

DIPLOMA OF PRIMARY CARE
DENTISTRY

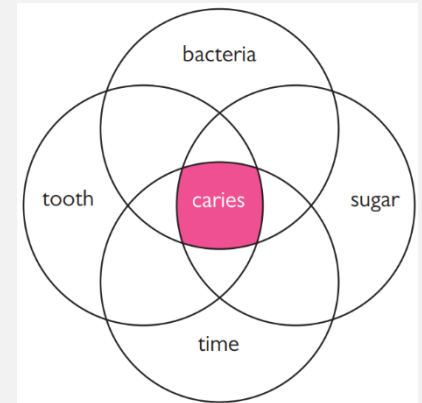
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PART – 1
CLINICAL SKILLS

PART 2: PREVENTIVE DENTISTRY

A. DENTAL CARIES:

- Dental caries is a sugar-dependent infectious disease.
- Acid is produced as a by-product of the metabolism of fermentable carbohydrate by plaque bacteria, which results in a drop in pH at the tooth surface.
- In response, calcium and phosphate ions diffuse out of enamel, resulting in demineralization.
- This process is reversed when the pH rises again.



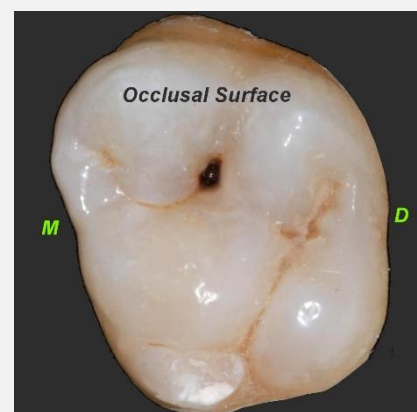
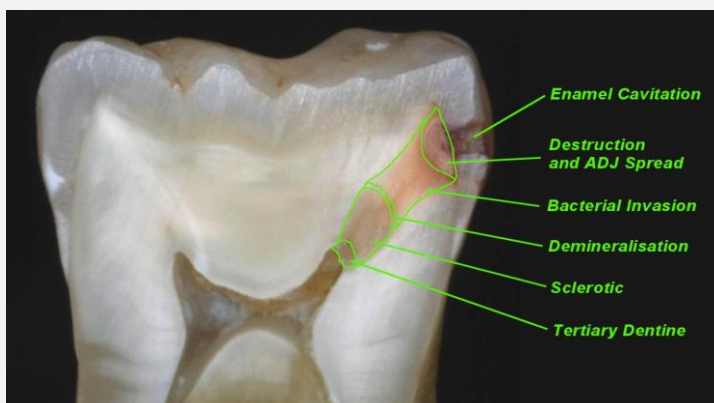
Caries is a dynamic process characterized by episodic demineralization and remineralization occurring over time. If destruction predominates, disintegration of the mineral component will occur, leading to cavitation.

Enamel caries:

- ∂ The initial lesion is visible as a white spot. This appearance is due to demineralization of the prisms in a sub-surface layer, with the surface enamel remaining more mineralized.
- ∂ With continued acid attack the surface changes from being smooth to rough, and may become stained.
- ∂ As the lesion progresses, pitting and eventually cavitation occurs.
- ∂ The carious process favours repair, as remineralized enamel concentrates fluoride and has larger crystals, with a decreased surface area.
- ∂ Fissure caries often starts as two white spot lesions on opposing walls, which coalesce.

Dentine caries:

- It comprises demineralization followed by bacterial invasion but differs from enamel caries in the production of 2° dentine and the proximity of the pulp.
- Once bacteria reach the amelo-dentinal junction (ADJ), lateral spread occurs, undermining the overlying enamel.



