

# RELATIONSHIP BETWEEN DIABETES AND PERIODONTAL DISEASE



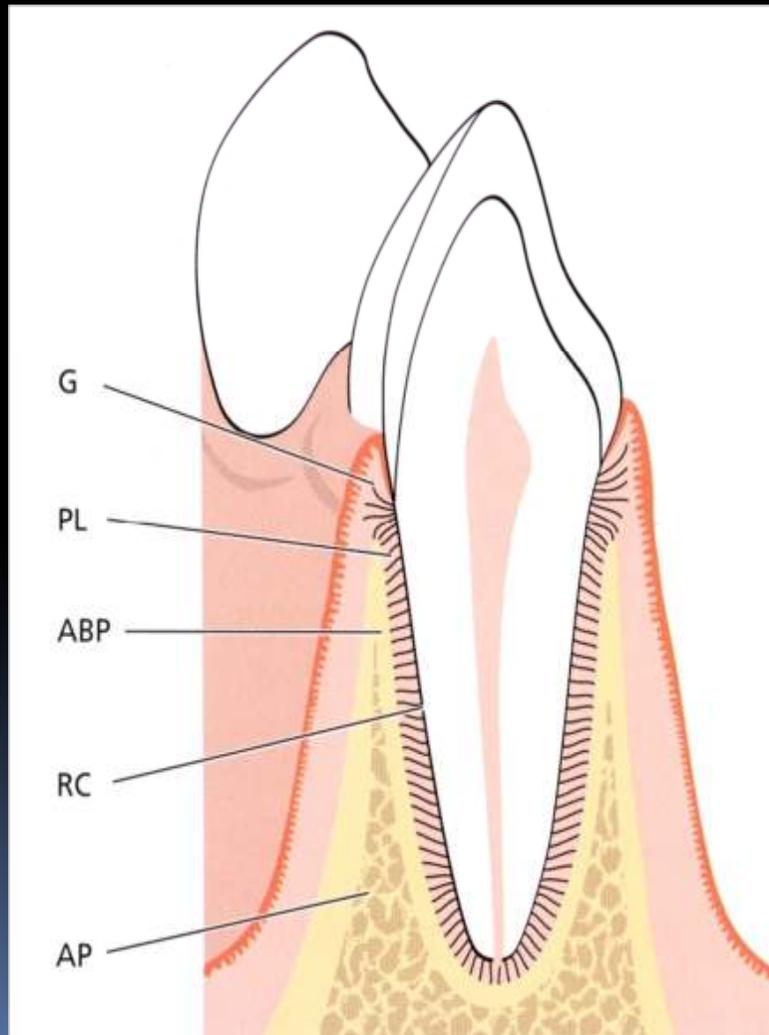
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설 양 조

# Periodontology? 치주과학?

- 치아 주위 조직을 연구, 치료하는 학문 분야  
(齒周科學)
- Periodontology, Periodontics
  - Peri : around
  - Odont, odous, odon(Greek) : Tooth
  - -logy, -tics



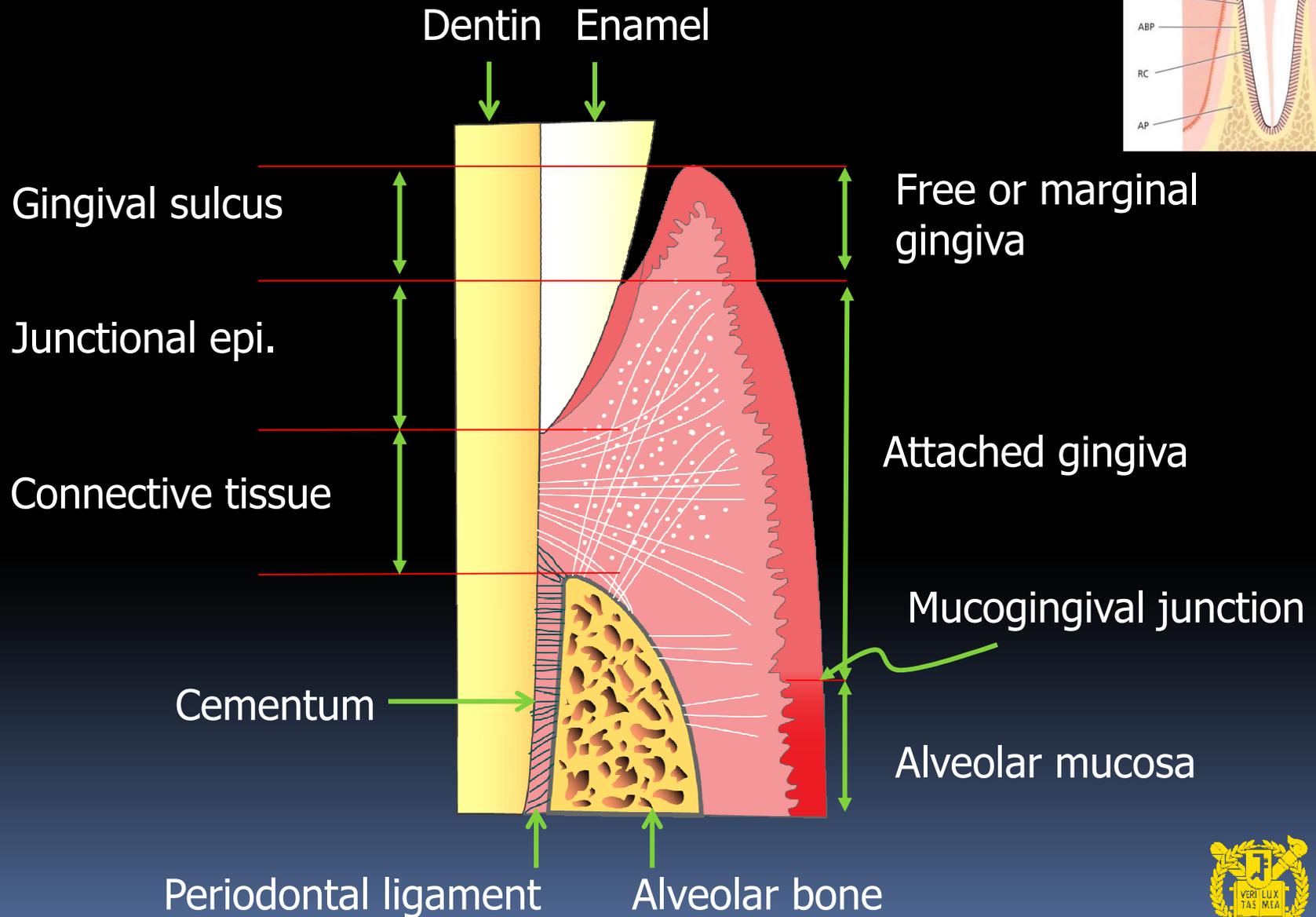
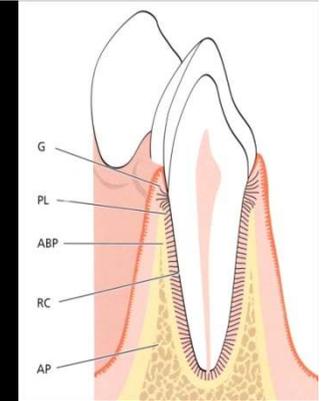
# Periodontium



- G: Gingiva (치은)
- PL: Periodontal Ligament (치주인대)
- ABP: Alveolar Bone Proper (고유 치조골)
- RC: Root Cementum (백악질)
- \* AP: Alveolar Process (치조돌기)



