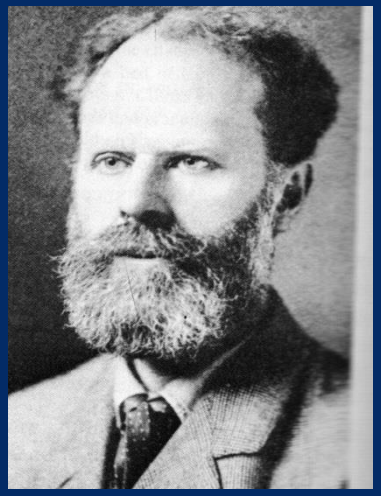
Aethiology

- Infectious disease
- Microbs
- Fermentable sugars

Antony van Leeuwenhoek

First who observed microbs of oral cavity 17.ct

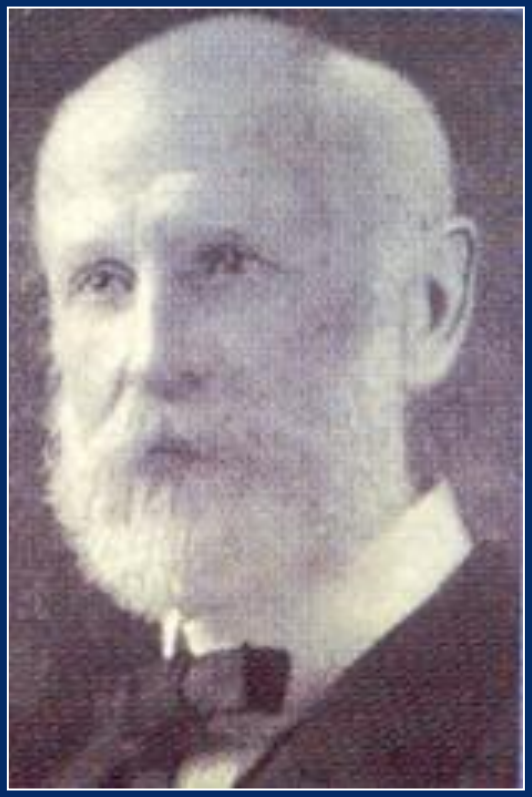


Willoughby Dayton Miller (1853 -1907)

1889,,Die Mikroorganismen der Mundhöhle“,,,The Micro-Organisms of Human mouth“.

Explained dental caries as a reslut of decalcification (acids from microbial metabolism)

Green Vardiman Black



(1836 – 1915)

When we will well understand reasons of dental caries, we will be able to heal it.

(G.V. Black 1900)

Microbiom

Human body
10^{14} Living cells
10% Cells of human body

Mikcobiom
Oral microbiom

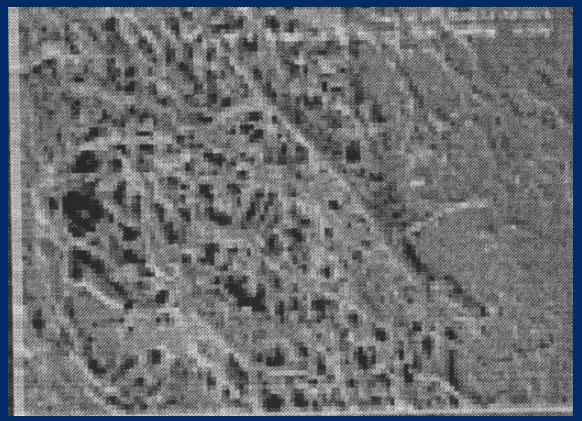
Dental biofilm

- Pelicle–Protektivní efekt
- Pelicle–monomolekular proteinicl ayerrich on prolin and phosphatea and glycoprotein rich on sulphate
- Bind to Ca2+ ions of enamel
- Protective effect

- Erosion

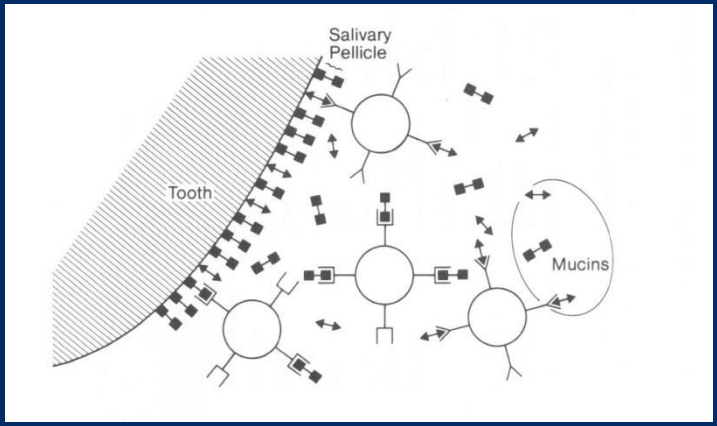
- Dentin hypersensitivity

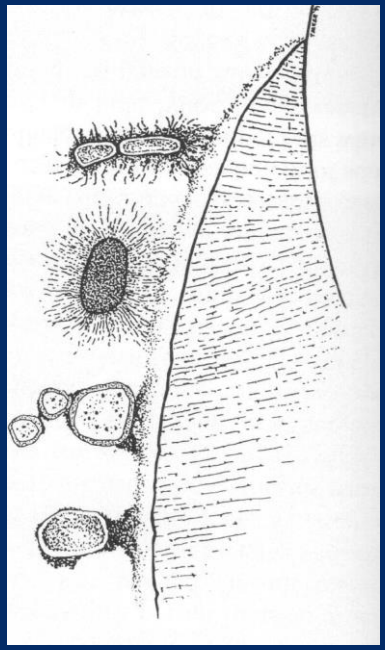
- Key role by remineralization



Biofilm

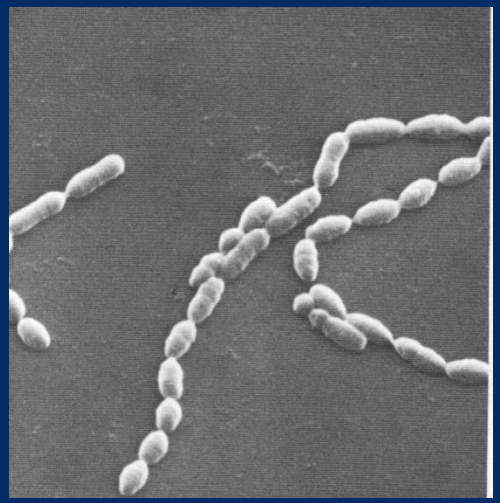
- Adherence
- *Adhezins*
- *Fimbries*

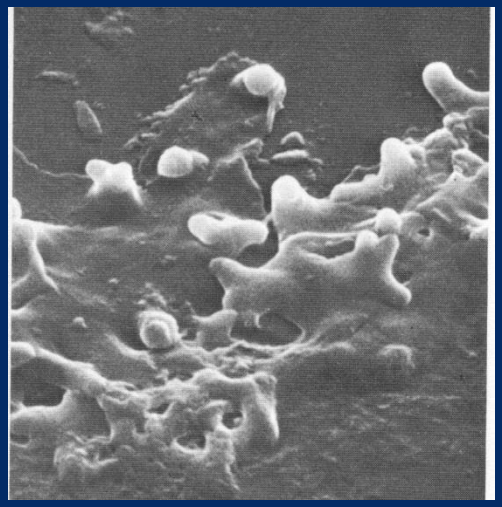




Biofilm

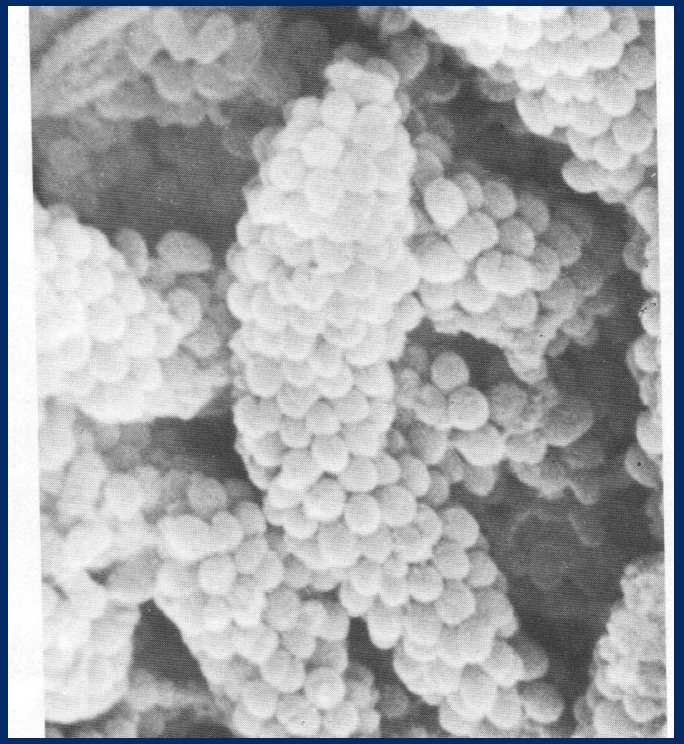
- colonization
- *multiplication*
- *koagregation*



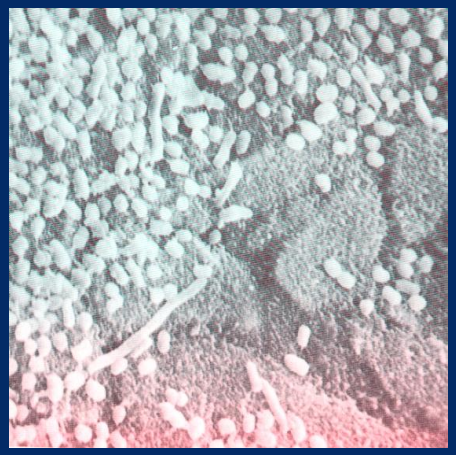


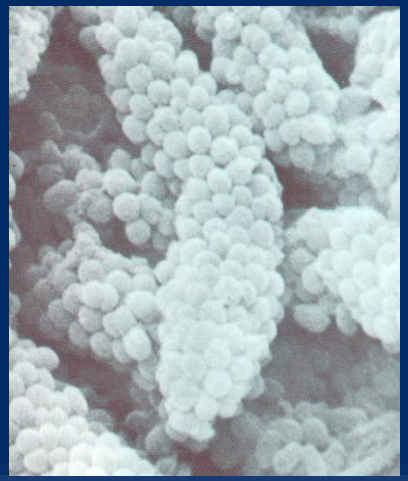
Biofilm

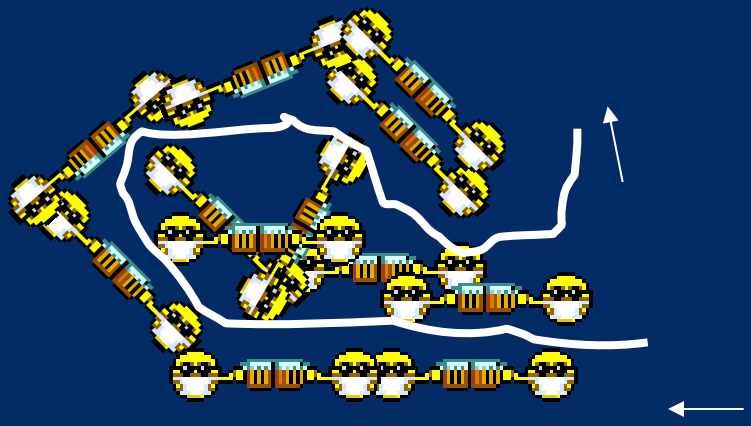
- Maturation



Biofilm







Higher metabolic activity
Higher resistency
(CHX 300x, AF 75x)
Hihger virulency
Good conditions for survival

