牙齒之發育與蛀牙

臉部之發育

牙齒之發育

➢ 牙齒之發育可分為
1. Bud stage
2. Cap stage
3. Bell stage
4. 牙本質之沉積與鈣化
5. 萌發

牙齒之發育

Oral epithelium
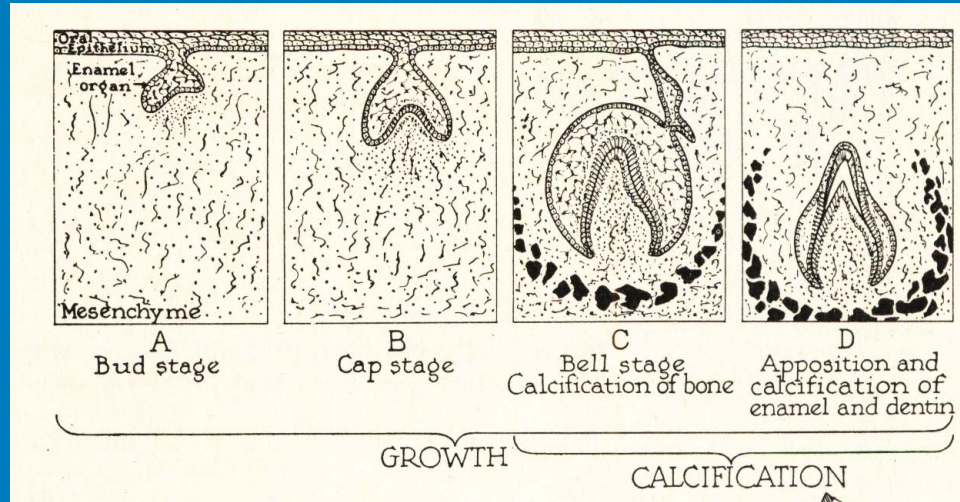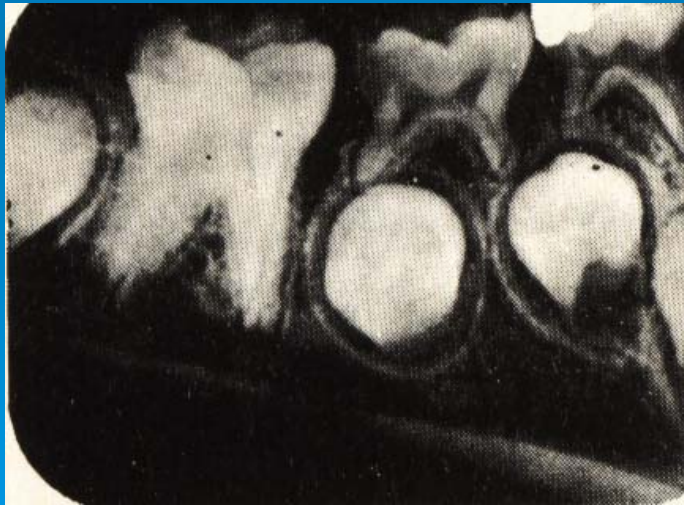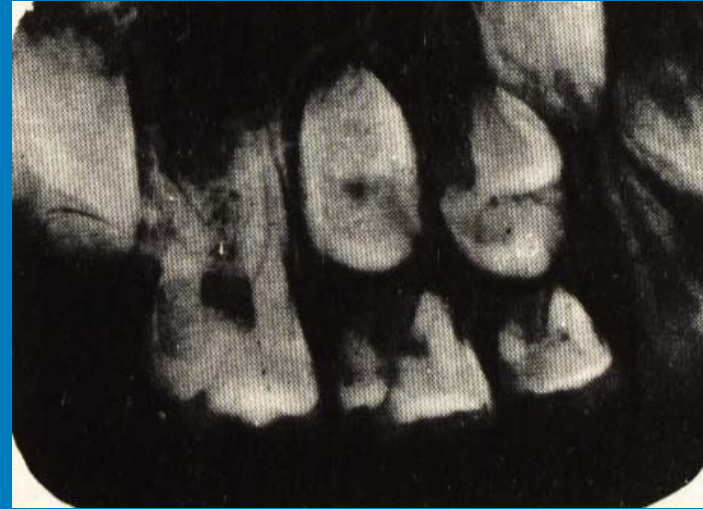Enamel organ
Mesenchyme

| A Bud stage | B Cap stage | C Bell stage Calcification of bone | D Apposition and calcification of enamel and dentin |

GROWTH   CALCIFICATION

| E (Intra-osseous) | F (Into oral cavity) | G | H |

Dentin   Pulp   Dentin   Cementum   Dentin

ERUPTION   ATTRITION

牙齒之發育

乳牙之發育

5 months in utero

7 months in utero

PRENATAL
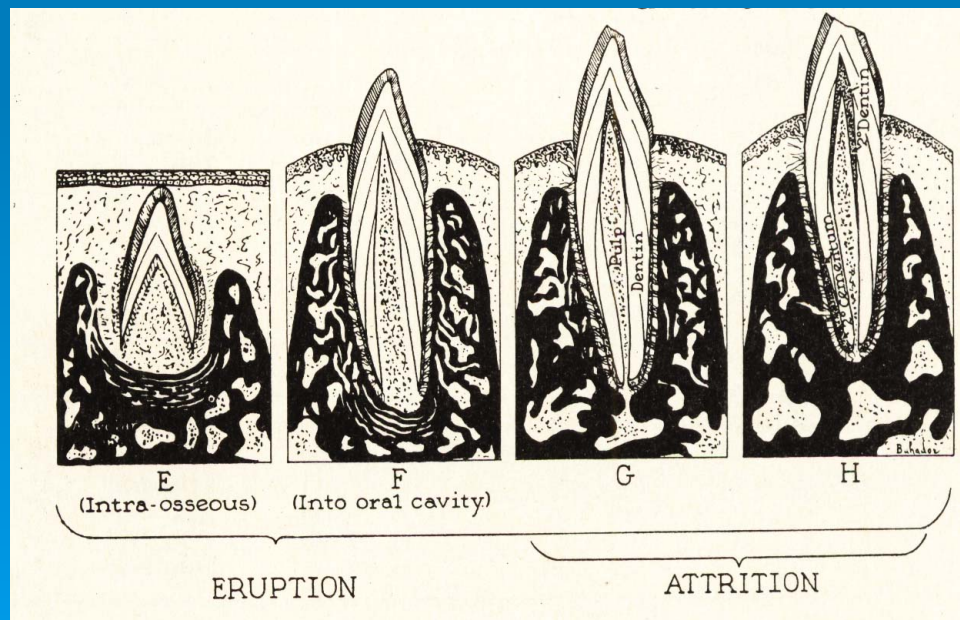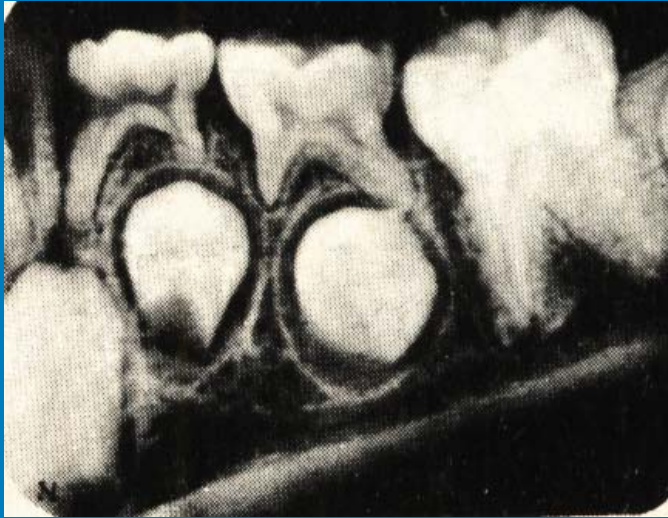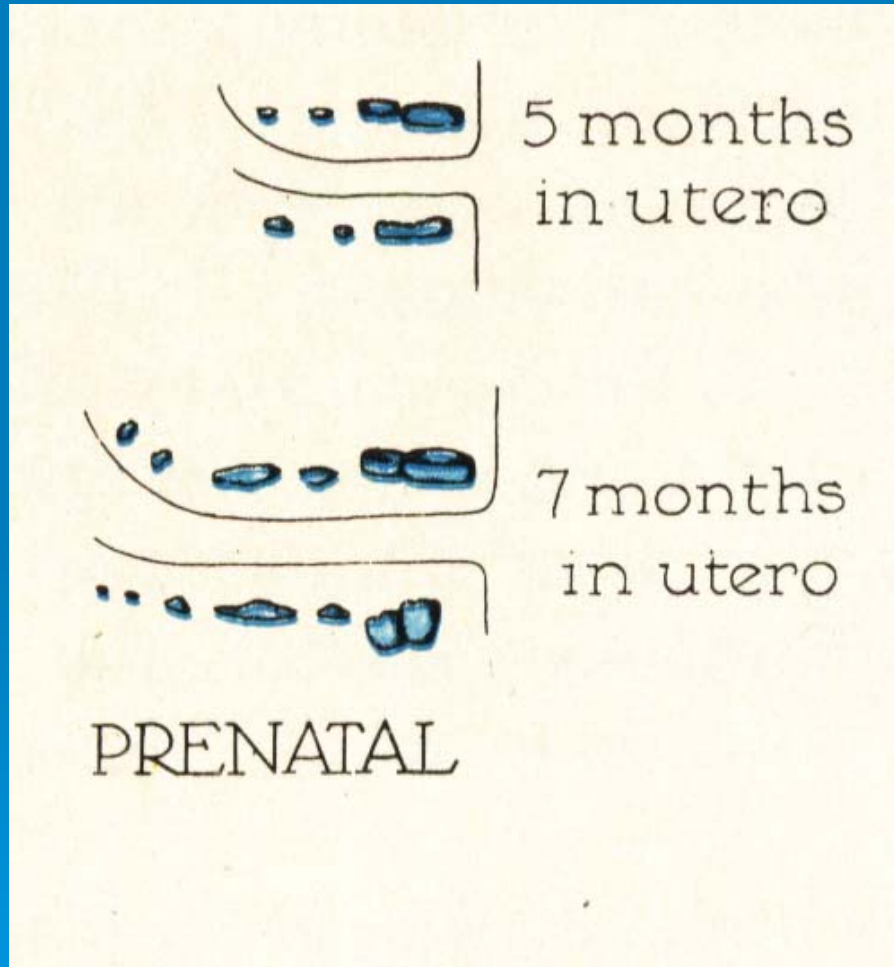
➢ 胚胎的第四個月乳牙開始鈣化

