Dental Caries

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- The three general diseases categories of focus in dentistry are:

- Dental caries
- Periodontal diseases
- Oral cancer

- عرفت منظمة الصحة العالمية نخر الأسنان : بأنه النهج المرضي الموضع على الأسنان بعد بزوغها ويترافق بتلين النسج المتكلسة ومن ثم تشكل بؤرة نخرة تسمى حفرة النخر.
- أما العالم فرانك فقد عرفه بأنه: مرض جرثومي لا نوعي يحدث بسبب جراثيم اللويحة السنية المسؤولة عن تدمير بللورات الهدروكسي أباتيت السنية.

- Dental caries is a dietary bacterial infectious disease with saliva as a critical regulator.

- It is the most common chronic infectious disease of childhood



Caries process takes place in the biofilm on the tooth surface .

Carious lesion is the result of carious process developing between the microbial biofilm and tooth structure

The metabolic activity of the microorganisms in the biofilm is invisible to the clinician,
but carious lesion that is a result of this activity is clinically apparent.

- Maintaining a disease-free state can result from **primary prevention.**
- When lifestyle changes are made early on, the risk for developing dental disease are minimized.

Lifestyle changes

- – less carbohydrates
- – better oral hygiene
- – improved nutrition
- – better education

- **Secondary prevention** (reverse, arrest incipient caries) and **early intervention** (MID &Preventive measures)

  can be used to reverse the initiation of disease.

⇩

- An outcome of good health can still be achieved, when incipient enamel lesions are reversed before cavities form.

MID- minimal intervention dentistry

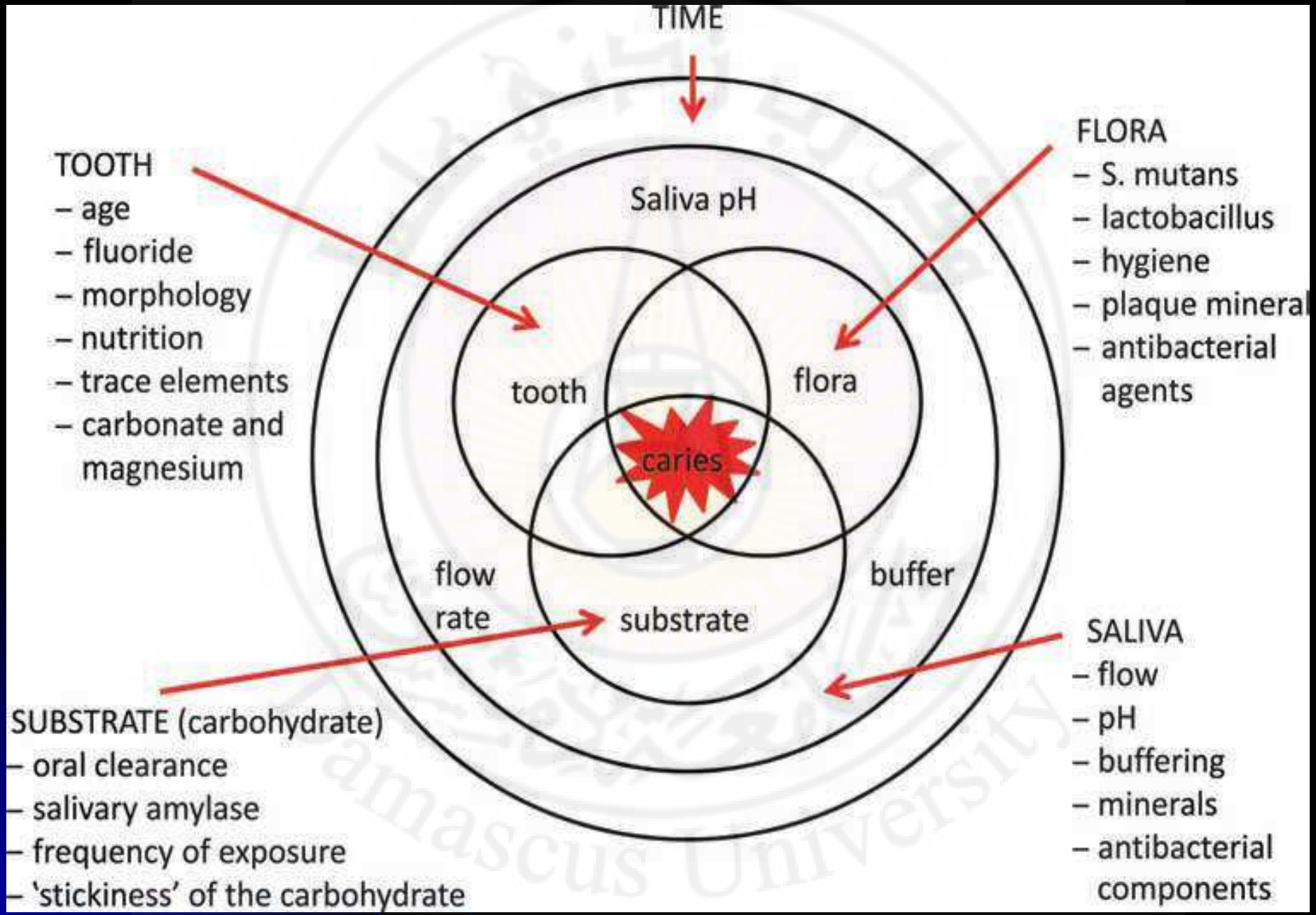
العوامل المؤثرة في حدوث النخر السني

١- شكل وبنية الأسنان (عوامل ذاتية).
٢- اللويحة الجرثومية.
٢- النظام الغذائي (دور الكربوهيدرات).
٣- التدفق والتركيب اللعابي.
٤- الوقت الكافي لحدوث النخر.
٥- الفلور.

Determinants of high caries risk in children and adolescents [Davies and Davies, 2008]

Factor	Feature
Diet	Characterized by high sugar intake
Current disease	Previous caries or high DT/DS
Saliva	Low flow
Appliances	Orthodontic fixed appliances
Dental attendance patterns	Infrequent, symptomatic attendance
Restorations	Evidence of previous disease
Socio-economic	Deprived communities
Family	Family and sibling history of caries and poor attendance
Medications	Sugared medications

DT/DS = Decayed teeth/decayed surfaces.


TIME
TOOTH
– age
– fluoride
– morphology
– nutrition
– trace elements
– carbonate and magnesium
FLORA
– S. mutans
– lactobacillus
– hygiene
– plaque mineral
– antibacterial agents
Saliva pH
tooth
flora
caries
flow rate
substrate
buffer
SUBSTRATE (carbohydrate)
– oral clearance
– salivary amylase
– frequency of exposure
– 'stickiness' of the carbohydrate
SALIVA
– flow
– pH
– buffering
– minerals
– antibacterial components

- تأخذ الآفة النخرية فترة أشهر أو سنين حتى تتشكل، فالنخور السنية ليست انحلالاً معدنياً متراكماً بل عملية ديناميكية تتميز بفترات متعاقبة من الانحلال المعدني و إعادة التمعدن .
- تظهر الآفة عندما يزيد الميزان السلبي للإنحلال المعدني عن نسبة إعادة التمعدن في فترة زمنية معينة.

World Cavity-Free Future Day

OCTOBER 14TH 2020

DENTAL CARIES (TOOTH DECAY) IS THE DISEASE WHICH, WHEN LEFT UNTREATED, CAN LEAD TO DENTAL CAVITIES

44% of the world's population suffer from tooth decay, making caries the most prevalent global condition



Tooth decay is a disease across the life course, with each age group and generation facing different experiences.



Over **600 million** children worldwide **(60-90%)** are affected by caries.



Globally, nearly **100%** of adults have tooth decay.



Globally, **30%** of adults aged 65-74 have no natural teeth.


IAPD
International Association
of Paediatric Dentistry
2nd GLOBAL
SUMMIT
Global Pathway to Evidence-Based
Dental Caries Management in Children
6-8 November, 2020 | Taipei, Taiwan

- يمر تطور الآفة النخرية بثلاث مراحل مميزة :

١- المرحلة المبكرة وتسمى الآفة الأولية incipient lesion وهي مرحلة التبقع الطبشوري على سطح الميناء.

٢- مرحلة تقدم الانحلال المعدني ضمن العاج.

٣- مرحلة الآفة الصريحة وظهور الحفرة النخرية الحقيقية.

Caries Development Stages : the development of caries occurs in three stages : مراحل تطور النخور : إن تطور النخر يحدث على ثلاثة مراحل

1

The earliest stage is the incipient lesion , Which Is share by Histologic changes of enamel.

المرحلة الأولى هي الآفة الأولية التي يحدث فيها تغييرات نسيجية في الميناء

Incipient lesion
الآفة البدئية

2

Progress the demineralization to DE junction, and or into dentin

تطور زوال التمعدن ليصل للملتقى الميناني العاجي وأو العاج

Second stage
المرحلة الثانية

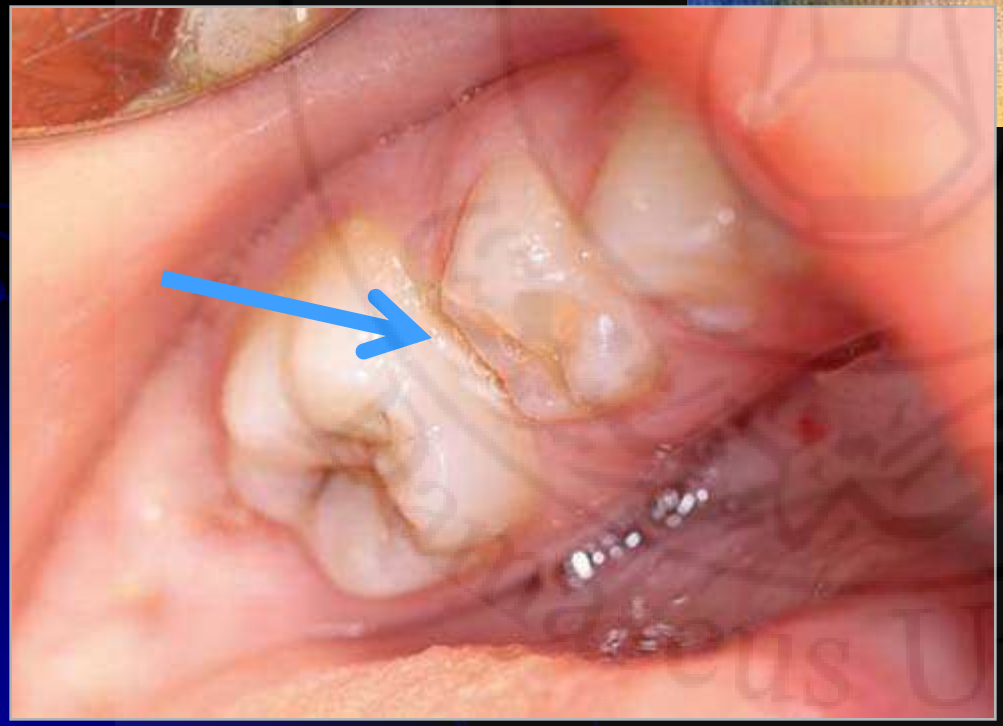
3

Actual Cavitation
حصول النخر
أو تشكل حفرة فعلية
ضمن السن

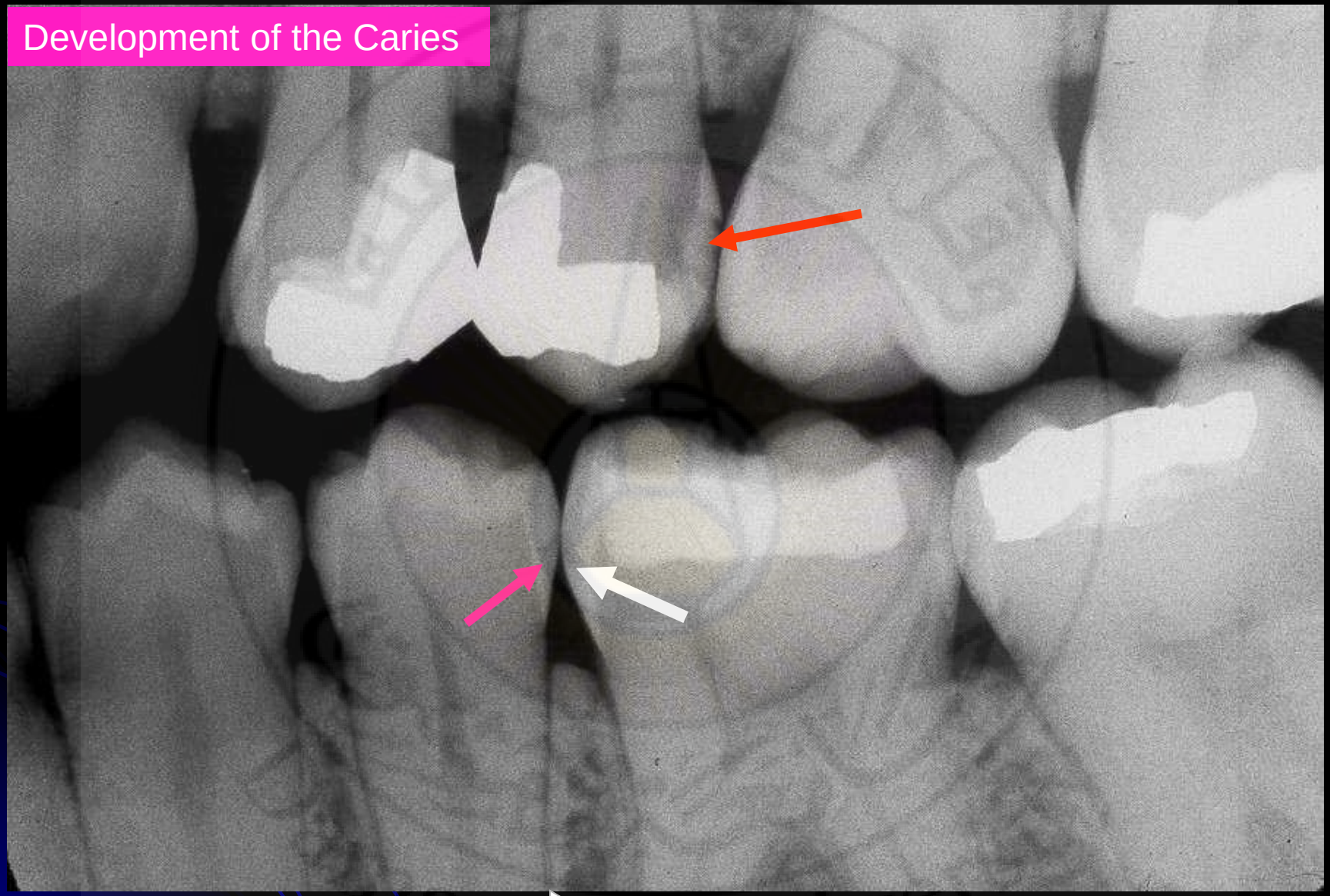
Final phase
المرحلة الأخيرة

Incipient lesions





Development of the Caries



Incipient بدئي

Secondary stage مرحلة ثانوية

Final stage مرحلة نهائية

Etiology – Host Factors
العوامل الذاتية

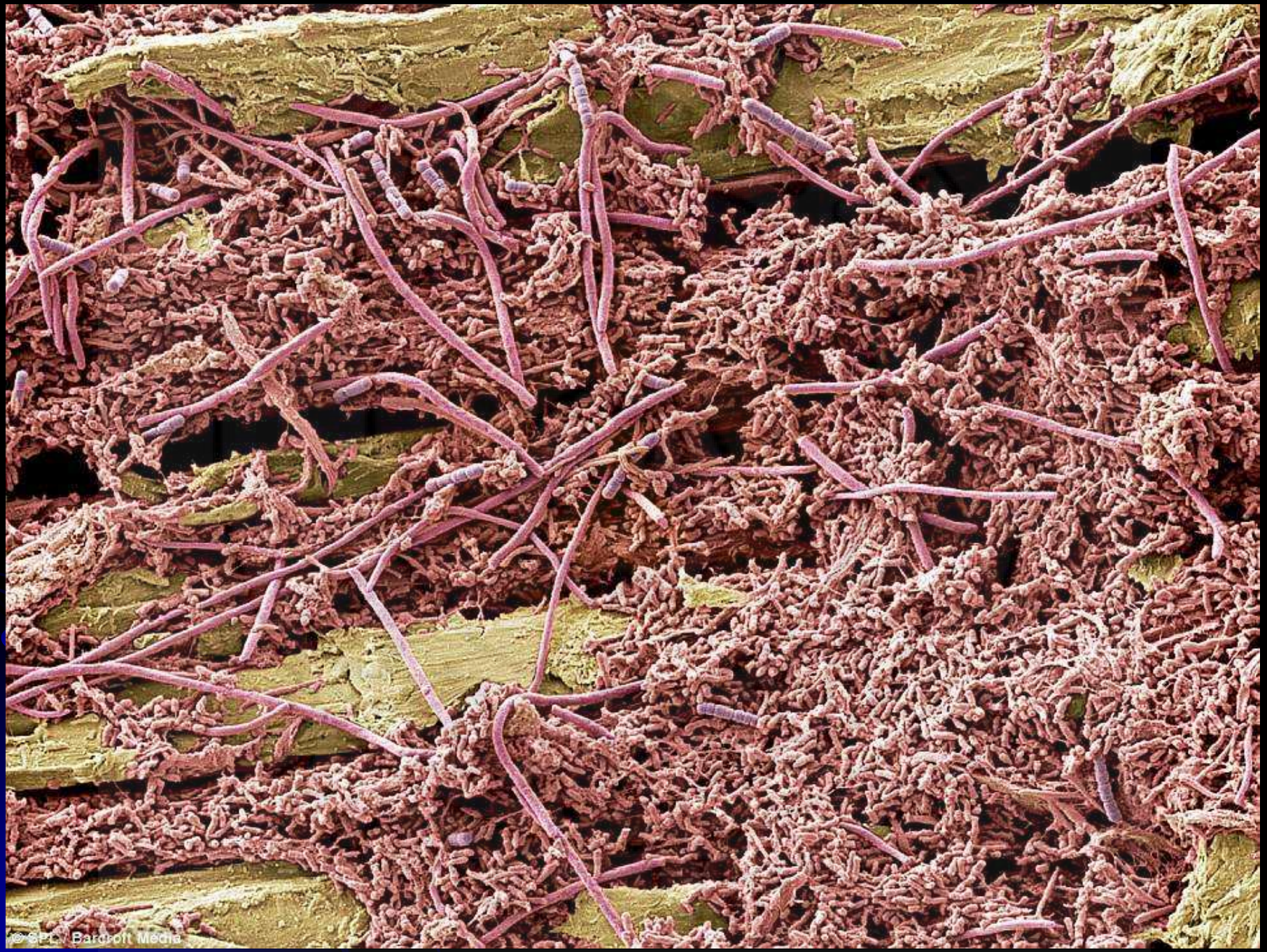
- Tooth factors
  - quality of enamel
  - presence/depth of pits and fissures
  - hypoplasia
  - fluoride exposure
- Saliva
  - pH
  - flow rate
  - buffering capacity
  - antimicrobial components



اللويحة الجرثومية

- تضم حوالي ٣٠٠ زمرة جرثومية ، الغالبية العظمى لا تؤثر في عملية النخر السني .
- تعد الـ streptococci mutans & lactobacilli الزمرتان الجرثوميتان المسؤولتان عن نخور الاسنان.
- وتتميزالـ sm بقدرتها على الالتصاق مع سطوح الأسنان وتحويل السكروز إلى غلوكان (مادة سكرية دبقة تساعد على التصاق الجراثيم بسطح السن) بكميات وافرة وسرعة استقلاب السكر وتحويله إلى حمض الـ lactic وأنواع أخرى من الحموض (البروبيونك والأستيت) التي تسبح ضمن اللويحة محدثةً الأذية السنية.

- تكون أعداد الـ SM في الآفات البدئية هي الأعلى بينما مع تطور الآفة وتقدمها(النخور العاجية) يرجح تراكم العصيات اللبنية LB .
- تحتاج الـ SM سطوح صلبة حتى تتراكم وتلتصق عليها لذلك تتواجد هذه الجراثيم بأعداد قليلة خلال السنة الأولى من حياة الطفل، وتبدأ بالازدياد مع بزوغ الأسنان.


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الالتصاق Adherence

العقديات الطافرة : قادرة على الارتباط مع بنية السن عبر إحدى آليتين :
١- الارتباط مع الغشاء المكتسب عبر البروتينات خارج الخلوية (اللصاقة) المتوضعة على أغشية هذه الجراثيم
٢- الآليات المعتمدة على السكروز : والتي تتطلب وجود مصدر للسكروز لإنتاج عديدات سكاكر خارج خلوية لصاقة (غلوكانات) التي تسمح بارتباط وتجمع مستعمرات جرثومية إضافية

Transmission of MS

- Vertical transmission
- Source is usually mother
- Transmission may occur at birth, but MS reside in low numbers in reservoirs such as tonsils or dorsum of tongue



- **Lactobacilli**
  - found in large numbers in some children
  - considered *opportunistic*, not initiators
  - numbers in cavity increase after DEJ invaded
  - lactobacilli are good indicators of total carbohydrate intake

النظام الغذائي ودور الكربوهيدرات

- There is no question that carbohydrates are the main etiological reason for the development of caries.
- One of the strategies in prevention of caries is to limit access to the more cariogenic sugars and substitute them with the anti-cariogentic ones.
- Not only does their conversion to acid result in enamel dissolution, but they also encourage the growth of more virulent cariogenic bacteria.

دور النظام الغذائي في النخور السنية

- النخر السني عملية ديناميكية تحدث بين السن المؤهل للإصابة وجراثيم اللويحة السنية والكربوهيدرات القابلة للتخمر .
- يعزز هذه العملية :- سوء العناية والصحة الفموية

- نقص الإفراز اللعابي.

- نقص الفلور.

- تعتبر السكاكر البسيطة عوامل مسببة للنخر السني.
- ويعد تكرار استهلاك السكاكرفي النظام الغذائي العامل الأساسي في إحداث النخور بغض النظر عن الكميات المستهلكة.
- تستطيع جراثيم اللويحة السنية استقلاب الكربوهيدرات والسكاكر البسيطة خلال ٢٠-٣٠ دقيقة وتحويلها إلى حموض.
- عندما ينخفض PH اللويحة إلى ٥.٥ تبدأ عملية النخر وخسف الأملاح المعدنية.

The role of dietary sugars

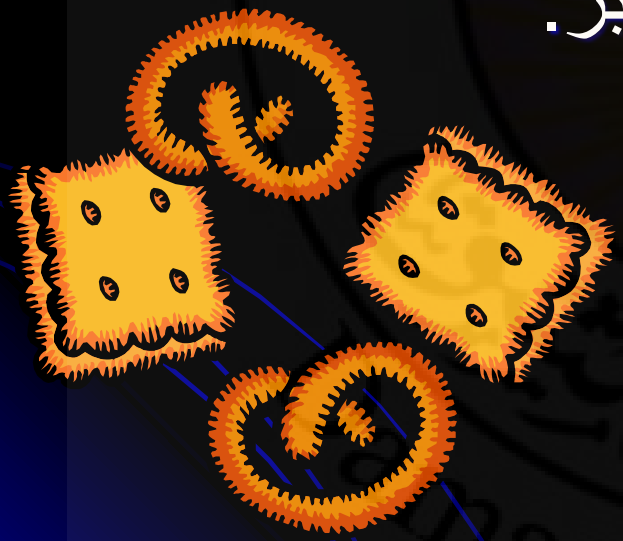
Not all sugars are cariogenic.

