DENTAL PLAQUE - THE MAJOR ETIOLOGIC FACTOR OF ALL KIND OF PERIODONTAL DISEASES
THE HUMAN HOST IS HEALTHY DESPITE THAT THE 90% OF THE CELLS IN THE HUMAN BODY ARE BACTERIA (Henderson 1998)
Plaque is natural and exists in harmony with the host in health.

Maintenance of health depends on the balance of the homeostatic relationship between the bacterial challenge and the host response.
Most bacterial species currently implicated in periodontitis can be found in periodontally healthy subjects in low numbers.

In some geographical regions, some species or clones are infrequently detected in periodontal health, and therefore could be considered as not belonging to the resident microflora in these populations (Van Winkelhoff et al. 2002).
DENTAL PLAQUE AS A BIOFILM

THE POSSIBILITIES OF CHEMICAL PLAQUE CONTROL

DR. GERA ISTVÁN  SE DPT. PERIODONTOLOGY
Most microorganisms in nature attach to surfaces and form matrix-embedded biofilms.

Biofilms are highly structured and spatially organized, and are often composed of consortia of interacting microorganisms,

The properties of microbial communities are more than the sum of the component species.
DENTAL PLAQUE

GINGIVITIS

PERIODONTITIS

LÖE CLASSIC EXPERIMENTAL GINGIVITIS STUDIES
BACTERIAL BIOFILM

IS MADE UP OF

„FRIENDLY COMMENSAL BACTERIA

AND HOSTILE PERIODONTOPATHOGENIC STRAINS

THE MANIFESTATION OF PERIODONTAL BREAKDOWN IS DEPENDENT ON THE HOST’S SUSCEPTIBILITY AND THE VIRULANCE OF THE BIOFILM
• Most natural biofilms contain multiple species and are termed microbial communities.
• The component organisms are not merely passive neighbors
• they are involved in a wide range of physical, metabolic and molecular interactions.
• These interactions may well be essential for the attachment, growth and survival of species at a site, enabling organisms to persist in hostile environments.
Disease is the consequence of this balanced relationship breaking down, provoked by

• either changes to the magnitude or nature of the microbial challenge

• or the scale and appropriateness of the host response

(Socransky et al. 1998).
Gene expression can alter markedly when cells form a biofilm,
resulting in many organisms having a radically different phenotype following attachment to a surface when compared with conventional liquid grown (planktonic) cells.

(Whiteley et al. 2001)
An important clinical consequence of both the structural organization of biofilms and the subsequent altered pattern of gene expression therein is the reduced susceptibility of cells to antimicrobial agents (Gilbert et al. 1997, 2002, Ceri et al. 1999, Stewart & Costerton 2001).
**THE MECHANISM OF PLAQUE ACCUMULATION**

<table>
<thead>
<tr>
<th>day</th>
<th>0</th>
<th>sterile dental pellicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Gram+ cocci</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Gram+ rods, actinomyces</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Gram - bacteria</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>anaerobes, Gram - majority</td>
</tr>
</tbody>
</table>
1. Kem ény szövettel asszociálódott plakk
2. Nem tapadó plakk
3. Tasakhámmal asszociálódott plakk
4. Bakteriális invázió a kötőszövetben
5. Az alveoláris csontfelszínnel asszociálódott baktériumok

Subgingivalis plakk
GINGIVITIS
PERIODONTITIS
IRRERVERSIBLE DAMAGE OF
THE ATTACHMENT
APPARATUS
THE CONSEQUENCE OF
THE INADEQUATE GINGIVAL
PROTECTION
WHY NOT NECESSARILY ALL GINGIVITIS PROGRESSES TO DESTRUCTIVE PERIODONTITIS????
DENTAL PLAQUE IS NECESSARY BUT NOT SUFFICIENT ETIOLOGIC FACTOR OF DESTRUCTIVE PERIODONTITIS
RISK FACTORS:

GENETICS
1(IL-1)
TNF

SYSTEMIC
ENDOCRINE
CARDIOVASCULAR
IMMUNOLOGICAL

BEHAVIORAL
STRESS
DIET
SMOKING
WAY OF LIFE
SEVERAL SYSTEMIC AND LOCAL MODIFYING FACTORS
ETIOLOGIC FACTORS

• Oral hygiene
  Local plaque retentive factors

bacterial specificity
systemic immune status
Diabetes mellitus
Tobacco smoking
Osteoporosis
Ethnic background
Age
Diet
Genetics

• Stress
  Socio-economics
ETIOLOGIC FACTORS

- Oral hygiene
- Local plaque retentive factors
- Bacterial specificity
- Systemic immune status
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- Ethnic background
- Age
- Diet
- Genetics
- Stress
- Socio-economics
HEAVY SUPRAGINGIVAL DENTAL CALCULUS DEPOSITION MECHANICALLY SEPARATING FRONT TEETH
HEAVY SUPRAGINGIVAL PLAQUE AND DENTAL CALCULUS DEPOSITION
ETIOLOGIC FACTORS