➢ 胚胎的第六個月所有乳牙都開始發育

乳牙牙齒之發育

Birth

6 mos.
(±2 mos.)
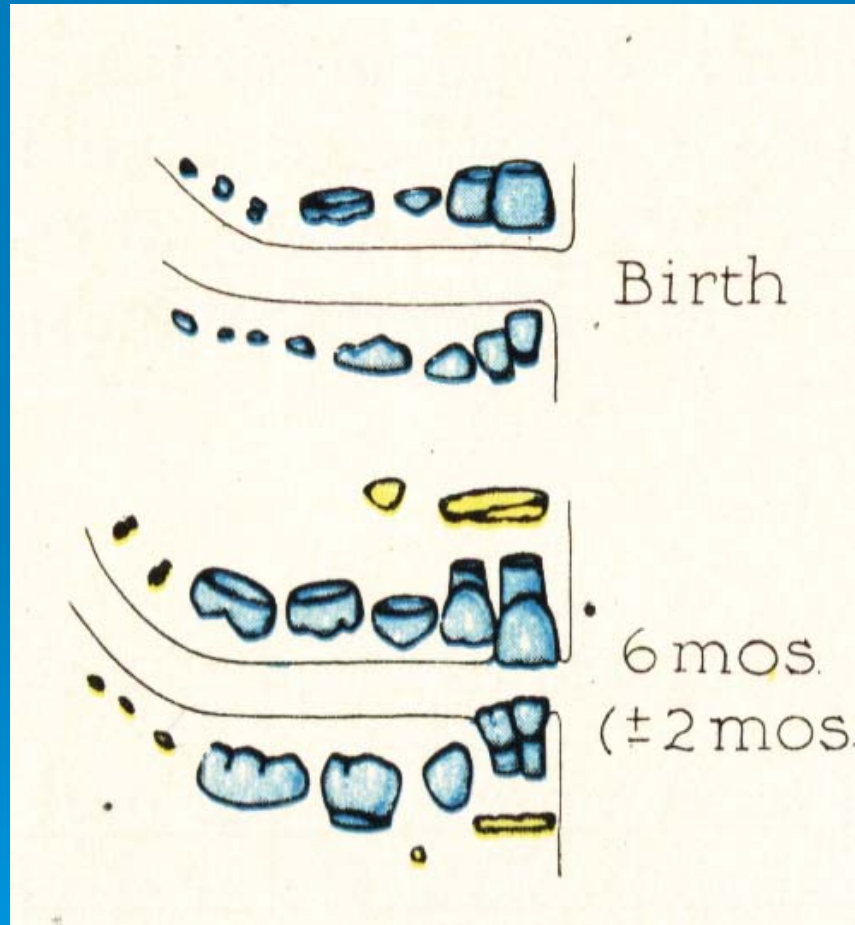
➤ 出生後六個月下顎正中門牙首先萌發

➤ 出生後七個月上顎正中門牙萌發

乳牙牙齒之發育

9 mos.
(±2 mos.)
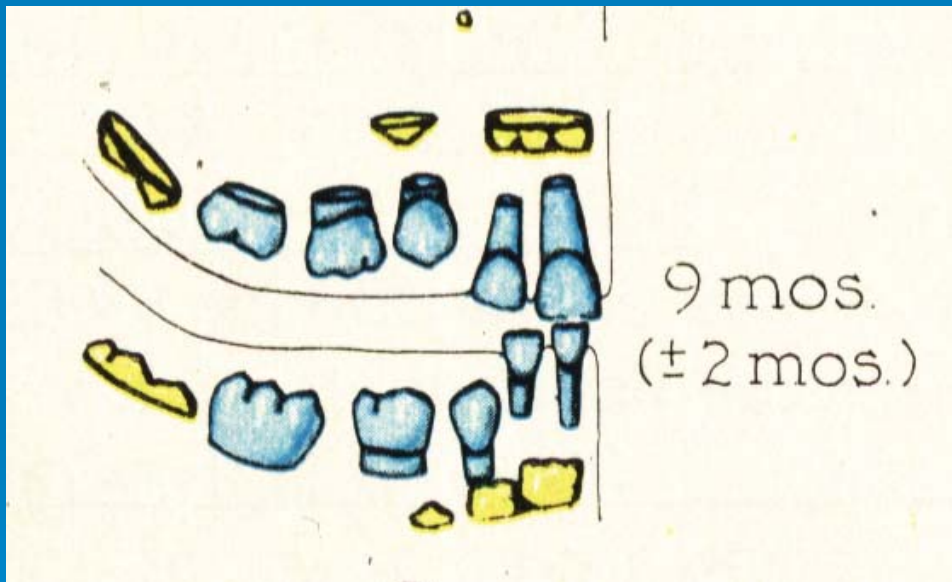
➢ 出生後八個月下顎側門牙萌發

乳牙牙齒之發育

1 year
(±3 mos.)
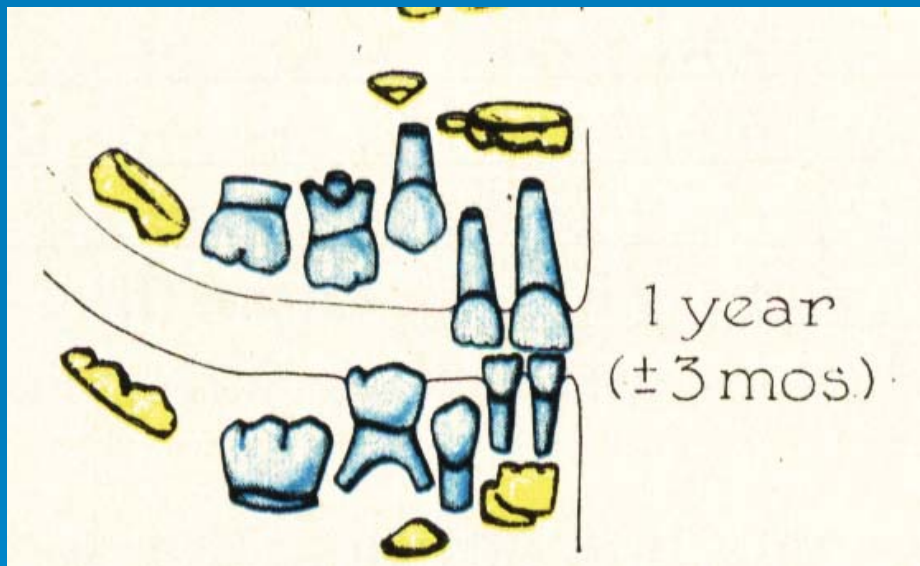
➤ 一歲左右乳牙第一臼齒萌發

乳牙牙齒之發育

> 一十六個月左右乳牙犬齒萌發

> 兩歲左右所有乳牙應已萌發

乳牙牙齒之發育

➢ 乳牙萌發的順序大致如下：

➢ 正中門牙→側門牙→第一臼齒→犬齒→第二臼齒

➢ 乳牙萌發的順序通常是下顎牙齒先，上顎牙齒後，而且是左右對稱。

成人永久牙齒之發育

成人永久牙齒之發育