# Dentogingival structure



# Healthy Periodontium





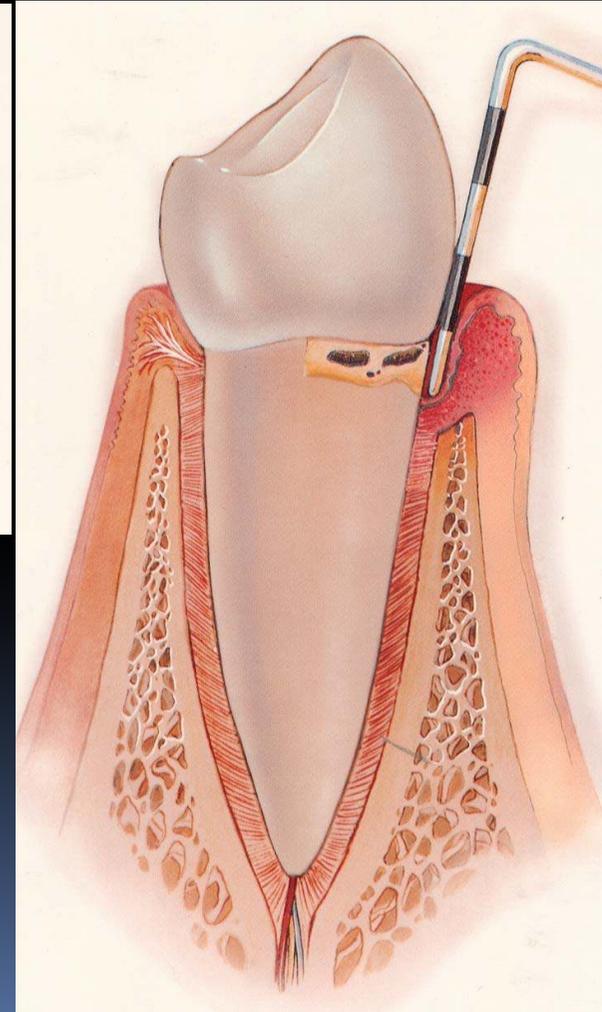
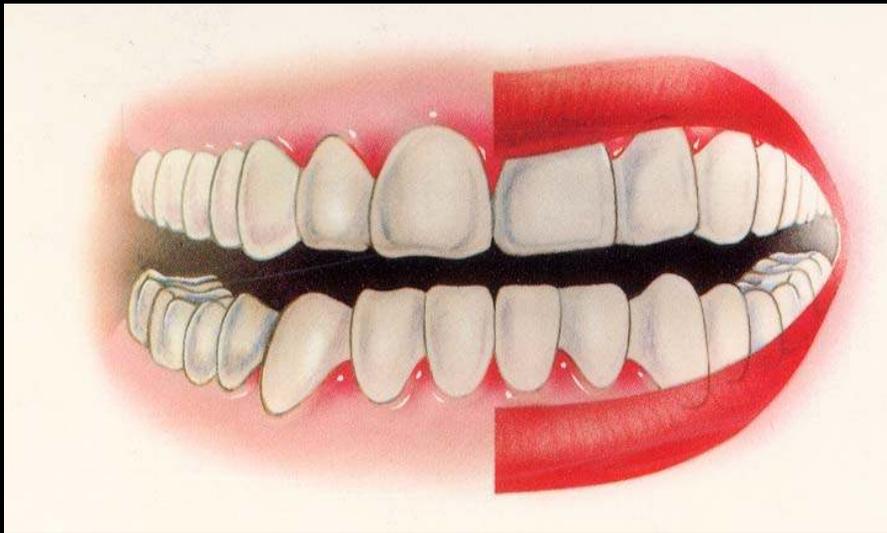
# Periodontal Disease?



- Chronic Inflammation around tooth supporting structure
  - Probing on Bleeding
  - Gingival color change
  - Gingival swelling
  - Ulcer
  - Bone loss
- 풍치, 잇몸병, 잇몸질환, 치주염.....