ليست جميع السكاكر مسببة للنخر السني

العوامل التي تجعل من السكاكر مسبب للنخر

- effects of frequency of sugar consumption
- effects of consistency (retentiveness) of sugar
- sugar at meals vs. in between meals

- يلعب شكل وتركيب الأطعمة السكرية دوراً هاماً في قدرتها النخرية حيث تستطيع الأطعمة الطرية اللصاقة أن تبقى في الحفرة الفموية لمدة أطول من المشروبات السكرية وبالتالي تكون تأثيراتها في العملية النخرية أكبر.



- ***Sugar consumption at meals*** – slight increase in caries.
- ***Sugar between meals*** – marked increase in caries.
- ***Sugar in sticky candies*** – greatest caries activity.

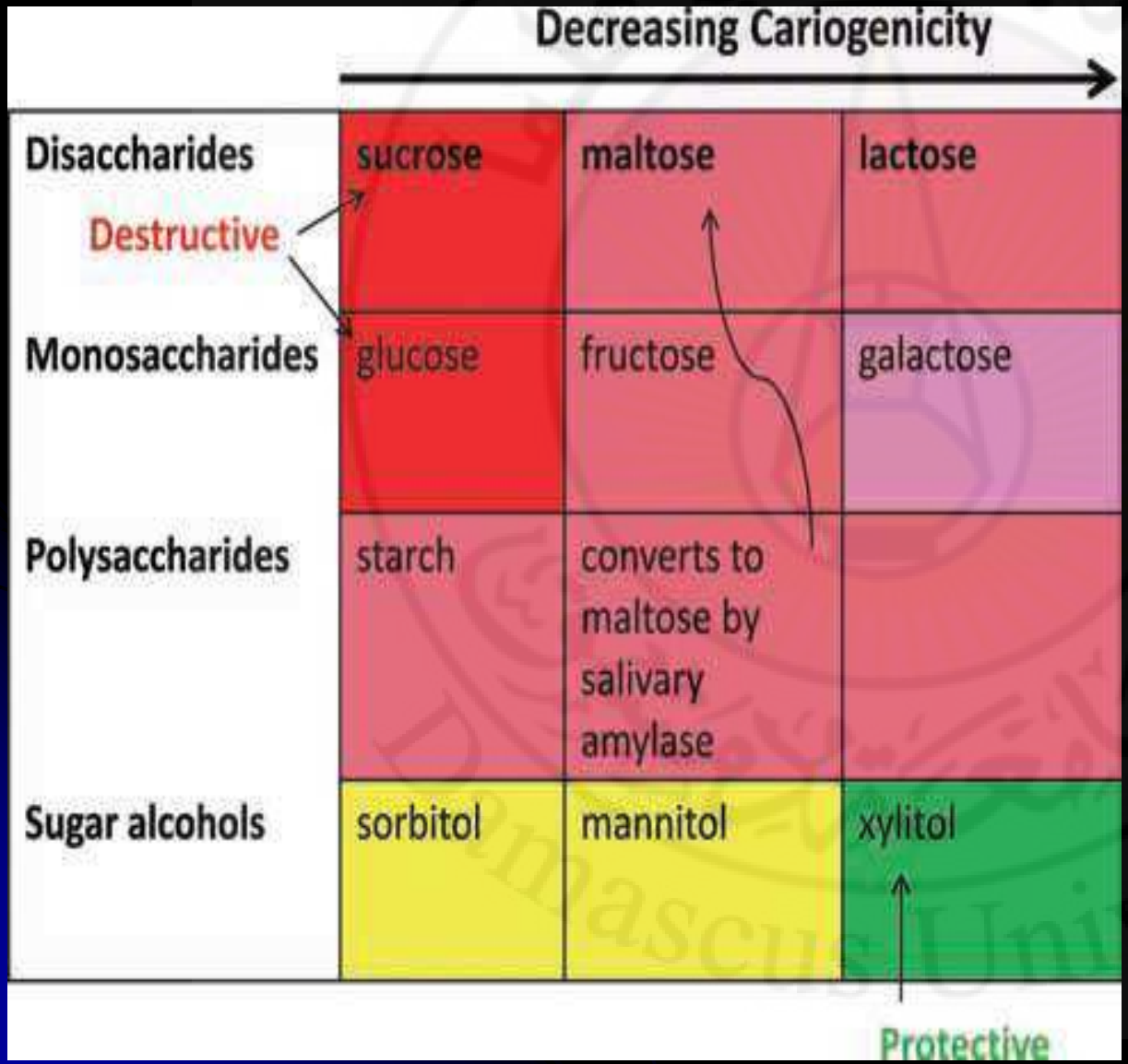
Cariostatic Foods
الأطعمة المثبطة للنخر السني

- الأطعمة التي لاتسبب النخر السني لعدم قدرة جراثيم اللويحة السنية على استقلابها وعدم قابليتها للتفكك في اللعاب ،وبالتالي لاتؤدي إلى تبدلات في PH اللعاب
- وتتضمن :الأطعمة البروتينية والدهون مثل البيض ، السمك، اللحم،والدواجن بالإضافة لمعظم الخضروات والبقوليات



والعلكة الخالية من السكر.

The more common dietary sugars are presented. The cariogenic potential of carbohydrates are presented too.



The sugars with the most cariogenicity **are sucrose and glucose** (**red).**

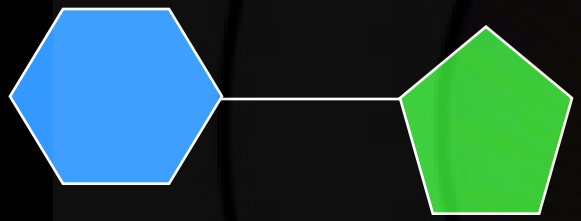
Other carbohydrates (**maltose, lactose, fructose, and starch)** are less cariogenic.

The **sugar alcohols, such as sorbitol and mannitol**, are the least cariogenic (yellow)

Xylitol has even been shown to be anticariogenic **(green).**

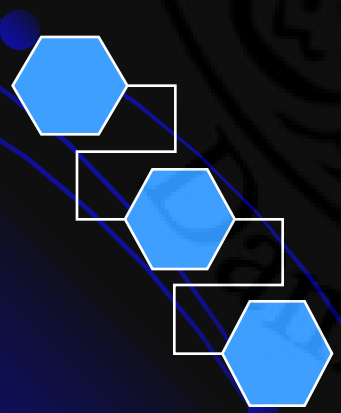
Sucrose

- Glucose + fructose

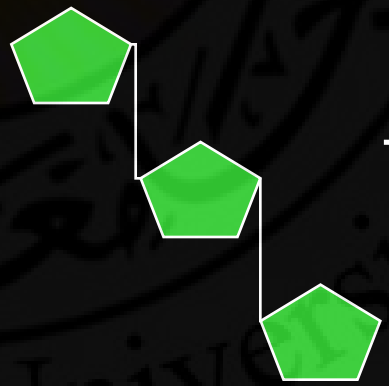


extracellular polyglucose,
glucan, (from sucrose metabolism only)
creates irreversible attachment

metabolized by | plaque bacteria



glucan +



fructan

Glucan

- Water soluble
- Extracellular “glue”
- Enables adhesion to tooth
  - reduced susceptibility to mechanical disruption
- Inhibits diffusion properties of plaque
  - reduces buffering capacity of saliva
  - inhibits transport of acid away from tooth

- The disaccharide sucrose and the monosaccharide glucose (a component of sucrose), are most cariogenic.

- Frequent ingestion, can cause severe damage to the tooth.

Role of Other Sugars

- Fructose and glucose are as effective as **sucrose** in their ability to cause a pH drop;
- Fructose is nearly equal to sucrose in cariogenicity;
- Raw starch causes only a small drop in plaque pH

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Role of Refined Starch

- Soluble starch and refined starch can be broken down by salivary amylase into sugars(maltose)





- These *refined carbohydrates* cause a variable pH drop that may be as large as that caused by sucrose

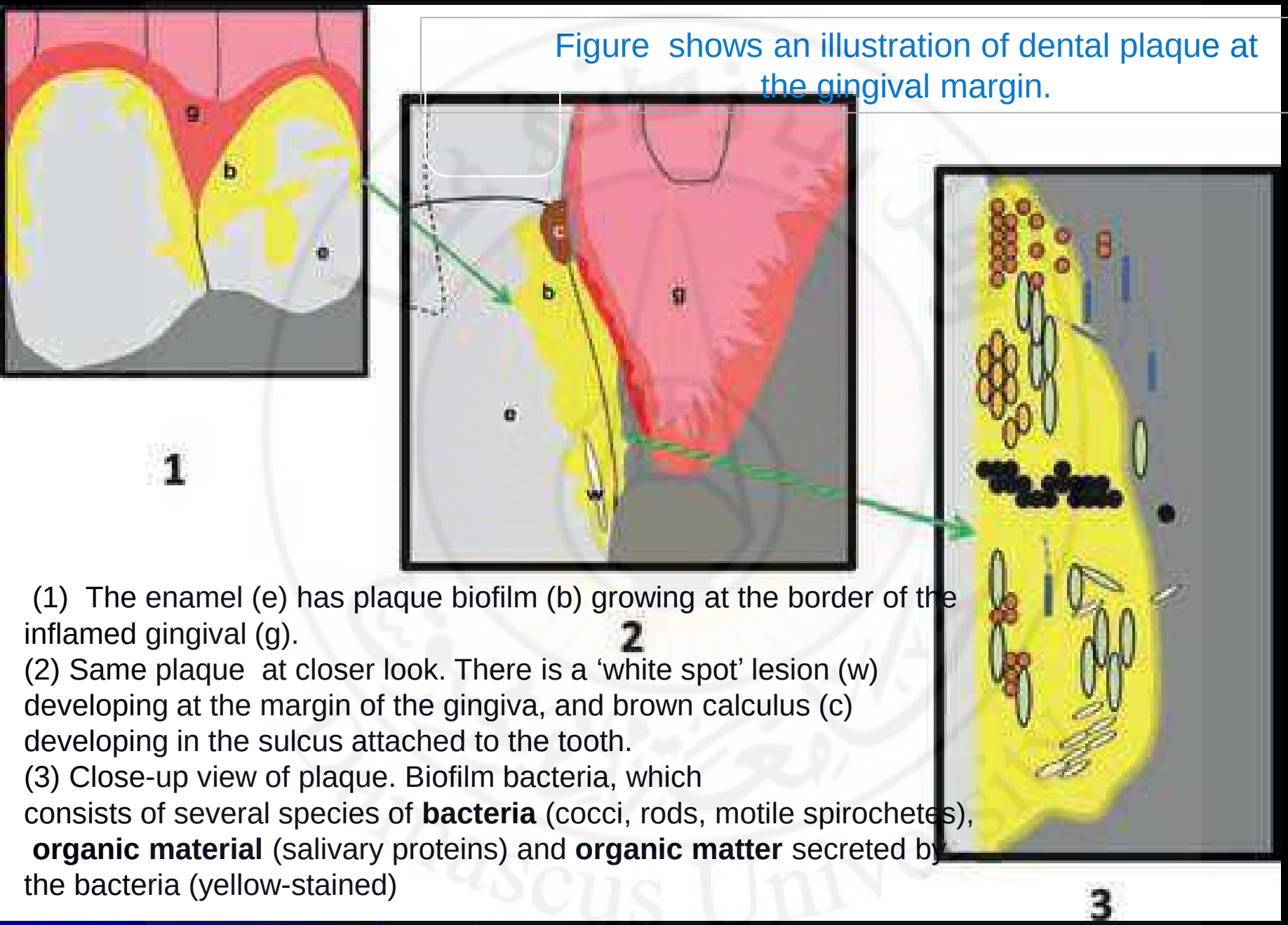
Damascus University

- The supragingival bacteria are dominated with streptococci and lactobacilli that can lower the plaque pH and induce decalcifications



white spot lesions.

Figure shows an illustration of dental plaque at the gingival margin.



(1) The enamel (e) has plaque biofilm (b) growing at the border of the inflamed gingival (g).
(2) Same plaque at closer look. There is a 'white spot' lesion (w) developing at the margin of the gingiva, and brown calculus (c) developing in the sulcus attached to the tooth.
(3) Close-up view of plaque. Biofilm bacteria, which consists of several species of **bacteria** (cocci, rods, motile spirochetes), **organic material** (salivary proteins) and **organic matter** secreted by the bacteria (yellow-stained)



- The plaque that is responsible for caries is generally located supragingivally and is acidogenic.

- People who consume sugars frequently in their diet increase the levels of streptococci and lactobacilli

- The two bacteria species thought to be responsible for caries.

- These bacteria continue to grow as the pH drops.

- If the plaque is not removed, eventually, the enamel starts to decalcify and an incipient ‘white spot’ lesion ensues.

- Marsh (1994) was able to show,
  that feeding of bacteria a meal of glucose
  can encourage the growth of cariogenic bacteria when the pH is allowed to drop .

Repeated glucose rinses encourages SM and LB growth when plaque acid is not controlled
Fluoride at high concentrations inhibits SM , but not LB !!!

- Xylitol had inhibitory properties for both cariogenic and periodontal bacteria.

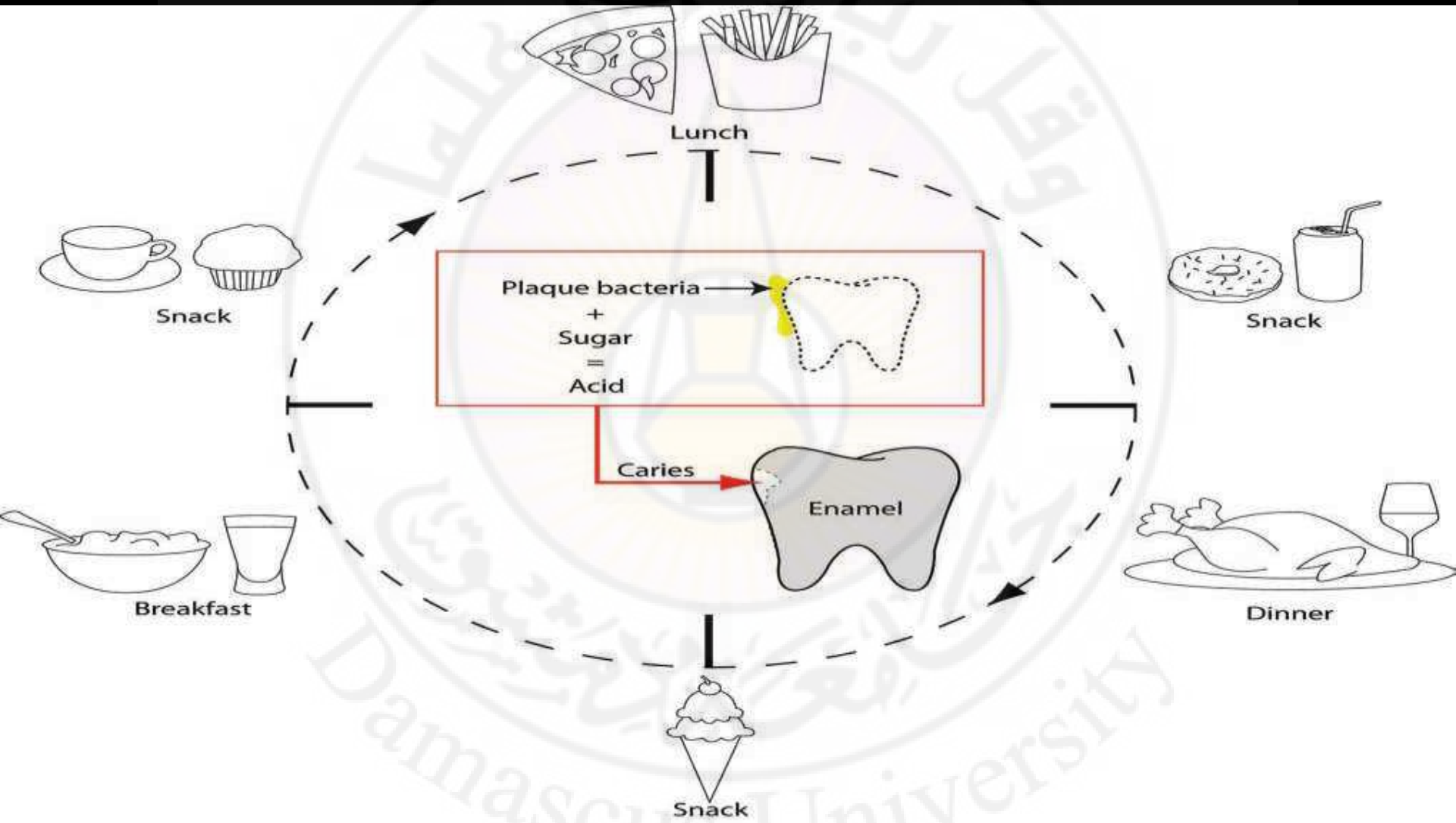
The demineralization–remineralization balance in caries

- The plaque thickness dominated by cariogenic bacteria, can effectively keep the saliva from reaching the enamel surface.
- In addition, the more plaque there is, the more acid is produced.
- These acids have a longer time to penetrate into the enamel under thick biofilm - This allows the tooth to demineralize!!!!
- If the saliva reaches the acids they are washed away and neutralized by the salivary buffers - This allows the tooth to remineralize.

- The cycle repeats itself over and over with every sweet snack and meal containing sugars.

- Caries occurs when the frequency of sugar exposure during the day is high.

The repeated cycle of ‘sugar attacks.’



To reduce plaque:
- Improve hygiene
- Introduce antimicrobials

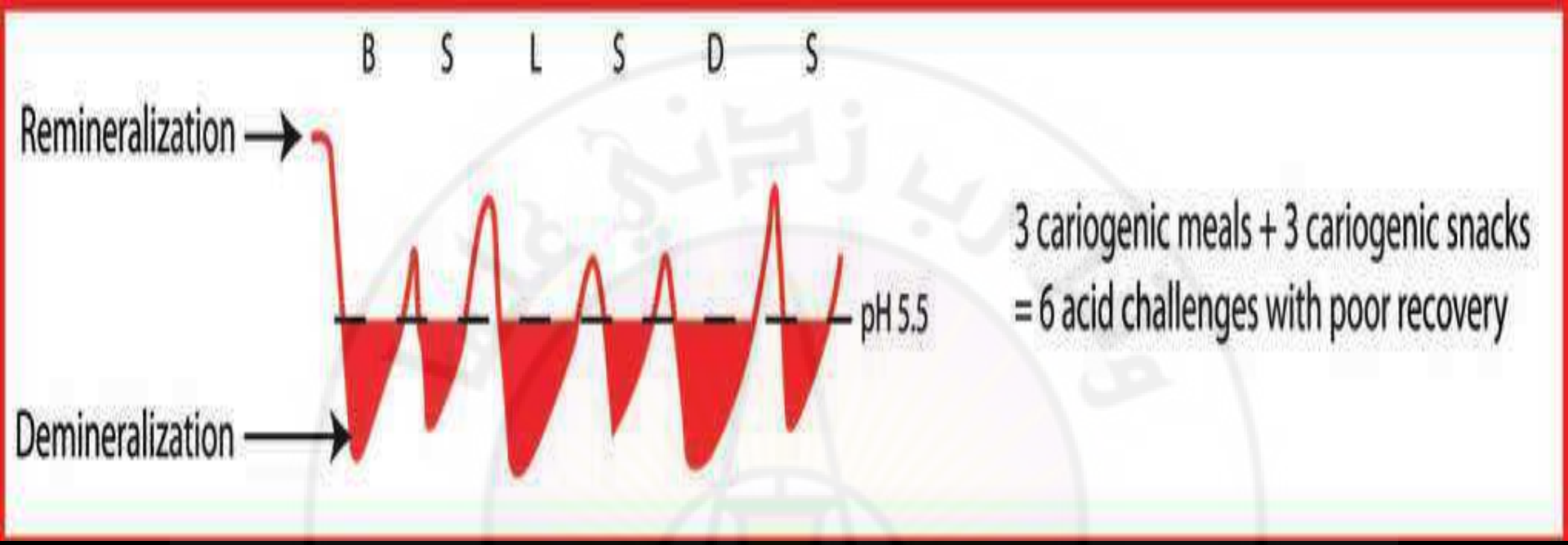
To reduce acid:
- Neutralize plaque acids
- Stimulate saliva
- Modify diet

To increase enamel resistance:
- Introduce topical fluorides
- Apply remineralizing agents

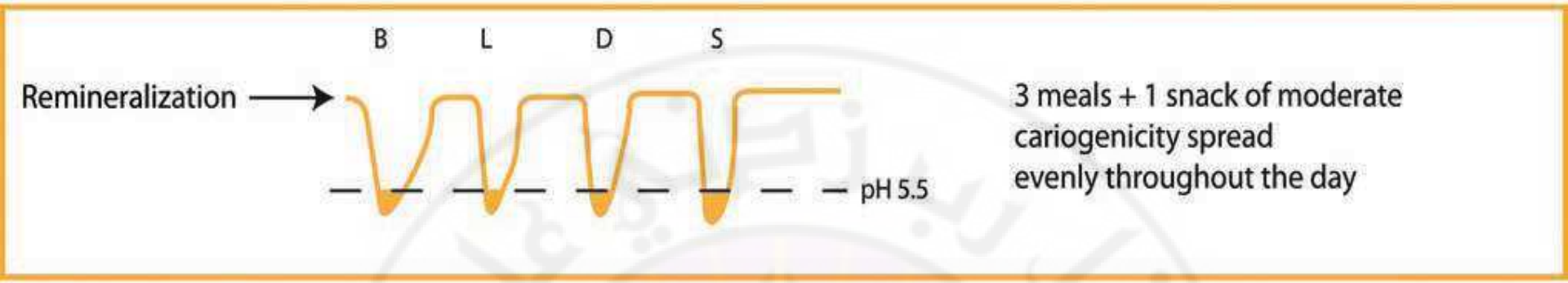
The pH of dental plaque in response to glucose has been studied using the classic

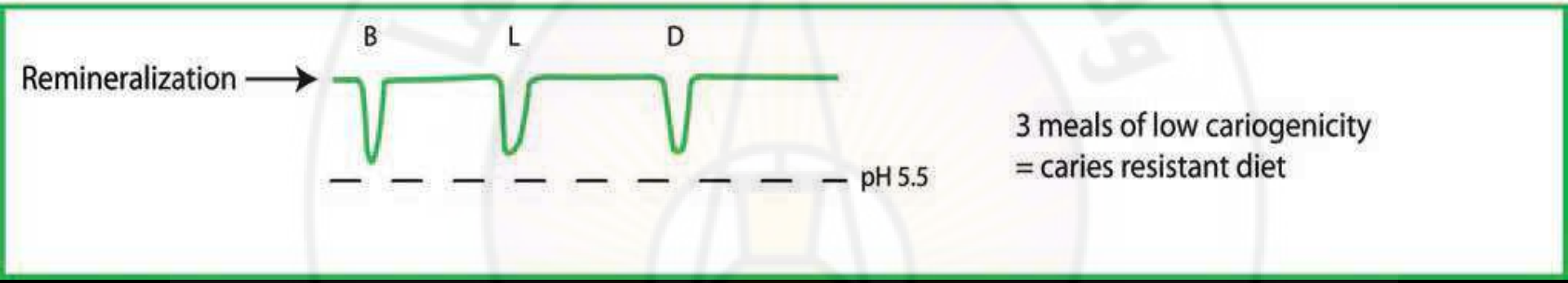
Stephan curve

The diagram illustrates the plaque pH response curves that have been obtained from patients with different risks for caries.



