



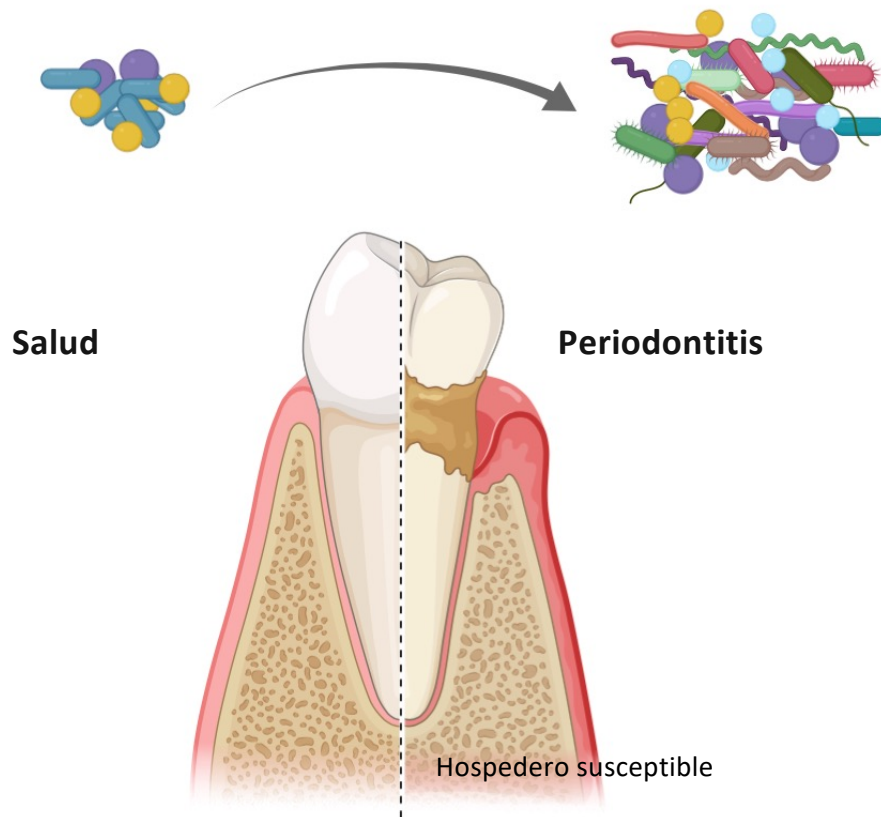
Generalidades Microbiología de las enfermedades periodontales y peri-implantarias

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Prof. Asociada, Área de Microbiología,
Departamento de Patología y Medicina Oral