Cariogenicity

- Streptococci : mutans, sanguis, mitis, sobrinus.
- Laktobacil

- *Production of acids (acidogenity)*
- *- Production of extra aand intracelullar polysacharids*
- *- Survival in acidic environment (aciduricity)*

Acidobasic dynamic in biofilm

Glykolysis

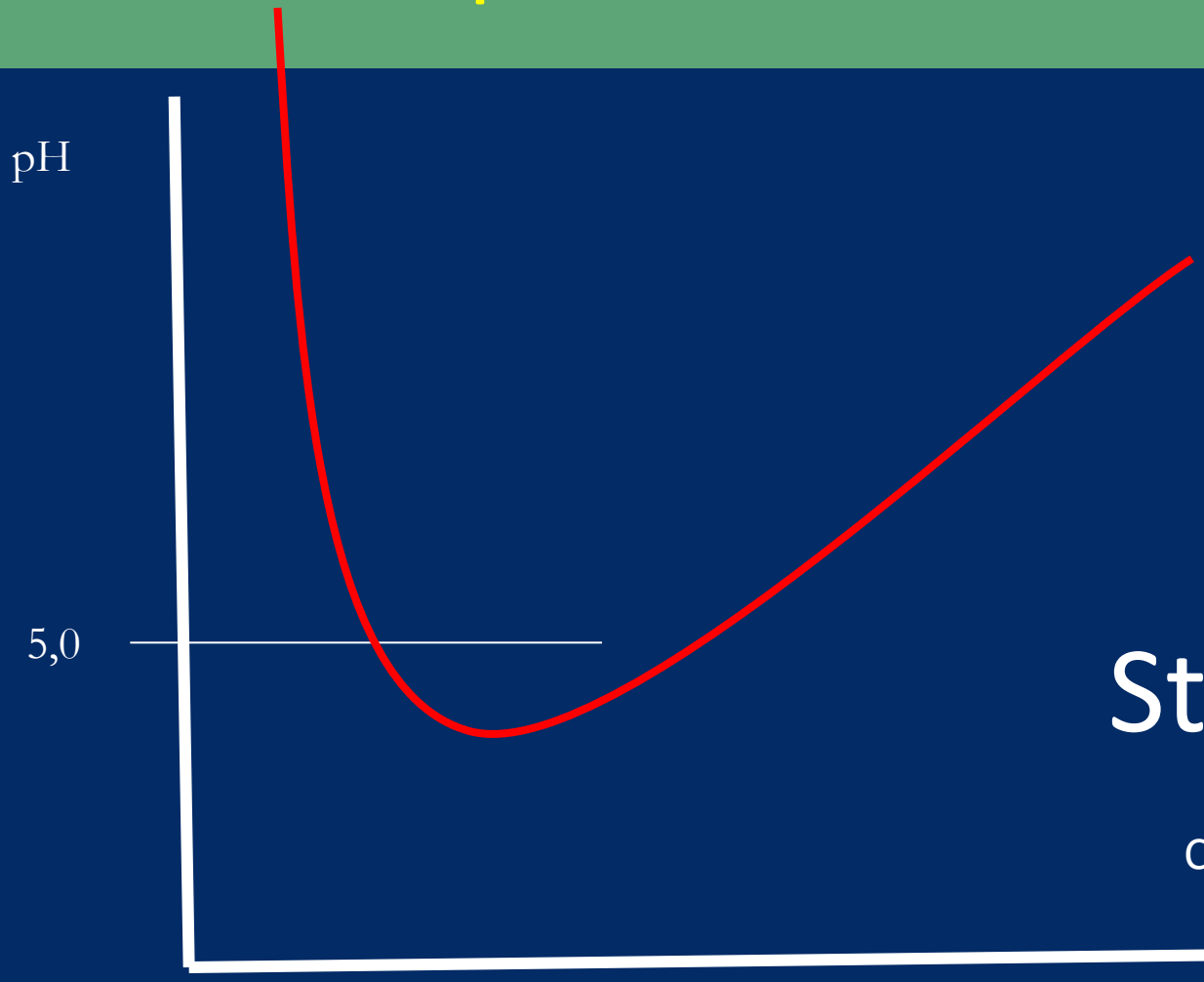
- Lactic acid and other acids

Base production

- NH^4

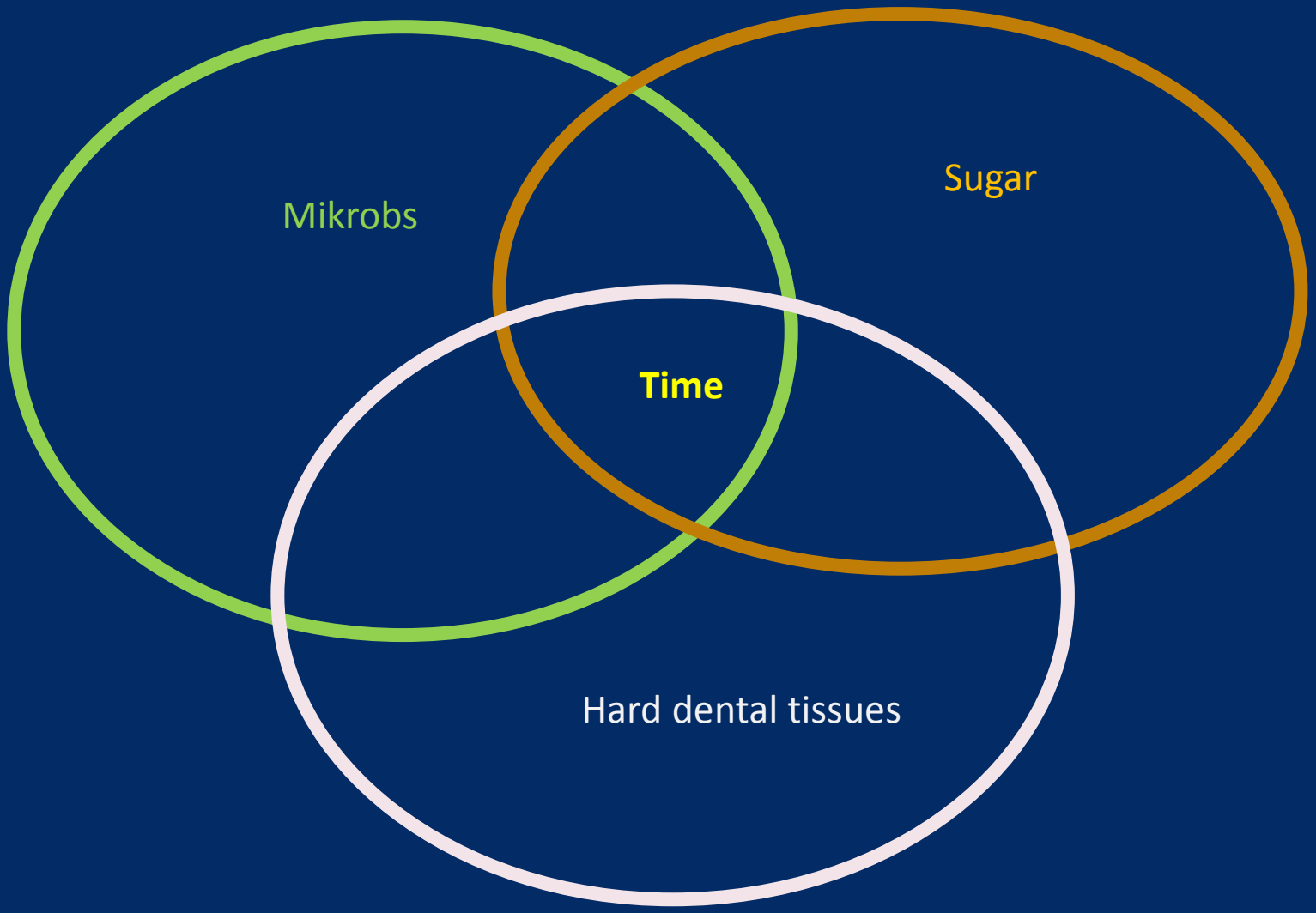
- Sugars 20 – 40% - tendency to acid púroduction and decalfication

Metabolic procedures in dental biofilm



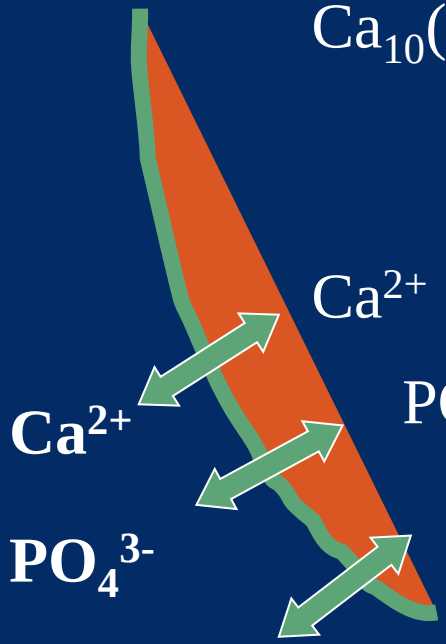
Stephan

Critical pH HA 5,7
FA 4,6

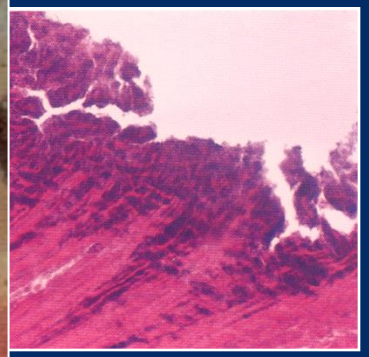

Mikrobs
Sugar
Time
Hard dental tissues

$Ca_{10}(PO_4)_6(OH)_2$

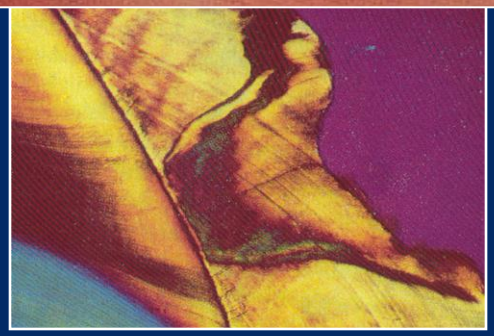
$Ca_{10}(PO4)_6F_2$



Cavitated lesion



Non ca



Decalcification

Time

Biofilm

Non specific hypothesis

- Plaque is always the reason

- **Specific hypothesis**
- Only pathogenic plaque is the causal factor

Saliva and dental caries
700 –80ml. (0,3ml), stimulated(1ml).0

- Product of salivary glands 700 – 800 ml. Klidová (0,3ml), stimulovaná (1ml).