6 years (±9 mos)
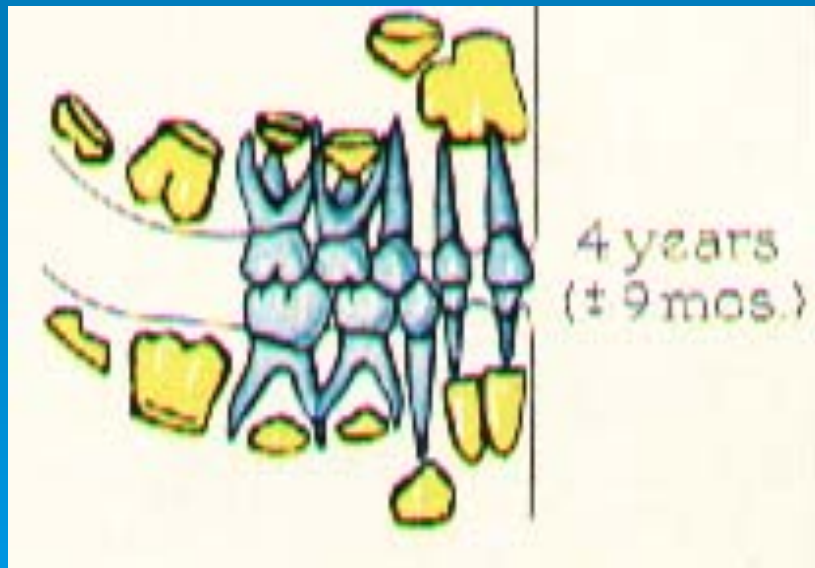
➤ 第一顆萌發的成人永久牙齒為第一大臼齒

➤ 通常六歲時於乳牙第二臼齒的遠心側萌發

成人永久牙齒之發育

7 years
(± 9 mos.)
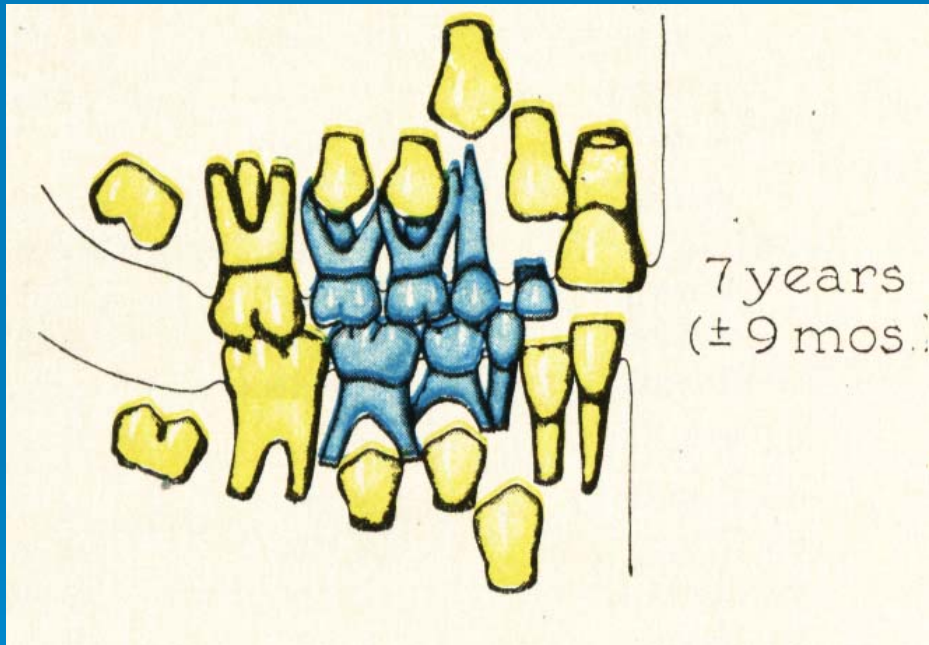
➢ 第二顆萌發的成人永
久牙齒為六至七歲萌
發的正中門牙

➢ 通常下顎的牙齒會比
上顎的早

成人永久牙齒之發育

➢ 永久牙萌發的順序如下：

第一大臼齒→下顎正中門牙與側門牙→
上顎正中門牙→上顎側門牙→下顎犬齒→第
一小臼齒→第二小臼齒→上顎犬齒→
第二大臼齒→第三大臼齒
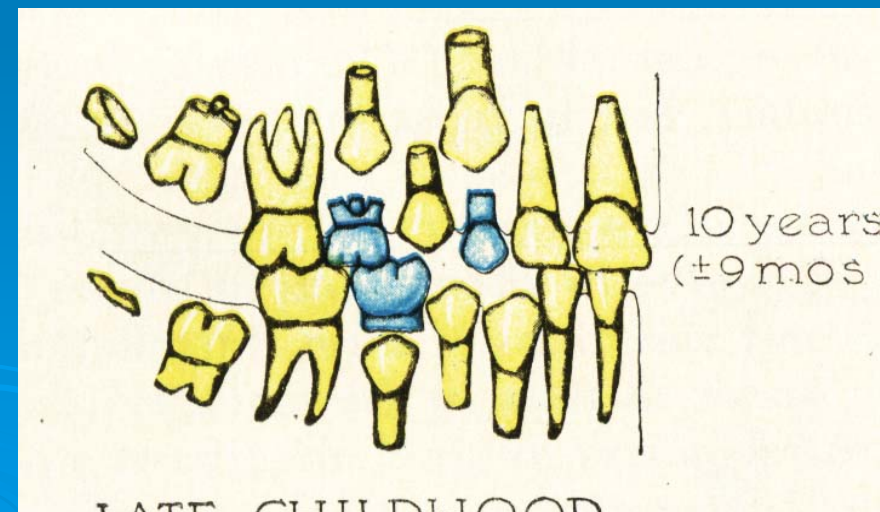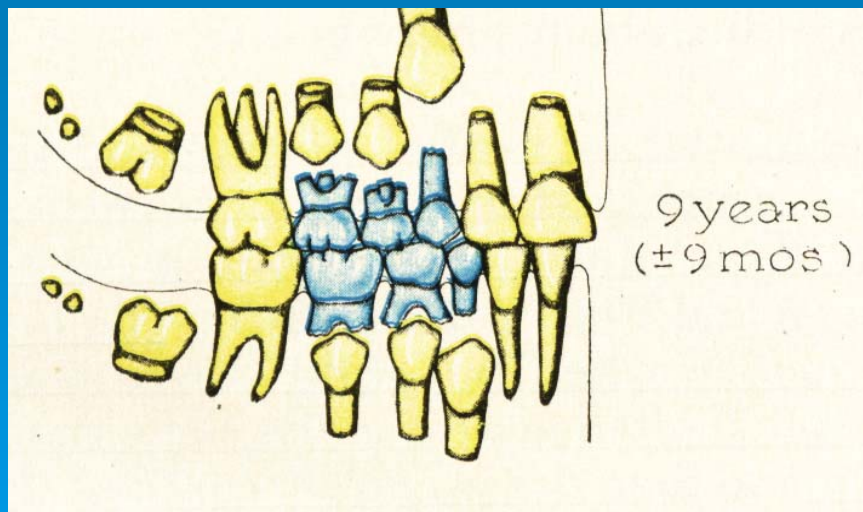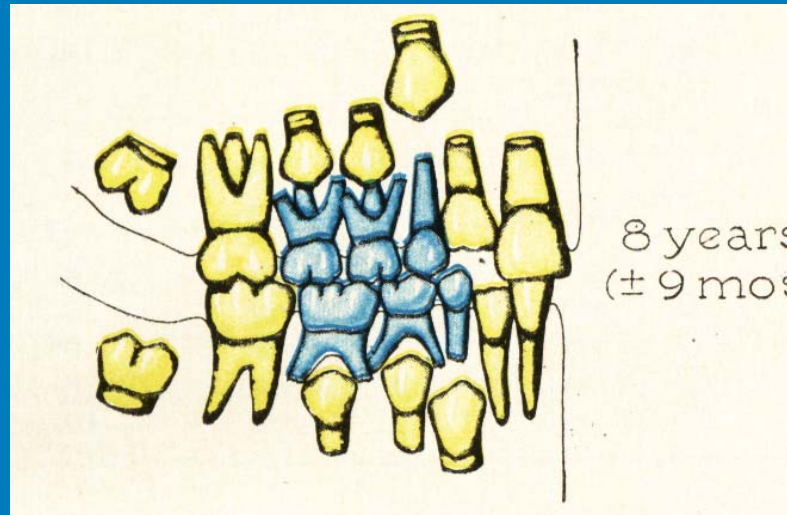
成人永久牙齒之發育