- A high-risk individual, when given a glucose rinse , will experience a dramatic drop in the plaque pH well below the critical pH of 5.5.
- The recovery to neutral pH in the high risk individual will be slow.





- For a moderate risk individual (yellow), the initial pH drop may only be a little lower than the critical pH.

- For a caries-resistant person (green), the initial pH drop of that person's plaque may not even reach the critical pH, and the recovery will be very quick.

Saliva اللعاب

- Composition
  - supersaturated with Ca, P
  - bicarbonate – principal buffer
  - proteins, immunologic/antibacterial components
  - fluoride
  - viscosity depends on gland, nervous control of secretion
- pH normally around 7.0; varies from ~5.5-8.0

The main components of saliva and their function

Classification of component	Ingredient	Function
Inorganic	Water (99%)	
Inorganic, organic	Carbonate, phosphate, protein	Buffers acid
Organic	Amylase, lipase, protease, pyophosphatase, lysozyme	Antibacterial
Organic	Mucins	Lubricant, calcium binding
Organic	IgA	Antibacterial

دور اللعاب

- Because of its buffering capacity and ability to neutralize acids, a simple intervention such as stimulating the saliva with chewing gum can arrest white spot lesions and prevent cavities from forming (Stookey 2008).

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- ينقص التدفق اللعابي في الحالات التالية:
  - medications (antihistamines, antiasthmatics)
  - disease (degenerative, metaplastic in salivary glands)
  - Anemia
  - dehydration
  - radiation
  - age

TYPES OF DENTAL CARIES ?

أنماط النخور السنية ؟

Occlusal Caries, pit and fissures (وهاد وميازيب) إطباقية

Proximal Caries ملاصقة

Facial and Lingual Caries شفوية ولسانية

Root Caries (cemental caries) (ملاطية) جذرية

Cervical Caries عنقية

Recurrent Caries (secondary)(ثانوية) ناكسة

Nursing bottle caries نخور الرضاعة

Arrested Caries متوقفة

Rampant Caries منتشرة جائحة

Occlusal Caries ,
pit and fissures
نخور أطباقية (وهاد وميازيب)





تنتشر عند الملتقى الميناءي العاجي
وممكن أن تقوض وتكسر الميناء
في الميناء تتطور النخور باتجاه
المواشير الميناءية وبالعاج تتجه نحو
الأقنية العاجية

The shape of the pits and fissures contribute to their high susceptibility to caries.

إن شكل الوهاد والميازيب يساهم في قابليتها العالية للإصابة بالنخر السني.

Proximal Caries

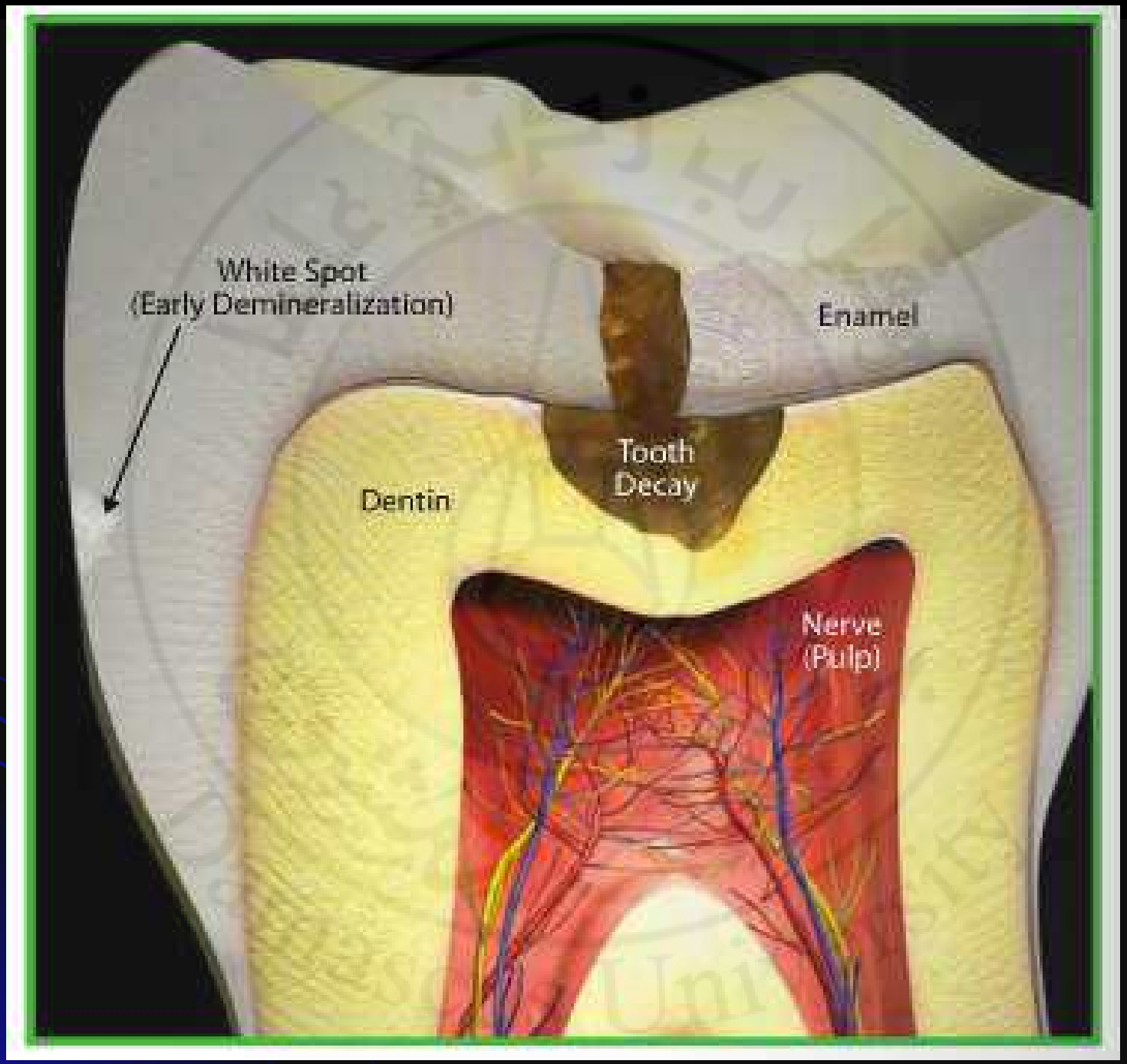
نخور ملاصقة



Proximal caries on the distal surface of the second premolar. Notice the Triangular appearance of caries.
In the enamel, caries progresses along the path of the enamel rods; in the dentin, caries progresses roughly along the path of the dentinal tubules.

نخر ملاصق على السطح الوحشي للضاحك الثاني
لاحظ المظهر المثلثي للنخر
في الميناء تتجه النخور باتجاه المواشير الميائية
بالعاج تكون على طول الأقنية العاجية




White Spot
(Early Demineralization)
Enamel
Tooth
Decay
Dentin
Nerve
(Pulp)

Facial and Lingual Caries

نخور السطوح الشفوية واللسانية







Root Caries (cemental caries)

نخور الجذور(النخور الملاطية)



إن أفضل وقاية للنخور الجذرية لدى المسنين هي بمنع المرض حول السني.
لدى الأعمار المتوسطة أو أقل فأن الإستراتيجية تتضمن :

١- الضبط أو السيطرة اليومية على اللويحة بالطرق الميكانيكية والكيميائية.
٢- تخفيض المدخول من الكربوهيدرات
٣- زيارة منتظمة للطبيب المختص.
٤- برنامج للفلور

Damascus University

Cervical Caries

النخور العنقية

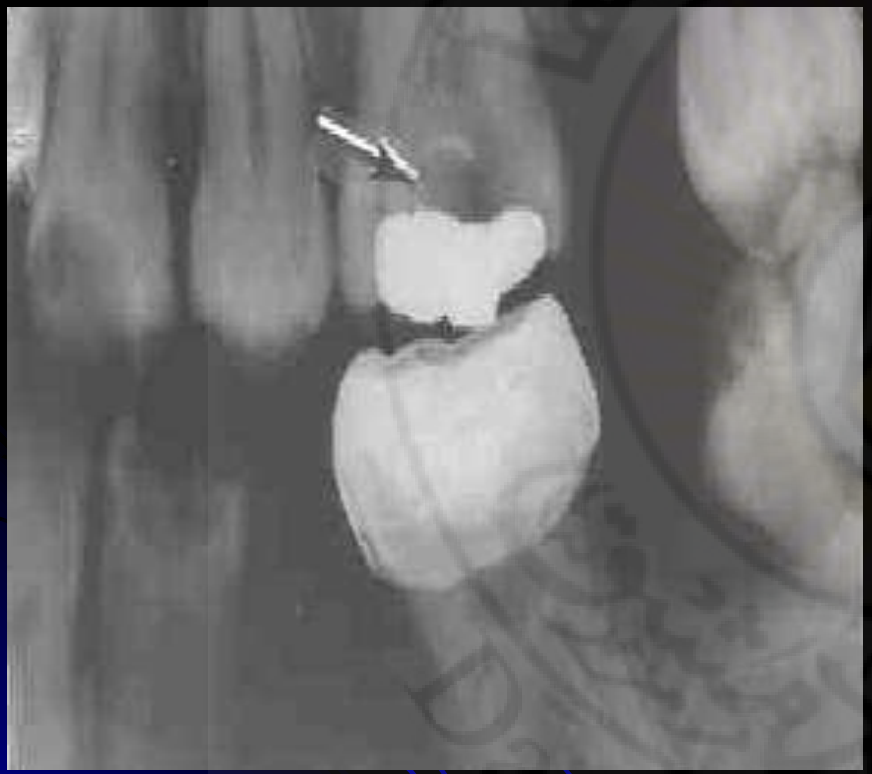






Recurrent Caries

النخور الناكسة





Nursing bottle caries

نخور الرضاعة



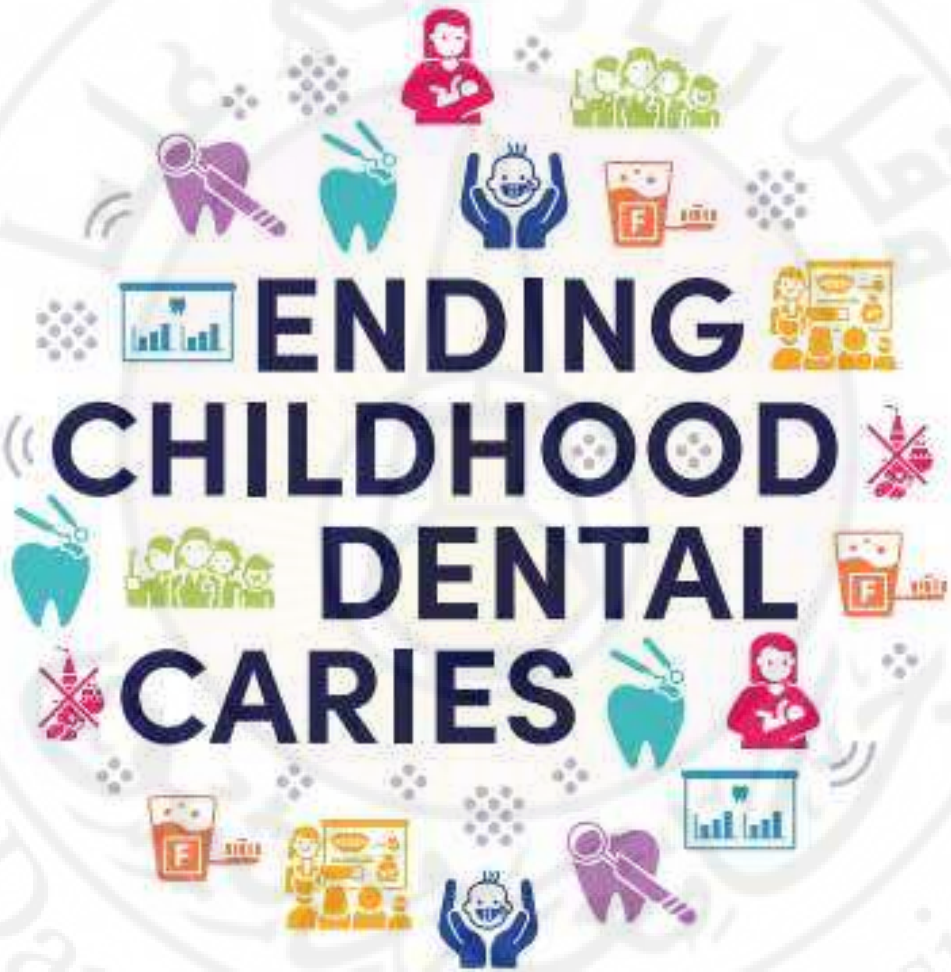


Children should not fall asleep with a bottle. This traps sugar from the drink in the child's mouth, causing tooth decay.

لا يجب أن يخلد الأطفال للنوم وهم يشربون زجاجة الحليب. لأن ذلك يؤدي إلى زيادة فترة تماس السكر مع فم الطفل مسبباً النخور.



World Health Organization



ENDING CHILDHOOD DENTAL CARIES

WHO Implementation manual

Oral Health Programme, Prevention of Noncommunicable Diseases
WHO Headquarters

Arrested Caries

النخور المتوقفة

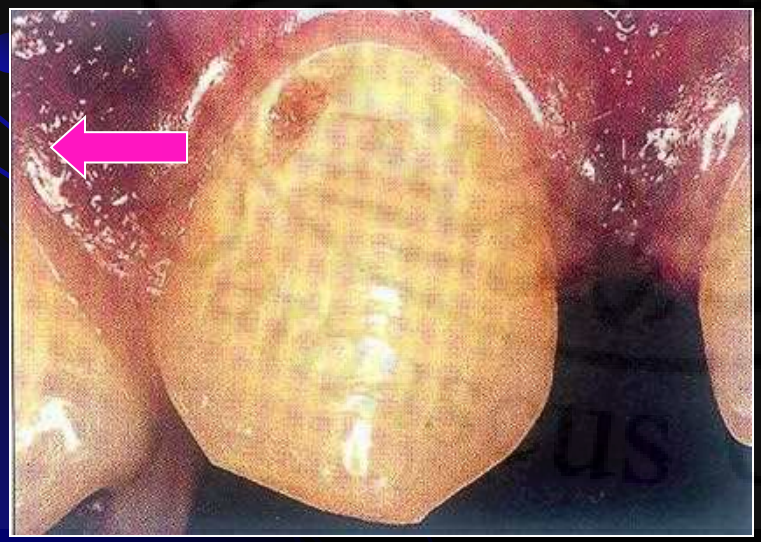
The caries process can be halted here

يمكن أن يتم إيقاف عملية النخر هنا



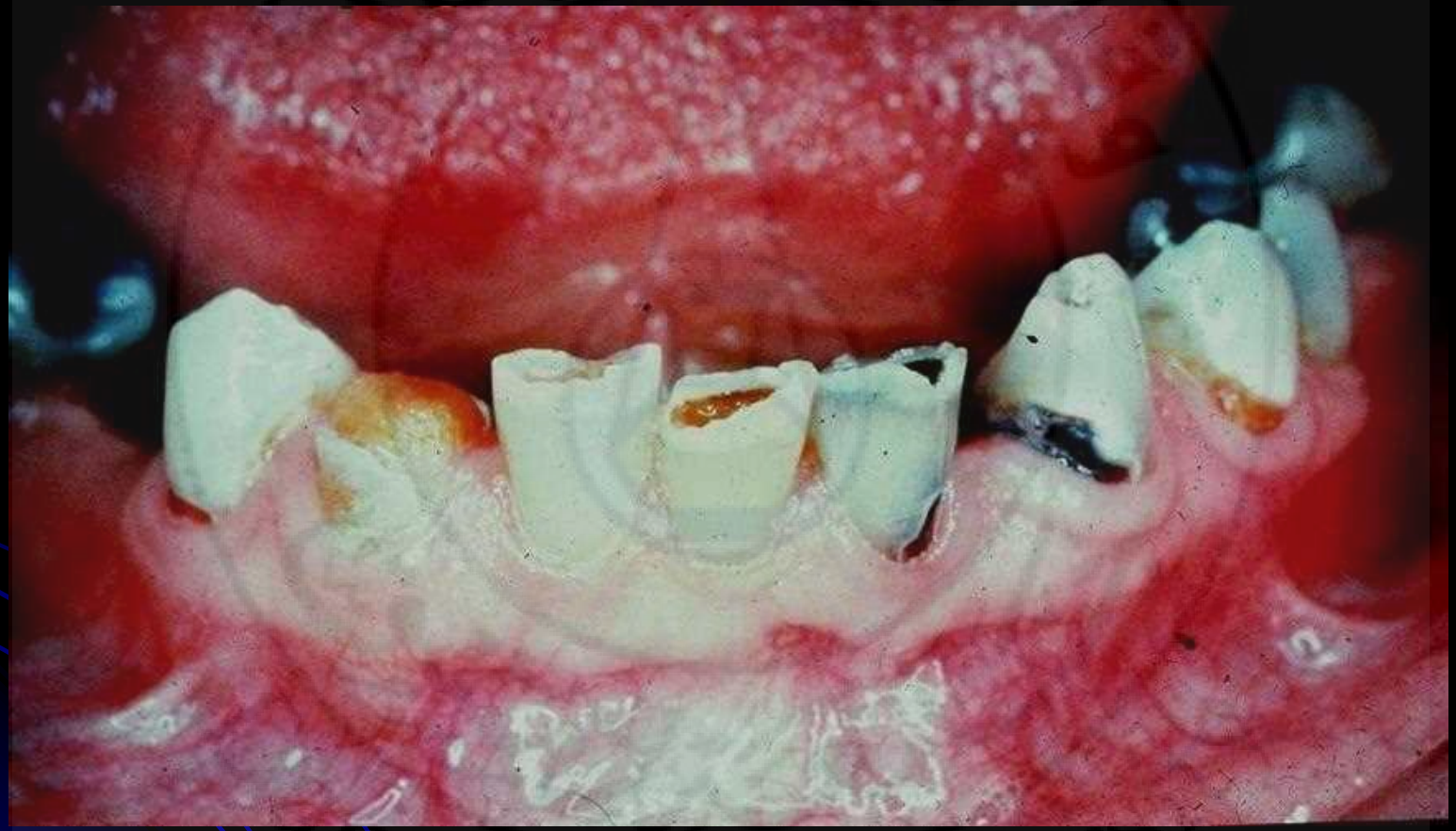








Rampant Caries
النخور الجائحة



Rapidly progressing caries usually found in children and teens with poor diet and inadequate oral hygiene

نخور تتطور بشدة توجد عادة عند الأطفال والمراهقين الذين تكون حميتهم الغذائية غير جيدة مع عناية فموية غير كافية.

Caries measurement methods
طرق تشخيص النخور

- Visual بصريا
- Visual +Tactile inspection (السبر) بصري ولمسي
- Radiography شعاعي
- Fiber optic transillumination
- Electrical conductance الناقلية الكهربائية
- Laser fluorescence التألق الليزري

Caries measurement methods

طرق تشخيص النخور

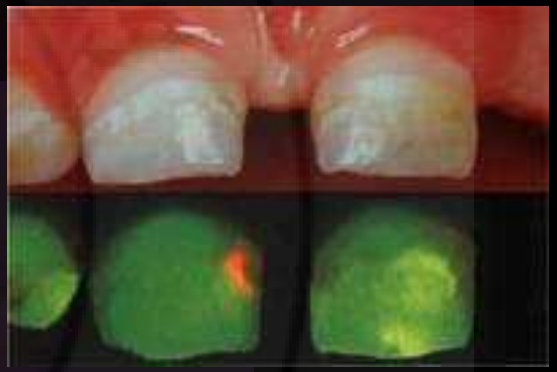
Fiberoptic transillumination (FOTI)

ألياف التألق الضوئي البصرية

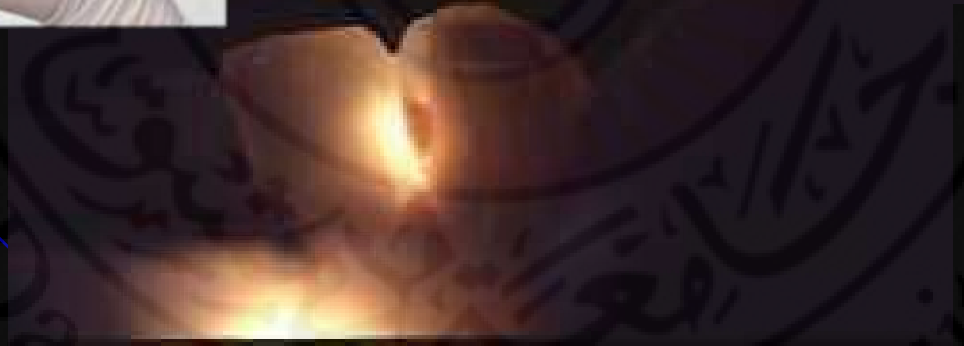
Uses a high intensity white light

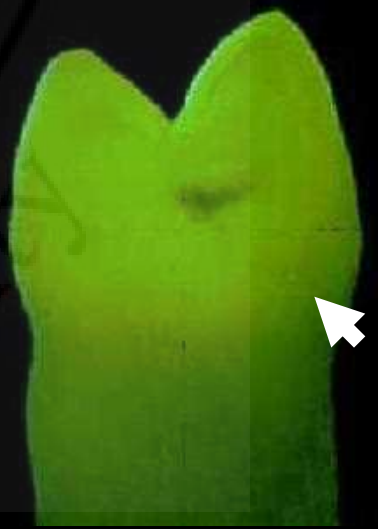
يستخدم ضوء أبيض ذو شدة عالية











Electrical conductance (EC)

الناقلية الكهربائية

Electrical Conductance measurement (ECM):

• In case of caries lesion- increase porosity of the dental tissue- higher fluid content than the sound tissue decrease electrical resistance.

في حال وجود آفة نخرية تزيد مسامية النسيج العاجي وبالتالي يكون هناك سوائل أكثر من الحالة الطبيعية وبالتالي تخف المقاومة الكهربائية



كنظام يستخدم تيارات خفيفة جدا لتحري النخر

Laser Fluorescence (LF) التألق الليزري

إن تقنية التألق الليزري تقيس تألق السن المستحث بعد تسليط حزمة ليزرية للتمييز بين الميناء السليم والمنخور.





Diagnodent Laser pen

This device can give a numerical reading of early decay in pits.

