



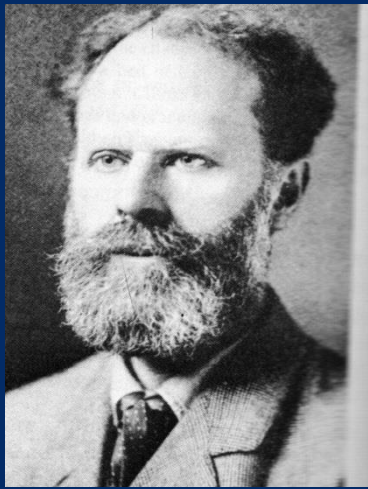
# Aethiology

- 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

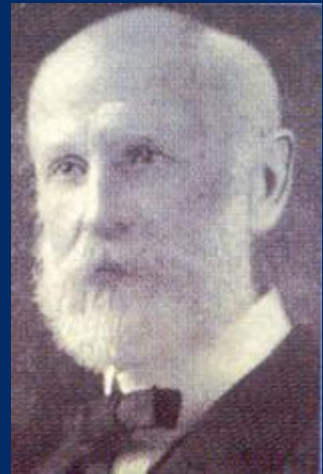
(1836 – 1915)



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**

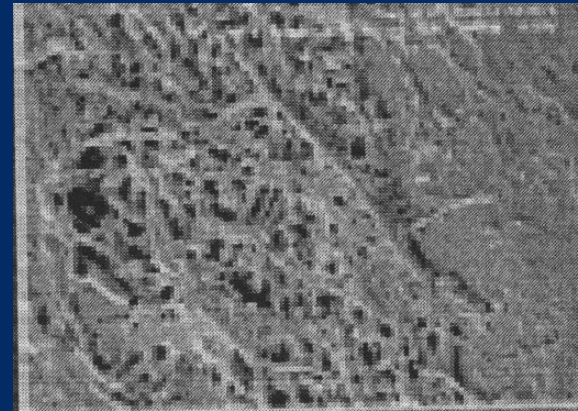
**10% Cells of human body**

**Mikcobiom**

**Oral microbiom**

# Dental biofilm

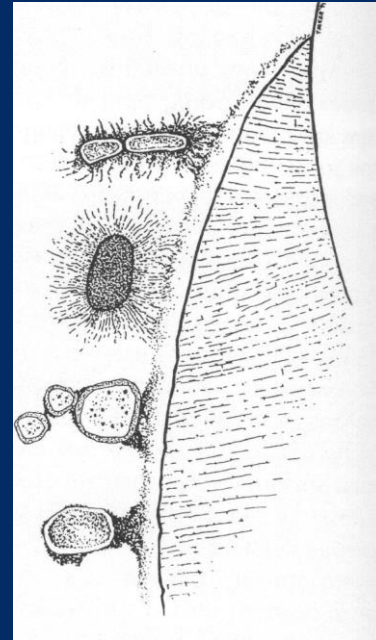
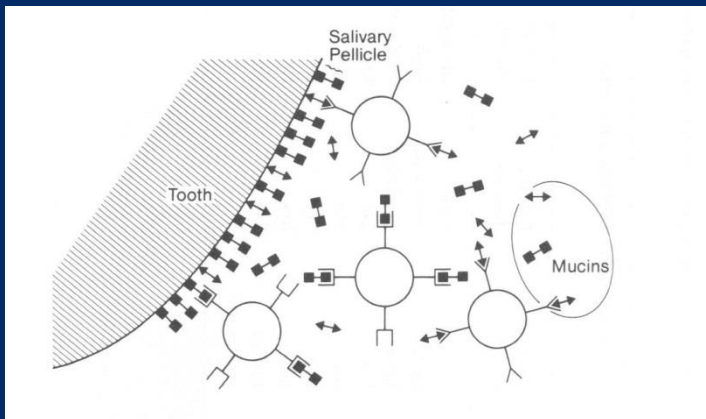
- Pelicle–Protective effect
- Pelicle–monomolecular proteinic layer rich on prolin and phosphates and glycoproteins, sulphates
- Bind to  $\text{Ca}^{2+}$  ions of enamel
- Protective effect
  - *Erosion*
  - *Dentin hypersensitivity*
  - *Key role by remineralization*





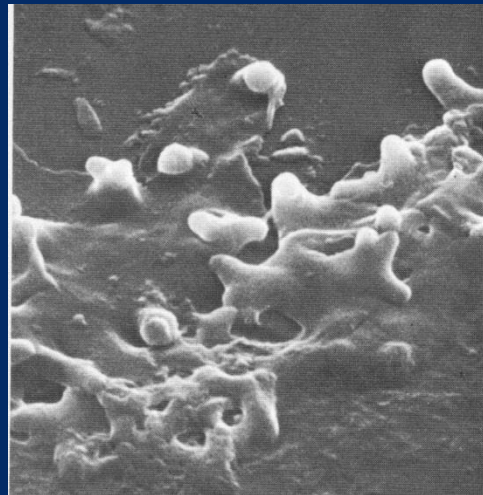
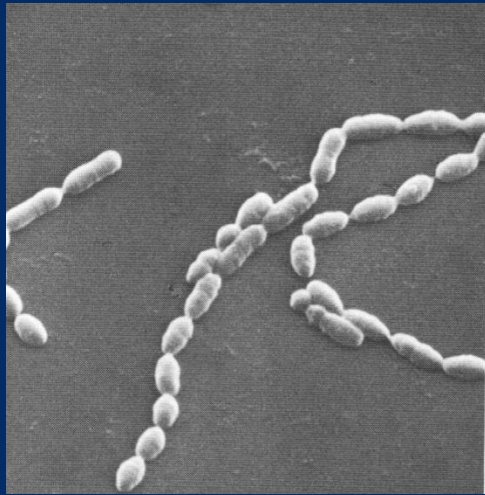
# Biofilm

- Adherence
  - *Adhezins*
  - *Fimbriες*



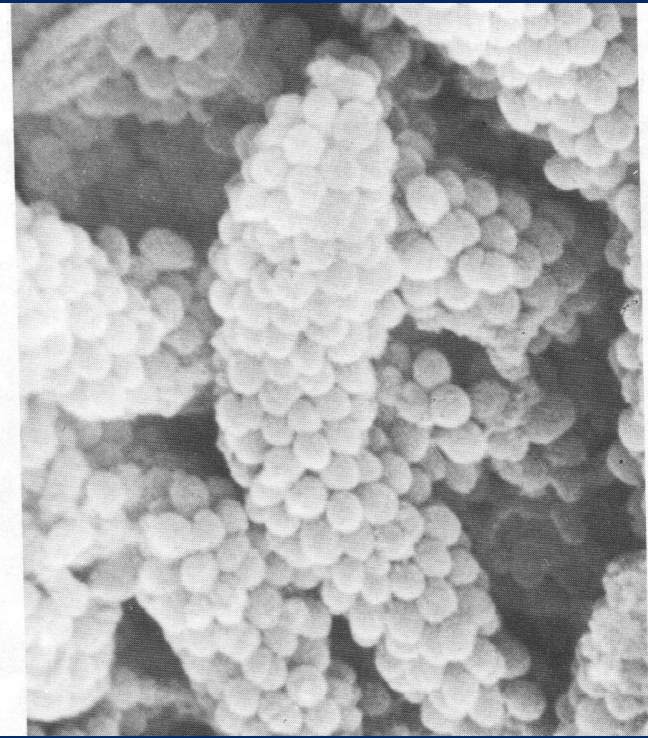
# Biofilm

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

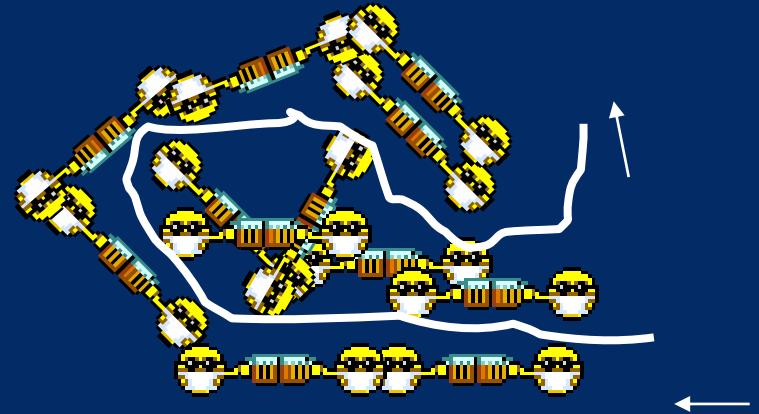
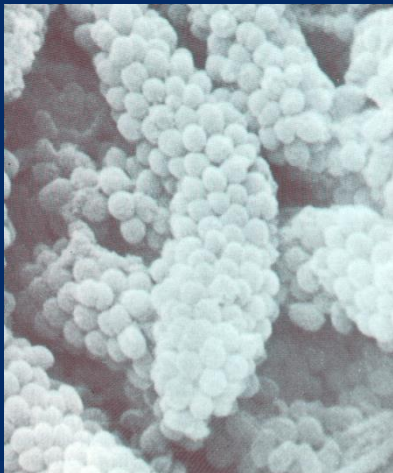
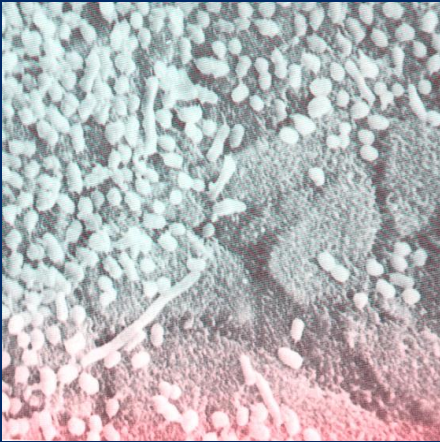


