Oral Diseases

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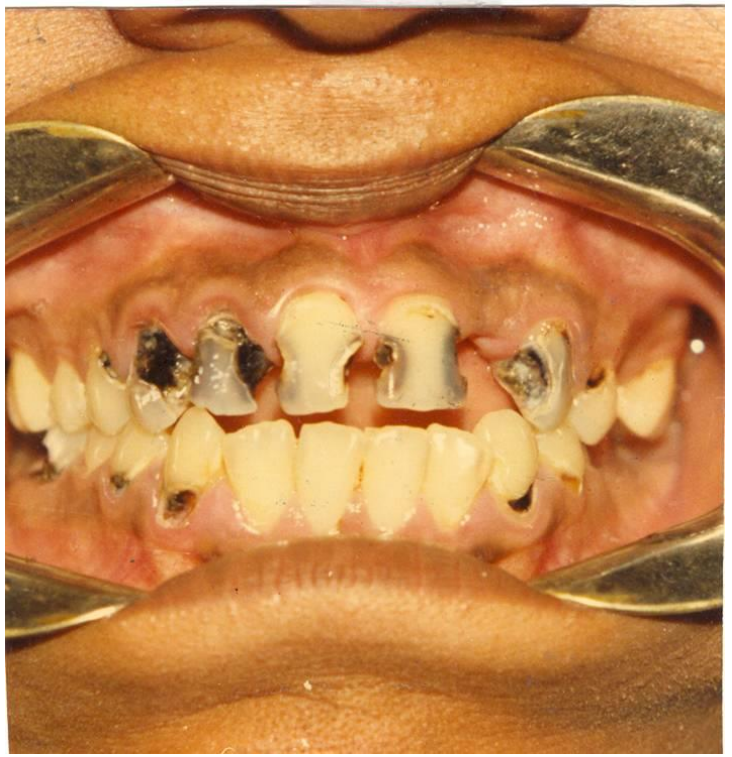
Dental-and orofacial diseases

Endemic diseases (population related diseases):

- **caries**
- **periodontitis**
- **oral cancer**

Definition of Caries

- Dental caries is the localised destruction of susceptible dental hard tissues by acidic by-products from bacterial fermentation of dietary carbohydrates.
- The signs of the carious demineralisation are seen on the hard dental tissues, but the disease process is initiated within the bacterial biofilm (dental plaque) that covers a toothsurface.



Classification of Caries

- According to its clinical form
  - Localization of the lesion
  - Morfology of the lesion
- According to its progression
  - Caries progression in time
  - Depth of the lesion

Clinical appereance of the lesion : localization

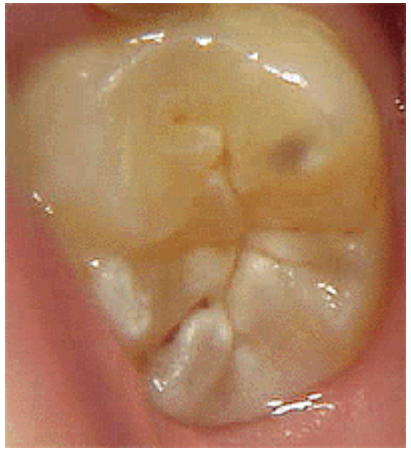
- Coronal caries
  - Fissura-
  - Superficial-
    - Contactpoint lesion
    - Smooth surface lesion
- Root caries

Clinical appereance of the lesion : morphology (histopathology)

