# Behandlingsprinsipper: tenner med nekrotisk/infisert pulpa; behandling av apikal periodontitt

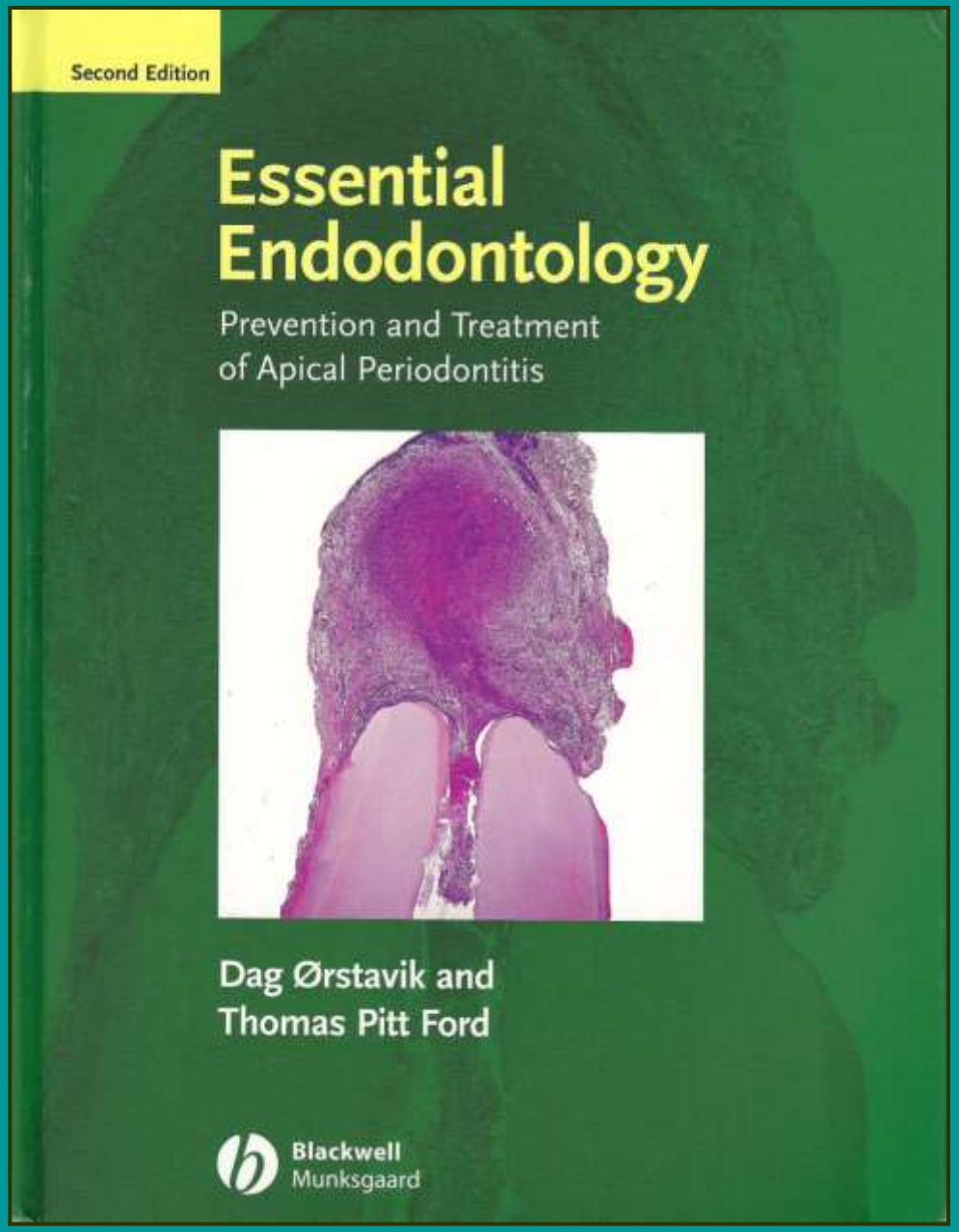
**Dag Ørstavik**

**UiO 2014**

**Textbook of Endodontology: Chapter 9; Clinical Endodontics Chapter 6**

**Se også: Behandlingsresultater og prognose på websiden:**

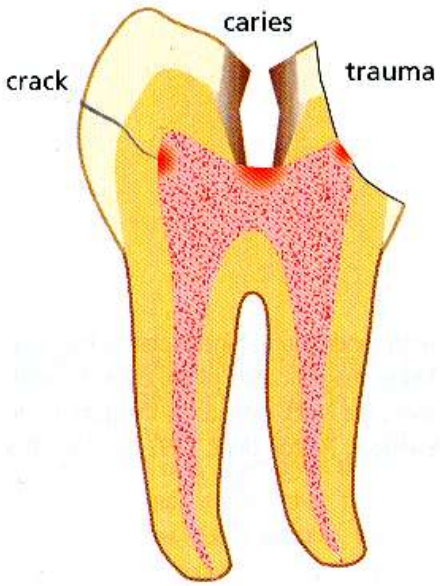
**www.uio-endo.no**



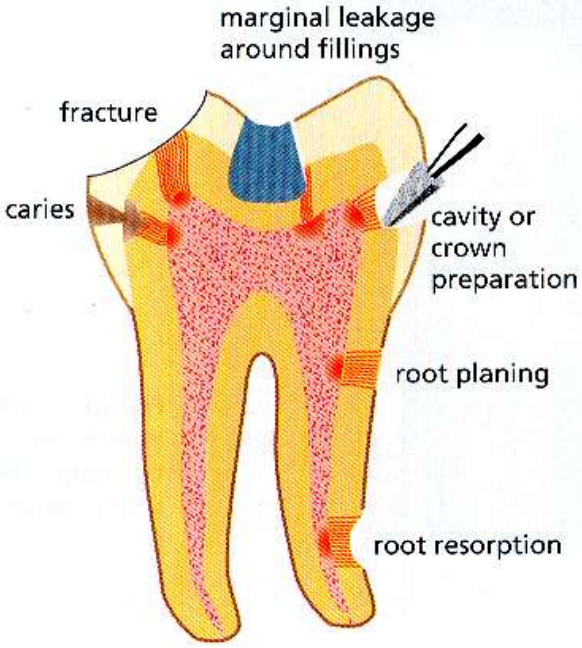

Litt egenreklame:

Sykdomslære og prinsipper, ikke tekniske detaljer

*Pulp exposure due to*

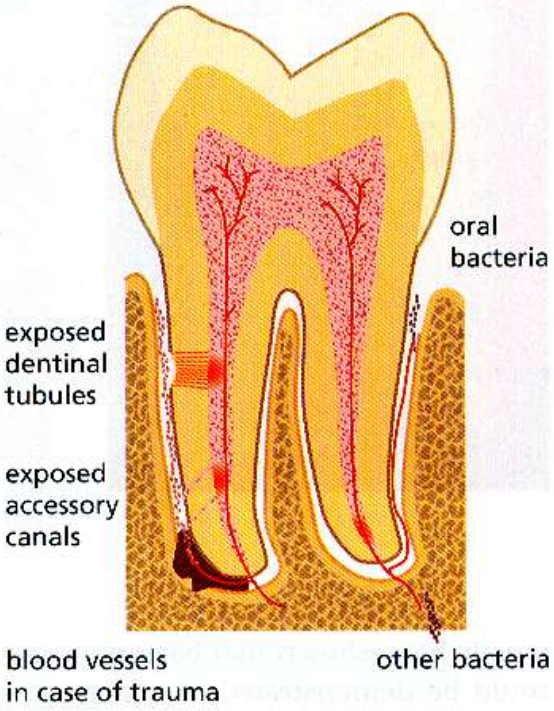


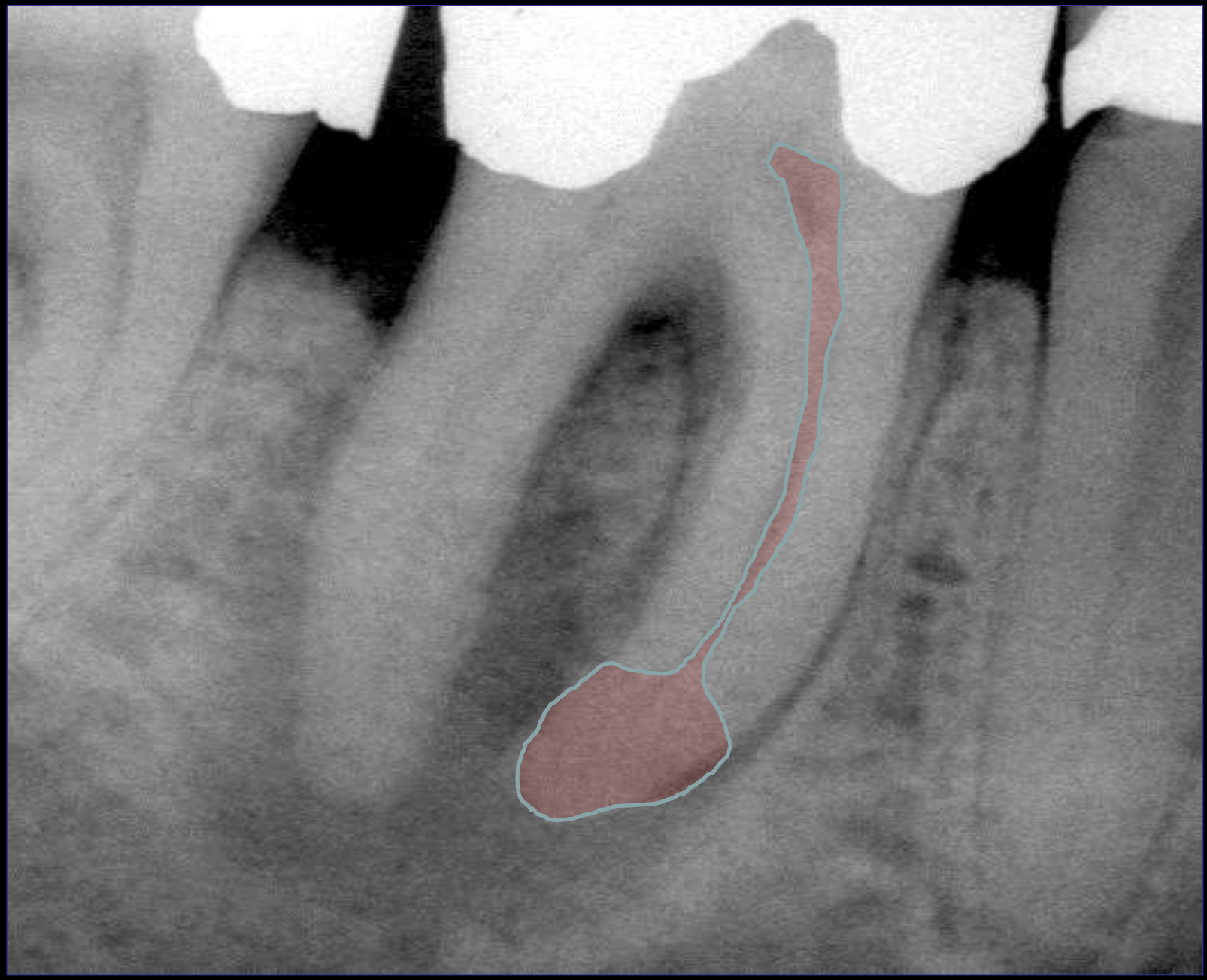

*Dentinal tubules exposed due to*




*From periodontal pockets via*

*Transient bacteremia by anachoresis with*

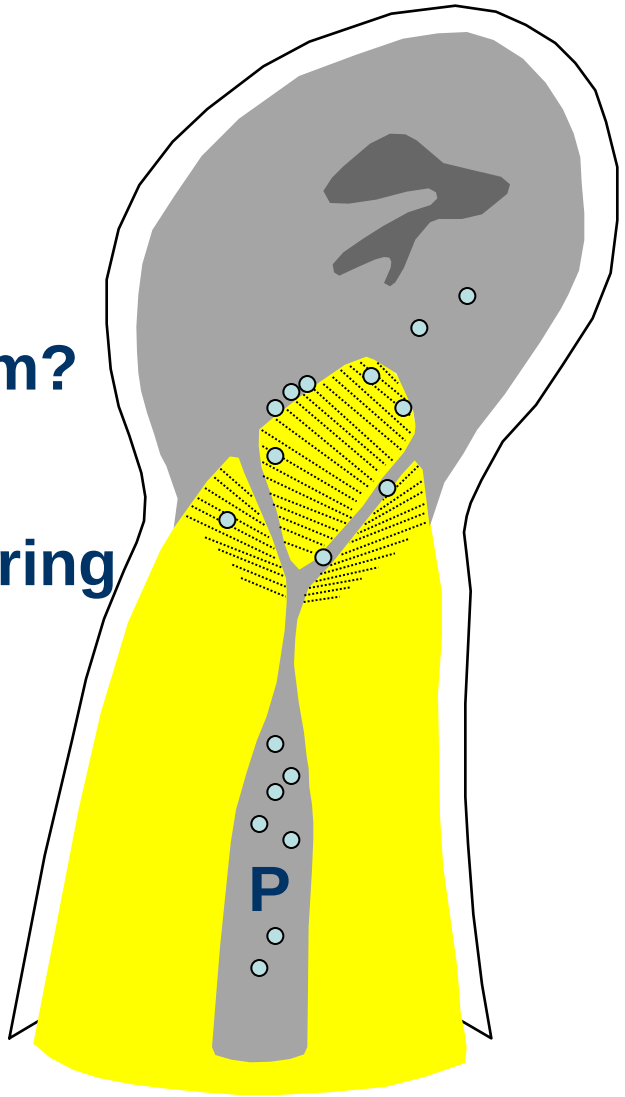


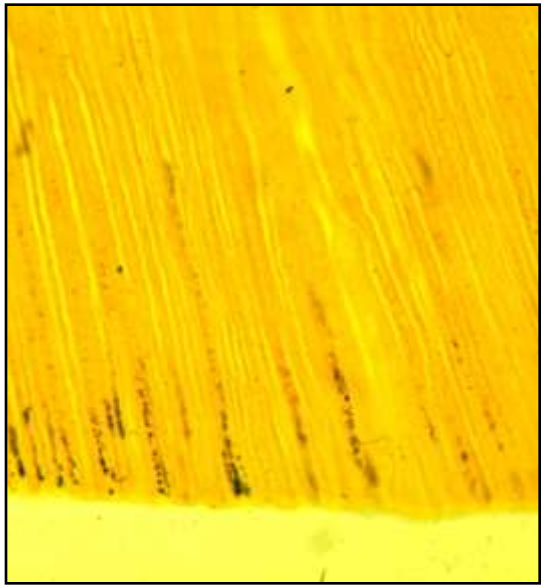


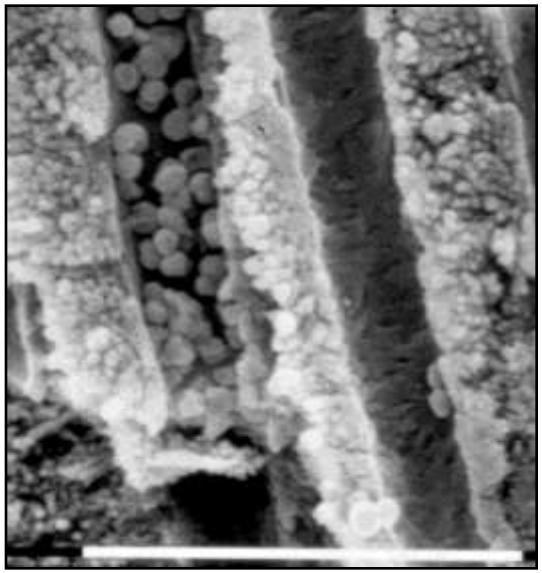
# Hvor er mikrobene?

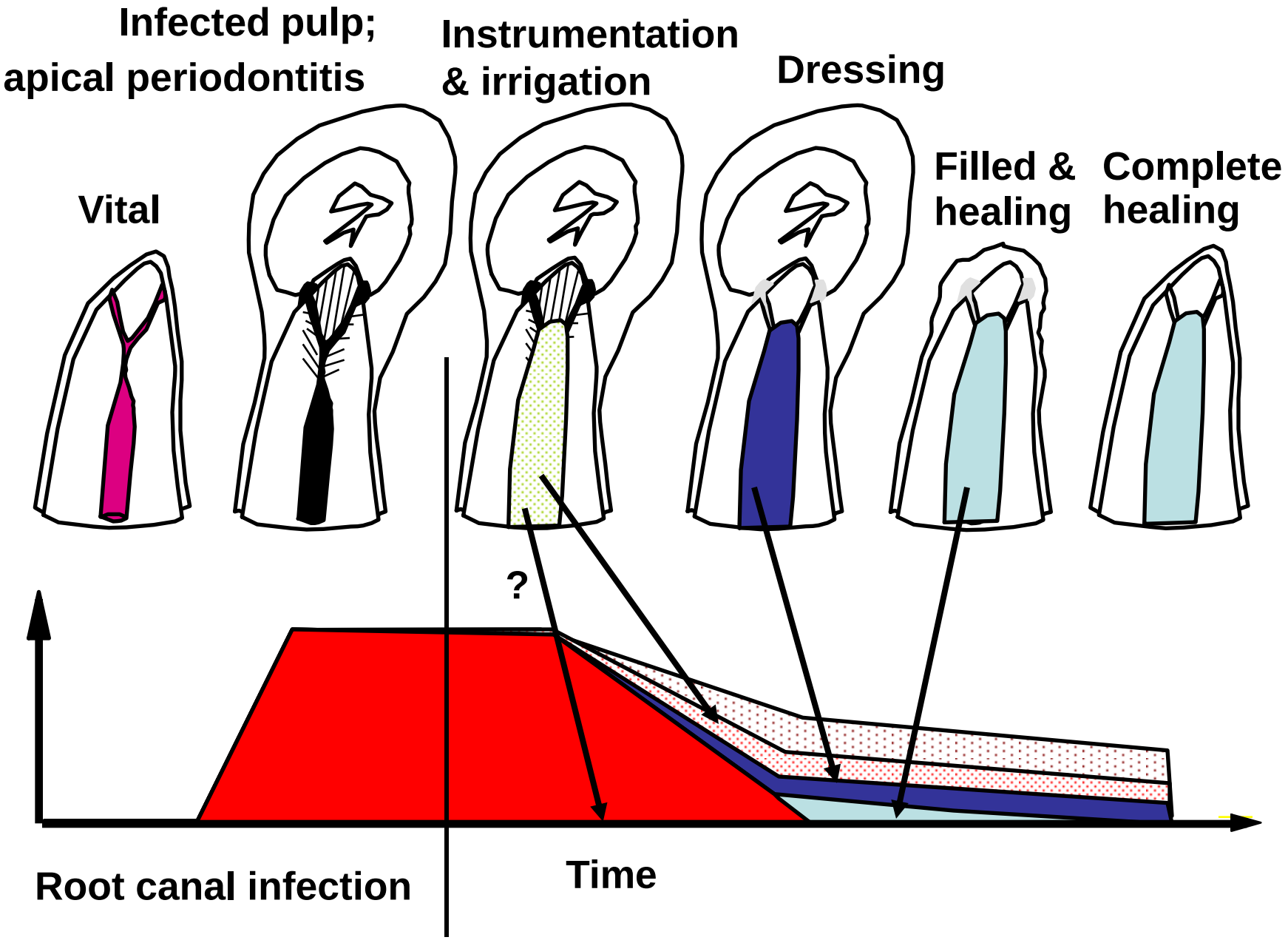
## Hva kan vi gjøre med dem?