# Biofilm

- 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<sup>+</sup>

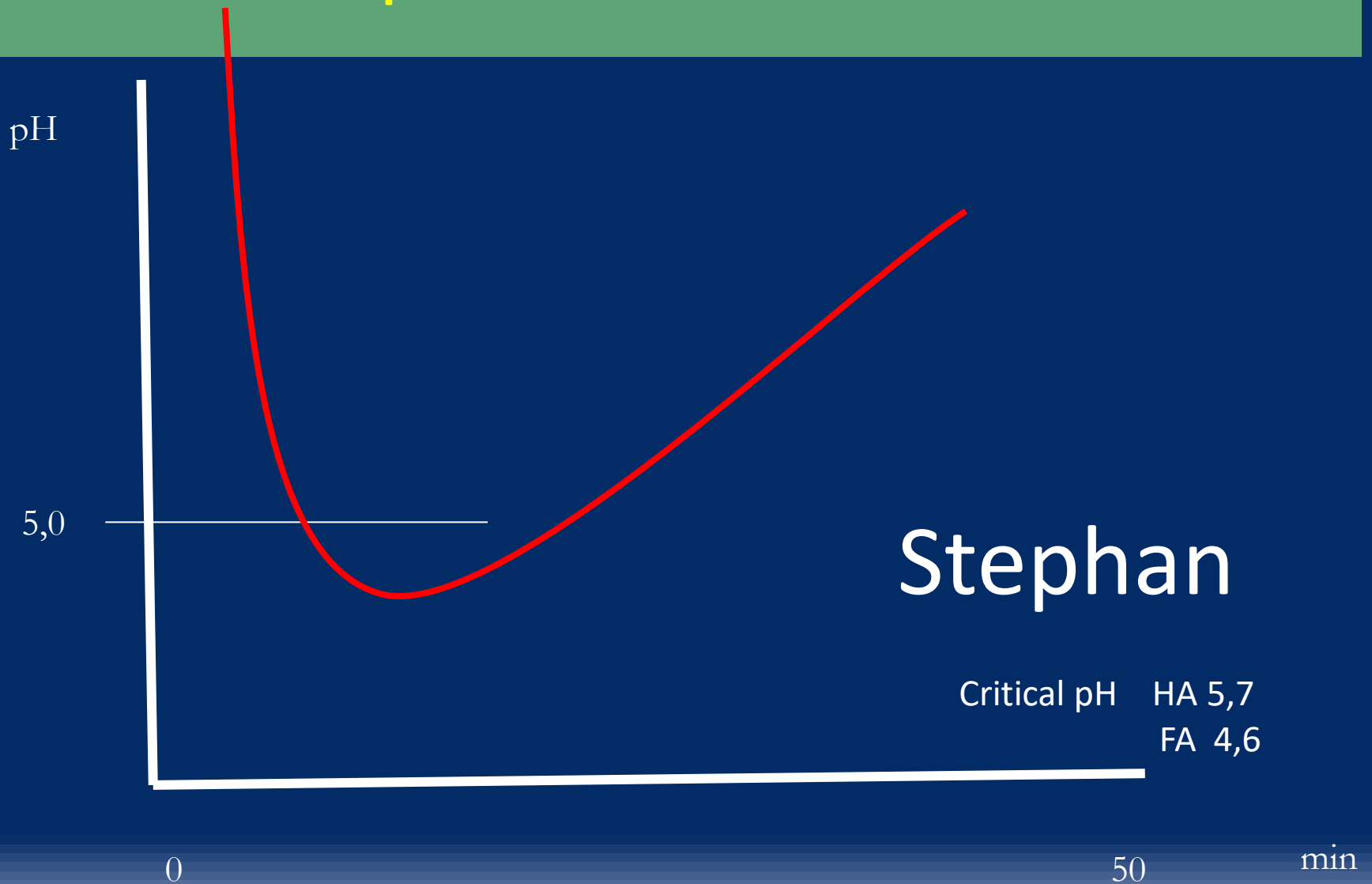
## Base production

Metabolism of proteins and

NH<sup>4</sup>

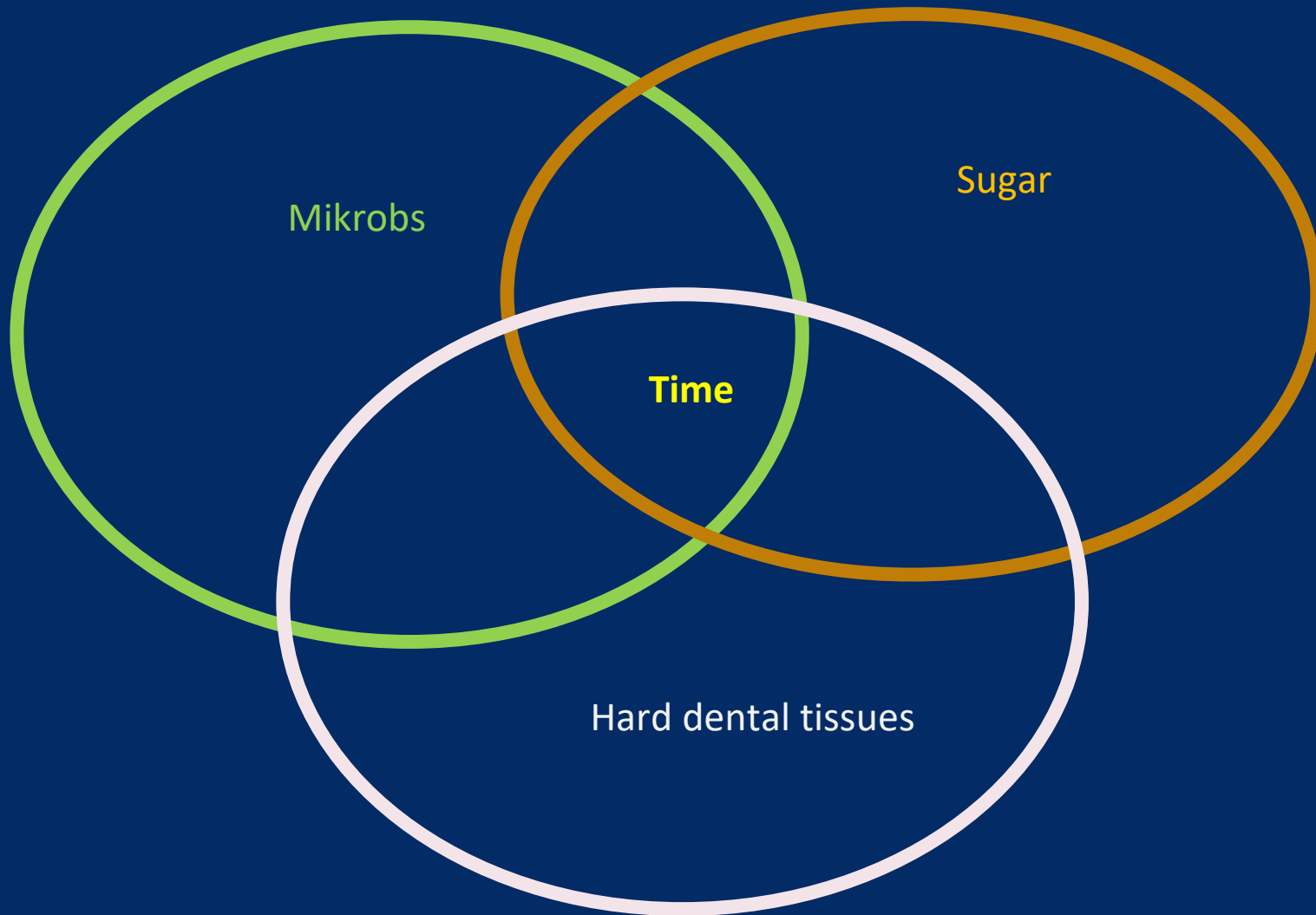
- Sugars 20 – 40% - tendency to acid púroduction and decalcification