成人永久牙齒之發育
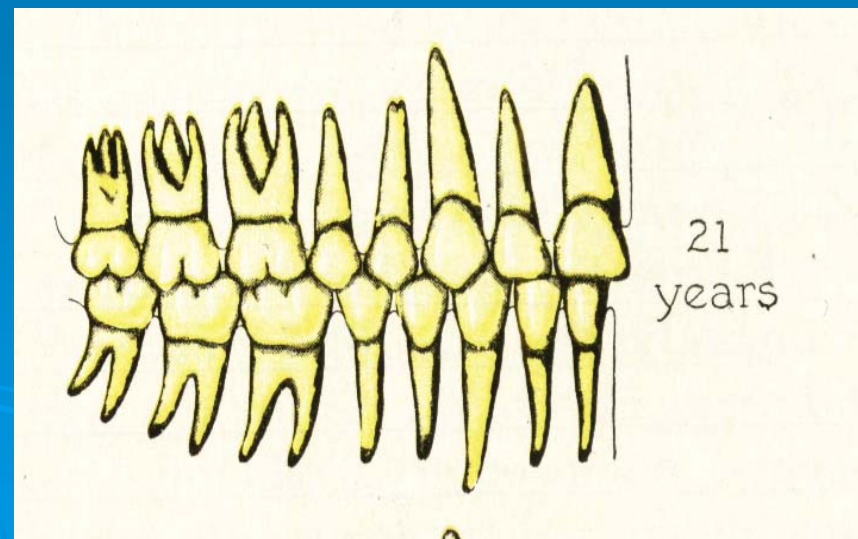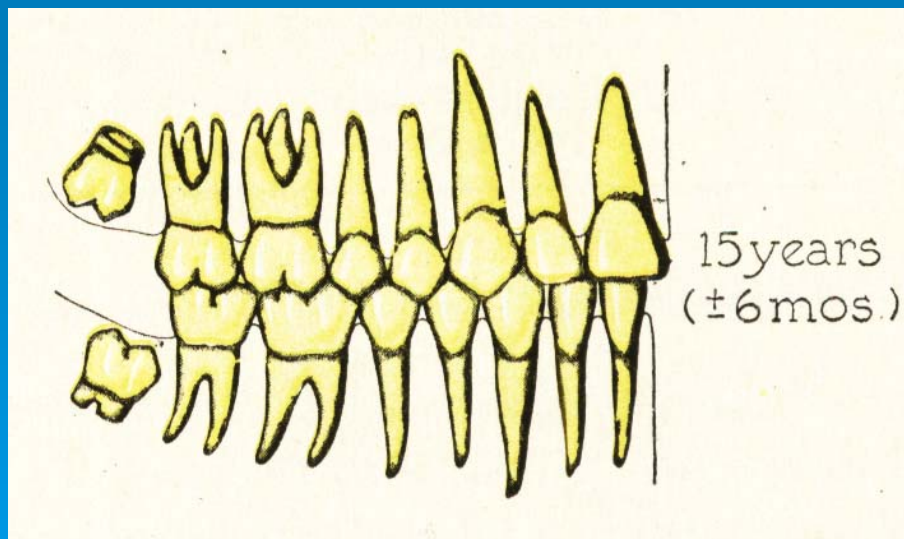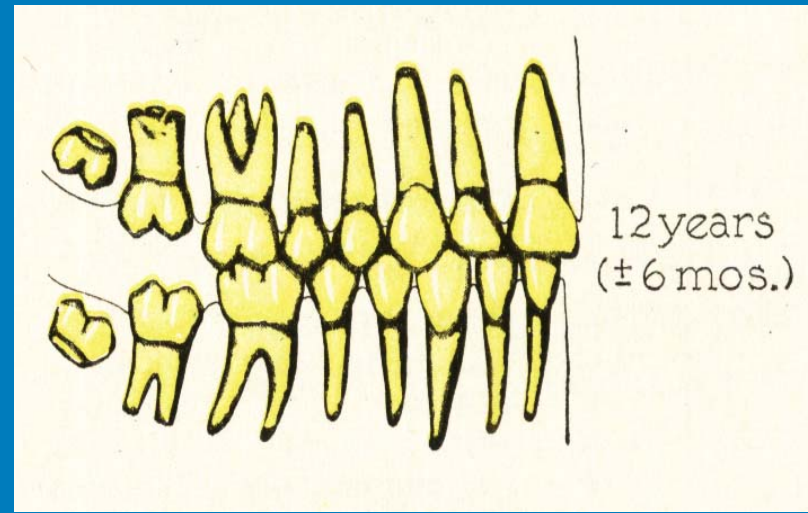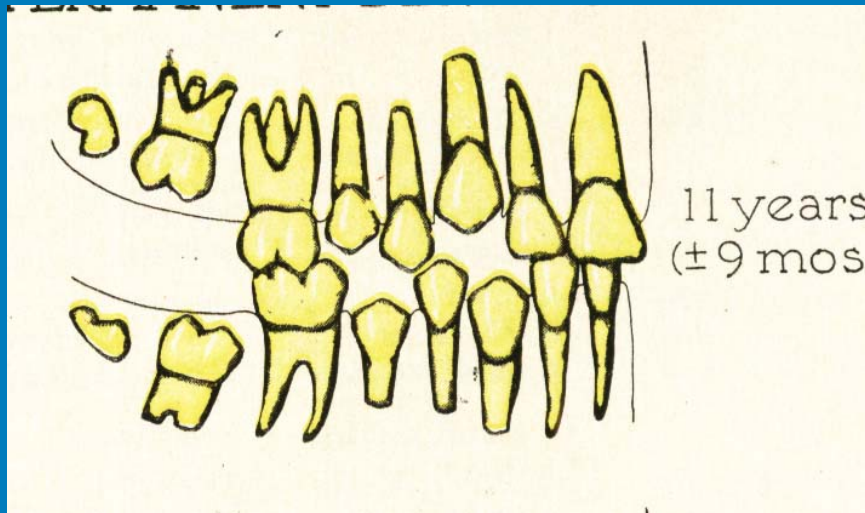
正常歯列

正常齒列

上顎牙齒咬合面

下顎牙齒咬合面

Dental caries - 齲蝕 (蛀牙)

齲蝕 (蛀牙)

➢ 齲蝕 (蛀牙)是人類最普遍的疾病

➢ 齲蝕的發生與飲食有密切關聯

➢ 已開發國家之齲蝕發生率於1980年代達到高峰，然後開始下降。

➢ 微量氟化物的使用是齲蝕發生率下降的主要原因。

齲蝕 (蛀牙)

➢ 齲蝕發生率於社會經濟下層社區依然偏高。
➢ 約**80%**的齲蝕發生於社會經濟下層社區之小孩。

齲蝕 (蛀牙)

➢ 齲蝕 (蛀牙)是細菌引起的感染性疾病。

➢ 齲蝕的症狀是牙齒鈣化組織的溶解破壞。

➢ 齲蝕只發生於含有大量細菌之牙菌斑下。

➢ 細菌代謝碳水化合物產生大量酸而溶解破壞牙齒。

Dental Caries

➤ Dental caries is an infectious microbiological disease of the teeth that results in localized dissolution and destruction of the calcified tissues.

➤ While symptomatic treatment is important, failure to identify and treat the underling causes will allow the disease to continue.

Dental Caries

- Carious lesions only occur under a mass of bacteria capable of producing a sufficiently acidic environment to demineralize tooth structure.

- A gelatinous mass of bacteria adhering to tooth surface is termed dental plaque.

Dental plaque

➢ The soft tenacious material found on tooth surfaces which is not readily removed by rinsing with water.

➢ The plaque bacteria metabolize carbohydrates for energy and produce organic acids as a by-product.

Dental Plaque (牙菌斑)

牙菌斑 →

牙菌斑 ←
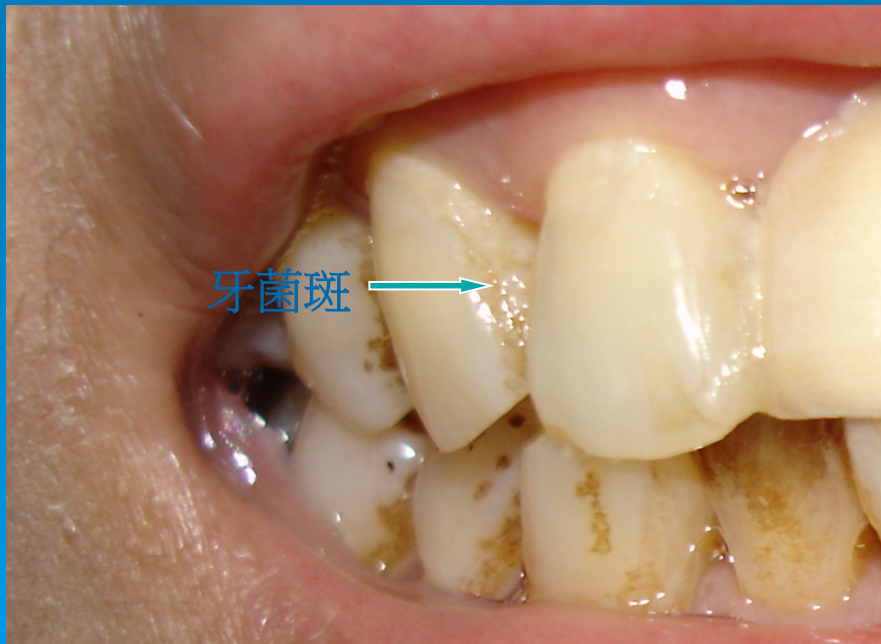
Dental plaque (牙菌斑)
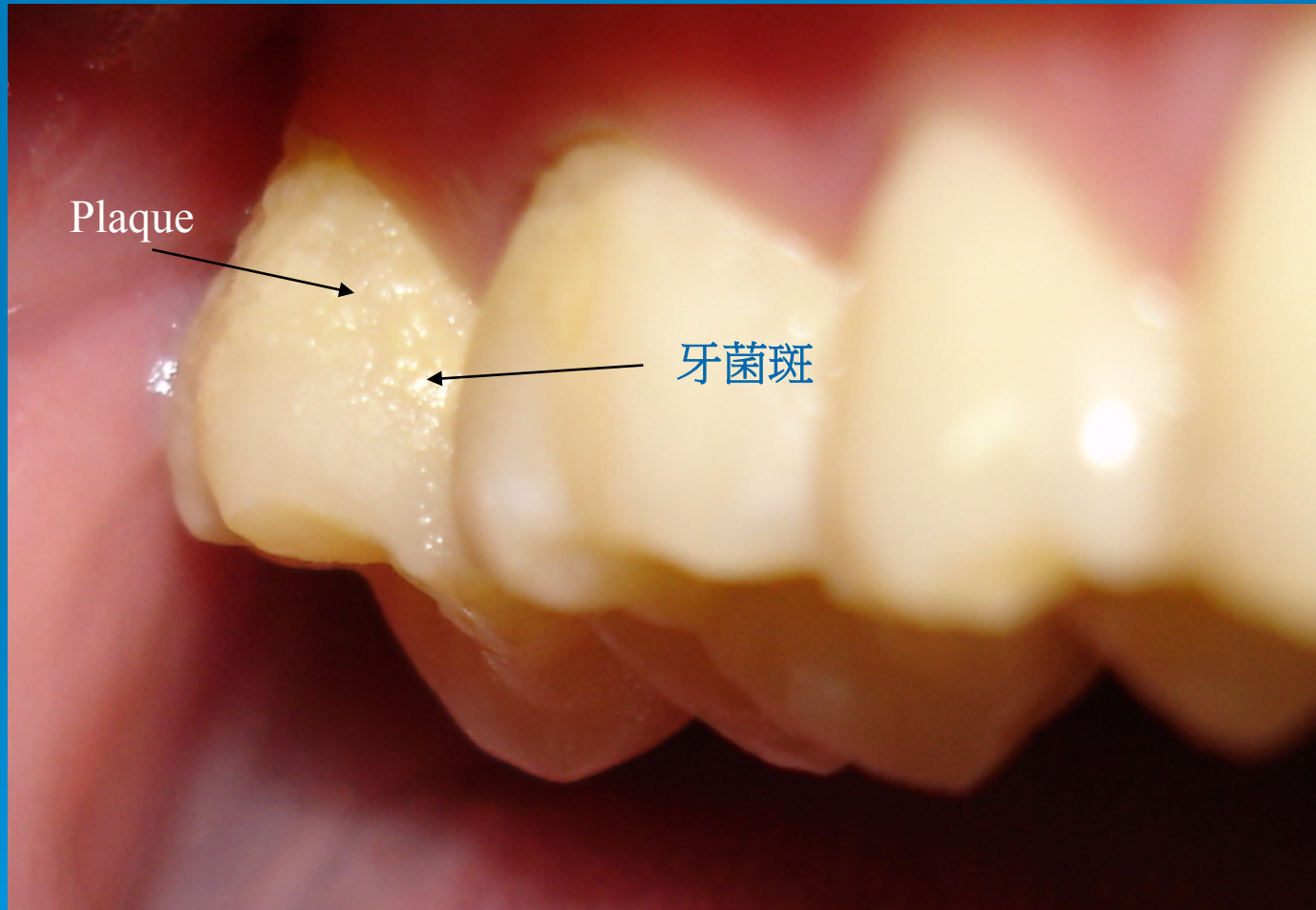
Dental plaque (牙菌斑)