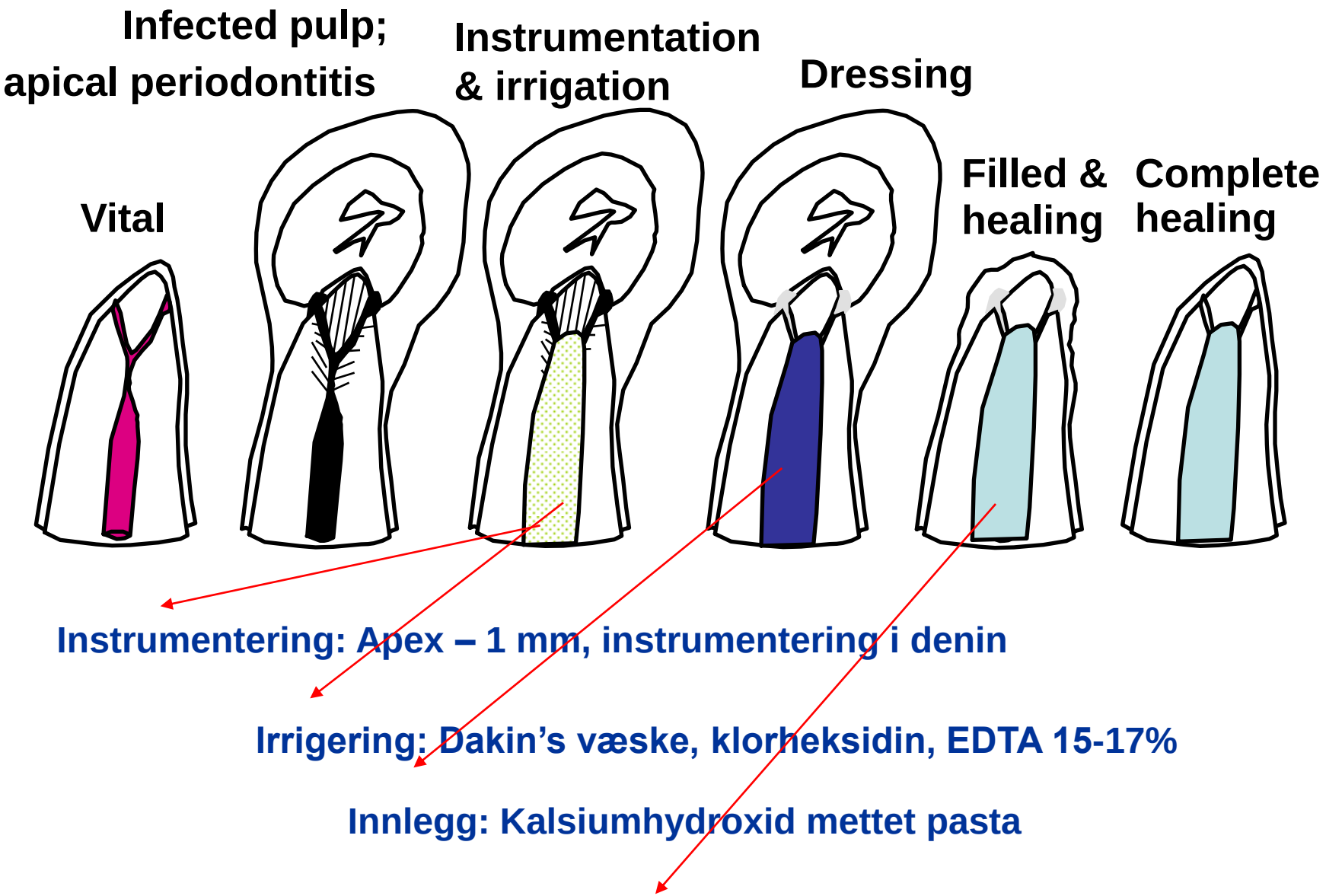
**Instrumentering**
***Irrigasjon***
***Innlegg***
**Fylling**

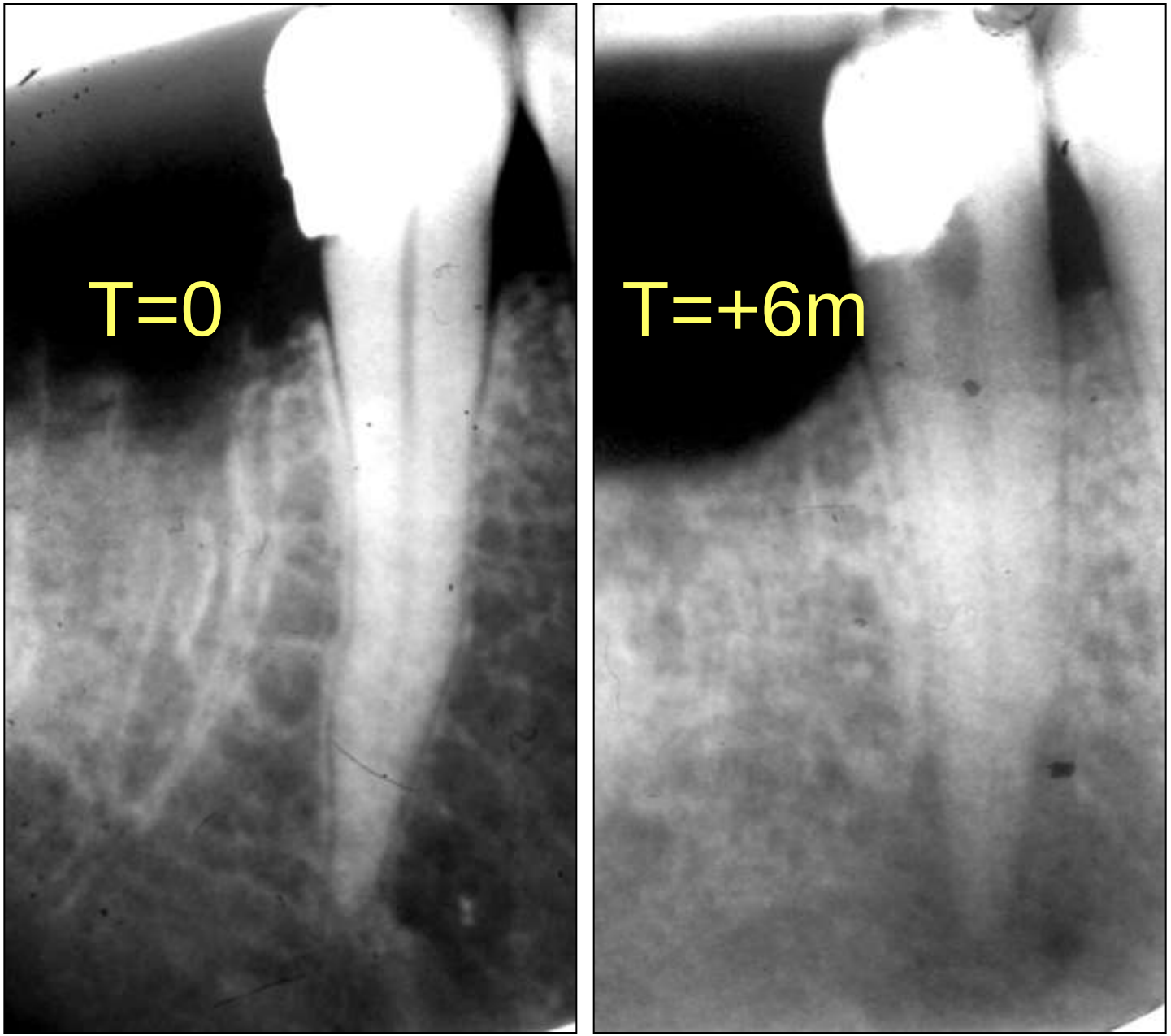





Infected pulp;
apical periodontitis
Instrumentation
& irrigation
Dressing
Filled &
healing
Complete
healing
Vital
?
Root canal infection
Time


Infected pulp;
apical periodontitis
Instrumentation
& irrigation
Dressing
Filled &
healing
Complete
healing
Vital
Instrumentering: Apex – 1 mm, instrumentering i denin
Irrigering: Dakin's væske, klorheksidin, EDTA 15-17%
Innlegg: Kalsiumhydroxid mettet pasta
Fylling: AH+ og guttaperka; tett toppfylling


T=0
T=+6m

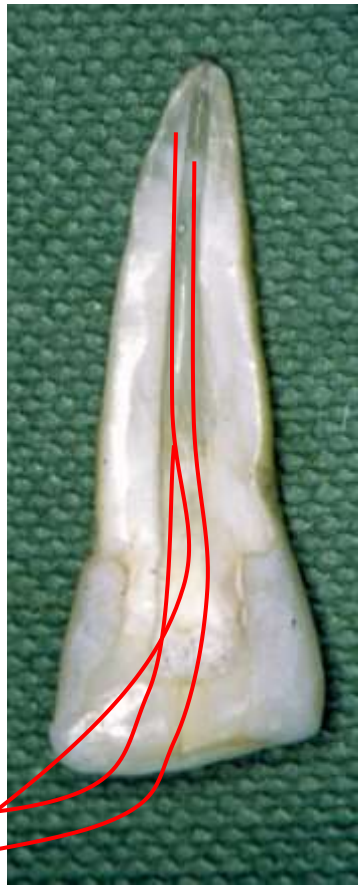
# Standard behandling

- Isolasjon og aseptikk: se websidens klinikkrutiner og om kofferdam
- Mekanisk og kjemisk eliminasjon av mikrober: NaOCl, EDTA, CHX, $Ca(OH)_{2.}$ Samme webside.
- Permanent rotfylling med koronal forsegling: Gutta-perka og sealer; standardisert teknikk (Reciprok), lateral kondensering, tett underfylling, tett koronal restaurering. Cave compositem!

