Evaluation of Endodontic Treatment

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- The University of Western Australia

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That root-filled tooth now has a periapical area ..... What next ???

2

That root-filled tooth now has a periapical area ..... What next ???

- **Why was there healing?**
  - **Diagnosis**
    - **Provisional**
    - **Investigated**
    - **Confirmed**
  - **Cause(s)**
    - **Identified**
    - **Removed**

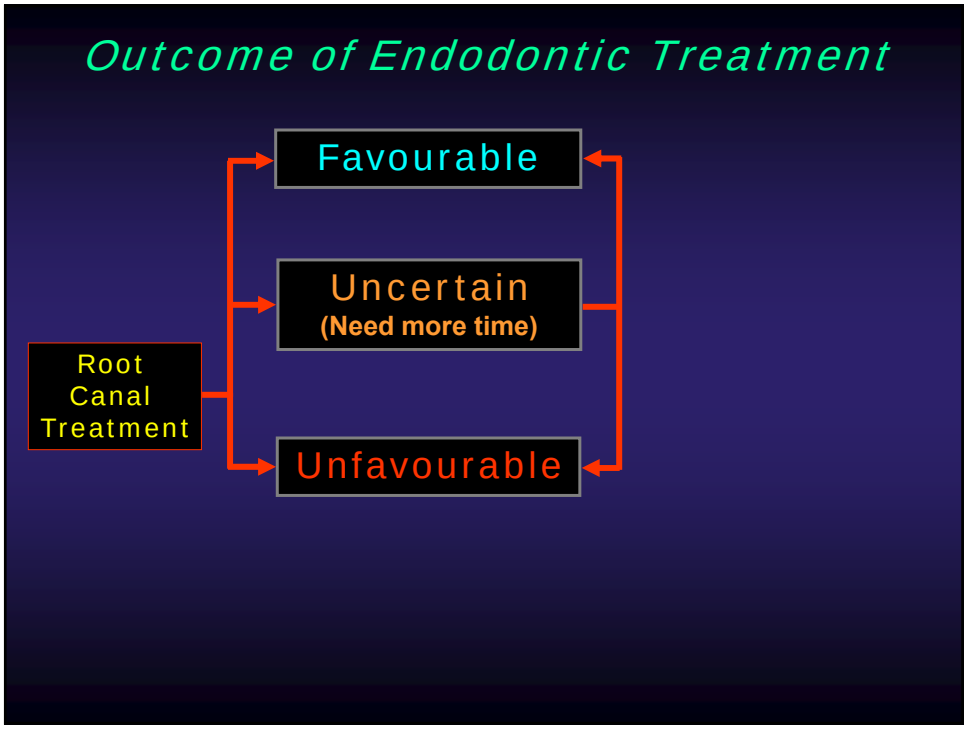
3

Endodontic Treatment

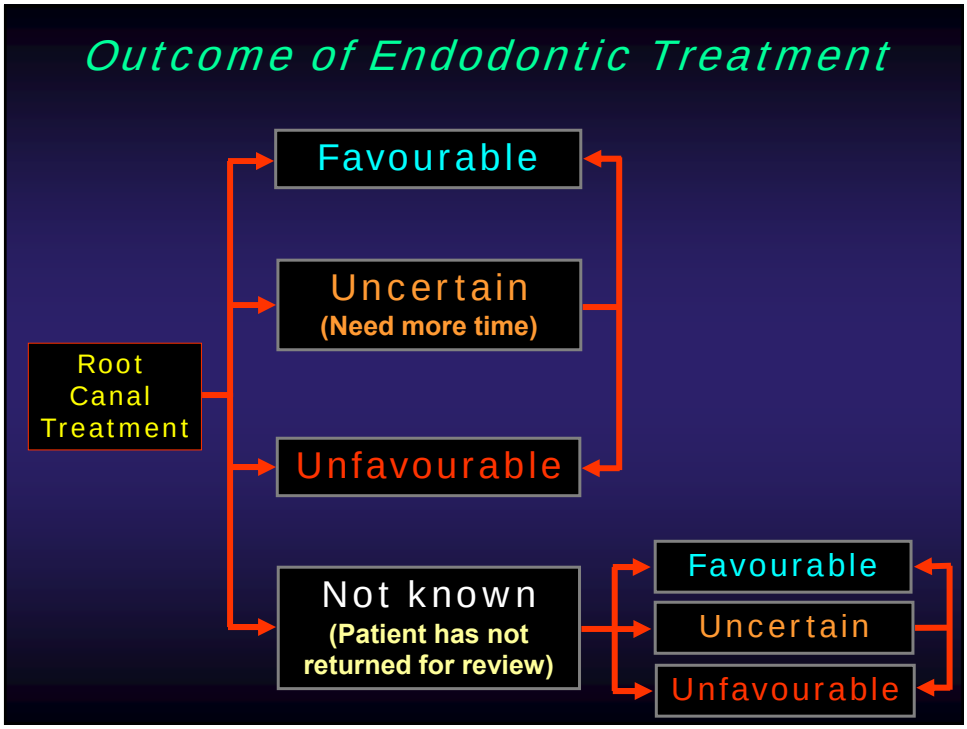
- **What is "success" ?**
- **What is "failure" ?**

Ú *OUTCOME of Treatment*

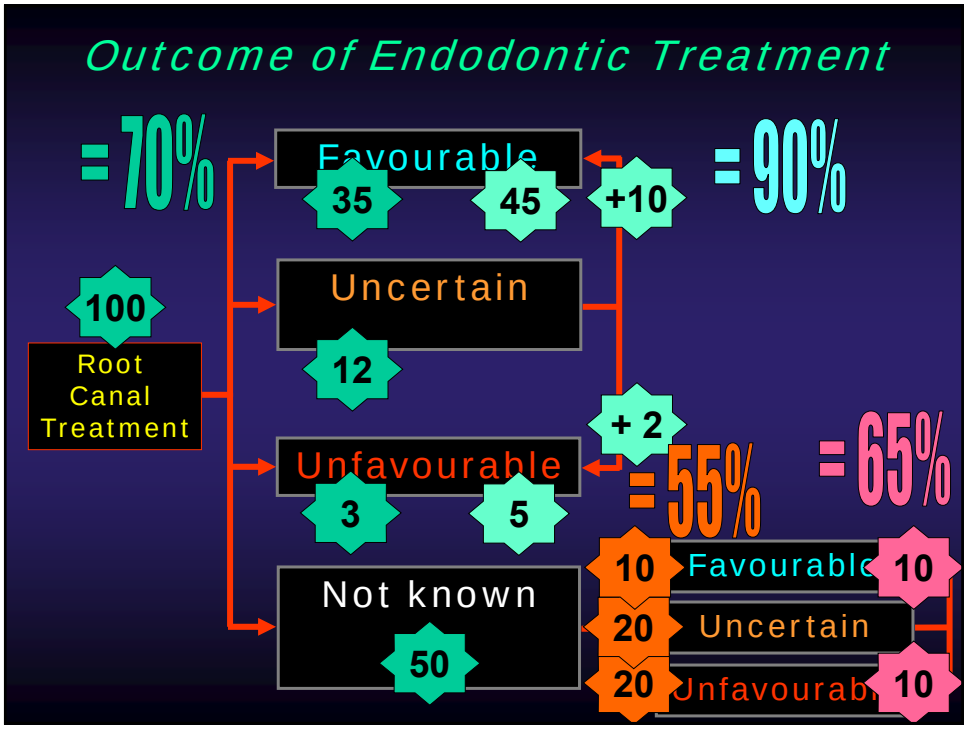
4


Outcome of Endodontic Treatment
Root Canal Treatment
Favourable
Uncertain
(Need more time)
Unfavourable

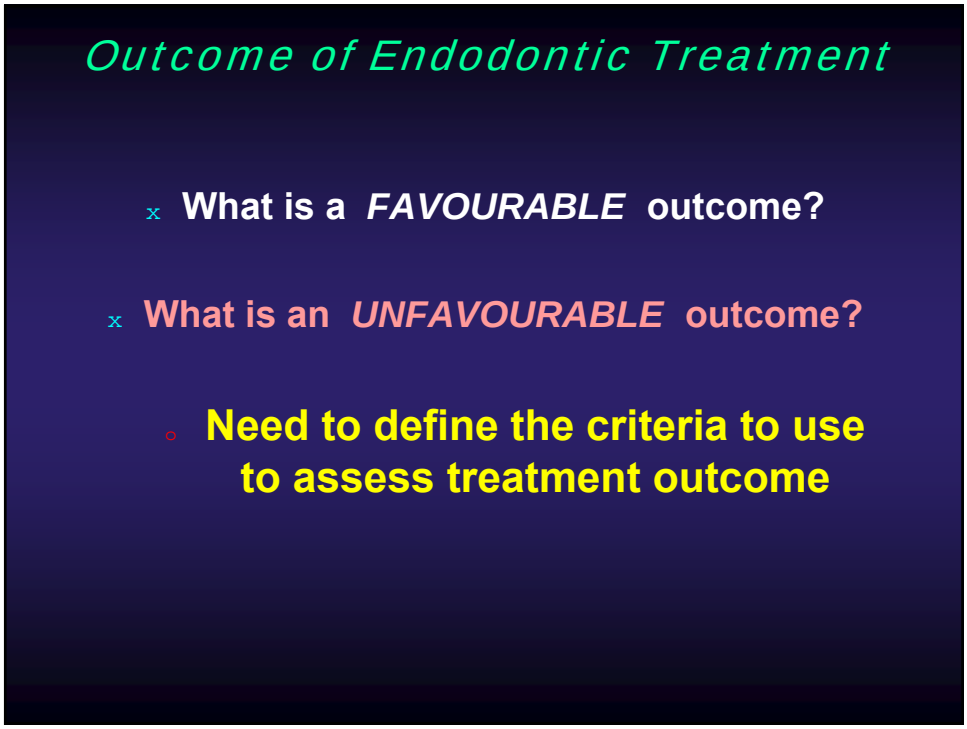
5


Outcome of Endodontic Treatment
Root Canal Treatment
Favourable
Uncertain
(Need more time)
Unfavourable
Not known
(Patient has not returned for review)
Favourable
Uncertain
Unfavourable

6


Outcome of Endodontic Treatment
=70%
Favourable
35
45
+10
=90%
100
Root Canal Treatment
Uncertain
12
+ 2
Unfavourable
3
5
=55%
=65%
10
Favourable
10
20
Uncertain
20
Unfavourable
10
Not known
50

7


Outcome of Endodontic Treatment
What is a FAVOURABLE outcome?
What is an UNFAVOURABLE outcome?
Need to define the criteria to use to assess treatment outcome

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Outcome of Endodontic Treatment

- What CRITERIA should be used to assess the outcome of endodontic treatment?
  - Histological
  - Clinical
  - Radiographic
  - Functional
  - Patient's perceptions

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Outcome of Endodontic Treatment

Histological Criteria

- No inflammatory cells
- No scar tissue
- Hard tissue repair
  - Bone
  - Cementum
- No resorption
  - Tooth
  - Bone

- *The IDEAL results !!!*
- *BUT* ... We can *NOT* assess these criteria in the clinical situation with our patients !!!

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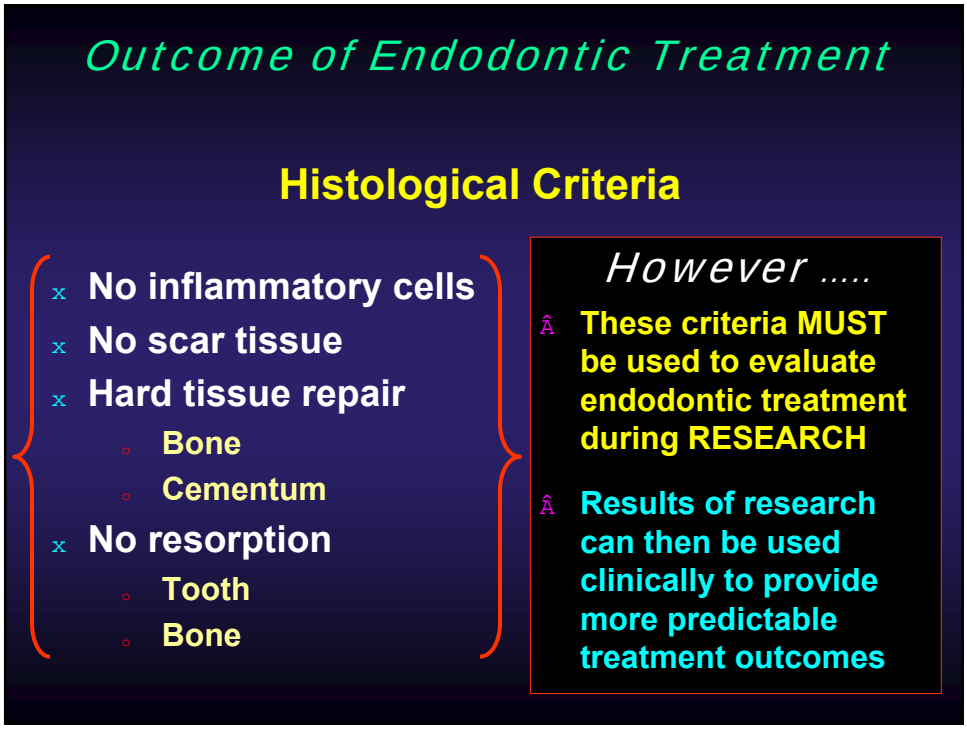
Outcome of Endodontic Treatment
Histological Criteria
No inflammatory cells
No scar tissue
Hard tissue repair
Bone
Cementum
No resorption
Tooth
Bone
However .....
These criteria MUST be used to evaluate endodontic treatment during RESEARCH
Results of research can then be used clinically to provide more predictable treatment outcomes