- Enamel caries
- Cement caries
- Dentin caries

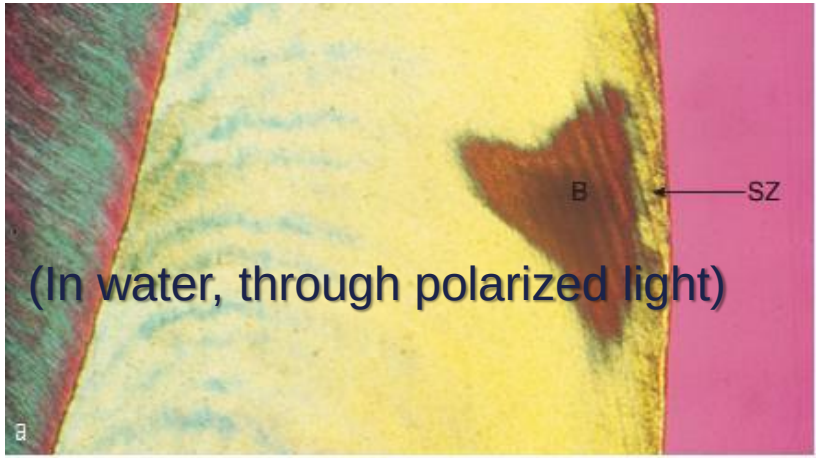
Enamel caries

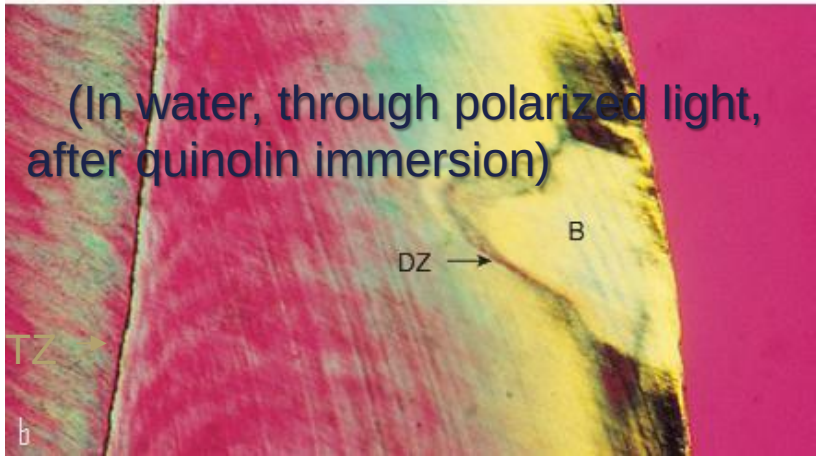
- Macroscopically
  - In case of a superficial caries:
    - Reversible white spot lesion without macroscopic destruction
  - In case of fissure caries:
    - Whitish-yellowish or brownish-blackish discoloration



Smooth surface incipient enamel caries (white spot lesion)

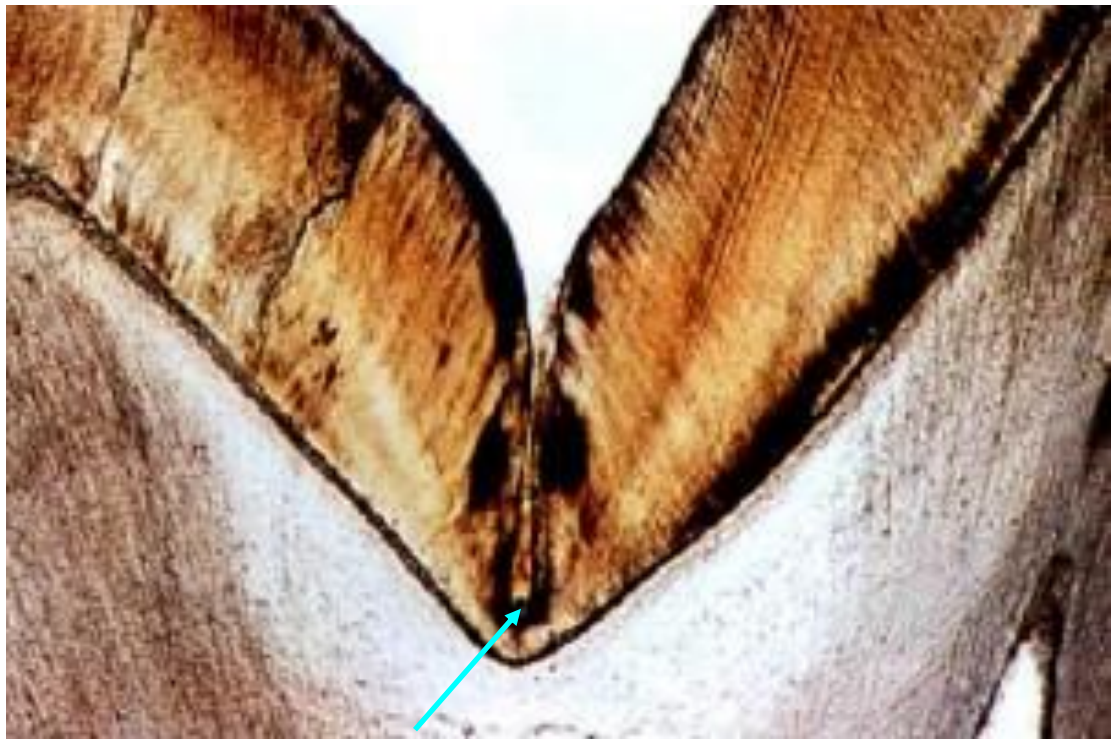
- Relative intact zone **SZ**
  - ~ 10% mineral loss
- the **B**ODY of the lesion (dark)
  - Porous matrix compared to the surrounding mineralized zones
- **Dark Zone**
  - Less porous, moderate mineral loss
- Transzlucent zone **TZ**
  - Minimal mineral loss





