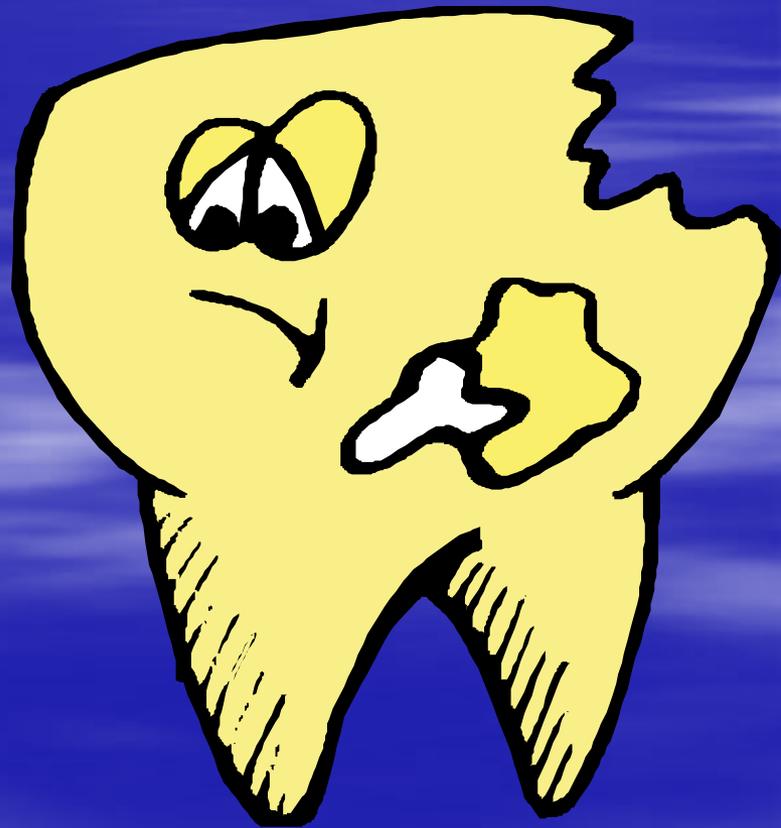


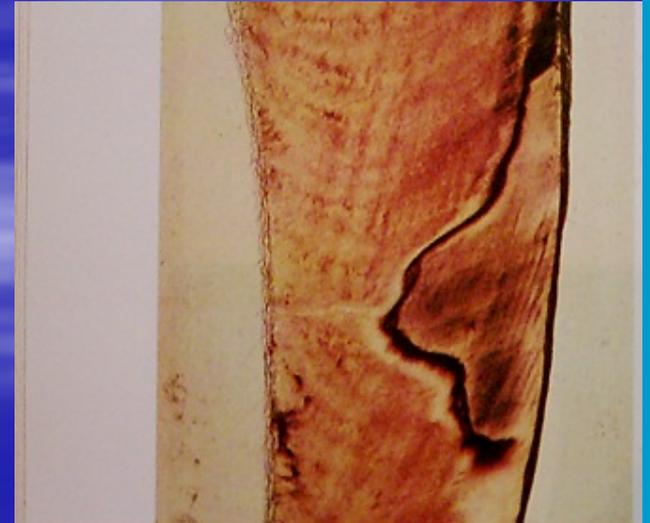
# Histopathology of Dental Caries



# ENAMEL CARRIES

## 1- Smooth surface caries

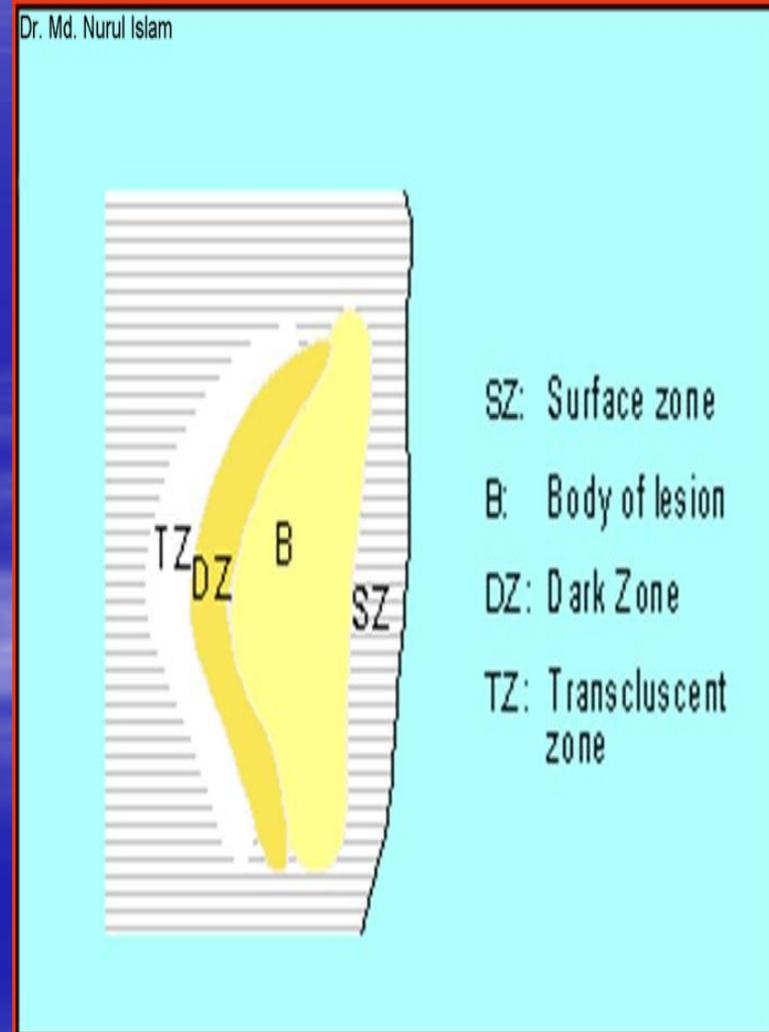
- The early carious lesion of enamel which is best seen on a dried surface , is a **white opaque spot**
- The extension of caries is in a cone shaped with the base towards the outer enamel surface and the apex towards the amelodentinal junction.
- Caries spreads in zones which are as follows  
( Ground section , polarized light microscopy ) :-
  - Translucent zone (zone 1)
  - Dark zone (zone 2)
  - Body of the lesion (zone 3 )
  - Surface zone (zone 4)