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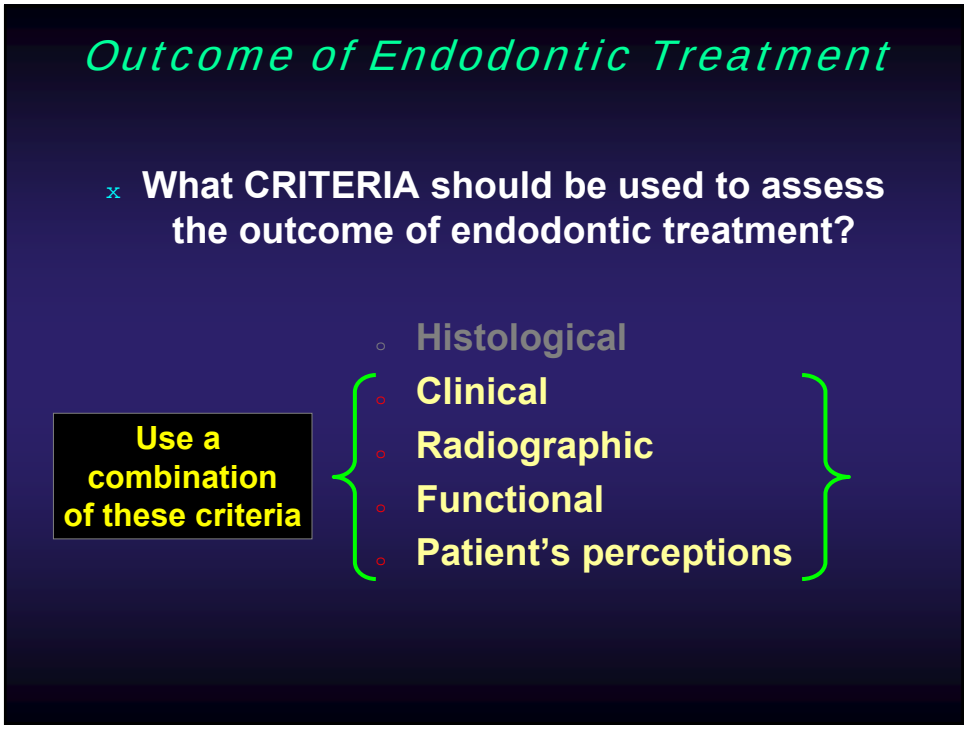
Outcome of Endodontic Treatment
What CRITERIA should be used to assess the outcome of endodontic treatment?
Use a combination of these criteria
Histological
Clinical
Radiographic
Functional
Patient's perceptions

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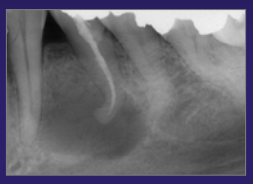
Outcome of Endodontic Treatment

CRITERIA for a *Favourable Outcome*:

- ? Lack of symptoms
  - But a lack of symptoms does not imply the lack of disease



The "Toronto study" - *JoE* 2003

- 95% of cases had no symptoms … but:
- Only 85% had repair evident radiographically

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Outcome of Endodontic Treatment

CRITERIA for a *Favourable Outcome*:

- 7 Lack of symptoms
- = Lack of evidence of ongoing pathosis
- = Radiographic signs of bone repair
  - Or no new radiolucency developing
- = No radiographic signs of resorption
- = Function maintained
- = Patient - comfortable tooth, no complaints

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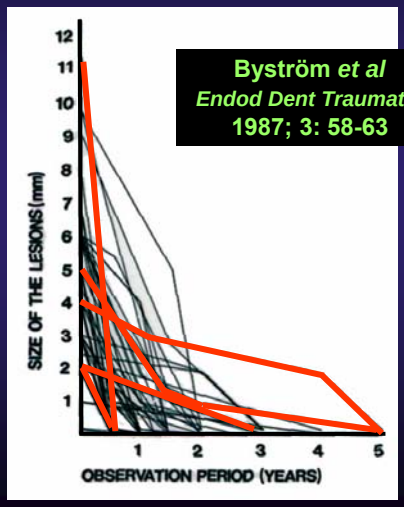
Outcome of Endodontic Treatment

WHEN should we assess the outcome?

- ? 6 months
- ? 1 year
- ? 2 years
- ? 3 years
- ? 4 years
- ? 5 years
- ? 10 years



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Outcome of Endodontic Treatment

WHEN should we assess the outcome?

- 6 months - initial indication
- 1 - 3 years - more accurate assessment
- 5 years - generally considered the time required to *accurately* assess outcome of the endodontic treatment
- *> 5 years - now really assessing the restoration rather than the RCF*

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Outcome of Endodontic Treatment

CRITERIA for an *Unfavourable Outcome*:

➔ **Anything that does not achieve the desired results for a favourable outcome**

- ***Usually because of either:***
  - ***Bacteria persisting in canals***
  - ***New bacteria entering the canals***
  - ***Ongoing periapical disease***
    - ➔ **true cyst, extra-radicular infection, FBR**

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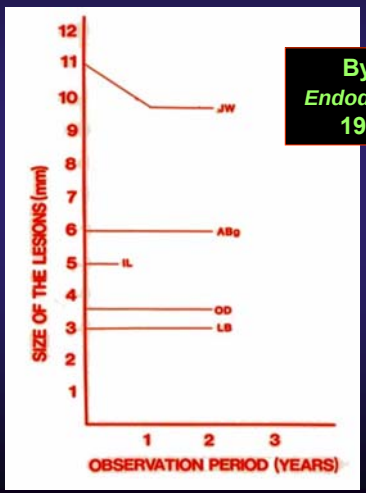
Outcome of Endodontic Treatment

Unfavourable Outcomes



Byström *et al*
Endod Dent Traumatol
1987; 3: 58-63

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Outcome of Endodontic Treatment

Criteria for Uncertain / Surviving cases

- When at least one of the criteria for a favourable outcome has not been achieved but the other criteria have been achieved - for example:
  - The pre-operative radiolucency has not healed completely or has not healed at all

  AND
  - The patient has no symptoms
  - There are no other clinical signs
  - The patient can function normally on the tooth
  - Typically noted at a review appointment

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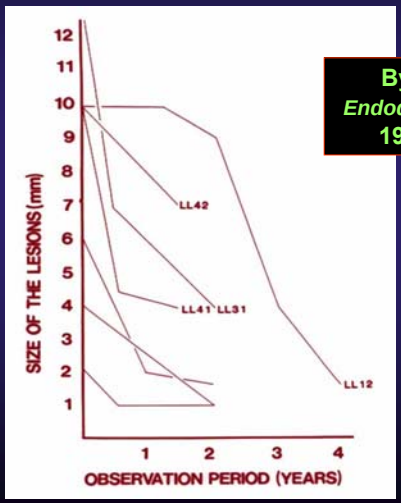
Outcome of Endodontic Treatment

Uncertain / Surviving cases



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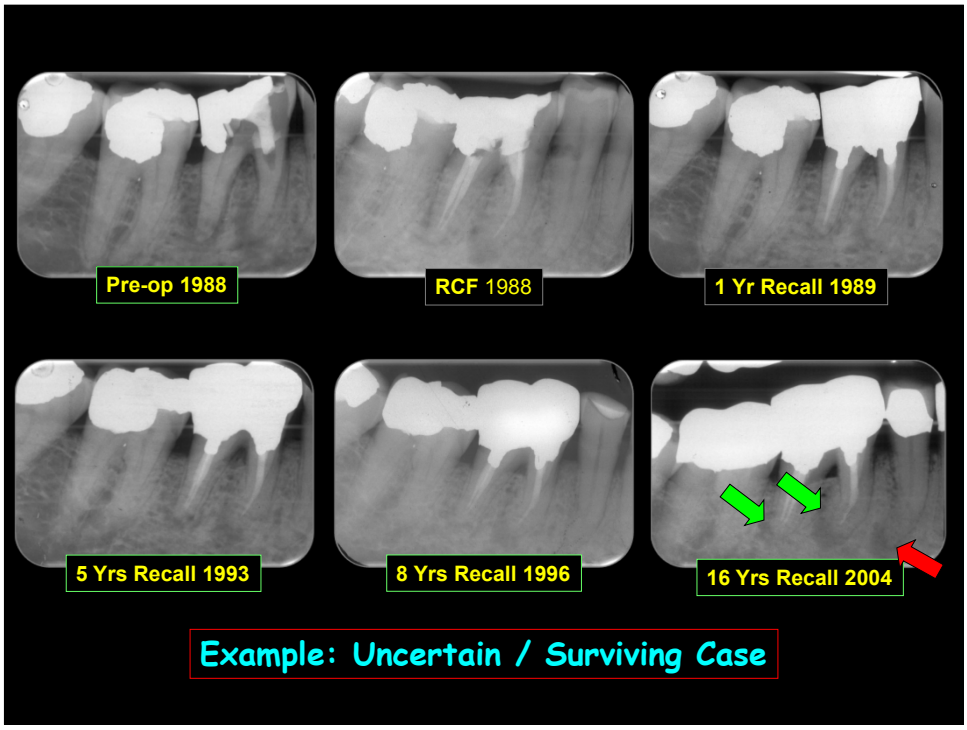

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A new way to consider root-filled teeth with periapical radiolucencies:

- Based on *WHEN* the radiolucency occurs:

1. **Early** - occur soon after treatment
   - *May be a true "failure" of the endodontic treatment - or the operator!!!*
   - *OR: may be due to a true cyst, an extra-radicular infection, a foreign body reaction or a periapical scar*
2. **Late** - occur many years later
   - A "new disease" - rather than a "failure" of endodontic treatment

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Unfavourable Endodontic Outcomes

- ***True "failures" of endodontic treatment***
  - **Occur a short time after treatment**
    - **Due to bacteria being left behind at the time of the previous treatment**
      - **Up to 5 years after treatment**
      - **Probably due to:**

- ***Inadequate treatment techniques***
- ***Inadequate asepsis during treatment***
- ***Inadequate temporaries during treatment***
- ***Inadequate restoration after the RCF***
- ***Etc, etc***

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Time Since Previous Endodontic Treatment until Re-Treatment Required

Allen *et al* J Endod 1987

No. of Years	% of cases	Cum. %
< 1	21.9 %	21.9 %
1 - 2	37.3	59.2
2 - 5	13.7	72.9
> 5	27.1	100.0

No. of cases examined: 1300

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Time Since Previous Endodontic Treatment until Re-Treatment Required

Abbott 1998

No. of Years	% of cases	Cum. %
< 1	21.2 %	21.2 %
1 - 2	15.8	37.0
2 - 5	24.0	61.0
> 5	39.0	100.0

No. of cases examined: 575

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"Infected Canal Disease Cycle"

- Small number of bacteria in the canal
  - Left at time of treatment
- Gradual proliferation / increase in numbers
- Periapical response develops
  - Chronic situation for some time
- Gradual increase in periapical involvement
  - No symptoms until response well established
- Acute phase when conditions suitable
  - Many factors can affect the "balance" situation
  - e.g. Other illness, treatment, stress, tiredness, etc

This cycle can take ?? 3 mths - 5 yrs

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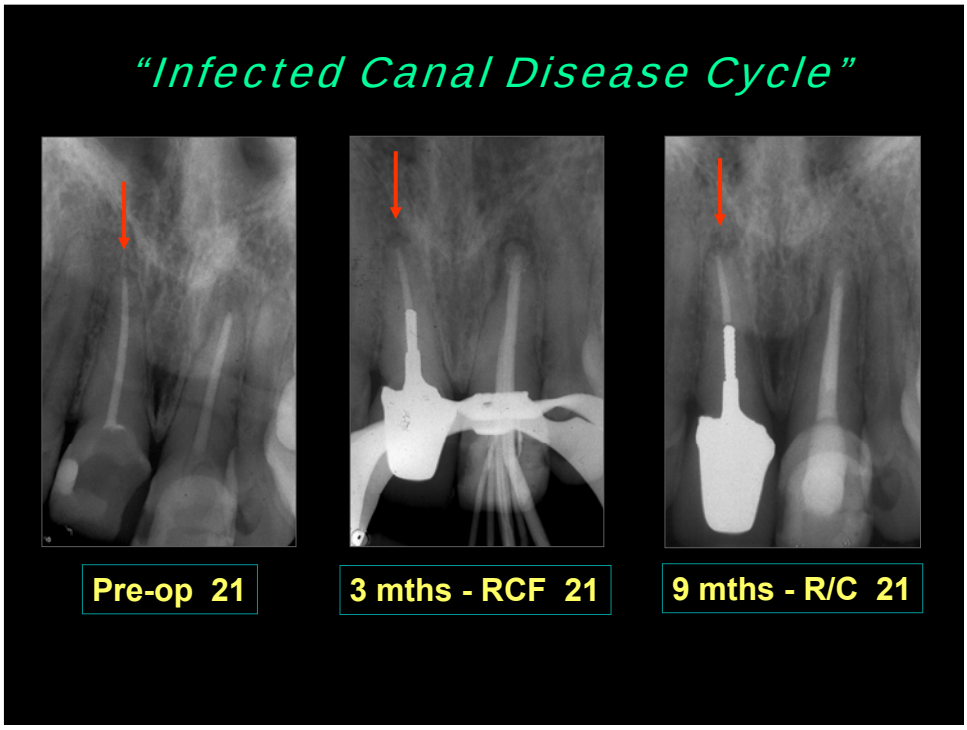

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A new way to consider root-filled teeth with periapical radiolucencies:

- Based on ***WHEN*** the radiolucency occurs:

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   - ↳ *OR: may be due to a true cyst, an extra-radicular infection, a foreign body reaction or a periapical scar*
2. **Late** - occur many years later
   - ↳ A "new disease" - rather than a "failure" of endodontic treatment

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Root-Filled Teeth with Radiolucencies

- Radiolucency may occur many years after endodontic treatment
  - NOT a FAILURE of endodontics.....
  - ..... But a ***NEW DISEASE***

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Root-Filled Teeth with Radiolucencies

- Radiolucency may occur many years after endodontic treatment
  - NOT a FAILURE of endodontics.....
  - ..... But a ***NEW DISEASE***
  - Bacteria re-enter the tooth
    - Through:
      - Broken down restorations
      - Caries
      - Cracks
      - Trauma – fractures
      - Etc, etc

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Restoration Breakdown

- All restorations have a finite life span
- Bacterial penetration may be occurring for a long time before:
  - Symptoms
  - Clinical signs
  - Caries
  - Fracture
  - Dislodgment
  - etc, etc…..

