



Dental caries

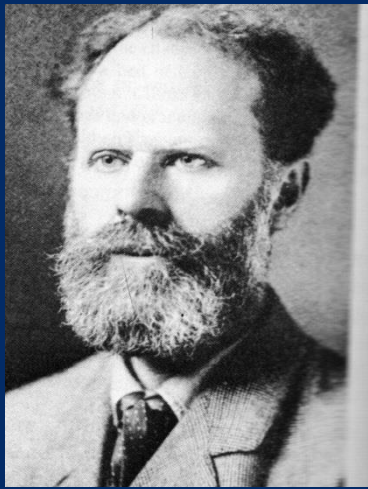
Aethiology

- Infectious disease
 - Microbs
 - Fermentable sugars

Antony van Leeuwenhoek



**First who observed microbes 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 result of decalcification (acids from microbial metabolism)

Green Vardiman Black

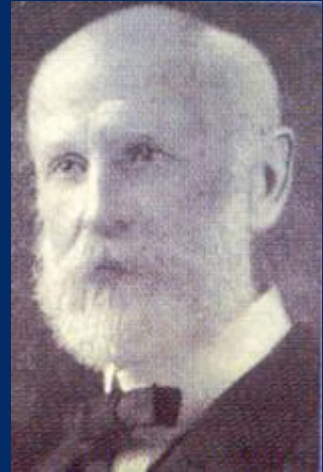
(1836 – 1915)



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

(G.V. Black 1900)

Preparation



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

Microbiom



Human body

10^{14} Living cells

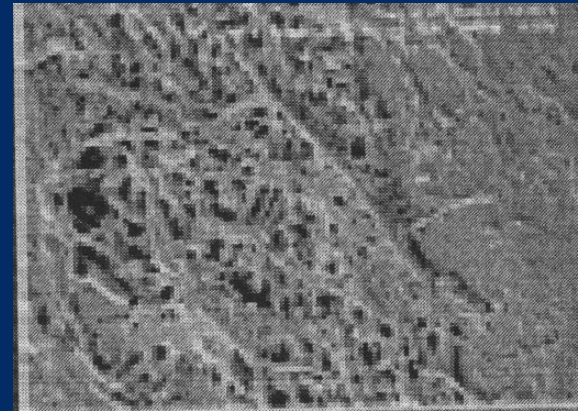
10% Cells of human body

Mikcobiom

Oral microbiom

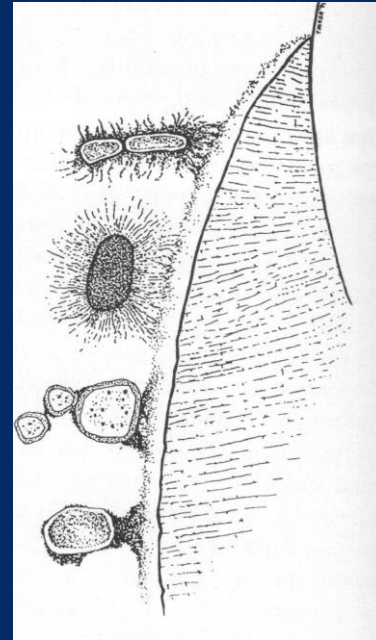
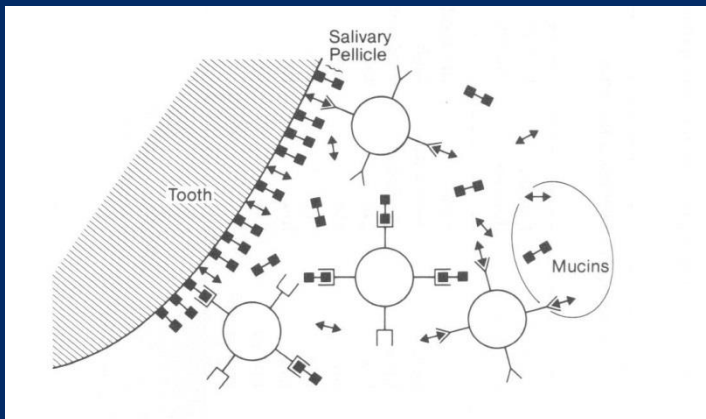
Dental biofilm

- Pelicle–Protective effect
- Pelicle–monomolecular proteinic layer rich on prolin and phosphates and glycoproteins, sulphates
- Bind to Ca^{2+} ions of enamel
- Protective effect
 - *Erosion*
 - *Dentin hypersensitivity*
 - *Key role by remineralization*



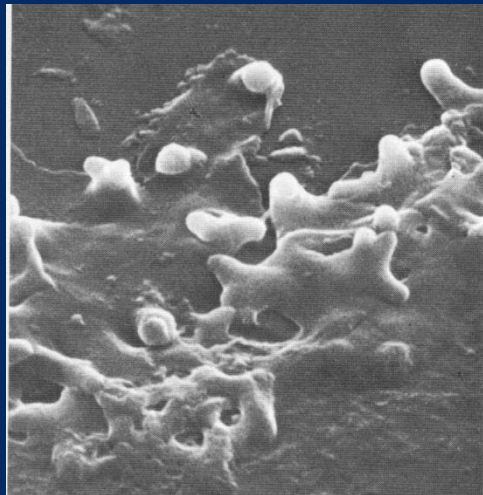
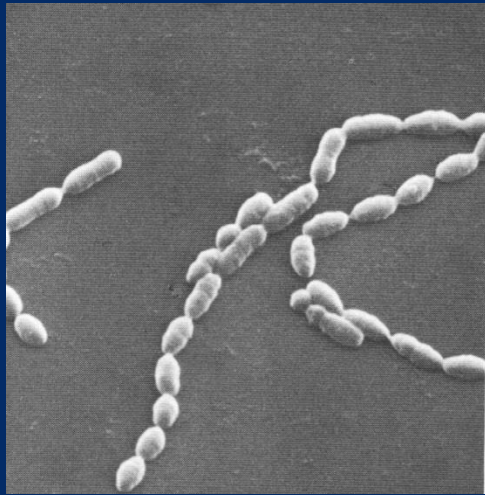
Biofilm