Clearence

- Microbs
- Rests of food

Saliva and dental caries

- Minerals
- Calcium and phosphates – oversaturated solution remineralization
- Proteins
- Glykoproteins - pelicle, barrier against overgrowing of crystala on the surface

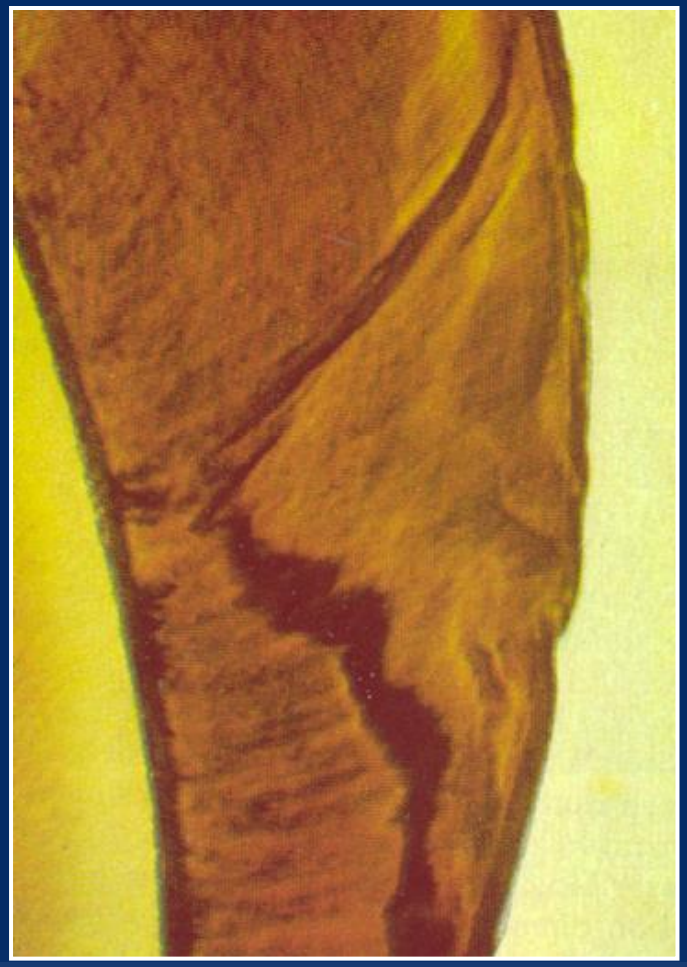
Buffer capacity of saliva

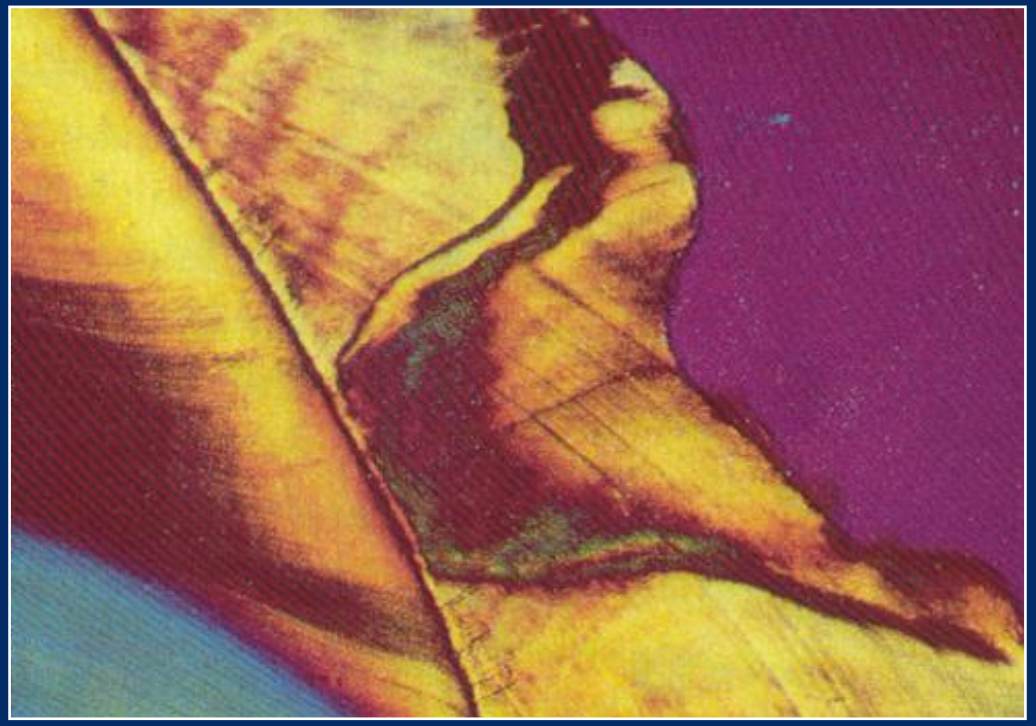
- Bicarbonatesystem
- Phosphate system
- In saliva not in plaque

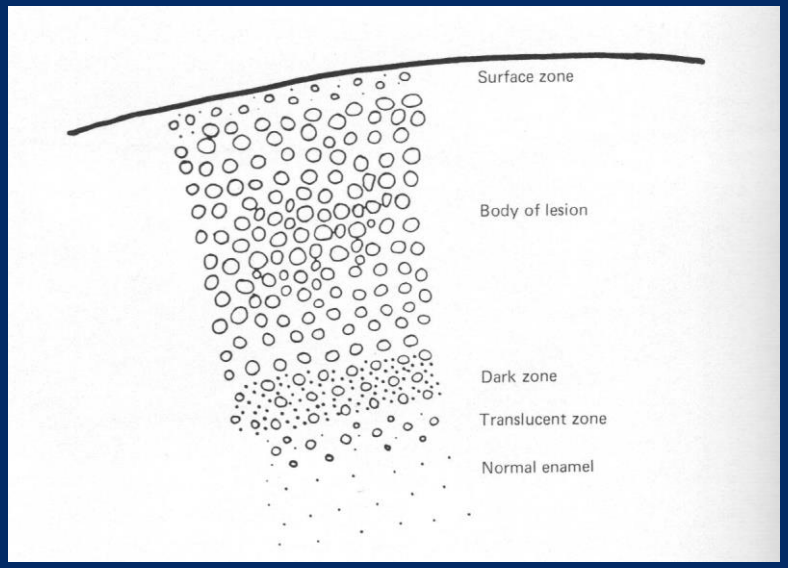
Slina

- Klíčová role v maturaci skloviny
- V remineralizaci iniciálních kazivých lézí
- V remineralizaci demineralizovaných okrsků skloviny

Inicial lesion







Porosity

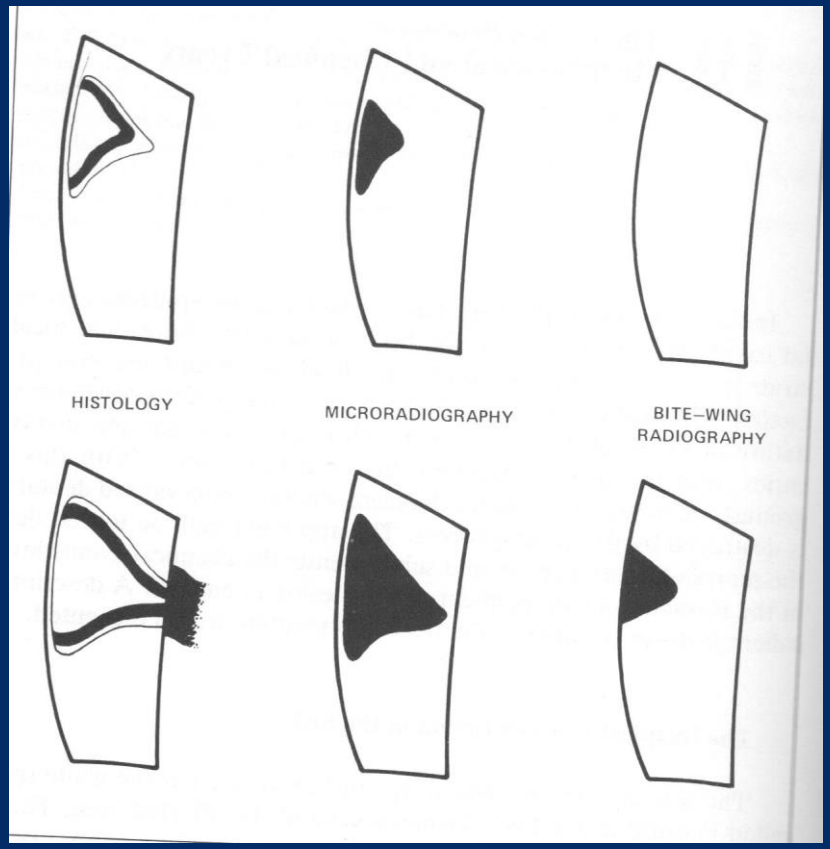
Superficial zone
5 %

Body of lesion
25%

Dark zone
2 –4%

Translucent zone
1%

Normal enamel
0,1%%



Histology x mikroradiography x BW

Diagnosis

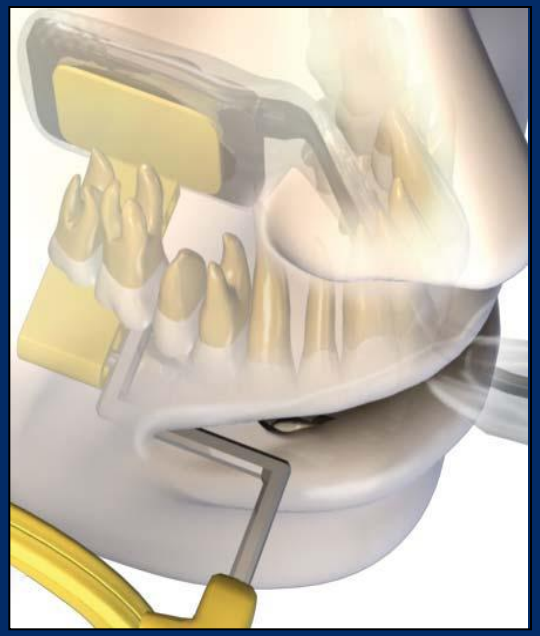
- Vizual inspection (ICDAS)
- Radiography
- Photography
- Optical nonfluorescent methods
- Optical fluorescent methods
- Transilumination
- Measurement of electrical impedancy

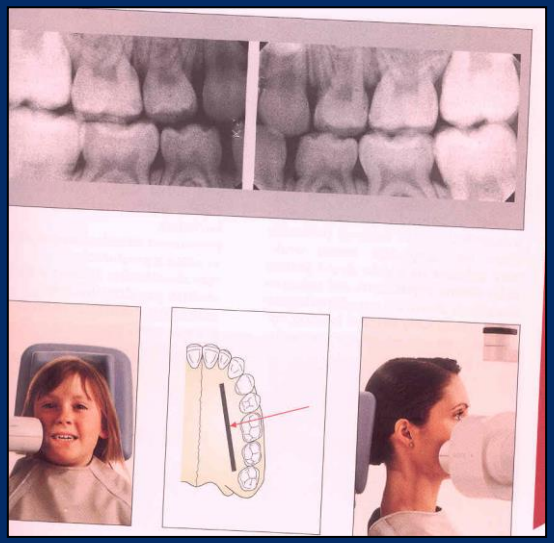
Visual inspection, magnification, dry surface

Photography

- Good documentation and evaluation of lesion
- Flash and light can misrepresent

Radiography



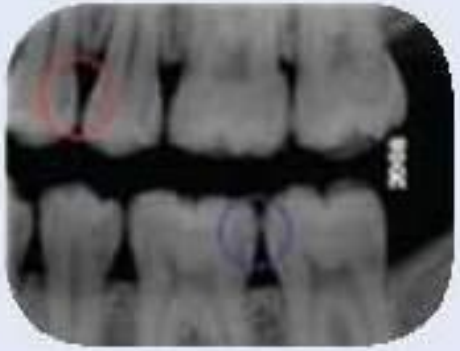


Bite wing

Radiography

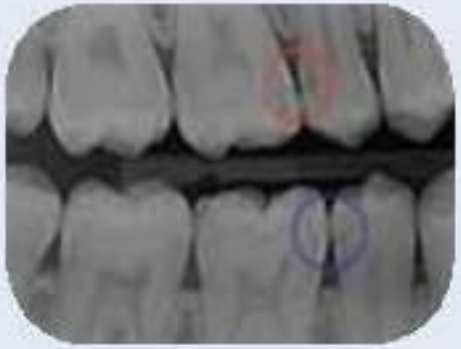
Klinické: **Identifikace** - Vyšetření: Bitewing rtg

Léze skloviny		ICDAS
E1	Vnější polovina skloviny	0, 1
E2	Vnitřní polovina skloviny	1
Léze dentinu		ICDAS
D1	Vnější třetina dentinu	2
D2	Prostřední třetina dentinu	3
D3	Vnitřní třetina dentinu	4