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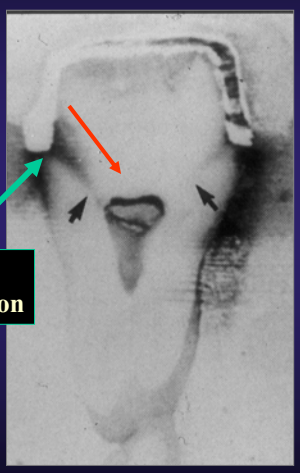
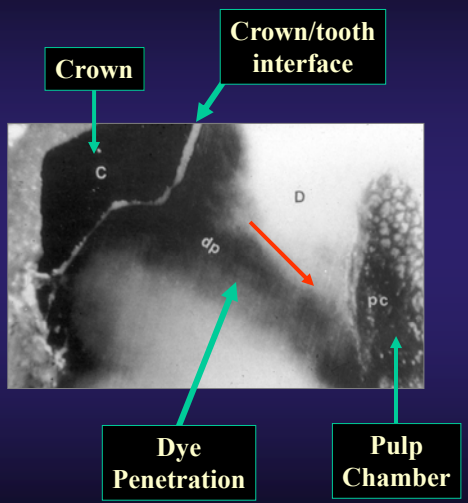
Restoration Breakdown



Pashley 1990



Goldman *et al* 1992

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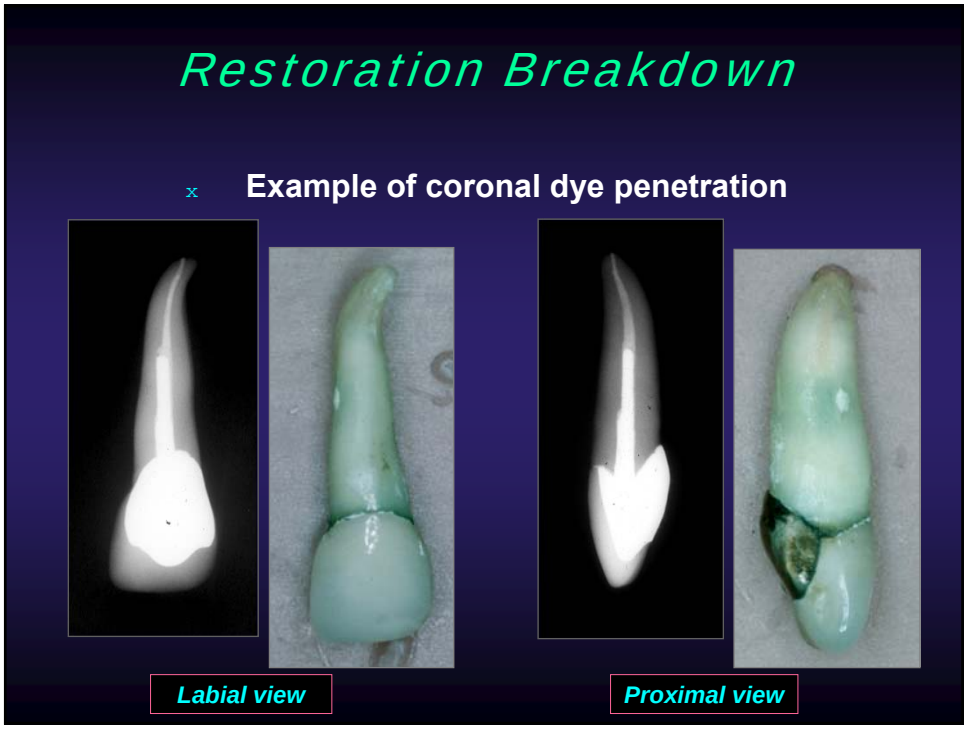
Restoration Breakdown
Example of coronal dye penetration
Labial view
Proximal view

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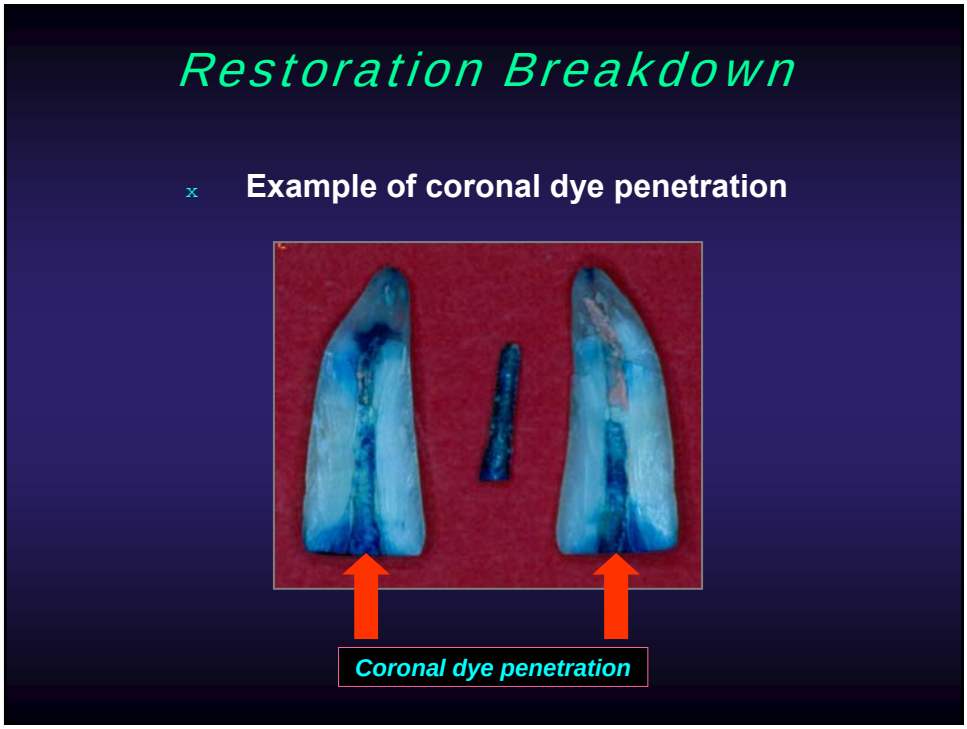
Restoration Breakdown
Example of coronal dye penetration
Coronal dye penetration

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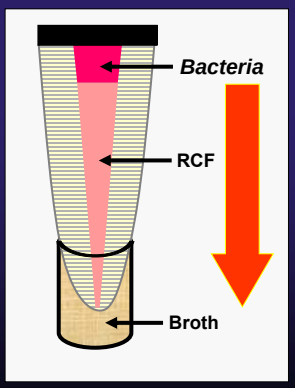
Bacterial Migration

- Many studies have demonstrated that various bacteria can migrate along the entire length of a root canal filling
  - Coronal ⇧ Apical
- Time for penetration varies
  - e.g. 2 days, 3 days, 20 days, 30 days, 60 days, 90 days, etc.



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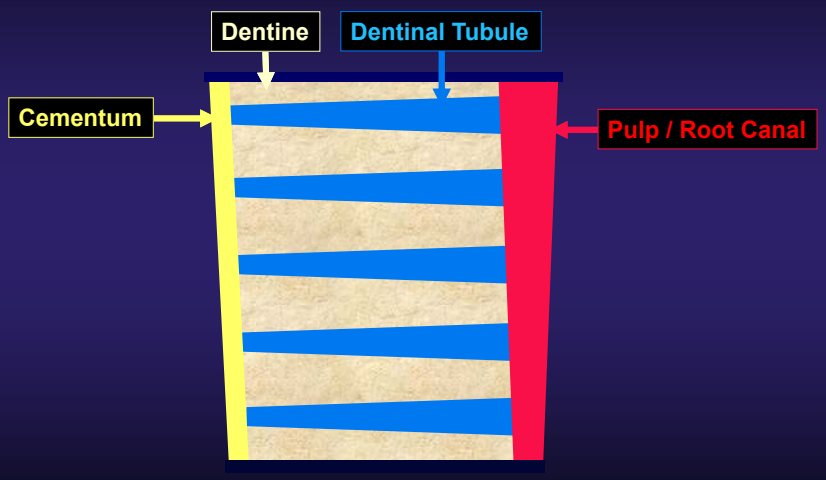
Traditional Concept of Dentine



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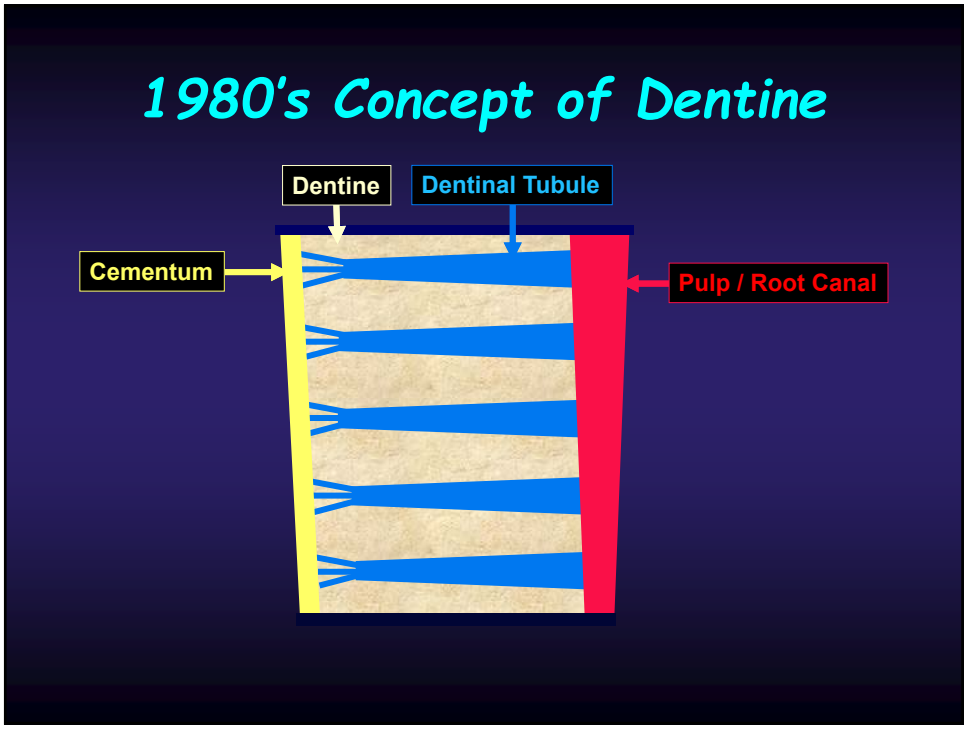
1980's Concept of Dentine
Dentine
Dentinal Tubule
Cementum
Pulp / Root Canal

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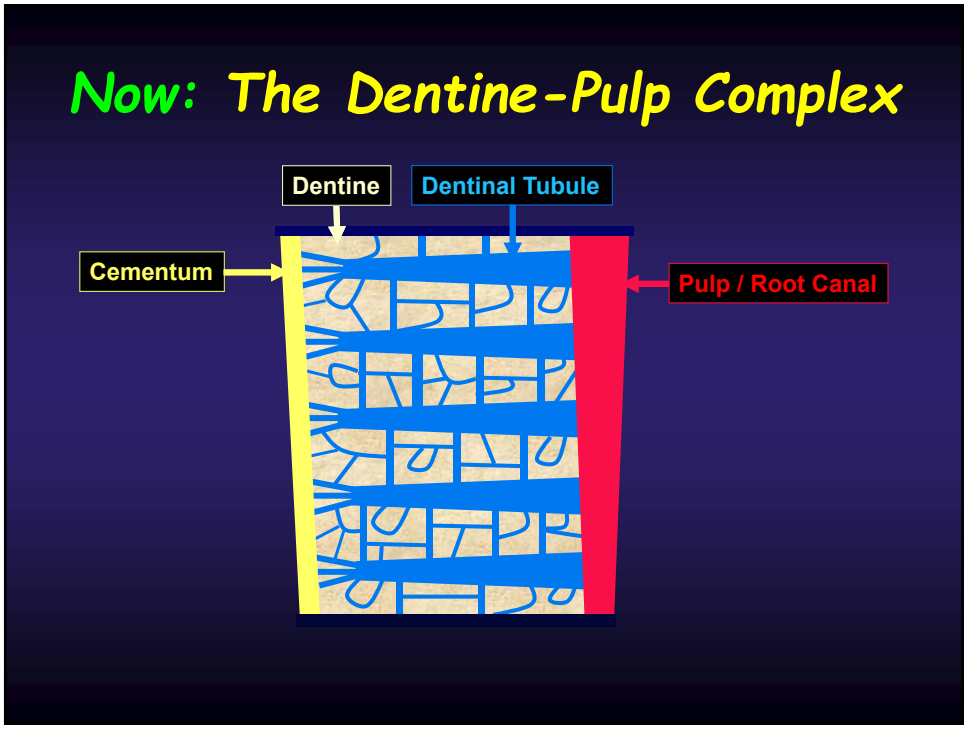
Now: The Dentine-Pulp Complex
Dentine
Dentinal Tubule
Cementum
Pulp / Root Canal

