Endodontic Microbiology

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Process in the mouth

caries

biofilm

endogene bakterial infection

different!

W. Loesche: *specific* plaque theory

Caries incipiens

Gängler

Gängler

Lussi 2005

Lussi

Hidden caries

Lussi, Francescut, Schaffner 2003

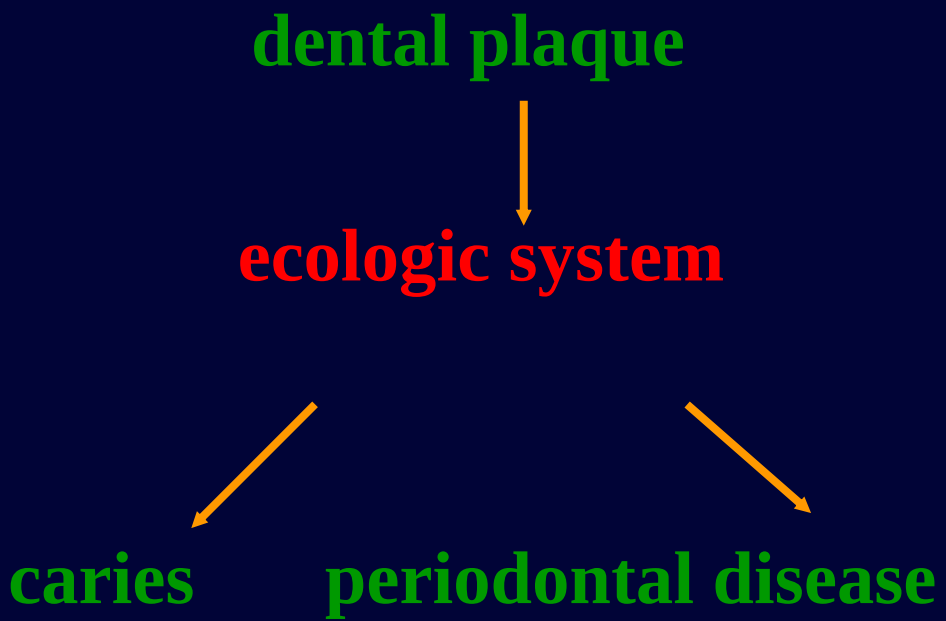
Hidden caries

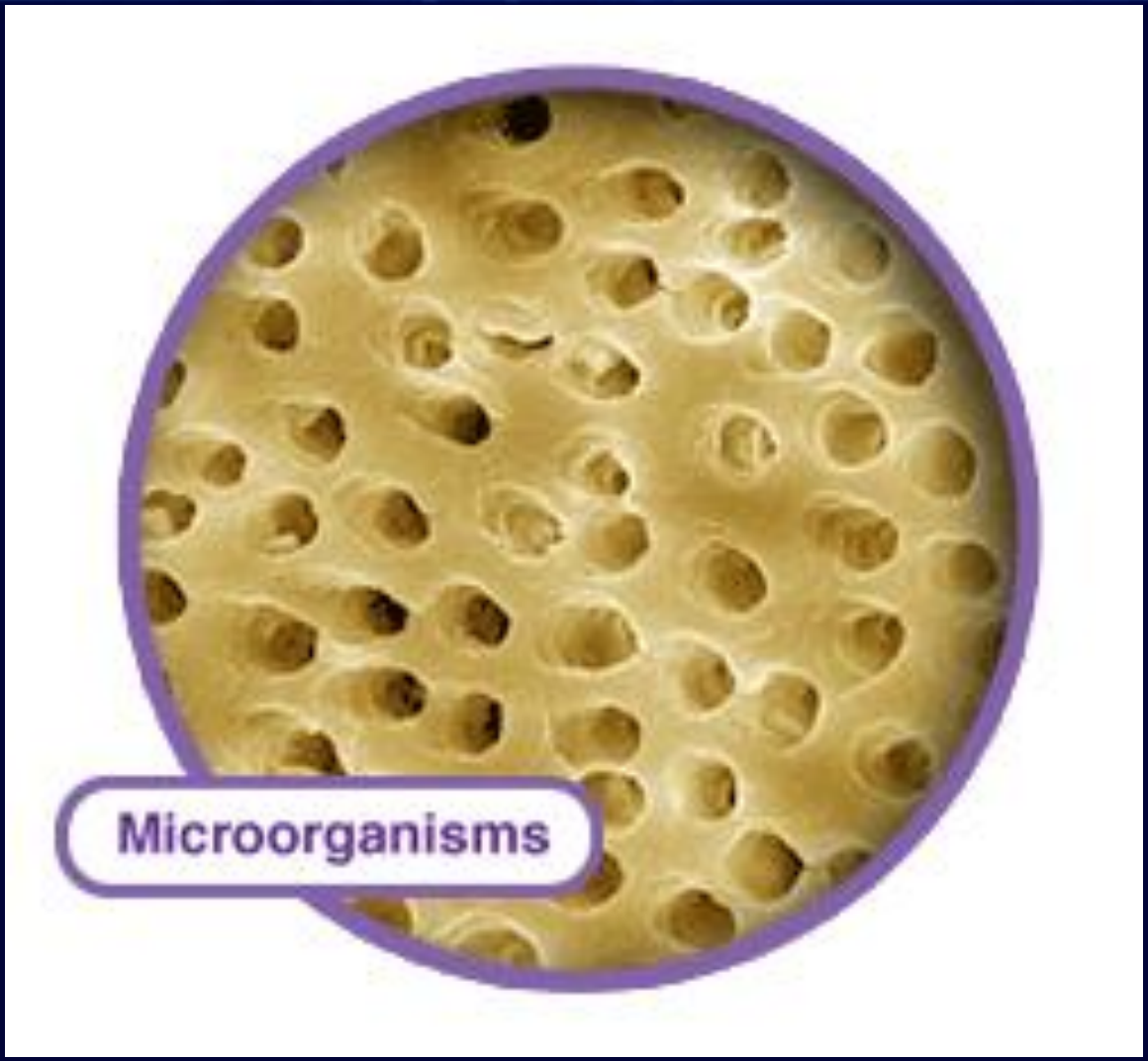
caries

demineralisation - remineralisation

Lussi, Francescut, Schaffner 2003

Caries indicators


dental plaque
ecologic system
caries
periodontal disease


Microorganisms

Endodontic Microbiology

Leeuwenhoek 1697 ”living beings” in the pulp

Miller 1894 pulp tissue pathoses and periodontal disease are connected with microorganisms

Endodontic Microbiology

IDENTIFICATION

histological - bacteriological - chemical

molecular - genetical

Endodontic Microbiology

The indigenous oral microflora may gain access to the pulp and impair its function along a number of different routes:

- Direct exposure of the pulp tissue i.e., following caries, cavity and crown preparation, or dental trauma