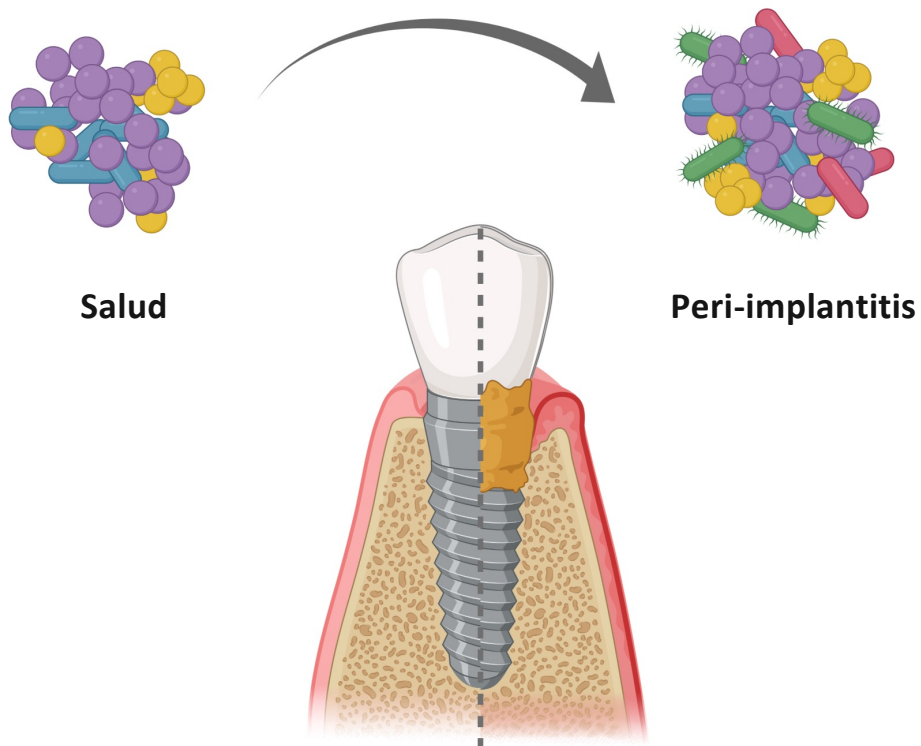
loreto.abusleme@odontologia.uchile.cl

Enfermedades periodontales y peri-implantarias



- Enfermedades que resultan de la interacción entre el microbioma subgingival y la respuesta inmuno-inflamatoria del hospedero
- Gingivitis
- Periodontitis

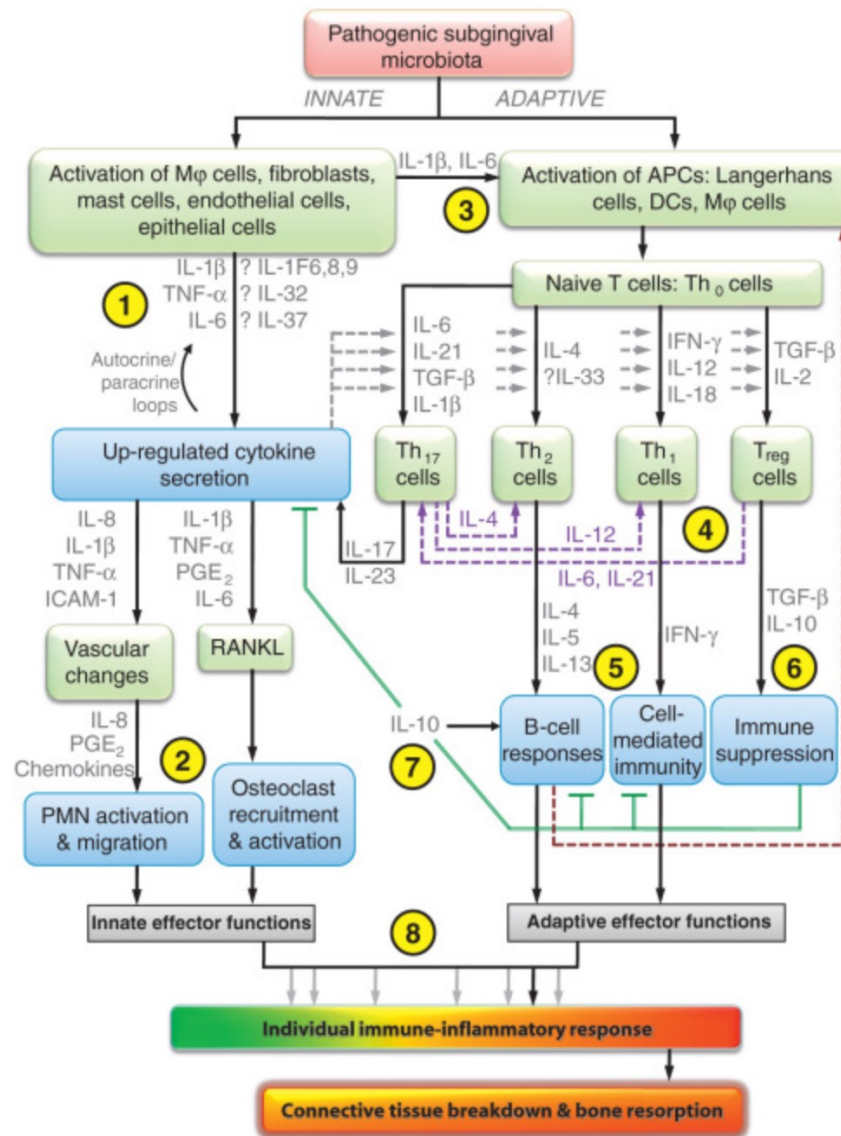
Enfermedades periodontales y peri-implantarias