Endodonti er:
Behandling/forebyggelse av apikal periodontitt:
**Langtids røntgenoppfølging**

Apikal periodontitt er:
Respons på rotkanalsinfeksjon

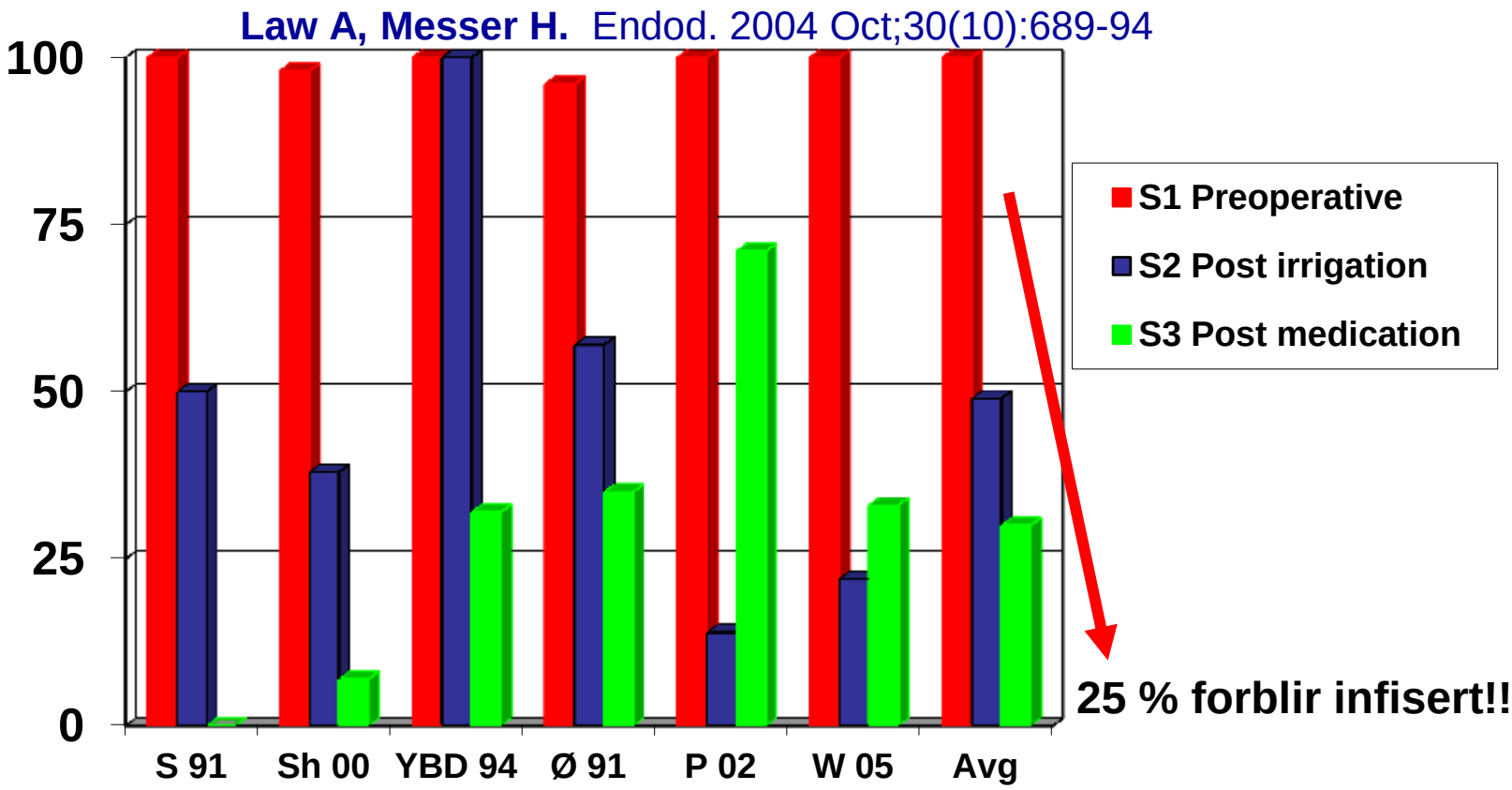
**Endodonti blir:**
**Forebyggelse eller eliminering av rotkanalsinfeksjon:**
**Prøvning av infeksjonskontroll = dyrking**



**Prøve**

| | |
|---|---|
| A | Ved kanalåpning |
| PI | Etter første gangs instrumentering |
| PD | Starten av annen seanse |

# Desinfeksjon av rotkanalen: bakteriologiske studier



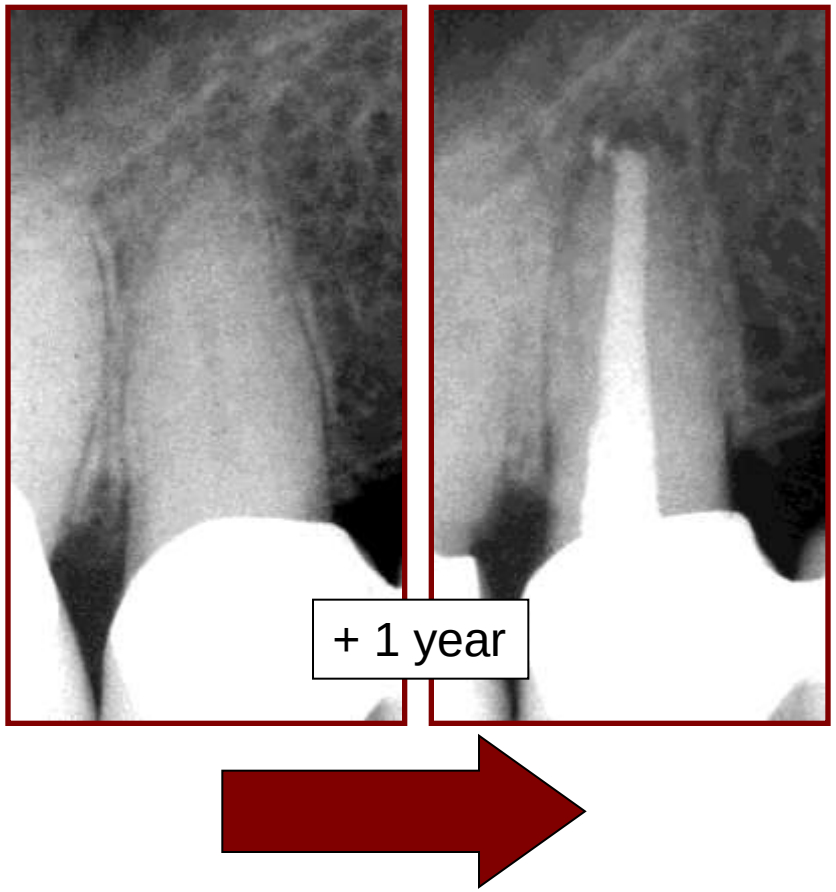

Institusjoner – optimal behandling; nye metoder oppdager flere mikrober

# Primær rotkanalinfeksjon

"The involved microbiota is dominated by **anaerobic bacteria**, particularly **Gram-negative species** such as *Porphyromonas, Prevotella, Fusobacterium, Filifactor, Campylobacter* and *Treponema*. **Gram-positive anaerobes, *Peptostreptococcus, Eubacterium,*** and *Pseudoramibacter*, as well as facultative or microaerophilic streptococci can also be commonly found in primary intraradicular infections." (Essential Endodontology 2008)