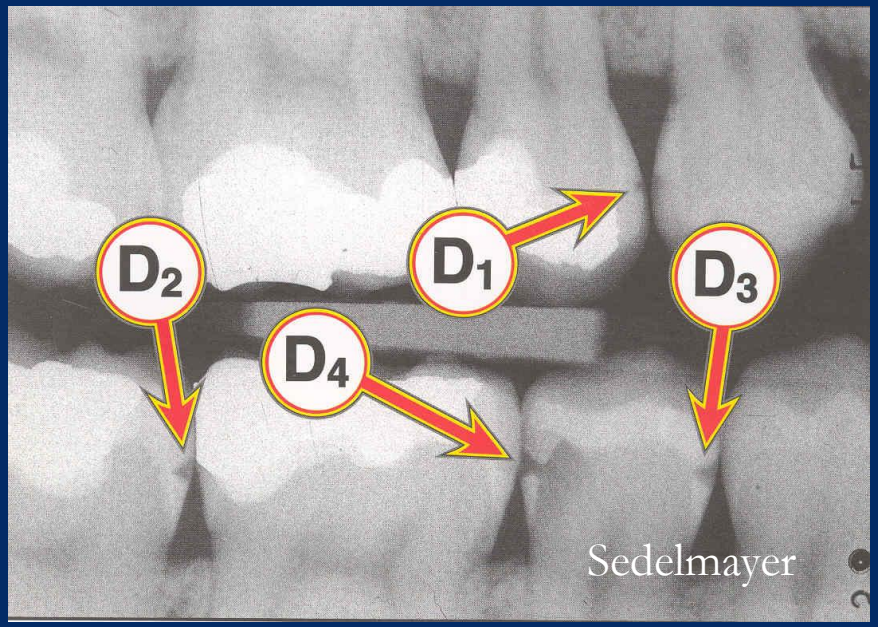


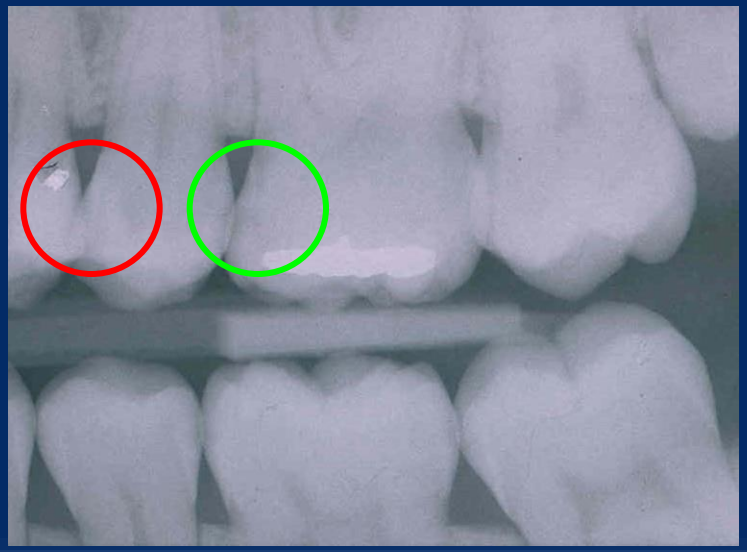
Kontrola za 2 roky u počátečních lézí D-1 (modrá) a D-2 (červená)

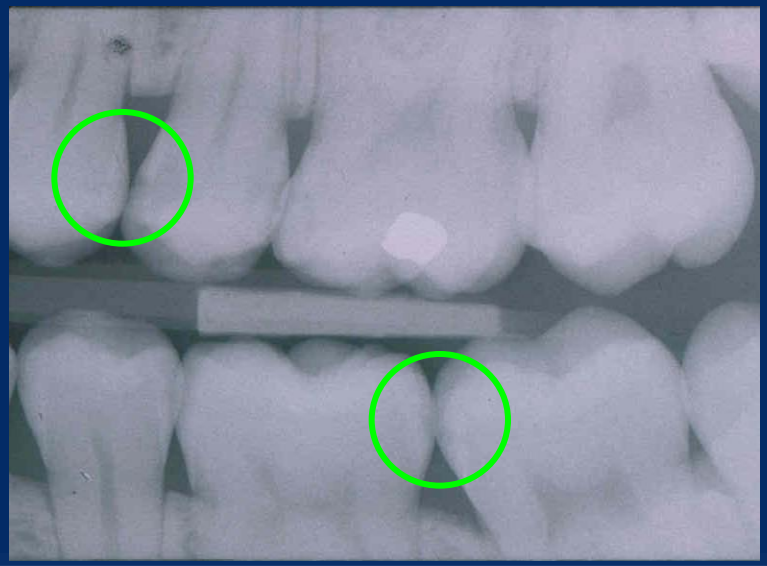
D-3



D-1 a D-2


D2
D1
D3
D4
Sedelmayer





Optical non fluorescent methods

- Distorsion og lihgt (OCM)

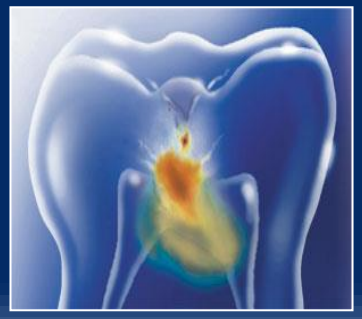
Non invasive, various results

Optical fluorescent methods

- **Principle:**

Absorption and irradiation back

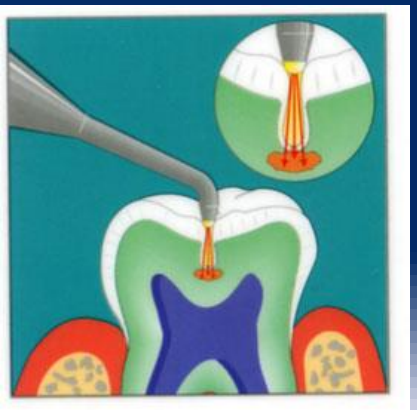
- **DIAGNOdent, DIAGNOdent pen, QLF, Vista Proof**



Infračervená laserová fluorescence

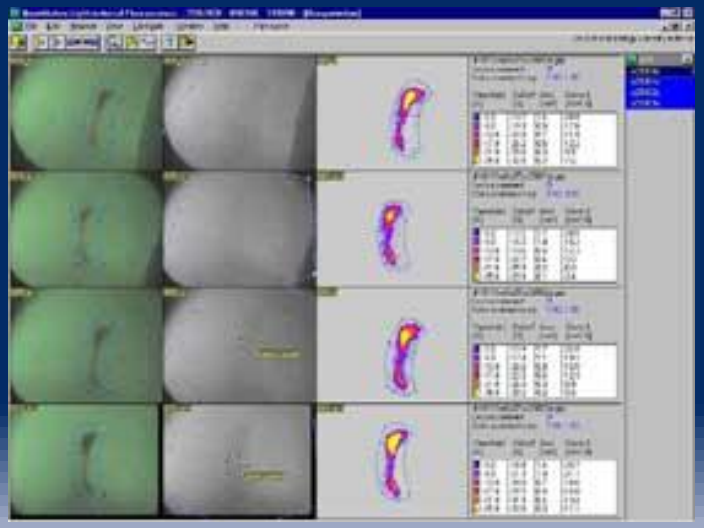
- **DIAGNOdent, DIAGNOdent pen**
- Toto fluoreskující záření se zobrazuje jako aktuální a rovněž jako maximální hodnota (peak)
- Hodnoty vyšší než 24 (DIAGNOdent), vyšší než 17 (DIAGNO dent pen) – kaz
- Falešně pozitivní výsledky při nedokonale očištěném zubu

DIAGNODENT



Quantitative Light –induced Fluorescence

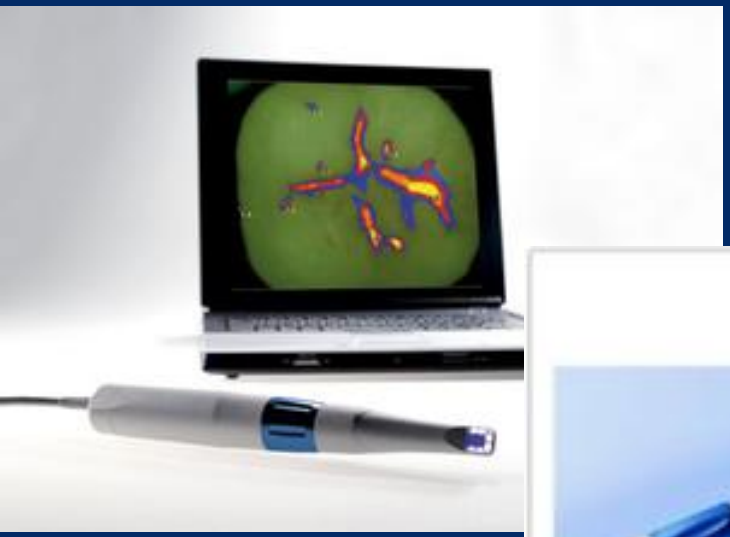
QLF

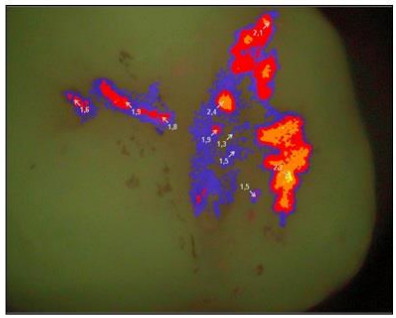


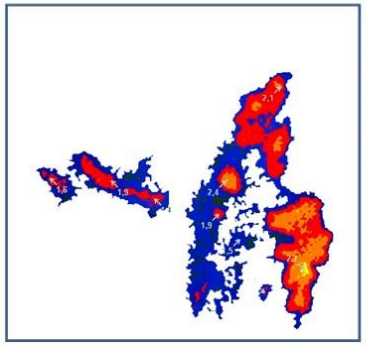
Vista Proof

- **Intraorální kamera** využívající princip fluorescence
- Kariézně změněné plošky emitují červené světlo, zdravé zubní tkáně zelené světlo
- Software vyhodnotí poměr červeného a zeleného spektra – zdravá sklovina a kariézní léze se barevně a číselně znázorní (škála 0-4) – sledování vývoje demineralizace + záznam
- Lze znázornit i zubní plak (není nutné použít dalších prostředků)
- Novinky – **Vista Cam iX** – kamera s dvěma vyměnitelnými koncovkami (intraorální X fluorescenční)
- **SoproLife** – zhodnocení zubního kazu v diagnostickém modu + rozlišení mezi zdravou a kariézní tkání v ošetřovacím modu