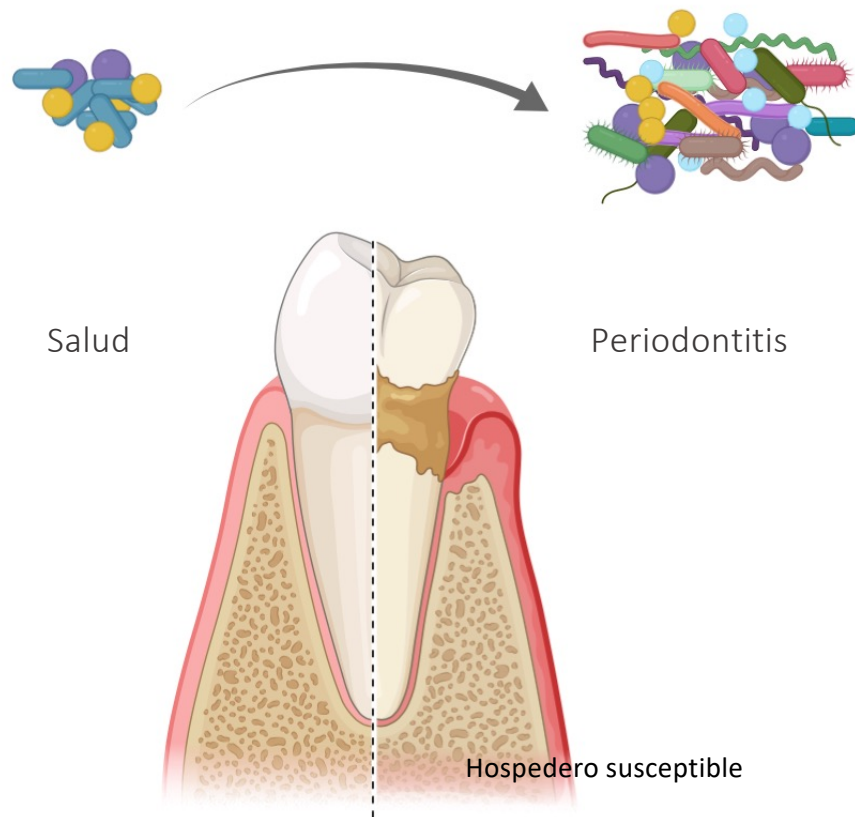
- Enfermedades que resultan de la interacción entre el microbioma subgingival y la respuesta inmuno-inflamatoria del hospedero
- Gingivitis
- Periodontitis
- Peri-mucositis
- Peri-implantitis

Patogénesis de las enfermedades periodontales

- Desencadenada por desbalances en la microbiota - eliminación sigue siendo el tratamiento de estas enfermedades
- Patogénesis es compleja!!!!