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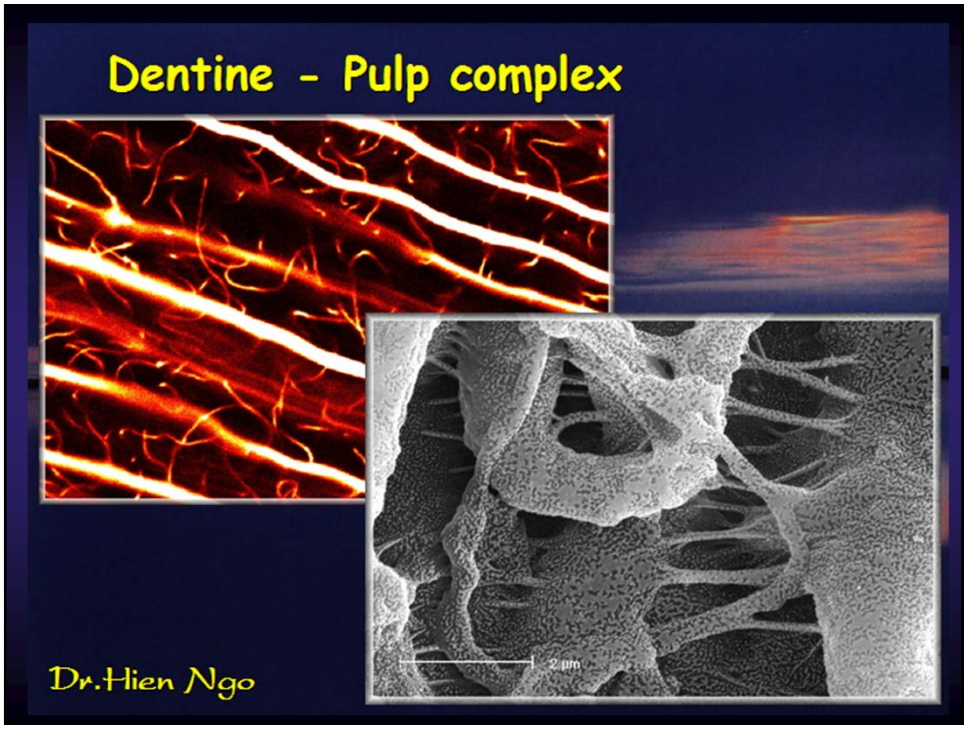

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The presence and distribution of bacteria in dentinal tubules of root-filled teeth

Kwang S, Abbott PV.

Int Endo J - 2014: 47, 600 - 610.

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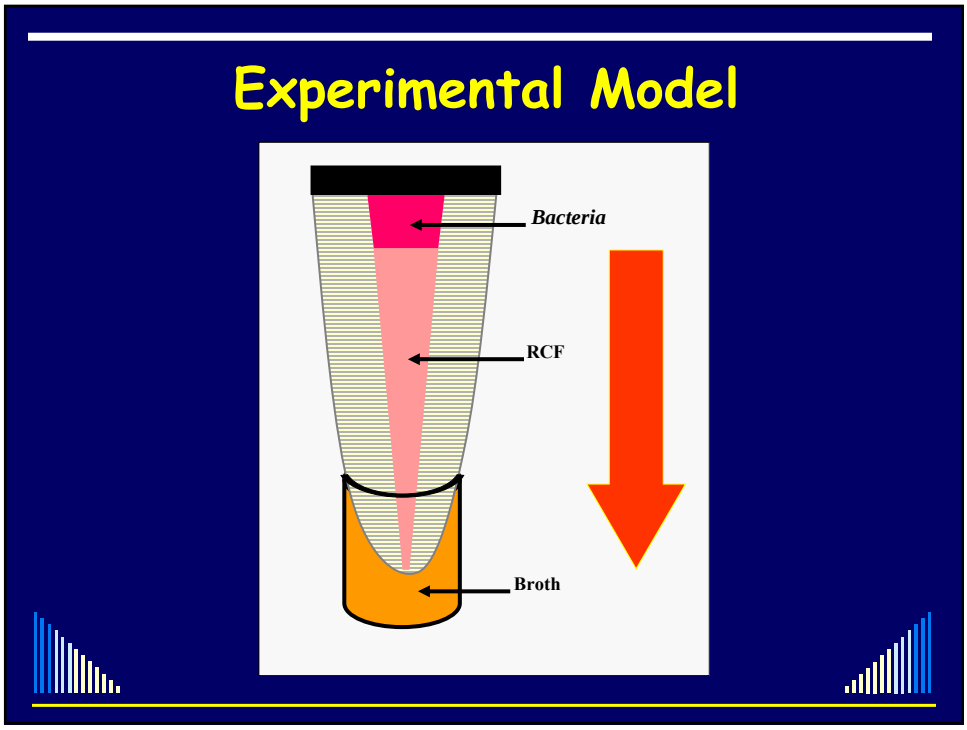
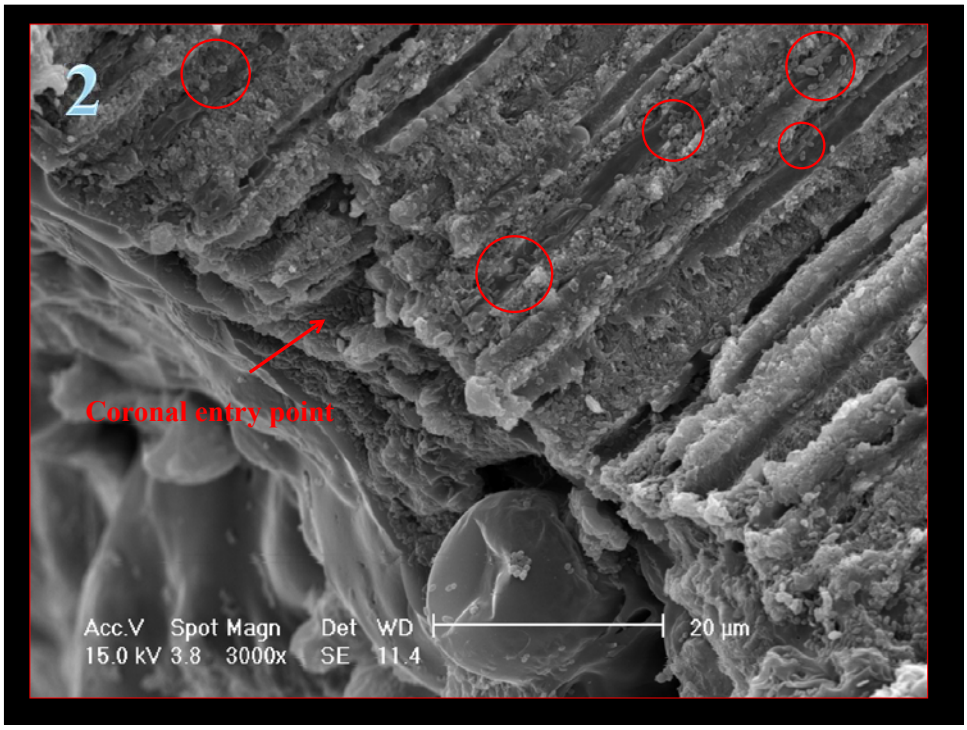