# Metabolic procedures in dental biofilm



Stephan

Critical pH HA 5,7  
FA 4,6



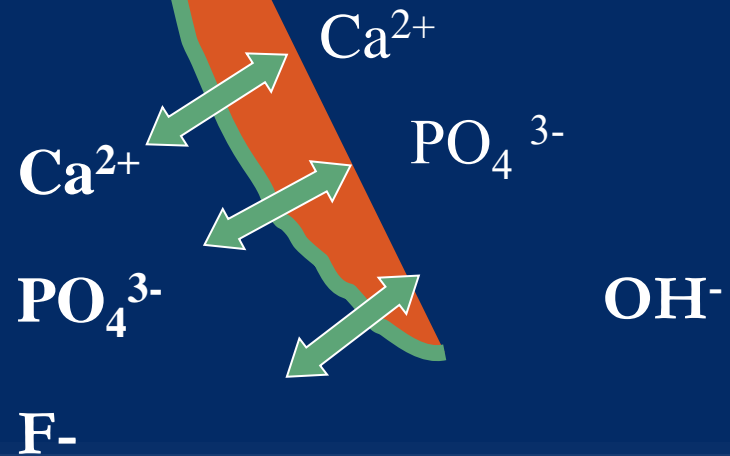
Mikrobs

Sugar

Time

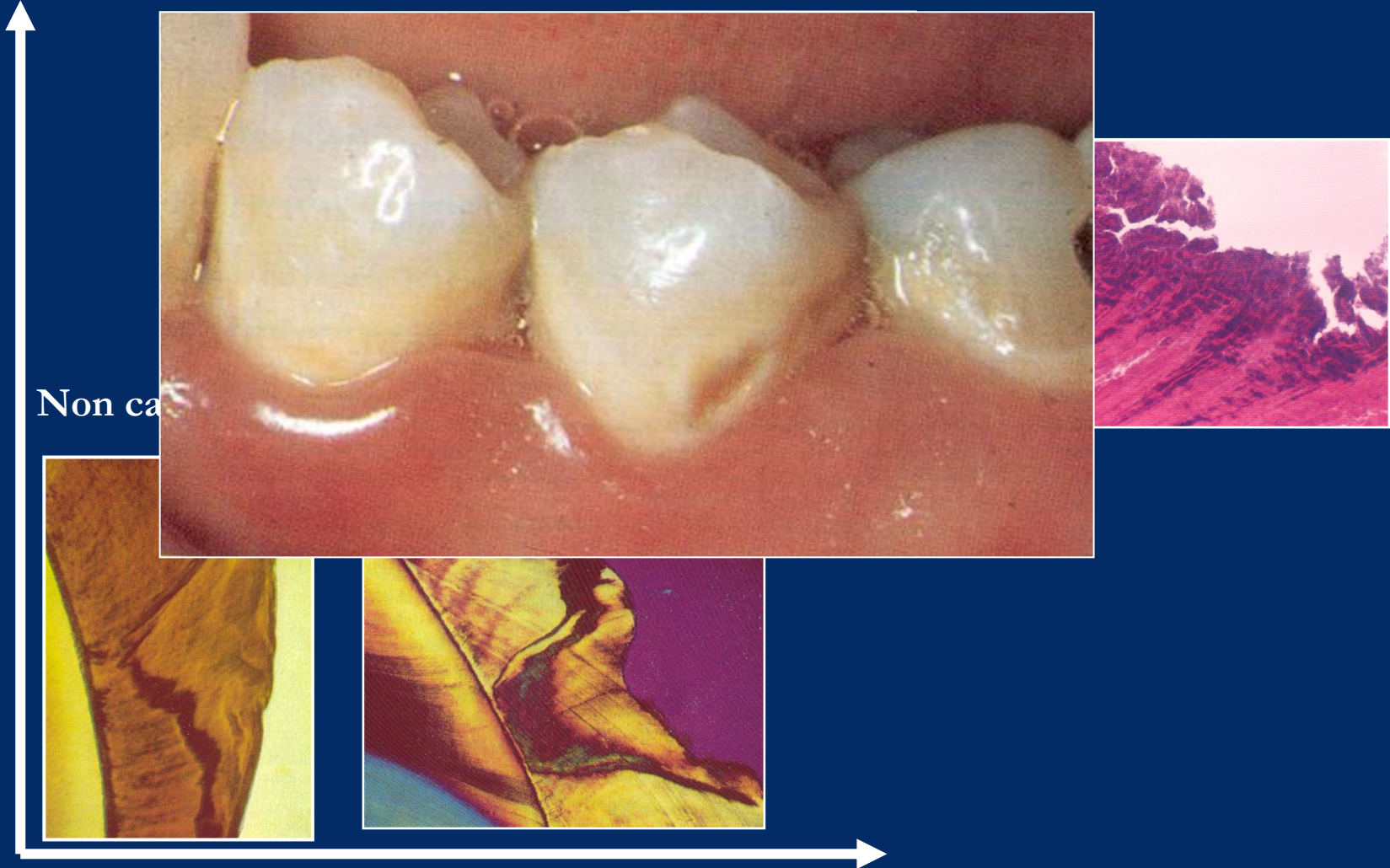
Hard dental tissues





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

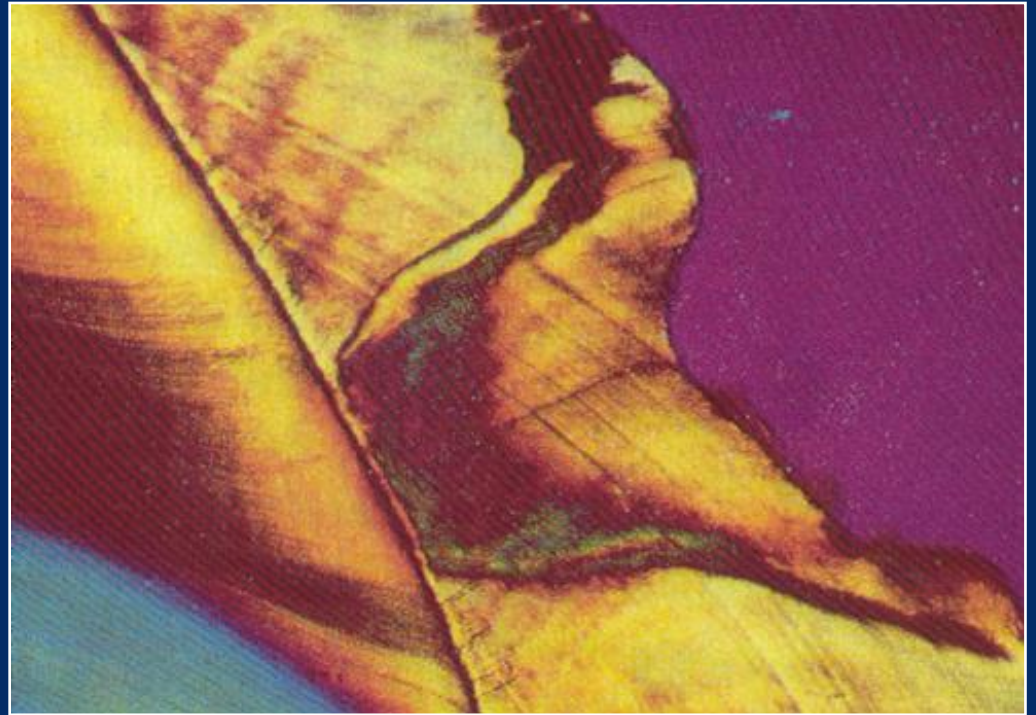
# Buffer capacity of saliva

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

# Slina

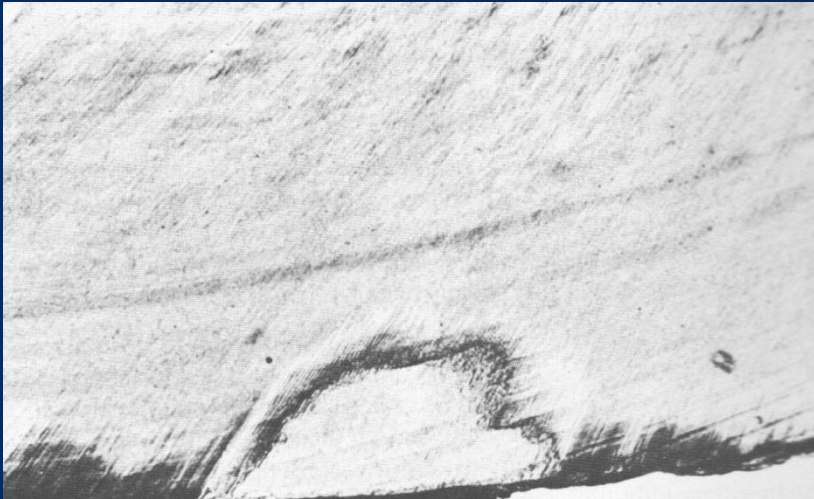
- Key role in maturation of enamel
- Remineralization of initial caries lesions