Rate of progression of caries:

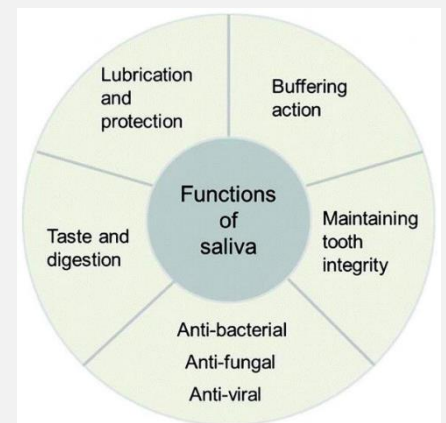
- Although it has been suggested that the mean time that lesions remain confined radiographically to the enamel is 3–4yrs, there is great individual variation and lesions may even regress.
- The rate of progression through dentine is unknown; however, it is likely to be faster than through enamel.
- Progression of fissure caries is usually rapid due to the morphology of the area especially common in 1° molars, with progress from early dentine involvement to pulpal involvement in <1 year in some cases.

Susceptible sites:

- The sites on a tooth which are particularly prone to decay are those where plaque accumulation can occur unhindered, approximal enamel surfaces, cervical margins, and pits and fissures.
- Host factors, the volume and composition of the saliva, can also affect susceptibility.

Saliva and caries:

- Saliva acts as an IO antacid, due to its alkaline pH at high flow rates and buffering capacity. Also:
 - ∂ Decreased plaque accumulation and aids clearance of foodstuffs.
 - ∂ Acts as a reservoir of calcium, phosphate, and fluoride ions, thereby favouring remineralization.
 - ∂ Has an antibacterial action because of its IgA, lysozyme, lactoferrin, and lactoperoxidase content.



- An appreciation of the importance of saliva can be gained by examining a patient with a dry mouth.
- Chewing sugar-free gum regularly after meals stimulates saliva production and does appear to decrease caries, but the reduction is small.

Root caries:

- With gingival recession, root dentine is exposed to carious attack.
- Treatment requires, first, control of the aetiological factors and for most patients this involves dietary advice and oral hygiene instruction (OHI).
- Topical fluoride may aid remineralization and prevent new lesions developing. However, active lesions will require restoration.



Caries prevention:

- Classically three main approaches are possible:
 - ▽ Tooth strengthening or protection.
 - ▽ Reduction in the availability of microbial substrate.
 - ▽ Removal of plaque by physical or chemical means.



- In practice this means dietary advice, fluoride, fissure sealing, and regular toothbrushing (which is also important in the prevention of periodontal disease).
- The relative value of these varies with the age of the individual.

⇒ **Diagnosis and its relevance to management:**

- Pre-cavitated lesion—prevention.
- Cavitated lesion—prevention and restoration.

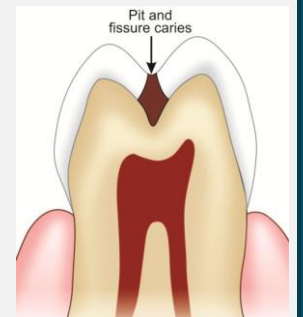
➤ **Smooth surface caries:**

- This is relatively straightforward to diagnose.
- The chances of remineralization are increased as it is obvious, and accessible for cleaning.
- Restoration is indicated if prevention has failed and the lesion is cavitated, if the tooth is symptomatic or sensitive, or if aesthetics is poor.