- Adherence
 - *Adhezins*
 - *Fimbriες*



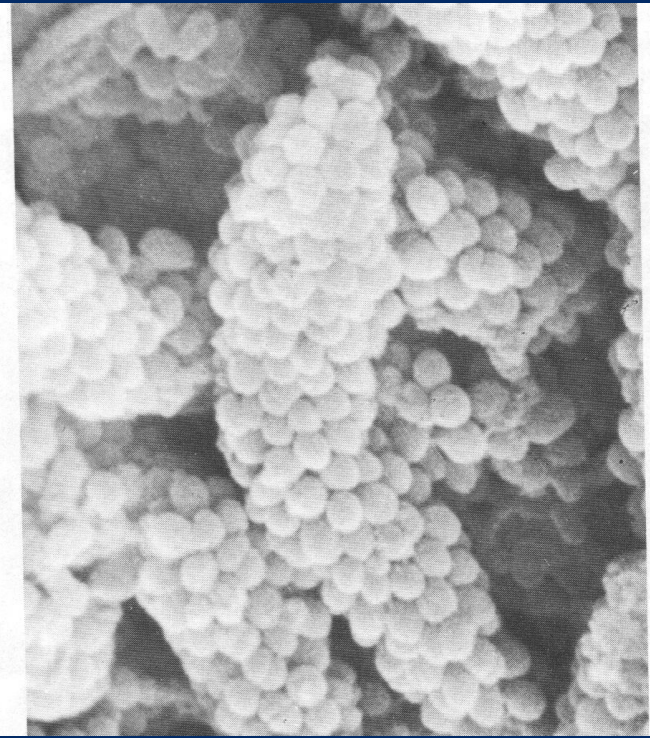
Biofilm

- *colonization*
- *multiplication*
- *koaggregation*

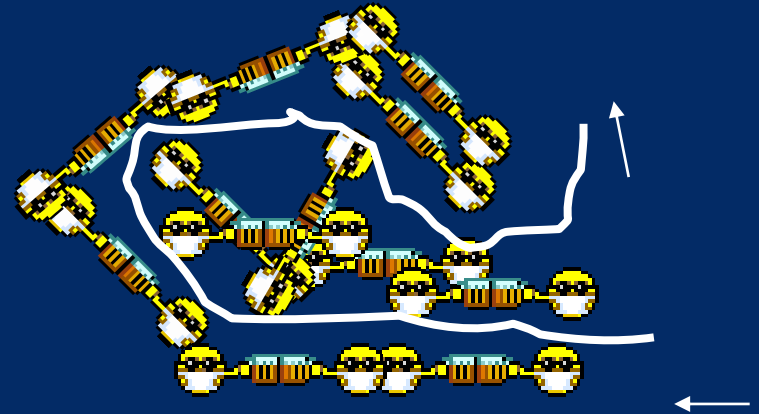
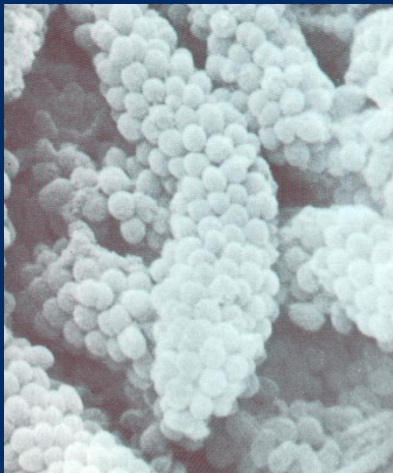
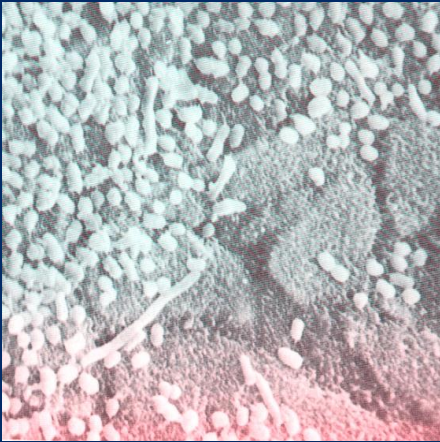


Biofilm

- Maturation



Biofilm



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

Cariogenicity

- Streptococcs : mutans, sanguis, mitis, sobrinus.
- Laktobacils
- *Production of acids (acidogenity)*
- - *Production of extra aand intracelullar polysacharids*
- - *Survival in acidic environment (aciduricity)*

Acidobasic dynamic in biofilm

Glykolyysis

- Lactic acid and other acids

H⁺

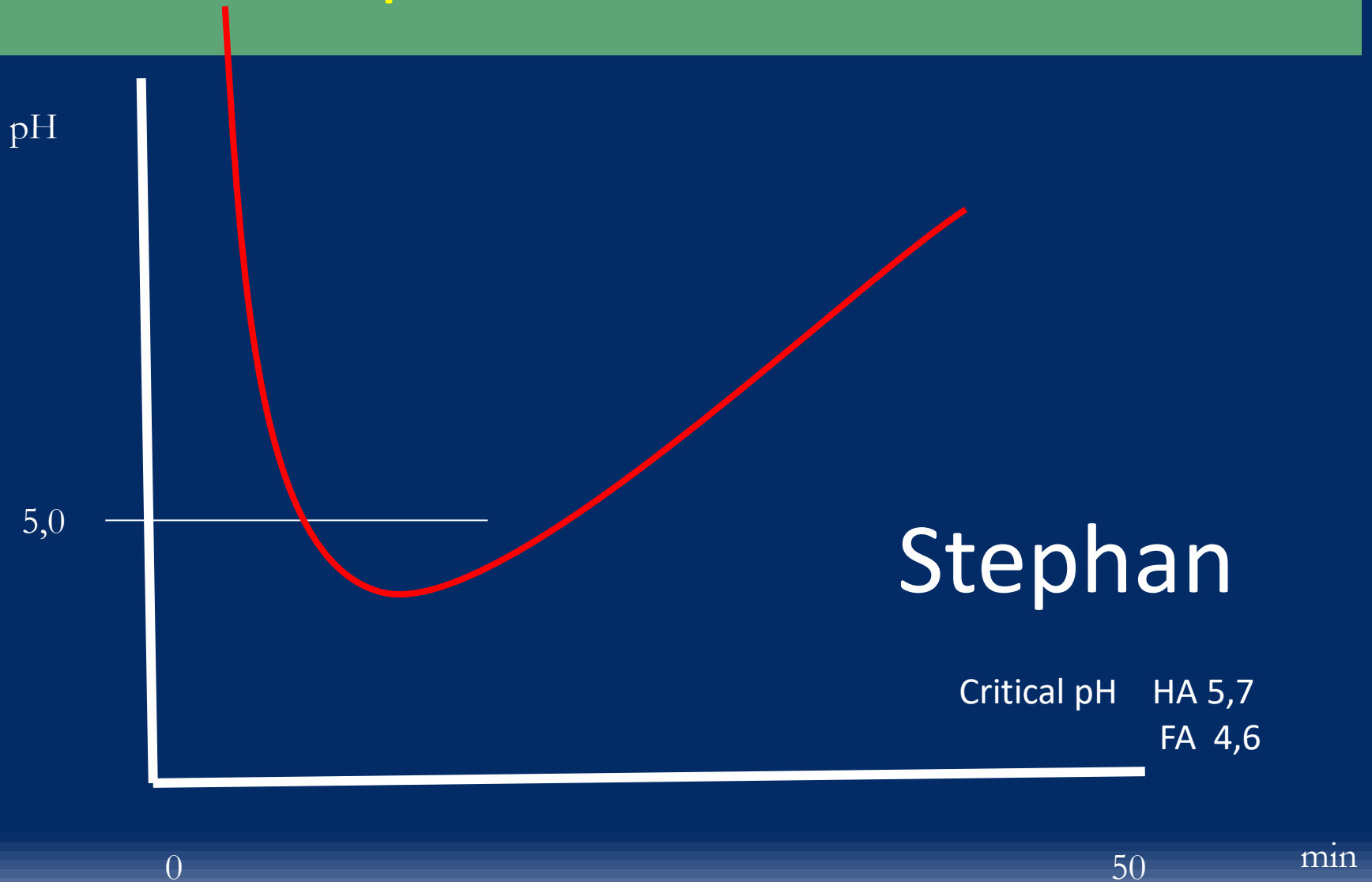
Base production

Metabolism of proteins and

NH⁴

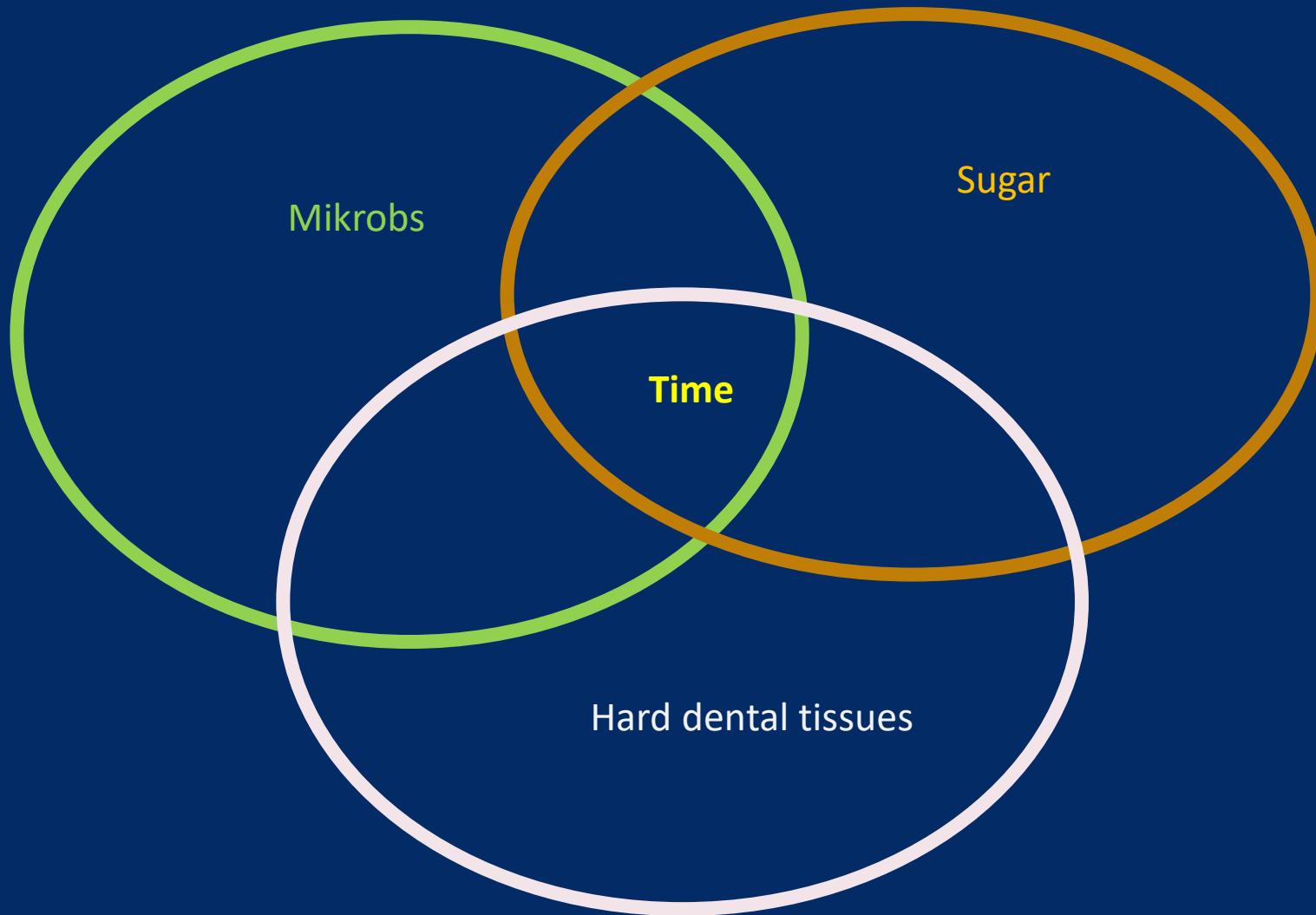
- Sugars 20 – 40% - tendency to acid púroduction and decalcification