Experimental Model
Bacteria
RCF
Broth

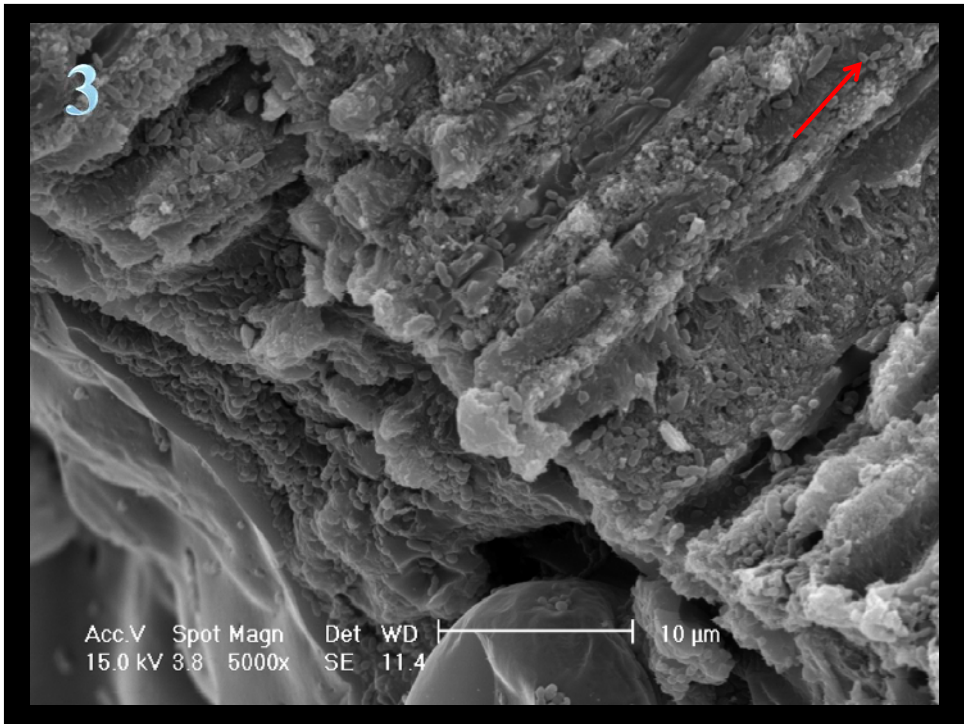
41


1
Acc.V Spot Magn Det WD 200 µm
15.0 kV 3.8 250x SE 11.4

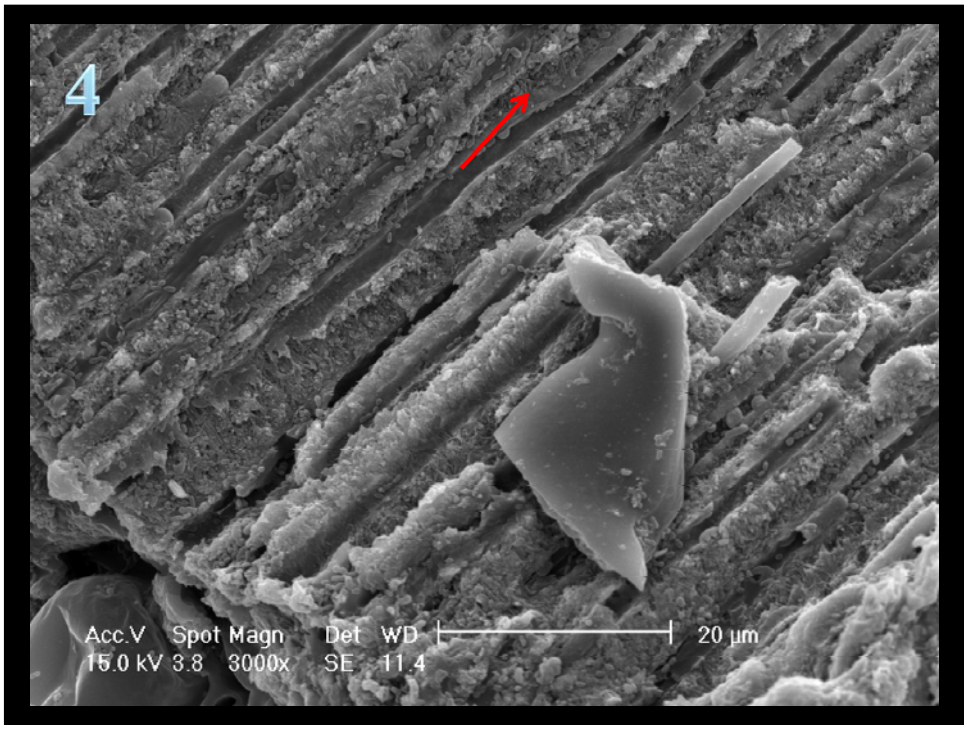
42


2
Coronal entry point
Acc.V Spot Magn Det WD 20 µm
15.0 kV 3.8 3000x SE 11.4

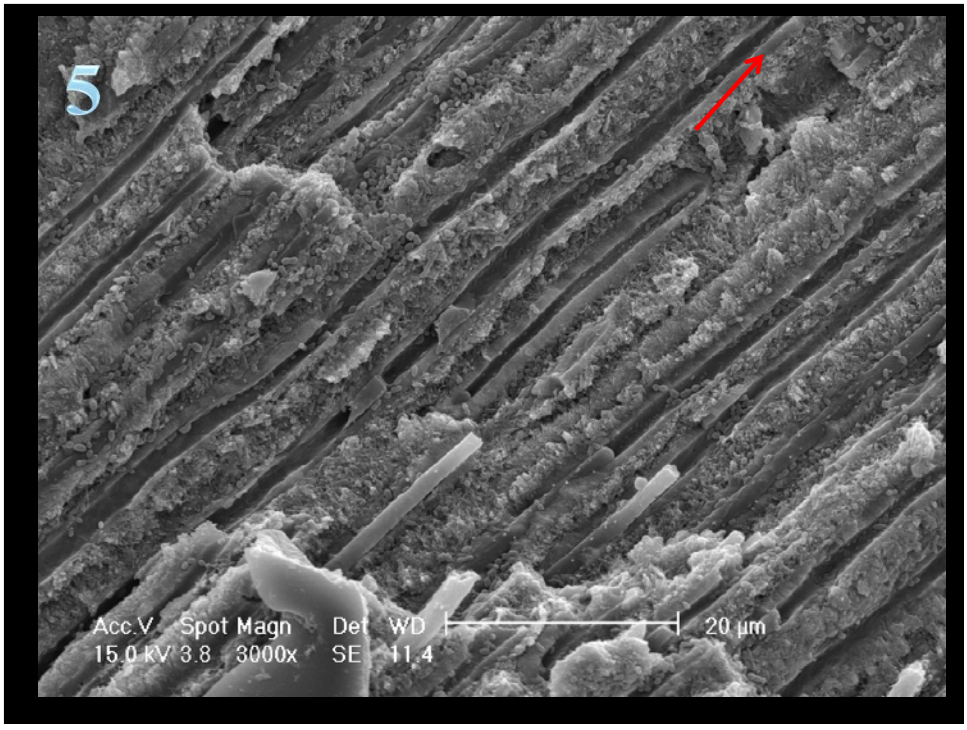
43


3
Acc.V Spot Magn Det WD 10 µm
15.0 kV 3.8 5000x SE 11.4

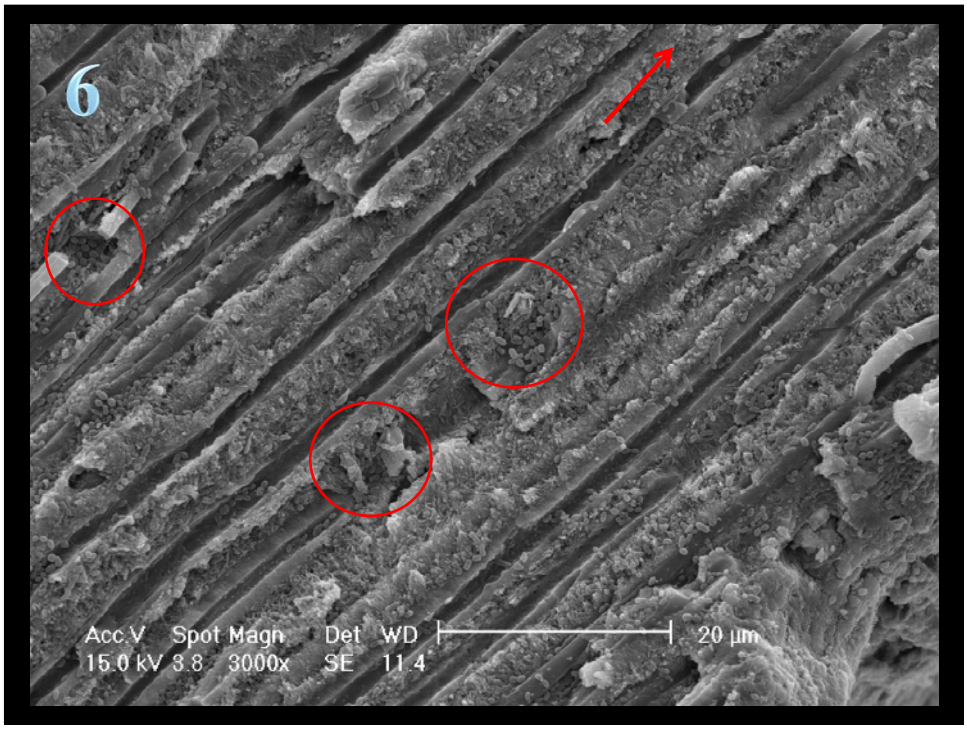
44


4
Acc.V Spot Magn Det WD 20 µm
15.0 kV 3.8 3000x SE 11.4

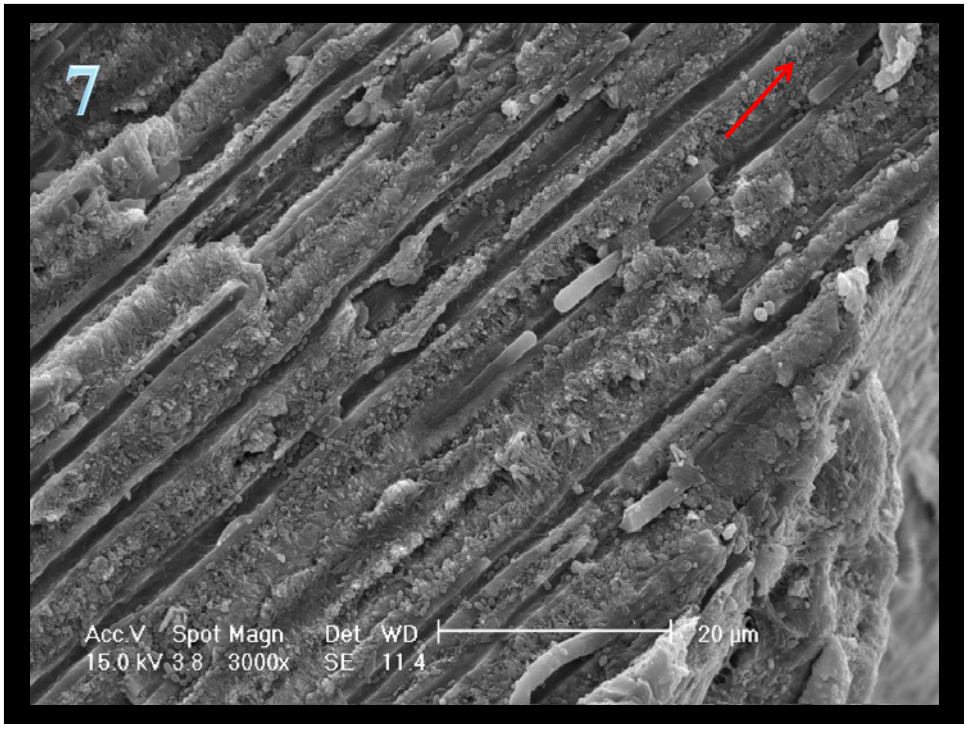
45


5
Acc.V Spot Magn Det WD 20 µm
15.0 kV 3.8 3000x SE 11.4

46


6
Acc.V Spot Magn Det WD 20 µm
15.0 kV 3.8 3000x SE 11.4

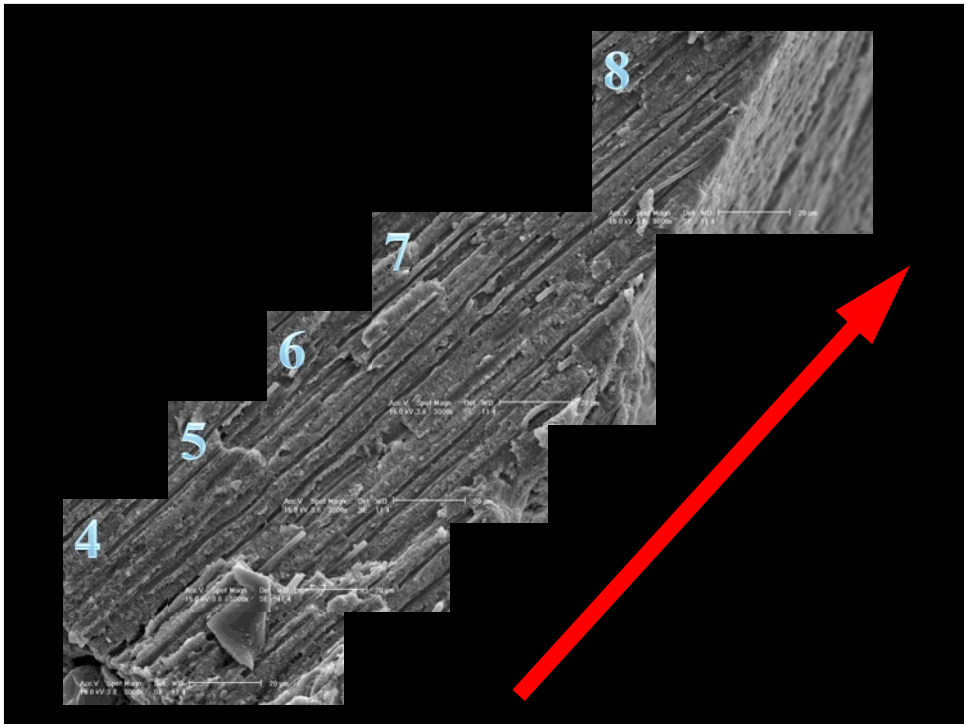
47


7
Acc.V Spot Magn Det WD 20 µm
15.0 kV 3.8 3000x SE 11.4

48


8
Root canal wall
Acc.V Spot Magn Det WD 20 µm
15.0 kV 3.0 3000x SE 11.4

49


8
7
6
5
4

50

Effect of Coronal Restorations

Ray & Trope *Int Endod J* 1995

Treatment Outcome - Favourable

RCF's:	Restorations: Good	Poor
Good	91.4 %	44.1 %
Poor	69.6 %	18.1 %

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Effect of Coronal Restorations

Ray & Trope *Int Endod J* 1995

- Concluded:

"... The quality of the coronal restoration was more important than the quality of the RCF for apical periodontal healing ..."

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Outcome of Endodontic Treatment

- High quality endodontic treatment, based on sound biological principles, will improve the number of favourable outcomes
  - By removing intra-radicular bacteria
    - with accurate diagnosis, removal of the cause, aseptic techniques, mechanical cleaning, disinfection via irrigation and medication, interim and temporary restorations, good RCF's, final restoration, etc
  - By reducing the extrusion of foreign bodies into the periapical tissues

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Outcome of Endodontic Treatment

- BUT: there will be an *upper ceiling* to the number of favourable outcomes that can be achieved by conventional endodontic treatment
  - Due to the role played by true cysts and extra-radicular bacteria
- The highest possible number of favourable outcomes will be limited by the incidence of these pathological entities

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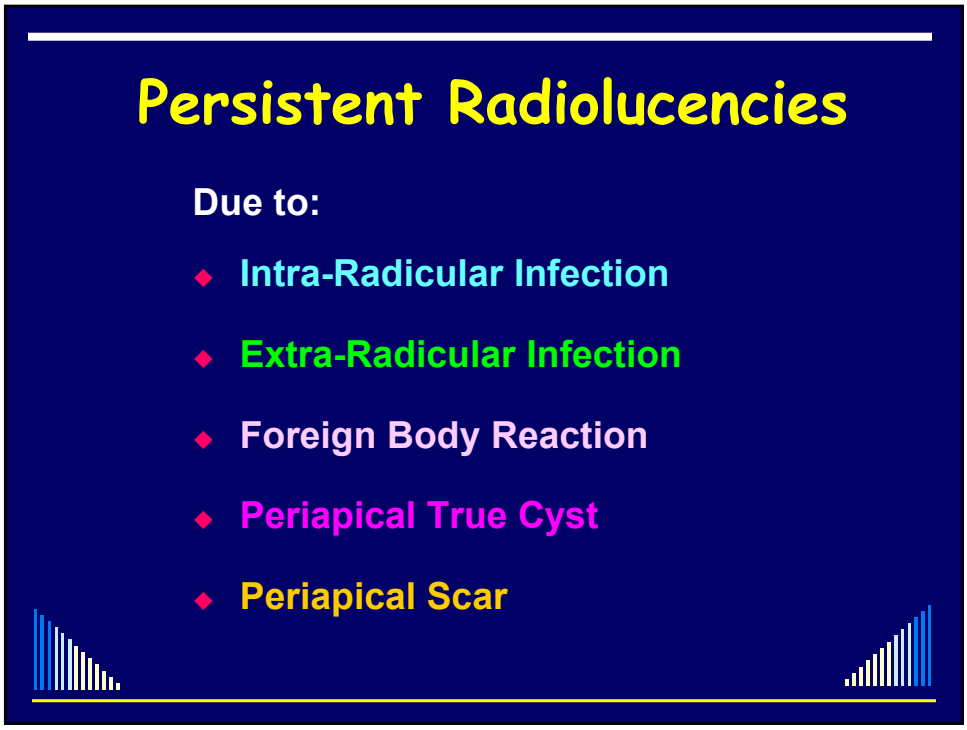
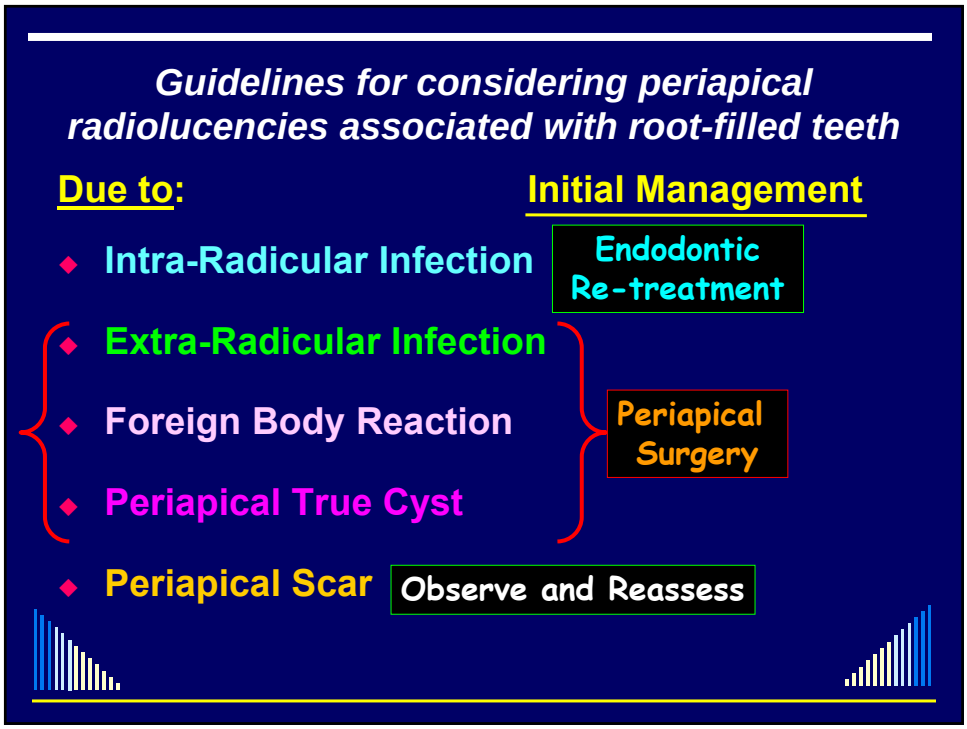