# Comparison Normal Periodontium & Early Periodontitis



Gum redness,  
Swelling,  
Bleeding on probing

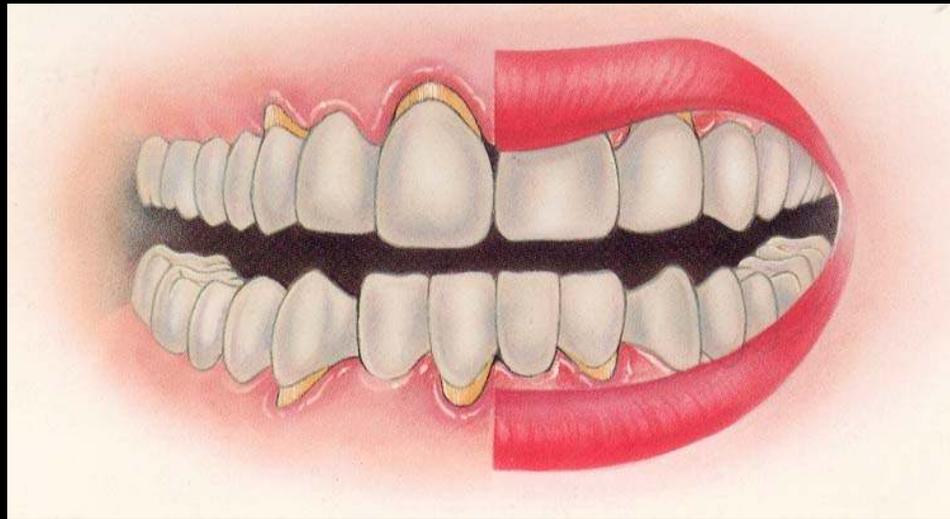




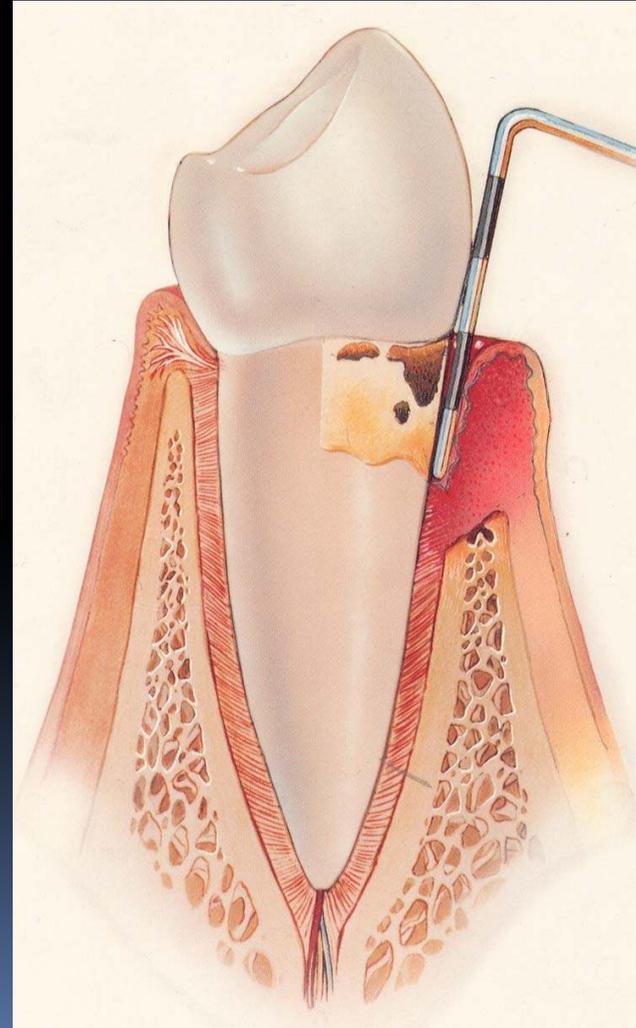




# Advanced Periodontal disease



Gingival recession  
Tooth mobility  
Bone resorption





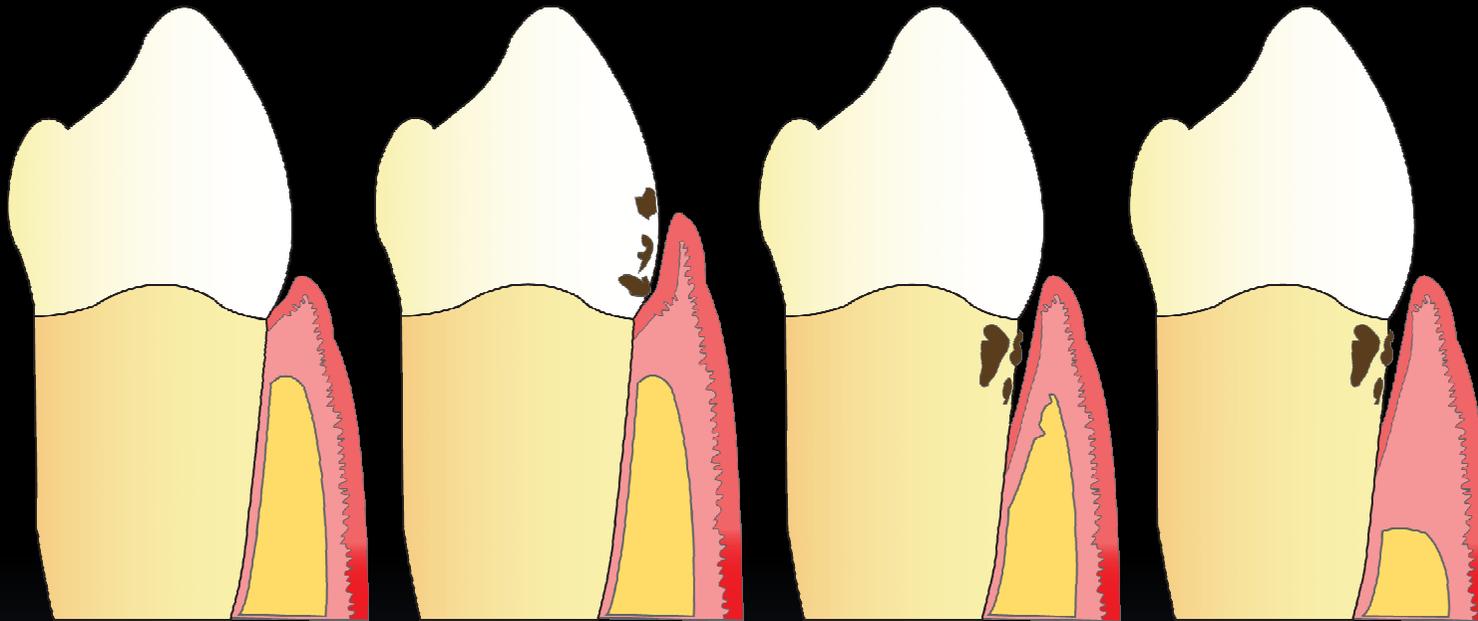




# Severe Periodontitis



# Periodontal Disease Progression



건강한 치은열구  
Healthy  
Gingival sulcus

치은낭  
Gingival pocket

골연상 치주낭  
Suprabony pocket

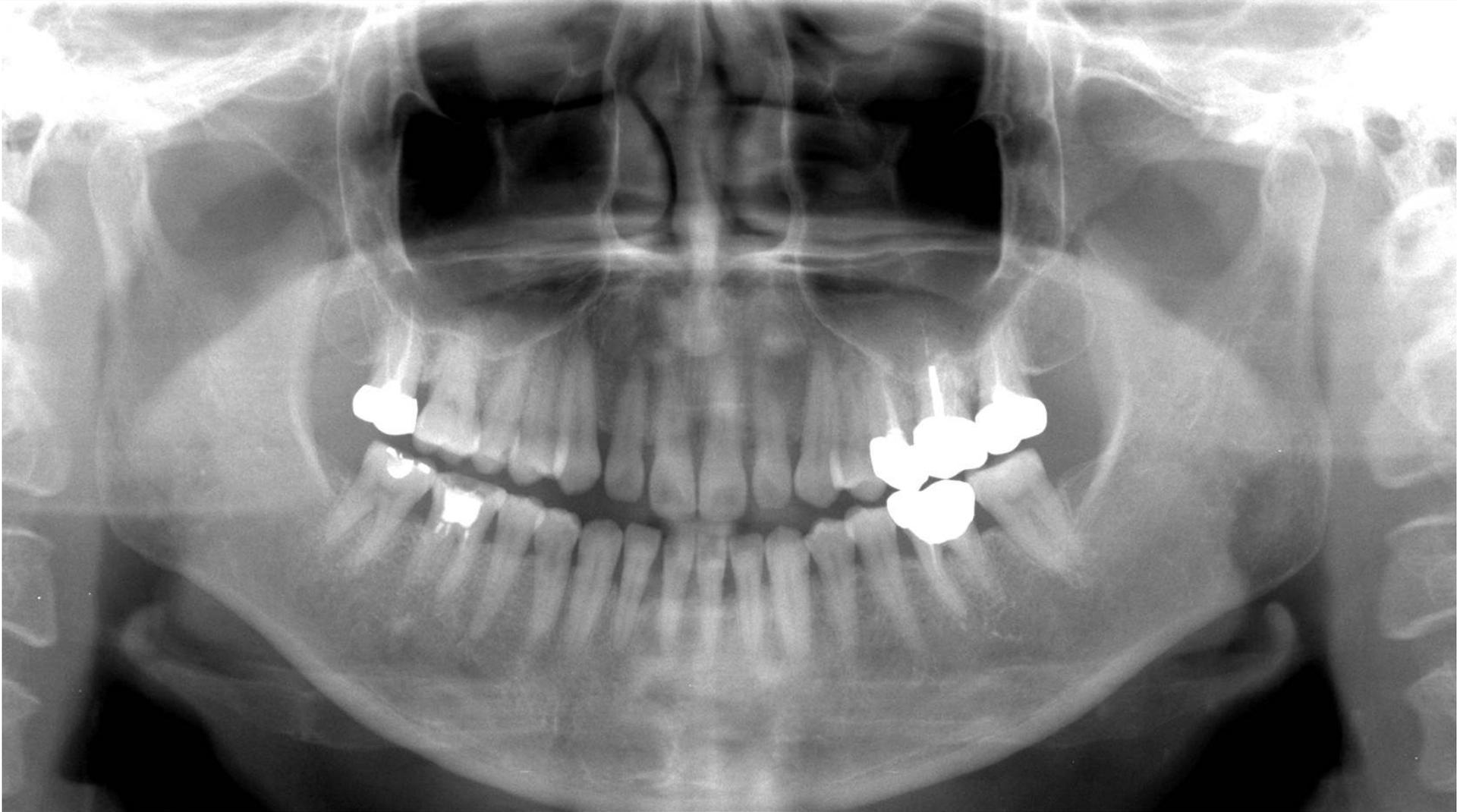
골연하치주낭  
Infrabony pocket



# Little or a Little Periodontitis

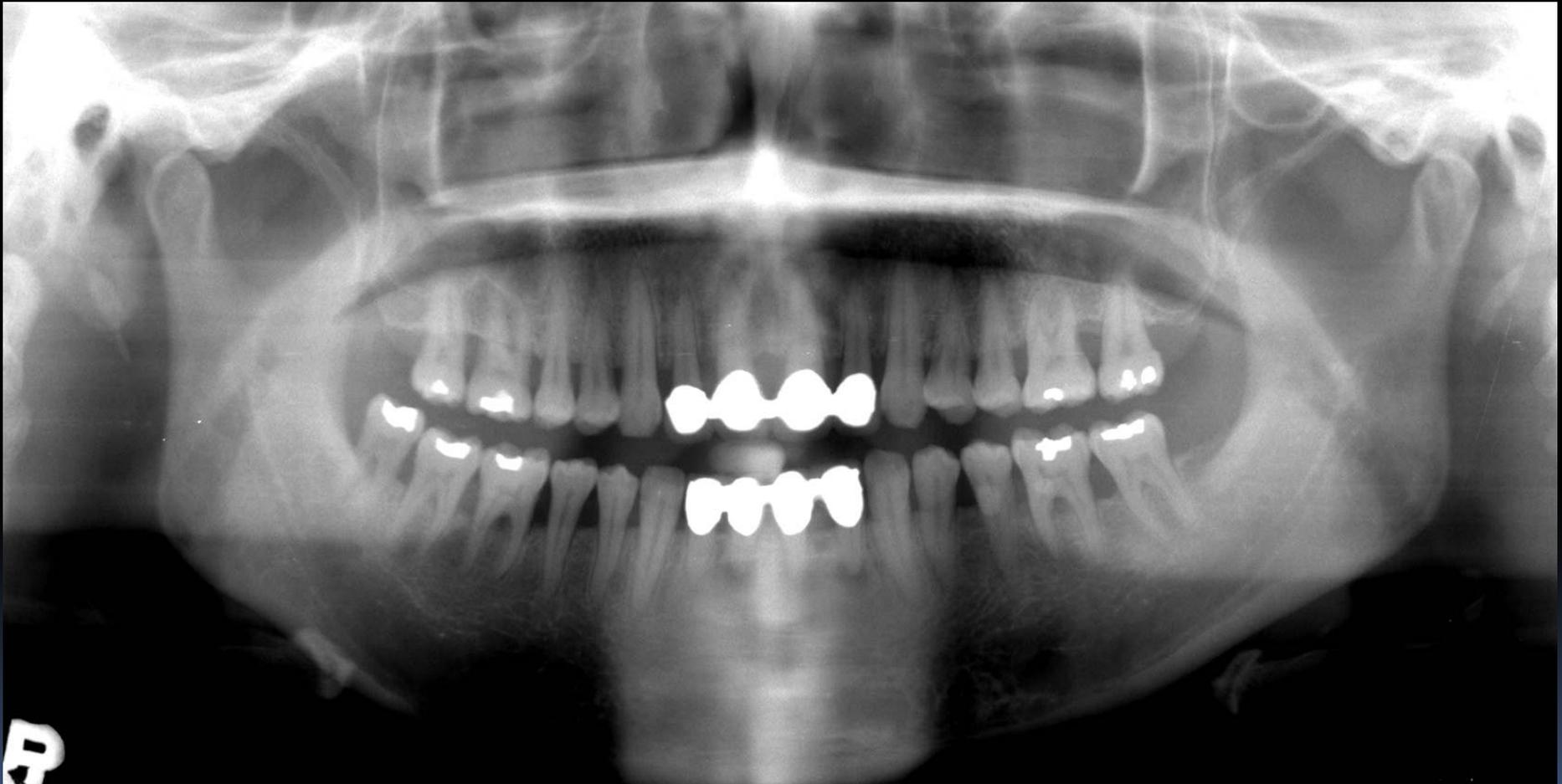


15 Y



56 Y

# Moderate to Severe Chronic Periodontitis



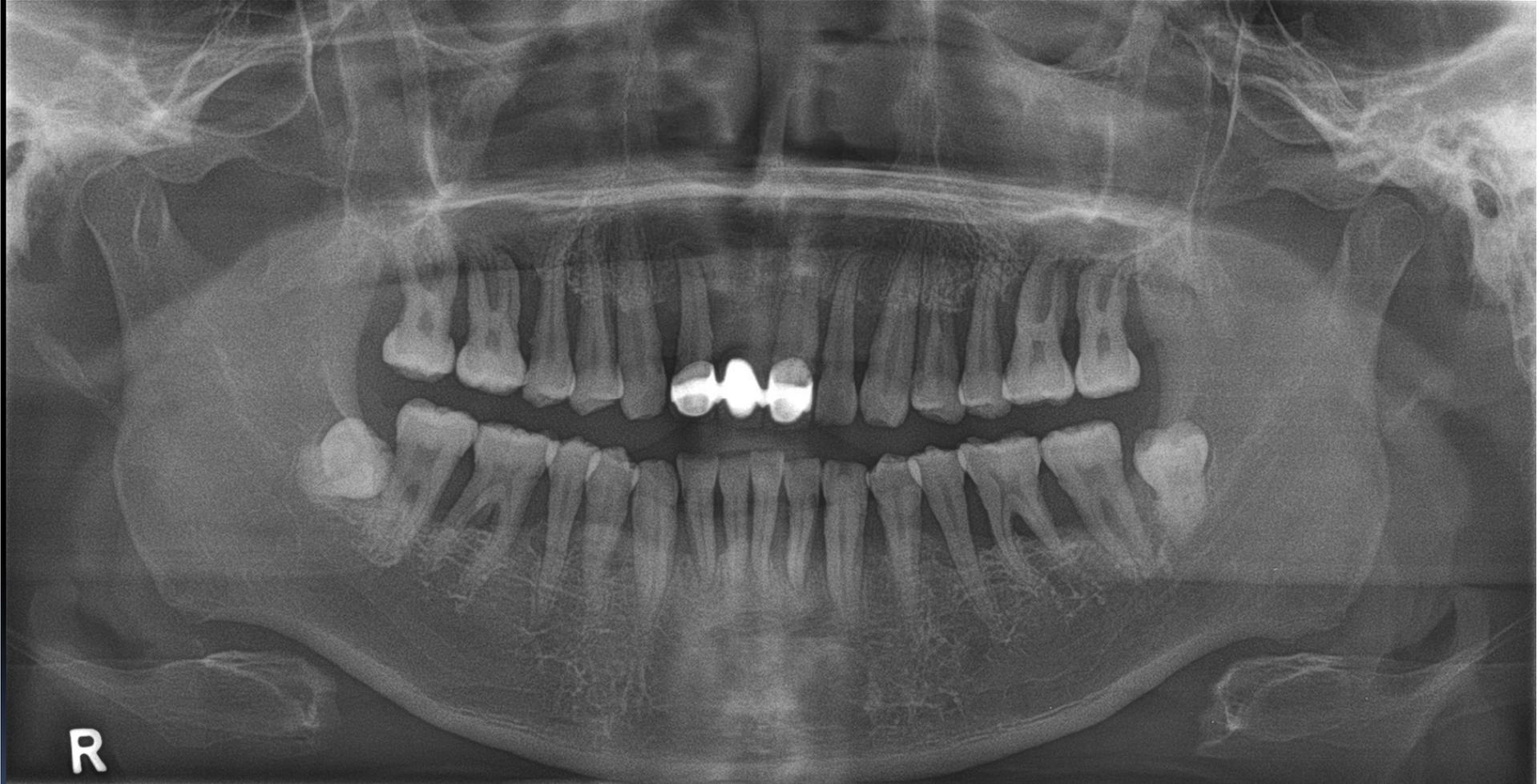
30 Y



55 Y

SNU Perio

# Aggressive Periodontitis

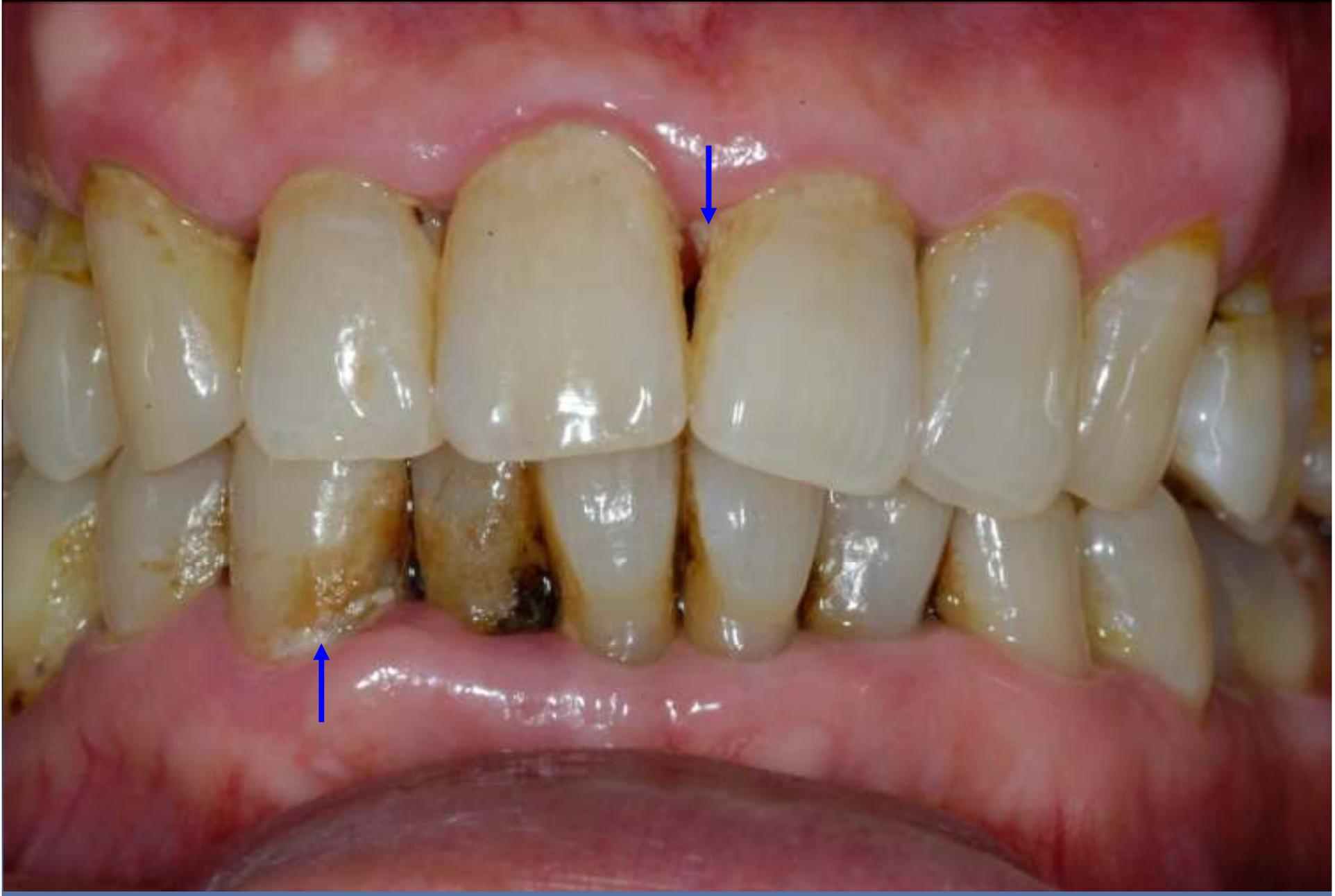


# Etiology of Periodontal disease

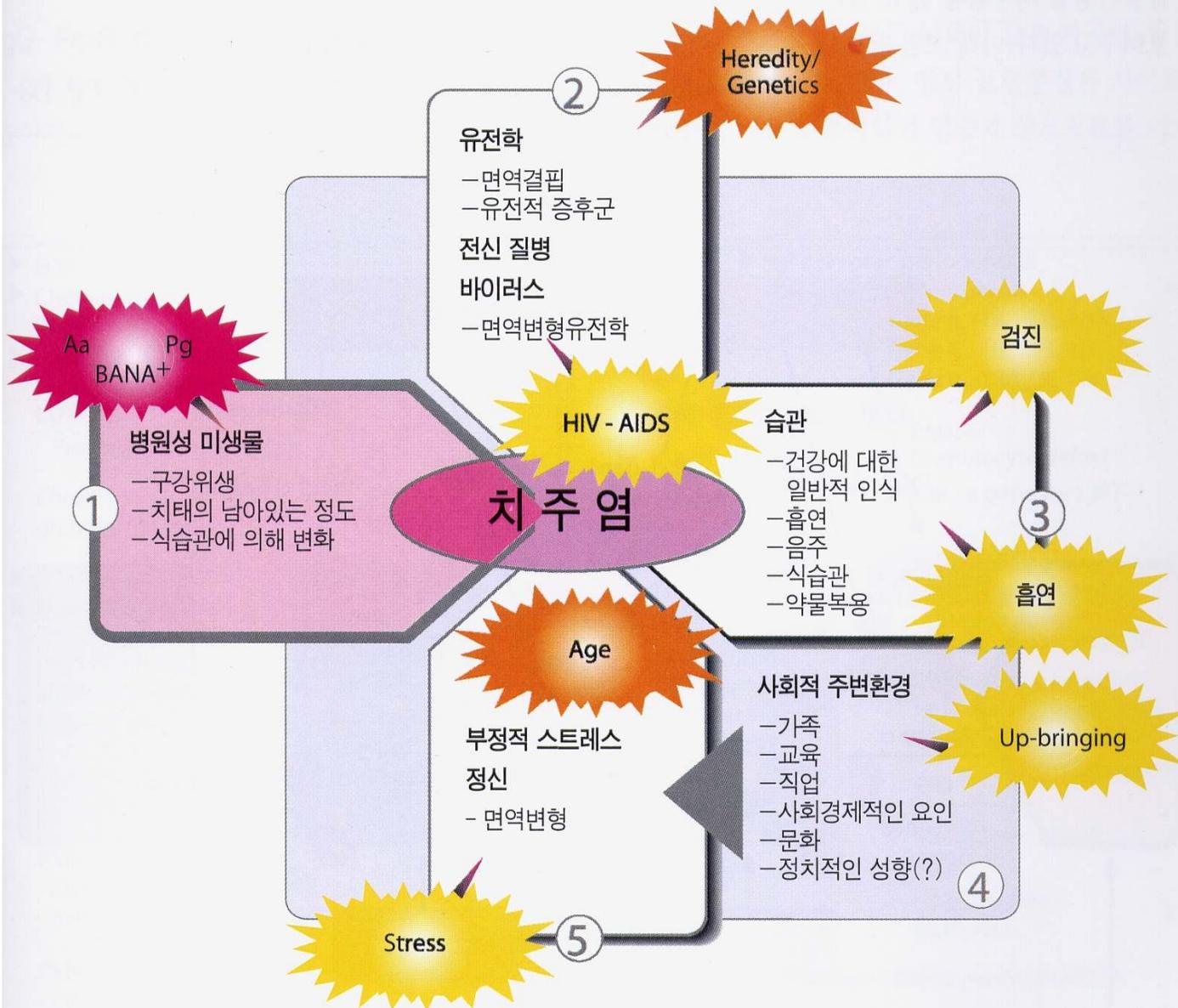
- Bacteria (Dental plaque, Biofilm)
- General health-Diabetes etc.
- Environmental factor – Smoking etc
- Genetic factor