Metabolic procedures in dental biofilm



Stephan

Critical pH HA 5,7
FA 4,6

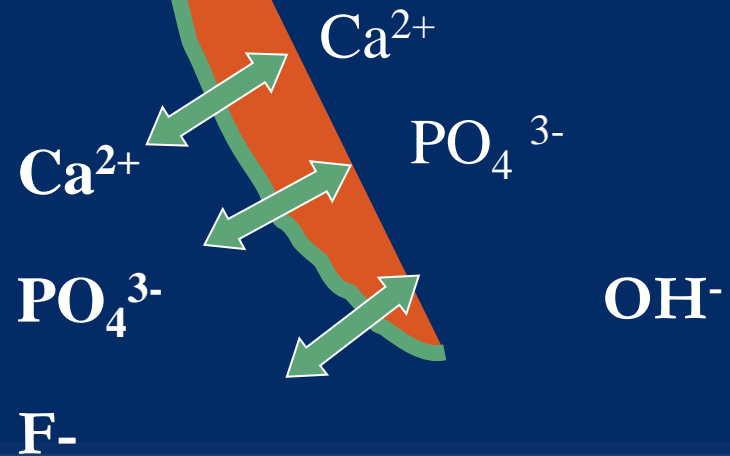
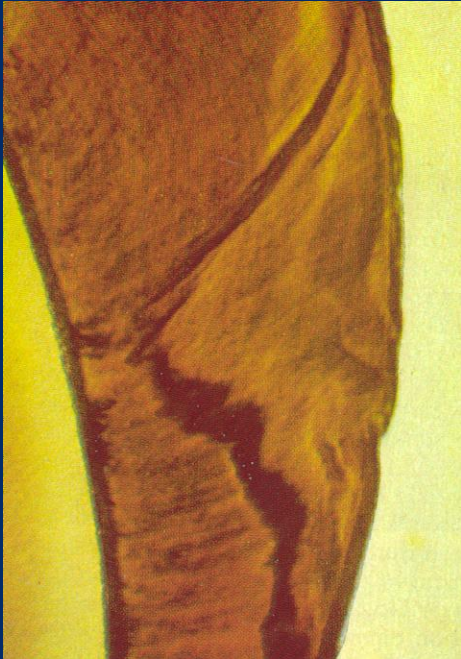


Mikrobs

Sugar

Time

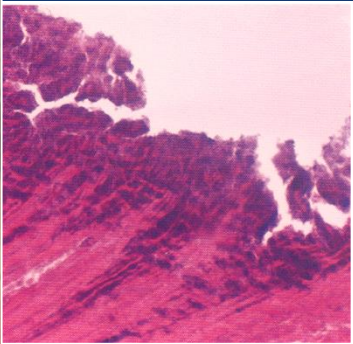
Hard dental tissues



Cavitated lesion

Decalcification

Non cav



Time

Biofilm

Non specific hypothesis

- Plaque is always the reason
- **Specific hypothesis**
- **Only pathogenic plaque is the causal factor**

Saliva and dental caries

700 – 800ml. (0,3ml), stimulated(1ml).0

- Product of salivary glands 700 – 800 ml/24 hours

Rested (0,3ml(min), stimulated(1ml/min).