يستطيع هذا الجهاز إعطاء قراءة رقمية عن النخور المبكرة في الوهاد

Laser Fluorescence (LF) التألق الليزري

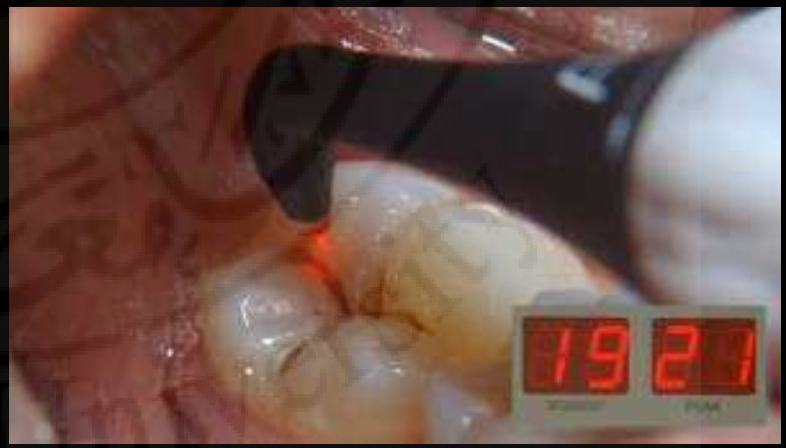
-القراءات تحت ١٠ تعني عدم وجود نخر

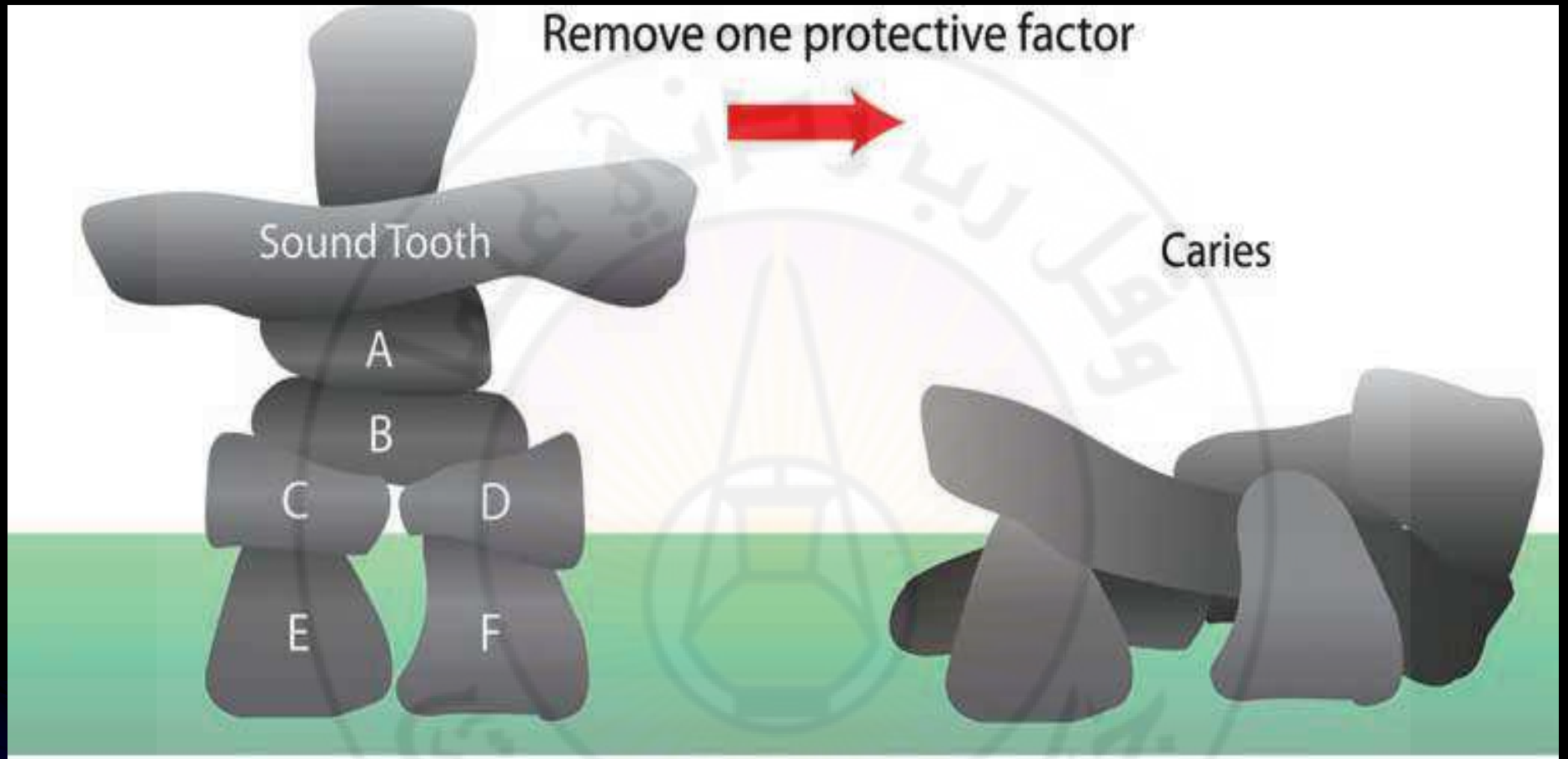
-القراءات من ١٠-٢٠ عادة هي تصبغات أو نخور مينائية

- القراءات فوق ٣٥ هي عبارة عن نخور بالعاج

-القراءات التي تصل لـ ٩٩ هي نخور متقدمة بالعاج بشكل كبير

هذا الجهاز قادر أن يعطي قراءات رقمية للنخور المبكرة في الوهاد





A: Protective saliva (flow, buffering, pH, anti-bacterial proteins)
B: Adequate remineralization capacity (salivary Ca^{2+}, PO_4^{3-}, F^-, alkali)
C: Good oral hygiene (bacterial flora–low *S. mutans*, *Lactobacillus*)
D: Ideal diet (calcium, protein, less frequent refined carbohydrates)
E: Good tooth resistance (morphology, no crowding or enamel defects, fluorapatite)
F: Ideal dentistry (alternative orthodontic therapy, gold restorations)

Prevention



1. Neutralize the plaque acids:

- This can be done by adding base or adding buffers such as sodium bicarbonate (baking soda) to the saliva to boost its ability to neutralize acids.

2. Improve hygiene:

- With bacterial levels low, less acid is produced.
- Plaque layers don’t have a chance to grow thick;
- Saliva can penetrate better to the enamel surface through thin layers of plaque.

3. Introduce antimicrobials:

- **Since caries is a disease** caused by bacteria, simply eliminating the bacteria or controlling their growth will reduce the caries incidence.
- Chlorhexidine, xylitol, ozone,

  even experimental antibodies, have been used to control bacterial growth.

4. Stimulate saliva:

- **Saliva contains numerous components** - that fight tooth decay
- buffers, remineralizing minerals, antimicrobial enzymes, antibodies.

Damascus University

5. Topical fluorides:

Fluoride added to the remineralizing incipient lesion increases the enamel crystals' resistance to dissolution by plaque acids.

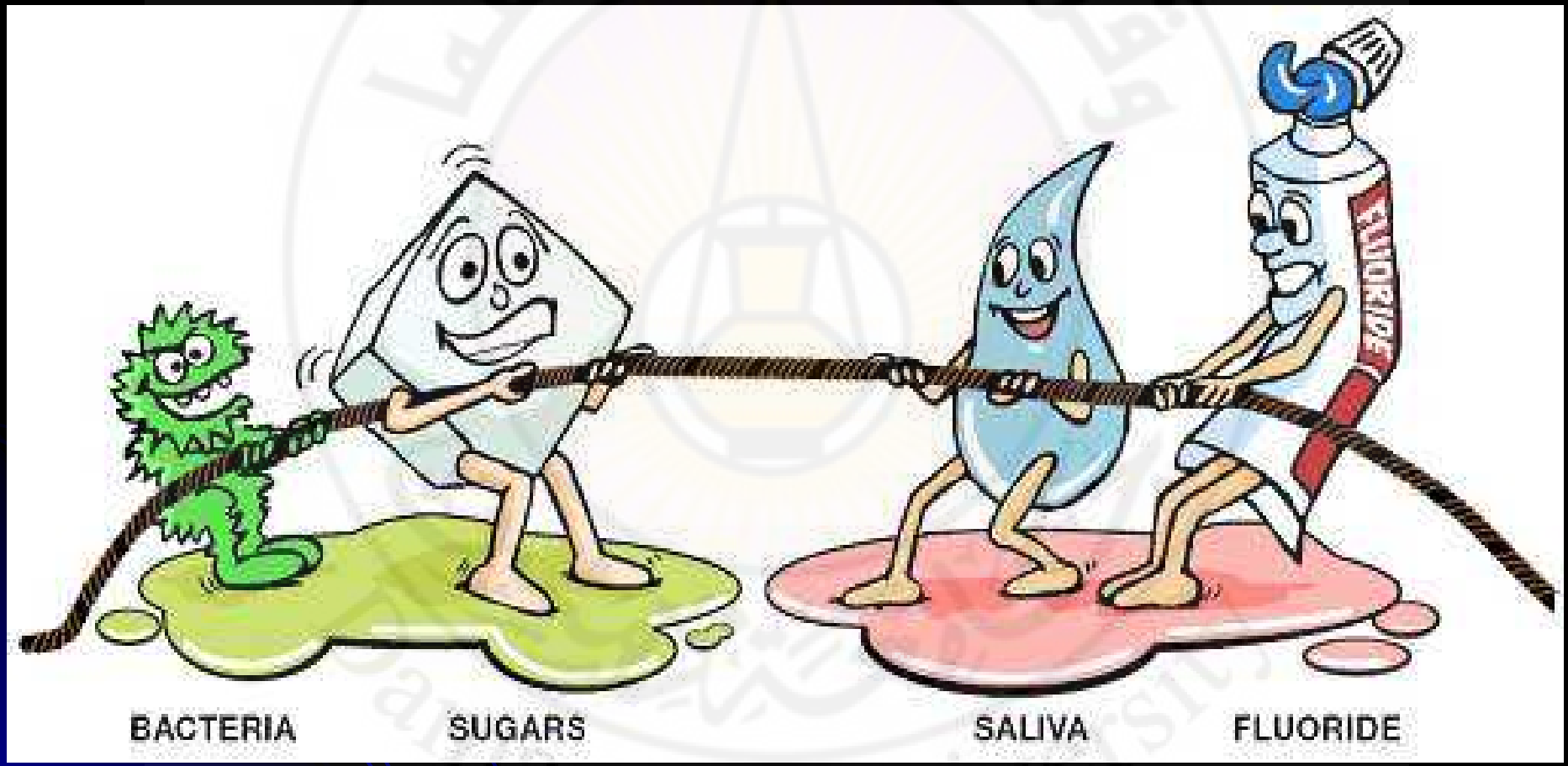




Fluoride & Sealants

Dr. Abeer Ahmad Aljoujou- PhD Oral Medicine

الميزان النخري



THE CARIES BALANCE

Disease Causing Factors

BAD disease-causing factors include the following:

Bad Bacteria – Acid-producing Bad bacteria
Absence of Saliva – The Absence of healthy salivary function (for example, dry mouth)
Dietary Habits (Poor) – Frequent sugars and acids lead to de-mineralization and a low pH allowing bad bacteria to thrive starting the decay process

Protective Factors

SAFE protective factors include the following:

Saliva and Sealants – Saliva neutralizes acid encouraging good bacteria to thrive and aids re-mineralization. Sealants seal the chewing surfaces of the teeth most likely to decay
Antimicrobials – Helping rid the bad bacteria and establish health-promoting bacteria
Fluoride – Strengthening the tooth surfaces against demineralization promoting re-mineralization
Effective Diet – Consuming a healthy diet



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Introduction

- يتواجد الفلور (fluoride) بشكل رئيسي في جسم الإنسان في العظام والأسنان
- تكون الجزئيات المعدنية المكونة للأسنان وخاصةً الميناء والحاوية على الفلور (fluorapatite) أكثر مقاومة للانحلال الحمضي من تلك غير الحاوية عليه (hydroxyapatite) .

Introduction

- Fluoride plays an important role in the prevention of dental caries.

The primary mechanism of action of fluoride in preventing dental caries is topical. Fluoride acts in the following ways to prevent dental caries:

1. It enhances remineralization of the tooth enamel. This is the most important effect of fluoride in caries prevention.
- 2. It inhibits demineralization of the tooth enamel.
- 3. It makes cariogenic bacteria less able to produce acid from carbohydrates.

www.aap.org/oralhealth/pact

- يلعب الفلور fluoride دوراً هاماً في الوقاية من النخر السني، ويكون التأثير الأساسي في هذه العملية تاثيراً موضعياً.
- يعمل الفلور على الوقاية من النخر بالآليات التالية:

١- يعزز عملية إعادة التمعدن remineralization في الميناء (وهي الآلية الأهم) .

٢- يثبط عملية خسف الأملاح المعدنية demineralization في سطح الميناء السني.

٣- يؤثر على جراثيم اللويحة السنية المحدثة للنخر (cariogenic bacteria) ويثبط انتاجها للحموض الحالَة للميناء.

المصادر الجهازية للفلور

- يتم امتصاص الفلور جهازياً من خلال :

١- مياه الشرب (الحاوية طبيعياً على الفلور أو المياه المفلورة).

٢- بعض الأطعمة والمشروبات(كالأطعمة البحرية والشاي).

٣- معاجين الأسنان.

٤- المكملات الغذائية الفلورية.

Infant Nutrition



- Human breast milk contains almost no fluoride, even when the nursing mother drinks fluoridated water.

Powdered infant formula contains little or no fluoride, unless mixed with fluoridated water. The amount of fluoride ingested will depend on the volume of fluoridated water mixed with the formula.

المصادر الموضعية للفلور

١- معاجين الأسنان :Toothpaste

٢- المضامض الفلورية: Fluoride mouthrinses

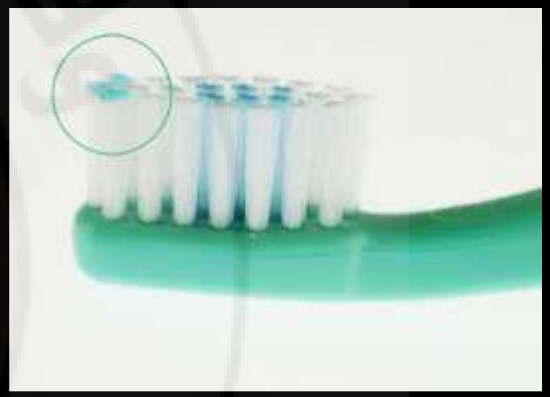
٣- الهلام الفلوري: Fluoride gels

٤- الفرنيش الفلوري: Fluoride varnish

Damascus University

Toothpaste

- Toothpaste is the most recognizable source of topical fluoride.



The addition of fluoride to toothpaste began in the 1950s.

Brushing with fluoridated toothpaste is associated with a 24% reduction in decayed, missing, and filled tooth surfaces.

The CDC concluded that the quality of evidence for fluoridated toothpaste in reduction of caries is grade 1. Strength of recommendation is A for use in all persons.

Toothpaste Guidelines

- The American Dental Association (ADA), American Academy of Pediatric Dentistry (AAPD), and the American Academy of Pediatrics (AAP) have all published the following recommendations:

  - Suggest a “smear” or “grain of rice” amount of toothpaste starting at tooth emergence for all children.
  - For children ages 3 to 6, recommend a “pea-sized” amount of fluoridated toothpaste.

- Toothpaste recommendations are no longer “risk-based”.

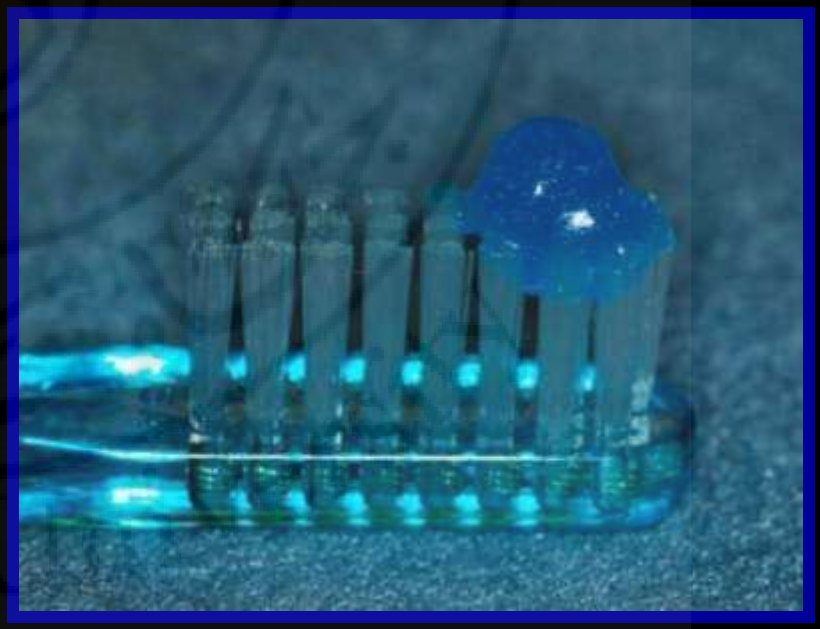
http://www.aap.org/oralhealth/pact

Toothpaste Amounts

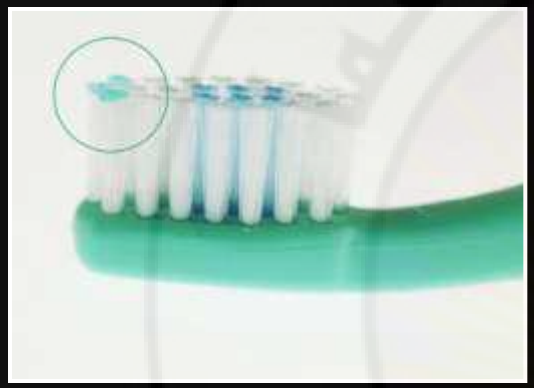
"Smear"



"Pea-sized"



Fluorosis and Toothpaste





Ingestion of toothpaste increases the risk of enamel fluorosis.

If fluoridated toothpaste is used, strategies to limit the amount swallowed include limiting the amount placed on the brush and observing the child as they brush.

Fluoride Mouthrinses

- Mouthrinses containing fluoride are recommended in a “swish and spit” manner for children at least age 6.
  - Daily use of a 0.05% sodium fluoride rinse may benefit children over 6 years who are at high risk for dental caries
  - No additional benefit shown beyond daily fluoridated toothpaste use for children at low risk for caries

المضامض الفلورية

- يستخدم عادةً محلول فلور الصوديوم المعتدلNaF بتركيز:
  - ٠,٢% أسبوعياً (٩٠٥ ppm).
  - ٠,٠٥% يومياً (٢٢٦ppm).
- غسول فلور القصديرSnF ٠,١% يومياً(٢٤٢ppm).
- غسول فلور الفوسفات الحامضية APF ٠,١% أسبوعياً (١٠٠٠ppm).
- APF ٠,٠٢٢% يومياً (٢٠٠ppm).

- يستخدم عادةً ١٠ مل من المحلول في كل مرة ويتم المضمضة لمدة دقيقة ثم يجب الامتناع عن الأكل والشرب لمدة ٣٠ دقيقة على الأقل.
- بالنسبة للأطفال يستخدم ٧مل والمضمضة لمدة ٣٠ ثانية.

- استطبابات استخدام المضامض الفلورية :

١- عند الأطفال المعالجين بأجهزة تقويمية.

٢- عند مرضى الأجهزة الصناعية الجزئية.

٣- المرضى الذين لديهم فعالية نخرية عالية أو عاليي الخطورة بالنسبة للنخر السني.

- **لا تستطب المضامض الفلورية عند الأطفال تحت عمر الـ ٦ سنوات بسبب عدم نضج منعكس البلع لديهم.**

Fluoride Gels

- Fluoride gels are professionally applied or prescribed for home use under professional supervision. They are typically recommended for use twice per year.

Fluoride Gels







- تكون تراكيز الهلام الفلوري عالية وتتطلب الحذر في استخدامها :
- ١,٢٣% APF (١٢٣٠٠ppm).
- ٠,٤% SnF (٩٦٨ppm).
- ٢% NaF (٩٠٥٠ppm).

Fluoride Varnish



Fluoride Varnish



- Varnish is a professionally applied, sticky resin of highly concentrated fluoride (up to 22,600 ppm).

In the United States, fluoride varnish has been approved by the FDA for use as a cavity liner and root desensitizer, but not specifically as an anti-caries agent.

-For caries prevention, fluoride varnish is an “off label” product.



Fluoride Varnish

- Application frequency for fluoride varnish
- ranges from 2 to 6 times per year.

The use of fluoride varnish leads to a 33% reduction in decayed, missing, and filled tooth surfaces(DMF s) in the primary teeth and a 46% reduction in the permanent teeth.

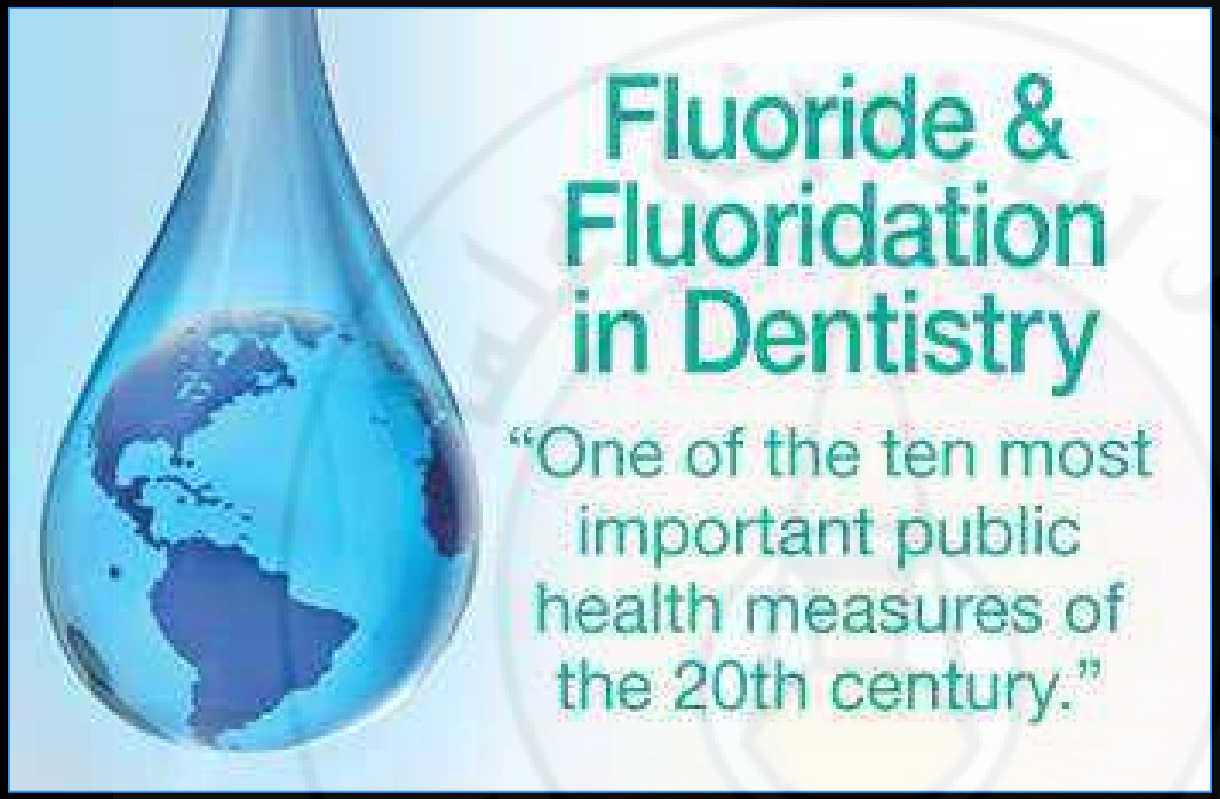


Community Water Fluoridation

- The goal of community water fluoridation is to maximize dental caries prevention while minimizing the frequency of enamel fluorosis.

- In January 2011, the US Department of Health and Human Services proposed 0.7 ppm be considered the optimal fluoride concentration in drinking water.

- Because there is geographic variability in community water fluoridation, it is important to know fluoride content of the water children consume.



- Water fluoridation was recognized by the Centers for Disease Control and Prevention (CDC) as one of the 10 greatest public health achievements of the 20th century.