Longitudinal ground section through a small lesion of enamel caries on a smooth surface examined in water with polarized light

Caries localized in the fissure (on a sliced tooth)



Cement caries

- Caries arising on the root surface, manifesting in most cases at the cemento-enamel junction

Dentin caries A ground section through the tooth.

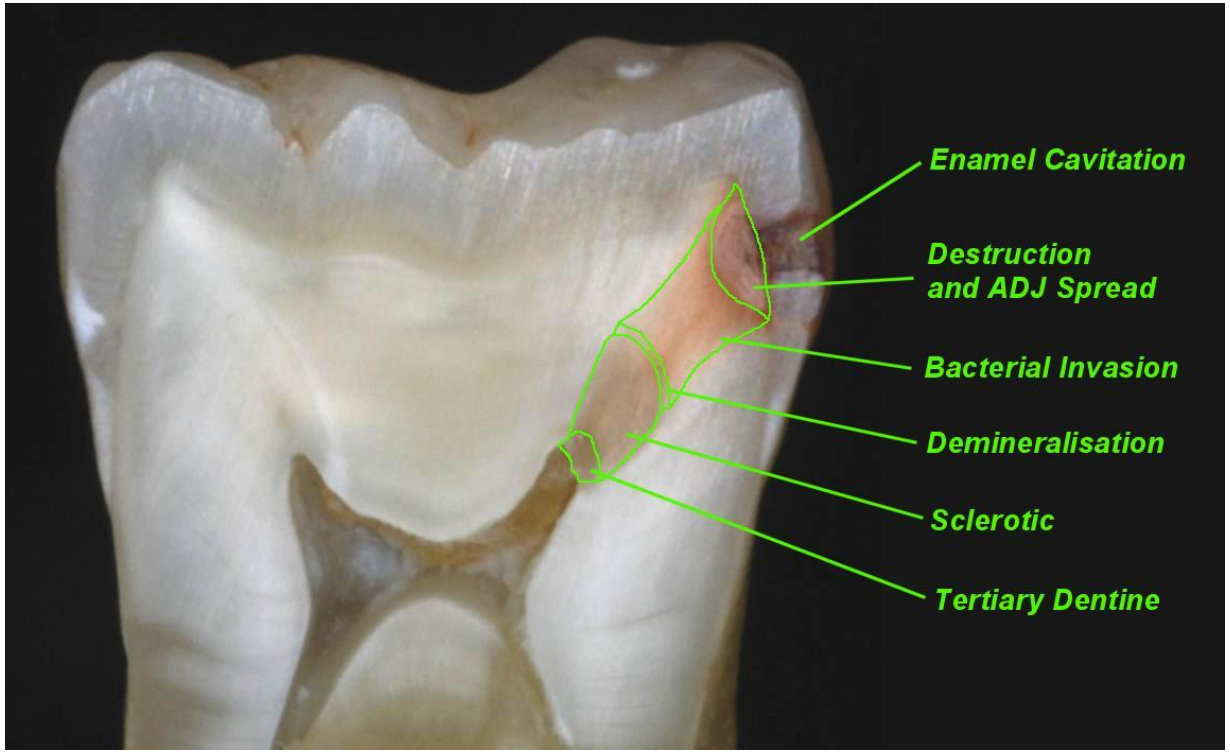
Zone of destruction

Zone of Bacterial Invasion

Zone of Demineralisation

Sclerotic Zone (also known as Translucent Zone)