Clearance

- Microbs
- Rests of food

Saliva and dental caries

Minerals

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

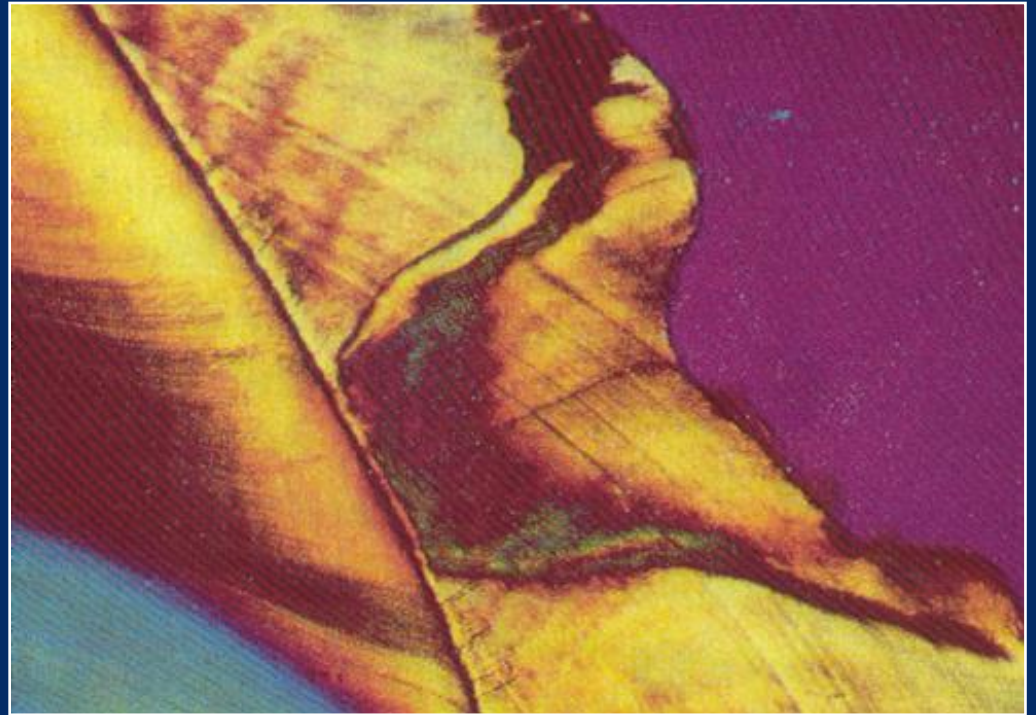
Buffer capacity of saliva

- Bicarbonate system
- Phosphate system
- In saliva not in plaque

Slina

- Key role in maturation of enamel
- Remineralization of initial caries lesions

Inicial lesion



Porosity



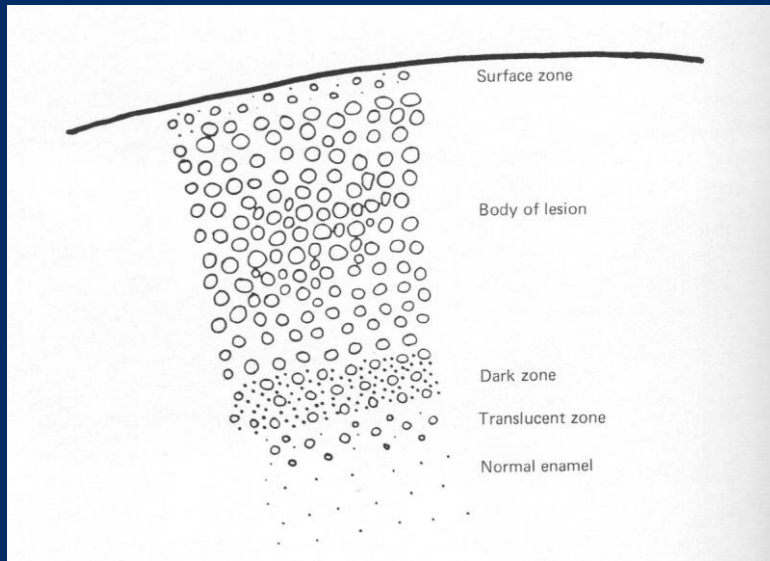
Superficial zone
5 %

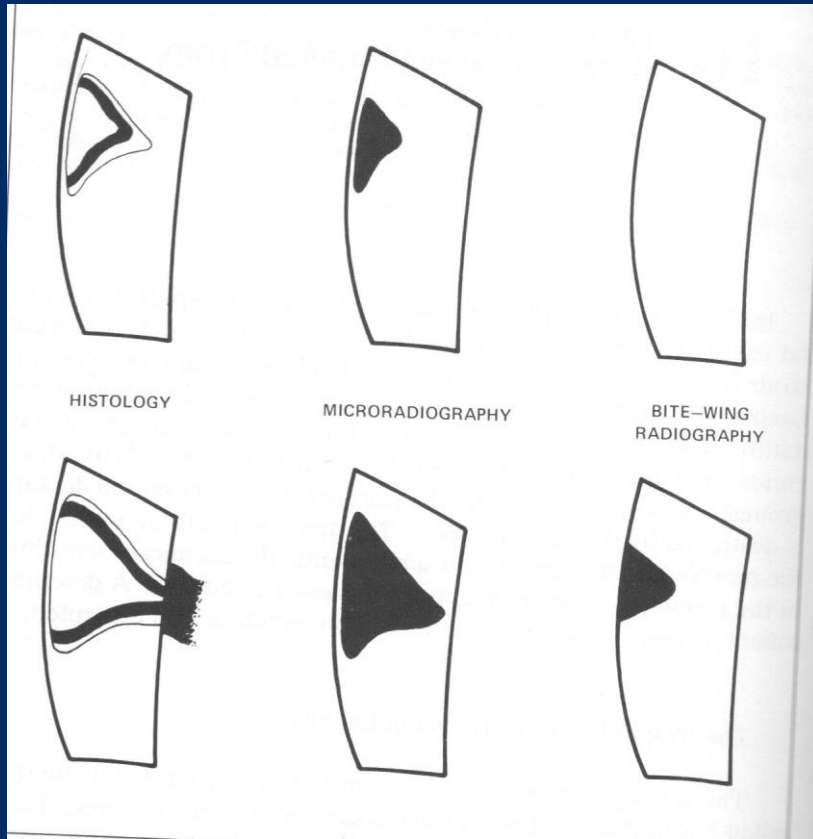
Body of lesion
25%

Dark zone
2 –4%

Translucent zone
1%

Normal enamel
0,1%%



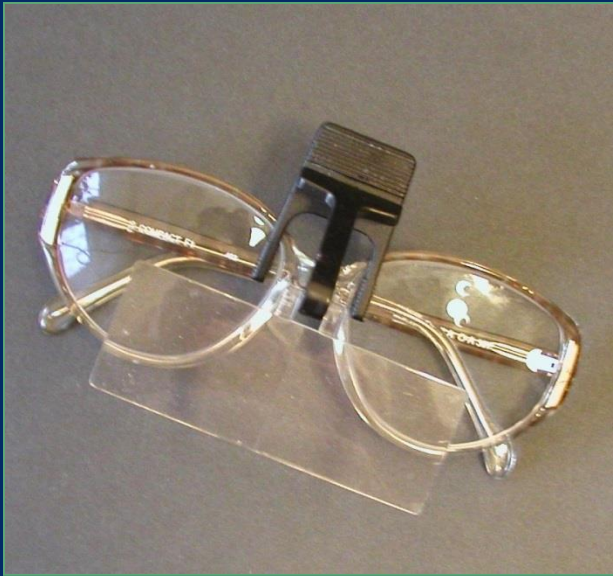


Histology x mikroradiography x BW

Diagnosis

- Visual inspection (ICDAS)
- Radiography
- Photography
- Optical nonfluorescent methods
- Optical fluorescent methods
- Transillumination
- Measurement of electrical impedancy

Visual inspection, magnification, dry surface

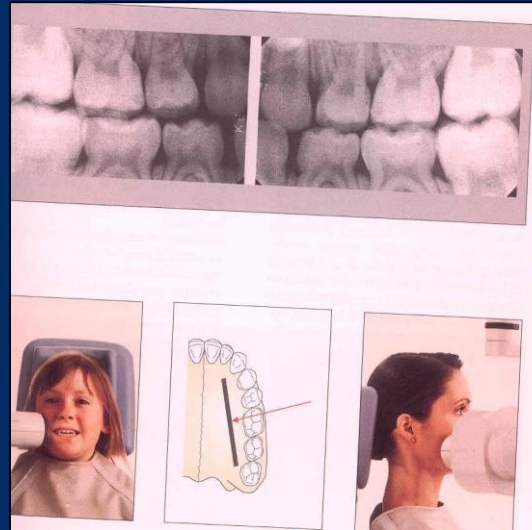
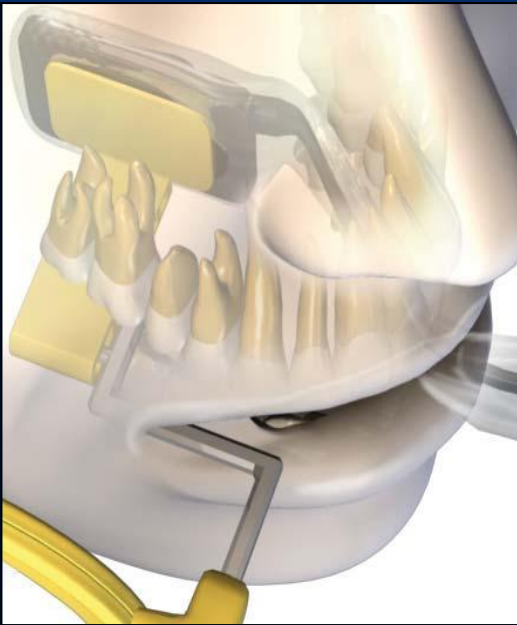


Photography

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



Radiography bite wing

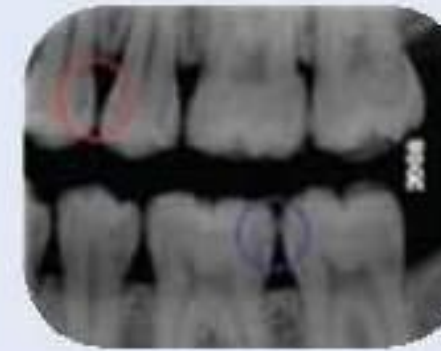
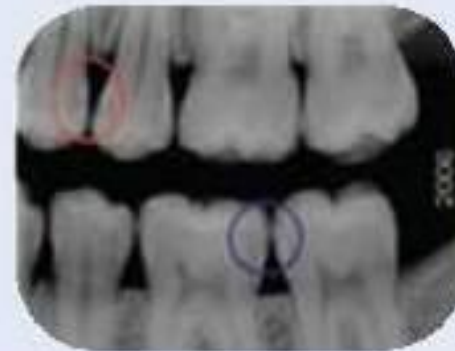


- D1 – outer middle of enamel
- D2 – inner middle to enamel – dentinoenamel Junction
- D3 – outer half of dentine
- D4 inner half of dentine

Radiography

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

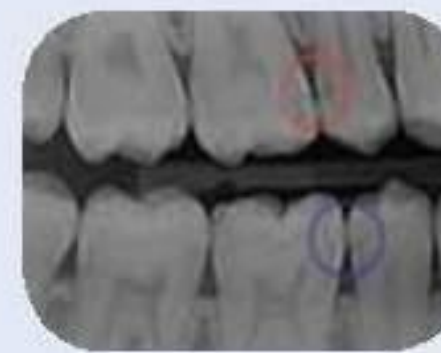
Léze skloviny	ICDAS
E1	Outer third of enamel
E2	Inner third of enamel
Léze v	
D1	Outer third of dentine
D2	Midle third of dentine
D3	Inner third of dentine