➢ 牙菌斑是非常黏稠的膠狀物質黏著於牙齒表面。

➢ 牙菌斑只能以機械式的方式去除，如刷牙。

➢ 牙菌斑無法以沖水方式去除，如漱口或沖牙機。

Dental plaque (牙菌斑)

➢ 牙菌斑的產生首先須有細菌附著於牙齒表面。

➢ 口腔內有超過300種的細菌，但只有變性鏈球菌能附著於牙齒表面引起蛀牙。

Microflora

- Mutans Streptococci are the most important microorganisms in the initiation of enamel caries.

- A. viscosus is the most important microorganisms in the initiation of root caries.

- Lactobacilli is the most important microorganisms in the progression of dentinal caries.

引起齲蝕的主要因素

➢ 細菌
➢ 牙齒
➢ 食物 – 碳水化合物
➢ 時間

去礦物質化

➢ Below the critical pH (5.5), the tooth mineral acts as a buffer and loses calcium and phosphate ions into the plaque.

➢ At a pH of 5.0, the surface maintains intact while the subsurface mineral is lost.

➢ At a pH of 4.0 or 3.0, the surface of enamel is etched and roughened.

脫鈣

➢ 牙齒表面之酸鹼值低於5.5時，牙齒的鈣與磷離子開始解離。

➢ 牙齒表面之酸鹼值低於5.0時，牙齒內層的鈣與磷離子開始解離。

➢ 牙齒表面之酸鹼值低於4.0時，牙齒的表面被破壞而變不可逆的粗造。

唾液

➢ 唾液是避免齲蝕最主要的機轉。

➢ 唾液最主要的功能是中和口腔牙齒表面的酸鹼值與促進脫鈣的牙齒組織再鈣化。

➢ 當口腔內牙齒表面的酸鹼值高於**5.5**時，脫鈣的牙齒組織即進行再鈣化。

➢ 避免齲蝕最主要的方法是增加牙齒再鈣化的時間，減少牙齒脫鈣的時間。

唾液

➢ Salivary protective mechanisms include bacterial clearance, direct antibacterial activity, buffers, and remineralization.

➢ The flushing effect of salivary flow is adequate to remove all microorganisms not adhere to an oral surface.

➢ Antibacterial activity has little effect on caries.

Buffers

➢ The volume and buffering capacity of saliva have major roles in caries protection.

➢ The buffering capacity of saliva is primary determined by the concentration of bicarbonate ion.

➢ The benefit of the buffering is to reduce the potential for acid formation.

去礦物質化

➤ Below the critical pH (5.5), the tooth mineral acts as a buffer and loses calcium and phosphate ions into the plaque.

➤ At a pH of 5.0, the surface maintains intact while the subsurface mineral is lost.

➤ At a pH of 4.0 or 3.0, the surface of enamel is etched and roughened.

再礦物質化

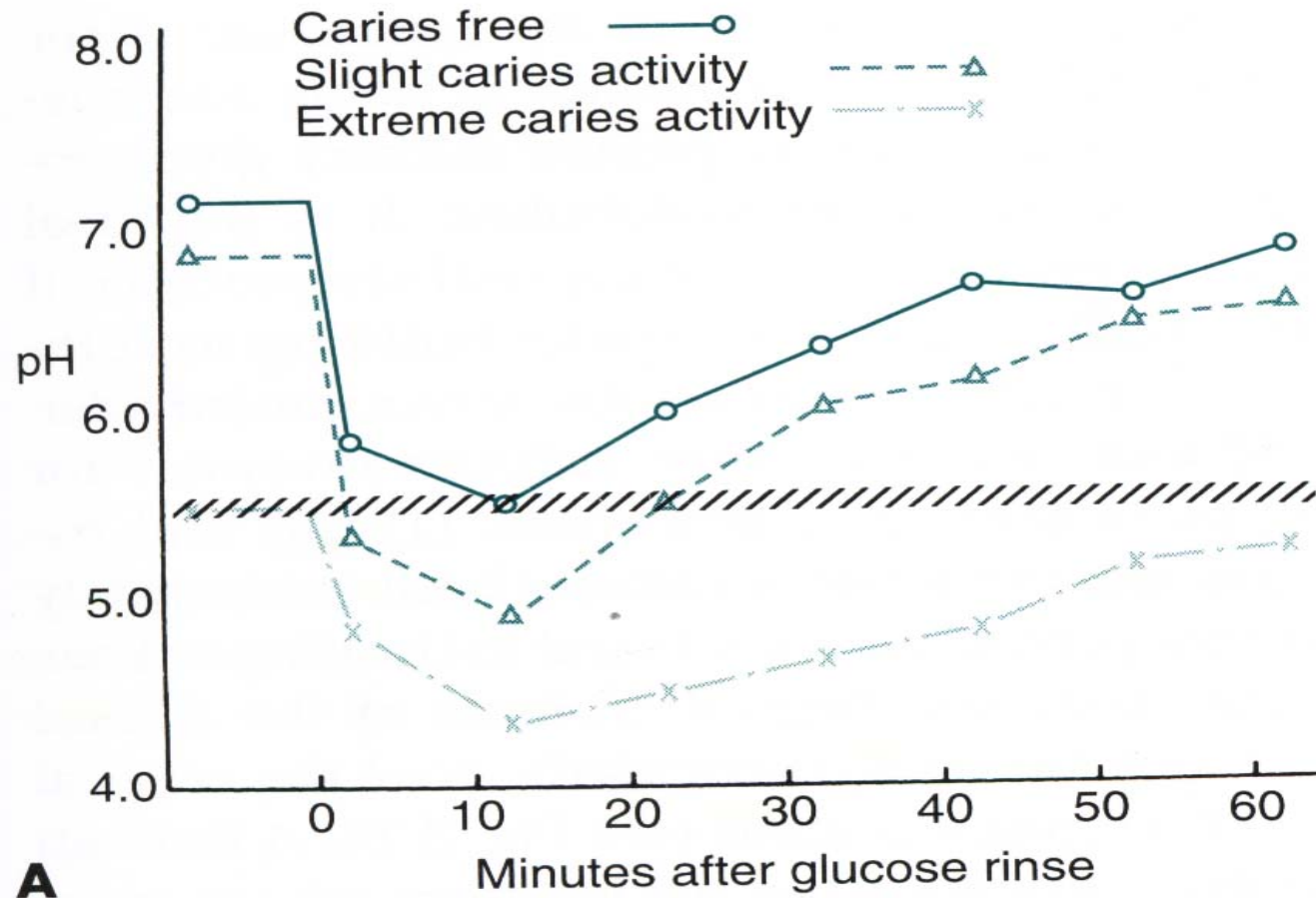➢ When the local pH is higher than 5.5 and calcium and phosphate ions are present, the demineralization of enamel may be reversed by remineralization of the damaged enamel.

食物對齲蝕的影響

➢ 蔗糖是最容易引起齲蝕的醣類。

➢ 引起牙釉質脫鈣之酸鹼值為5.5-5.0。

➢ 引起牙本質(牙根)脫鈣之酸鹼值為6.2-6.7。

➢ 以糖水漱口一次，會使口腔內牙齒表面之酸鹼值低於5.5，並維持60分鐘。

pH values after glucose rinse

食物對齲蝕的影響

➢ 引起蛀牙最主要的原因是時常或長時間吃含糖食物或飲料。

➢ 飯後咀嚼木醇糖(Xylitol)口香糖5分鐘，可中和口內酸鹼值，降低齲蝕的發生。

Dietary factors of dental caries

➢ Consumption of raw starch has little effect on the pH of plaque.