Tertiary Dentine (also known as Reactive Dentine)



It shows enamel cavitation, and five Zones of Dentine Caries

(Picture and Material is from the University of Birmingham)

Dentin caries zones

1. Zone of Destruction

- When enamel has been cavitated, bacteria infect the dentine. There may be a Zone of Destruction within the dentine, where the dentine becomes necrotic, and liquifies. Cracks appear in the dentine, usually at right angles to the direction of the dentinal tubules. The liquified areas are called *Liquefaction Foci,* and the cracks are called *Transverse Clefts.*

  With rapid caries, this zone is soft and yellow. With slowly progressing caries, it is harder and browner. This region is easily removed with an excavator.

Dentin caries zones

- **2. Zone of Bacterial Invasion**

  The tubules are invaded by bacteria, which then multiply within the tutbule lumen. As well as decalcifying the dentine with acid, the bacteria dissolve the proteins (like collagen) within the tubules. This is called *proteolysis*. This region can be removed by a rose-head bur, gentle pressure running slowly.

Dentin caries zones

3. Zone of Demineralisation

Acid produced by the bacteria travels down the dentinal tubules, causing demineralisation. The zone of demineralisation is the advancing front of the carious lesion, and may be very small (less than 1mm). Dentine is relatively easily dissolved/demineralised by acid, at pH 6.7. It is important to note that there are no bacteria in this region.

Clinically, it is very difficult to tell by feel or appearance where the Zone of Bacterial Invasion stops, and the Zone of Demineralisation starts. However, Caries-Indicator Dyes will show which zone you are in.

Dentin caries zones

4. Sclerotic (Translucent) Zone

A defence reaction occurs within the tubules when acid initially starts to penetrate them. The (live) odontoblast processes start to lay down calcification within the tubules, and they become plugged with mineral deposits. This helps to slow down the acid advance, giving the pulp some protection from the acid.

Occasionally this zone of tubular sclerosis can be seen on radiographs as a radio-dense (whiter) area below the caries, because of the extra mineralisation.

Dentin caries zones

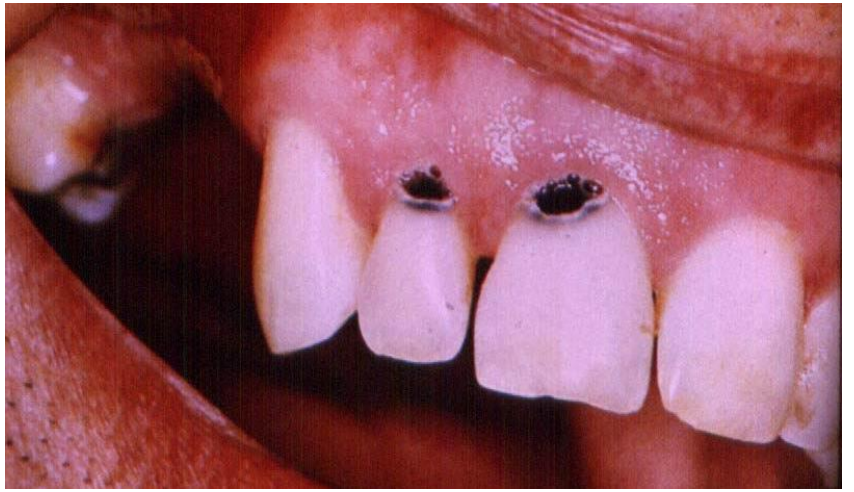
5. Tertiary Dentine (Reactive Dentine)

When the pulp is mildly inflamed by advancing acid, it produces tertiary dentine in an attempt to wall off the insult.