Vista Proof



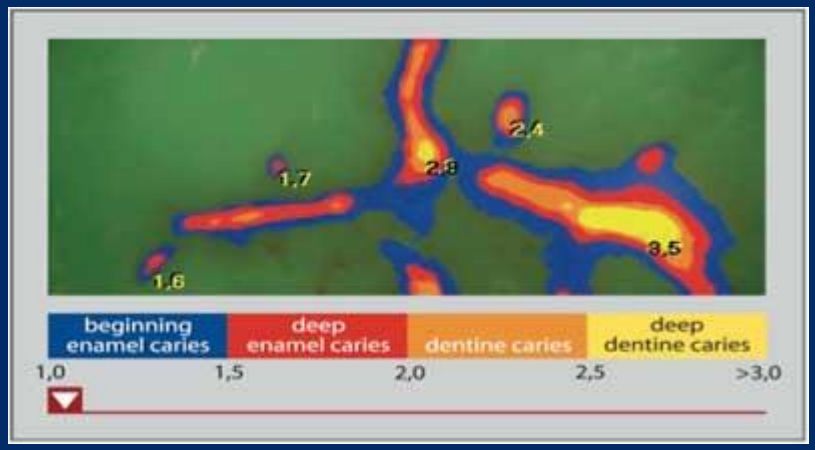




Vista Cam iX

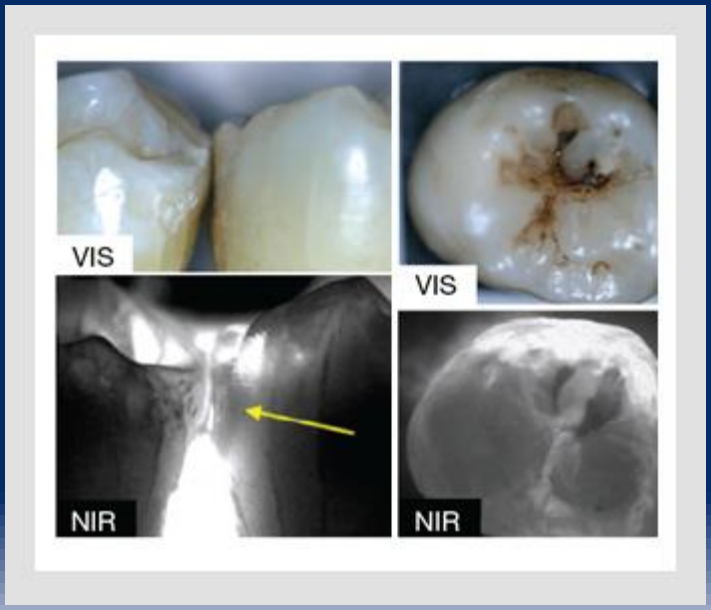
SoproLife

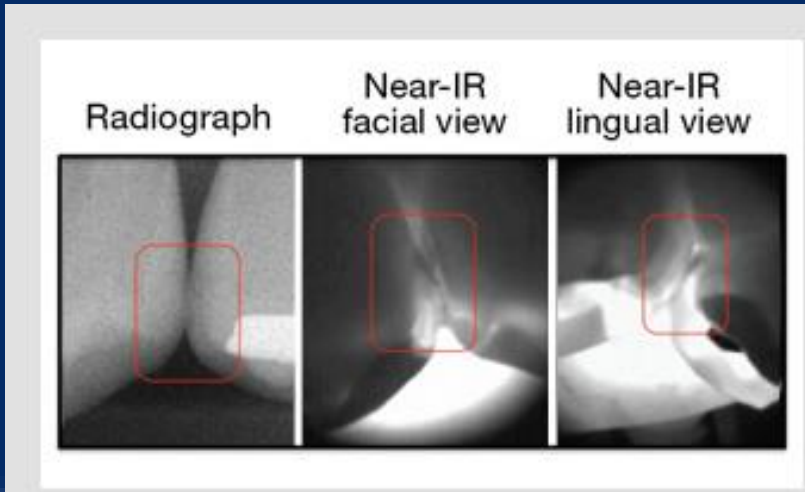

PORTRAIT
SMILE
INTRA-ORAL
MACRO
DAYLIGHT MODE
TREATMENT MODE
DIAGNOSTIC MODE


1,7
2,4
2,8
3,5
1,6
beginning enamel caries
deep enamel caries
dentine caries
deep dentine caries
1,0
1,5
2,0
2,5
>3,0

FOTI – fibre optic transillumination

Proximal caries lesion





DIFOTI

(D i g i t a l F i b r e O p t i c
T r a n s – I l l u m i n a t i o n)

- j bílého světla – kamera s CCD senzorem – počítač – zobrazení jako obrázek

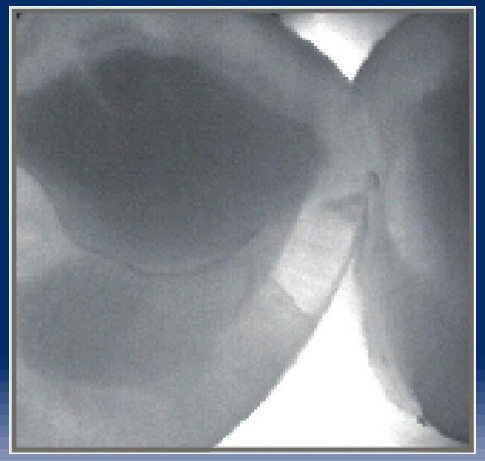
DIAGNOCam

- DIFOTI (Digital Imaging Fiber Optic Transillumination)
- light(700-1400nm)
- Caries lesions and cracs–light absorption–dark spots
- (higher content of mwater in caries lesions – higher absorption of light)
- Documentation

DIAGNOCam- klasifikace nálezu

- **0 –**

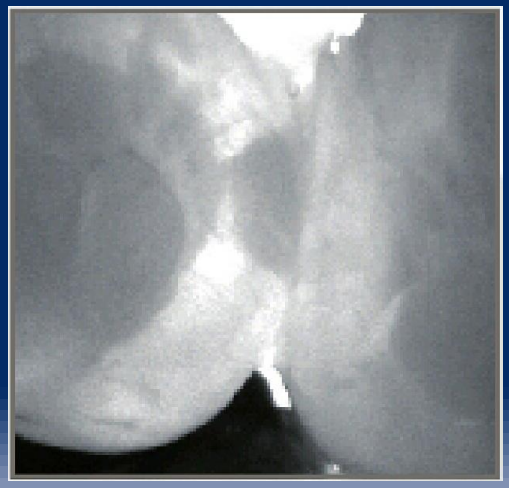
- **1.**

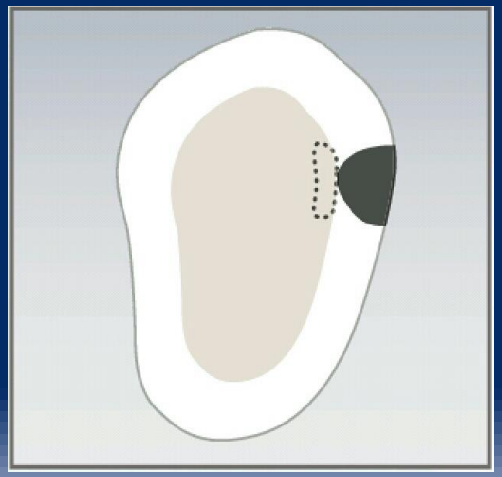


DIAGNOCam- klasifikace nálezu

- **2- caries in enamel**

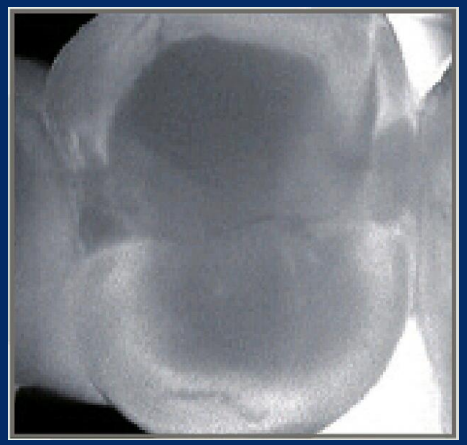
- **3 - caries in enamel and dentin**

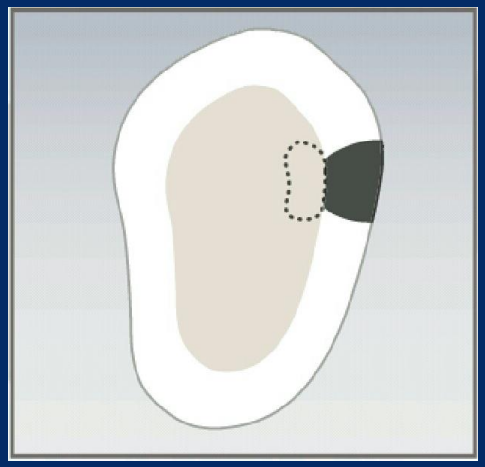




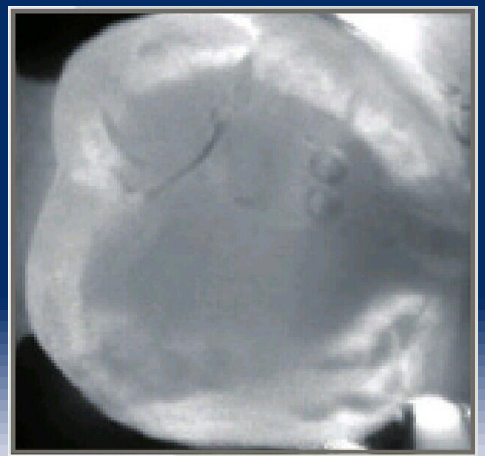
DIAGNOCam- klasifikace nálezu

- **4 - kaz ve sklovině zasahující do dentinu – použít minimálně invazivní metodu**

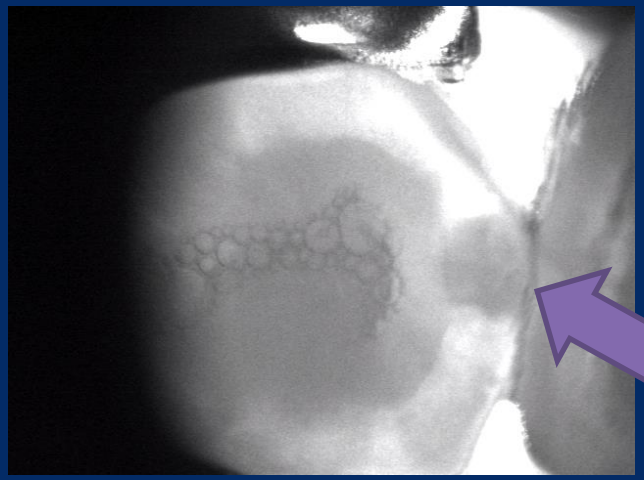


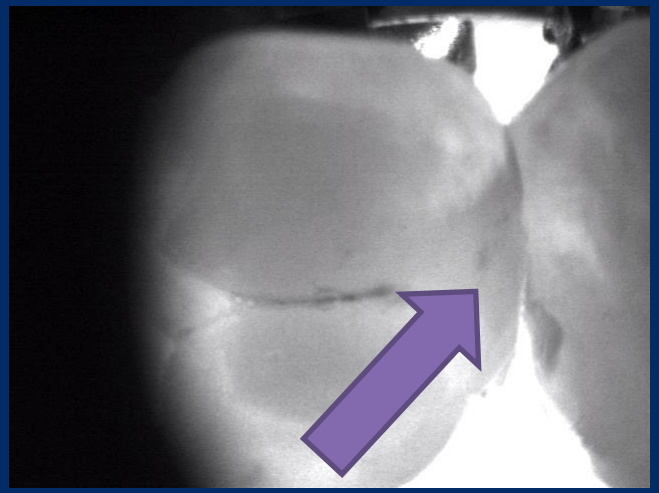


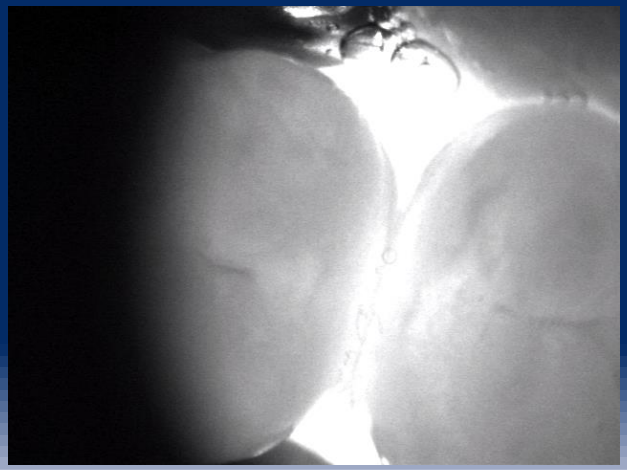
- **5 – kaz rozšířený do dentinu – použít invazivní metodu**