- Oral hygiene
- Local plaque retentive factors
- Bacterial specificity
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- Tobacco smoking
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- Ethnic background
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- Genetics
- Stress
- Socio-economics
FAULTY RESTAURATIONS
LOCAL PLAQUE RETENTIVE FACTORS
• Oral hygiene
  Local plaque retentive factors
• Bacterial specificity
• Systemic immune status
• Diabetes mellitus
• Tobacco smoking
• Osteoporosis
• Ethnic background
• Age
• Diet
• Genetics
• Stress
  Socio-economics
LARGE MASS OF SUPRAGRANIVAL PLAQUE AND CALCULUS

THE SUBGINGIVAL PLAQUE IS TOTALLY INDEPENDENT OF THE SUPRAGRANIVAL ORAL ENVIRONMENT FORMS A BIOFILM, THAT CAN ONLY BE REMOVED BY PROFESSIONAL MECHANICAL DEBRIDEMENT
ETIOLOGIC FACTORS

- Oral hygiene
  Local plaque retentive factors
- Bacterial specificity
- Systemic immune status
- Diabetes mellitus
- Tobacco smoking
- Osteoporosis
- Ethnic background
- Age
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ETIOLOGIC FACTORS

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THE PREVALENCE OF SEVER PERIODONTITIS AMONG DIABETIC AND NON DIABETIC POPULATION

The percentage of teeth with >5mm attachment loss:

- Diabetes: 11.0%
- Healthy: 5.0%

89.0%
95.0%
ETIOLOGIC FACTORS

- Oral hygiene
- Local plaque retentive factors
- Bacterial specificity
- Systemic immune status
- Diabetes mellitus
- Tobacco smoking
- Osteoporosis
- Ethnic background
- Age
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- Stress
- Socio-economics

THE RATE OF ALVEOLAR BONE LOSS RELATED TO THE AGE

- Non-smoker
- Smoker
ETIOLOGIC FACTORS

- Oral hygiene
- Local plaque retentive factors
- Bacterial specificity
- Systemic immune status
- Diabetes mellitus
- Tobacco smoking
- Osteoporosis
- Ethnic background
- Age
- Diet
- Genetics
- Stress
- Socio-economics

TOTAL EDENTULOUSNESS IN OSTEOPOROTIC AND NORMAL AGE MATCHED POPULATION

ETIOLOGIC FACTORS

- Oral hygiene
- Local plaque retentive factors
- Bacterial specificity
- Systemic immune status
- Diabetes mellitus
- Tobacco smoking
- Osteoporosis
- Ethnic background
- Age
- Diet
- Genetics
- Stress
- Socio-economics
THERE IS NO CORRELATION BETWEEN LOCAL ETIOLOGIC FACTORS AND THE SEVERITY OF TISSUE DESTRUCTION
ETIOLOGIC FACTORS

- Oral hygiene
  Local plaque retentive factors
- Bacterial specificity
- Systemic immune status
- Diabetes mellitus
- Tobacco smoking
- Osteoporosis
- Ethnic background
- Age
- Diet
- Genetics
- Stress
- Socio-economics


WHO pathfinder studies

<table>
<thead>
<tr>
<th>CPITN scores</th>
<th>12 year old</th>
<th>12 year old</th>
<th>35-44 year old</th>
<th>35-44 year old</th>
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</thead>
<tbody>
<tr>
<td>Deep pocket (CPITN 4)</td>
<td>0,1</td>
<td>0</td>
<td>8</td>
<td>2,3</td>
</tr>
<tr>
<td>3-5mm Pocket (CPITN 3)</td>
<td>4,1</td>
<td>0</td>
<td>26,4</td>
<td>15,41</td>
</tr>
<tr>
<td>Calculus (CPITN 2)</td>
<td>30,9</td>
<td>30,1</td>
<td>50,8</td>
<td>71,3</td>
</tr>
<tr>
<td>Initial gingivitis (CPITN 1)</td>
<td>38,5</td>
<td>30,8</td>
<td>7,6</td>
<td>6,8</td>
</tr>
<tr>
<td>Healthy (CPITN 0)</td>
<td>26,2</td>
<td>39,1</td>
<td>5</td>
<td>4,3</td>
</tr>
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ETIOLOGIC FACTORS

- Oral hygiene
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VERY SEVERE ALVEOLAR BONE LOSS
ETIOLOGIC FACTORS

- Oral hygiene
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Many studies have indicated that lower income groups have a much higher prevalence of gingivitis and periodontitis than people living on a much higher living standards (Oliver et al. 1996, Micheilis & Bauch 1996).

These can be attributed to the inferior oral hygiene, the lack of sophisticated oral hygienic aids, the inferior standards in dental care and the limited access to dental services.
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<td>Socio-economics</td>
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According to a survey from eastern Germany, 62.4% of all people with a qualification equivalent to junior high school certificate had advanced periodontitis, and none of them had healthy periodontium, while only 37.7% of the participants with university degree had advanced periodontitis (Mengel et al. 1993).
PERIODONTITIS

- CARDIOVASCULAR DISEASES
- DIABETES MELLITUS
- GASTRO-INTESTINAL DISEASES
- RESPIRATORY DISEASES
- OSTEOPOROSIS
- PRETERM LW BIRTH
SEVERAL SYSTEMIC AND LOCAL MODIFYING FACTORS
THE INFECTED PERIODONTAL POCKET CAN BE A DENTAL FOCUS
THE MAJOR GOAL OF ANY CAUSE RELATED PERIODONTAL TREATMENT IS:

TO CLEAN TEETH AND RESTORE ORAL HYGIENE