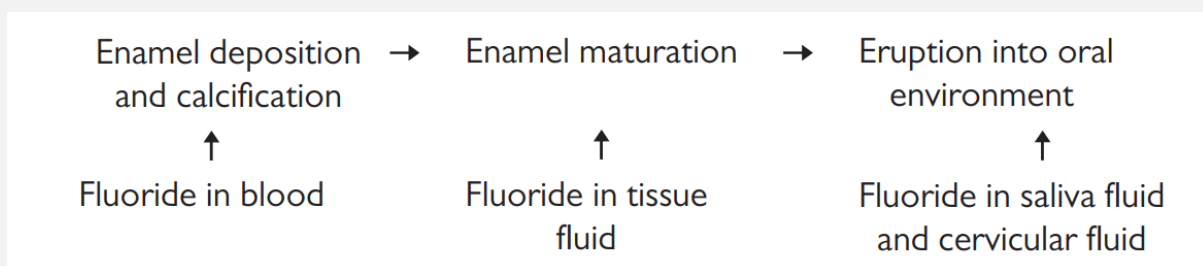
➤ **Pit and fissure caries:**

- This is difficult to diagnose reliably, especially in the early stages.
- Testing the suspected cavity with a sharp probe is discouraged as stickiness could be due to the morphology of the fissure and the probe could encourage cavitation.
- The anatomy of the area also tends to favour spread of the lesion, which often occurs rapidly.
- As fissure caries is less affected by fluoride and oral hygiene (OH), fissure sealant (f/s) is preferable to watching and waiting particularly in high-risk individuals.
- Occlusal caries evident on b/w radiographs should not always be excised.
- If the tooth is fissure sealed or restored, check the margins very carefully, and if intact, monitoring the lesion radiographically is often justified initially.
- If marginal integrity is not intact, investigate the area with a small round bur.
- The 'cavity' can be aborted if no caries is found and the surface sealed.



B. FLUORIDE:

- The concentration of fluoride in enamel increases with increased fluoride content of water supply and increase towards the surface of enamel.
 - Pre-eruptive effects:
 - ⇒ Enamel formed in the presence of fluoride has:
 - Improved crystallinity and increase crystal size and decrease acid solubility.
 - More rounded cusps and fissure pattern, but the effect is small.
 - Discontinuation of systemic fluoride results in an increase in caries, pre-eruptive effects must be limited.
 - Post-eruptive effects: newly erupted teeth derive the most benefit.
 - Inhibits demineralization and promotes remineralization of early caries.
 - Enhances the degree and speed of remineralization and renders the remineralized enamel more resistant to further attack.
 - Decrease acid production in plaque by inhibiting glycolysis in cariogenic bacteria.
 - An increase concentration of fluoride in plaque inhibits the synthesis of extracellular polysaccharide.
 - It has been suggested that fluoride affects pellicle and plaque formation, but this is unsubstantiated.
- ⇒ At a high pH, fluoride is bound to protein in plaque. A drop in pH results in release of free ionic fluoride, which augments these actions.
- ⇒ Fluoride is more effective in reducing smooth surface than pit and fissure caries.



+ Safety and toxicity of fluoride:

- Fluoride is absorbed rapidly, mainly from the stomach.
- Peak blood levels occur 1h later.
- It is excreted via the kidneys, but traces are found in breast milk and saliva.
- The placenta only allows a small amount of fluoride to cross, prenatal fluoride is relatively ineffective.

1. Fluorosis:

- Fluorosis (or mottling) occurs due to a long-term excessive consumption of fluoride.
- It is endemic in areas with a high level of fluoride occurring naturally in the water.
- Clinically, it can vary from faint white opacities to severe pitting and discoloration.
- Histologically, it is caused by increase porosity in the outer third of the enamel.
- The degree of mottling/fluorosis increase as the concentration of fluoride (parts per million (ppm)) in the water supply increases.

2. Toxicity:

- Safely tolerated dose (STD).
- Dose below which symptoms of toxicity are unlikely = 1mg/kg body weight.
- Potentially lethal dose (PLD).
- Lowest dose associated with a fatality.
- Patient should be hospitalized = 5mg/kg body weight.
- Certainly, lethal dose (CLD).
- Survival unlikely = 32–64mg/kg body weight

⇒ **Fluoride concentration in various products:**

∂ Standard fluoride (F) toothpastes:

▽ 1000ppm F = 1mg F/mL.

▽ 1500ppm F = 1.5mg F/mL.

∂ Daily fluoride mouthrinse 0.05% NaF = 0.023% F = 0.23mg F/mL.

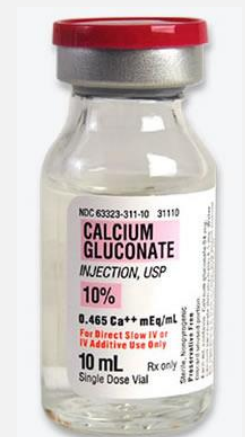
∂ Acidulated phosphate fluoride (APF) gel 1.23% F = 12.3mg/mL.