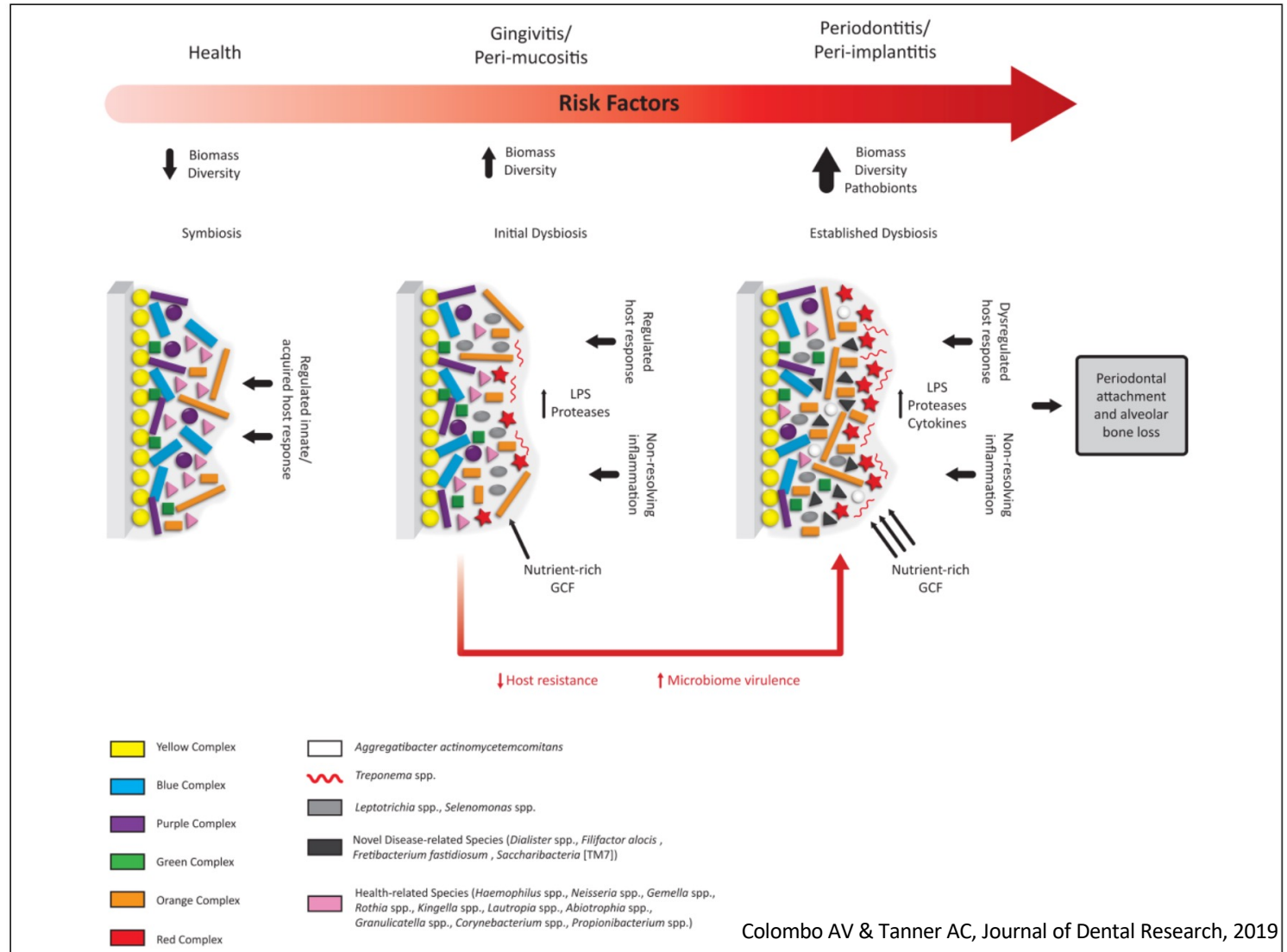


Origen disbiótico de las enfermedades periodontales



- Tienen su origen en un “desbalance/desequilibrio” en las comunidades polimicrobianas subgingivales conocido como “**disbiosis**”
- En la literatura también se definen como enfermedades asociadas a **biopelículas** de un carácter patogénico

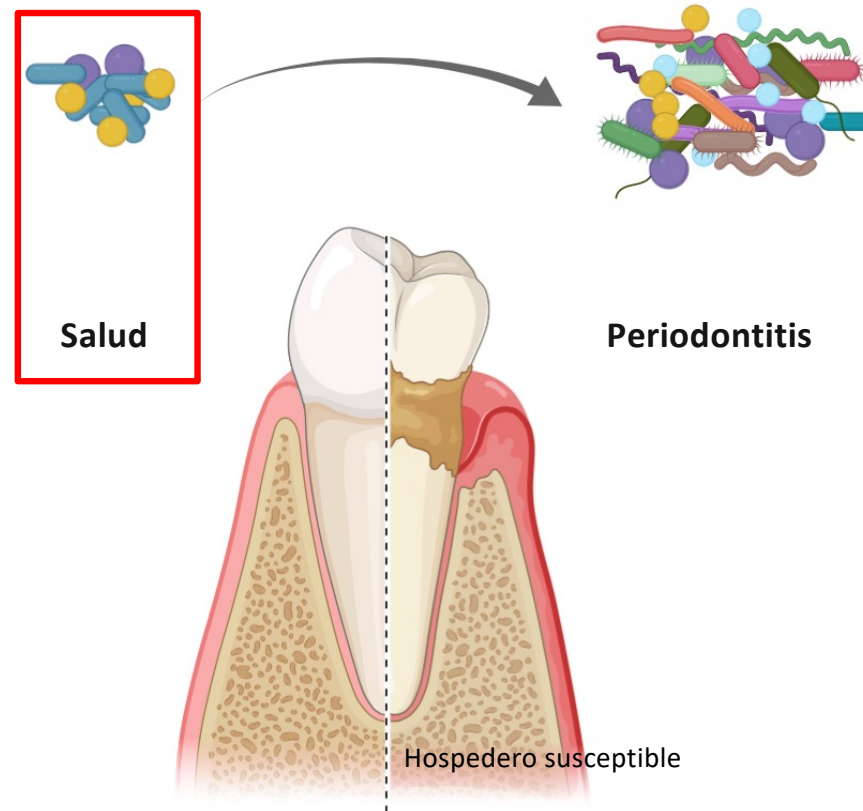
Origen disbiótico de las enfermedades periodontales y peri-implantarias