# TRANSLUCENT ZONE

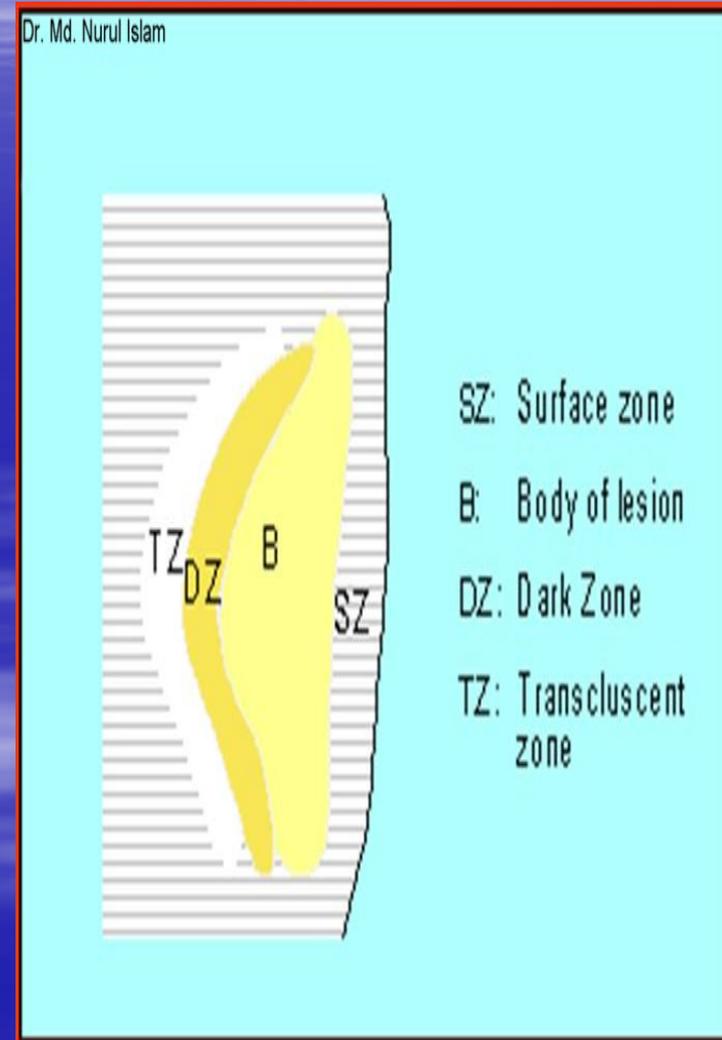
## Zone of initial demineralization

- More porous than the normal enamel. contains **1%** by volume space
- These pores are larger than the pores in normal enamel.
- Chemical analysis show that there is a fall in the magnesium and carbonate content as compared to the normal enamel



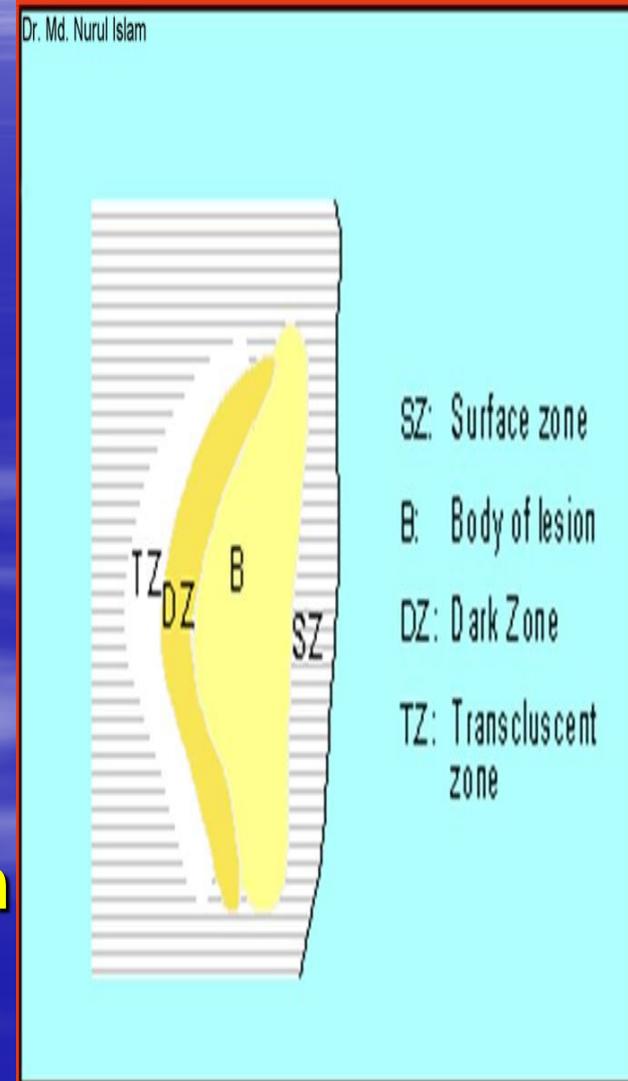
# Dark zone

- This zone contains **2- 4%** by volume pores.
- Superficial to zone 1.
- Some pores are large and some are smaller than the translucent zone suggesting that some remineralization has occurred.
- In rapidly advancing lesion the dark zone narrow.
- In this zone previously liberated salts are redeposited.