Finally, here is a picture of the distal lesion itself. Although the radiograph didn't show much, cavitation is clearly visible (click to magnify). Note the cavity is *below* the contact point, so accessible to a contra-angled probe.

Caries types according to its temporal course

- Caries rapida (rampant caries)
  - Acute, rapid course
- Caries tarda (arested caries)
  - Chronic, indolent



Clinical classification according to the depth of its penetration

- Caries incipiens
  - No macroscopic material loss
- Caries superficialis
  - Macroscopic metrial loss is localised onto the enamel
- Caries media
  - Cavitation is involving dentin but a hard dentin layer exists between the pulp and the lesion
- Caries profunda
  - The lesion is separated from the pulp by a thin dentin layer
- Caries penetrans
  - The lesion penetrates the pulp

Periodontal disease

- 1. alveolar bone
- 2. periodontal ligament
- 3. cementum
- 4. gingiva

Periodontal Disease

- While many different diseases affect the tooth-supporting structures, make up the vast majority of periodontal diseases and have traditionally been divided into two categories:
  - Gingivitis
  - Periodontitis

Gingivitis (Inflammation of the gum tissue)

- A non-destructive periodontal disease.
- The most common form of gingivitis, and the most common form of periodontal disease overall, is in response to bacterial biofilms (also called plaque) adherent to tooth surfaces, termed *plaque-induced gingivitis. In the absence of treatment, gingivitis may progress to periodontitis, which is a destructive form of periodontal disease.*
- *While in some sites or individuals gingivitis never progresses to* periodontitis, *data indicates that periodontitis is always preceded by gingivitis.*

Gingivitis

- The symptoms of gingivitis are somewhat non-specific and manifest in the gum tissue as the classic signs of inflammation:
- Swollen gums
- Bright red or purple gums
- Gums that are tender or painful to the touch
- Bleeding gums or bleeding after brushing.