- Host response



# Dental Plaque, Biofilm







### 104. 위험인자와 그 비중 (대응 위험도)

**일차 위험인자** 

- 치태의 특수 원인균

- *A. actinomycetemcomitans* : ×2
- BANA + 복합체\* : ×3.6 (Pg Tf Td)
- *P. gingivalis* : ×2.7

**이차 위험인자** 

- 불변성 위험인자

- 유전적 하자 : ?
- IL-1 다형성 유전자 : ×2.7
- 민족성 : ?
- 성별 : ?
- 연령 : ?

**- 가변성 위험인자** 

- 흡연 : ×2.8-6.7
- 스트레스 : ×3-5
- 교육 : ×3
- 검진을 안 함 : ×3.2
- 당뇨병 : ×2-3
- HIV/AIDS : ?

\* BANA-positive 세균은 N-Benzy l-DL-Arginin-2-Naphthalamid (합성 트립신성분)을 가수분해한다.

출처 : N. Clarke & R. Hirsch의 도식 1995(p. 22)

# DM and Periodontal disease

- Diabetes is a risk factor for gingivitis and periodontitis.
- Periodontal treatment may help control plasma glucose concentration.



# Diabetes and periodontal disease

- Periodontal disease to be one of the most prevalent complication of diabetes
- Adults with poorly controlled diabetes
  - 2.9 (2.8~3.4) fold increased risk of having periodontitis compared to non-diabetic adult subjects

Tsai C, Taylor GW et al. 2002