# Inicial lesion





# Porosity



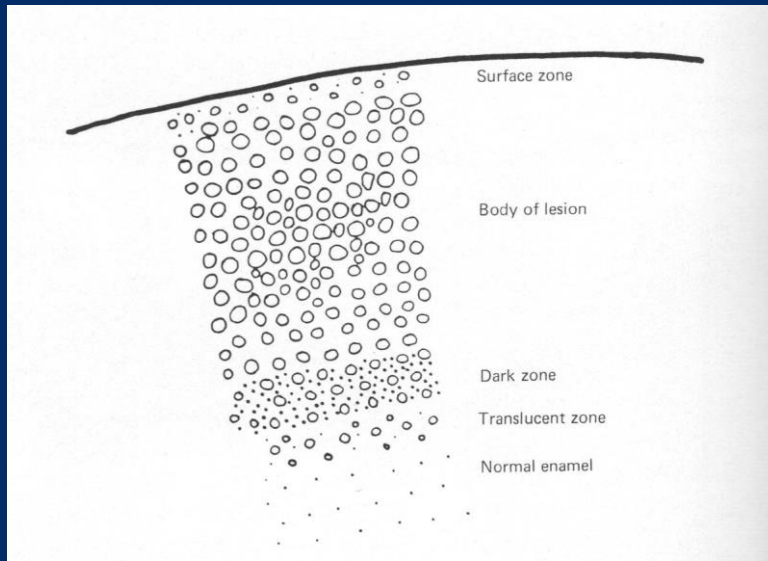
Superficial zone  
5 %

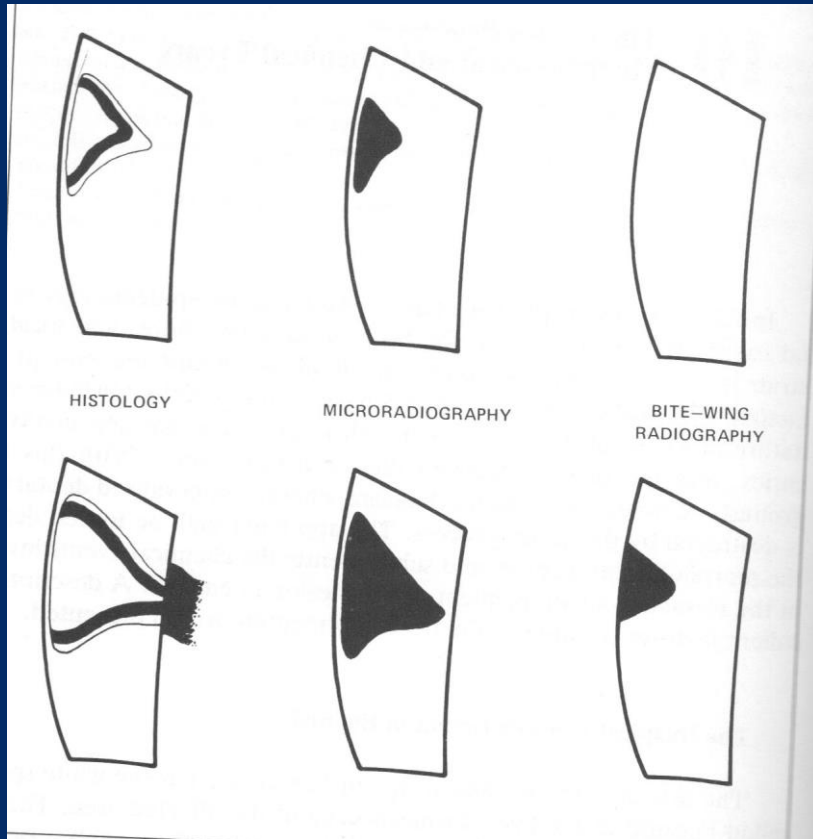
Body of lesion  
25%

Dark zone  
2 –4%

Translucent zone  
1%

Normal enamel  
0,1%%



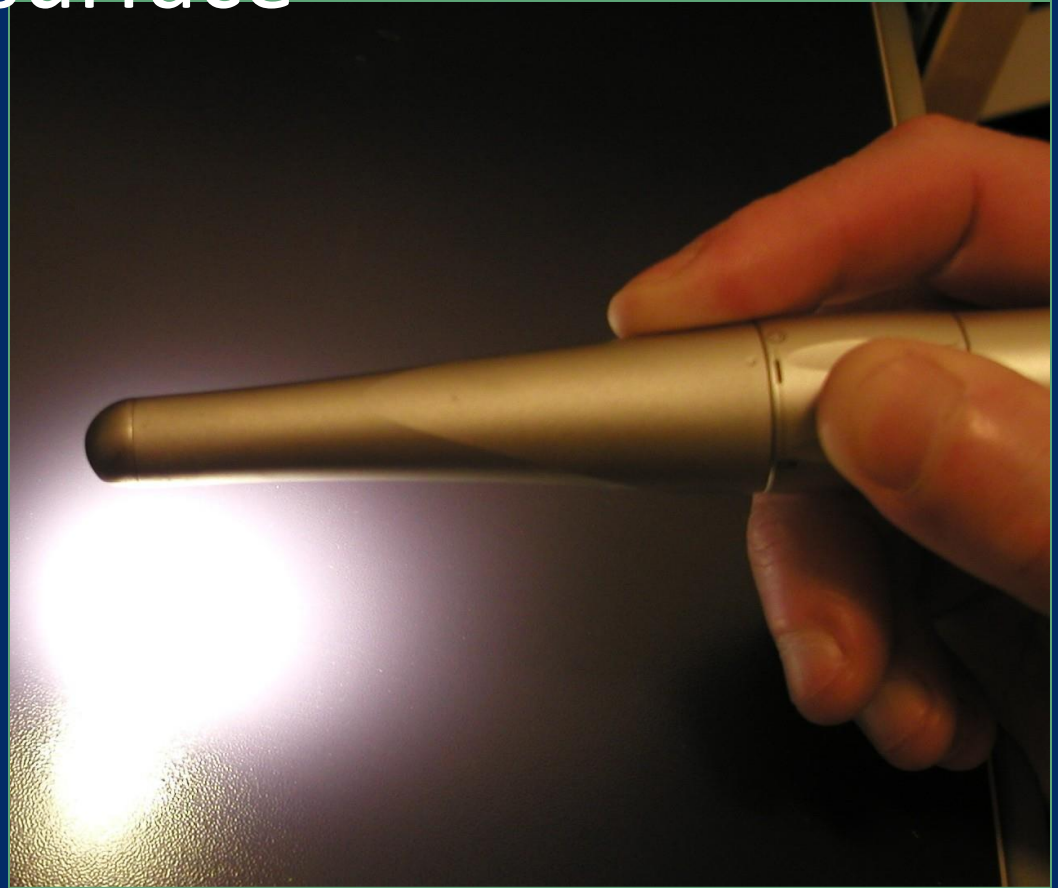
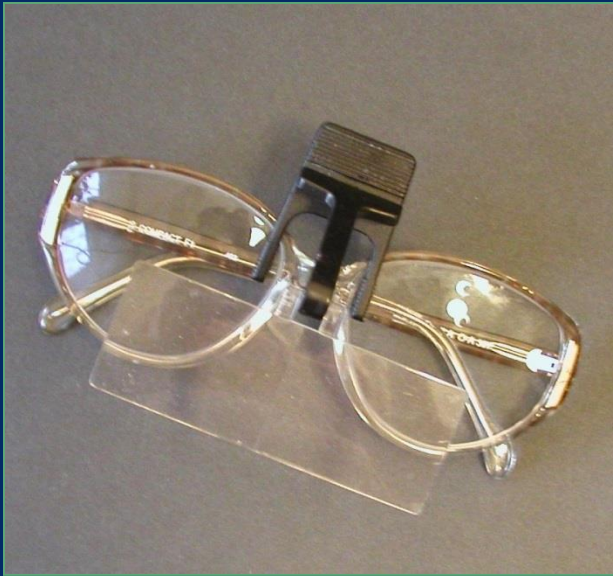


Histology x mikroradiography x BW

# Diagnosis

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

# Visual inspection, magnification, dry surface

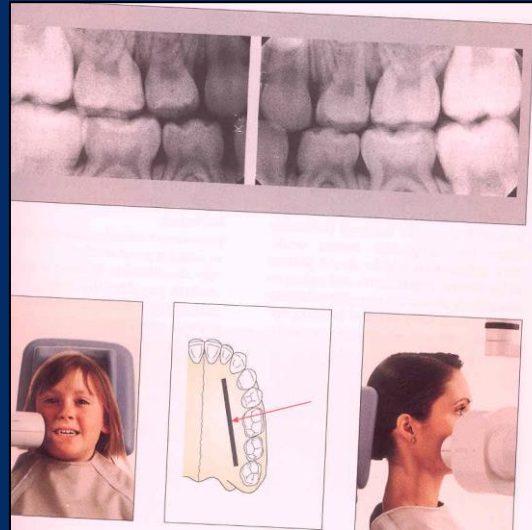
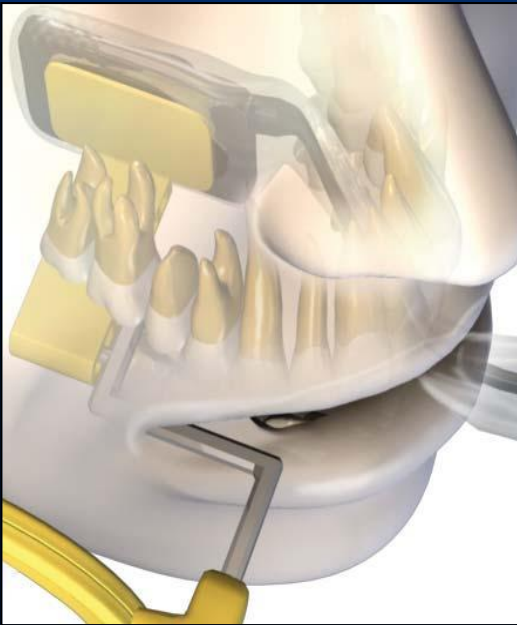