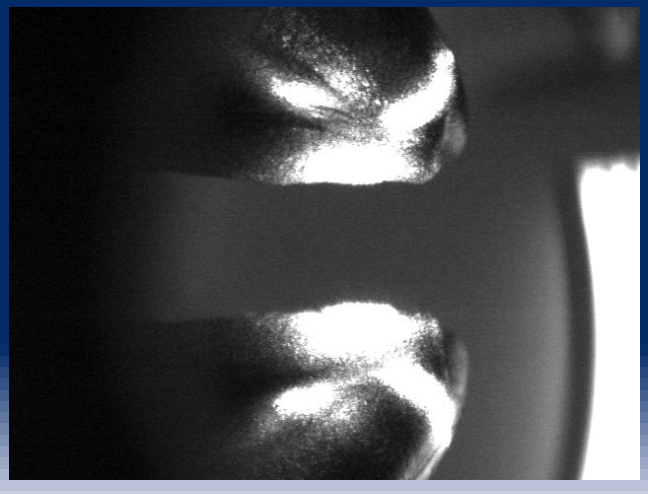


DIAGNOCam



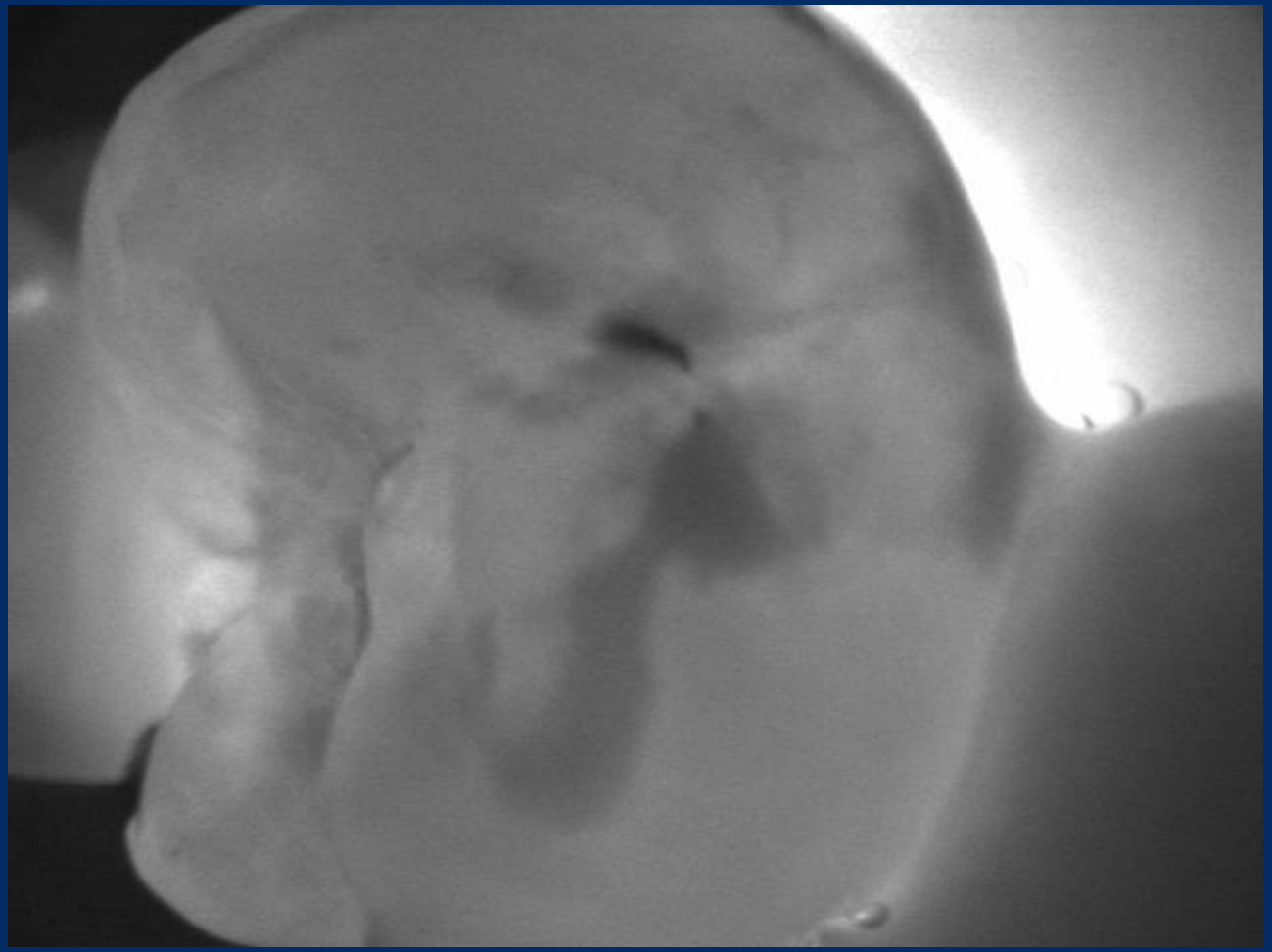


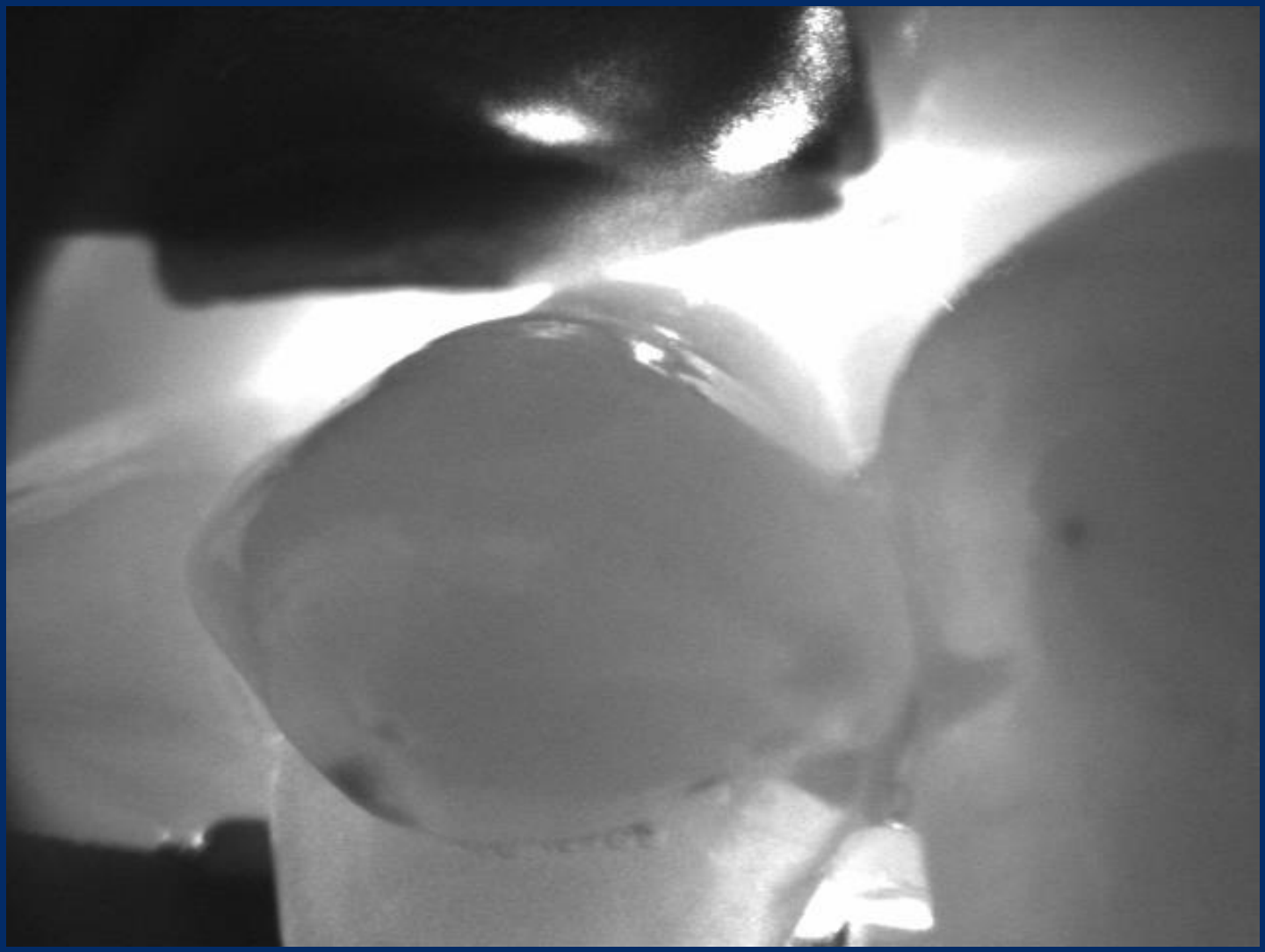


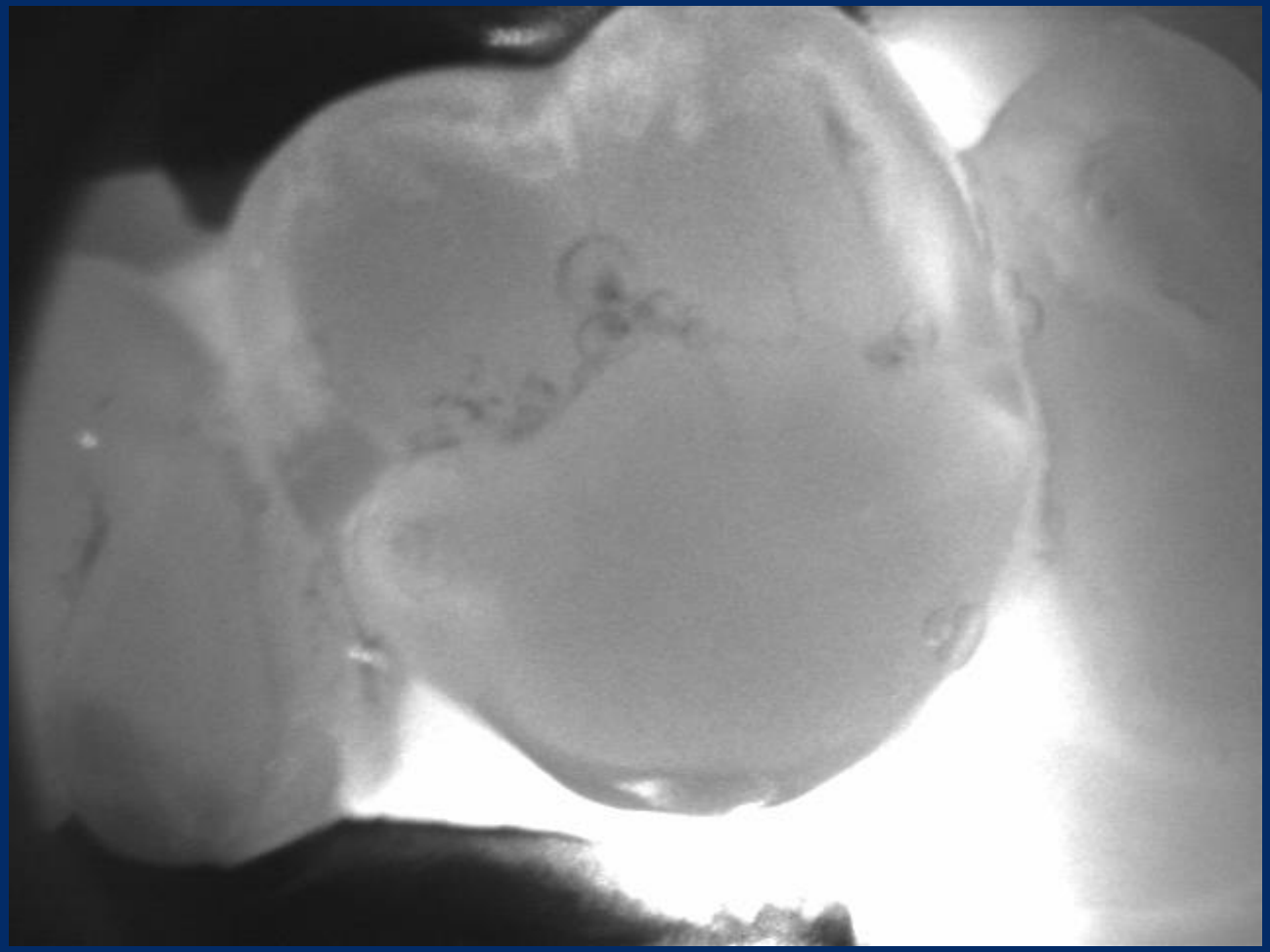


Diagnocam

Bitewing



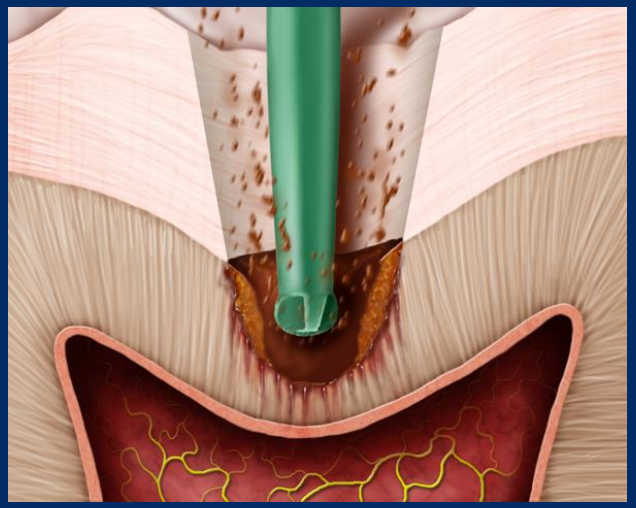




Transiluminace pomocí optického vlákna- FOTI

- Přístroje k diagnostice aproximálních kazů (KaVo DIAlux probe)
- **+** vyšší senzitivita než RTG snímek a opakovatelnost vyšetření
- - necitlivost přístroje na léze kolem výplní a nemožnost zhotovovat snímky a dokumentovat stav

Measurement of electrical resistancy



Pit and fissure caries

- Class I. acc. to Black

Caries danger area

Special morphology

Special sructure of enamel

Diagnosis

ICDAS–INTERNATIONAL CARIES DETECTION AND ASSESMENT SYSTÉM

ICDAS–INTERNATIONAL CARIES DETECTION AND ASSESMENT SYSTEM

- **ICDAS**(2002)–6 code, later **ICDAS –II** –4code
- Caries lesionsin pit and fissures, smooth surfaces, roots and enext to fillings **–CARS** (Caries Associated with Restoration and Sealants

- Blunt probe

- Clean and dry surfaces, time of observation 5 s

- http://www.icdas.org/courses/english/index.html