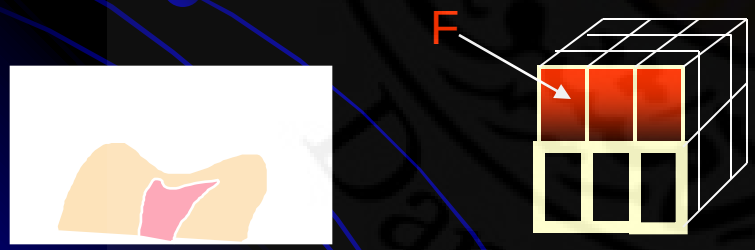
GOALS OF FLUORIDE (F) ADMINISTRATION

1. Do no harm

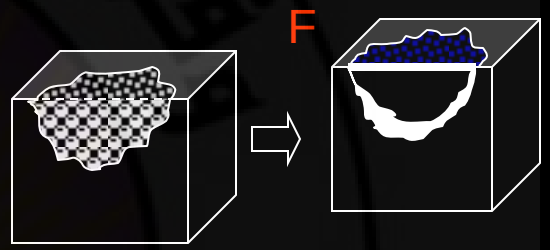


Fluorosis or toxicity

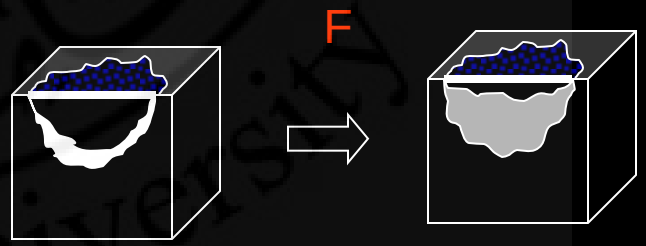
2. Prevent decay on in tact dental surfaces



3. Arrest active decay



4. Remineralize decalcified teeth





mild



moderate



pitting



severe


Sealants protect the chewing surfaces!
Fluoride protects the smooth surfaces!

Fluoride Dietary Supplementation

When access to community water fluoridation is limited, fluoride can be supplemented in liquid, tablet, or lozenge form.

Fluoride supplements require a prescription. Fluoride supplements should be prescribed only to children whose community water source has Suboptimal fluoride levels.



Used with permission from Content Visionary

Supplementation Dosing Schedule

The AAP, ADA, and AAPD have developed the following recommendations regarding fluoride supplementation:

1. All sources of fluoride must be considered, including primary drinking water, other sources of water, prescriptions from the dentist, fluoride mouthrinse in school, and fluoride varnish.
2. Children who have adequate access to (and are drinking) appropriately fluoridated community water should NOT be supplemented.
3. Children younger than 6 months and older than 16 years should NOT be supplemented.

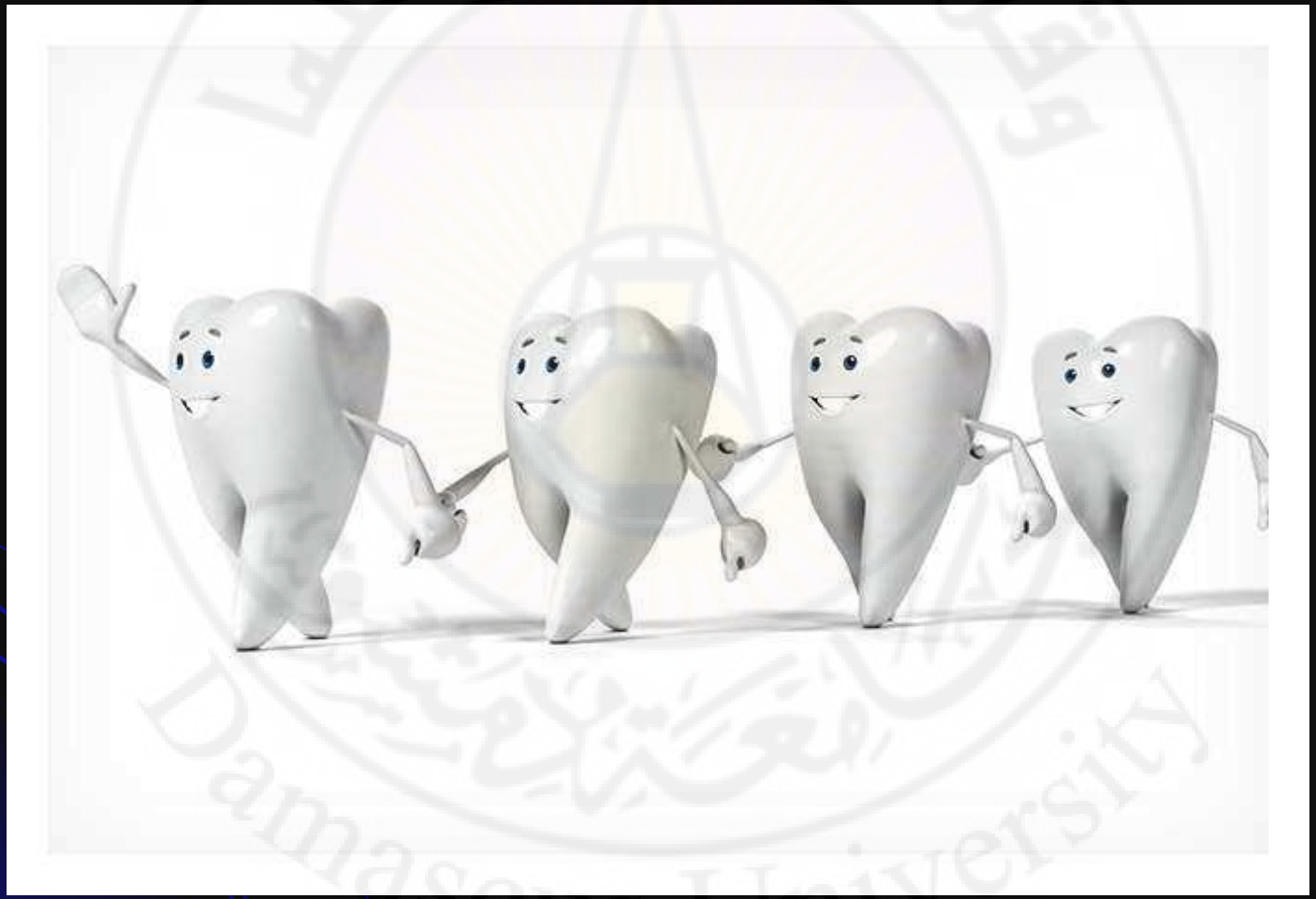
Fluoride Supplements, continued

The American Dental Association (ADA) and the American Academy of Pediatric Dentistry (AAPD) recommend fluoride supplements be prescribed only to children at high risk for caries.

- Strength of recommendation: B

The United States Preventive Services Task Force (USPSTF) in 2014 recommended fluoride supplementation be prescribed to ALL children older than 6 months whose primary water source is deficient in fluoride.

- Strength of recommendation: B.
- The AAP endorses the USPSTF recommendation to prescribe fluoride supplements to all children ages 6 months to 16 years who drink sub-optimally fluoridated water.



PIT and FISSURE SEALANTS


Sealant Is Applied
Into The Pits & Fissures

FISSURES AND GROOVES

- They are formed at the junction of the developmental lobes of the enamel.Sound coaleacence of the lobes results in grooves,faulty coalescence results in fissures.
- Fissures act as food and bacterial traps that may predispose tooth to dental caries.
- Occlusal grooves,which are sound,sserve an important function as an escape path for the movement of food to the facial and lingual surfaces during mastication.
- The resulting narrow clefts provide a protected niche for acidogenic bacteria and the organic nutrients they require.

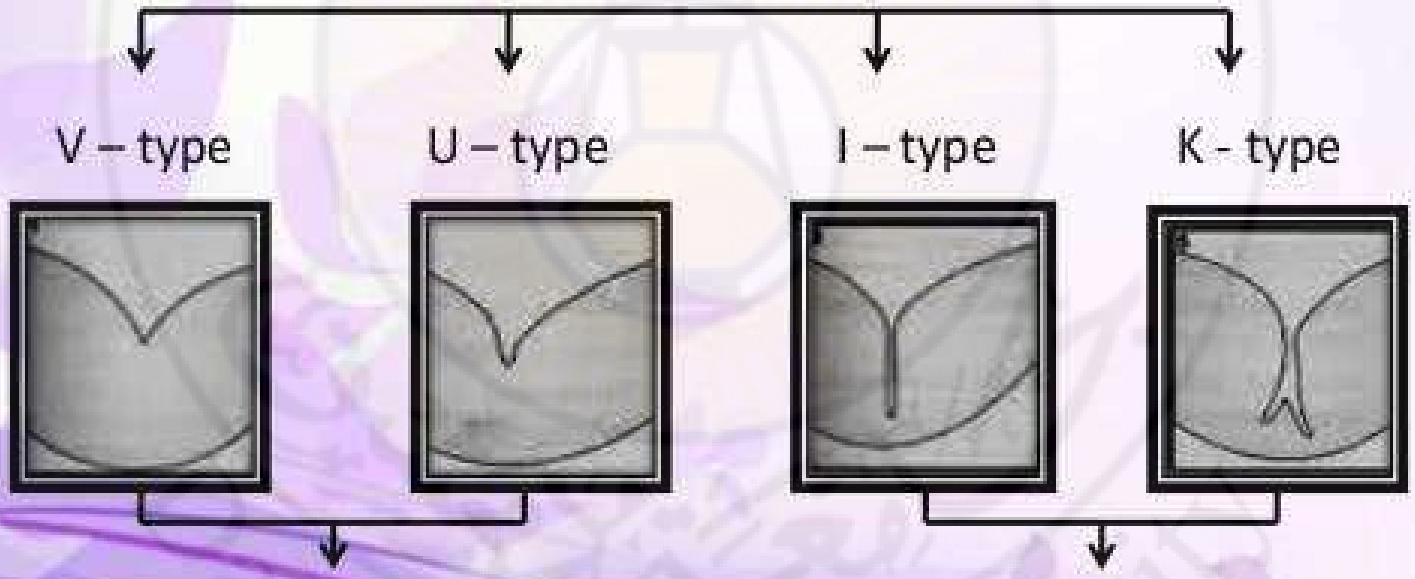
- There are 5 types of fissures based on the alphabetical description of shape they are
  - V type
  - U type
  - I type
  - K type
  - H shaped fissures-seen mostly in premolars.
- Susceptibility of caries is related to form and depth of these pits and fissures.
- The shallow wide V and U shaped fissures tend to be self-cleansing and somewhat caries resistant.
- Deep narrow I shaped and K shaped fissures are quiet constricted and resemble a bottle neck.

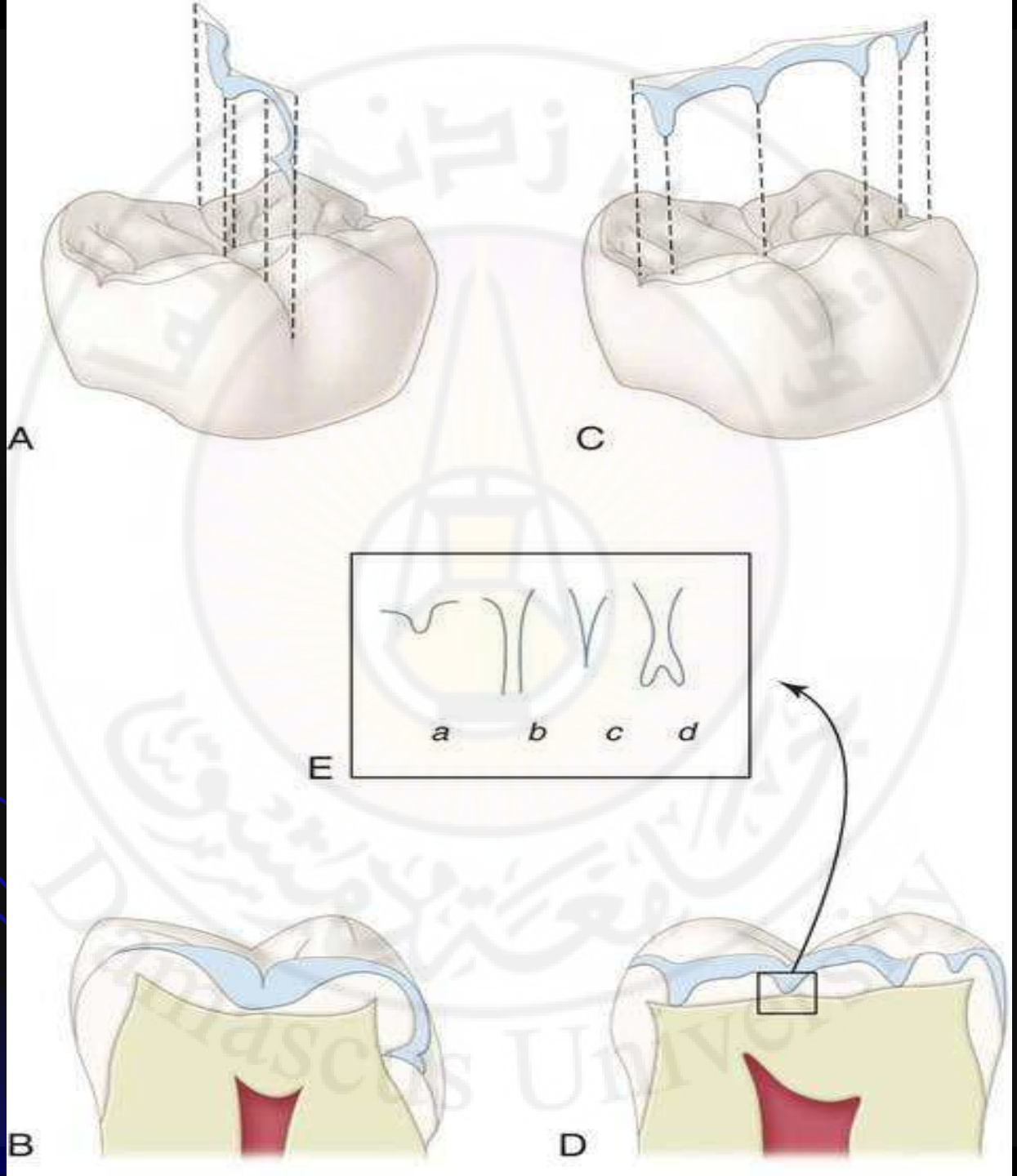
PIT & FISSURE:

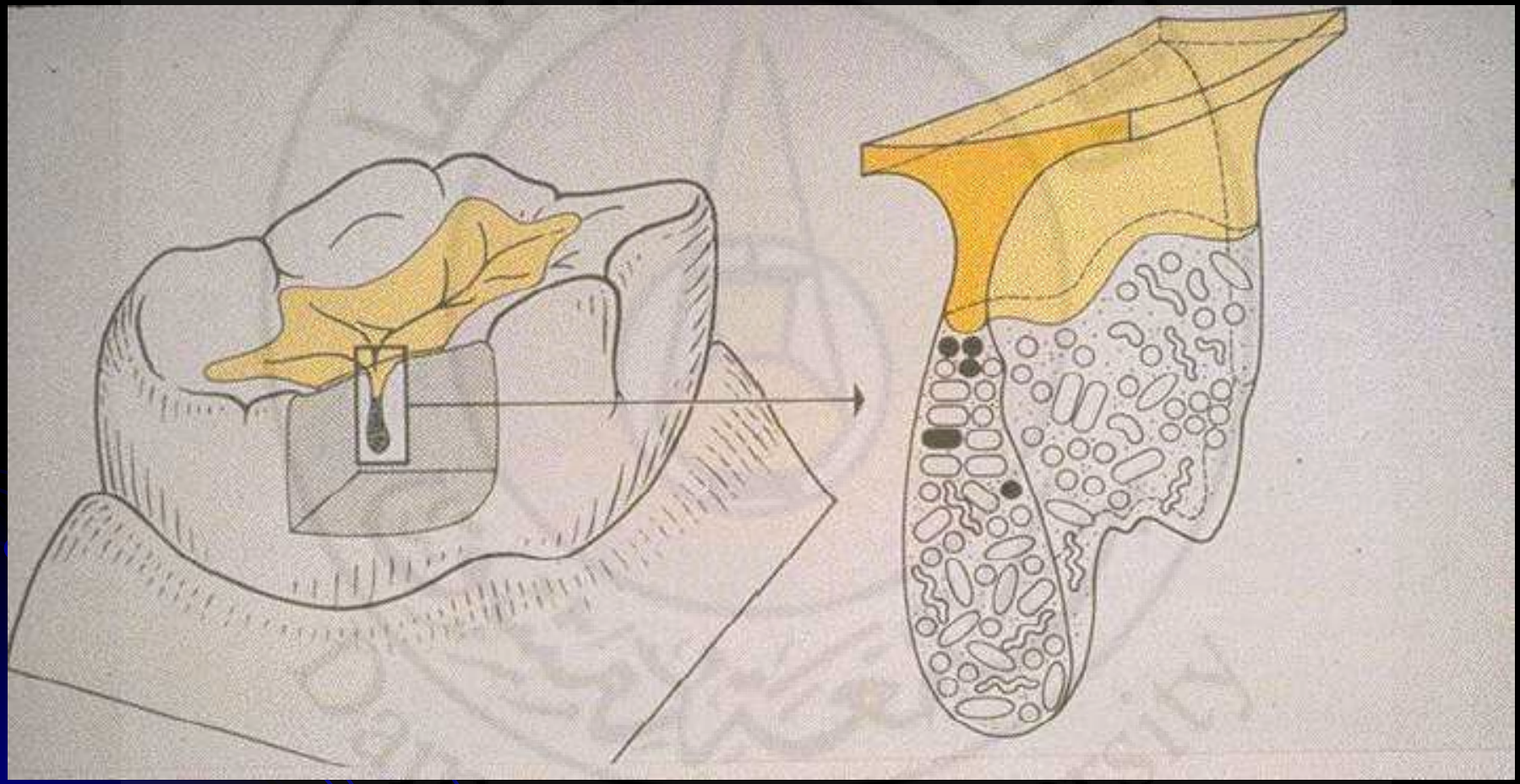
- **PIT**: Small pin point depression located at the junction of developmental grooves.

- **FISSURE**: Deep clefts between adjoining cusps.

MORPHOLOGY OF FISSURES: (NANGO - 1960)