# Photography

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



# Radiography bite wing

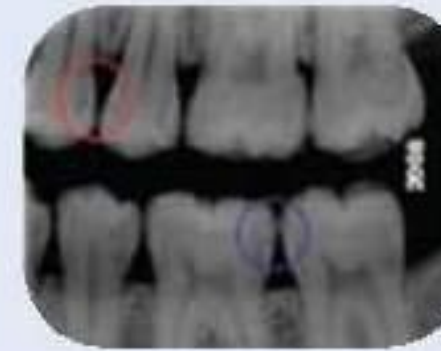
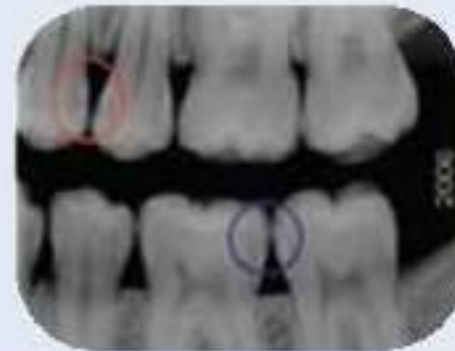


- D1 – outer middle of enamel
- D2 – inner middle to enamel – dentinoenamel Junction
- D3 – outer half of dentine
- D4 inner half of dentine

# Radiography

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

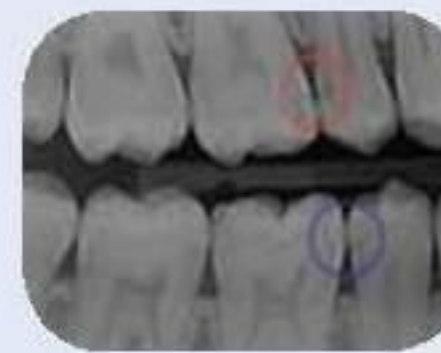
Léze skloviny	ICDAS
E1	Outer third of enamel
E2	Inner third of enamel
Léze d	
D1	Outer third of dentine
D2	Midle third of dentine
D3	Inner third of dentine



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

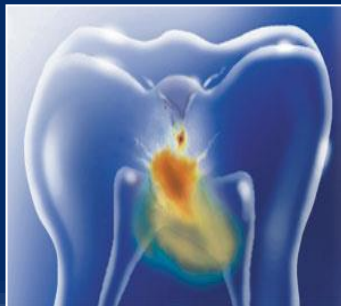


# Optical fluorescent methods

- Principle:

Absorption and irradiation back

- DIAGNOdent, DIAGNOdent pen, QLF, Vista Proof



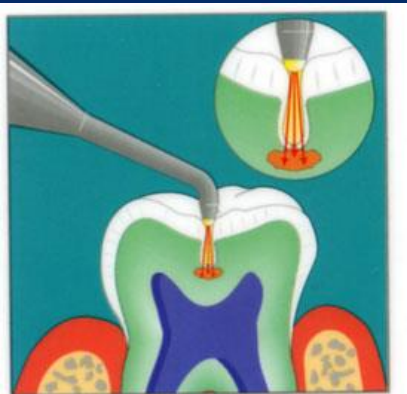
# Infrared laser fluorescence

- **DIAGNOdent, DIAGNOdent pen**

Calibration, display

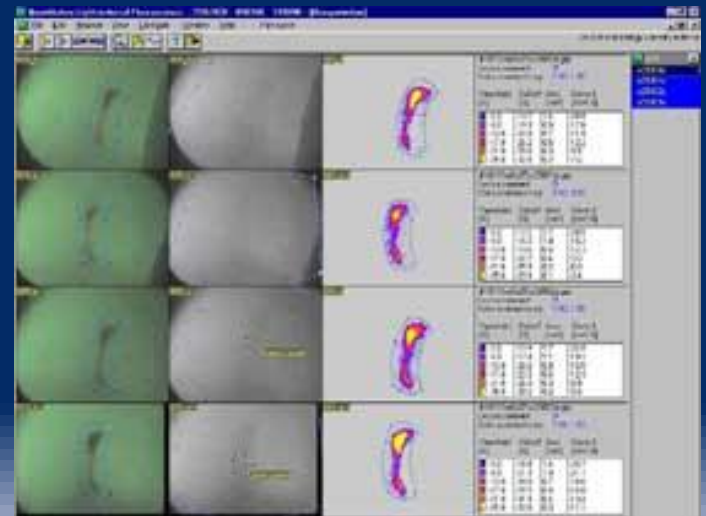
- More than 24 (DIAGNOdent), more than 17 (DIAGNO dent pen) – caries
- False positive results – dental biofilm

# DIAGNODENT

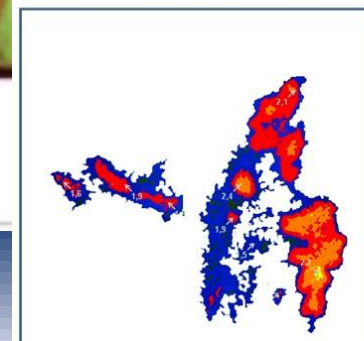
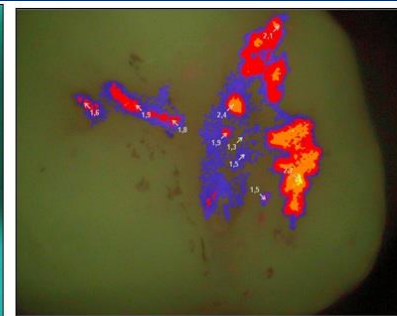