# Diabetes affects periodontitis

- Poorly controlled diabetic patients show significantly greater inflammation than well-controlled diabetic patients.
- Well controlled diabetic subjects had no significant increase in the risk of periodontitis
- Glycemic control improvement may be associated with decreased periodontal inflammation.

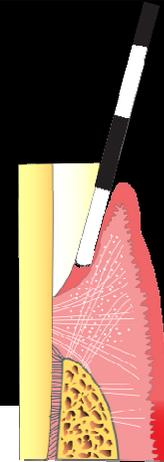
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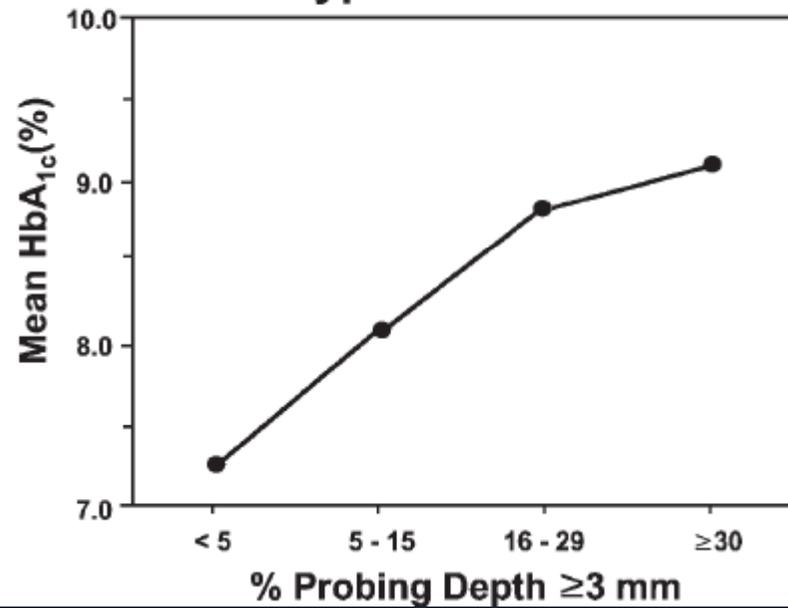
# Diabetes affects periodontitis

- High prevalence and severity
- Less response to Periodontal treatment
- Difficult to maintain after treatment
  
- Any clinical characteristic related to Diabetes?
  - NONE

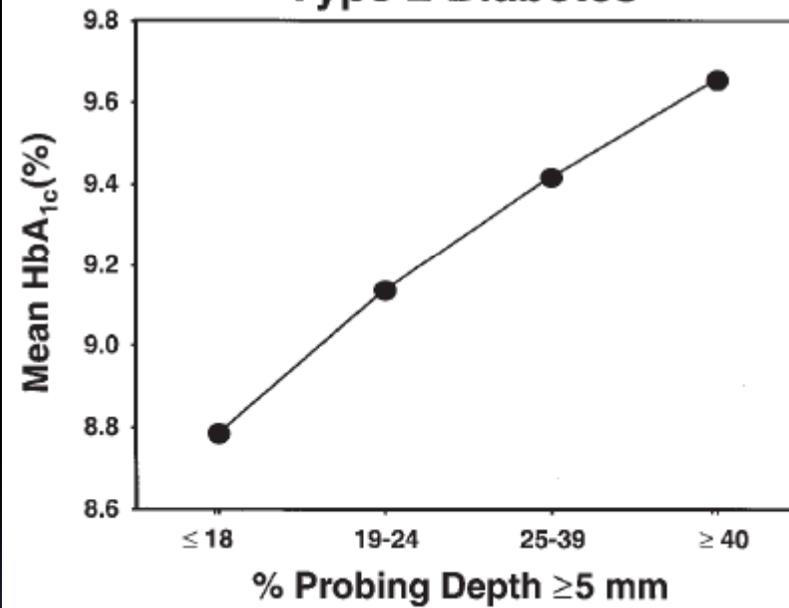




### Type 1 Diabetes



### Type 2 Diabetes



□ *Nelson et al. 1990*



# Why?

- Due to different microbial organism?
  - The flora associated with diabetes dose not appear to be different to non diabetic flora.  
*Yuan et al. 2001, Zambon et al. 1988*
- Many research reported
  - Host immune response alterations
  - Decreases in matrix-producing cells
  - AGE-RAGE interaction