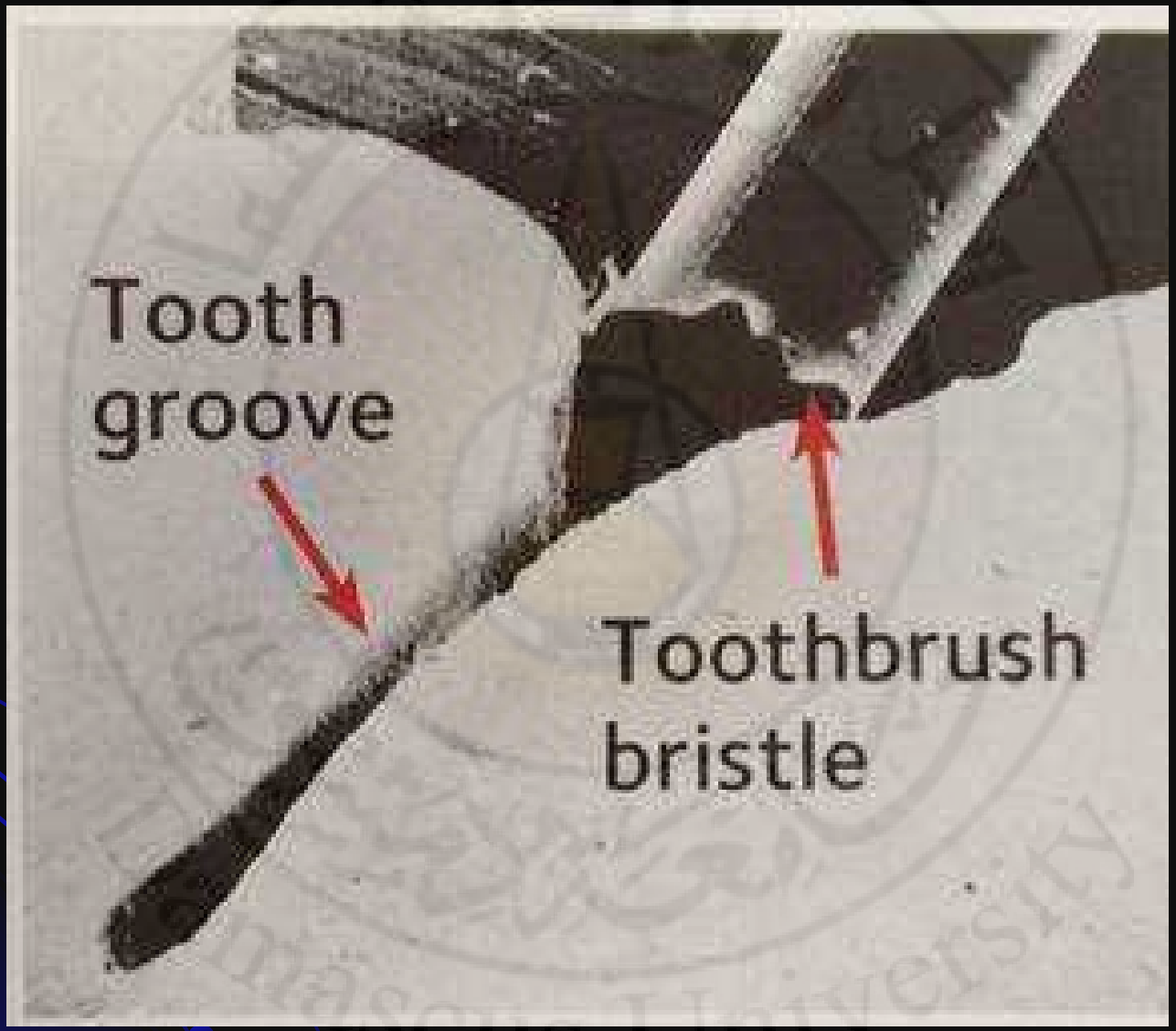



A
C
a
b
c
d
E
B
D

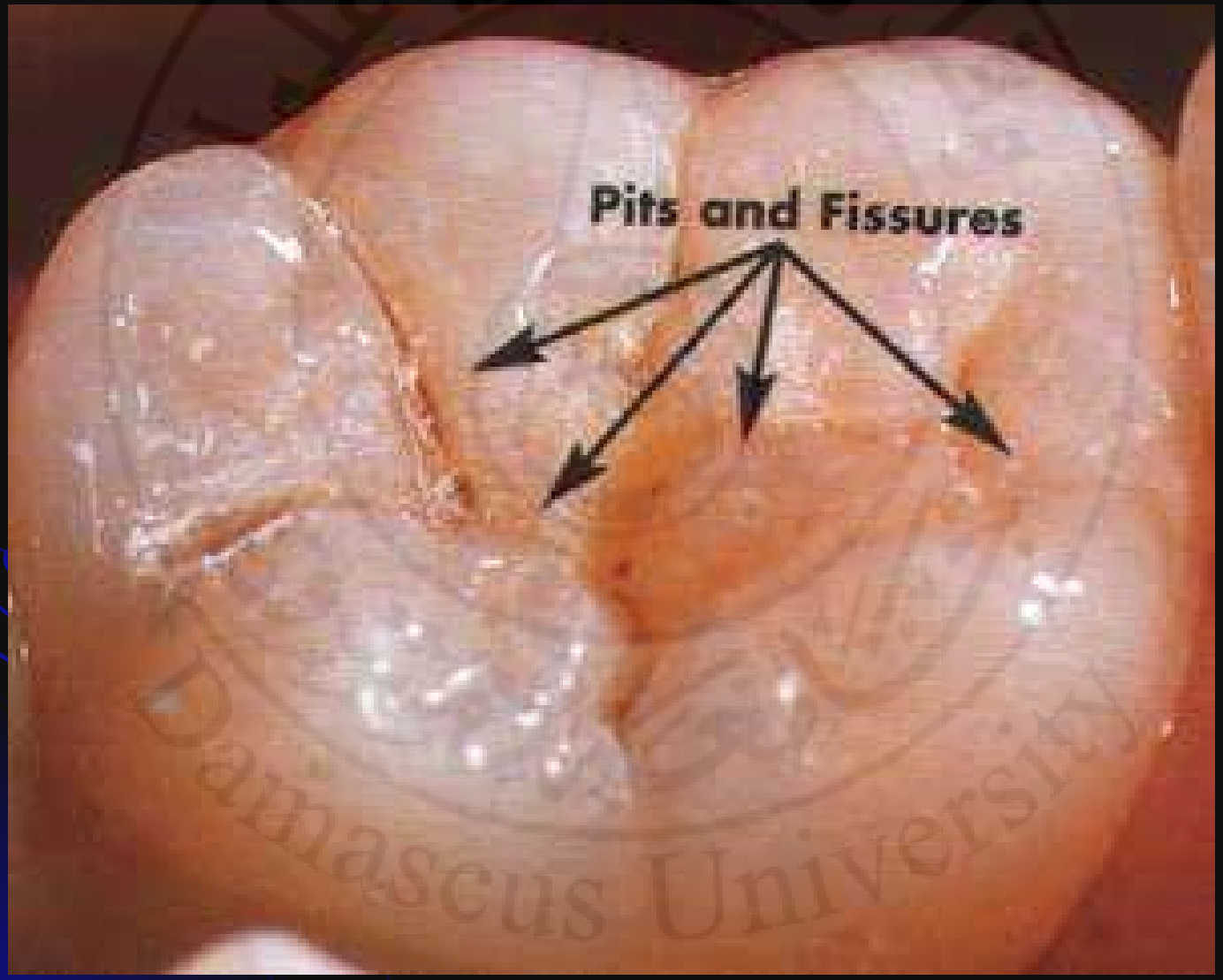


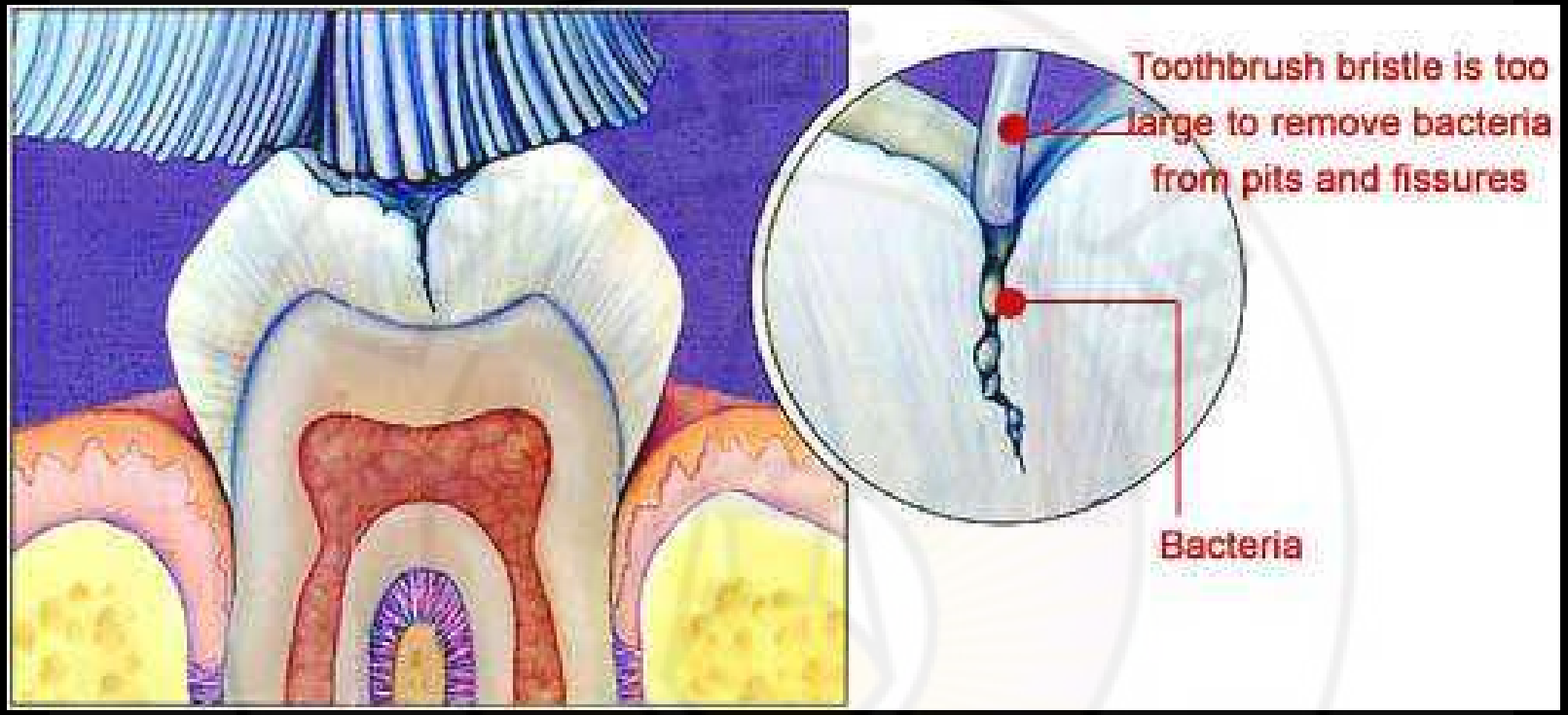
Pits and Fissures can be described as:

- Areas in the fossa's and grooves that have failed to form
- Found on occlusal surfaces of posterior teeth
- Found on the lingual of anterior teeth
- Narrow and deep grooves
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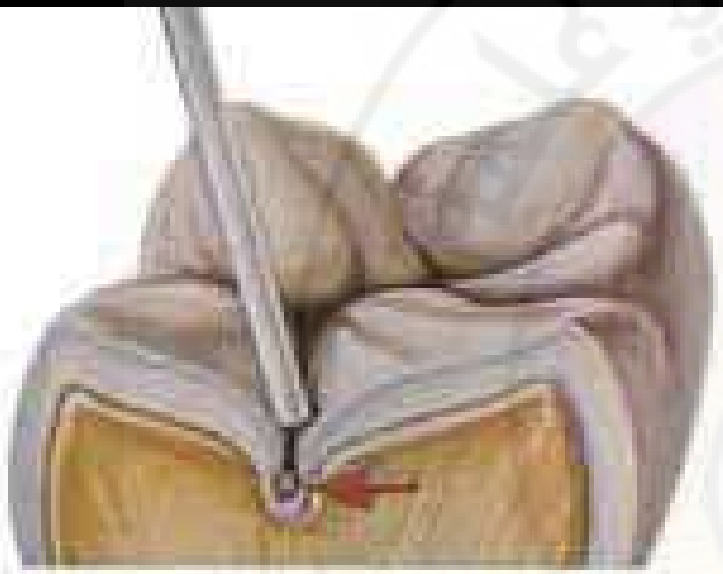

Tooth
groove
Toothbrush
bristle

Pits and Fissures

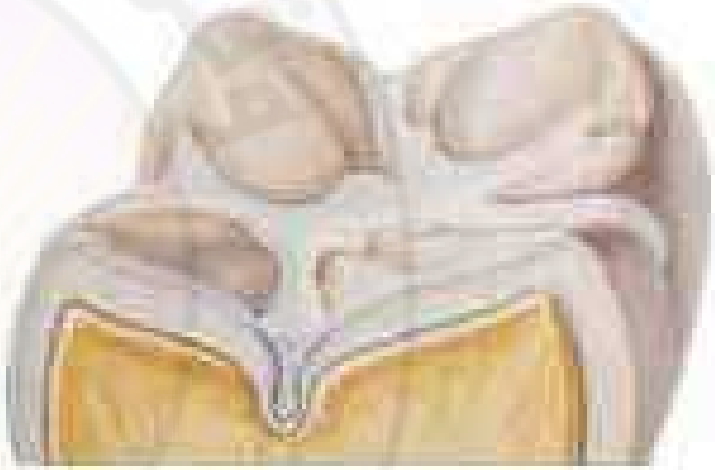



Toothbrush bristle is too large to remove bacteria from pits and fissures
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Animated-Teeth.com
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Toothbrush bristles are to large to clean out grooves in most teeth
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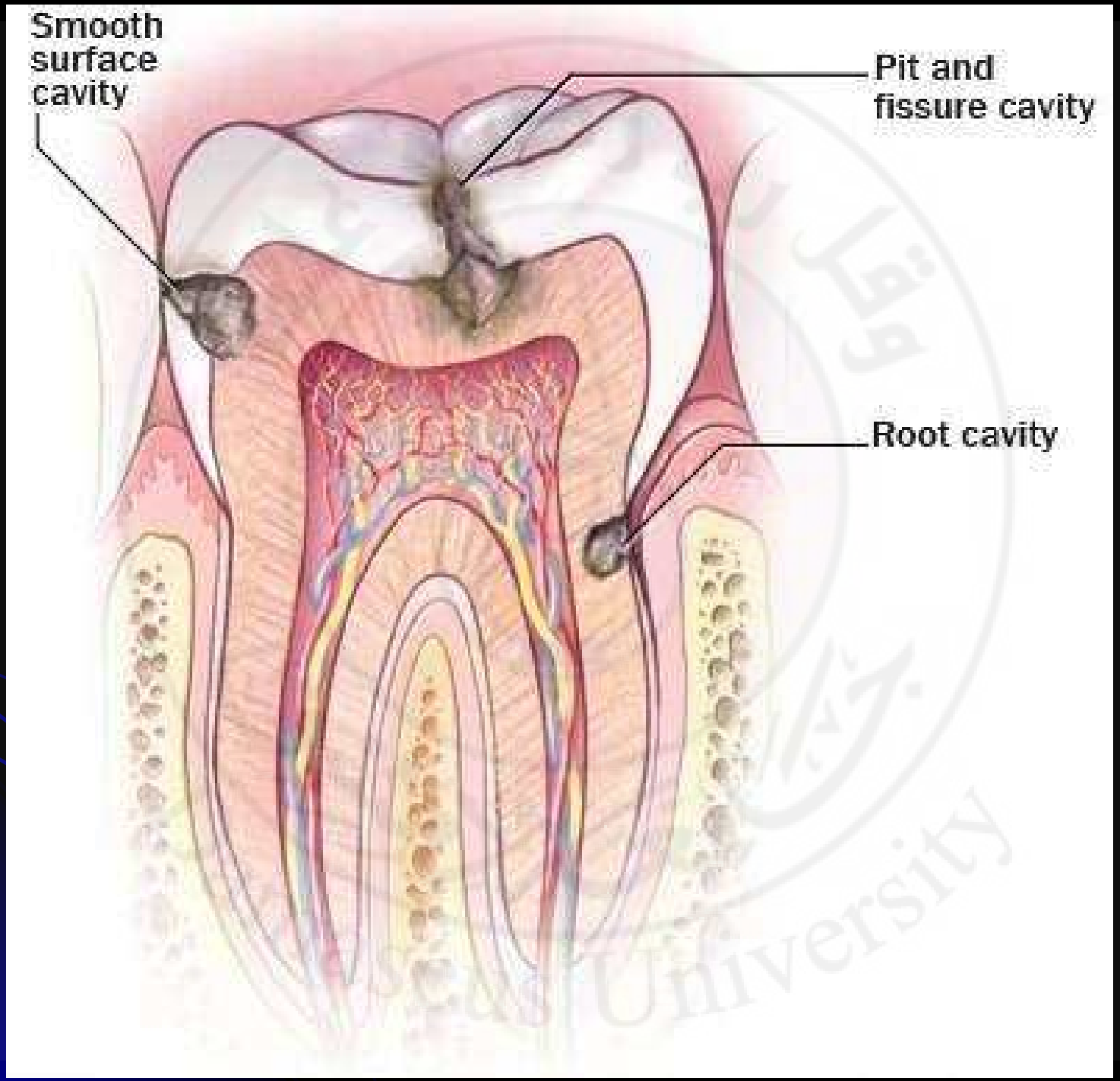


Dental sealants can be used to cover the grooves in teeth to prevent cavities from forming

Damascus University

Occlusal vs. Proximal Caries in the USA




Smooth surface cavity
Pit and fissure cavity
Root cavity

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- Can also be used to seal margins of composite restorations.

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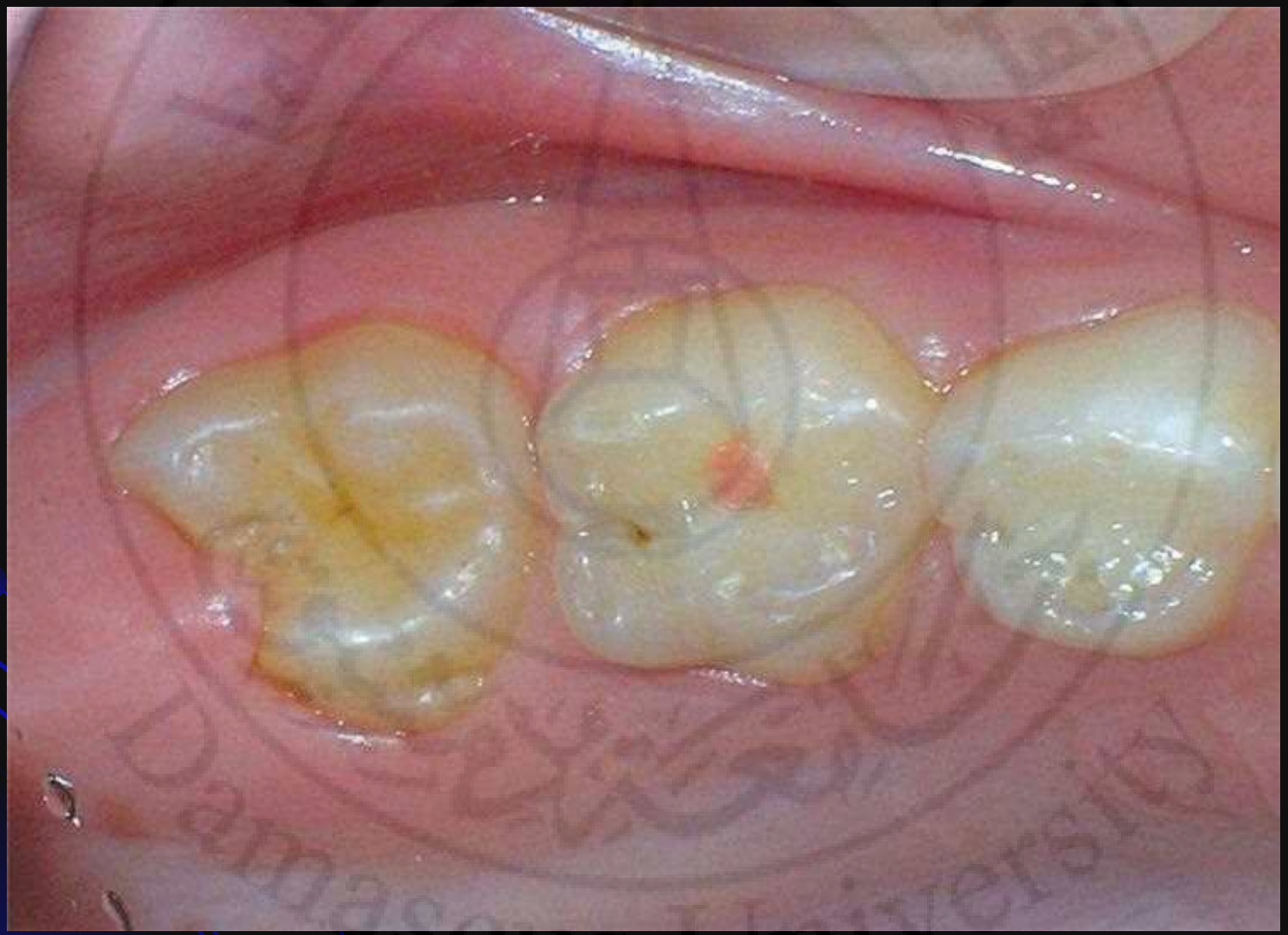
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glass ionomer sealants :

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- release fluoride over time.
- Less sensitive to moisture contamination than resin-based materials.
- Retention is a major problem with GIC sealants, but if this concern can be resolved, there maybe advantages to the GIC sealants through the release of fluoride.

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يستعمل الـ GIC على الأسنان البازغة حديثاً أو طور البزوغ



Sealant Application Technique

- Isolation
- Etching
- Rinse and dry
- Application
- Light-curing
- Check occlusion


Cleaning Pit & Fissure
Apply FineEtch
Cleaning
Light-cure it for 20 seconds
Apply Seal·it



Chewing surface of a molar before sealant is applied.

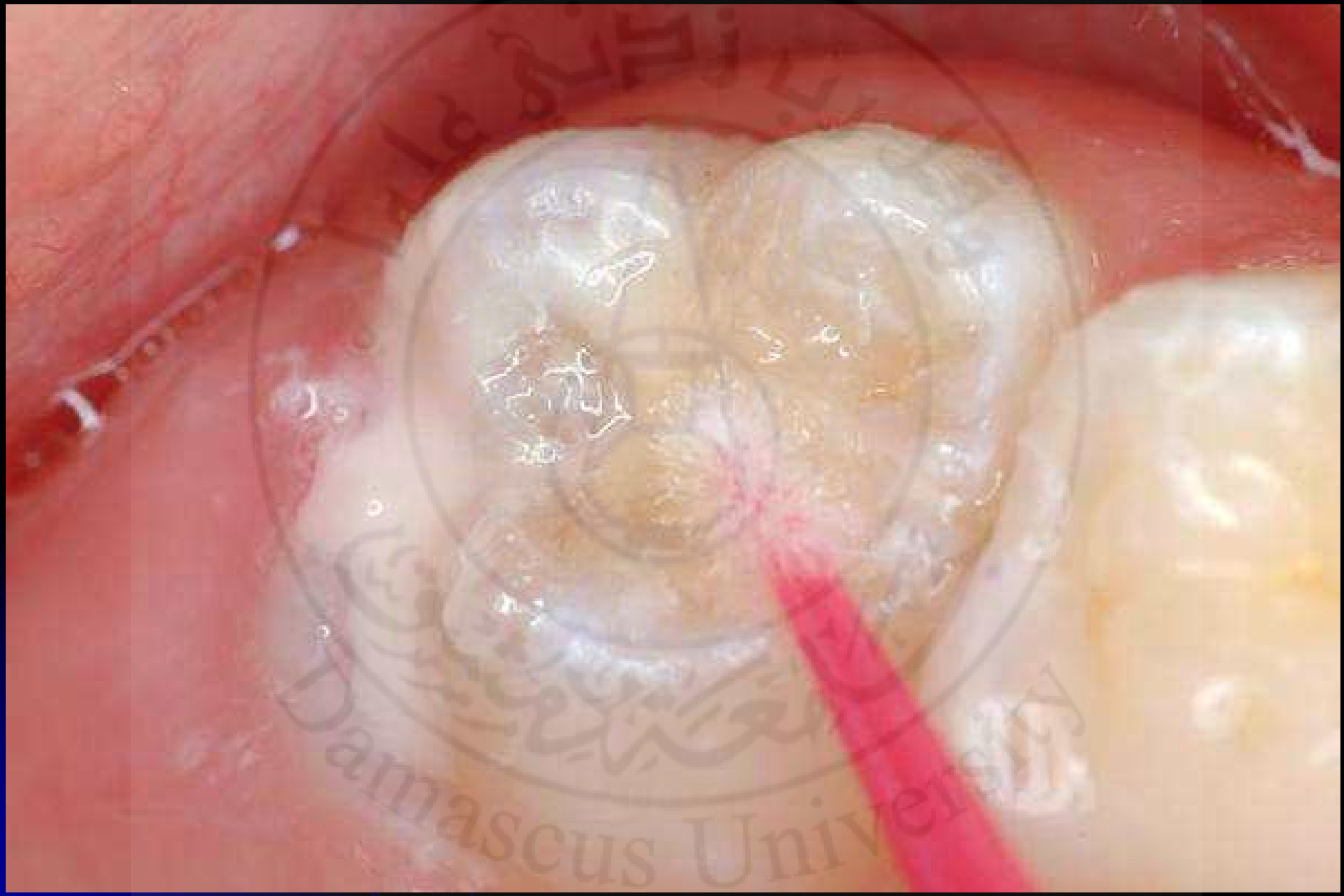


The tooth surface is etched with a mild solution to help the sealant adhere.



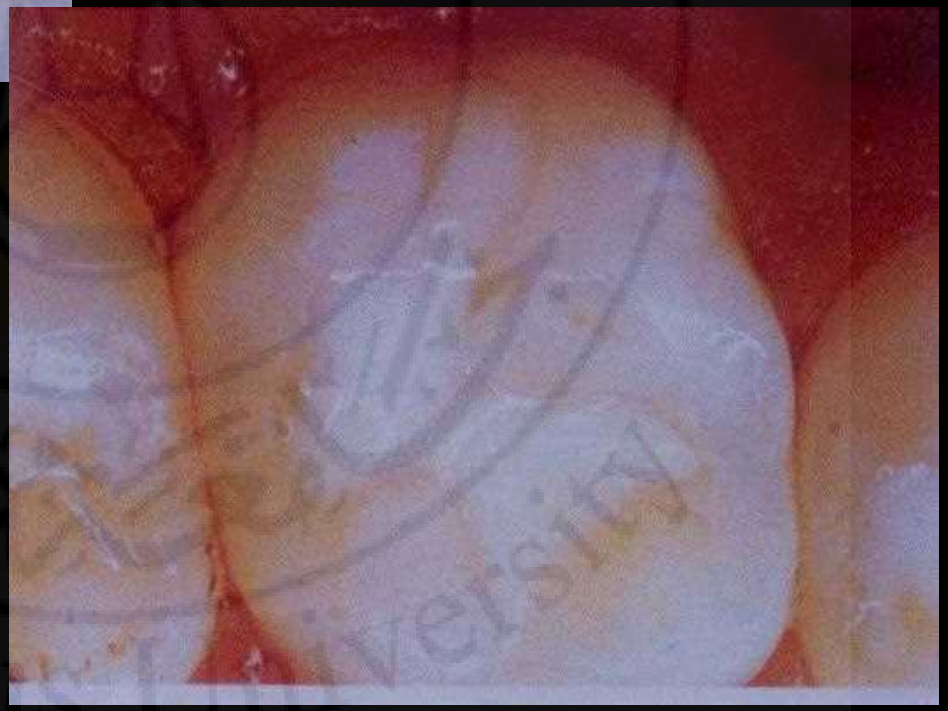
Chewing surface of a molar protected by a shaded sealant.

