

* DENTAL CAVIES:

- disease of mineralized tissues of the teeth
- caused by action of microorganisms on fermentable CARBS
- characterized by demineralization & disintegration

4 MAJOR ETIOLOGIC FACTORS:

- ① metabolic substrates → quality & quantity of sugars
- ② microorganisms → what bacteria
- ③ teeth & their environment → quality of teeth, saliva & immunity
- ④ time → duration & frequency of carb intake

Etiology:

AILOGENIC THEORY

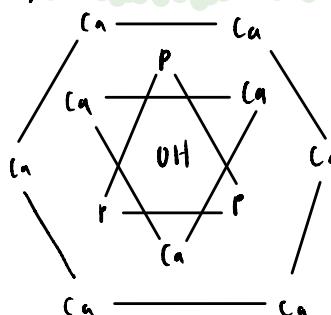
(1981 - 1997)

→ some plaque bacteria are capable of fermenting suitable dietary CARBS to produce acids, causing plaque pH to fall below critical levels leading to demineralization of teeth

TOOTH HARD TISSUE

- MINERAL:

- HYDROXYAPATITE:



- held together via ionic bonds
- snowflake shape → lined up → rod-shaped
- enamel rods extend from DEJ to surface
- SUBSTITUTION IONS:
 - calcium: lead, strontium, magnesium, radium
 - phosphate: carbonate
 - hydroxyl: fluoride, chlorine

- ORGANIC MATRIX:

- protein → main component
- other organic materials

- WATER

- Cells in Dentin:

	ENAMEL	DENTIN
ORGANIC	4	20
MINERAL	95	70
water	1	10

ENAMEL RESISTANCE TO CHEMICAL ATTACK DEPENDS ON:

- 1) HA CRYSTAL REGULARITY → more regular = more stable
- 2) SUBSTITUTION IONS → can ↑ or ↓ susceptibility
 - Fluoride ↑ acid resistance
 - Carbonate ↓ acid resistance, ↑ fracture strength

HA LATTICE IS POROUS → FREE IONS + COMPOUNDS diffuse in

Acid can dissolve HA, but reversible to a pH dependent point



· HA = insoluble @ neutral pH

· Ca & phosphate ions are water soluble

· if RXN goes to the right → dissolution / demineralization

· if RXN goes to the left → remineralization

slightly ↑ for cementum & dentin (enamel is harder)

Critical pH = 5.5

↳ pH below which dissolution of tooth enamel occurs in oral cavity

NOT FIXED!!

depends on concentrations solubility

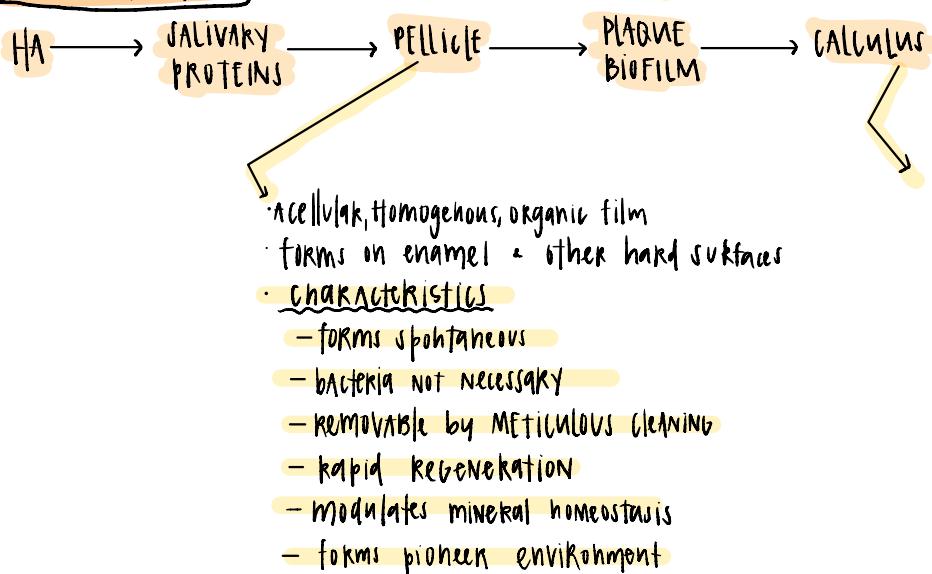
CARIES-SUSCEPTIBLE SITES

- favorable for plaque retention
- limited access for saliva

SUSCEPTIBLE SITES

1. pits & fissures
2. IP surfaces just cervical to the contact point
3. cervical margin just coronal to gingival margin
4. exposed root surface
5. defective restoration margins
6. appliance adjacent tooth surfaces

PLAQUE DEVELOPMENT



• soft, mineralized bacterial deposit on teeth
• good environment for ↑ Acid production, ↑ Bacterial metabolism & ↓ saliva protection
• composition:

- plaque/tooth interface (pellicle)
- microbial layers & colonies
- ECM → carbs, proteins, nucleic acids

• plaque biofilm in which inorganic deposits have caused mineralization
• ↑ risk for developing gingivitis & periodontitis

BACTERIAL METABOLISM

• germ-free animals do not produce caries when fed a cariogenic diet

↳ NEED APPROPRIATE BACTERIA PRESENT TO PRODUCE CARIES!!

- *Streptococcus mutans*
- *Lactobacillus* sp.
- *Actinomyces* sp.

gnomobiotic animals
add-back experiments

* MUTANS STREP ⇒ KEYSTONE MICROBE for CARIOS!

E.g. *S. mutans*, *subtilis*, *hatus*, & *chiselus*

PROPERTIES:

- 1) SUGAR transport good @ low pH
- 2) Attach to PLaque BIOFILM
- 3) Homolactic Acid fermenters → produce LA as by-product of sucrose (2 Lactic Acid : 1 fermentable monosaccharide)
- 4) they ARE Aciduric = tolerate highly acidic environment
- 5) produce insoluble glucan for protection from saliva (Glucosyl-transferase) [G-T]
- 6) produce intracellular polysaccharides extracellular levan } "SNACKS" (Fructosyl-transferase) [F-T]
- 7) Bacteriocins → kill their neighbor