ICDAS

Before assesment

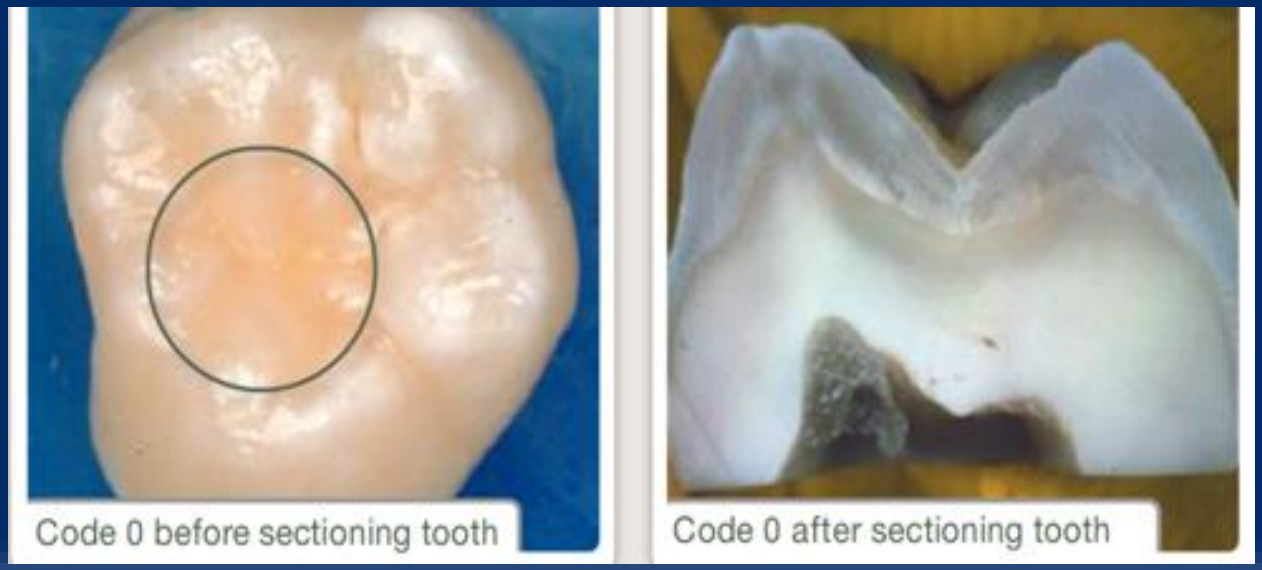
Clean and dry teeth surfaces

Blunt probe

5 seconds observation

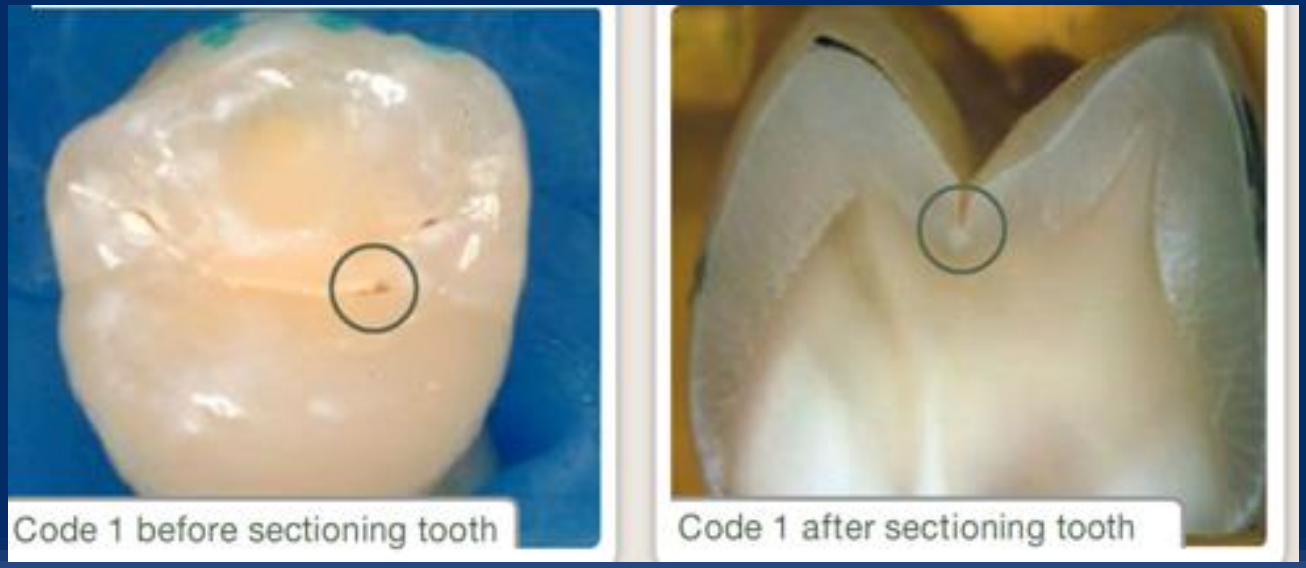
ICDAS – kritéria

- **0 no changes observed**



ICDAS - kritéria

- **1.- first visual changes observed on dry surface only (opaque, white, brown)**



ICDAS - kritéria

- **2.** – first visual changes on wett surfaces


Code 2 before sectioning tooth


Code 2 after sectioning tooth

ICDAS - kritéria

- **3** – enamel is still present, zone of decalcification is out of fissure, dentin is affected


Code 3 before sectioning tooth


Code 3 after sectioning tooth

ICDAS - kritéria

- **4** – dark colour around the fissure (grey, blue, brown), enamel can be broken


Code 4 before sectioning tooth


Code 4 after sectioning tooth

ICDAS - kritéria

- **5 – cavitated lesion**

ICDAS - kritéria

- **6** – large cavitation

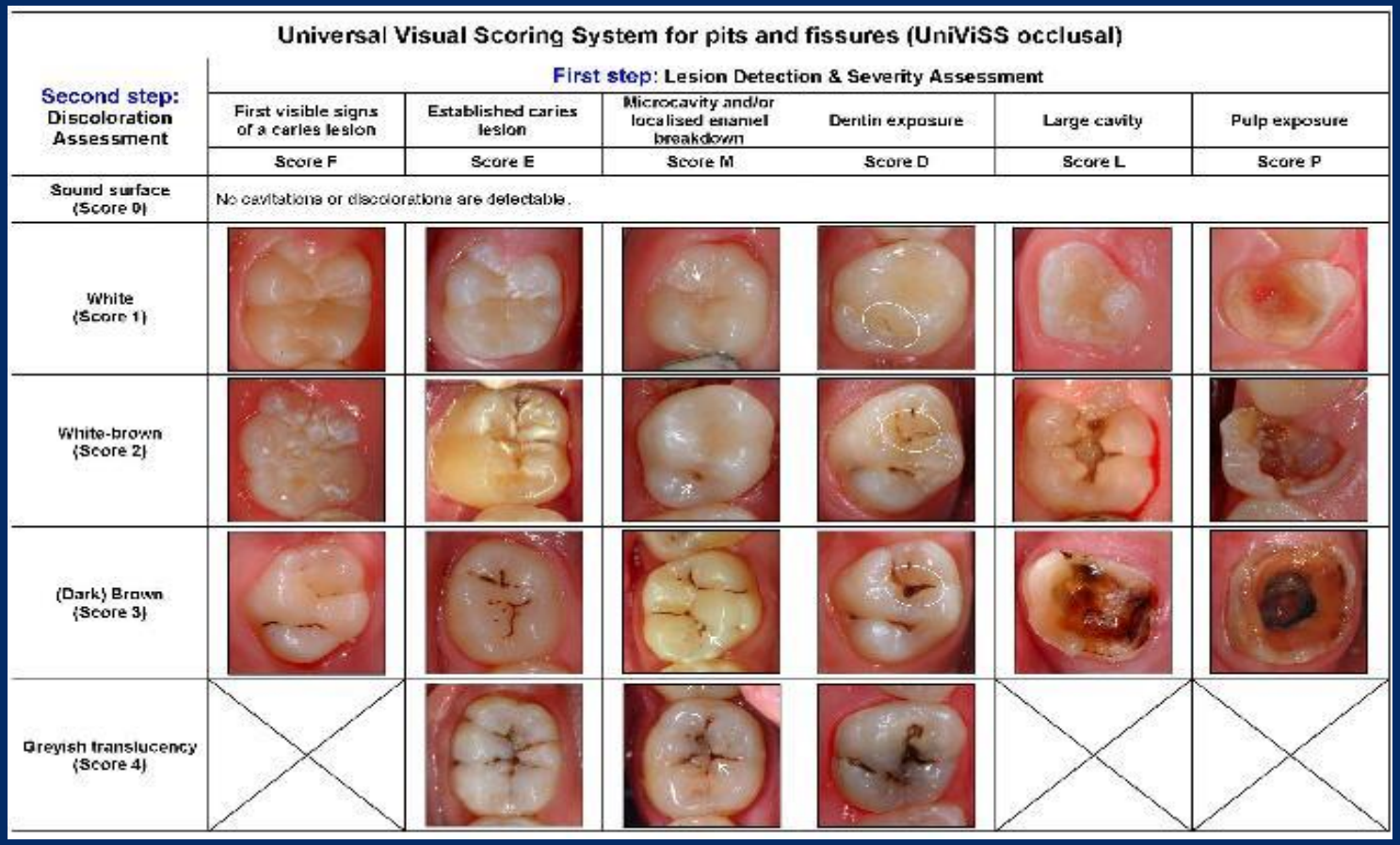
ICDAS - kritéria

- **KÓD 6 – rozsáhlá kavitace**, přičemž dentin je v hloubce i šířce naprosto zřetelný, minimálně poloviny zubní plošky je postižená kazem, pulpa může být zasažena