➢ Consumption of soluble (cooked) starch, such as bread or crackers, may easily causes the drop of pH 5.5 to 6.0, levels which is critical for initiation of dental caries.
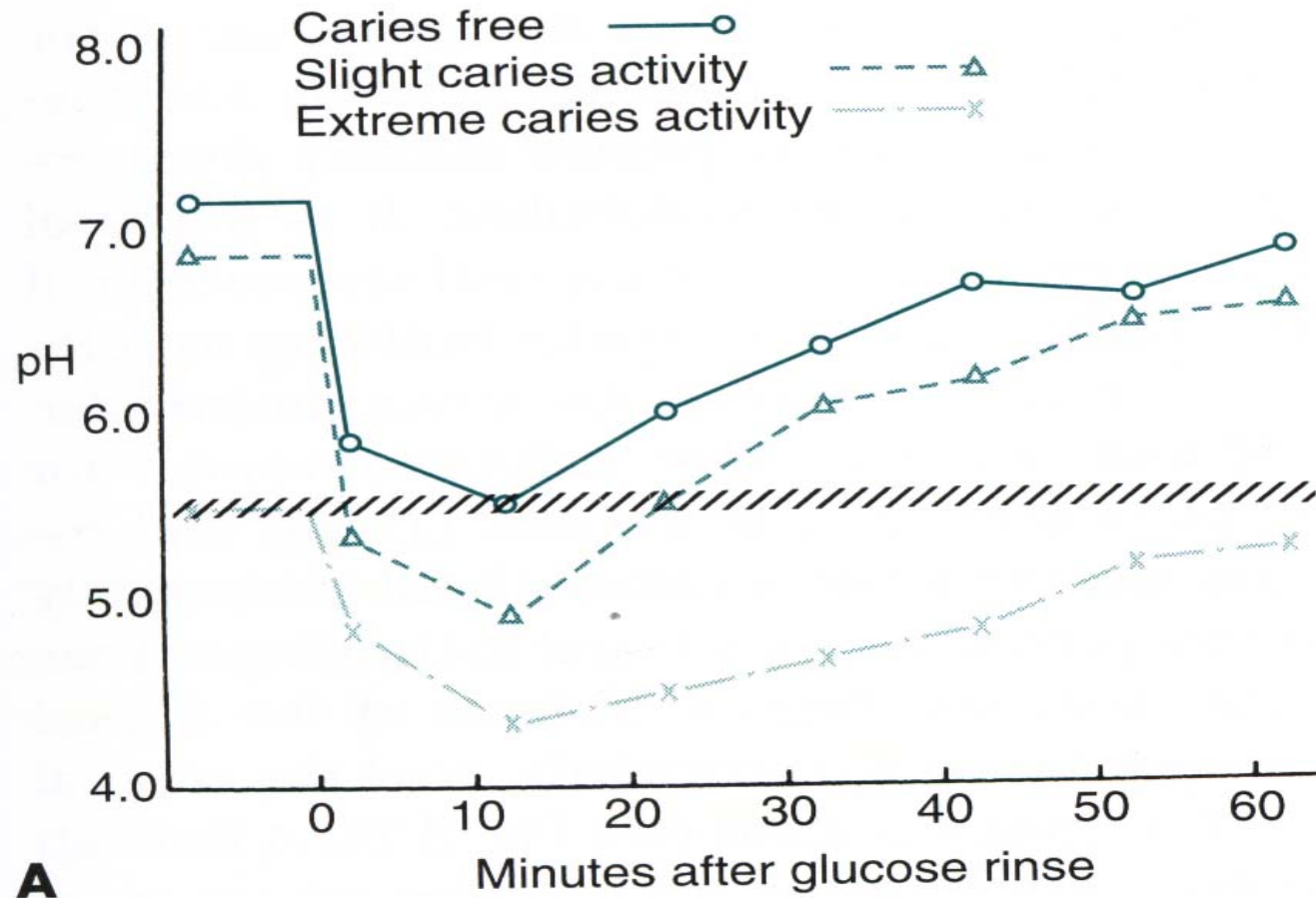
Role of sucrose on dental caries

➢ Sucrose is regarded as the most common dietary sugar and is largely responsible for dental caries.

➢ Sucrose also occurs naturally in fruits.

➢ Sucrose in considered to be more cariogenic than other sugars.

pH values for demineralization

➢ Demineralization of enamel occurs in the pH range 5.0 to 5.5.

➢ Demineralization of dentin occurs in the pH range 6.2 to 6.7.

➢ A single sucrose rinse can produce pH depression lasting up to 1 hour.

pH values after glucose rinse
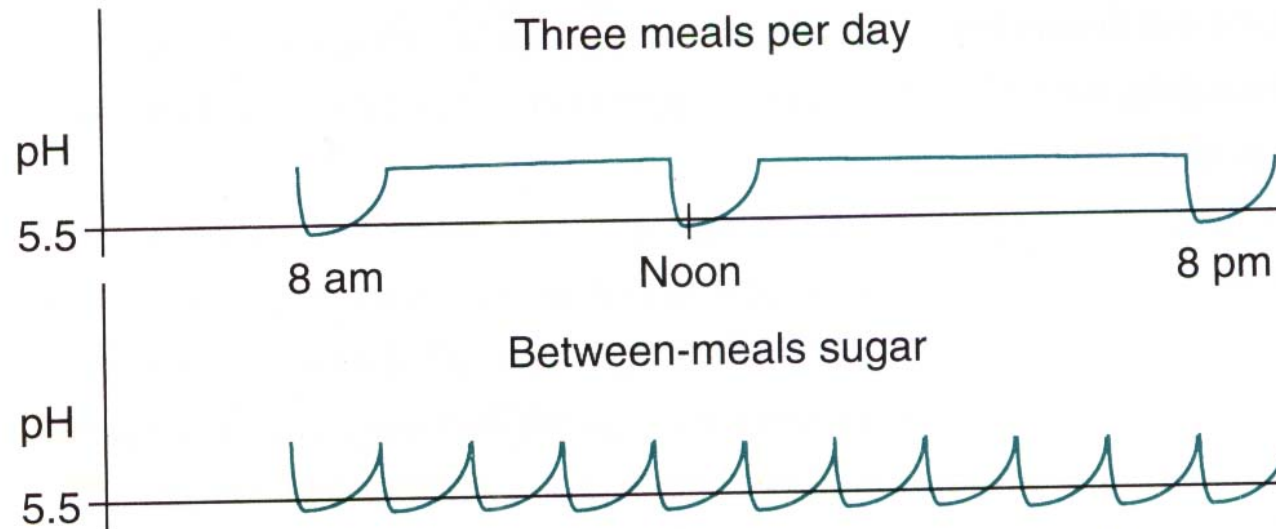
Role of sucrose on dental caries

> High frequency sucrose exposure is the single most important factor in producing a cariogenic plaque.

pH values after meals

Effect of Frequency of Ingestion of
Sugary Foods on Caries Activity

Xylitol gum

- Xylitol is a natural five-carbon sugar obtained from birch trees.
- Xylitol keeps the sucrose molecule from binding with MS.
- MS can not metabolize xylitol.
- It is recommended to chew a piece of xylitol gum after eating for 5 to 30 minutes.

Xylitol gum

> Chewing any sugar-free gum after meals reduces the acidogenicity of plaque because chewing stimulates salivary flow, which improves the buffering of the pH drop that occurs after eating.