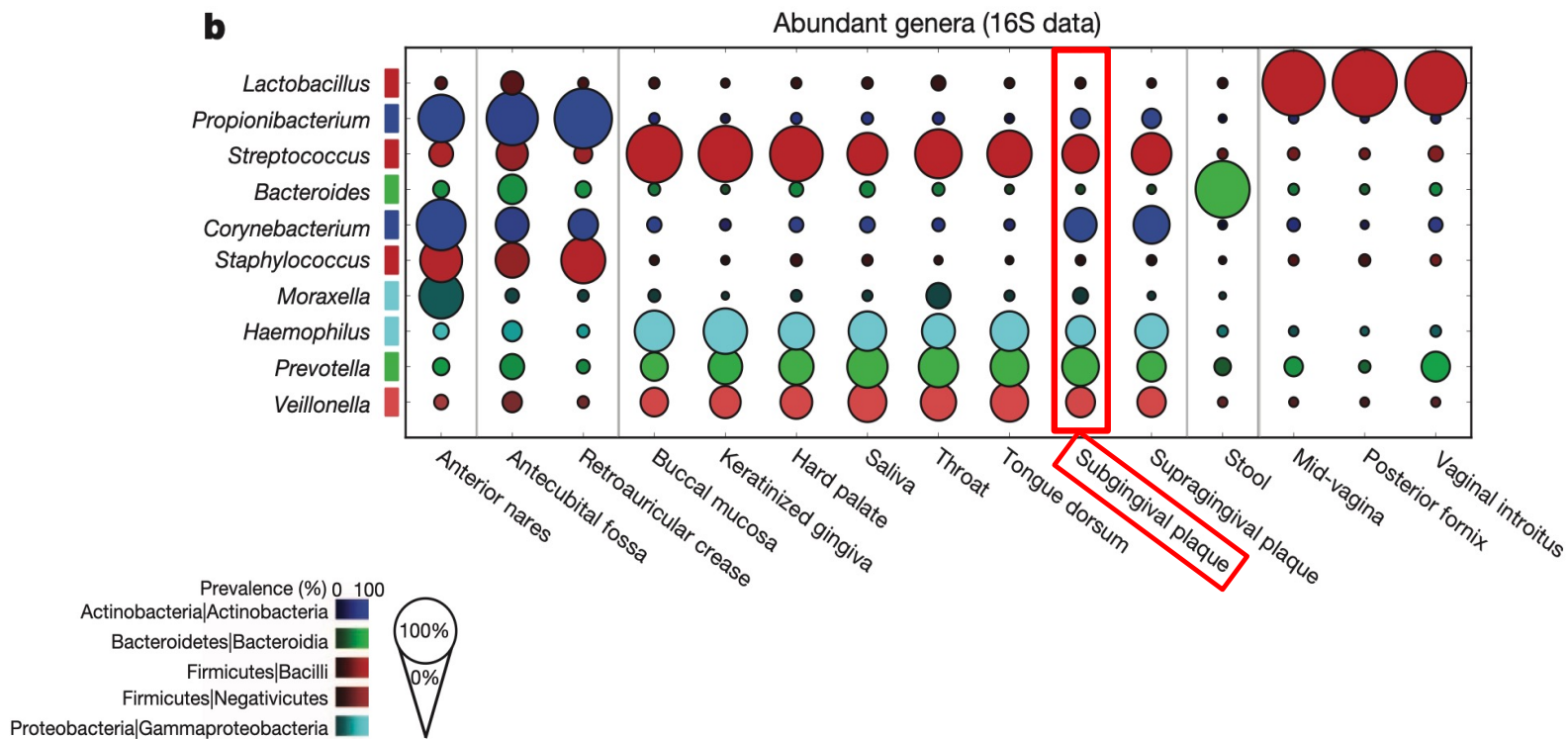
¿ Sabemos cómo es la microbiota subgingival asociada a salud ?