Gingivitis

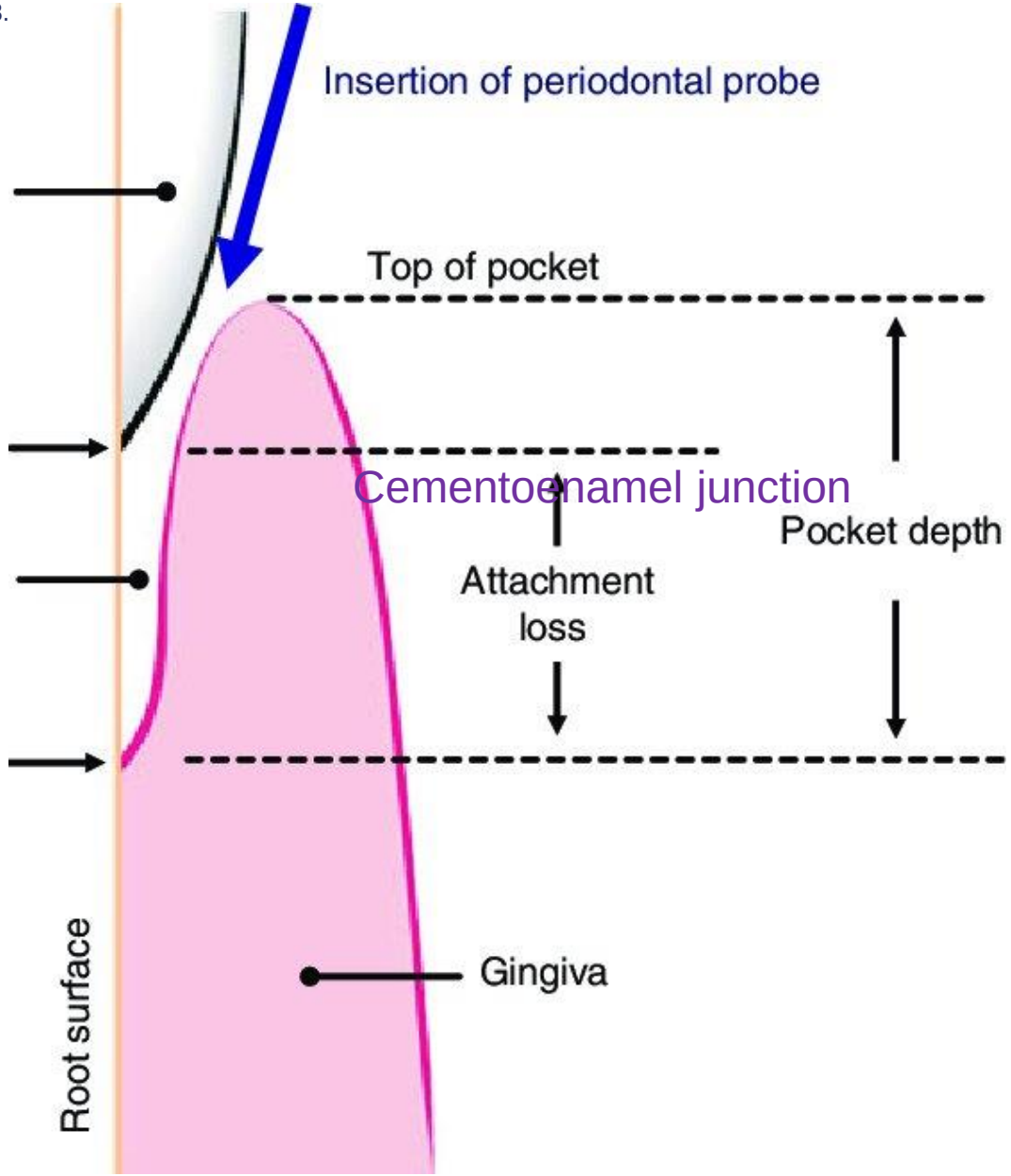
- Additionally, the stippling that normally exists on the gum tissue of some individuals will often disappear and the gums may appear shiny when the gum tissue becomes swollen and stretched over the inflamed underlying connective tissue. The accumulation may also emit an unpleasant odor. When the gingiva are swollen, the epithelial lining of the gingival crevice become ulcerated and the gums will bleed more easily with even gentle brushing, and especially when flossing

Periodontitis

Inflammatory diseases affecting the tissues that surround and support the teeth.

Involves progressive loss of the alveolar bone around the teeth, and if left untreated, can lead to the loosening and subsequent loss of teeth.

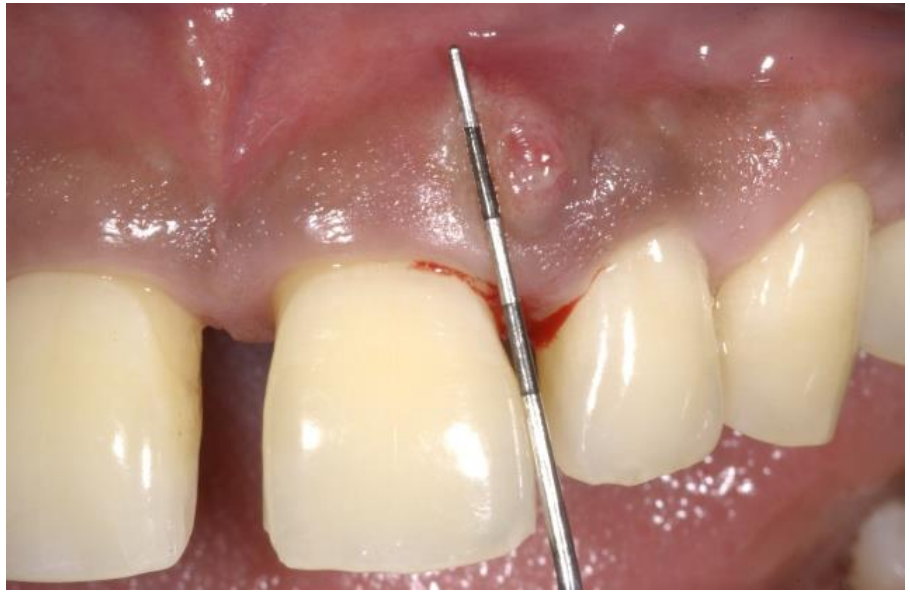
Caused by microorganisms that adhere to and grow on the tooth's surfaces, along with an overly aggressive immune response against these microorganisms.