# Host Immune Response

- Immune cell functions altered in Diabetes.
  - Neutrophil function diminished
    - Bacterial killing in periodontal pocket is inhibited.
  - Monocyte/Macrophage upregulation
    - cytokine increased
- → Increased periodontal destruction



## Decreases in matrix-producing cells

- Decreased fibroblast, osteoblast in periodontal ligament
  - Alterations in connective tissue metabolism
  - Decreased wound healing capacity
- Microvascular changes affect periodontal regeneration
- → Decreased response to treatment

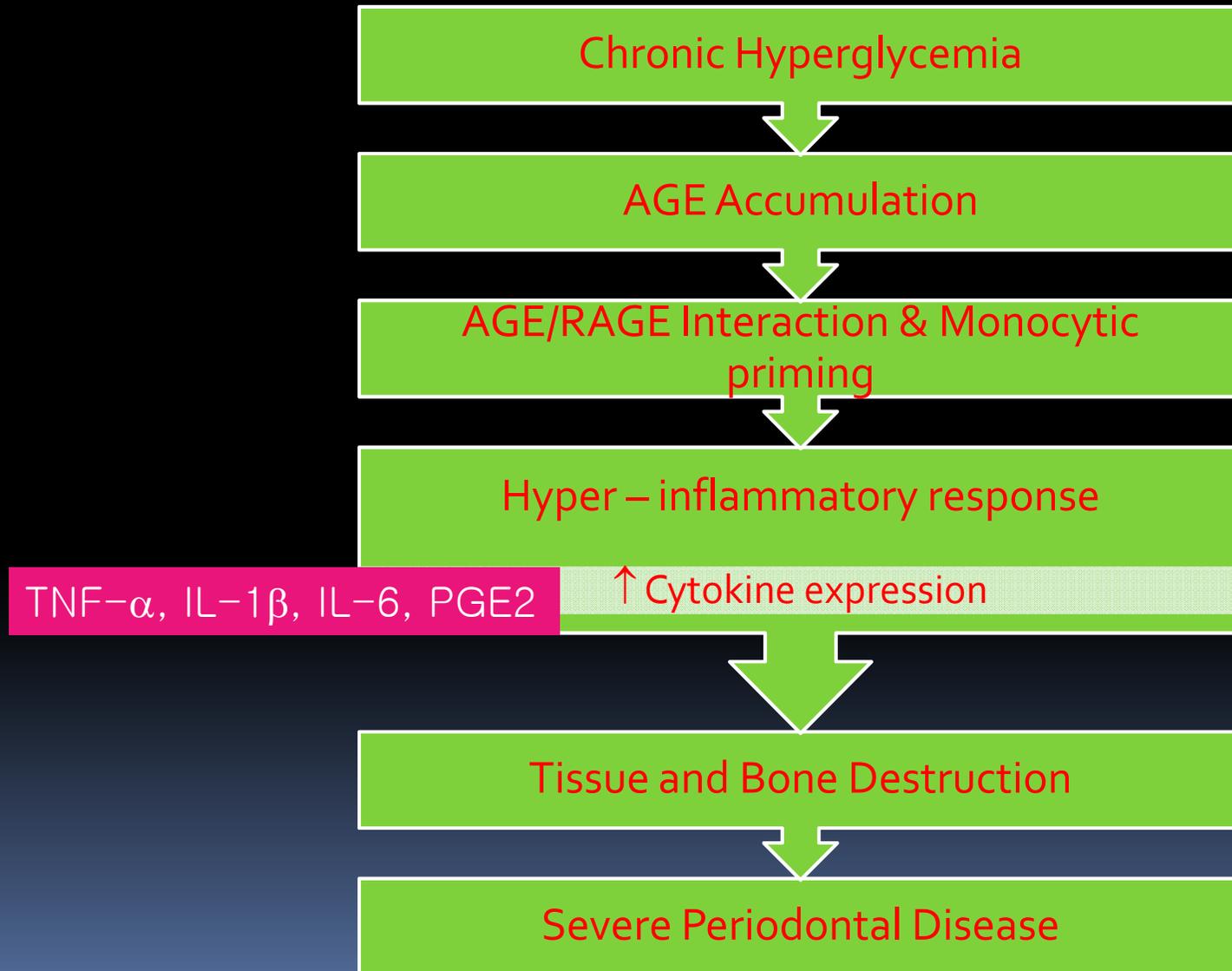


# Advanced glycation end products(AGEs)

- Have multiple effects on cell-to-cell and cell-to-matrix interactions
- Major link between the various diabetic complications
- Induce macrovascular complications



# Impact of hyperglycemia on Periodontal disease progression



# Controlled Diabetic Patient

- Treatment outcome is the same as non-diabetic periodontitis patient.

The effect of periodontal therapy in diabetics. Results after 5 yrs.  
Westfelt E et al. *J Clin Periodontol* 1996

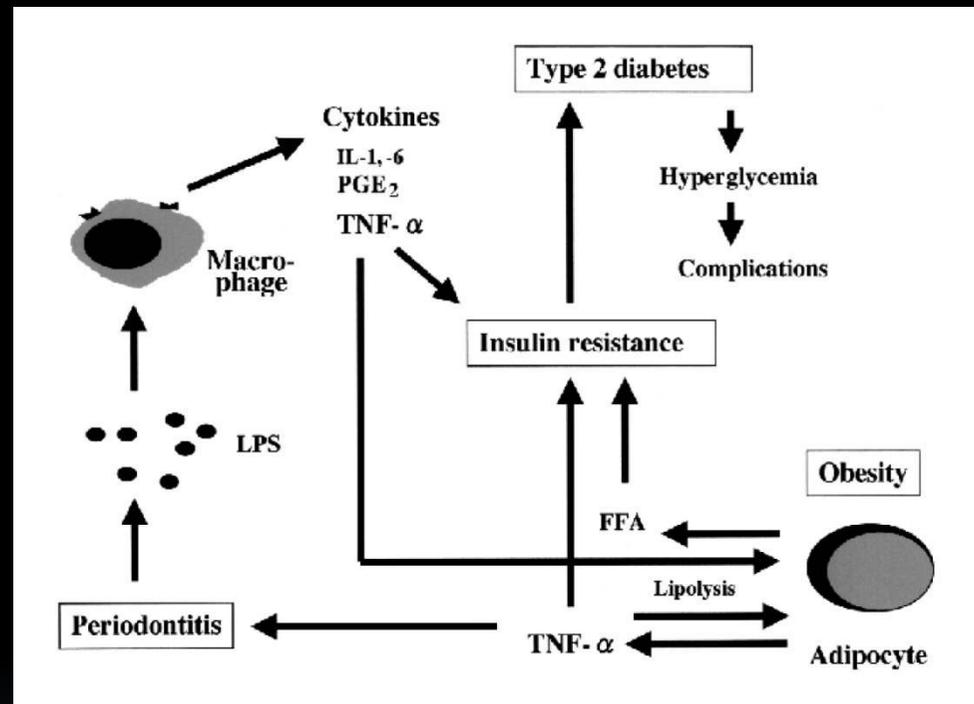


# DM and Periodontal disease

- Diabetes is a risk factor for gingivitis and periodontitis.
- Periodontal treatment may help control plasma glucose concentration.