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



D-3



D-1 a D-2

Optical non fluorescent methods

- Distorsion og lihgt (OCM)

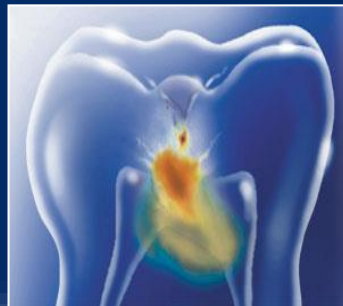
Non invasive, various results

Optical fluorescent methods

- Principle:

Absorption and irradiation back

- DIAGNOdent, DIAGNOdent pen, QLF, Vista Proof



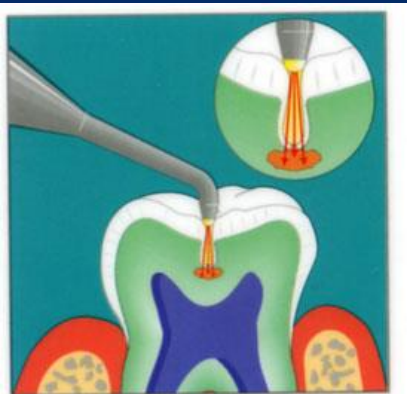
Infrared laser fluorescence

- **DIAGNOdent, DIAGNOdent pen**

Calibration, display

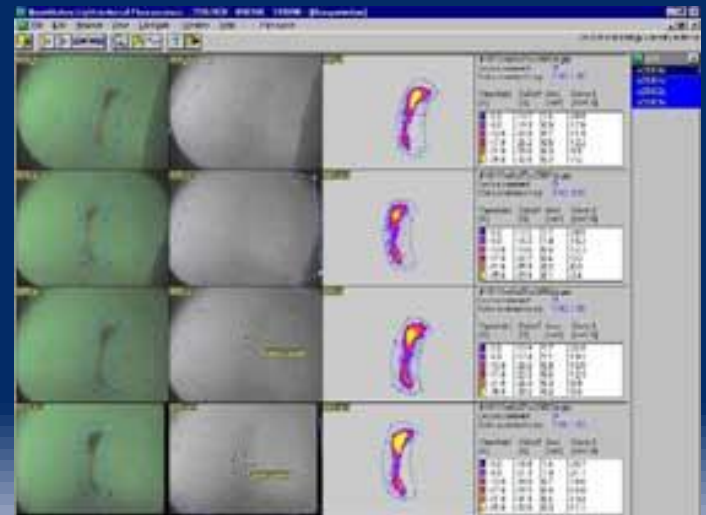
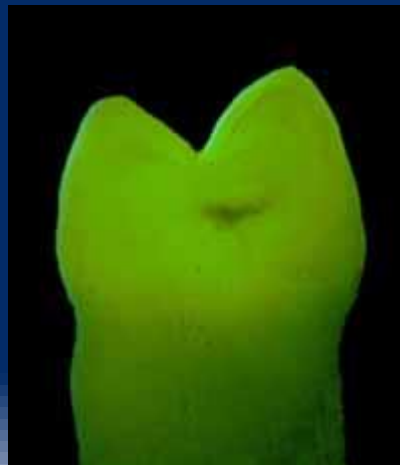
- More than 24 (DIAGNOdent), more than 17 (DIAGNO dent pen) – caries
- False positive results – dental biofilm

DIAGNODENT

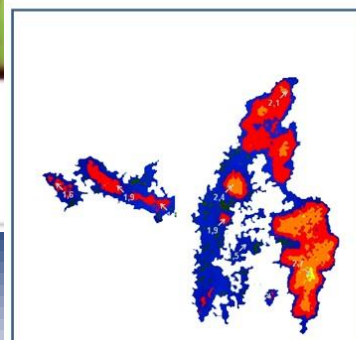
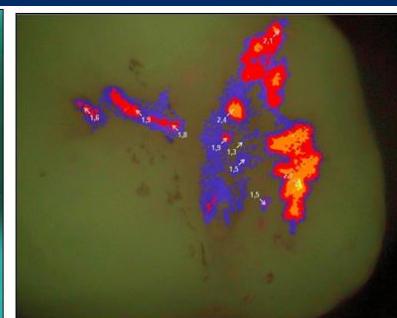


Quantitative Light – induced Fluorescence

QLF



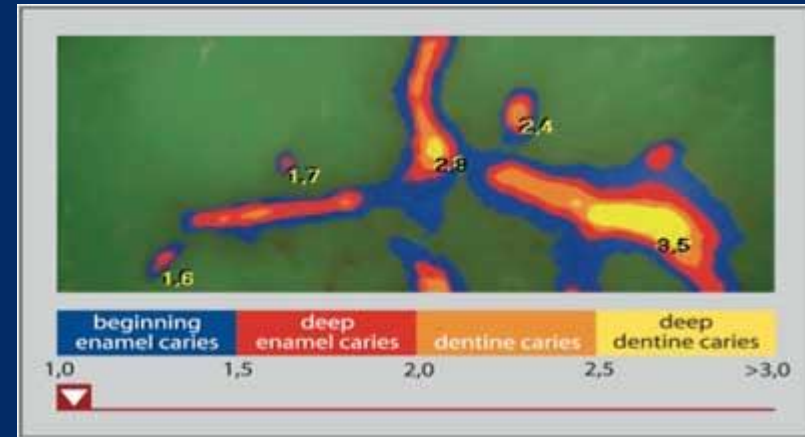
Vista Proof



Vista Cam iX

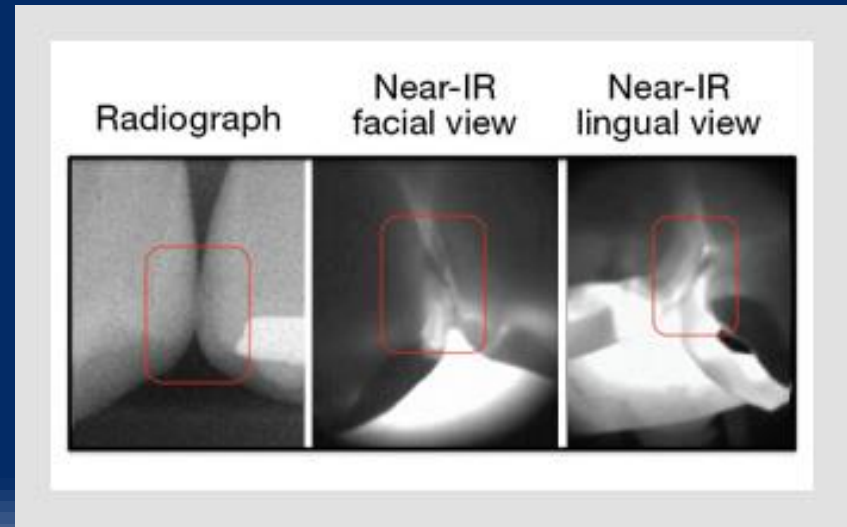
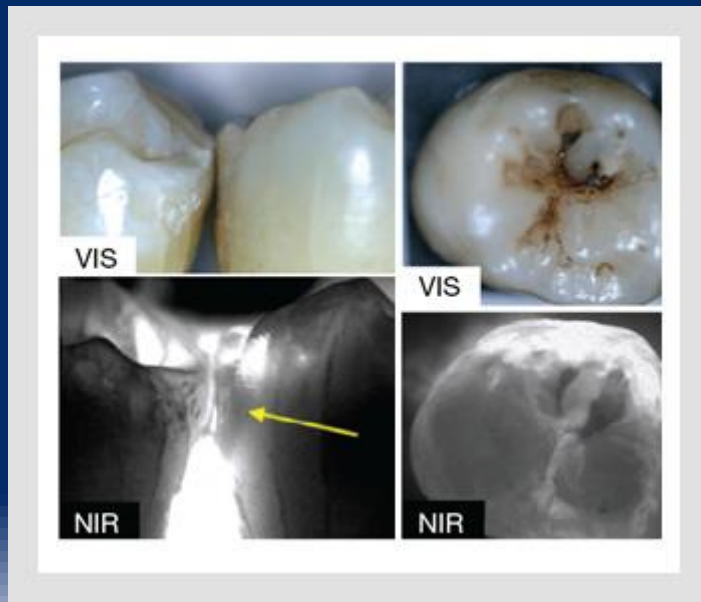