- Sealants are generally placed on the tooth in liquid form and then cured either chemically or with light activation.
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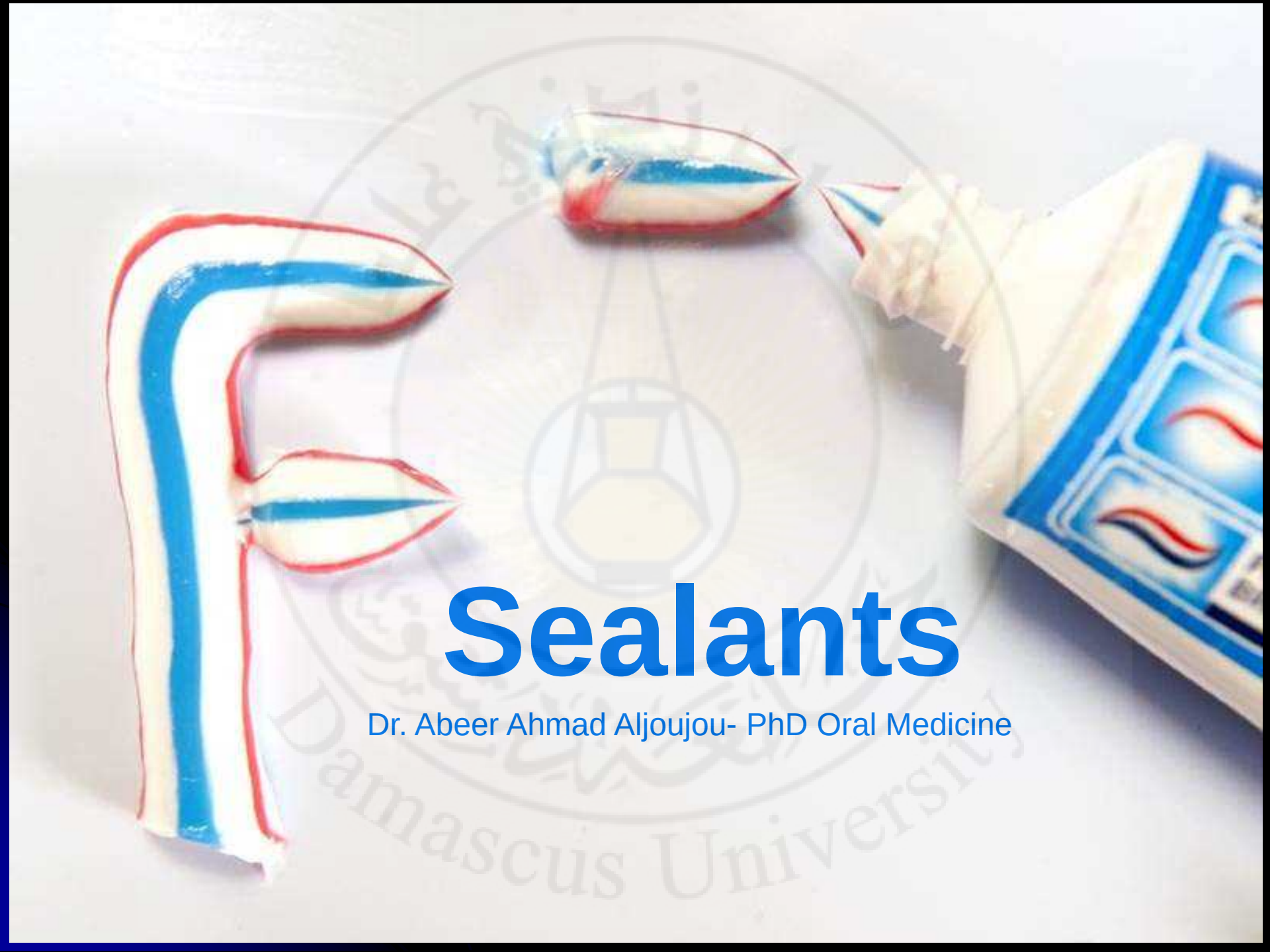
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- Immediately Post Curing
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- Evaluate at EVERY RECALL
  - –As with ALL Restorations


10 years later
At time of placement

...in practice, sealants are not made to be applied only once.

Ripa, 1985



Sealants

Dr. Abeer Ahmad Aljoujou- PhD Oral Medicine

THE CARIES BALANCE

Disease Causing Factors

BAD disease-causing factors include the following:

Bad Bacteria – Acid-producing Bad bacteria
Absence of Saliva – The Absence of healthy salivary function (for example, dry mouth)
Dietary Habits (Poor) – Frequent sugars and acids lead to de-mineralization and a low pH allowing bad bacteria to thrive starting the decay process

Protective Factors

SAFE protective factors include the following:

Saliva and Sealants – Saliva neutralizes acid encouraging good bacteria to thrive and aids re-mineralization. Sealants seal the chewing surfaces of the teeth most likely to decay
Antimicrobials – Helping rid the bad bacteria and establish health-promoting bacteria
Fluoride – Strengthening the tooth surfaces against demineralization promoting re-mineralization
Effective Diet – Consuming a healthy diet



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PIT and FISSURE SEALANTS


Sealant Is Applied
Into The Pits & Fissures

FISSURES AND GROOVES

- They are formed at the junction of the developmental lobes of the enamel.Sound coaleacence of the lobes results in grooves,faulty coalescence results in fissures.
- Fissures act as food and bacterial traps that may predispose tooth to dental caries.
- Occlusal grooves,which are sound,sserve an important function as an escape path for the movement of food to the facial and lingual surfaces during mastication.
- The resulting narrow clefts provide a protected niche for acidogenic bacteria and the organic nutrients they require.

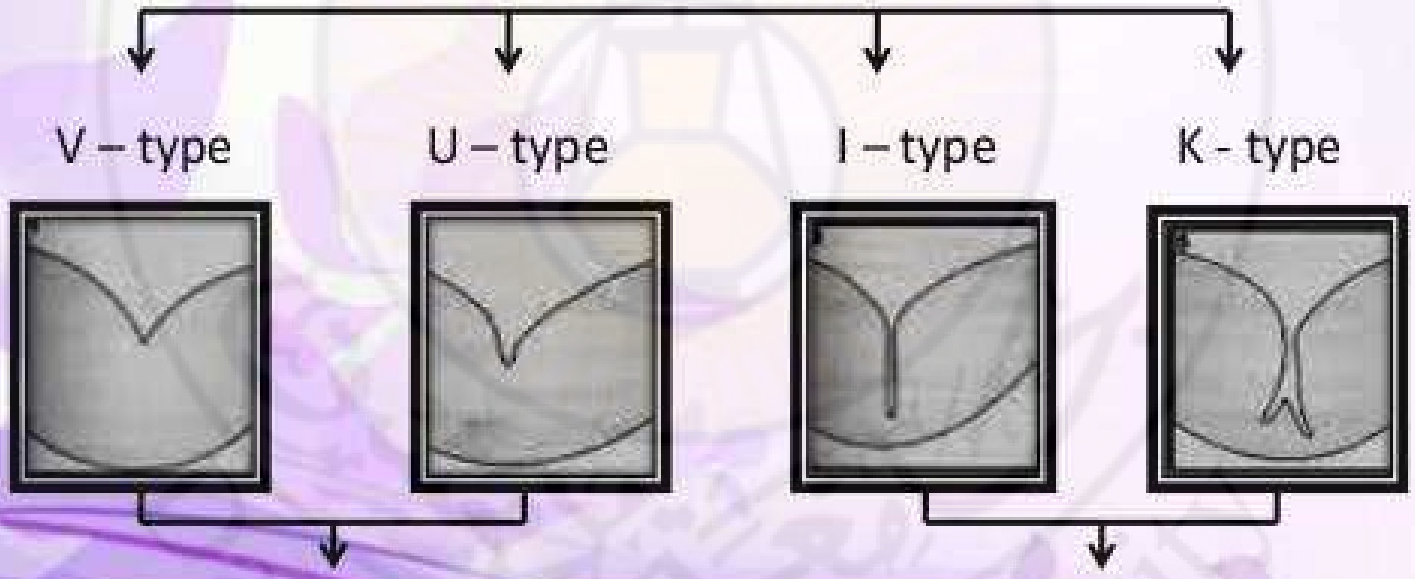
- There are 5 types of fissures based on the alphabetical description of shape they are
  - V type
  - U type
  - I type
  - K type
  - H shaped fissures-seen mostly in premolars.
- Susceptibility of caries is related to form and depth of these pits and fissures.
- The shallow wide V and U shaped fissures tend to be self-cleansing and somewhat caries resistant.
- Deep narrow I shaped and K shaped fissures are quiet constricted and resemble a bottle neck.

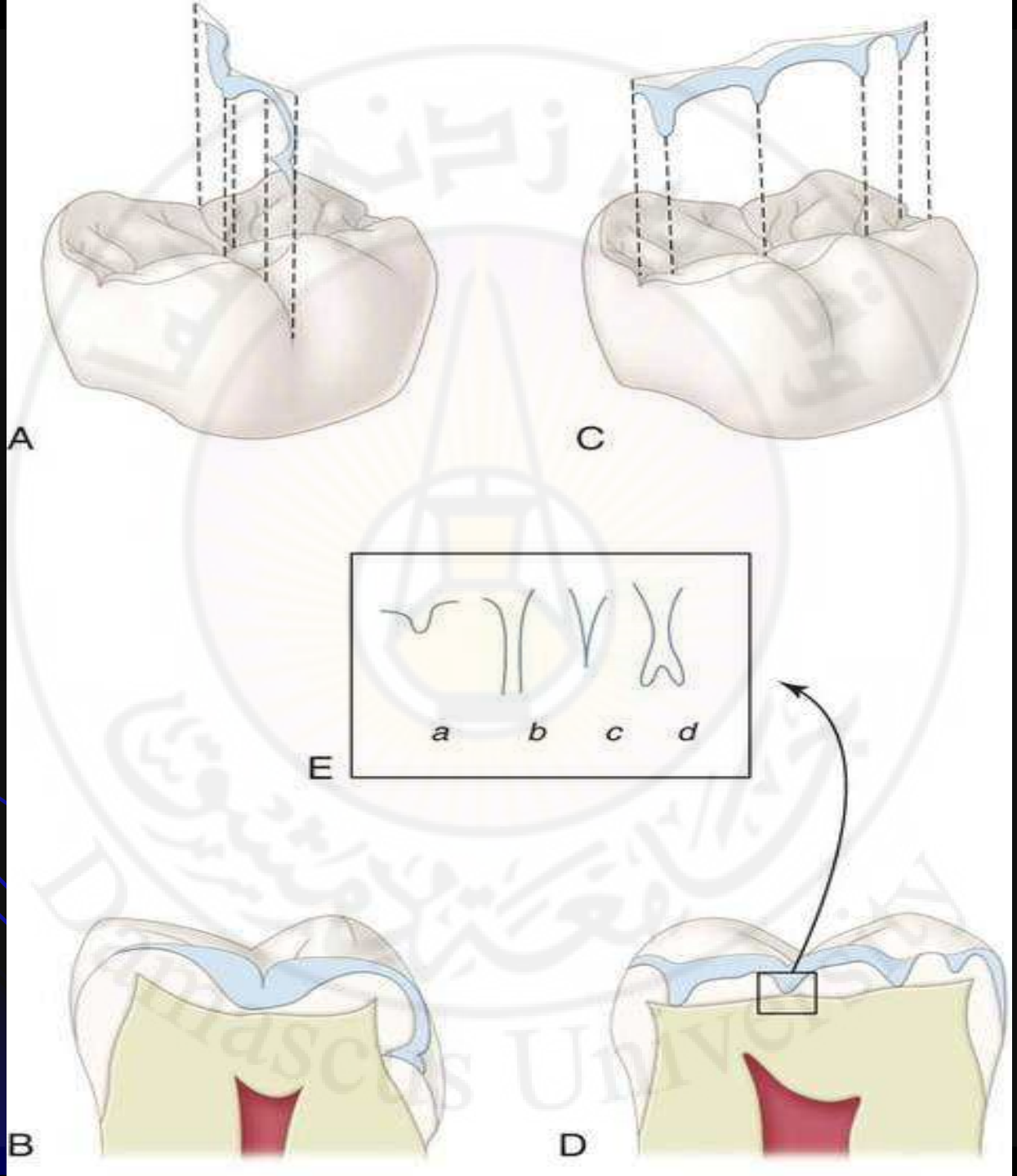
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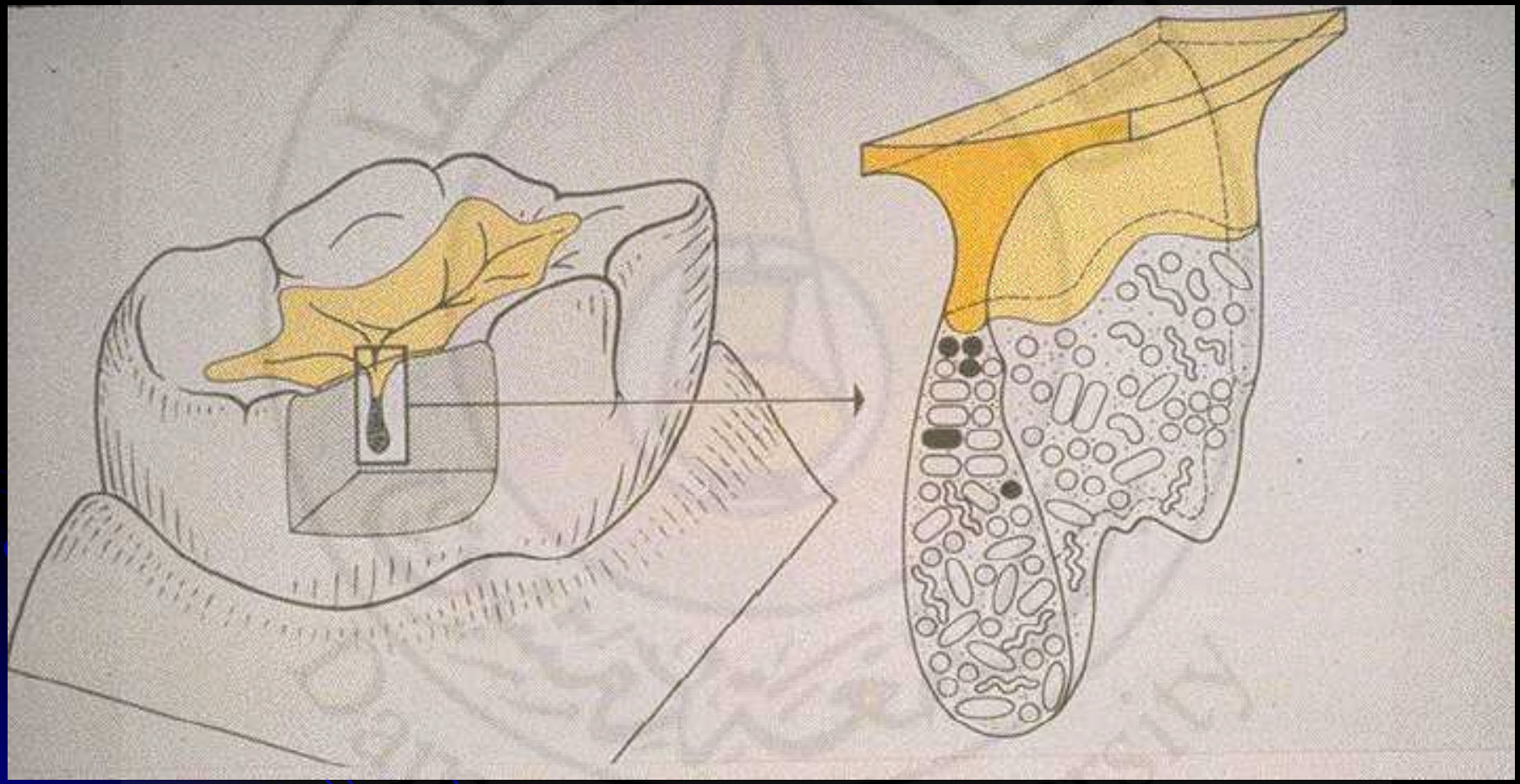
- **PIT**: Small pin point depression located at the junction of developmental grooves.

- **FISSURE**: Deep clefts between adjoining cusps.

MORPHOLOGY OF FISSURES: (NANGO - 1960)

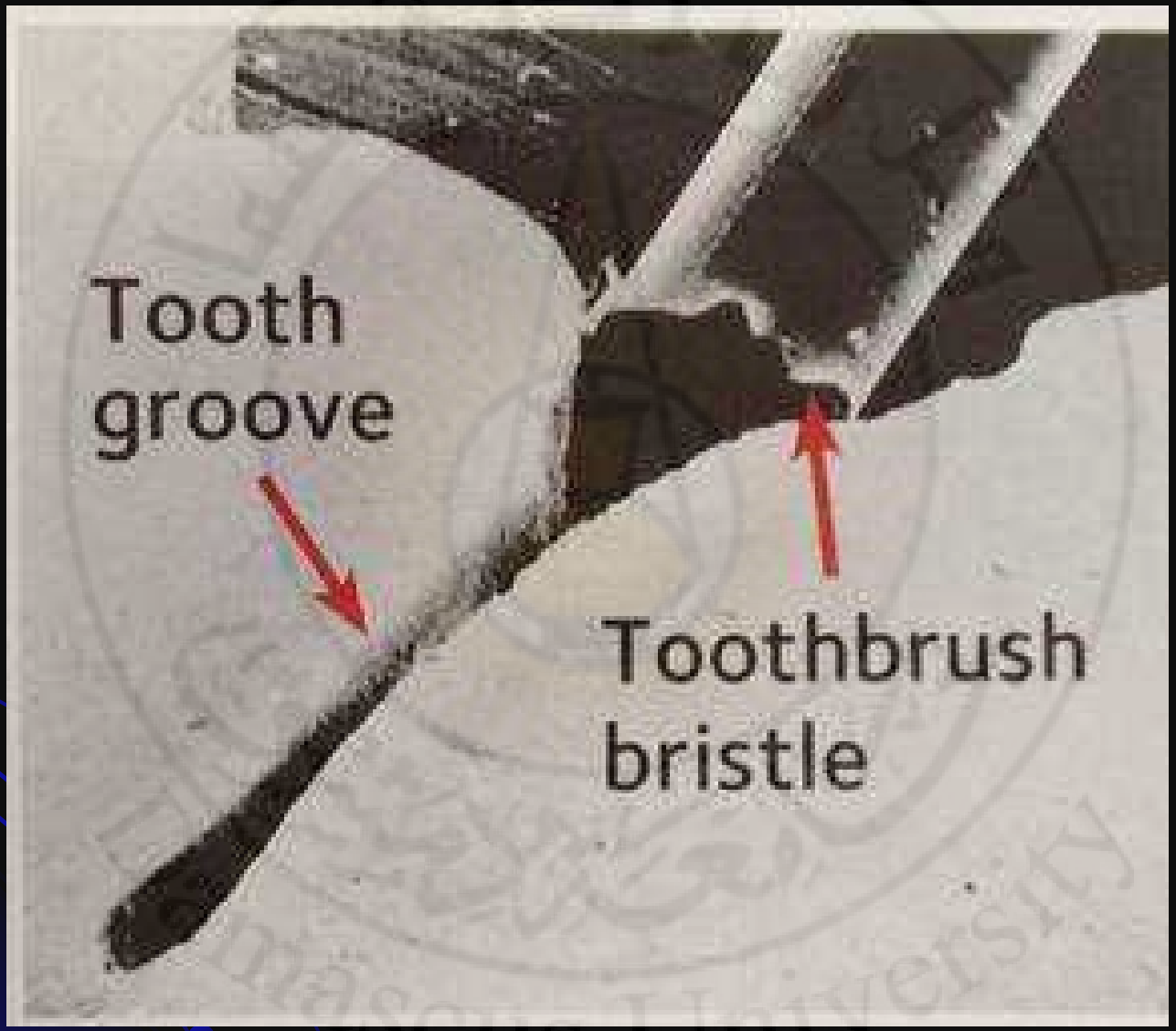



A
C
a
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B
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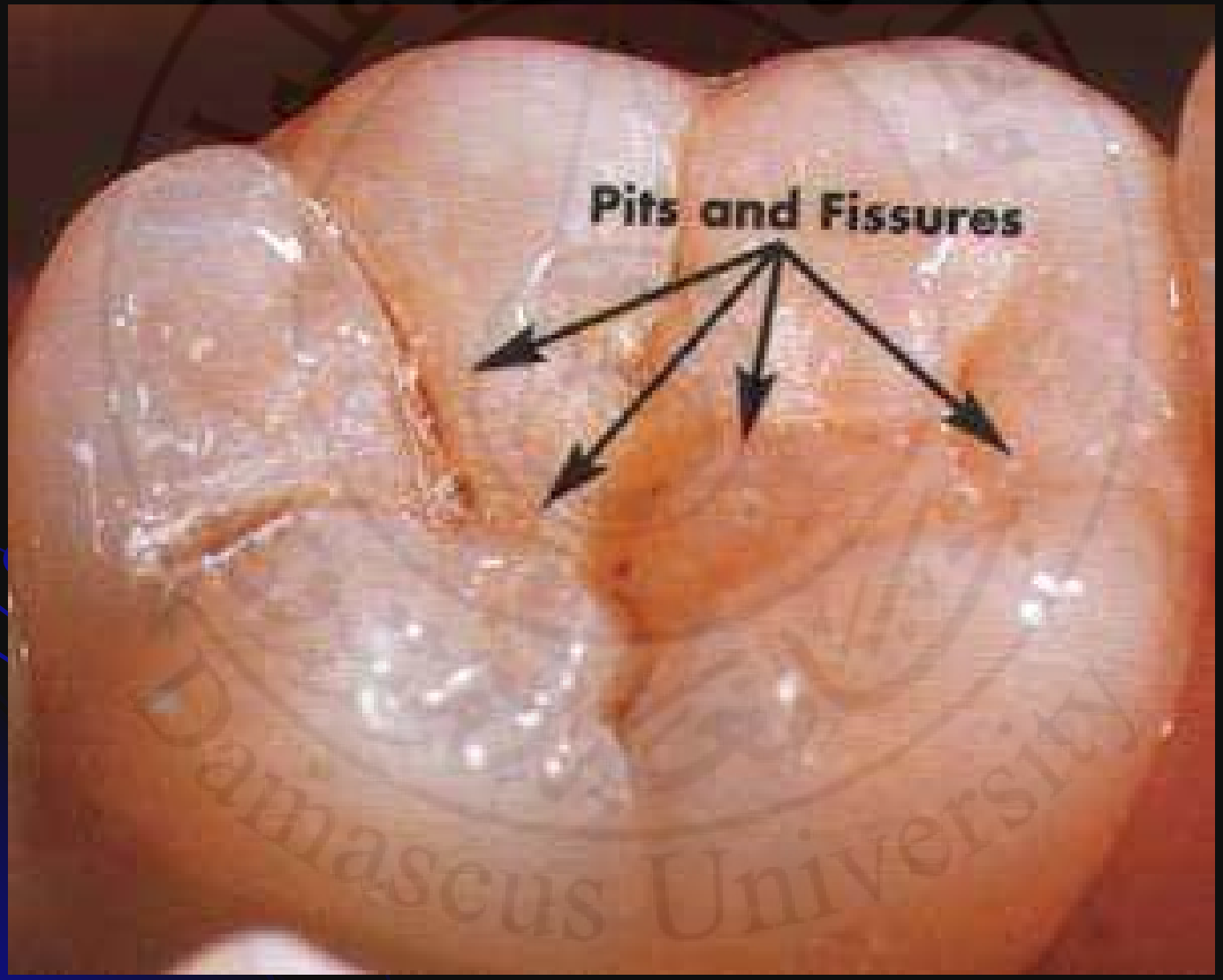