# Quantitative Light – induced Fluorescence

## QLF



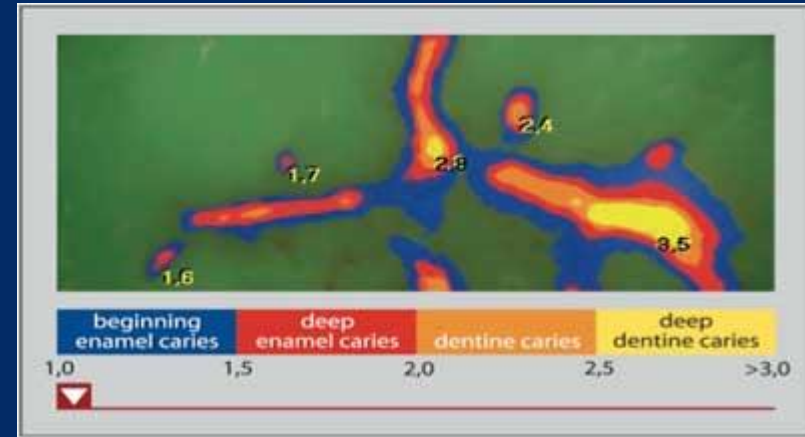
# Vista Proof



# Vista Cam iX

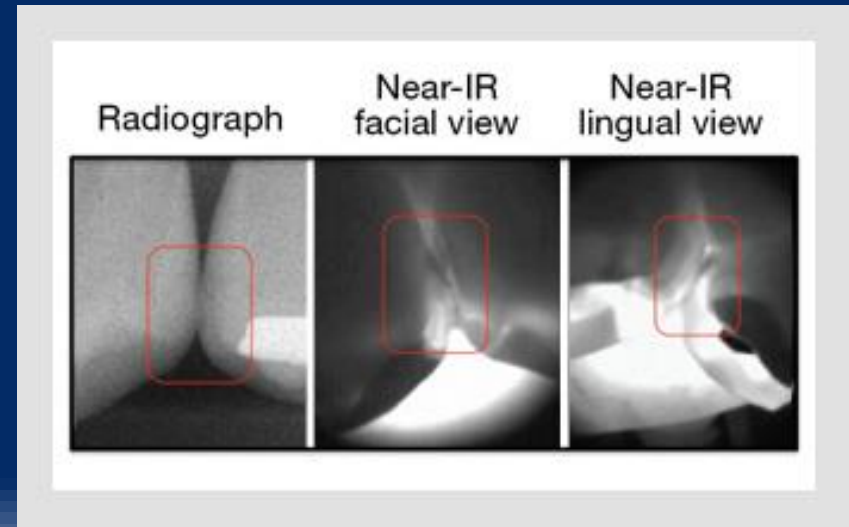
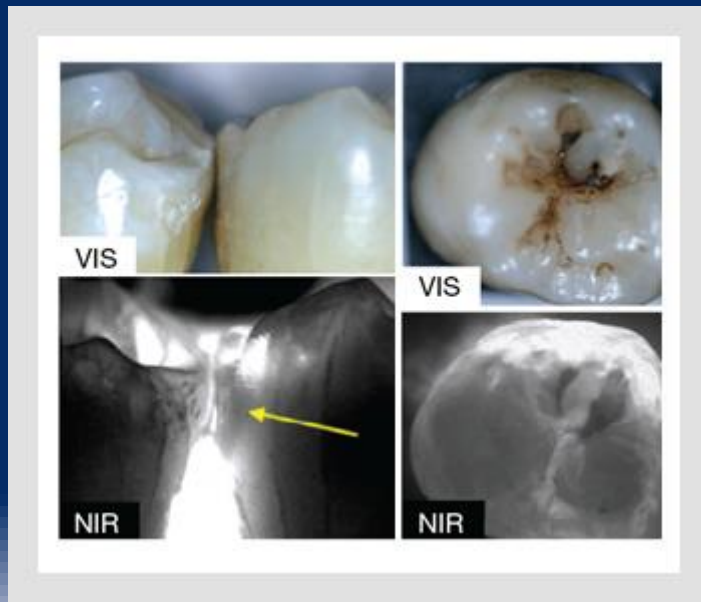


# SoproLife



# FOTI – fibre optic transillumination

Proximal caries lesion





# DIFOTI

(Digital Fibre Optic  
Trans-Illumination)



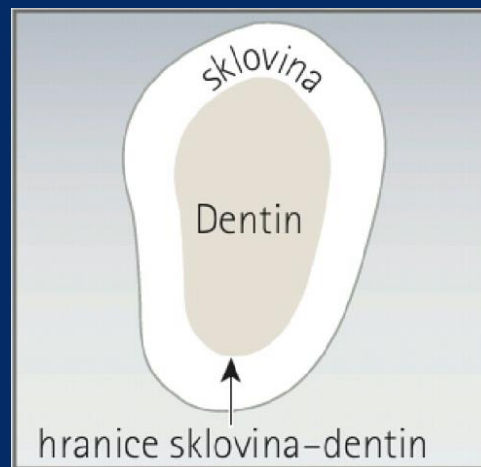
# DIAGNOCam



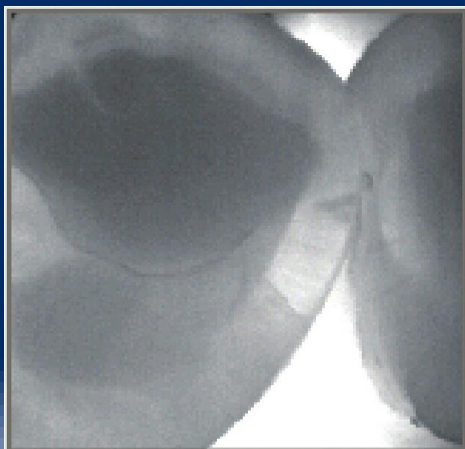
- DIFOTI (Digital Imaging Fiber Optic Transillumination)
- light(700-1400nm)
- Caries lesions and cracks—light absorption—dark spots
- (higher content of water in caries lesions – higher absorption of light)
- Documentation

# DIAGNOCam- klasifikace nálezu

- 0 –

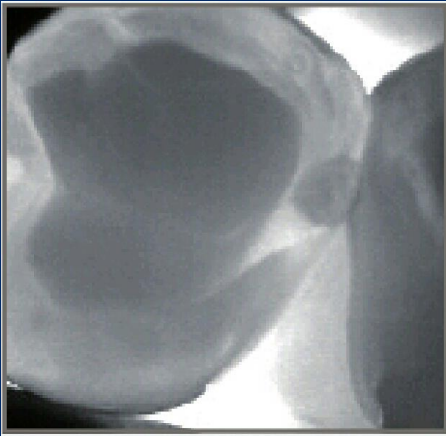


- 1.

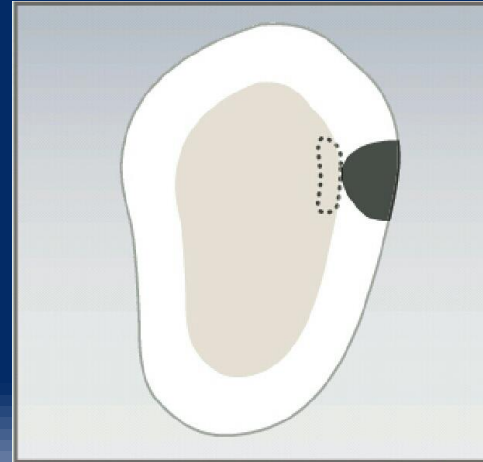
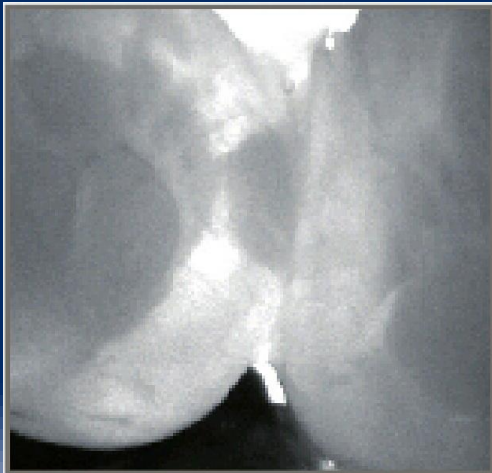


