# Pulpitis and Root Canal Microbiology

# Summary

- **Pulpitis:** Infection of pulp tissue
- Infections that need immediate treatment(exept trauma) in dendistry is called **Pupl's acute or subacute infection**

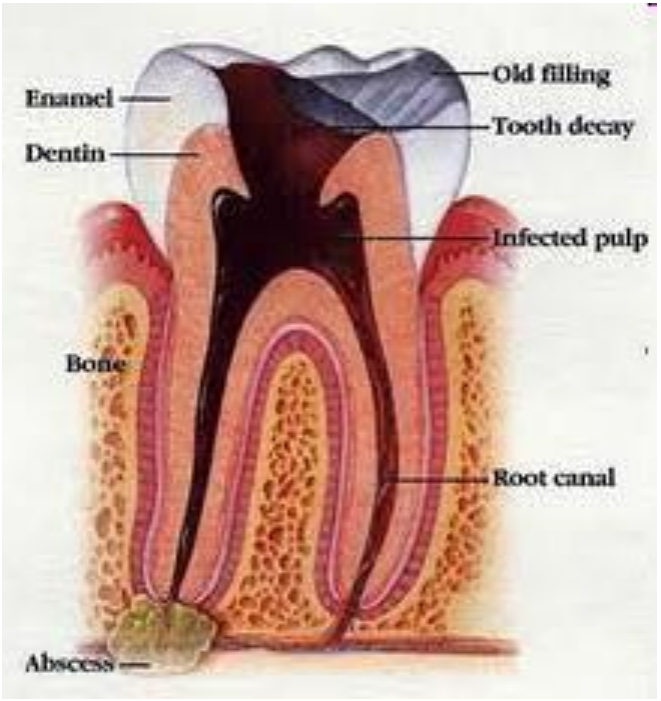
- **PULPİTİS** is most commonly observed infection in dendistry

# Pulp Invasion

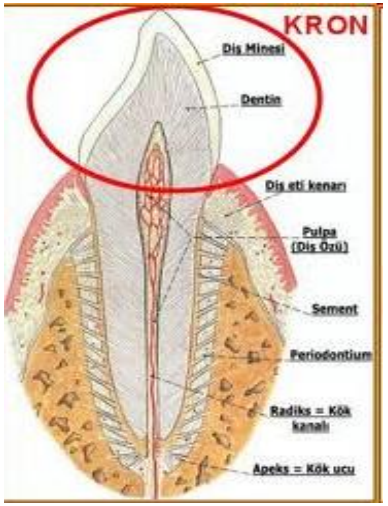
Closed, asymptomatic and vital pulp is **STERILE**

Pulp invasion occurs in 3 ways

1. Coronal Way
2. Retrograde Way
3. HematogenousWay(anachoresis)



# Coronal Way




- Most common way in pupl invasion by bacteria.

2 types;

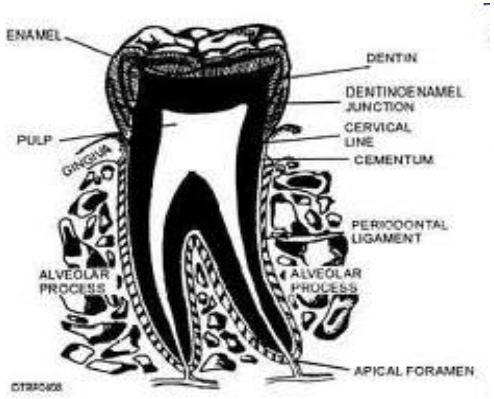
1. Bacteria penetrating from tooth decay basement
2. Dekortike teeth by crown cutting

Bakteria can reach to pupl rooms via naked dentin tissue

If the number of bacteria in pupl is low, **macrophages** can fagocyte them

Every thickness of dentin is an insufficient barier for bacteria

# Retrograde Way




- Bacteria; pass from damaged periodontal membrane to **foramen apical**
- Thus, there may be no decay in krone
- ***Spirochetes***, ***Selenomonas sputigena*** and ***Wolinella recta*** *are* mobile and can pass periodontal membrane at first
- **Treponema** enter firstly to pulp in retrograde way
- Prevelance *T. denticola*, 68%; *T. vincentii*, 36%; *T. medium*, 48%
- Retrograde way; especially **traumatic necrotising teeth**

# Hematogenous Way

- Another way of bacterial invasion of pulp **haematogenous (anachoresis)**
- Bacteria come from **bacteremia** or another infective source can locate to tooth pulp
- Very rare but, possible

  For this reason haemotegenous pulps in anamnesis; trauma, systemic problems, immune defects !!!!