- Exposure of accessory canals and apical foramina in periodontal disease
- Exposure of dentin following caries, periodontal disease, dental restorative procedures, cracks in enamel, erosion etc.

Endodontic Microbiology

Anachoresis:
metastasis due to transient bacteremia has been suggested as a possible pathway for bacterial penetration into areas of pulp necrosis.

- **Such a route of bacterial invasion requires, that :**
- **pulp be partially or totally damaged, and**
- **bacteria have been disseminated into the bloodstream and are to be capable of leaving the circulation and entering the damaged pulp.**

Endodontic Microbiology

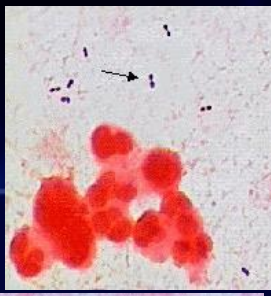
Conditions conducive to growth of bacteria in the necrotic pulp:

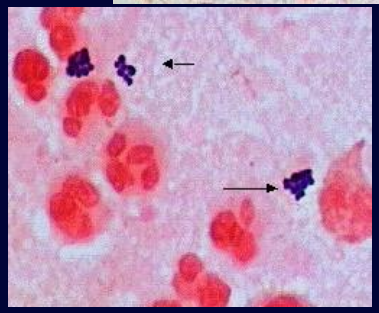
- **nutritional factors,**
- **influence of oxygen,**
- **bacterial interactions.**

Microbial flora of the infected root canal is NOT the same, as the the microbial flora of the mouth.

Microbial flora of the periodontal pocket is more complex, but similar to the flora of the infected root canal.