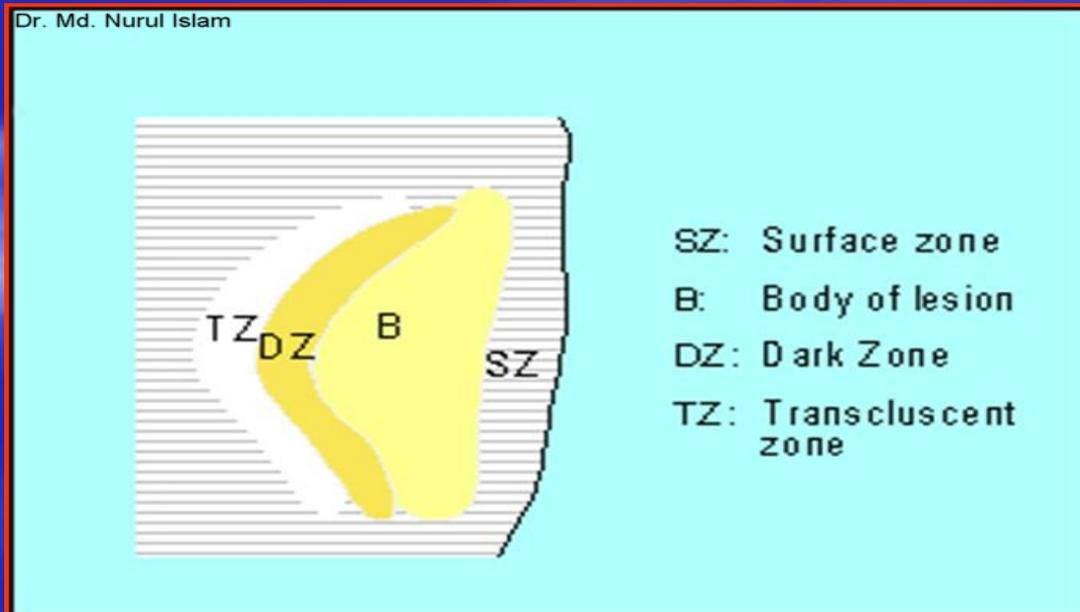
# Body of the Lesion

- This zone has pore volume of
- **5-25%**
- It contains appetite crystals larger than the normal enamel pores.
- There is more of an effort for the remineralization but by the further attack there is further dissolution of the mineral
- **Thus this is the zone of maximum demineralization.**



# Surface zone

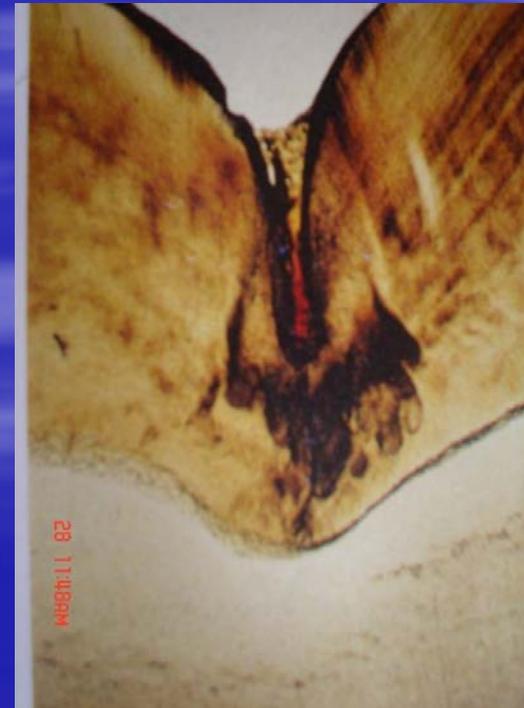
- Remain unaffected
- An area of active reprecipitation of minerals from both the plaque & that dissolved from the deeper area of the lesion, as ions diffuse outward.