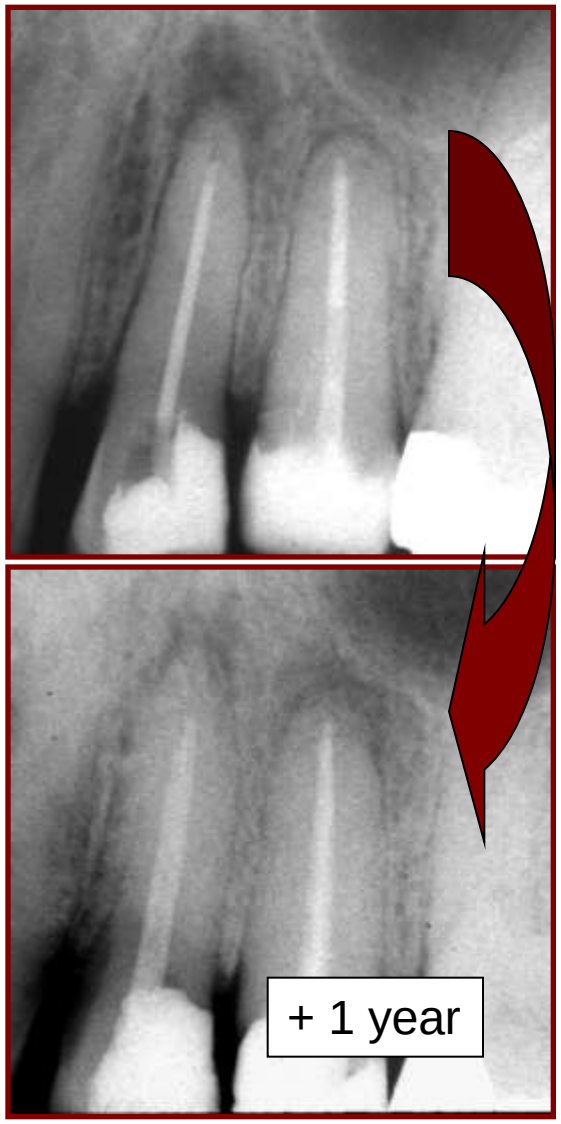
# Sekundær rotkanalinfeksjon

- "Species commonly associated with secondary infections include **facultative organisms**, *Pseudomonas aeruginosa, Staphylococcus* species, *E. coli,* other enteric rods, *Candida* species, and *E. faecalis,* all of them not usually found in primary infections." (Essential Endodontology 2008)



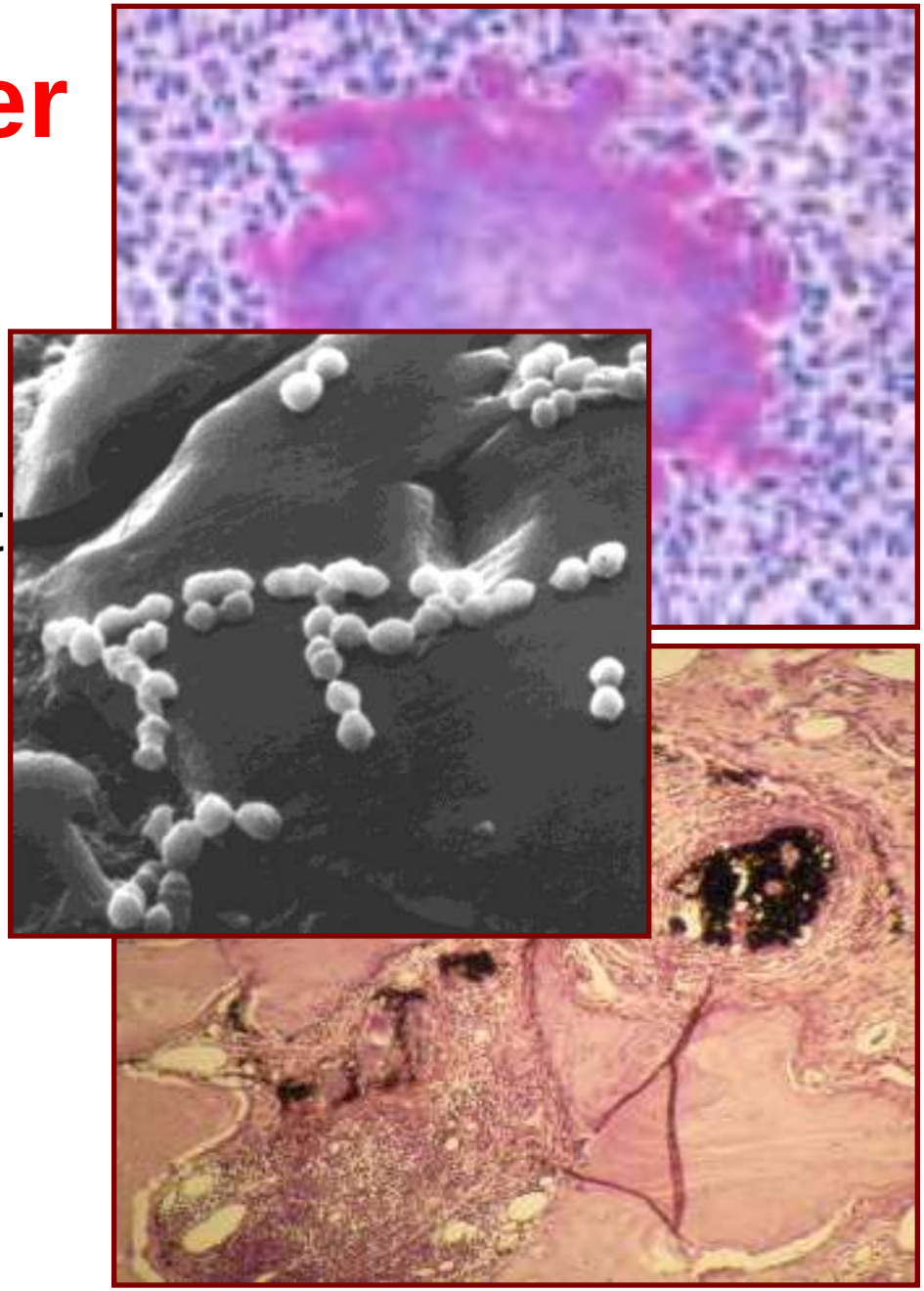
# Persisterende rotkanalinfeksjon

"The microbiota of persistent infections usually consists of fewer species than primary infections. **Gram-positive facultative bacteria, particularly *E. faecalis*, are predominant**. Fungi can also be found, in frequencies significantly higher when compared with primary infections." (Essential Endodontology 2008)



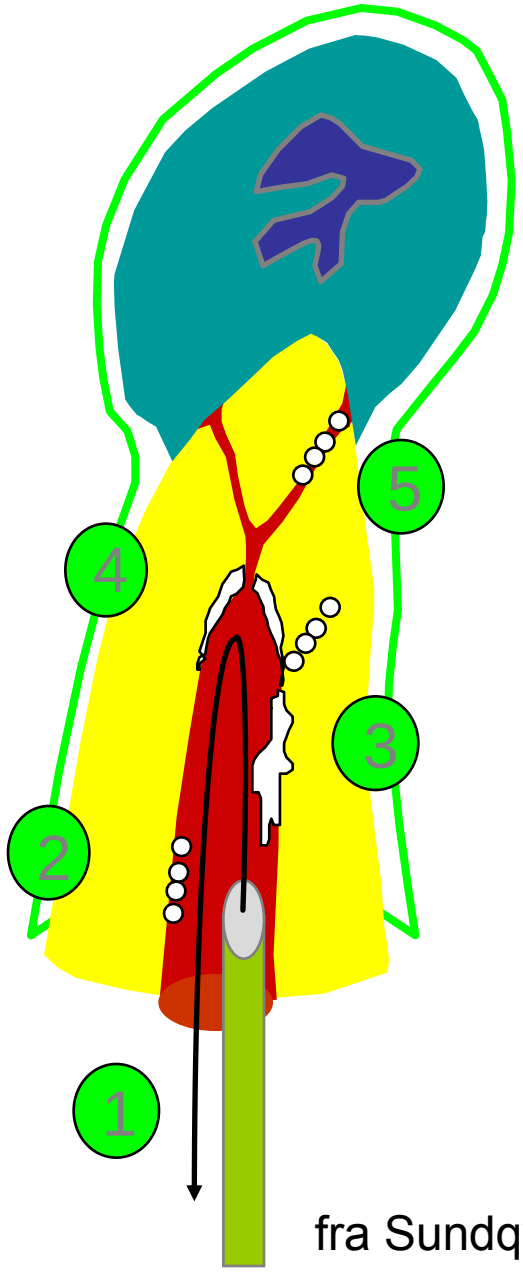
# Ekstraradikulær infeksjon

"The most common extraradicular infection, independent of the intraradicular infection, is apical actinomycosis, caused by ***Actinomyces* species or *P. propionicum*** "(From Siqueira tbp)



# Kofferdam og aseptikk

- http://www.odont.uio.no/om/iko/fagavdelinger/endodonti/Klinikkrutiner/index.html
- Kofferdam etter kanallokalisering ved infiserte kasus!
- Tett gingivalt – oppbygging eller TempBond eller lignende, tanntråd knyttet
- Nytt instrumentoppsett, sterile instrumenter




# Medikamentenes funksjoner

(1) Fukting av kanalveggene og utspyling av debris

***(2) Drepe mikrober.***

(3) Løse opp vevsrester.