SoproLife



FOTI – fibre optic transillumination

Proximal caries lesion



DIFOTI

(Digital Fibre Optic
Trans-Illumination)



DIAGNOCam



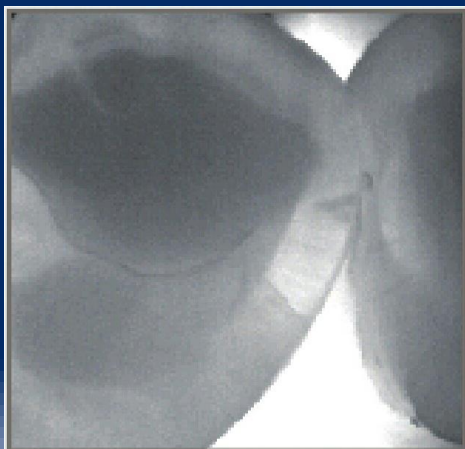
- DIFOTI (Digital Imaging Fiber Optic Transillumination)
- light(700-1400nm)
- Caries lesions and cracks—light absorption—dark spots
- (higher content of water in caries lesions – higher absorption of light)
- Documentation

DIAGNOCam- klasifikace nálezu

- 0 –

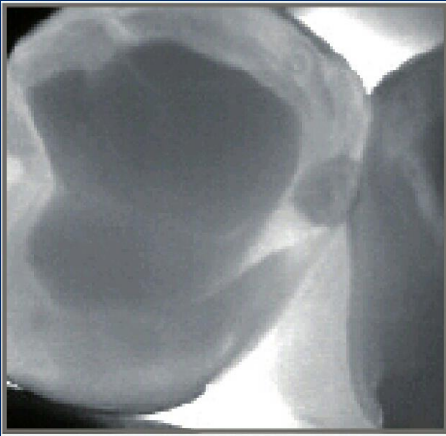


- 1.

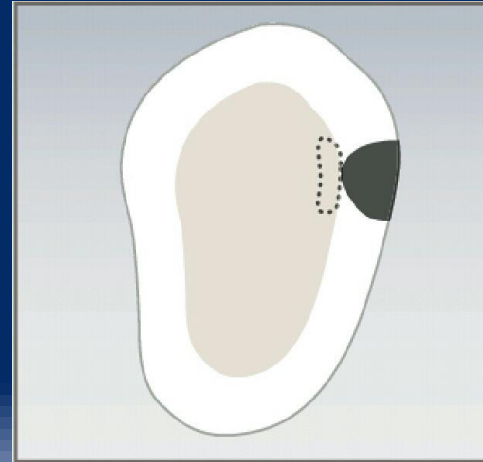
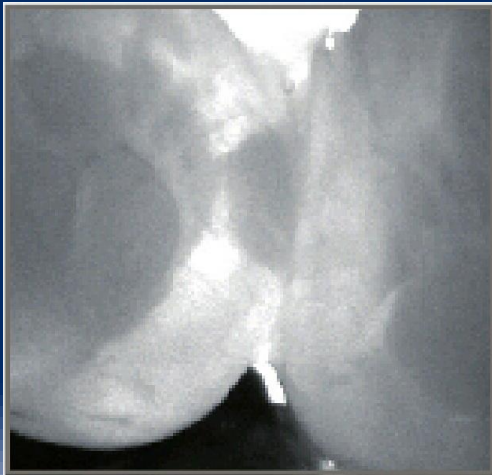


DIAGNOCam- klasifikace nálezu

- 2- caries in enamel

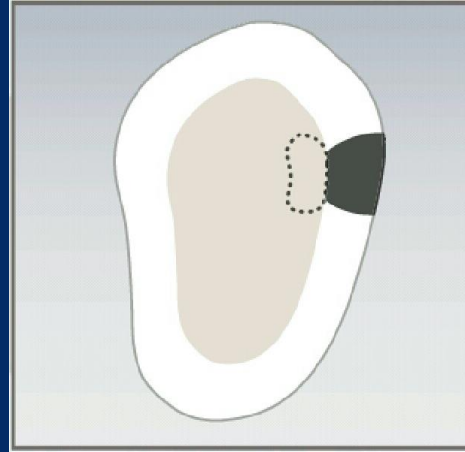


- 3 - caries in enamel and dentin

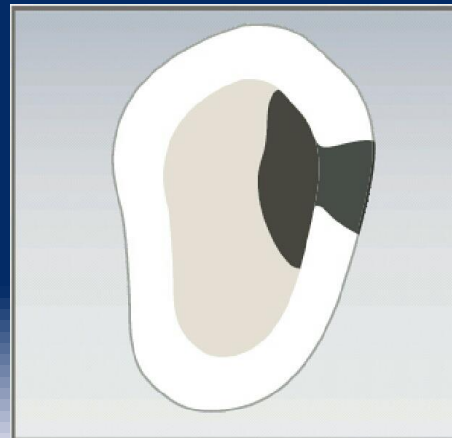


DIAGNOCam- klasifikace nálezu

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

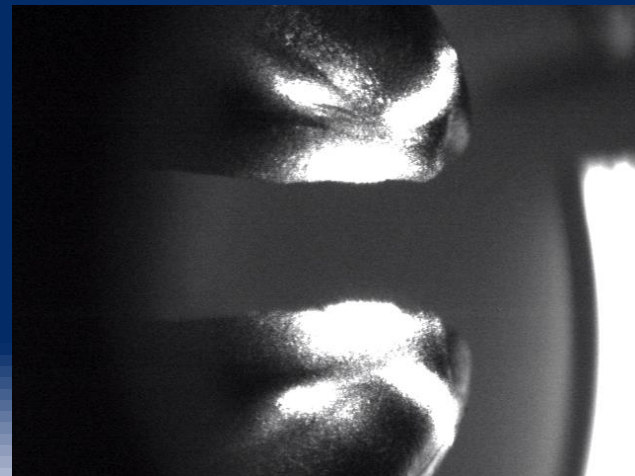
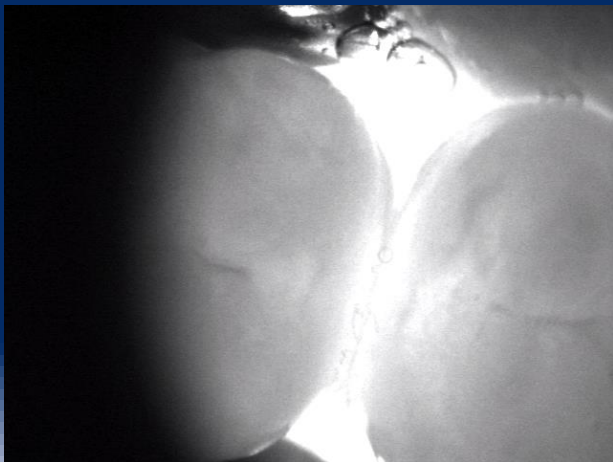
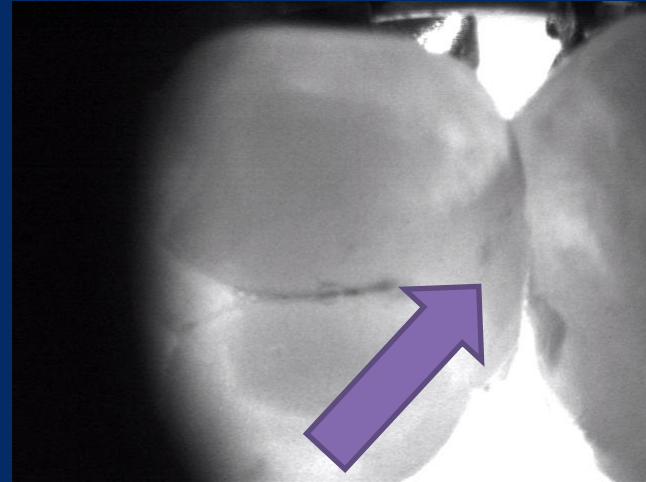
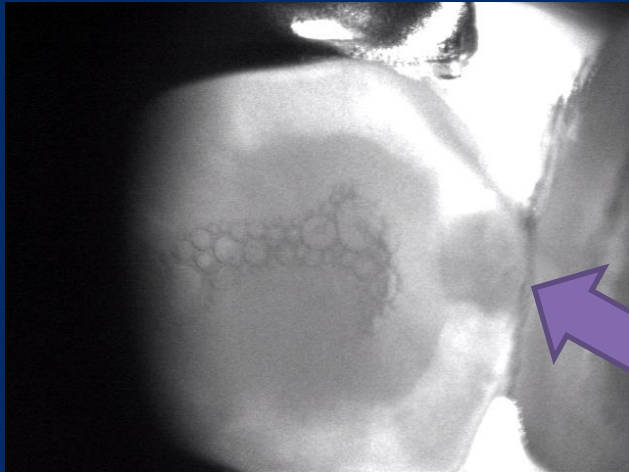


