
Pulpitis and Root Canal Microbiology

Summary

- **Pulpitis:** Infection of pulp tissue
- Infections that need immediate treatment(except trauma) in dentistry is called **Pupl's acute or subacute infection**
- **PULPITIS** is most commonly observed infection in dentistry

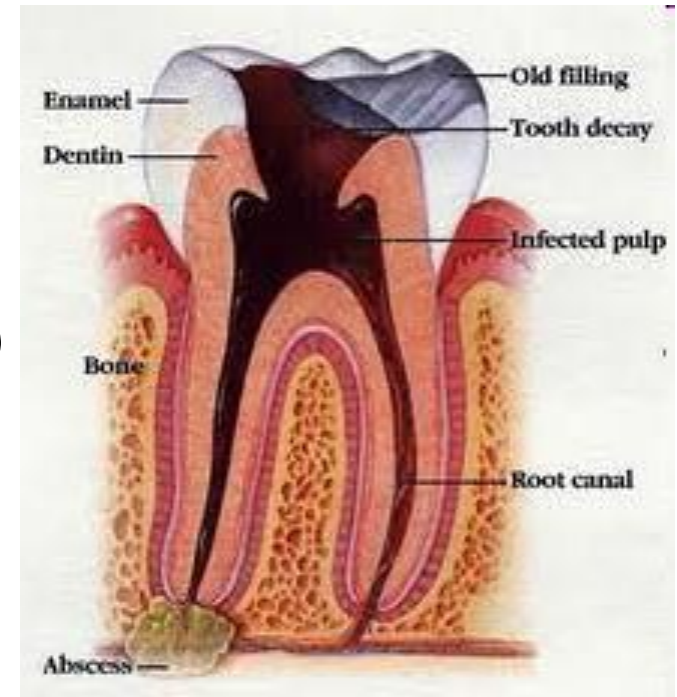


Pulp Invasion

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

Pulp invasion occurs in 3 ways

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



Coronal Way

- Most common way in pulp invasion by bacteria.

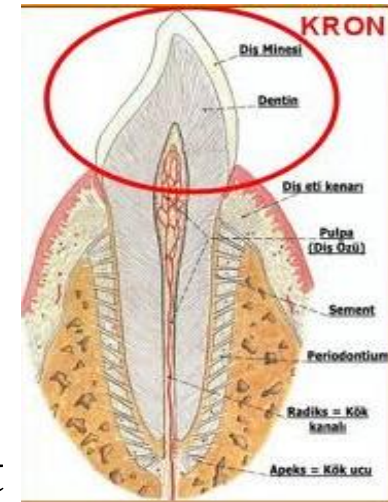
2 types;

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

Bakteria can reach to pulp rooms via naked dentin tissue

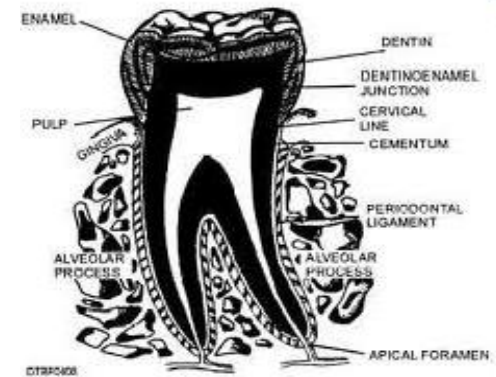
If the number of bacteria in pulp is low, **macrophages** can fagocyte them

Every thickness of dentin is an insufficient barrier for bacteria



Retrograde Way

- Bacteria; pass from damaged periodontal membrane to **foramen apical**
- Thus, there may be no decay in crown
- *Spirochetes*, *Selenomonas sputigena* and *Wolinella recta* are mobile and can pass periodontal membrane at first
- **Treponema** enter firstly to pulp in retrograde way
- Prevalance *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 entering m.o to pulp room; Pulpa odasına ilk giren mo.lar; late decay flora members
- **Lactobasilli, streptococcus, gram negative rods, anaerobes**
- Common features of bacteria in cavity basement at the last stage of decay:: **Gram pozitive and saccharolytic**