Caries vs carbohydrates
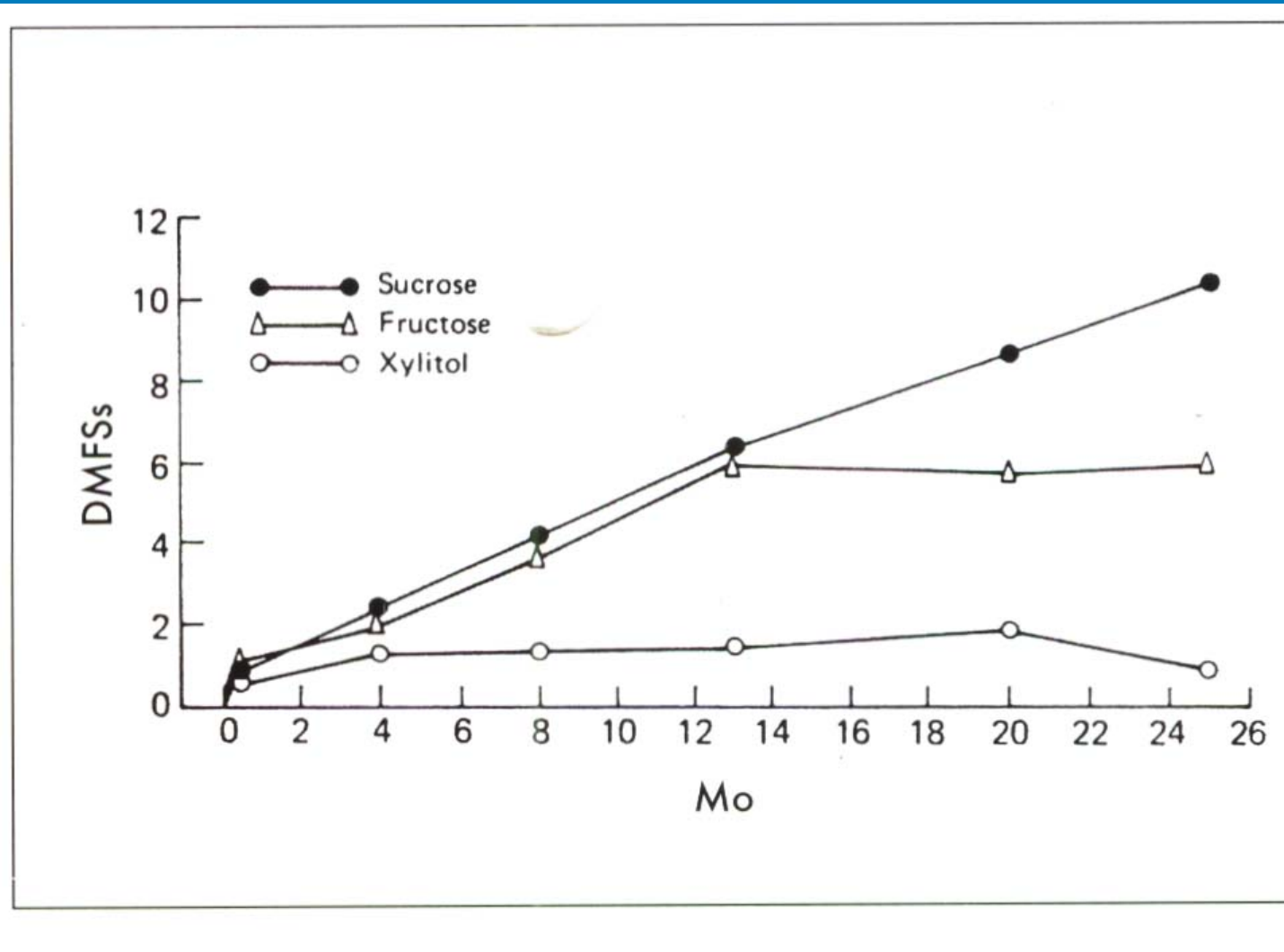
容易發生蛀牙的牙齒位置

➢ 小溝裂縫
➢ 牙齒鄰接面下緣
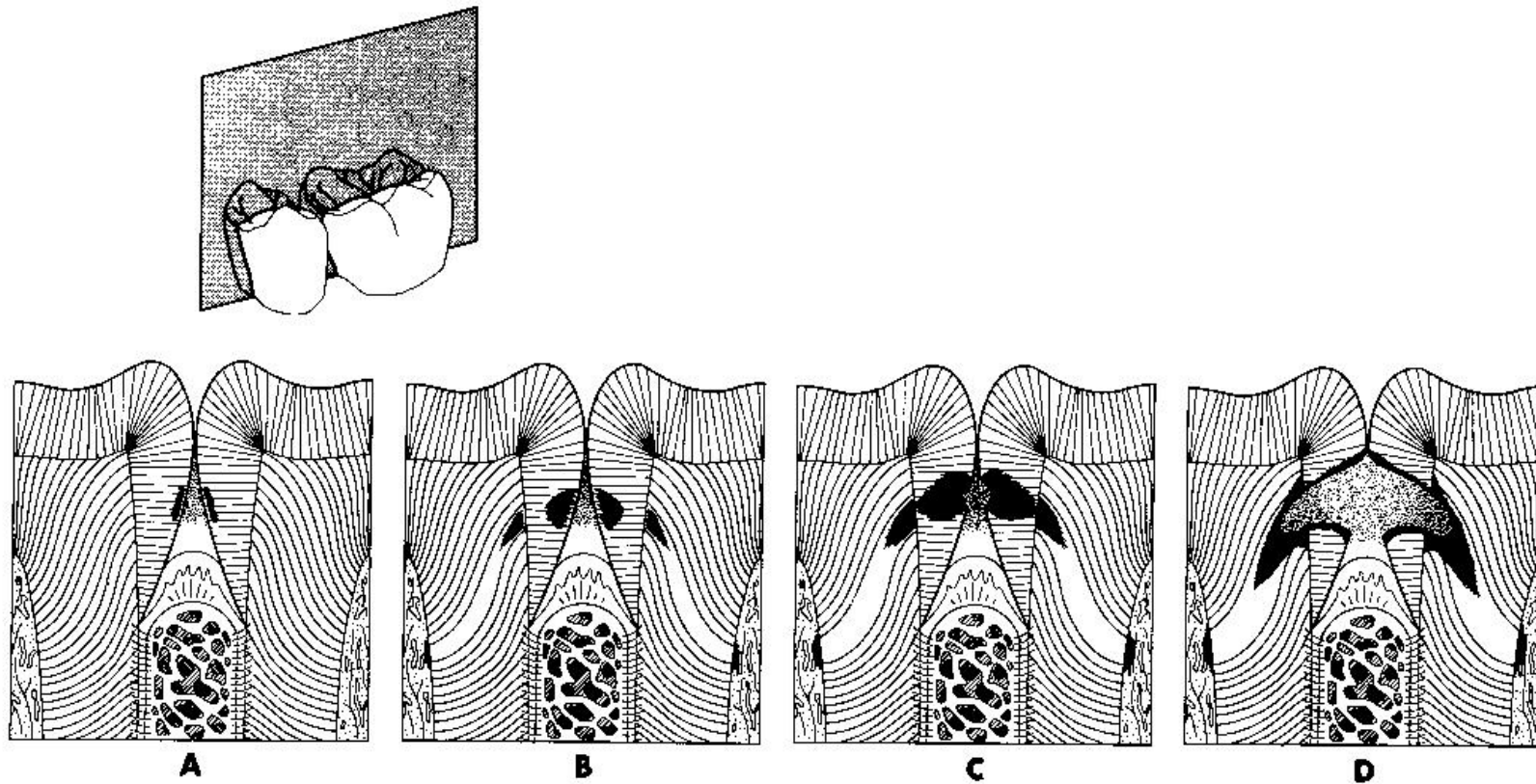➢ 牙根面
➢ 牙齦下

咬合面小溝裂縫蛀牙

蛀牙

Pit and fissure caries

牙齒鄰接面下緣蛀牙

前牙鄰接面齲蝕〈蛀牙〉

前牙鄰接面齲蝕〈蛀牙〉

前牙鄰接面齲蝕〈蛀牙〉
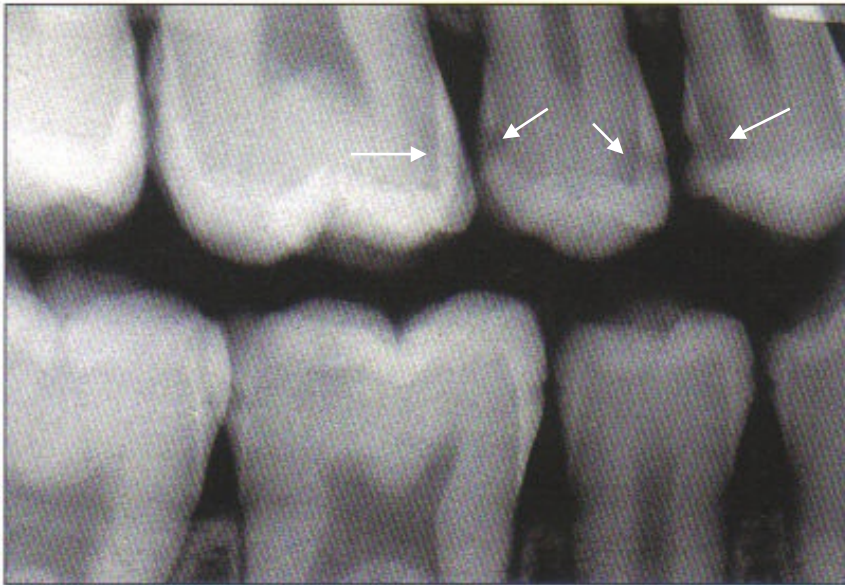
後牙鄰接面齲蝕〈蛀牙〉

牙齒鄰接面下緣蛀牙

Figs 4-7a and 4-7b Radiographs showing approximal demineralizations in the outer enamel, to the dentino-enamel junction, and in the outer and inner half of dentin. (Occlusal lesions are visible on teeth 18, 30, and 31, and recurrent caries under the restoration on tooth 14).