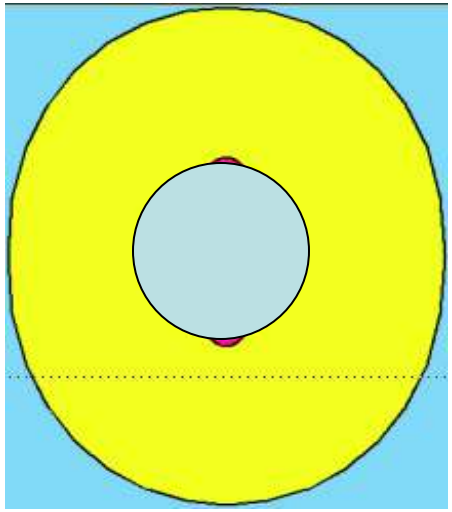
(4) Fjerne smearlaget og løse opp ytr dentin

(5) Rense områder utenfor mekanisk rekkeviddde

**(Innlegg) Ca(OH)2: desinfiserer og *fyller***

fra Sundqvist & Figdor, in 'Essential Endodontology, 1. utgave 1998

# Bakterievekst etter instrumentering: *in vitro; E. faecalis*



| **Instrument** | **% Red.** |
|---|---|
| NiTi #30 | 98.17 |
| NiTi #35 | 99.50 |
| ***NiTi #40*** | ***99.57**** |
| GT hand 0.12t | 94.17 |
| Profile 0.06t/#5 | 97.26 |

Siqueira et al. 1999

Understøttet i flere kliniske studier; Shuping, Sigurdsson, Trope, Orstavik et al 1999-2004

# Endodon

- What is e
- What is e
  - Many th
- What is a
  - A granu
  - Caused
    canal sy
- How do w
  - By recognizing etio

# Endodontisk prognose

- Hva er endodontisk suksess?
- Hva er endodontisk mislykket behandling?
  - Ymse former av infeksjon med en røntgenologisk lesjon
- Hva er en lesjon?
  - Et granulom eller en cyste
  - Den ”eneste” årsak er infeksjon i rotkanalsystemet
- ***Hvordan kan vi forbedre oss?***
  - ***Ved å erkjenne etiologien og rette all behandling mot den***

# En nødvendig distinksjon:

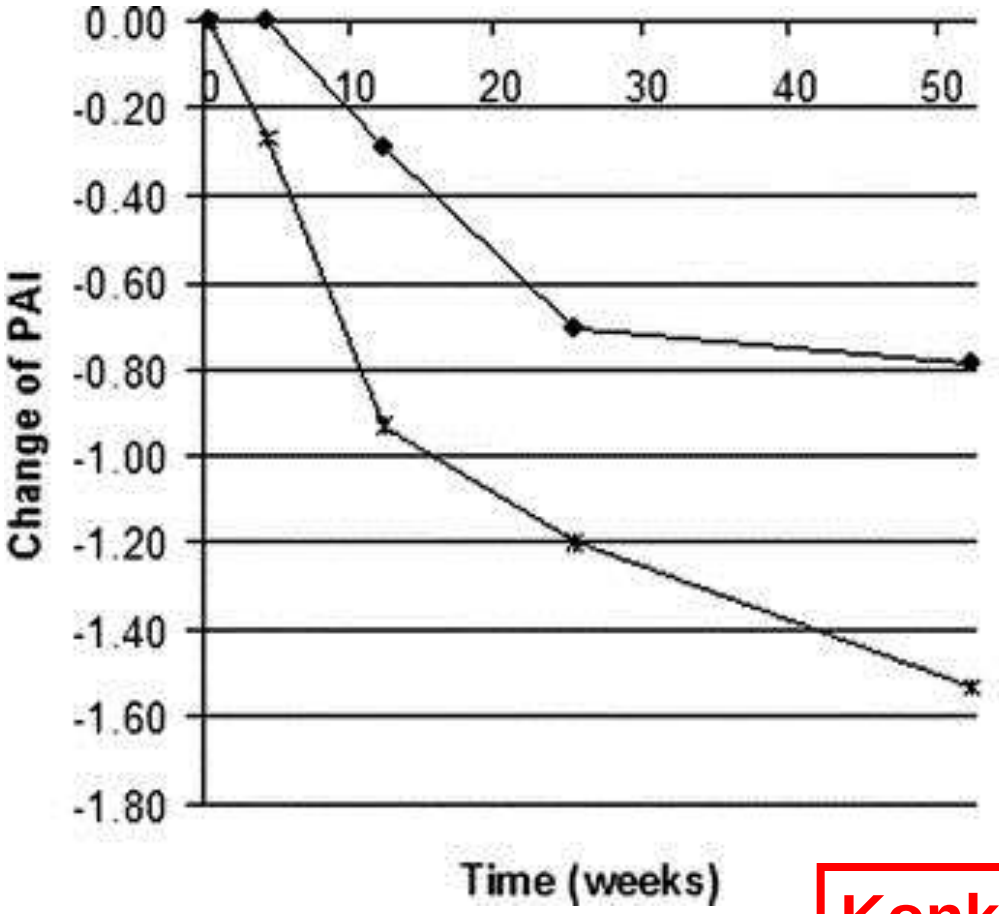
- Den vitale pulpa – et spørsmål om aseptikk
  - Enkelt: Vi desinfiserer for å opprettholde ptikk; vi bruker prosedyrer utviklet for fiserte pulpae for å være på den sikre siden

Den nekrotiske, infiserte pulpa – utfordringen

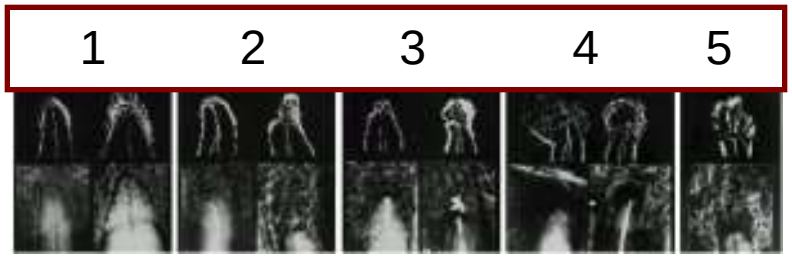
- Effektiv n e or et lykk

# Trenger vi å forbedre oss?

- Hvordan går det i praksis?
  - Institusjoner – infiserte tenner: 70-85% suksess suksess
  - Epidemiologiske studier – alle diagnoser: 60-70% suksess




Waltimo et al., 2005

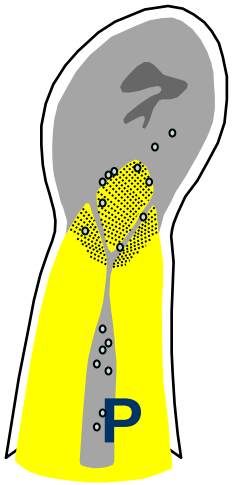


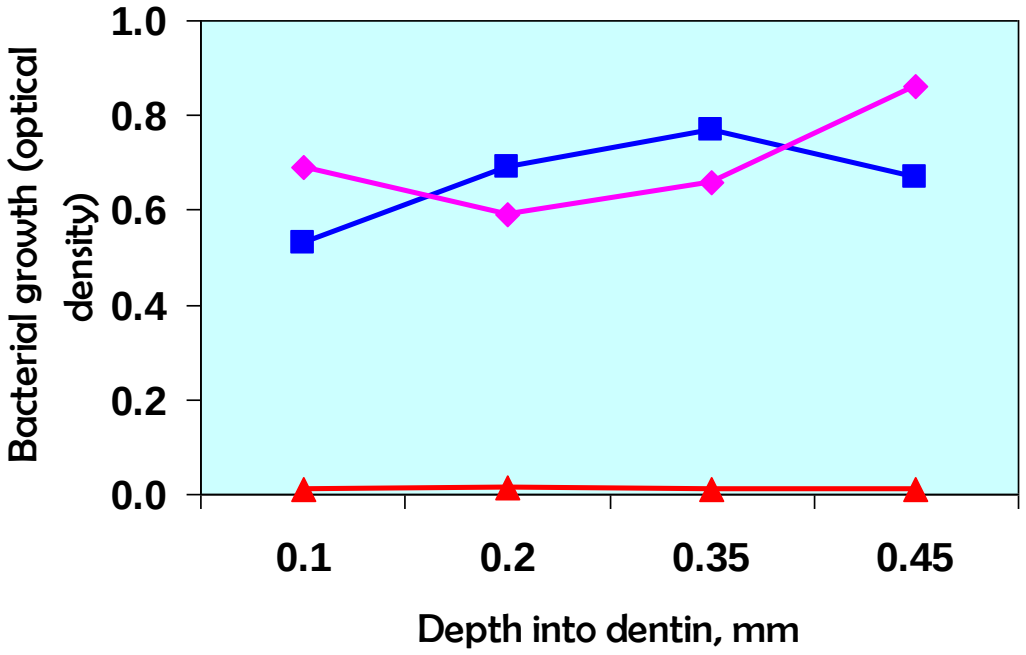

**Konklusjonen er klar: bakterier i kanalen ved fylling er årsaken til dårlig prognose**

Utvalgte etterundersøkelser på utfallet av rotbhandling av tenner med kronisk apikal periodontitt (Essential Endodontology 2008)

| **Forfatter** | **% suksess** |
|---|---|
| Sjögren et al. 1997 | 83 |
| Trope et al. 1999 | 74 |
| Weiger et al. 2000 | 71 |
| Abitbol 2001 | 76 |
| Peters & Wesselink 2002 | 71 |