# Pulp formation from tooth decay

- First enetering m.o to pulp room;Pulpa odasına ilk giren mo.lar; late decay flora members
- **Lactobasilli, streptoccus, gram negative rods, anaerobes**

- Common features of bacteria in cavity basement at the last stage of decay:: **Gram pozitive** and **saccharolvtic**

**Ex.** ***Streptococcus, Lactobacillus, Leptothrischia, Bifidobacterium, Actinomyces, Rothia***

- Other bacteria can also found but not dominant

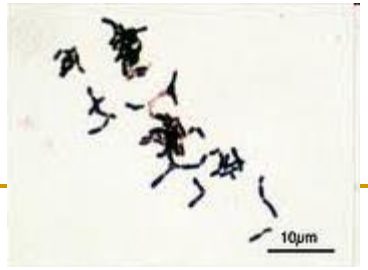
**Ex:** ***Peptostreptococcus, Bacteroides, Capnocytophaga, Wolinella***

# Pulp's response to m.o

- Specific antibodies in early pulpitis: **IgM**, **IgE** and **IgG** (less) *(A.israelii, A. naeslundii, Eubacterium alactolyticum, Lactobacillus casei, Peptostreptococcus micros, Porphyromonas endodontalis, Prevotella buccae, P. intermedia, Mitsoukella multiacidus, S. mutans* and *Veillonella parvum)*
- Dominant bacteria in early Erken pulpitis;

***Streptococcus, Lactobacillus, Bifidobacterium, Actinomyces, Rothia***

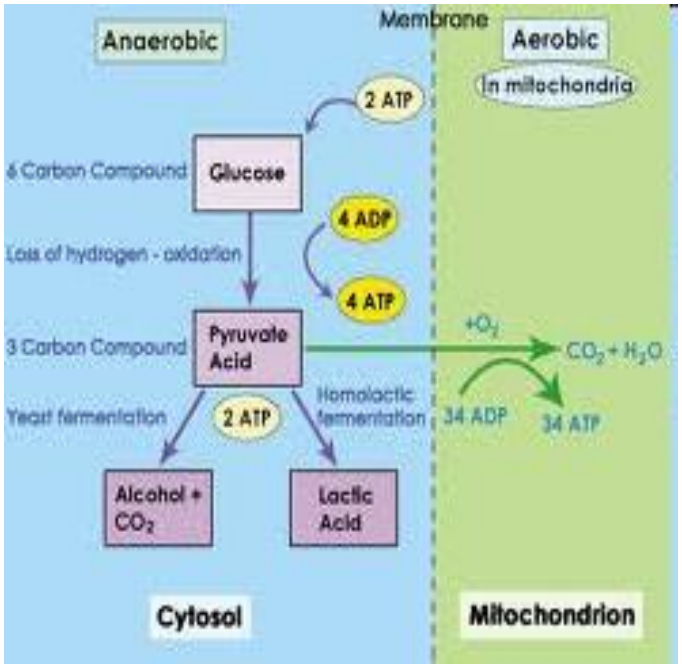
- Within 1-2 days, toot pulp is completely invaded
- Exudate accumulation and microabscesses are pulps's inflammatory response


# Flora variation in pulp and bacterial metabolism

Bacteria decomposite pulp elements in 3 stages:

1. Carbonhydrate fermentation phase
2. Glycolipide fermentation phase
3. Protein fermentation phase



# Carbonhydrate fermentation phase

**Oligosaccarides**

↓ Saccarulvtik bacteria

**Disaccharides**

↓ Saccarolvtik bacteria

**Monosaccarides**

(Hexose and pentose glucoses)

**Important**: Most distinct complaint: **PAIN**

# Glycolipide fermentation phase

**Glycolipide and proteins**

Saccaroltik + proteolytik bacteria

↓

**Toxins**

↓

Decomposation of blood vessels that pass from foramen apikal to Clinic apec 2. venous stasis formation

↓

Root pulp resignation (entering to 3. phase)