# Periodontitis affects Insulin resistance



- TNF- $\alpha$  influence insulin sensitivity in both obese and type 2 diabetic patients

*Nishimura et al. 2003 J Periodontol*



## Periodontal treatment has a positive effects ??

- The effects of periodontal therapy on glycaemic control and systemic inflammation is not proven beyond doubt.
- Effects of diabetes mellitus on periodontal and peri-implant conditions: update on associations and risks. Salvi GE et al, 2008, *J Clin Periodontol*
- Studies showed trends, however, no statistical significant difference

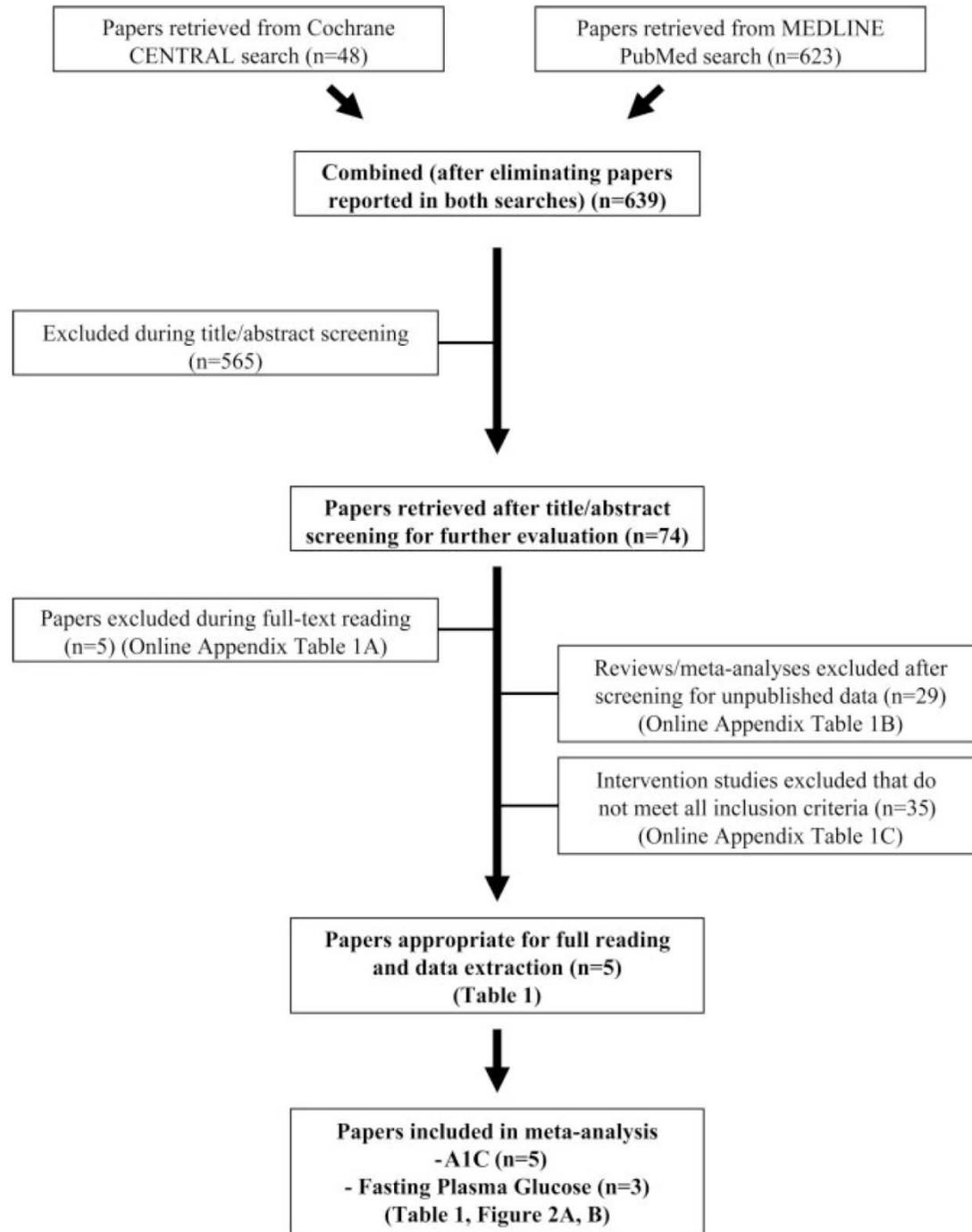


# Periodontal treatment has a positive effects !!

- Periodontal treatment leads to an improvement of glycemic control in type 2 diabetic patients for at least 3 months.
- Teeuw WJ et al, 2010, *Diabetes Care*  
Effect of Periodontal Treatment on Glycemic Control of Diabetic Patients – A systemic review and meta-analysis.



Teeuw WJ et al,  
2010,  
*Diabetes Care*



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- **Katagiri S et al, 2009**
- Jones JA et al, 2007
- Kiran M et al, 2005
- Promsudthi A et al, 2005
- Stewart JE et al, 2001



## Katagiri et al, 2009, *Diabetes Res Clin PR*

Multi-center intervention study on glycohemoglobin (HbA<sub>1c</sub>) and serum, high sensitivity-CRP (hs-CRP) after local anti-infectious periodontal tx in type 2 diabetic patients with periodontal disease.

- After periodontal treatment,
  - Improved glycemic control in type 2 diabetic pts
  - hs-CRP decreased group
    - Significantly reduced HbA<sub>1c</sub>
  - hs-CRP unchanged group
    - Not reduced HbA<sub>1c</sub>
- Periodontal disease release cytokines, TNF- $\alpha$  and IL-6 which have been reported to induce insulin resistance.



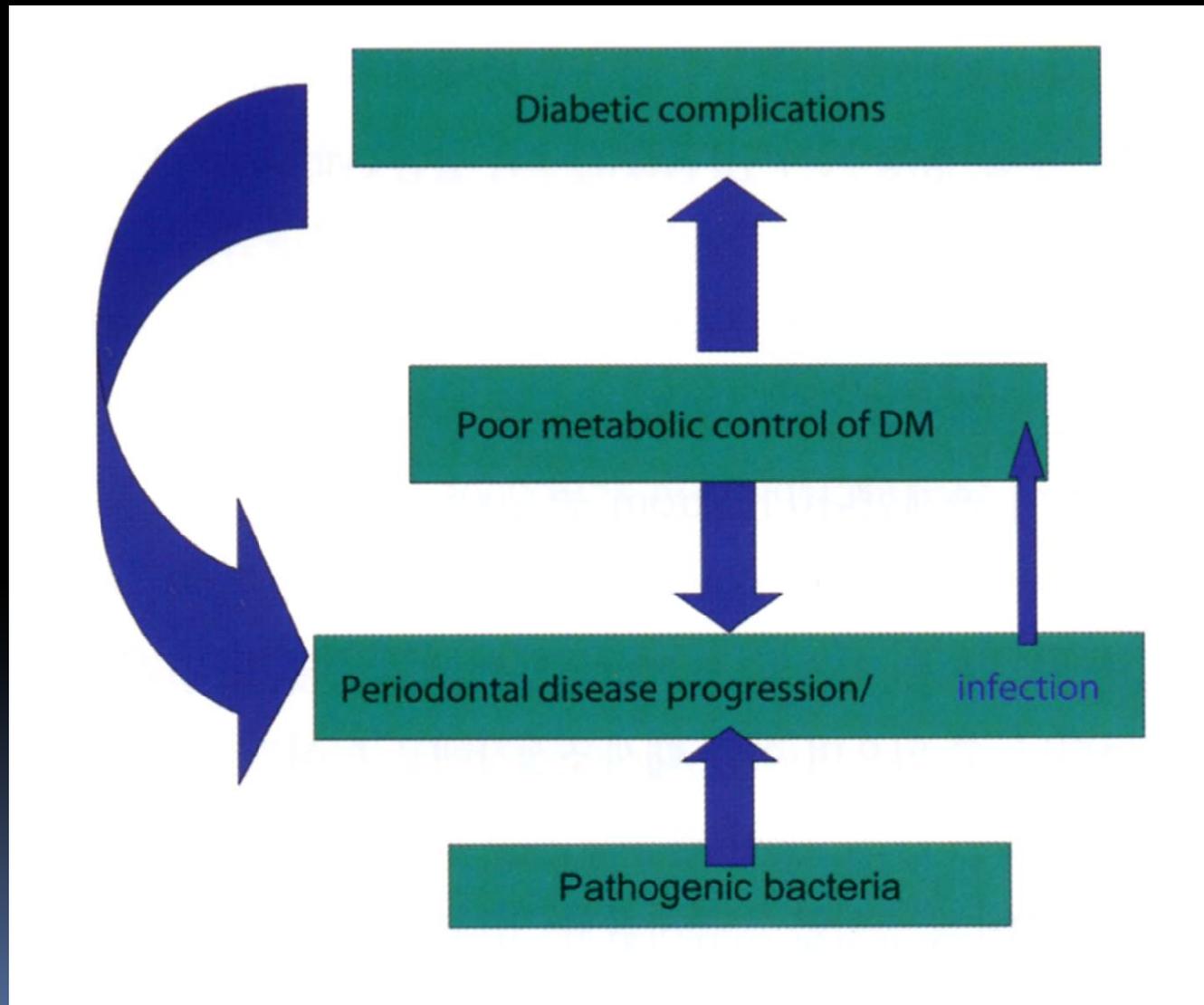
# Mild to Moderate Periodontitis



# Severe Periodontitis



# 2-way Relationship



# Treatment Case

- Scaling & Root planing
- Re-evaluation
- Flap curettage at some area
- Supportive periodontal therapy