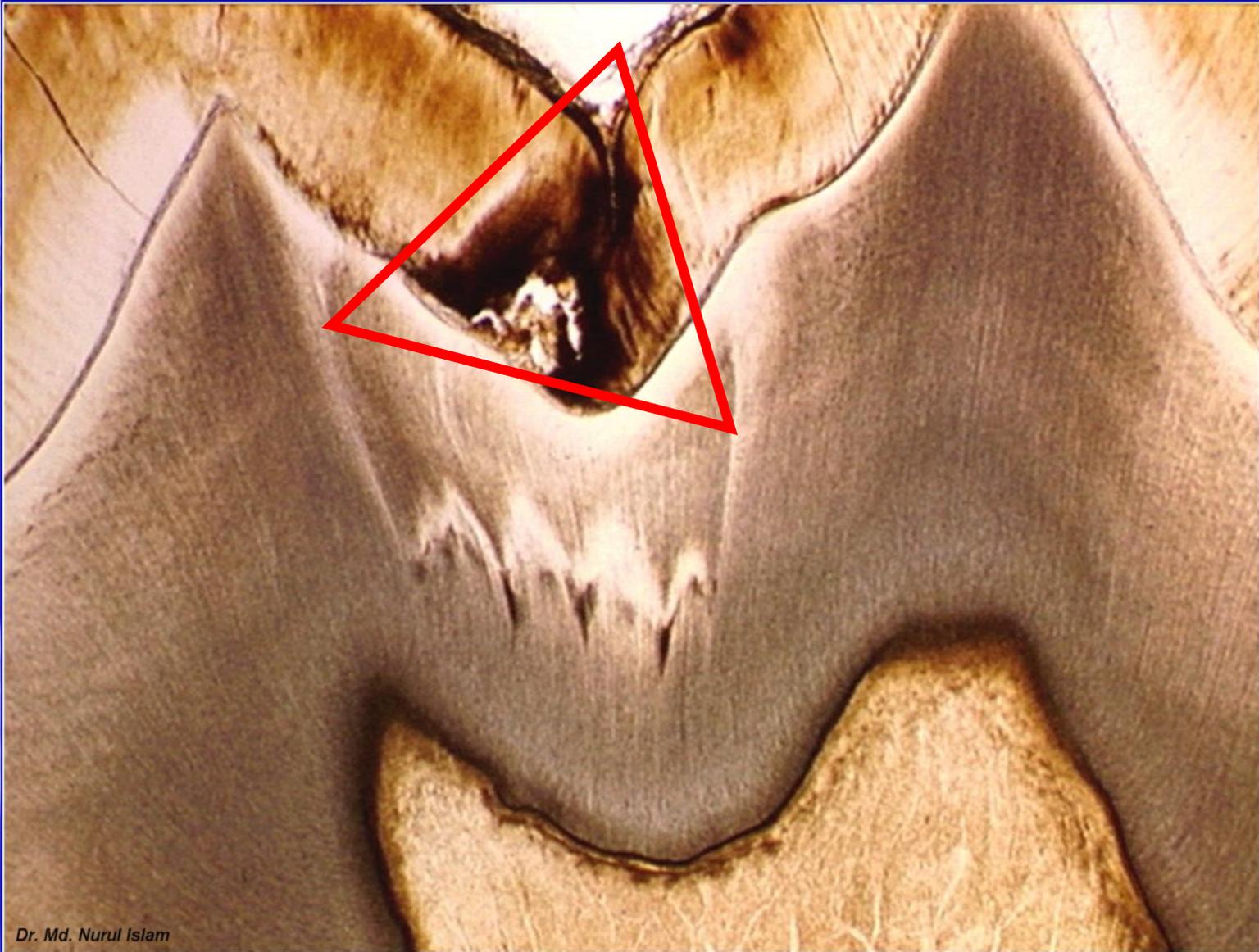




## 2- Pit and Fissure Carie

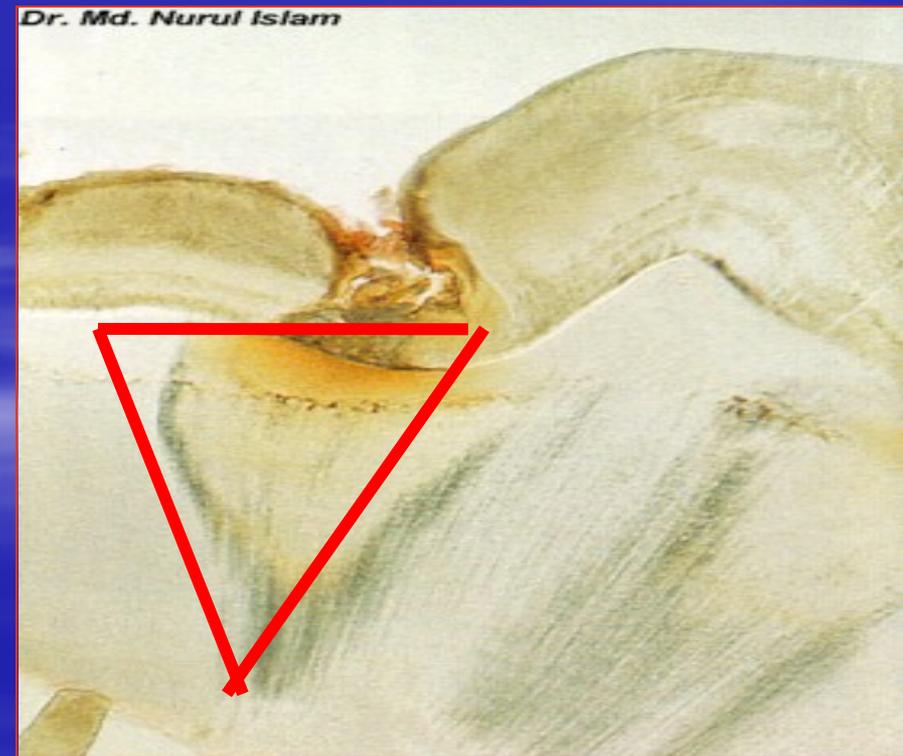
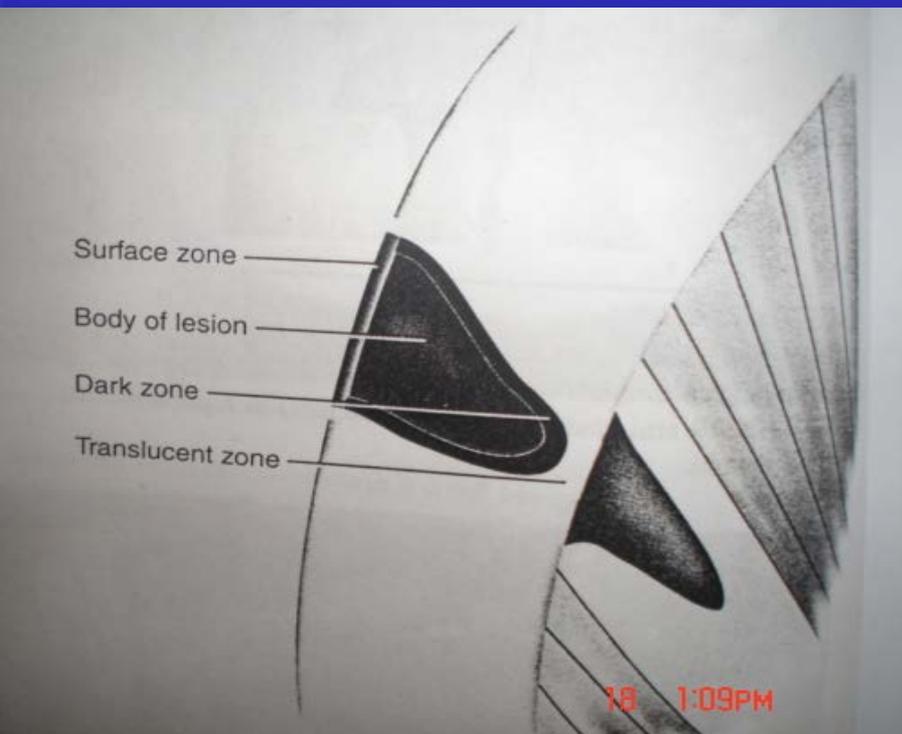
- Enamel in the bottom of pit or fissure is very thin, so early dentin involvement frequently occurs.
- Here the caries follows the direction of the enamel rods.
- It is triangular in shape with the apex facing the surface of tooth and the base towards the DEJ.
- Histologically is similar to that of smooth surface caries but morphologically, it is differ.
- When reaches DEJ, greater number of dentinal tubules are involved.
- It produces greater cavitation than smooth surface caries & there is more undermining of enamel.