# *Klorheksidin dreper* E. faecalis *inntil 0,45 mm inn i dentintubuli*

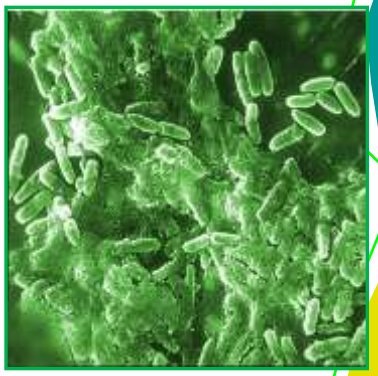


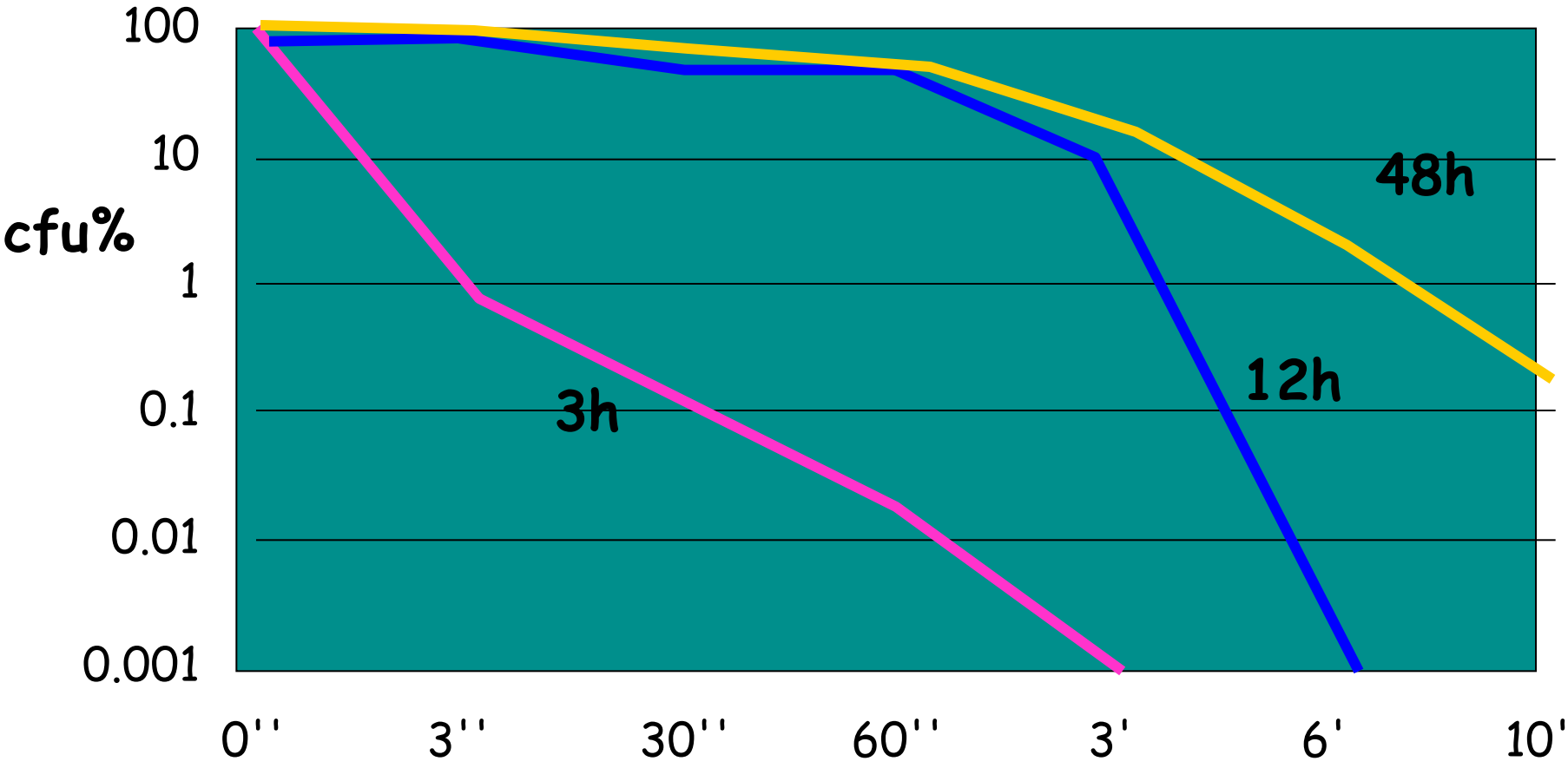

Komorowski et al. 2000, Substantivity of Chlorhexidine-Treated Bovine Root Dentin

# Inhibition of antibacterial effect

- Pulpal tissue
- Smear
- Hydroxyapatite
- Collagen
- Microbes: alive or dead
- All above inhibit disinfection: emphasis also on mechanical cleansing
- Biofilm properties



# Effect of physiological state – $Ca(OH)_2$ Old and starving bacteria are more resistant to medicaments



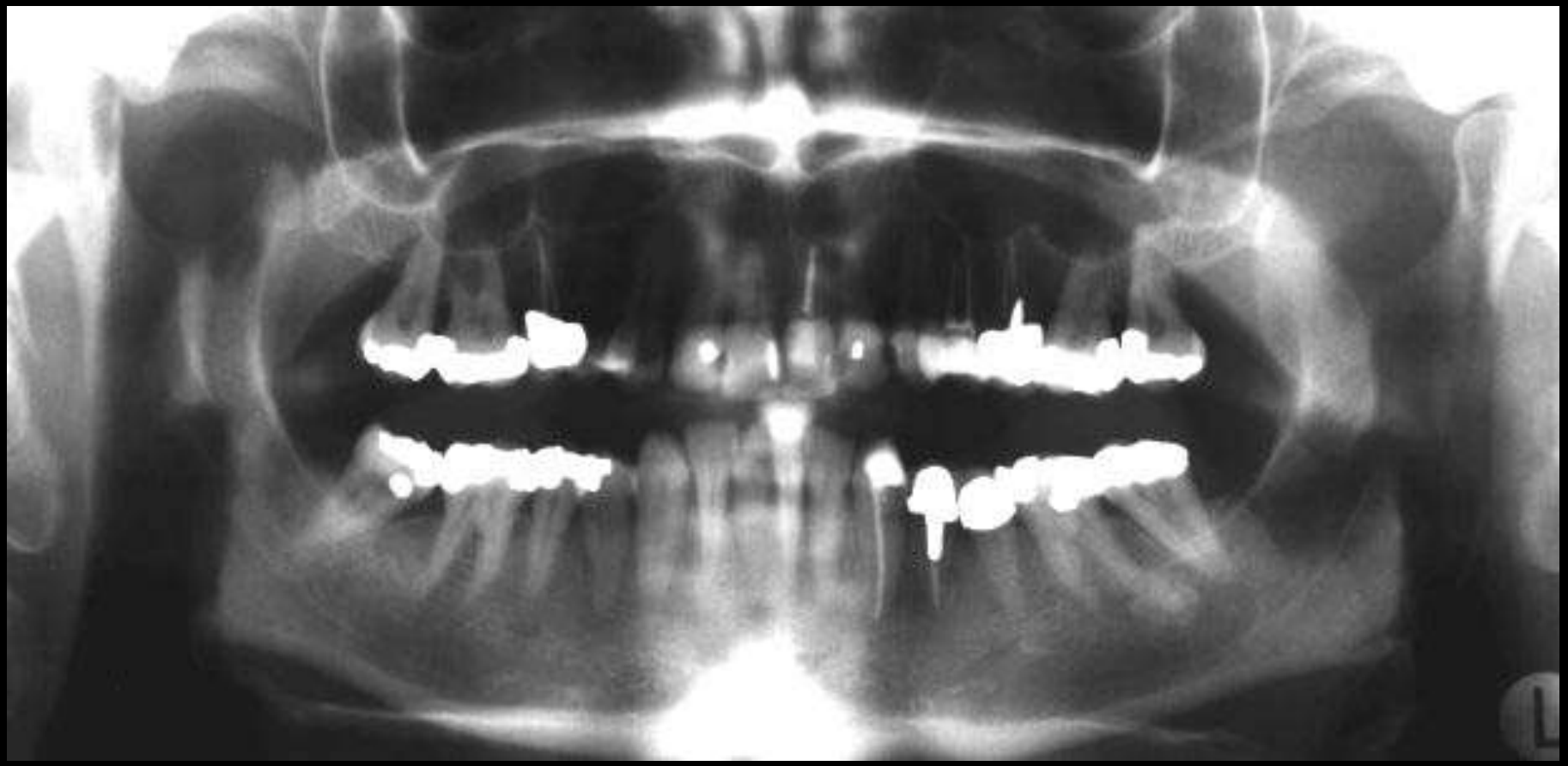

From Portenier et al., 2005

# Effect of physiological state – $Ca(OH)_2$

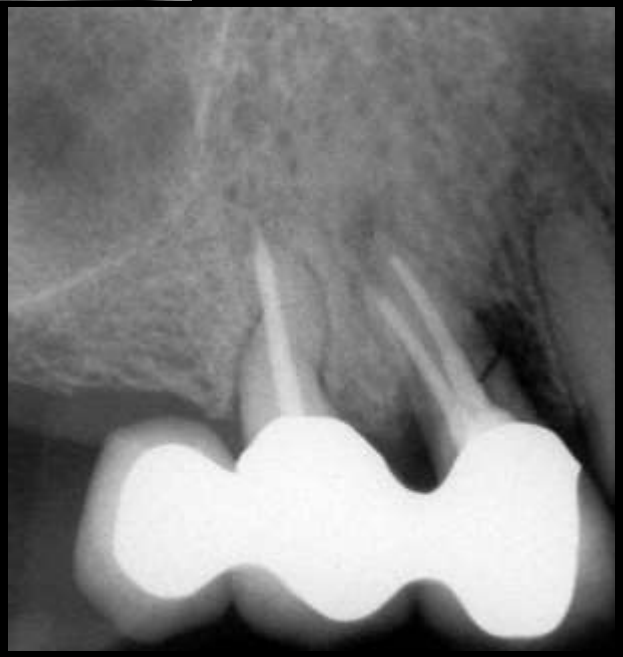
*E. faecalis* bound to collagen becomes more resistant to the antimicrobial effect of calcium hydroxide. This finding may contribute to our understanding of why *E. faecalis* cannot be eliminated easily from the dentinal tubules using medicaments such as calcium hydroxide.
Kayaoglu & Ørstavik 2008