∂ Fluoride varnish 5% NaF = 2.26% F = 22.6mg/mL.

➤ To reach the 5mg F/kg threshold (requiring hospitalization) a 5yr-old (about 19kg) would have to ingest 95 (1mg F) tablets, 63mL of 1500ppm toothpaste, or 7.6mL of 1.23% of APF gel.

➤ **Antidotes:**

- 5mg F/kg body weight—refer to hospital quickly for gastric lavage.
- If any delay gives intravenous (IV) calcium gluconate and an emetic.



+ Planning fluoride therapy:

1. Systemic fluoride:

a. Water fluoridation:

- At 1ppm (1mg F per litre), water fluoridation reduces caries by 50%.
- The main advantages are systemic and topical effect; no effort is required on the part of the individual; and the low cost.
- In some countries school water has been fluoridated, but a concentration of 5ppm is required to offset the less frequent intake.

b. Fluoride drops and tablets:

- The regimen (mg F per day) depends upon drinking water content.
- This approach can be almost as effective as fluoridated water but requires good parental motivation.
- Unfortunately, compliance is generally poor, so benefit as a public health measure is questionable.

Table 2.1 Daily fluoride supplementation

Age	mg F per day
6 months to 3yrs	0.25
3yrs to 6yrs	0.5
>6yrs	1.0

c. Milk: 2.5–7ppm F has been tried successfully.

d. Salt: Cheap and effective for rural communities in developing countries where water fluoridation is not feasible.

2. Topical fluoride:

- Professionally applied fluorides: Gels or foams applied in trays
- Rinsing solutions: contraindicated in children <7
- Toothpastes: Aid tooth cleaning, but, most importantly, provide fluoride.
- Fluoride: Most toothpastes contain sodium monofluorophosphate &/ or NaF, in concentrations of 1000–1500ppm (1–1.5mg per 1cm of paste).
- Anti-calculus agents: sodium pyrophosphate, can d calculus formation by 50%.
- Desensitizing agents: 10% strontium or potassium chloride, or 1.4% formaldehyde.
- Antibacterial agents: triclosan.

Fissure sealants:

- A fissure sealant is a material that provides an impervious barrier to the fissure system to prevent the development of caries.

⇒ Types of fissure sealant:

- Sealants can be classified by polymerization method (light- or self-cure), resin system (Bis-GMA or urethane diacrylate), colour (clear or tinted), and whether they are filled or unfilled.
- The choice is one of personal preference; however, it has been pointed out that coloured/opaque sealants are more readily obvious to the patient, and it is more noticeable if the sealant has been lost.
- An advantage of clear sealants is that they may allow visualization of decay through the resin.
- The retention rates of the different types are similar: success depends upon maintaining an absolutely dry field during application.
- GI sealants do release fluoride but have poorer retention than resin sealants.
- They are useful for high caries-risk children as a temporary sealant where adequate isolation for successful placement of resin-based sealants is not possible, partially erupted teeth/poor cooperation.

Resin fissure sealant technique:

- Prophylaxis (this may be omitted if the tooth is already relatively free from plaque).
- Isolate and dry the tooth.
- Etch for the time recommended by the manufacturer (usually 20–40sec) with 30–50% phosphoric acid.
- Wash thoroughly, re-isolate, and dry well. If salivary contamination occurs or parts of the surface have not etched well, re-etch.
- Application of a suitable enamel bonding agent may improve retention.
- Apply f/s (method depends upon delivery system).
- After polymerization try to remove the sealant.

⇒ If satisfactory, occlusal adjustment is usually not required unless a large volume has inadvertently been applied or a filled resin is used.

Follow-up:

- F/s should be monitored clinically and where appropriate, radiographically (b/w).
- Defective sealants should be replenished to maintain their marginal integrity.

The End