Persistent Radiolucencies
Due to:
Intra-Radicular Infection
Extra-Radicular Infection
Foreign Body Reaction
Periapical True Cyst
Periapical Scar

55


Guidelines for considering periapical radiolucencies associated with root-filled teeth
Due to:
Initial Management
Intra-Radicular Infection
Endodontic Re-treatment
Extra-Radicular Infection
Foreign Body Reaction
Periapical True Cyst
Periapical Surgery
Periapical Scar
Observe and Reassess

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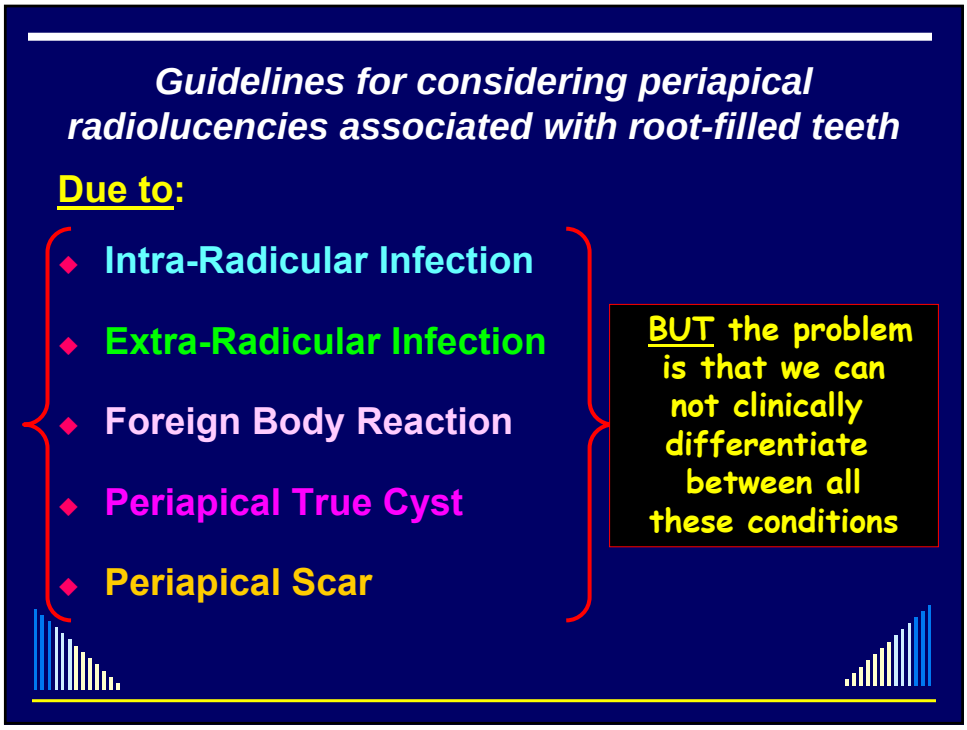
Guidelines for considering periapical radiolucencies associated with root-filled teeth
Due to:
Intra-Radicular Infection
Extra-Radicular Infection
Foreign Body Reaction
Periapical True Cyst
Periapical Scar
BUT the problem is that we can not clinically differentiate between all these conditions

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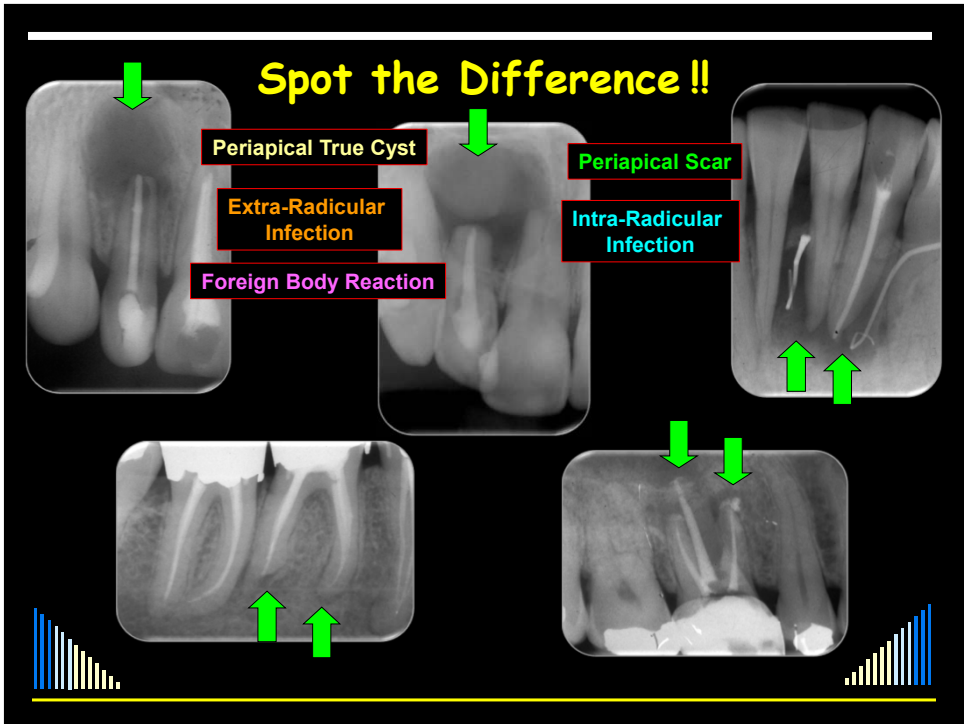
Spot the Difference !!
Periapical True Cyst
Extra-Radicular Infection
Foreign Body Reaction
Periapical Scar
Intra-Radicular Infection

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Guidelines for considering periapical radiolucencies associated with root-filled teeth

Due to:

- Intra-Radicular Infection
- Extra-Radicular Infection
- Foreign Body Reaction
- Periapical True Cyst
- Periapical Scar

How common are each of these?

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Incidence of Radicular Cysts

Table I. Incidence of radicular cysts among periapical lesions

Reference	Cysts (%)	Granuloma (%)	Others (%)	Total lesions (n)
Sommer[35]	6	84	10	170
Block et al.[48]	6	94	—	230
Sonnabend and Oh[11]	7	93	—	237
Winstock[28]	8	83	9	9804*
Linenberg et al.[40]	9	80	11	110
Wais[39]	14	84	2	50
Patterson et al.[49]	14	84	2	510
Simon[29]	17	54	23	35
Stockdale & Chandler[50]	17	77	6	1108
Lin et al.[36]	19	—	81	150
Nobuhara and Del Rio[51]	22	59	19	150
Baumann and Rossman[38]	26	74	—	121
Mortensen et al.[42]	41	59	—	396
Bhaskar[25]	42	48	10	2308
Spatafore et al.[52]	42	52	6	1659
Lalonde and Luebke[27]	44	45	11	800
Seltzer et al.[26]	51	45	4	87
Priebe et al.[24]	55	46	—	101

Cysts: 6 - 55%
Granuloma: 0 - 94%
"Others": 0 - 81%

Total: 18,026 lesions

Nair *et al* - *OS:OM:OP:OR:Endo* 1996

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Biopsy Reports – Various Studies

Diagnosis	Nair *et al* 1996
Periapical Granuloma	35%
Periapical Abscess	50%
Periapical Cyst	6% - Pocket 9% - True
Periapical Scar	N/R
Foreign Body Reaction	N/R
Extra-Radicular Infection	N/R
Keratocyst	N/R

- Few patients had pain
- Not all teeth had RCF
- Most had extensive caries or coronal breakdown
- All teeth were extracted
- Periapical soft tissue lesion had to be attached to tooth apex
- *"Represented an unknown fraction of all teeth extracted with periapical radiolucencies"*
- Complete serial sectioning
- Light microscopy and TEM

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Biopsy Reports – Various Studies

Diagnosis	Nair *et al* 1996	Abbott 1999
Periapical Granuloma	35%	61%
Periapical Abscess	50%	4%
Periapical Cyst	6% - Pocket 9% - True	14%
Periapical Scar	N/R	1%
Foreign Body Reaction	N/R	20%
Extra-Radicular Infection	N/R	2% Actinomycosis
Keratocyst	N/R	N/R

- Biopsies during surgery
- Most teeth had Root Canal Re-treatment before surgery
- Half had previous apical surgery – esp. with retrograde amalgam
- Many had over-extended previous RCF
- Some had continual pain or infection despite RC Re-tx
- Light microscopy – only a few sections viewed

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Biopsy Reports – Various Studies

Diagnosis	Nair *et al* 1996	Abbott 1999	Love & Firth 2009
Periapical Granuloma	35%	61%	77%
Periapical Abscess	50%	4%	3%
Periapical Cyst	6% - Pocket 9% - True	14%	18%
Periapical Scar	N/R	1%	3%
Foreign Body Reaction	N/R	20%	25% in a granuloma 2% in cysts 1% in scars
Extra-Radicular Infection	N/R	2% Actinomycosis	N/R
Keratocyst	N/R	N/R	N/R

- Biopsies during surgery
- R'lucency persisting for >4 years or enlarging
- Some patients had pain
- RCT not possible - or already performed but no healing
- Light microscopy – up to four sections viewed

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Biopsy Reports – Various Studies

Diagnosis	Nair *et al* 1996	Abbott 1999	Love & Firth 2009	Schultz *et al* 2009	Wang *et al* 2004	Becconsall-Ryan *et al* 2010
Periapical Granuloma	35%	61%	77%	70%	83%	65%
Periapical Abscess	50%	4%	3%	5%	N/R	3%
Periapical Cyst	6% - Pocket 9% - True	14%	18%	23%	14%	32%
Periapical Scar	N/R	1%	3%	1%	3%	1%
Foreign Body Reaction	N/R	20%	25% in a granuloma 2% in cysts 1% in scars	N/R	N/R	N/R
Extra-Radicular Infection	N/R	2% Actinomycosis	N/R	N/R	N/R	N/R
Keratocyst	N/R	N/R	N/R	1%	N/R	N/R

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Outcome of Endodontic Treatment

- BUT: even with high quality "intracanal treatment", there will still be an *upper limit* to the number of favourable outcomes that can be achieved by conventional endodontic treatment Largely determined by the incidence of:
  - Residual intracanal bacteria → ?? 35 - 83 %
  - Extra-radicular infection → ?? 2 %
  - Peri-radicular true cysts → ?? 9 %
  - Foreign body reactions → ?? 20 - 25 %
  - Periapical scars → ?? 1 - 3 %

Biopsy studies - limited value - only the % of the biopsies examined, not the % in all patients

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Specialist Endodontic Practice Service Mix - Surgical Cases

- 1986 - 1990
  - 10.6% of all cases treated
    - Abbott - *J Endod* 1994; 20: 253-7
- 1995 - 1999
  - 1% of cases
- 2005 - 2010
  - 0.1% of cases

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Guidelines for considering periapical radiolucencies associated with root-filled teeth

Due to:

- Intra-Radicular Infection
- Extra-Radicular Infection
- Foreign Body Reaction
- Periapical True Cyst
- Periapical Scar

Usually also have an infected root canal system - often the first problem

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Guidelines for considering periapical radiolucencies associated with root-filled teeth

- **Ideally: do endodontic re-treatment first since most periapical radiolucencies are caused by, or are associated with, intra-radicular bacteria**
  - Then the treatment will be more predictable and the rate of favourable outcomes will be higher
    - → Since the cause of the radiolucency is addressed
- **If still no healing, consider periapical surgery**
  - If re-treatment before surgery: 24% higher rate of healing than when surgery done alone (Grung *et al* - 1990)