The pocket is the space between the root surface and the gingiva. In healthy gums, the base of the pocket is coincident with the cementoenamel junction (CEJ, the boundary between the enamel crown and the root) and there is no attachment loss. In periodontitis, the base of the pocket migrates apically (i.e. away from the enamel crown towards the root tip), thereby creating a pocket. The base of the pocket is therefore apical to the CEJ, and attachment loss can be measured (in mm, using a periodontal probe) from the CEJ to the base of the pocket. Pocket depth (also called probing depth) is measured in mm from the top of the pocket (i.e. from the gingival margin) to the base of the pocket. In this example, the pocket depth might be 6 mm, with 4 mm loss of attachment (as indicated in this example, pocket depth is usually greater than attachment loss due to the inflammation-induced swelling of the gingiva). The direction of insertion of a periodontal probe is indicated

Characteristics of periodontitis

- 1. Periodontal pocket formation
- 2. Gingival ulcer, purulent exsudation
- 3. Destruction of the alveolar bone and the periodontal ligaments
- 4. Teeth become loose, shifting, loss of the tooth can occur



The 1999 classification system for periodontal diseases and conditions

2-6 are termed *destructive periodontal disease* ***because the damage is essentially irreversible.***

1. *Gingivitis*
2. *Chronic periodontitis*
3. *Aggressive periodontitis*
4. *Periodontitis as a manifestation of systemic disease*
5. *Necrotizing ulcerative gingivitis/periodontitis*
6. *Abscesses of the periodontium*
7. *Combined periodontic-endodontic lesions*

Oral cancer

- **About 3000 people in Hungary diagnosed as having oral cancer annually, and as a result of this sad situation 1700 people dies because of this disease group.**
- **Neoplasms of the oral cavity can be diagnosed very easily, even though, many of them show up at a later stage at the dental office.**
- 2.5 % of the all cancer cases are oral cancers

Cancer

- known medically as a malignant neoplasm, is a broad group of various diseases, all involving unregulated cell growth.
    - In cancer, cells divide and grow uncontrollably, forming malignant tumors, and invade nearby parts of the body.
- Metastatic ability
    - The cancer may also spread to more distant parts of the body through the lymphatic system or bloodstream.
- Not all tumors are cancerous.
    - Benign tumors do not grow uncontrollably, do not invade neighboring tissues, and do not spread throughout the body.
- There are over 200 different known cancers that afflict humans.
- Cancer is fundamentally a disease of failure of regulation of tissue growth. In order for a normal cell to transform into a cancer cell, the genes which regulate cell growth and differentiation must be altered.

Oral cancer localization

- appears as a growth or sore in the mouth that does not go away, although patients usually appear at later stages at the dentist's office
- cancers of the lips
- tongue
- cheeks
- floor of the mouth
- hard and soft palate
- Salivary glands
- sinuses
- pharynx (throat),

What Are the Symptoms of Oral Cancer?

- The most common symptoms of oral cancer include:
  - Swellings/thickenings, lumps or bumps, rough spots/crusts/or eroded areas on the lips, gums, or other areas inside the mouth
  - The development of velvety white, red, or speckled (white and red) patches in the mouth
  - Unexplained bleeding in the mouth

What Are the Symptoms of Oral Cancer? (2)

- Unexplained numbness, loss of feeling, or pain/tenderness in any area of the face, mouth, or neck
- Persistent sores on the face, neck, or mouth that bleed easily and do not heal within 2 weeks
- A soreness or feeling that something is caught in the back of the throat
- Difficulty chewing or swallowing, speaking, or moving the jaw or tongue
- Hoarseness, chronic sore throat, or change in voice
- Ear pain
- A change in the way your teeth or dentures fit together
- Dramatic weight loss

Thank you for your attention!
Please evaluate the lecture and me!