ICDAS II - modification

0:			Žádná nebo nepatrná změna v průsvitnosti skloviny po delším osušování vzduchem (>5 sekund). Žádná demineralizace skloviny anebo úzká opáknízóna.
1:			Opacita nebo diskolorace obtížně viditelné na mokrém povrchu, avšak jasně zřetelné po osušení vzduchem. Demineralizace skloviny omezená na vnějších 50 % vrstvy skloviny.
2:			Opacita nebo diskolorace jasně zřetelná bez osušení vzduchem. Bez rozpoznatelné klinické kavitace. Demineralizace zasahující mezi 50 % skloviny a vnější třetinou dentinu.
3:			Lokalizované porušení skloviny v opáknínebo diskolorované sklovině. +/- našedlá diskolorace ze spodního dentinu. Demineralizace zasahuje prostřední třetinu dentinu.
4:			Kavitace v opáknía diskolorované sklovině ohrožující spodní dentin. Demineralizace zasahuje vnitřní třetinu dentinu.

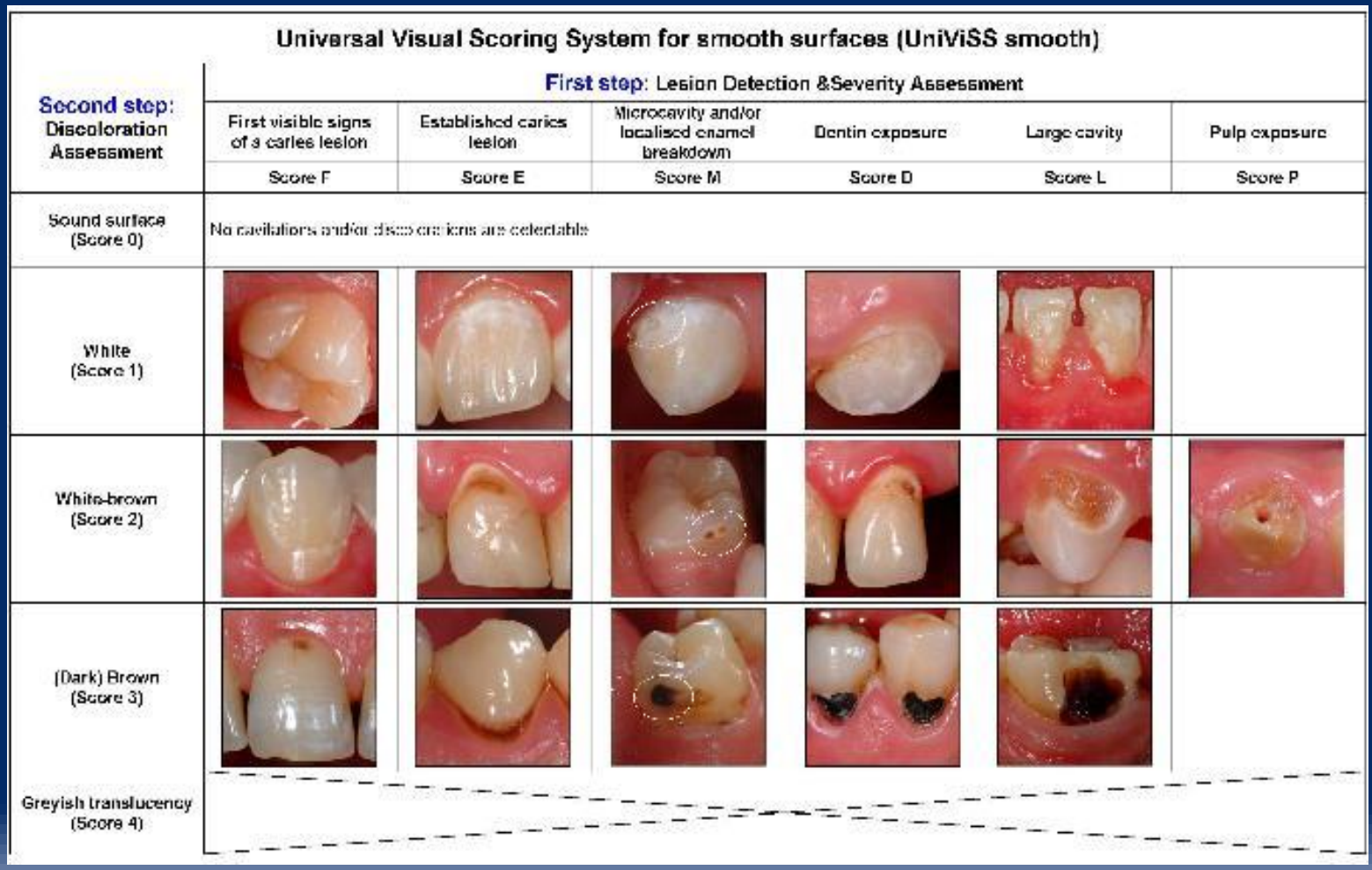
UniViss – universal scoring systém (occlusal surface)



Universal Visual Scoring System for pits and fissures (UniViSS occlusal)

Second step: Discoloration Assessment	**First step:** Lesion Detection & Severity Assessment					
	First visible signs of a caries lesion	Established caries lesion	Microcavity and/or localised enamel breakdown	Dentin exposure	Large cavity	Pulp exposure
	Score F	Score E	Score M	Score D	Score L	Score P
Sound surface (Score 0)	No cavitations or discolorations are detectable.					
White (Score 1)						
White-brown (Score 2)						
(Dark) Brown (Score 3)						
Greyish translucency (Score 4)						

UniViss (smooth surface)



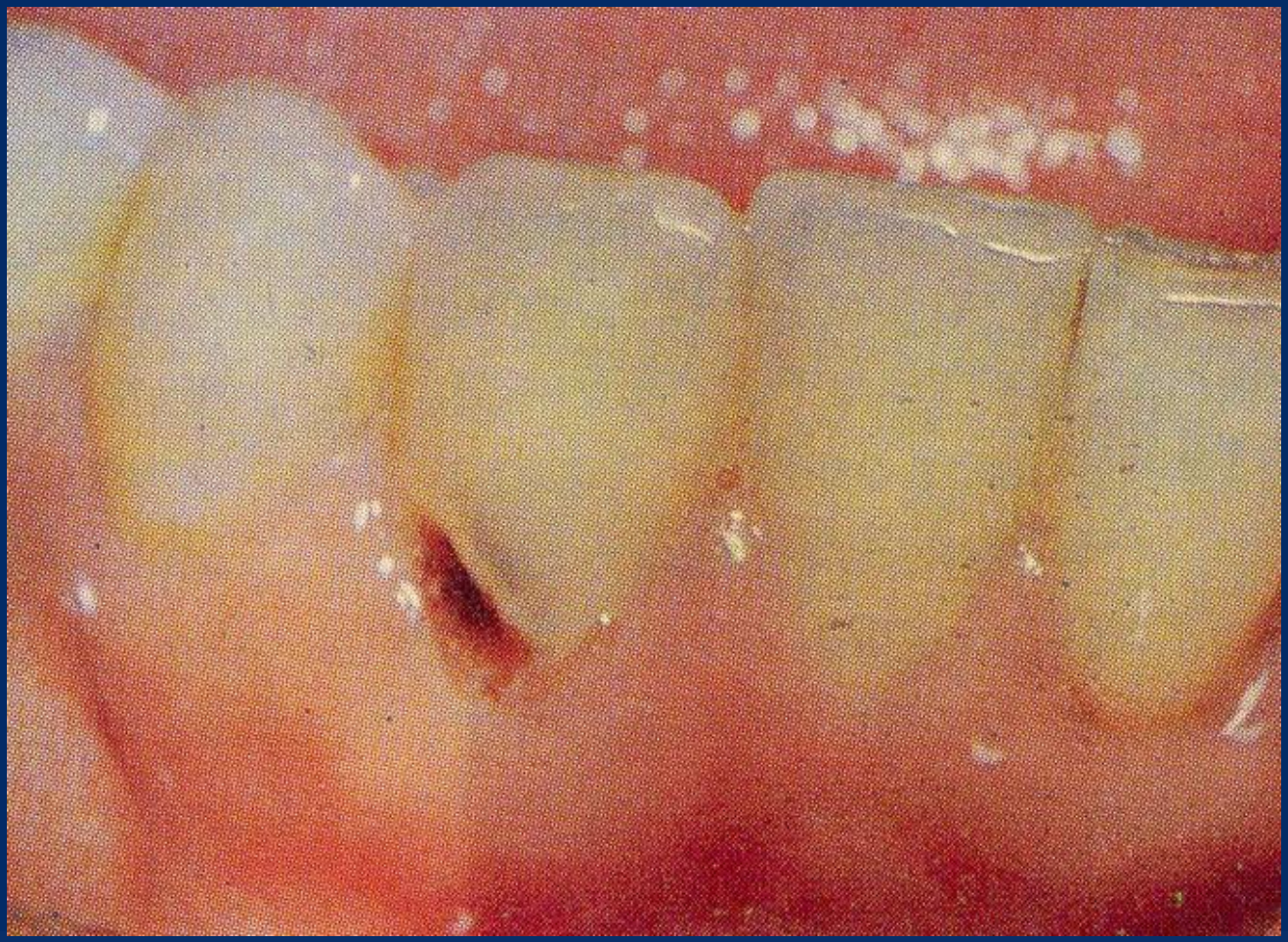
Classification acc to Black

Classification acc to Black

Classification acc to Black

Classification acc to Black

Classification acc to Black



Classification of dental caries Mount and Hume

- Location
- 1.Occlusal
- 2. Proximal
- 3.Cervical

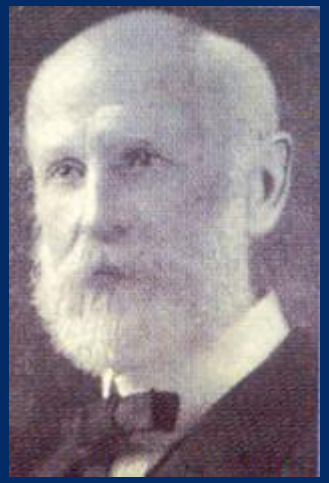
- Size

- 1.Small
- 2. Medium
- 3. Big
- 3.Large

Occlusal caries

- ICDAS 0 – 1 : observation
- ICDAS 2: observation or preventive filling
- ICDAS 3 – 4: filling therapy

Preparation



- Preparation is an instrumental treatment of carious tooth that that leaves the rest of the tooth that is restorable, resistent and that prevent the origin of dental caries at the same surface.