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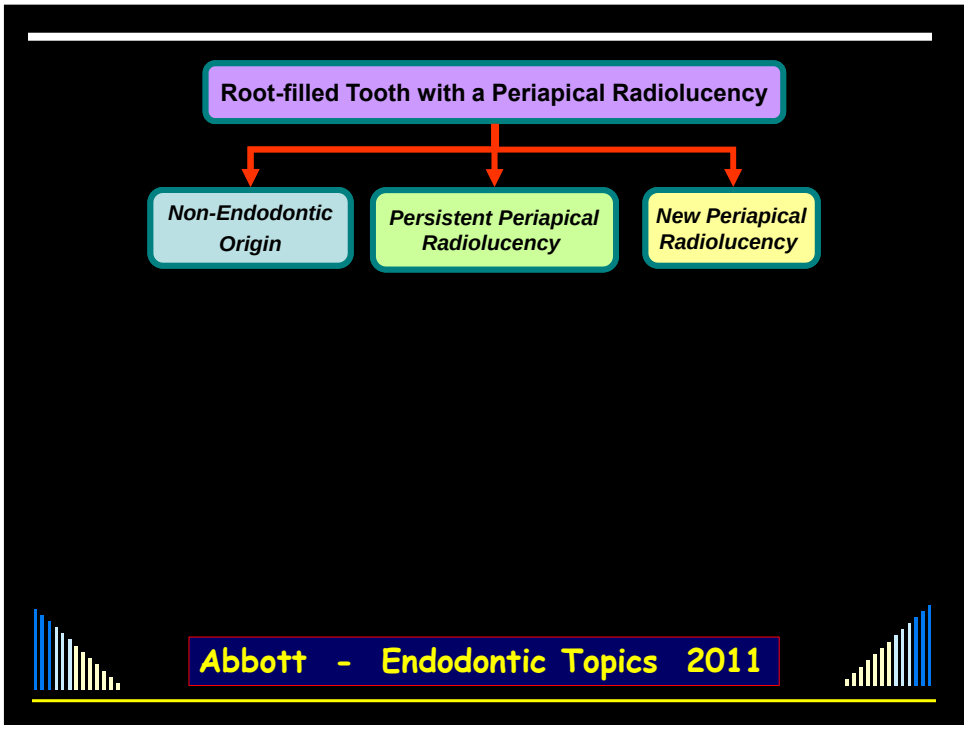

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Differential diagnoses for periapical radiolucencies associated with root-filled teeth

1. A lesion that mimics a periapical radiolucency but is not endodontic in origin
2. A persistent radiolucency on a recently root-filled tooth (< 5 years ago) due to one of the following:
   - An intra-radicular infection
   - An extra-radicular infection
   - A foreign body reaction
   - A periapical true cyst, or
   - A periapical scar
3. A new radiolucency due to:
   - Any of the above presenting as a new lesion on a tooth that had the RCF done > 5 years ago

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Differential diagnoses for periapical radiolucencies associated with root-filled teeth

1. A lesion that mimics a periapical radiolucency but is not endodontic in origin


Radiolucent lesions of the jaws that may present as "periapical" pathosis and should be considered as part of the differential diagnosis of such pathoses.

EPITHELIAL CYSTS

Developmental Odontogenic
- Odontogenic keratocyst
- Dentigerous cyst
- Lateral periodontal cyst
- Glandular odontogenic cyst

Non-Odontogenic
- Nasopalatine duct cyst
- Nasolabial cyst

NEOPLASMS AND OTHER TUMOURS

Odontogenic
BENIGN
- Ameloblastoma
- Squamous odontogenic tumour
- Calcifying epithelial odontogenic tumour
- Clear cell odontogenic tumour
- Ameloblastic fibroma
- Ameloblastic fibrodentinoma
- Odontoameloblastoma
- Adenomatoid odontogenic tumour
- Calcifying odontogenic cyst
- Odontogenic fibroma
- Odontogenic myxoma
- Benign cementoblastoma

CARCINOMAS
- Malignant ameloblastoma
- Primary intraosseous carcinoma
- Malignant variants of other odontogenic tumours
- Malignant changes in odontogenic cysts

SARCOMAS
- Ameloblastic fibrosarcoma
- Ameloblastic fibrodentinosarcoma
- Odontogenic carcinosarcoma

Non-Odontogenic
BENIGN
- Cemento-ossifying fibroma
- Neurofibroma
- Neurilemoma
- Osteoid osteoma
- Osteoblastoma
- Chondroma
- Idiopathic histiocytosis

MALIGNANT
- Ewing's sarcoma
- Chondrosarcoma
- Osteosarcoma
- Neurogenic sarcoma
- Carcinoma of the maxillary sinus
- Malignant neural tumours
- Burkitt's lymphoma
- Metastatic carcinoma
- Primary lymphoma of bone
- Plasma cell neoplasms
  - Solitary plasmacytoma
  - Multiple myeloma
- Malignant salivary gland tumours

NON-NEOPLASTIC BONE LESIONS
- Fibrous dysplasia
- Cemento-osseous fibroma & cemento-osseous dysplasias (including periapical cemental dysplasia and florid osseous dysplasia)
- Cherubism
- Central giant cell lesions
- Central haemangioma of bone
- Aneurysmal bone cyst
- Simple (traumatic/solitary/haemorrhagic) bone cyst

INFLAMMATORY LESIONS
- Radicular cysts (of pulpal origin)
  - Apical: true, pocket
  - Lateral
  - Residual
- Paradental cysts - including:
  - Inflammatory collateral cyst
  - Mandibular infected buccal cyst
- Periapical granuloma
- Condensing osteitis (also called idiopathic bone sclerosis)
- Periapical abscess
- Osteomyelitis
- Tuberculosis

METABOLIC DISEASES
- Paget's disease (initial phase)
- Hyperparathyroidism

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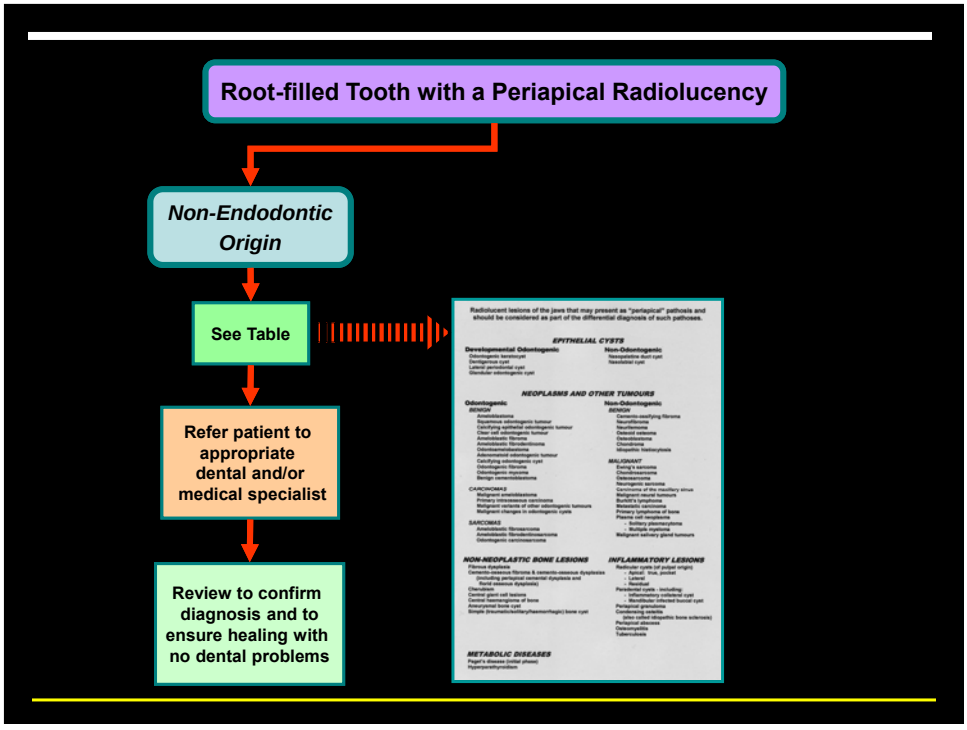

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Differential diagnoses for periapical radiolucencies associated with root-filled teeth

2. A persistent radiolucency on a recently root-filled tooth (< 5 years ago) due to one of the following:

   A. An intra-radicular infection

   B. An extra-radicular Infection

   C. A foreign body reaction

   D. A periapical true cyst, or

   E. A periapical scar

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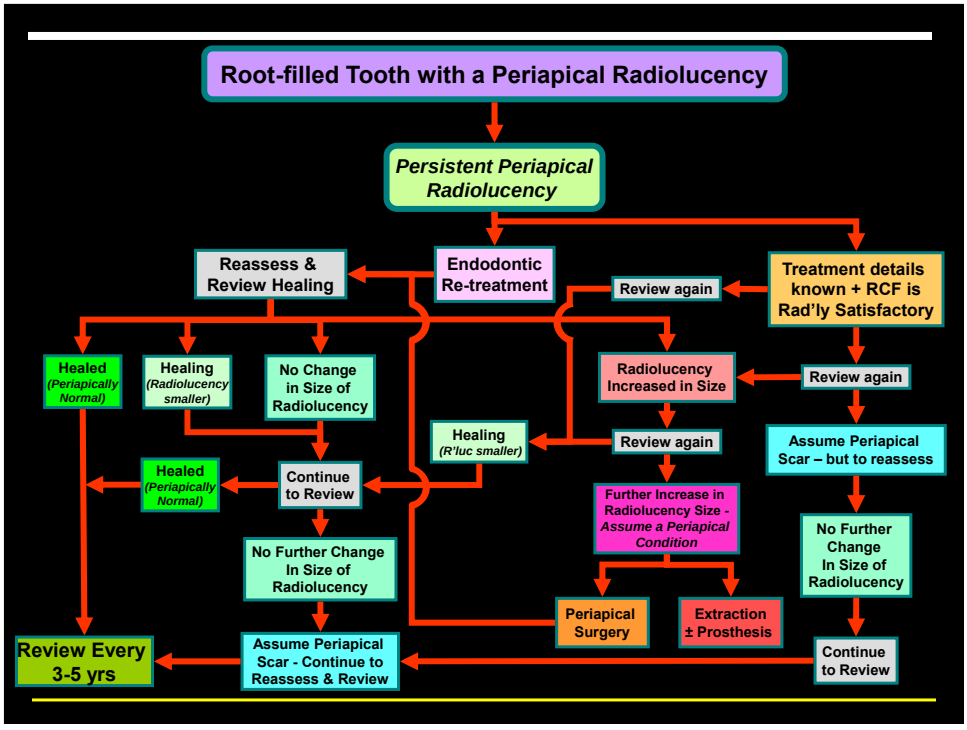

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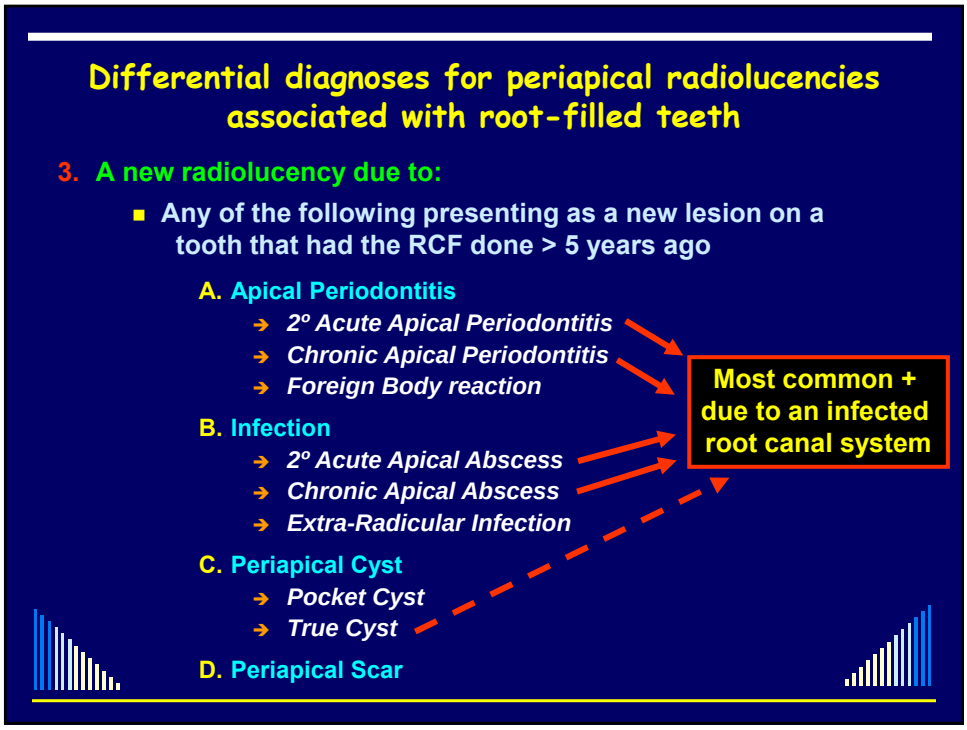
Differential diagnoses for periapical radiolucencies associated with root-filled teeth
3. A new radiolucency due to:
Any of the following presenting as a new lesion on a tooth that had the RCF done > 5 years ago
A. Apical Periodontitis
2º Acute Apical Periodontitis
Chronic Apical Periodontitis
Foreign Body reaction
B. Infection
2º Acute Apical Abscess
Chronic Apical Abscess
Extra-Radicular Infection
C. Periapical Cyst
Pocket Cyst
True Cyst
D. Periapical Scar
Most common + due to an infected root canal system