# DENTIN CARRIES

- It develops from E caries,,when it reach DEJ → lateral extension → greater dentinal tubules involvement, which act as a pathway for m.o to deeper area & then to pulp.
- It form a cone –shape lesions, apex toward the pulp & base toward DEJ.



Ground section show 5 microscopic zones ;-

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

-due to degeneration of the odontoblastic process. It is the deepest zone.

Zone 2; **Zone of dentinal sclerosis** (translucent zone )

-Deposition of Ca salts in the tubules.

From demineralized zone & from odontoblast cells ( defence mechanism )

Zone 3; **Zone of decalcification**

...Dentin is softer than normal (acid production by m.o )

It is a sterile dentin ( no bacterial invasion )

Zone 4; **Zone of bacterial invasion**

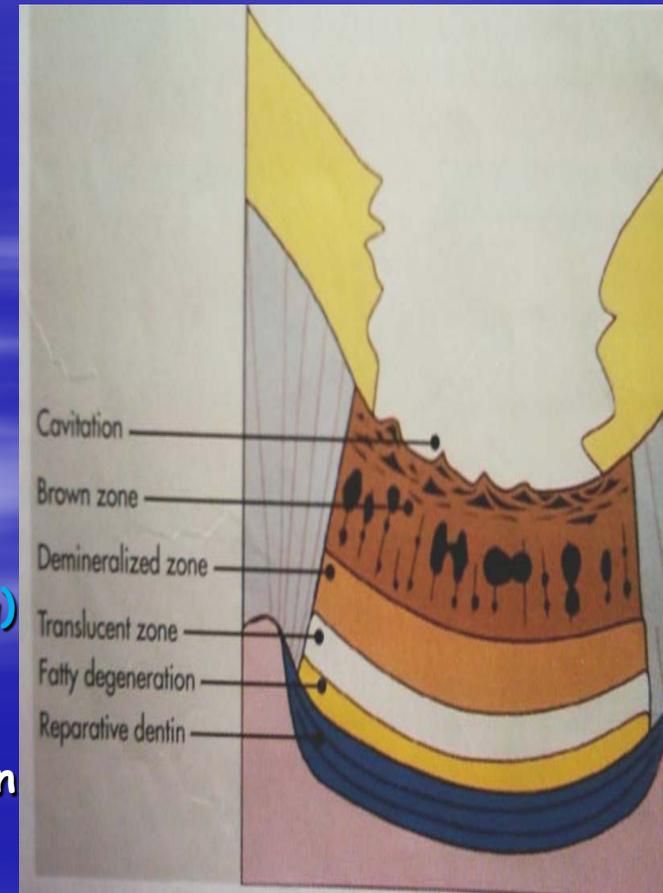
Extension & multiplication of bacteria within D.T.