牙齒鄰接面下緣蛀牙

蛀牙

蛀牙

牙齒鄰接面下緣蛀牙

蛀牙

牙齒鄰接面蛀牙

齒頸部齲蝕
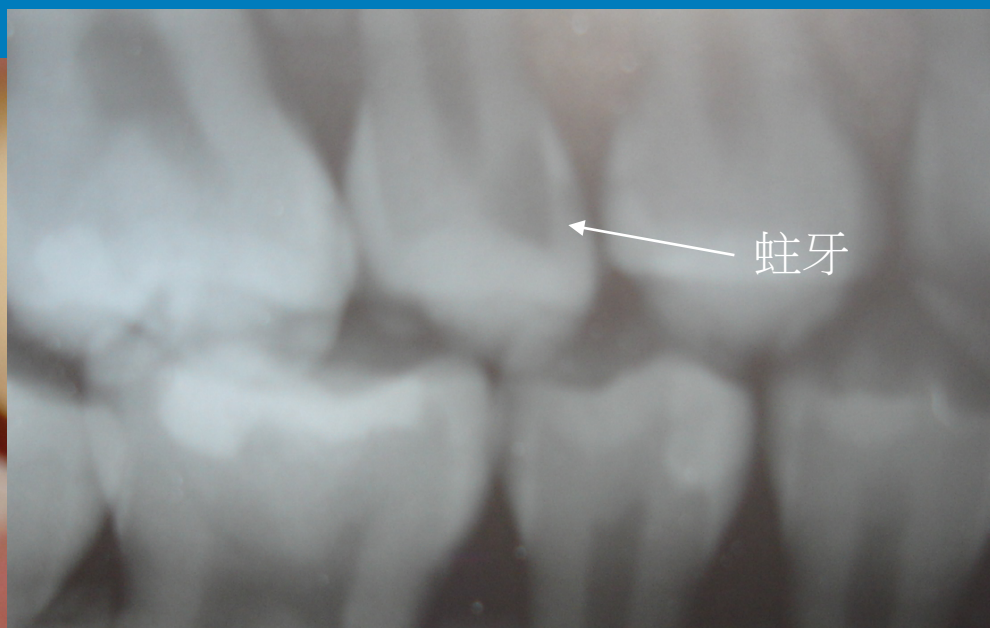
齒頸部齲蝕與復形

齒頸部磨損

Root Caries

AGE	%
18-24	0
35-44	21
45-54	26
55-64	38
65-74	47
75+	56

TABLE 1-3

Periodontal Status/Root Caries

Age	% 1 mm + Recession	% 3 mm + Recession	% Root Caries
18-24	$11\frac{1}{2}$	1	
35-44	46	12	21
45-54		26	26
55-64	78	35	38
≥65	87	46	47

From National Center for Health Statistics: *Plan and operation of the Third National Health and Nutrition Examination Survey: 1988-1994* (DHHS Publication No. [PHS] 94-1308, Series 1, No. 322), Hyattsville, Md, 1994, National Center for Health Statistics.

Root caries

➢ It has been suggested that root caries is likely to become one of the more significant patient management issues of the future.

➢ Greater life expectancies coupled with improved dental care have resulted in an increasing number of patients who retain most of their dentition into old age.

Root caries

➢ Root caries is a problem of increasing importance in the elderly, dentate patient.

➢ Root caries lesions can be initiated only when root surfaces are exposed to the oral environment.

Root caries

> There is a general agreement that the prevalence of root caries will increase in the dentate older population.

Root caries

Location of root caries

Fig 12-1 Root caries lesion on a tooth with gingival recession.

Fig 12-2 Root caries lesion undermining coronal enamel.

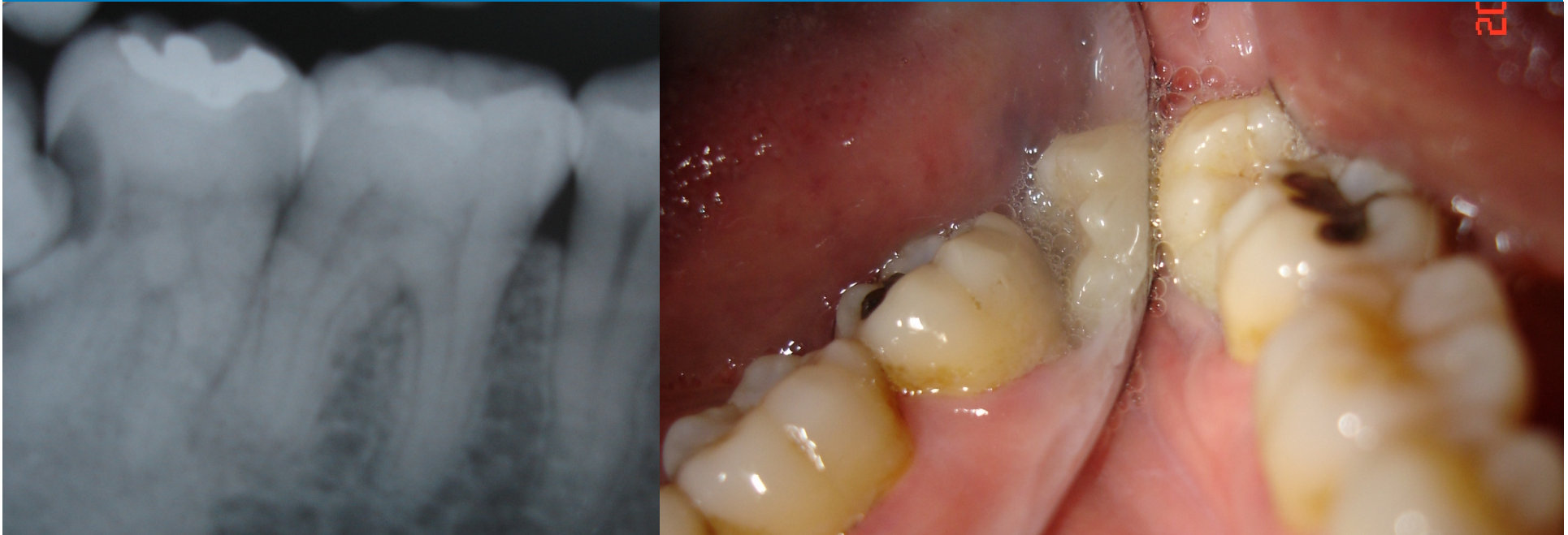**Fig 12-3** Active root caries lesion extending laterally.

Root caries

Root caries

Root caries

Location of root caries

➢ Root caries can occur at the margin of restorations that have their cervical interface on the root surface.

➢ An active root caries lesion usually spreads laterally and may encircle the tooth if let untreated.

Location of root caries

➢ Root caries lesions may occur on any exposed root surface, but initial lesions on the facial and proximal surfaces are most common.

➢ It is common for root caries lesions to be obscured by plaque, food debris, and calculus.

蛀牙的診斷

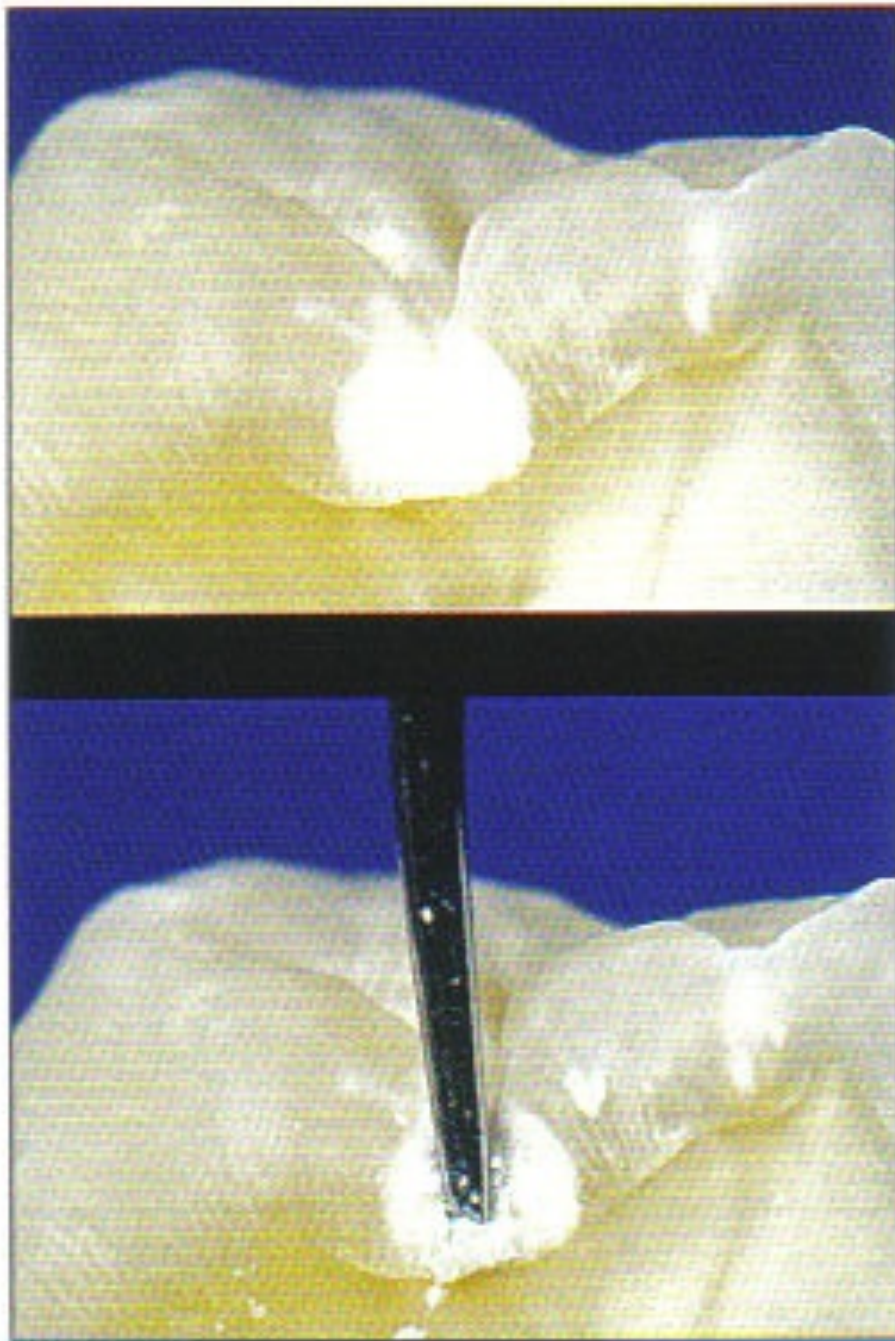➢ Clinical examination-by explore
➢ Radiography

Fig 4-6 The explorer tip can easily damage white spot lesions.

Cries detection by X-ray

enamel　　填補物　　dentin