# DIAGNOCam- klasifikace nálezu

- 2- caries in enamel

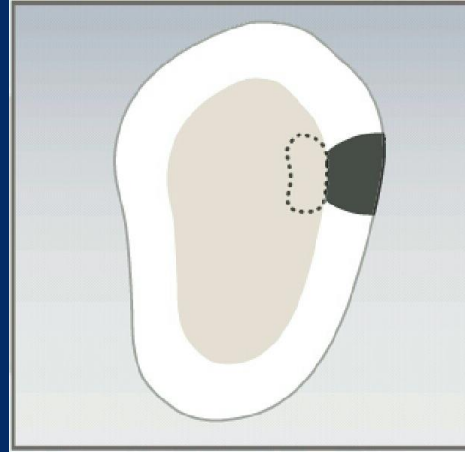


- 3 - caries in enamel and dentin

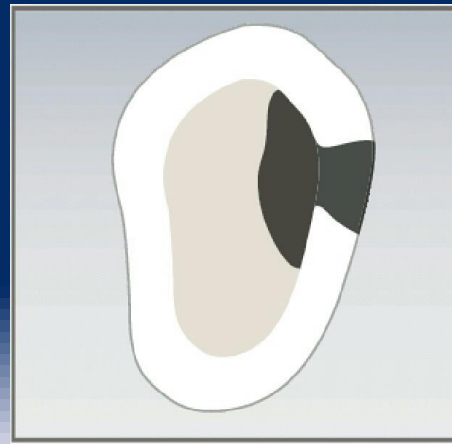


# DIAGNOCam- klasifikace nálezu

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

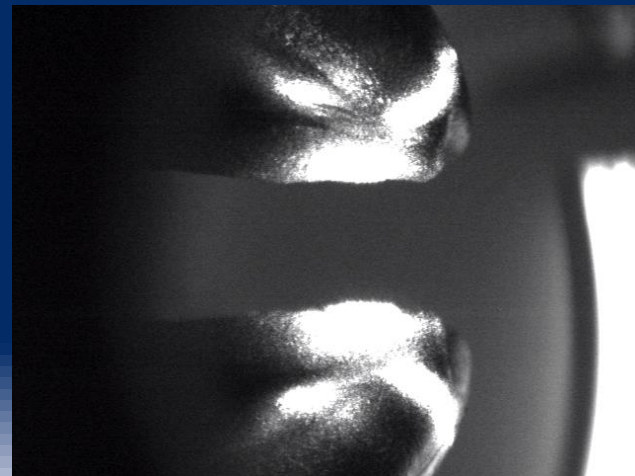
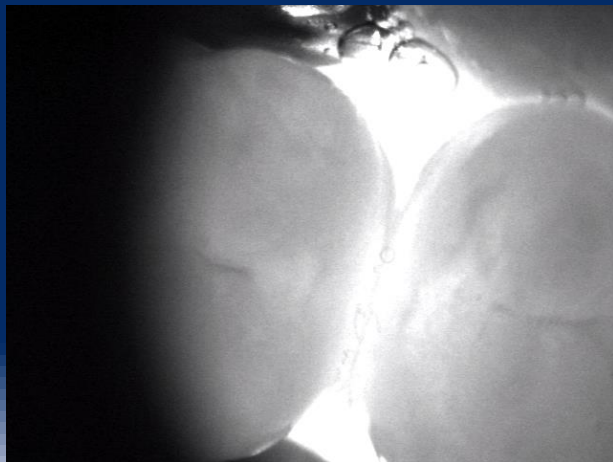
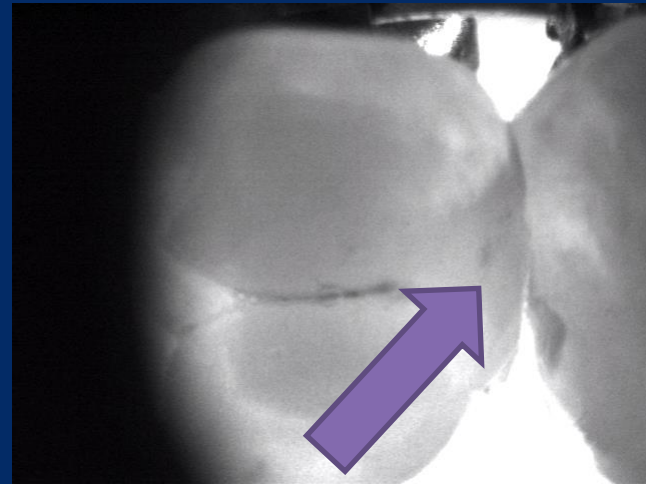
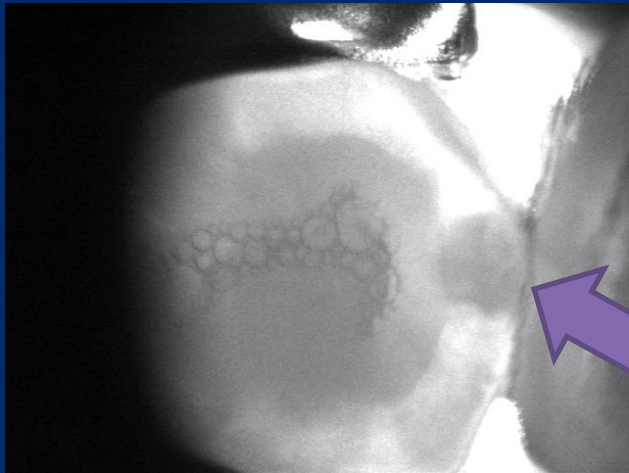