Two type of bacteria:-

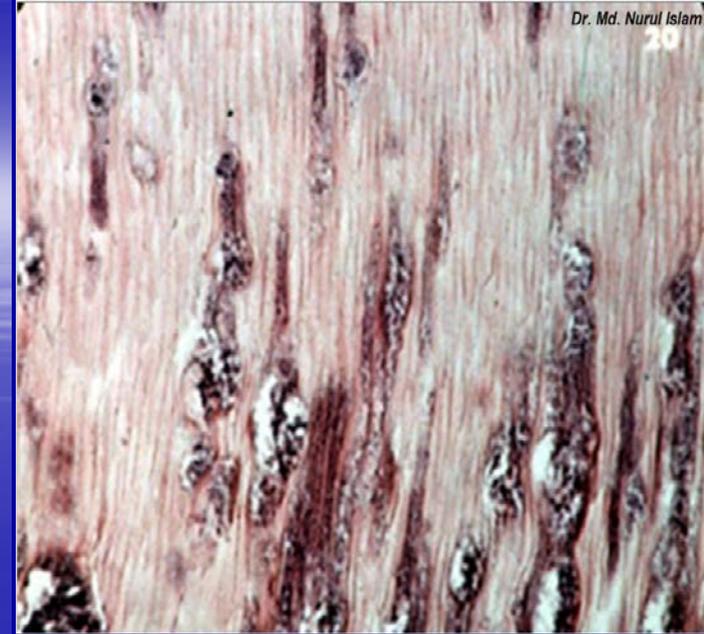
: 1- Acidogenic(lactobacilli)- acid—demineralization ( **inorg** )

2- Proteolytic—proteolytic enzymes-**organic** destruction

Dentin is soft enough to be removed by instrumentation



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.

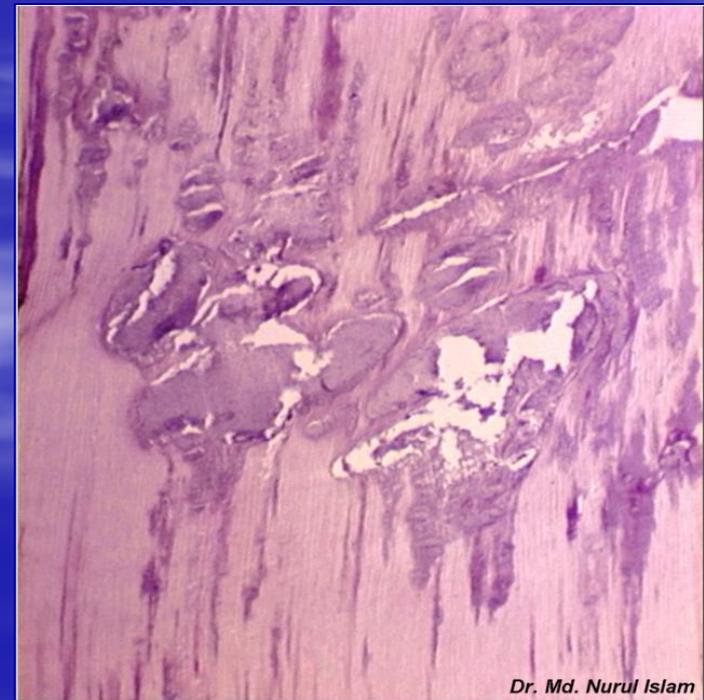


Zone 5; **Zone of destruction** (decomposition of dentin)

Liquifaction foci enlarged & increased in number.

Cracks or clefts appear at right angle to D.T. forming transverse clefts. It is formed from coalense of liquifactive foci on the adjacent D.T.

Little remain from D architecture---cavitation.



# ROOT CARIES

- Primary tissue that is effected in the root caries is the cementum.
- This starts when the root is exposed to the oral environment as a result of the periodontal disease this is followed by the bacterial colonization.
- Actinomyces species present in large number. (mutans & lactobacilli) also present.
- There is subsurface demineralization of the cementum extending to D.
- Hypermineralized surface (minerals from plaque & saliva).
- Clinically diagnosed as a brown saucer-shaped cavity.



# IMMUNOLOGICAL ASPECT OF DENTAL CARIES

- Natural active immunity ( serum & salivary Ab ) is of little effects ----  
S.mutans is weekly antigenic.
- Artificial active immunity ( vaccines ) induce Abs that cross react  
with the heart muscle.
- ( ↓ in D.C. in the experimental animals )
- Humoral immunity is provided mainly by salivary IgA Abs ( little  
effect of crevicular IgG & IgM Abs ).
- Salivary IgA act mainly by interfering with the attachment of the m.o  
to the tooth surface.
- Genitically engineering Abs ( monoclonal Ab ) against specific  
s.mutans, may produce passive immunization in the future.