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

- Other bacteria can also found but not dominant

Ex: *Peptostreptococcus, Bacteroides, Capnocytophaga, Wolinella*

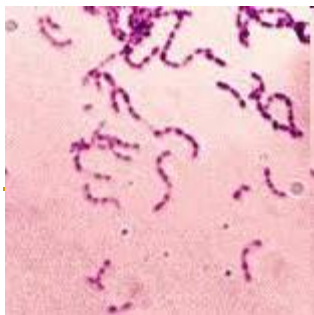
Pulp's response to m.o

- 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

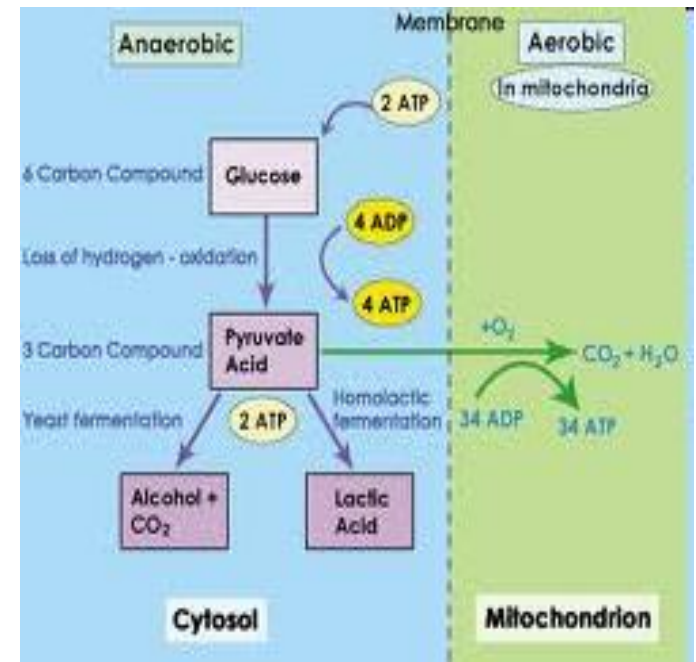
- ❑ Within 1-2 days, tooth pulp is completely invaded
- ❑ Exudate accumulation and microabscesses are pulp's inflammatory response



Flora variation in pulp and bacterial metabolism

Bacteria decompose pulp elements in 3 stages:

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



Carbohydrate fermentation phase

Oligosaccarides



Saccarolytik bacteria

Disaccharides



Saccarolytik bacteria

Monosaccarides


(Hexose and pentose glucoses)

Important: Most distinct complaint: **PAIN**

Glycolipide fermentation phase

Glycolipide and proteins


Saccarolitik + proteolitik bacteria



Toxins



Decomposition of blood vessels that pass from foramen apikal to
Clinic apic 2. venous stasis formation



Root pulp resorption (entering to 3. phase)