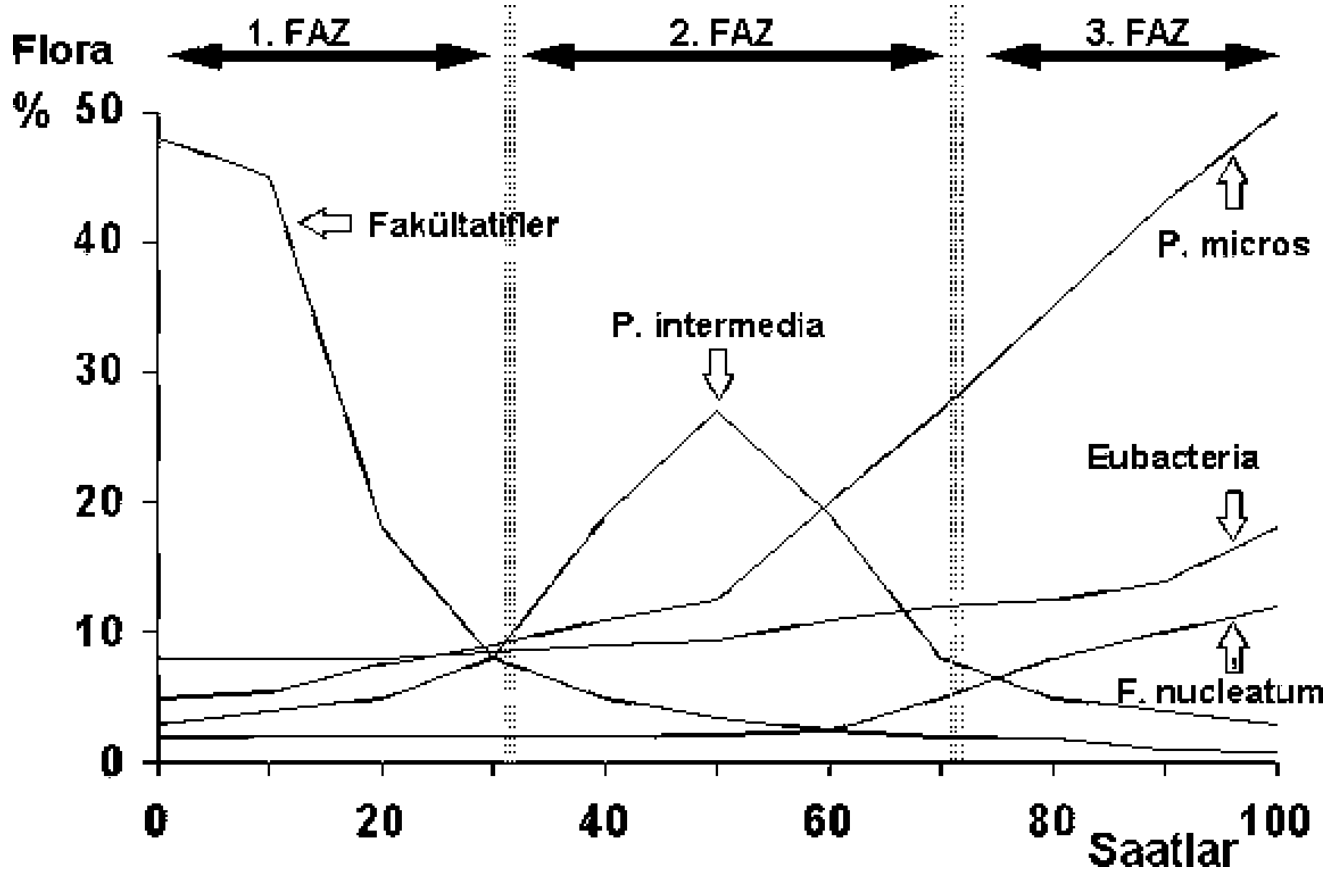
**Important**: Dominant bacteria: *P.denticola*, *P.intermedia*, *P.buccae*

# Protein fermentation phase

- Roor pulp and crown pulp enter to 3. phases in short ranges
- This phase is stable
- No PAIN in patients
- Bacteria variety decreases
- Most distinct bacteria in this stage:
  - ***Actinomyces, Bacteroides, Eubacterium, Fusobacterium, Peptostreptococcus, Porphyromonas, Selenomonas, Veillonella, Wolinella türleri*** **and** ***spiroketler***

# Phase alterations in pulp and root canal infections

Figure. Bacteria profile of pulp and root canal infections ve



# Infected root canal

Table. Pathogen bacteria in infected root canal and izolation frequency

| Bacteria isolated from infected root canal | Izolation frequency (%) |
|---|---|
| *Fusobacterium nucleatum* | 48 |
| *Porphyromonas* | 35 |
| *Prevotella intermedia* | 34 |
| *Peptostreptococcus micros* | 34 |
| *Eubacterium alactolyticum* | 34 |
| *Lactobacillus* | 32 |
| *Peptostreptococcus anaerobius* | 31 |
| *Eubacterium lentum* | 31 |
| *Fusobacterium* türleri | 29 |
| *Wolinella recta* | 25 |
| *Streptococcus anginosus* | 17 |
| *Peptostreptococcus* türleri | 15 |
| *Streptococcus mitis* | 15 |
| *Actinomyces israelii* | 11 |
| *Eubacterium timidum* | 11 |
| *Capnocytophaga ochracea* | 11 |
| *Eubacterium brachy* | 9 |
| *Prevotella buccae* | 9 |
| *Porphyromonas endodontalis* ve *P.gingivalis* | 9 |
| *Selenomonas sputigena* | 9 |
| *Veillonella parvula* | 9 |
| *Propinobacterium propionicum* | 8 |
| *Prevotella oris* | 8 |
| *Eubacterium nodatum* | 6 |
| *Prevotella denticola* | 6 |
| *Prevotella loescheii* | 6 |