- 5 – kaz rozšířený do dentinu – použít invazivní metodu



# DIAGNOCam





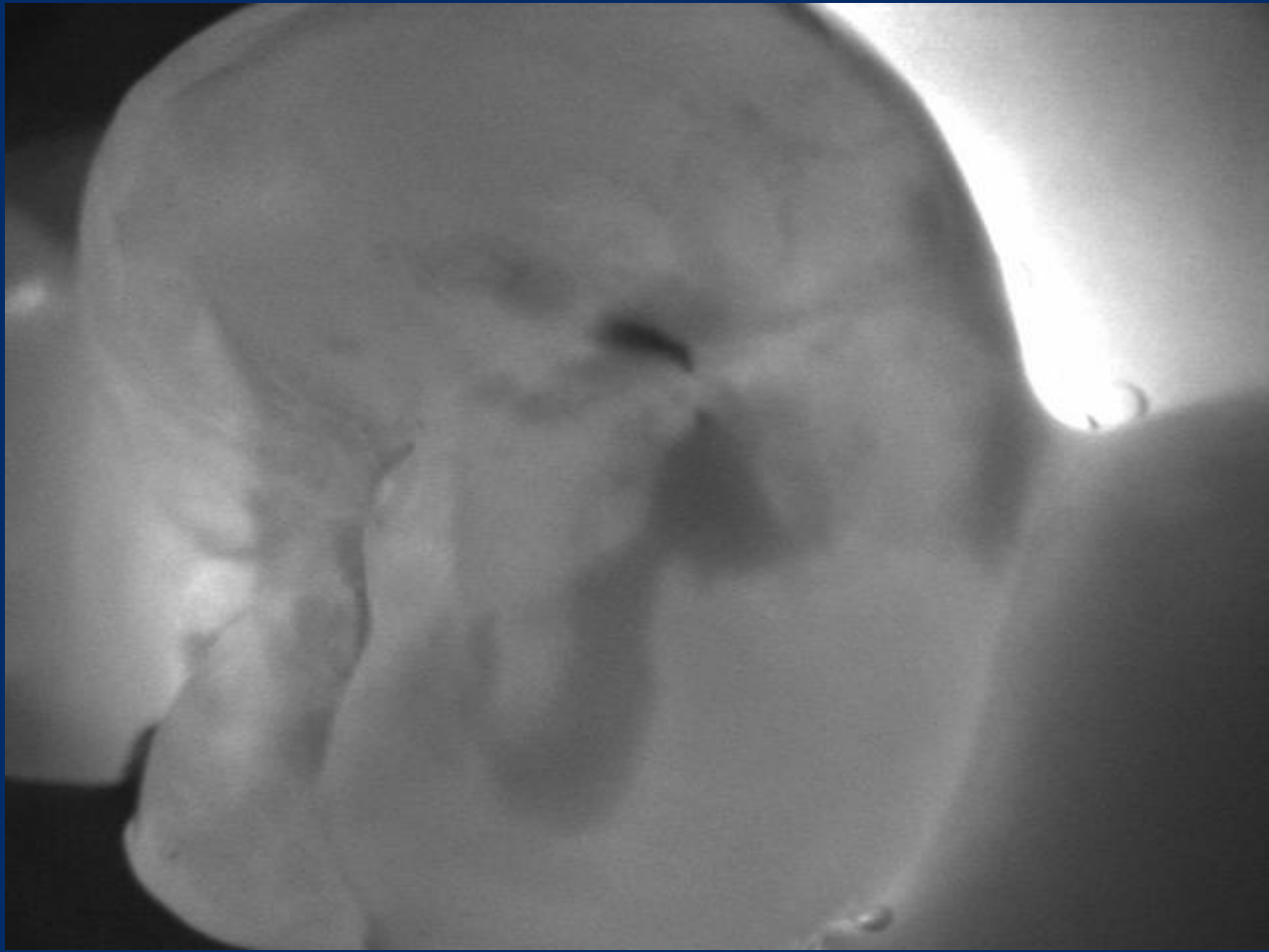


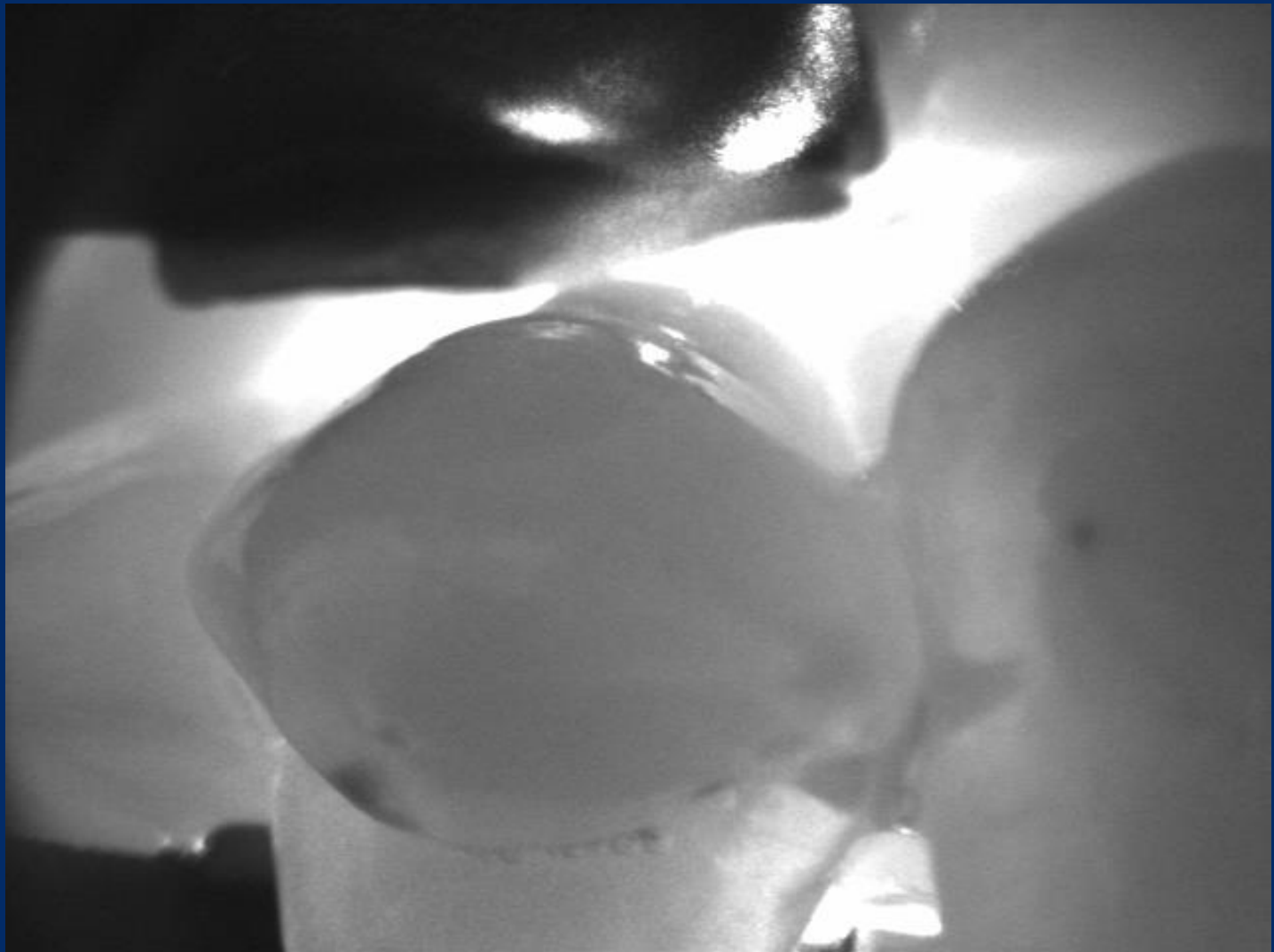
Diagnocam

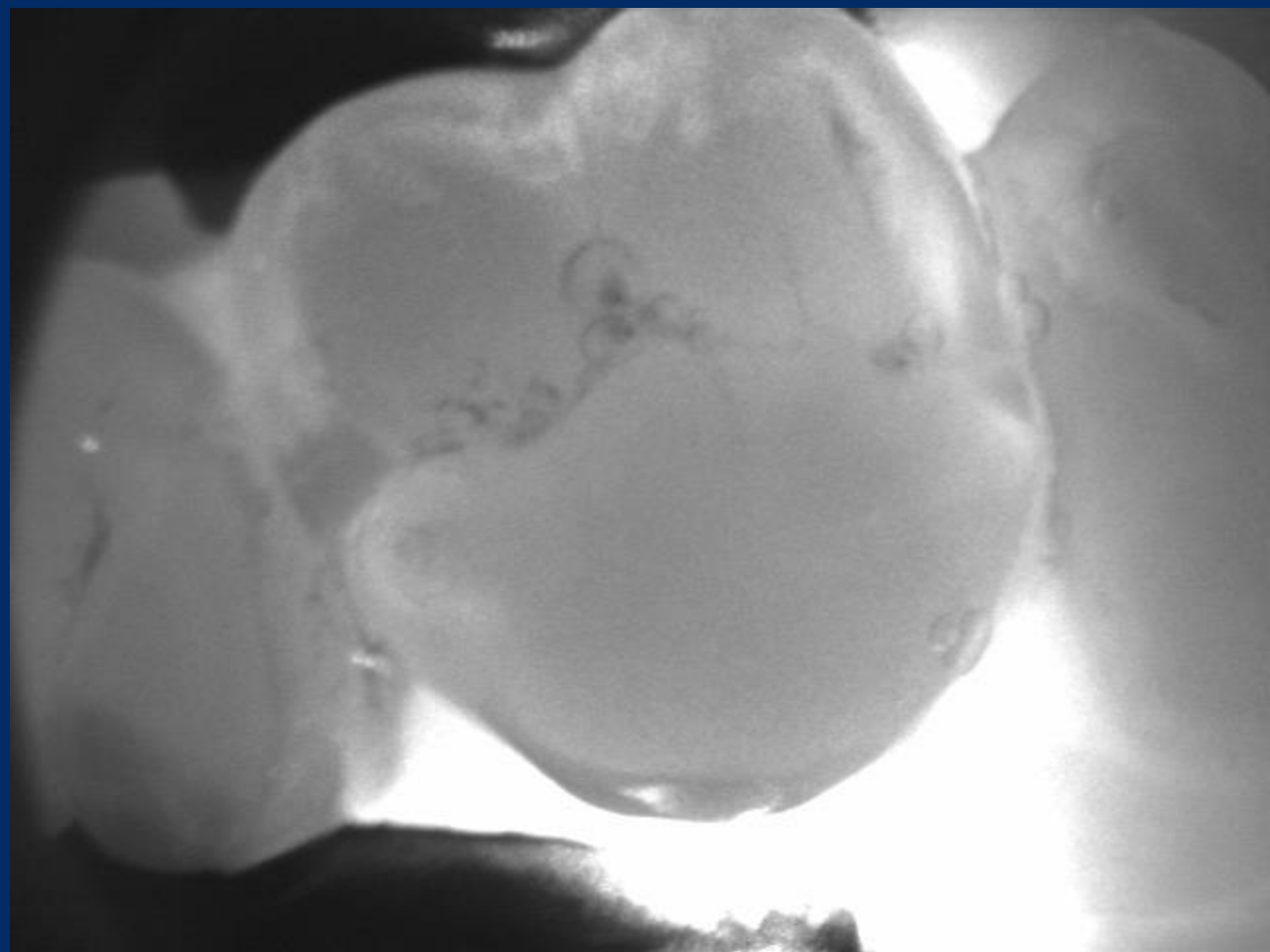


Bitewing









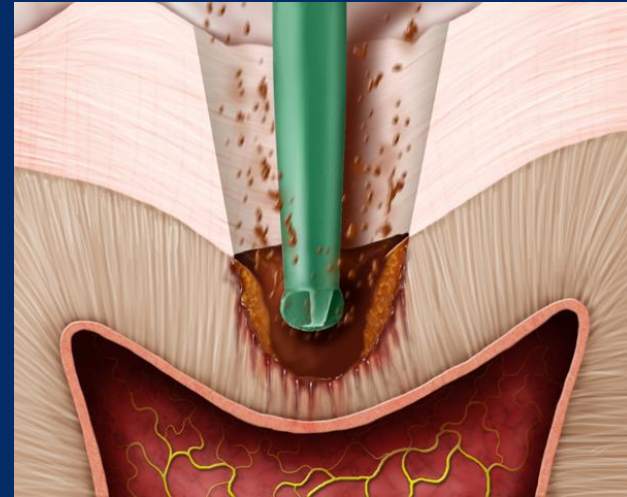
# Transillumination using optical fibre

## 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

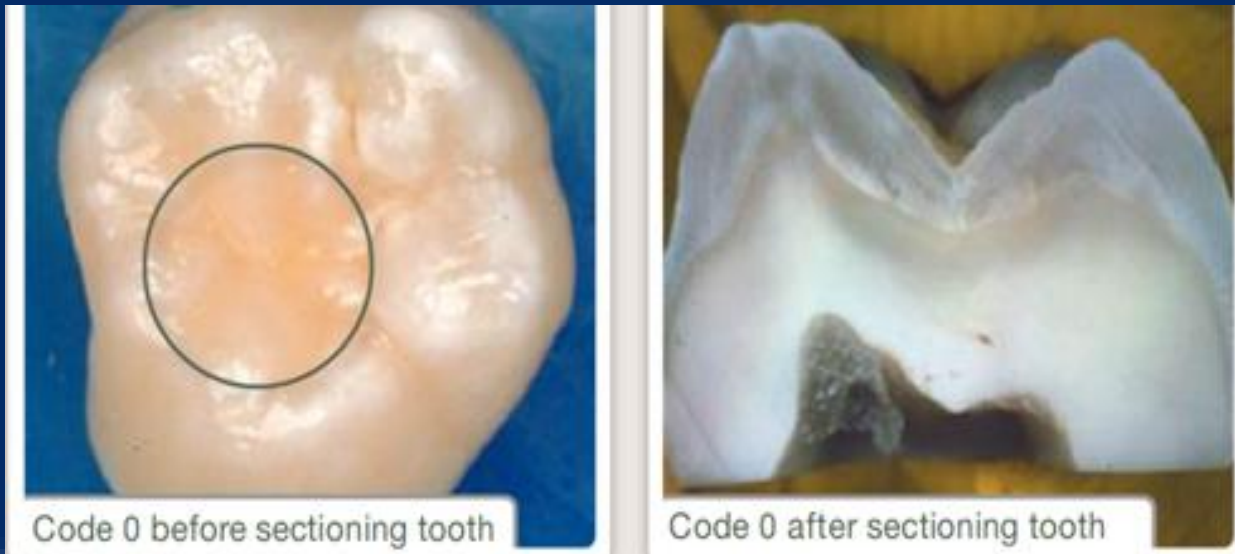
Blunt probe

5 seconds observation



# ICDAS – criteria

- 0 no changes observed



# ICDAS - criteria

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



# 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



Code 5 before sectioning tooth



Code 5 after sectioning tooth



















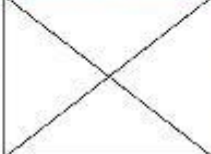



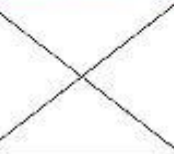
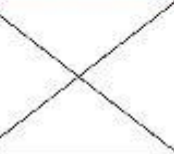


# ICDAS - kritéria

















- 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