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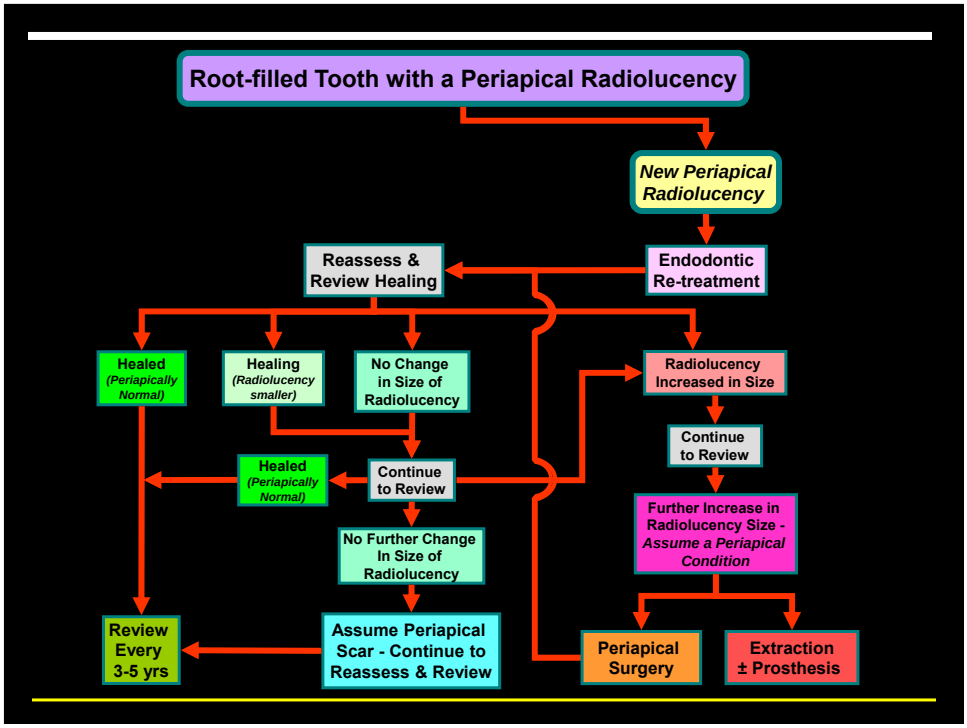
Root-filled Tooth with a Periapical Radiolucency
New Periapical Radiolucency
Endodontic Re-treatment
Reassess & Review Healing
Healed (Periapically Normal)
Healing (Radiolucency smaller)
No Change in Size of Radiolucency
Radiolucency Increased in Size
Continue to Review
Healed (Periapically Normal)
Continue to Review
Further Increase in Radiolucency Size - Assume a Periapical Condition
No Further Change In Size of Radiolucency
Review Every 3-5 yrs
Assume Periapical Scar - Continue to Reassess & Review
Periapical Surgery
Extraction ± Prosthesis

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Guidelines for considering periapical radiolucencies associated with root-filled teeth

SUMMARY

- ***Do endodontic re-treatment first !!!***

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Managing Persistent Radiolucencies

- **Ideally: do endodontic re-treatment first since most periapical radiolucencies are caused by, or are associated with, intra-radicular bacteria**
  - **Therefore the rate of favourable outcomes will be higher**
  - **As shown by Grung *et al* (1990):**
    - **If re-treatment before surgery**
      - **24% higher rate of healing than when surgery was done alone**

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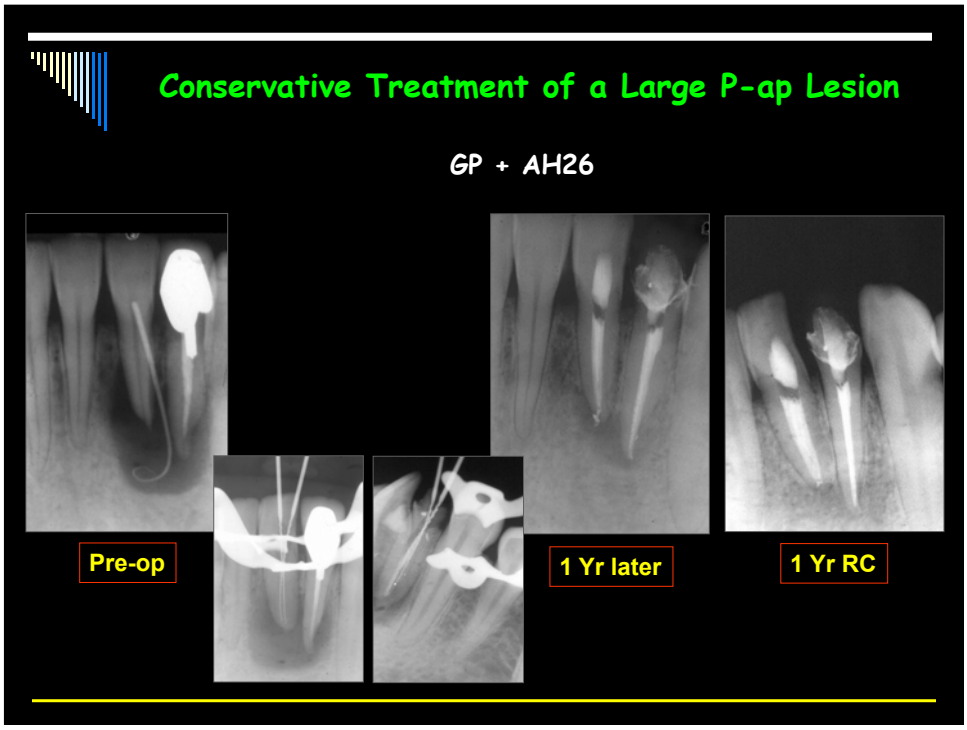
Conservative Treatment of a Large P-ap Lesion
GP + AH26
Pre-op
1 Yr later
1 Yr RC

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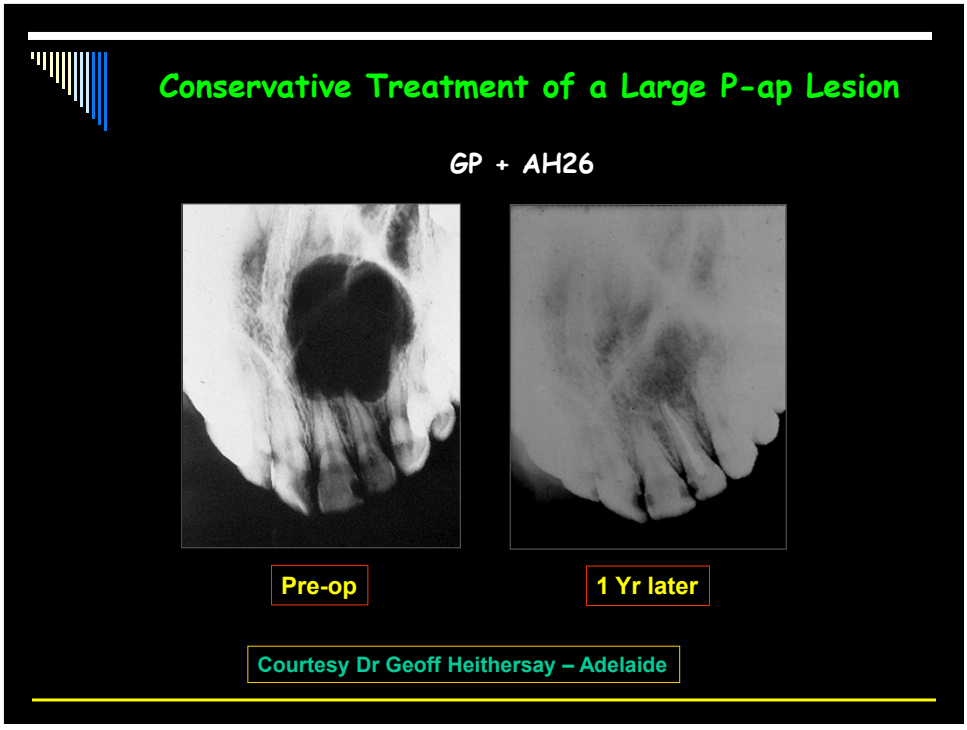
Conservative Treatment of a Large P-ap Lesion
GP + AH26
Pre-op
1 Yr later
Courtesy Dr Geoff Heithersay – Adelaide

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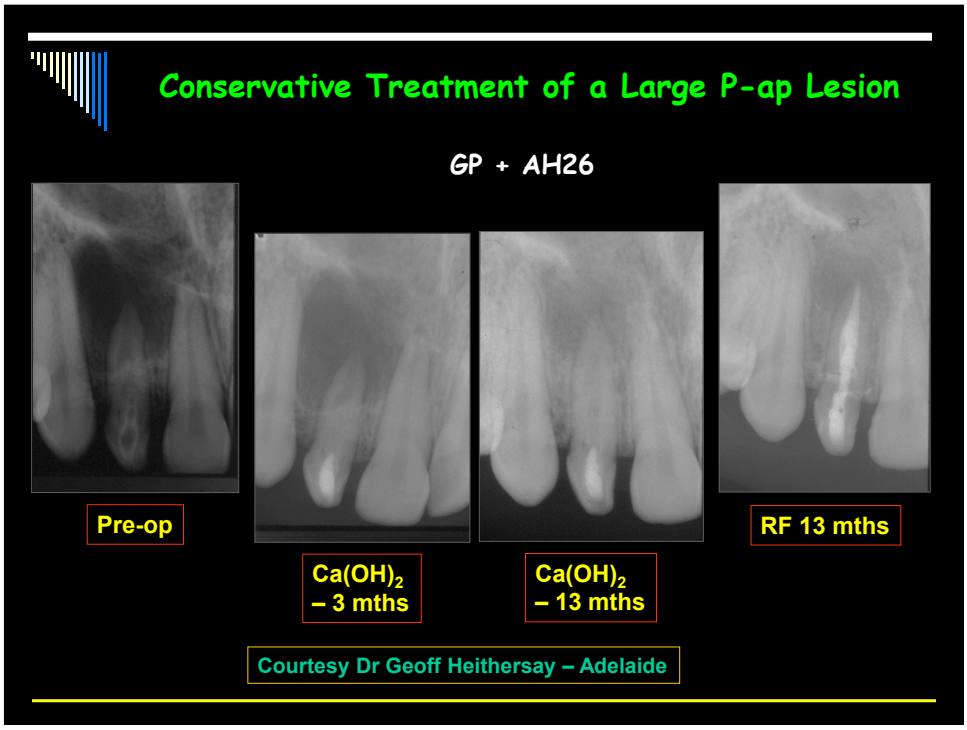
Conservative Treatment of a Large P-ap Lesion
GP + AH26
Pre-op
Ca(OH)2 – 3 mths
Ca(OH)2 – 13 mths
RF 13 mths
Courtesy Dr Geoff Heithersay – Adelaide

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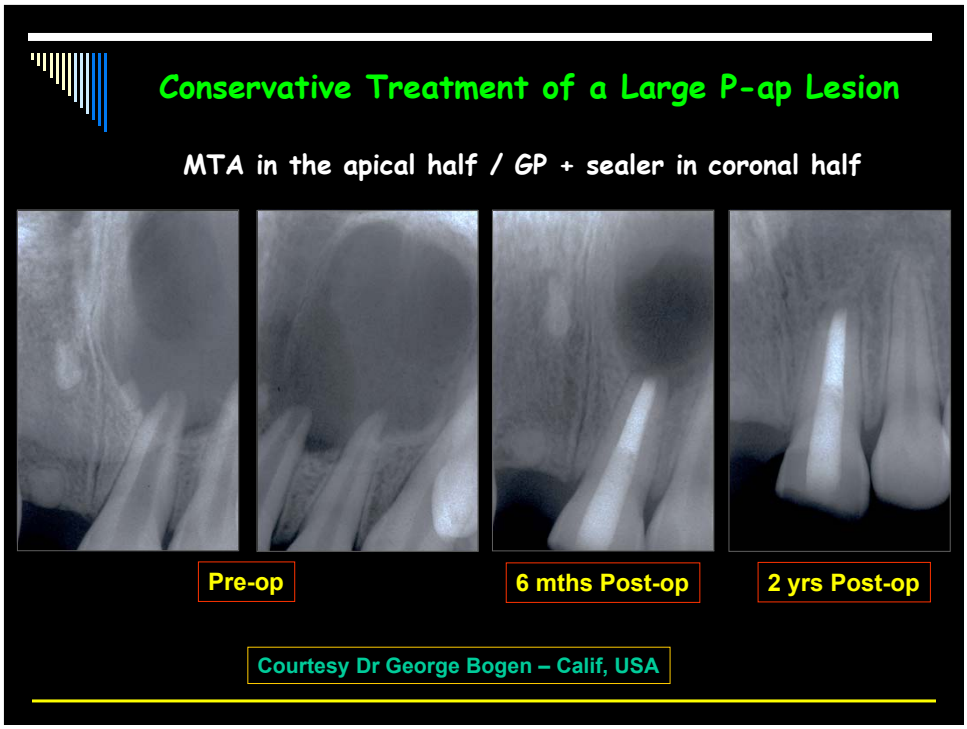
Conservative Treatment of a Large P-ap Lesion
MTA in the apical half / GP + sealer in coronal half
Pre-op
6 mths Post-op
2 yrs Post-op
Courtesy Dr George Bogen – Calif, USA

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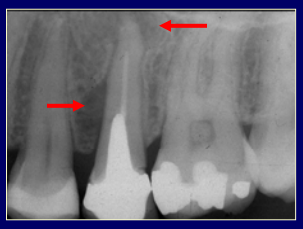
Management Options

- What are the options?
  - No treatment
  - Extraction
  - Surgery
  - Re-treatment



- *It depends on the DIAGNOSIS !!!*

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