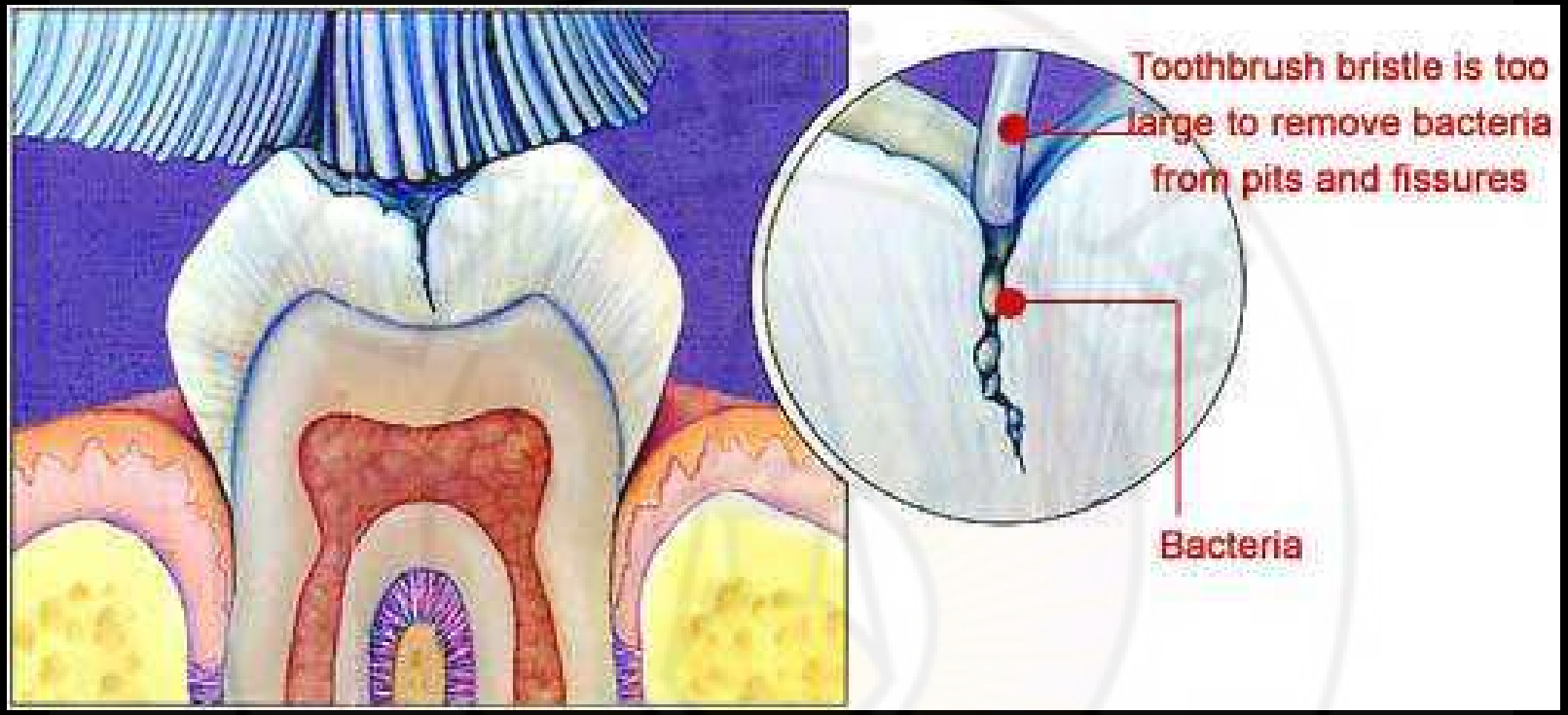
Pits and Fissures can be described as:

- Areas in the fossa's and grooves that have failed to form
- Found on occlusal surfaces of posterior teeth
- Found on the lingual of anterior teeth
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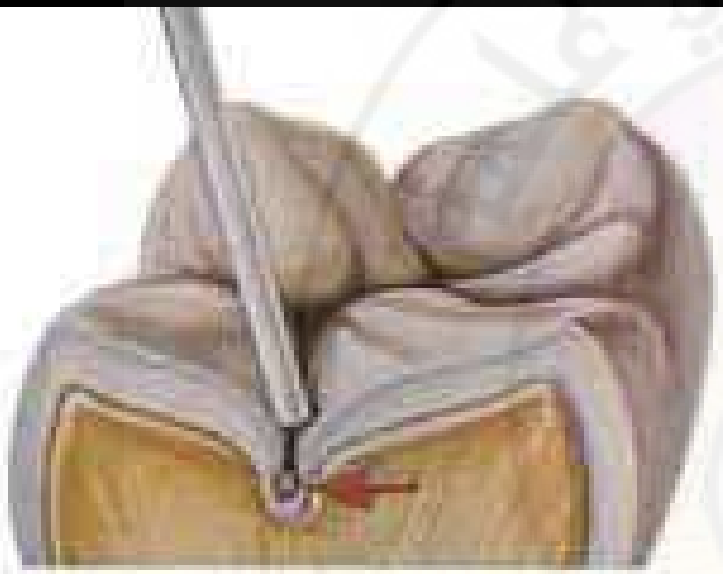

Tooth
groove
Toothbrush
bristle

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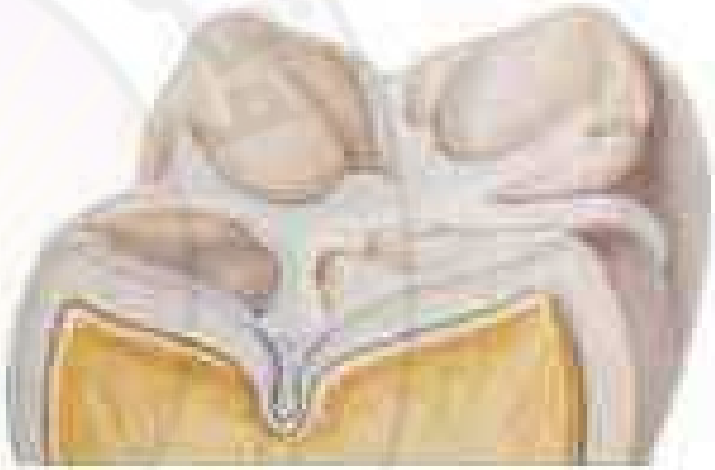



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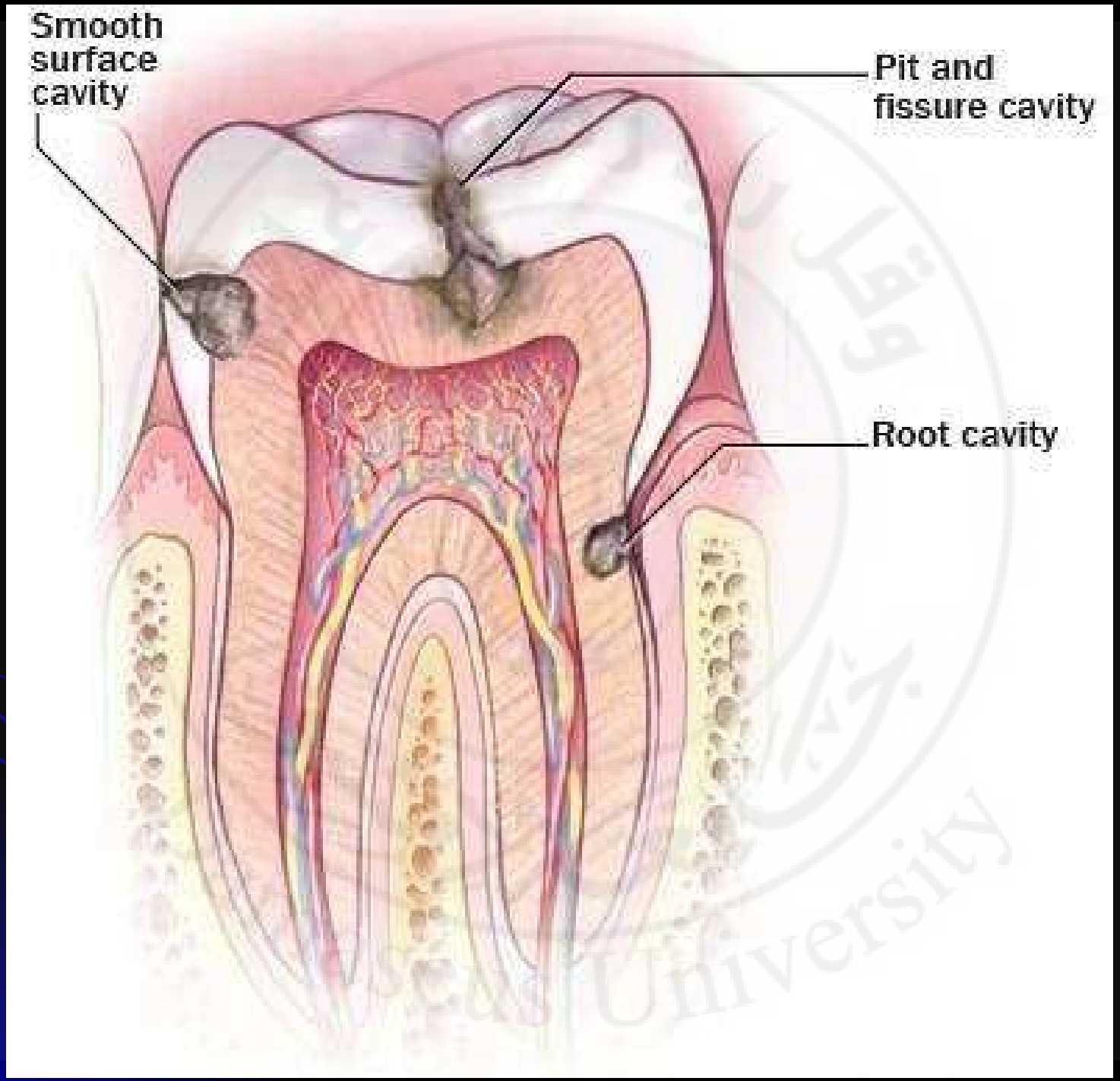


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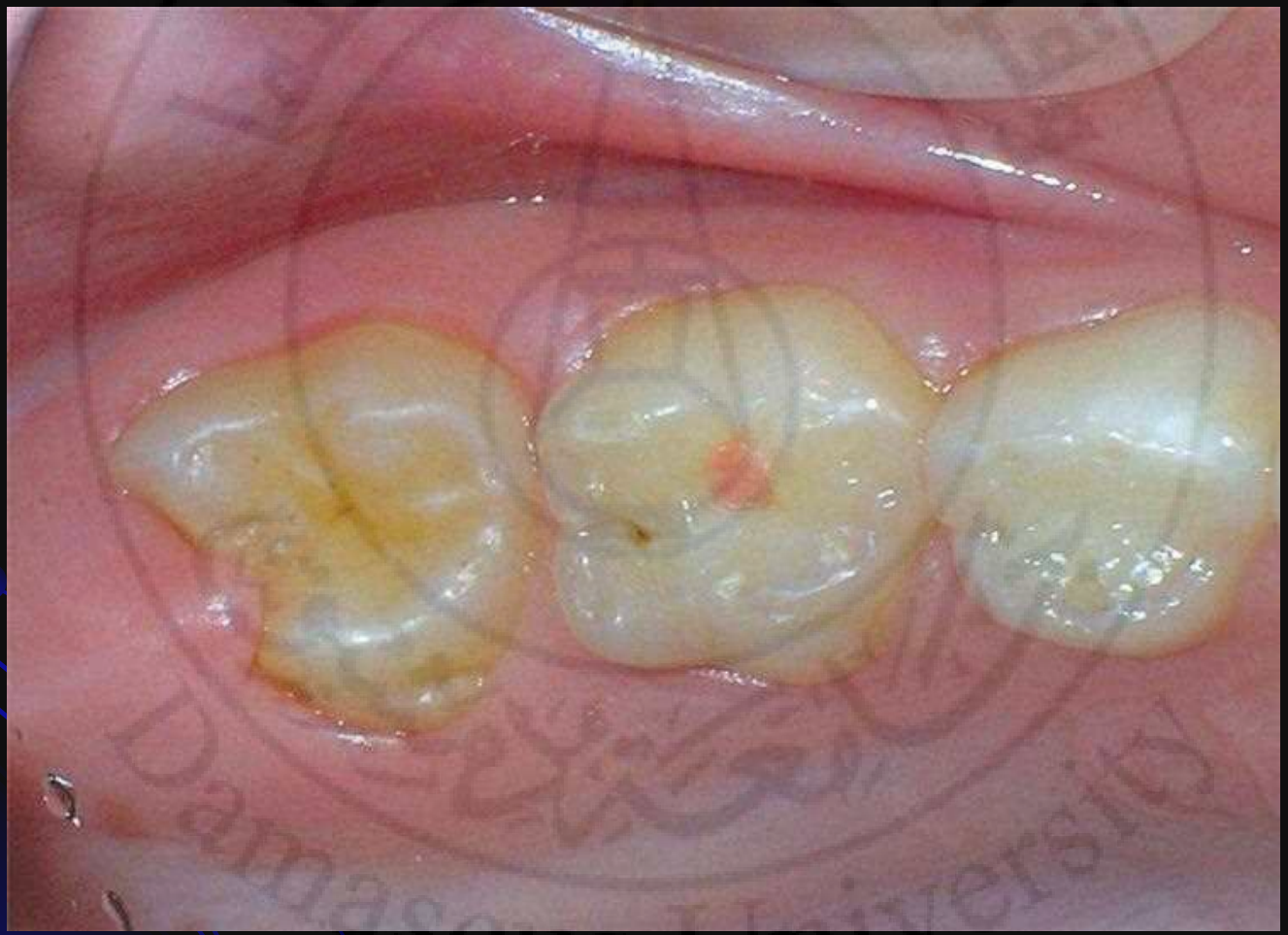
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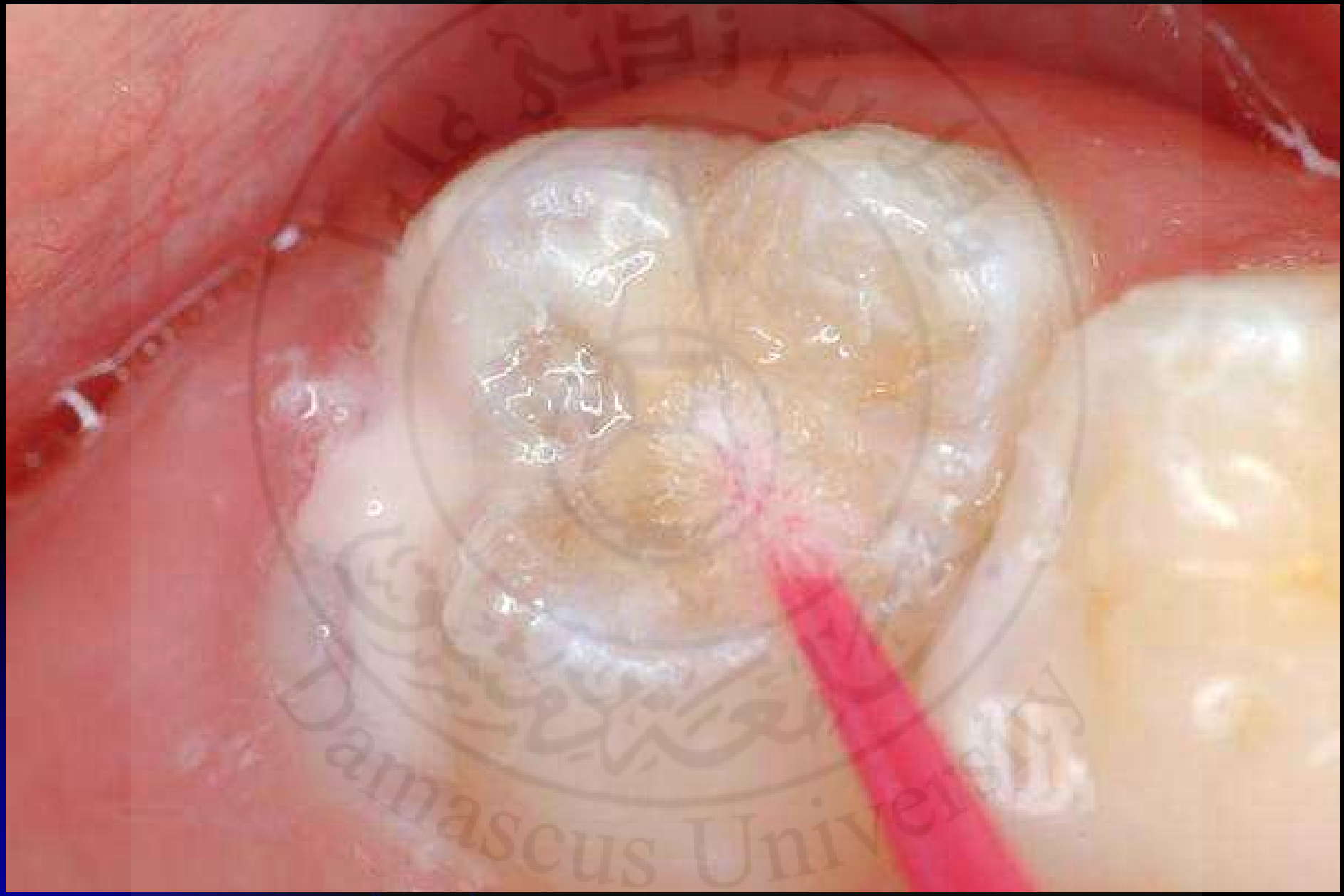


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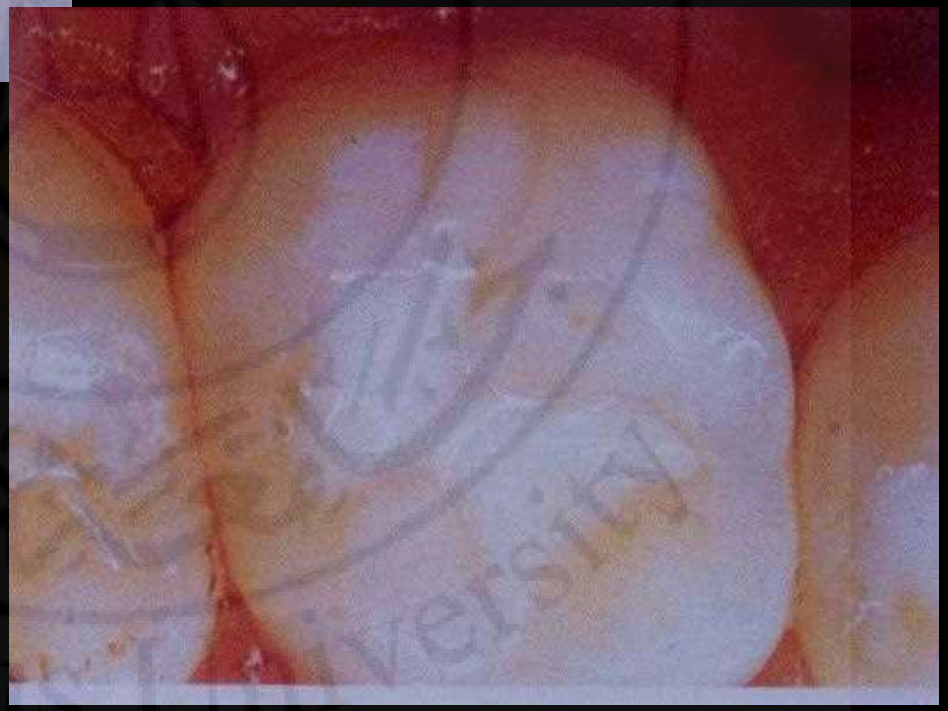
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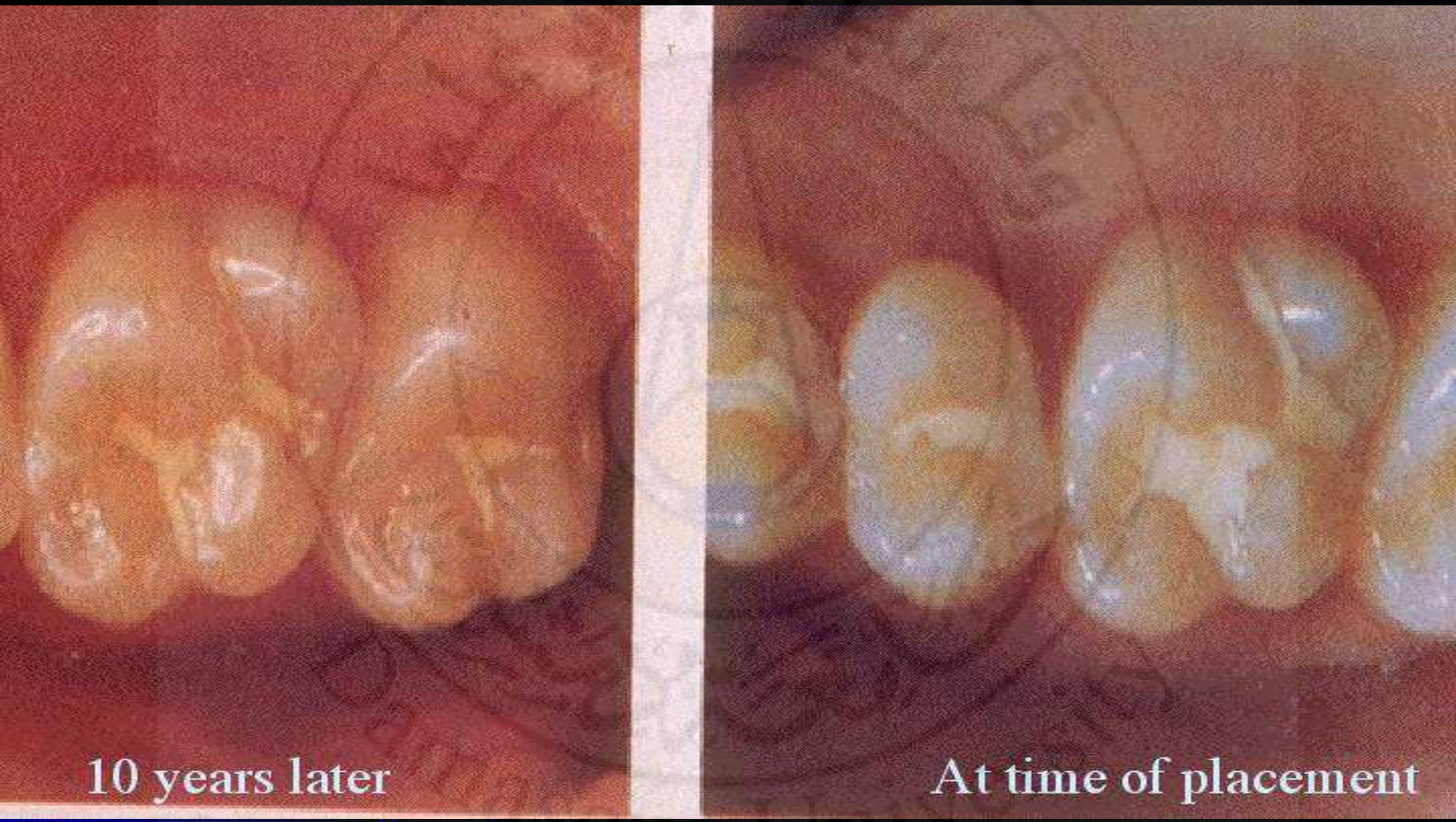






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Fluoride protects the smooth surfaces!



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Ripa, 1985