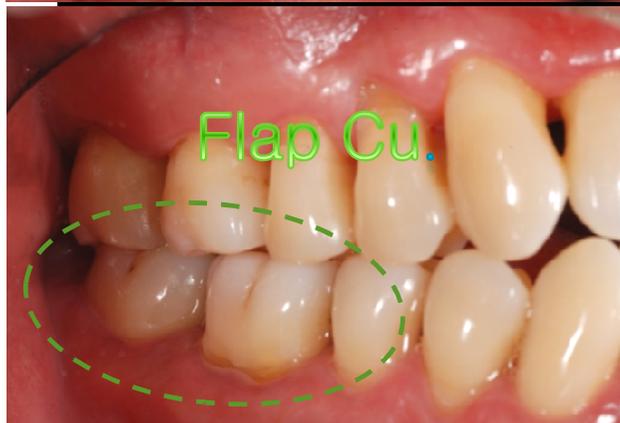
# X-ray



# Periodontal Treatment

## Scaling, Root planing





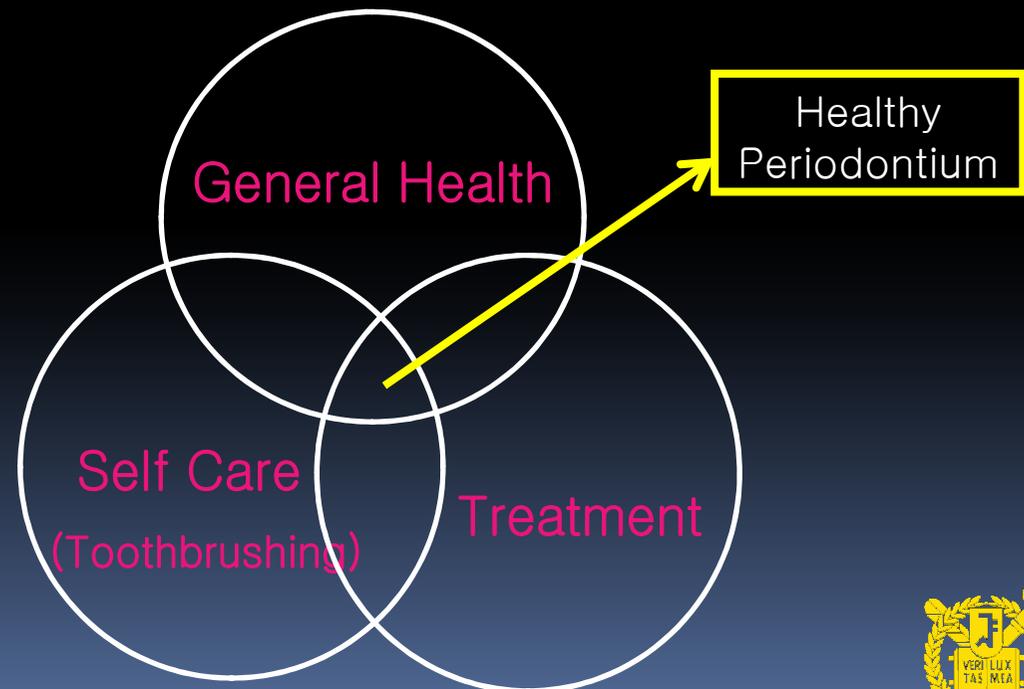






# Recommendations for Diabetic Patients

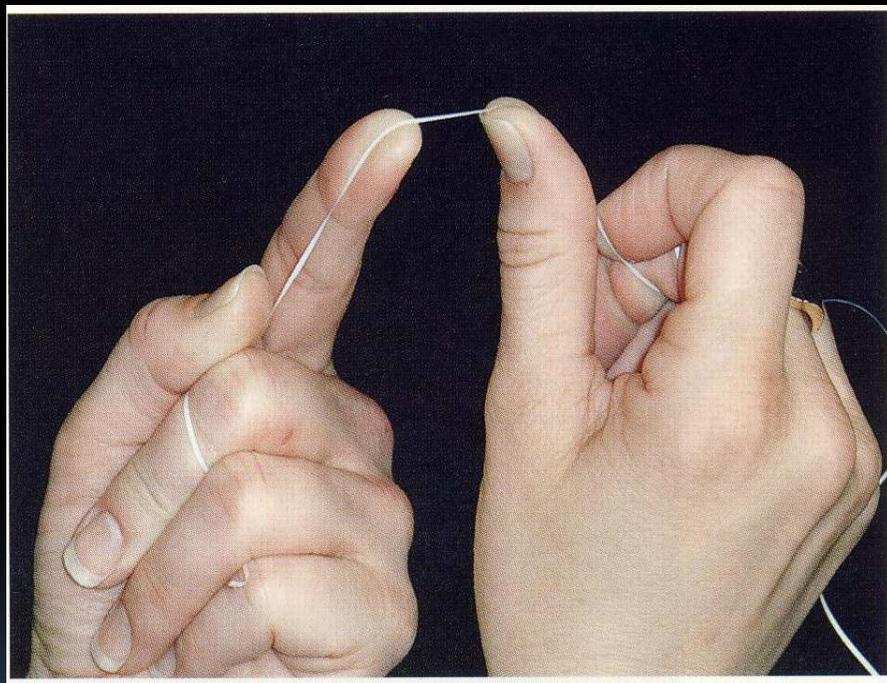
- Recommend Periodontal treatment
- After treatment, Supportive treatment for every 3-6 month



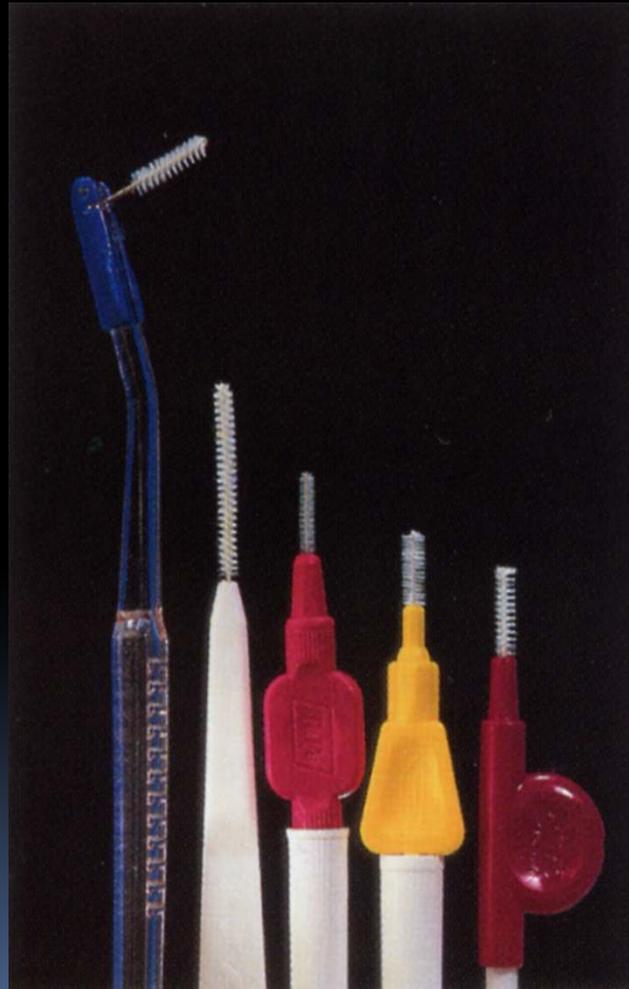
# Tooth Brushing Instruction



# Dental Floss (치실)



# Proxabrush (치간 칫솔)



A scenic view of a tropical beach. In the foreground, there are large, green, succulent-like plants. To the left, a thatched hut is visible on the sandy beach. The ocean is a vibrant turquoise color, with white waves breaking near the shore. In the background, a city skyline with various buildings is visible under a clear blue sky.

경청해 주셔서 감사합니다.