- 5 – kaz rozšířený do dentinu – použít invazivní metodu



DIAGNOCam



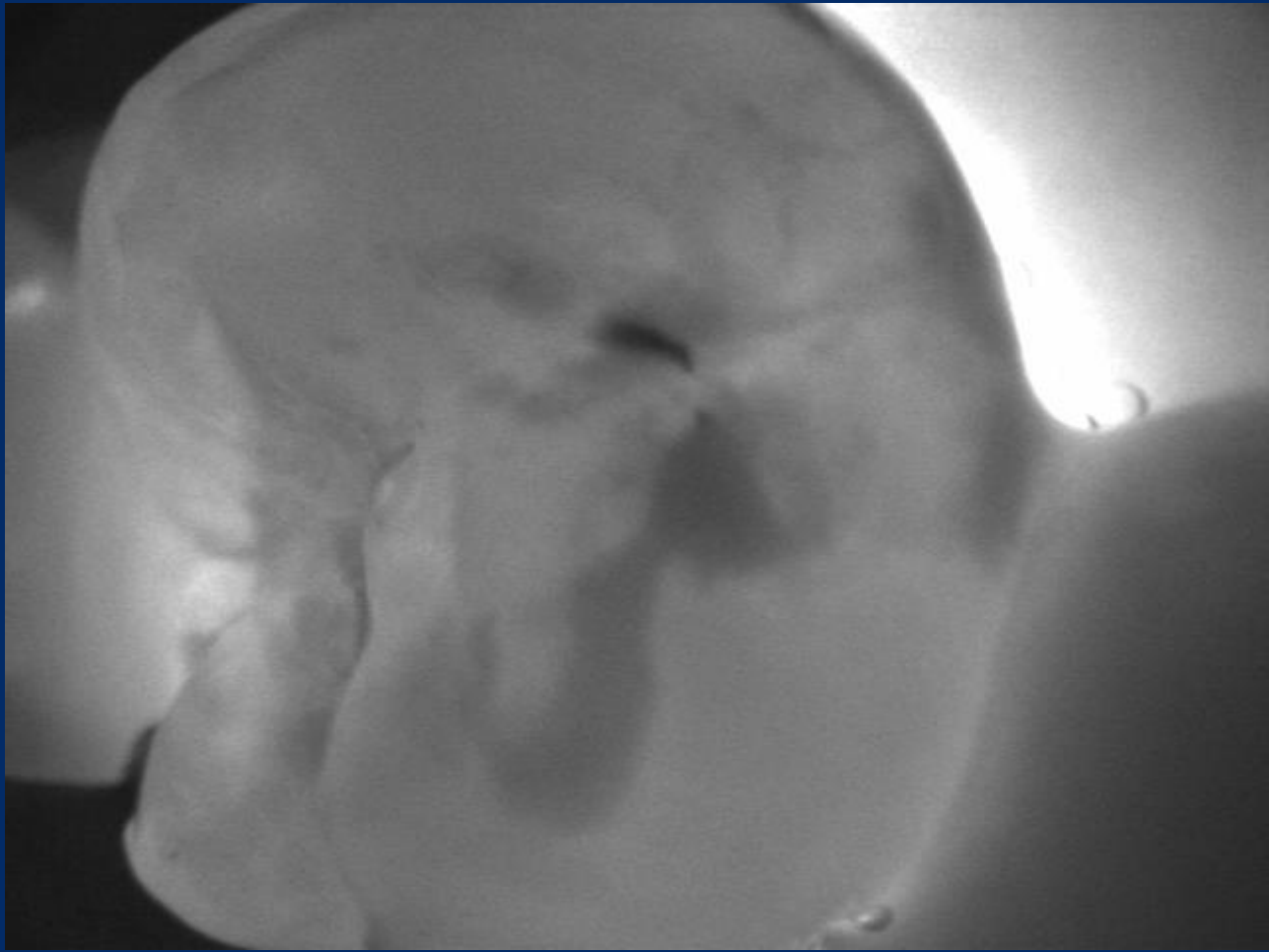


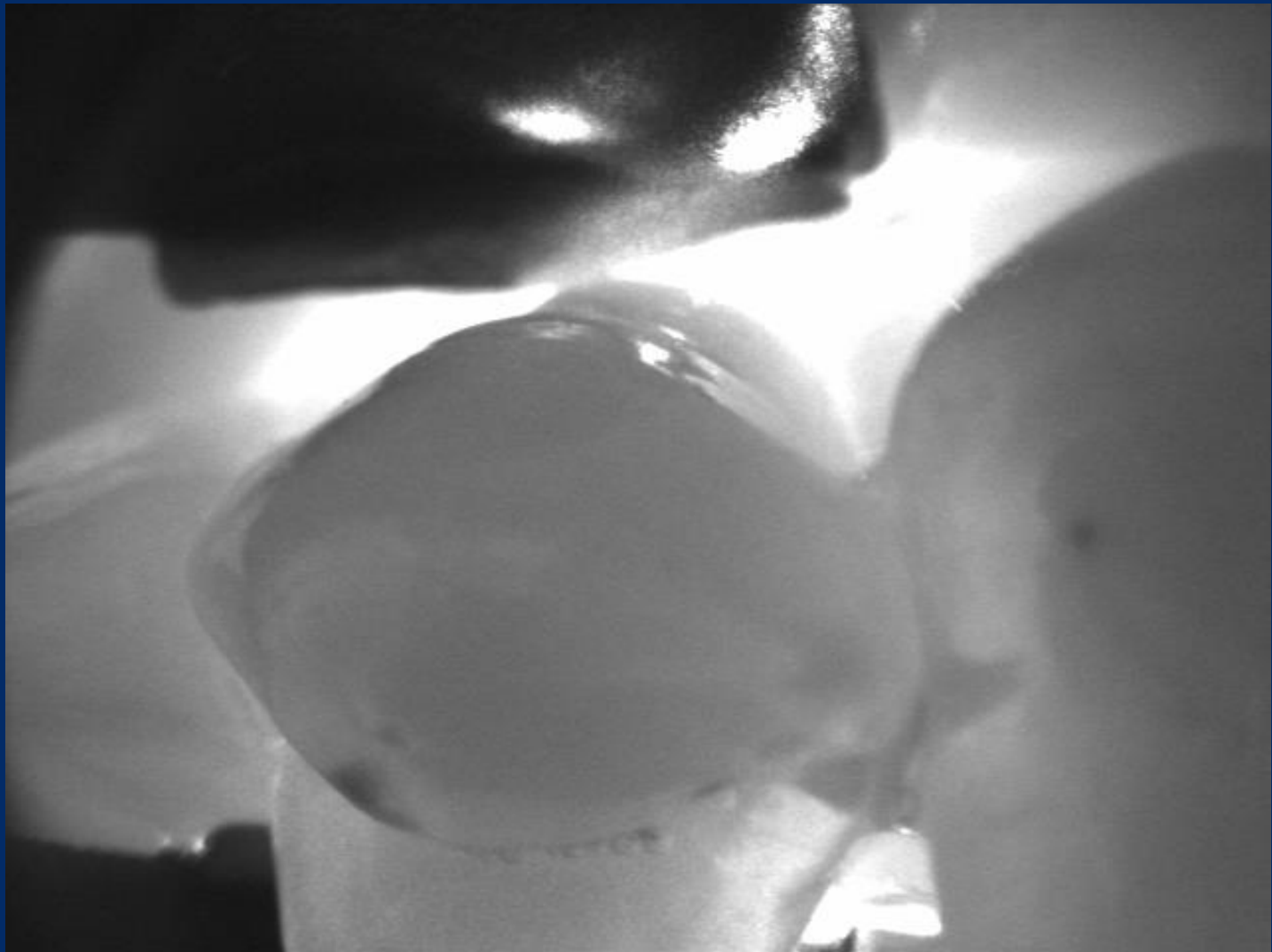


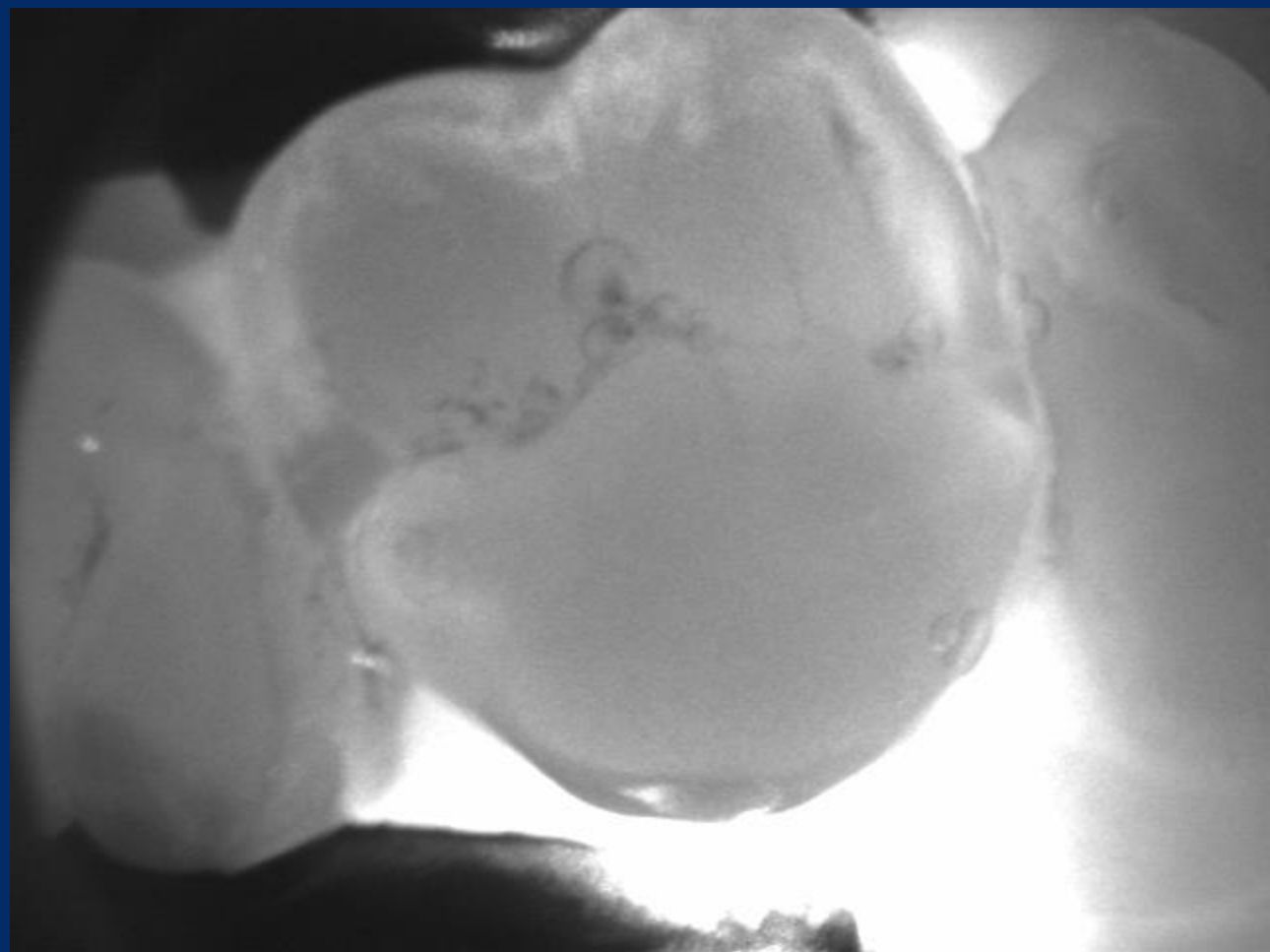
Diagnocam



Bitewing







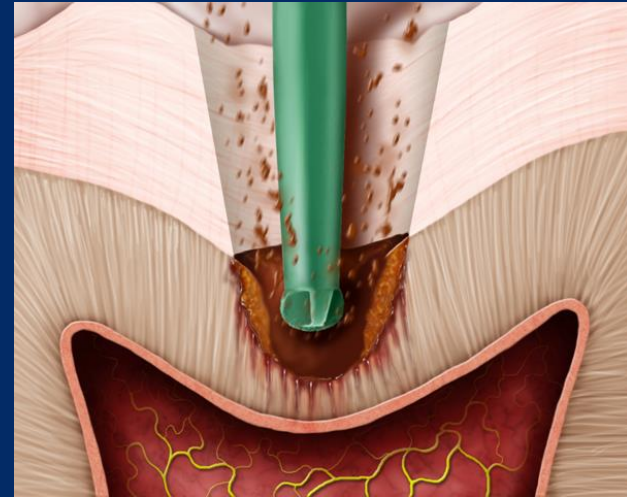
Transillumination using optical fibre

FOTI

- KaVo DIALux probe – proximal caries
- + higher sensitivity than x-ray
- no sensitivity on secondary caries
- no archivation



Measurement of electrical resistancy



Pit and fissure caries

- Class I. acc. to Black

Caries danger area

Special morphology

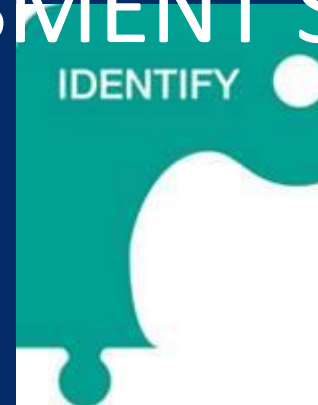
Special structure of enamel



Diagnosis

ICDAS—INTERNATIONAL CARIES DETECTION
AND ASSESMENT SYSTÉM

ICDAS—INTERNATIONAL CARIES DETECTION AND ASSESMENT SYSTEM



- **ICDAS(2002)**–6 code, later **ICDAS –II** –4code
- ☐ Caries lesions in 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



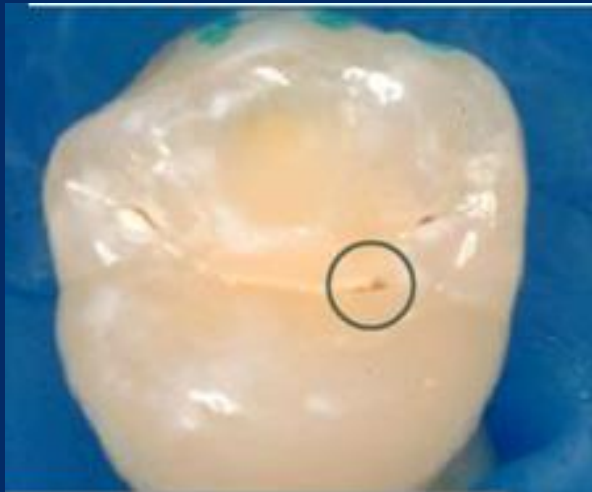
ICDAS – criteria

- 0 no changes observed



ICDAS - criteria

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



Code 1 before sectioning tooth



Code 1 after sectioning tooth

ICDAS - criteria

- 2. – first visual changes on wet surfaces



ICDAS - criteria

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



ICDAS - criteria

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



ICDAS - criteria

- 5 – cavitated lesion



















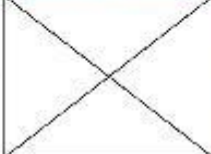



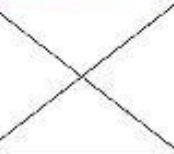
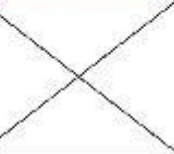


ICDAS - kritéria

















- 6 – large cavitation



UniViss – universal scoring system (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)

Universal Visual Scoring System for smooth surfaces (UniViSS smooth)						
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 and/or discolorations are detectable					
White (Score 1)						
White-brown (Score 2)						
(Dark) Brown (Score 3)						
Greyish translucency (Score 4)						

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