# Prognose & epidemiologi

- Suksess og feilslag
- Bruk i andre restaureringer
- Forhold til alternative behandlinger (= ekstraksjon) og relative prognoser
- Forholdet til periodontale problemer
- Tverrsnittsresultater i befolkningen






99-01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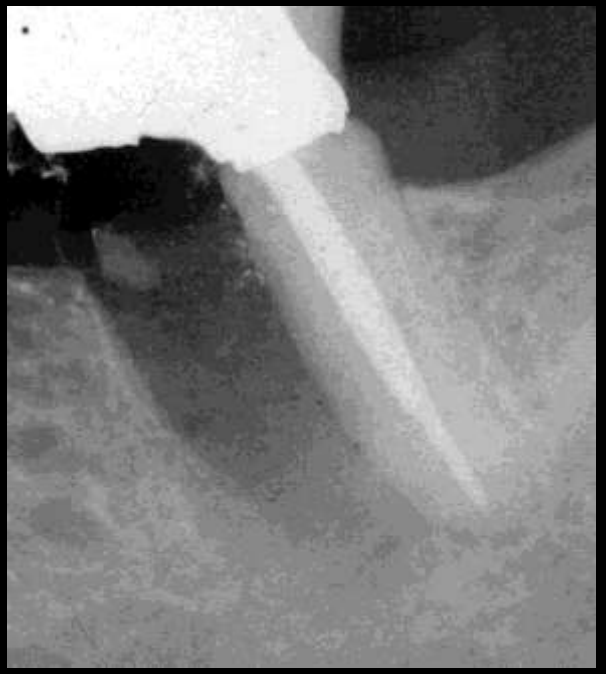


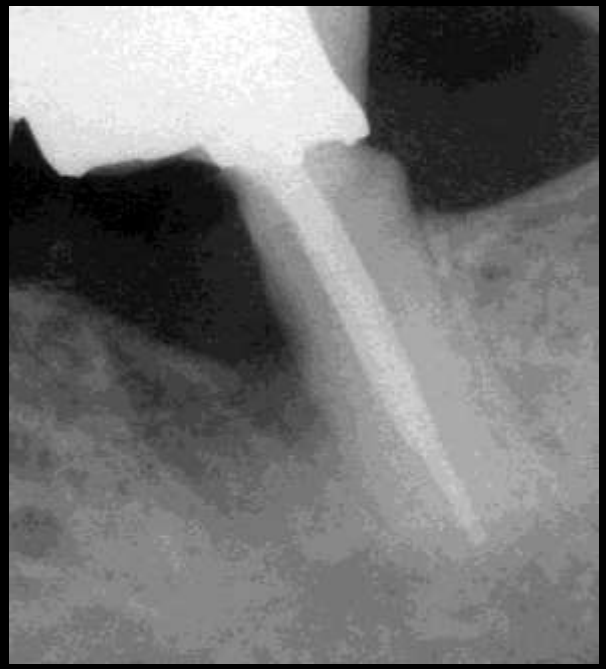


Table 6 P-values of variables significantly (P < 0.05) affecting treatment outcome

| | END1 (periapical endpoint 1–6) All roots | NAP roots | CAP roots |
|---|---|---|---|
| Age | | | 0.020 |
| Jaw | | | < 0.001 |
| Periapical status | < 0.001 | < 0.001 | < 0.001 |
| Caries | | | 0.022 |
| Marginal support | 0.001 | 0.016 | 0.002 |
| Function | | 0.018 | |
| Over-instrumentation | 0.031 | 0.002 | |
| Apex-to-filling distance | 0.025 | 0.009 | 0.020 |
| Density | 0.040 | | |
| Sealer | | | |

CAP, chronic apical periodontitis; NAP, no apical periodontitis.

*Limited number of observations, inclusion in statistical model not possible.

Community Dent Oral Epidemiol. 2003 Feb;31(1):59-67

# Risk indicators for apical periodontitis

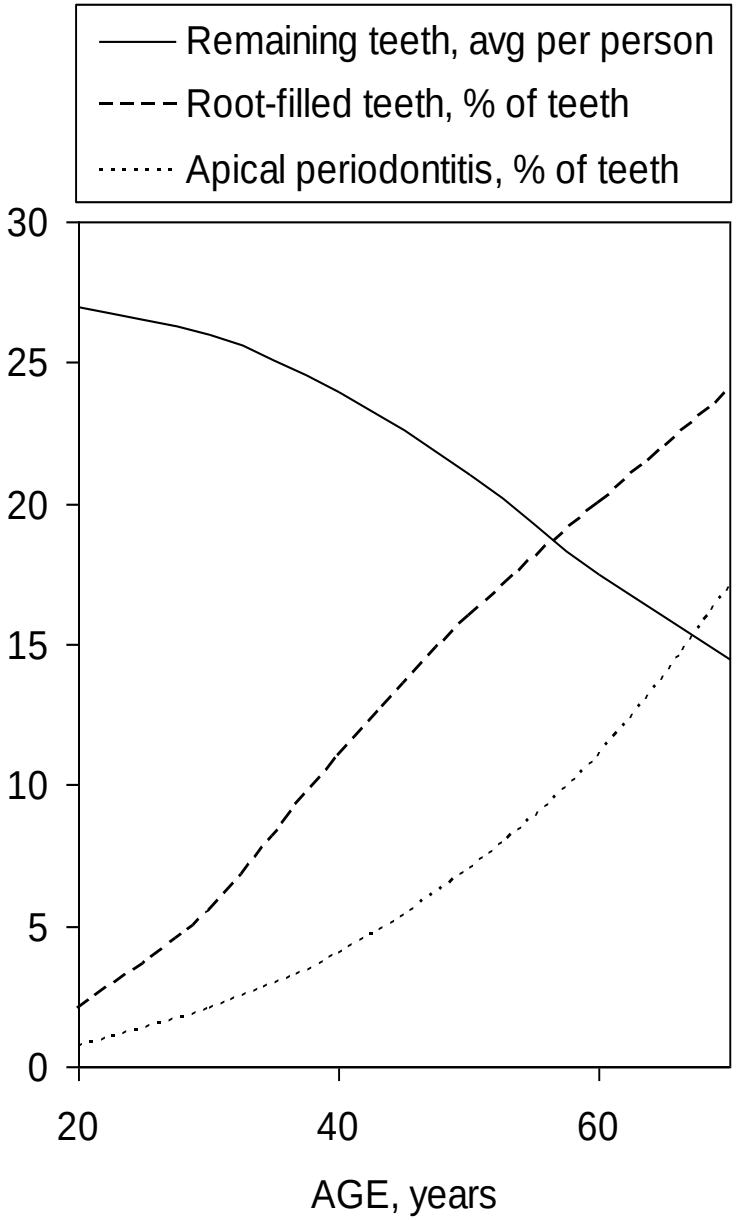
*Lise-Lotte Kirkevang and Ann Wenzel*

| **Variables** | **Category** | **Adjusted OR** | **95% CI (*P*)** |
|---|---|---|---|
| Age | 20-29 (*n* = 111) | 1.00 | - |
| | 30-39 (*n* = 153) | 1.82 | 0.80-4.12 (0.15) |
| | 40-49 (*n* = 169) | 1.24 | 0.54-2.86 (0.61) |
| | 50-59 (*n* = 144) | 2.38 | 0.97-5.85 (0.59) |
| | 60+ (*n* = 36) | 1.80 | 0.40-8.39 (0.43) |
| Smoking | No (*n* = 325) | 1.00 | - |
| | Yes (*n* = 250) | 1.64 | **1.00-2.84 (0.05)** |
| Number of services from the dentist | 0 (*n* = 82) | 3.98 | **1.87-8.46 (0.00)** |
| | 1-5 (*n* = 309) | 1.00 | - |
| | 6-9 (*n* = 127) | 0.89 | 0.47-1.67 (0.70) |
| | 10-19 (*n* = 56) | 0.99 | 0.39-2.47 (0.90) |
| | 20+ (*n* = 12) | **12.63** | 0.79-200.07 (0.07) |

Adjusted odds ratio (OR) with 95% confidence intervals (CI) and *P*-values.

| **Variables** | **Category** | **Adjusted OR** | **95% CI (*P*)** |
|---|---|---|---|
| Number of teeth | 1-18 (*n* = 22) | 1.00 | - |
| | 19-27 (*n* = 280) | 0.66 | 0.18-2.49 (0.54) |
| | 28 (*n* = 311) | 0.34 | 0.09-1.34 (0.12) |
| Number of secondary caries | 0 (*n* = 403) | 1.00 | - |
| | 1 (*n* = 141) | 0.95 | 0.51-1.79 (0.88) |
| | 2 (*n* = 69) | 2.63 | **1.01-6.87 (0.05)** |
| Number of inadequate coronal fillings | 0-2 (*n* = 474) | 1.00 | - |
| | 3 (*n* = 134) | 2.44 | **1.17-5.07 (0.02)** |
| Number of root fillings | 0 (*n* = 295) | 1.00 | - |
| | 1 (*n* = 140) | 11.18 | **5.99-20.85 (0.00)** |
| | 2 (*n* = 178) | 80.07 | **38.19-167.87 (0.00)** |

Adjusted odds ratio (OR) with 95% confidence intervals (CI) and *P*-values.




Eriksen 1998