of bacterial invasion

Zone 5; Zone of decomposed dentin due to acids and enzymes.



Reactionary dentin

- Protective mechanism to protect pulp
- Develops as a result of localized, non-specific irritation to odontoblasts
- Hyper mineralized,less number of dentinal tubules having irregular & torturous course



Root caries

Histopathology:

• Outer surface of cementum – hyper mineralized, thus more caries resistant

•. Resistance due to

• Reprecipitation of minerals

•• Precipitation of minerals from Plaque

Clefts formed, through which bacteria penetrate & cause tooth structure destruction

• Penetration occurs along course of Sharpey's fibers

• Once cementum completely exposed & destroyed, underlying dentine is exposed