Diplococci

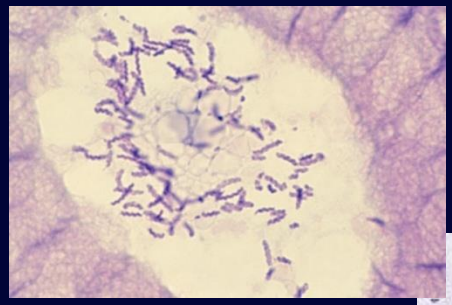


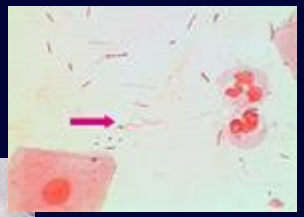


Gram-pos. rods

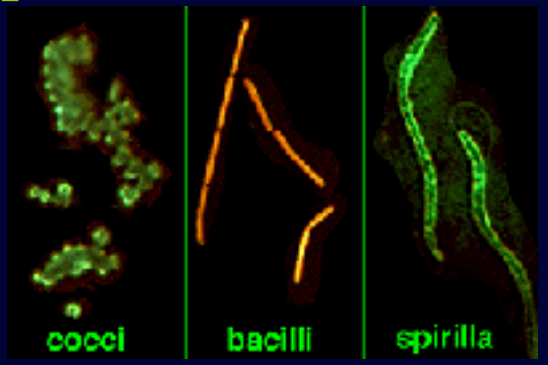
Clusters

Gram-pos. chain





Spirochetal form



Bacteria Isolated from Periodontal & Endodontic Infections

Organisms	Gingivitis	Adult Periodontis	Endodontic Infections
Actinobacillus actinomycetemcomitans	-	+	?
Porphyromonas gingivalis	-	+	+
Prevotella intermedia	+	+	+
Bacteriodes forsythus	-	+	+
Capnocytophaga spp.	+	-	+
Eikenella corrodens	-	+	+
Eubacterium spp.	-	+	+
Fusobacterium spp.	+	+	+
Peptostreptococcus micros	-	+	+
Campylobacter rectus	+	+	+
Treponema denticolla	+	+	+
Enteric rods/ pseudomonads	+	+	?
Streptococcus spp.	+	-	+
Actinomyces spp.	+	-	+

+ = Often isolated, - = Not often isolated

Adapted from Debelian et al., (1994) *Endod. Dent. Traumatol.* **10**:57-65

Endodontic Microbiology

The pathogenic role of bacteria in periapical pathoses:

necrotic debris alone (although stimulating phagocytosis and tissue repair) will not produce enough irritation to sustain inflammatory responses in the periapex.

Therapy of root canal infection

Aseptic conditions

Sterile instruments

1. **Debridement: cleaning and shaping**

2. **Antimicrobial irrigating with tissue dissolution /NaOCl/ and antimicrobial dressing /$Ca(OH)_2$/**

3. **Complete obturation**

Therapy of root canal infection

ASEPSIS

Process of excluding contamination by microorganisms

1. **Rubber dam isolation**
2. **Excavation of all caries, removal of defective fillings, plaque, and calculus from all tooth surfaces**
3. **Cleaning, disinfection**
4. **Sterile instruments, handling**
5. **Temporization**

NaCl

20 %

NaOCl

50 %

Ultrasonic

70 %

Fenol

ᔓᔓᔓᔓᔓᔓᔓᔓᔓᔓᔓ 66 %

$Ca(OH)_2$

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The use of antibiotics

yes ? **no ?**

in wich case ?

The use of antibiotics

! ! Antibiotics cannot substitute for a thorough diagnosis and proficient endodontic therapy ! !

Systemic antimicrobial treatment is generally indicated when symptoms of endodontic infections are present that suggest marked progression or systemic involvement.
Fever, malaise, cellulitis, unexplained trismus…

Daily monitoring !

The use of antibiotics

Before treatments with bacteriaemia

- **Scaling**
- **Extraction, sculption**
- **Rootcanal treatment + additional surgery (curettage, resectio)**
- **Intraligamental injection**
- **Treatments with bleeding of the gingiva (surgery)**

(Magyar Belorv. Arch. 1995.)

The use of antibiotics

Non penicillin-allergic patient:

1 h before treatment — **2 g Amoxicillin p.o.**
50 mg/kg Amoxicillin p.o.

Penicillin-allergic patient:

1 h before treatment — **600 mg Dalacin p.o.**
20 mg/kg Dalacin p.o.

Antibiotic prophylaxis of high-risk patient

Always

- Heart valves damaged by rheumatic fever
- Bacterial endocarditis
- Congenital cardiac malformations
- Surgically constructed systemic - pulmonary shunt
- Idiopathic hypertrophic subaortic stenosis
- Mitral valve prolapse with insufficiency

Antibiotic prophylaxis of high-risk patient

After consultation their physician

- **Immunosuppressive therapy**
- **Therapy on cytotoxic drugs**
- **Receiving irradiation for cancer**
- **Prosthetic joint implants or systemic infection**
- **Bisphosphonate therapy**

Careful history ---- consultation

<u>INFECTION CONTROL</u>

(HIV, Hepatitis B, disinfection, sterilization)