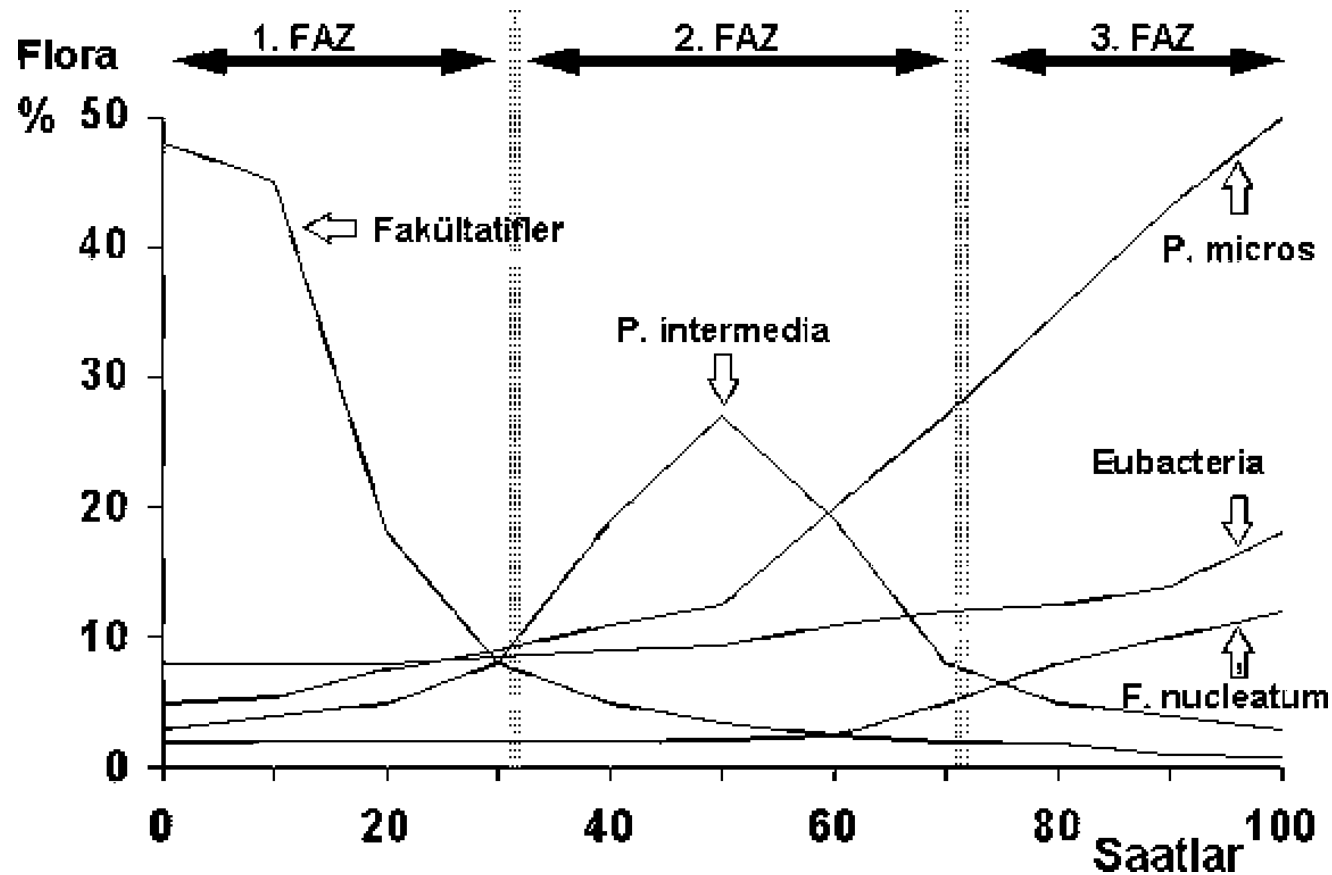
Important: Dominant bacteria: *P.denticola*, *P.intermedia*, *P.buccae*

Protein fermentation phase

- Root 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 (%)
<i>Fusobacterium nucleatum</i>	48
<i>Porphyromonas</i>	35
<i>Prevotella intermedia</i>	34
<i>Peptostreptococcus micros</i>	34
<i>Eubacterium alactolyticum</i>	34
<i>Lactobacillus</i>	32
<i>Peptostreptococcus anaerobius</i>	31
<i>Eubacterium lentum</i>	31
<i>Fusobacterium türleri</i>	29
<i>Wolinella recta</i>	25
<i>Streptococcus anginosus</i>	17
<i>Peptostreptococcus türleri</i>	15
<i>Streptococcus mitis</i>	15
<i>Actinomyces israelii</i>	11
<i>Eubacterium timidum</i>	11
<i>Capnocytophaga ochracea</i>	11

<i>Eubacterium brachy</i>	9
<i>Prevotella buccae</i>	9
<i>Porphyromonas endodontalis</i> ve <i>P.gingivalis</i>	9
<i>Selenomonas sputigena</i>	9
<i>Veillonella parvula</i>	9
<i>Propionobacterium propionicum</i>	8
<i>Prevotella oris</i>	8
<i>Eubacterium nodatum</i>	6
<i>Prevotella denticola</i>	6
<i>Prevotella loescheii</i>	6