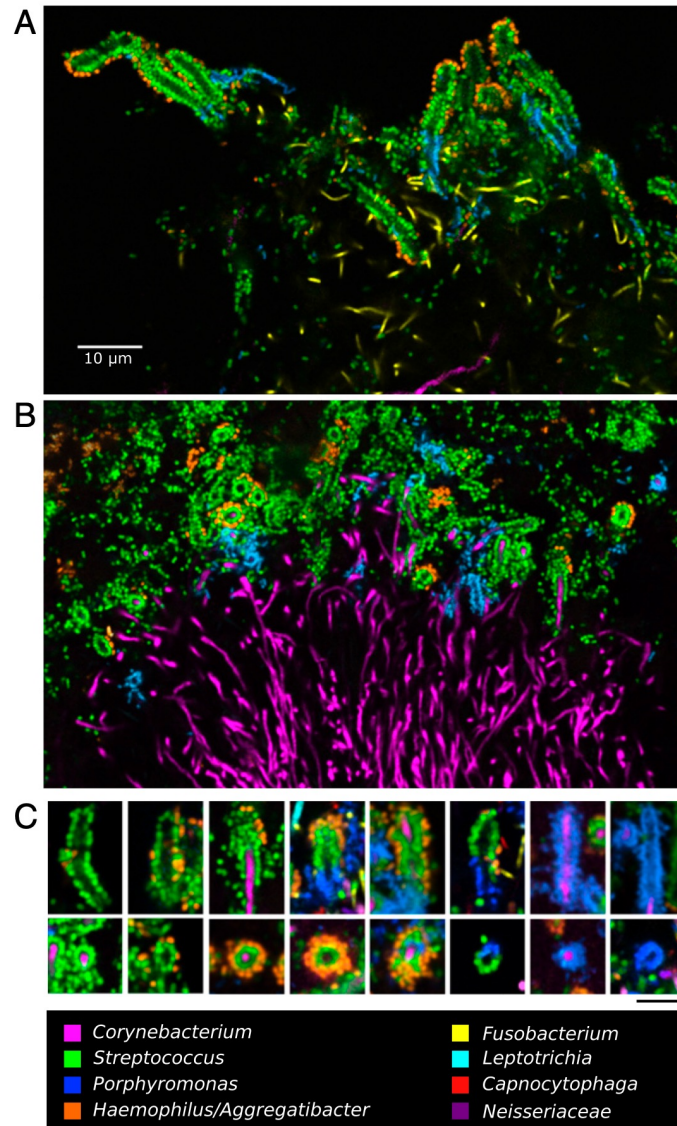
¿ Sabemos cómo es la microbiota subgingival asociada a salud ?



¿ Sabemos cómo es la microbiota subgingival asociada a salud ?

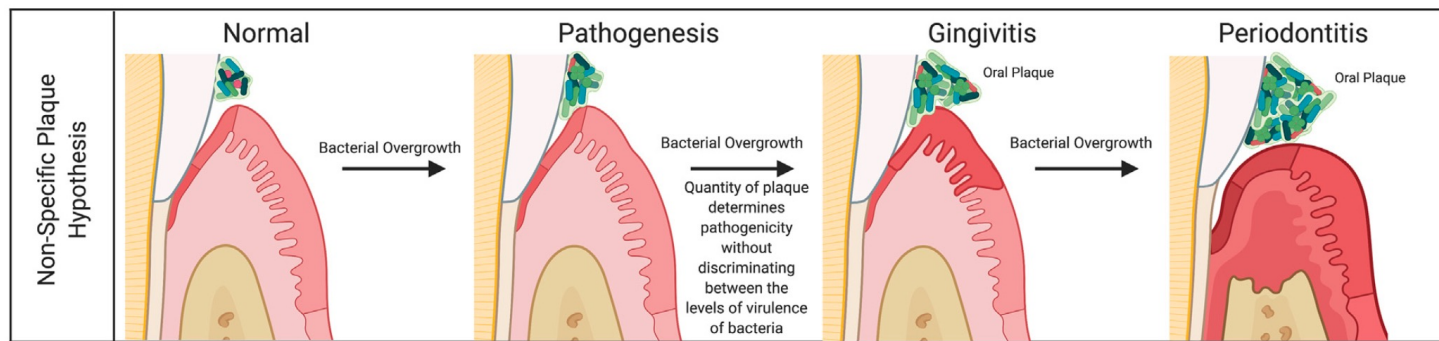


¿ Sabemos cómo es la microbiota subgingival asociada a salud ?



Teorías respecto al origen microbiano de las enfermedades periodontales

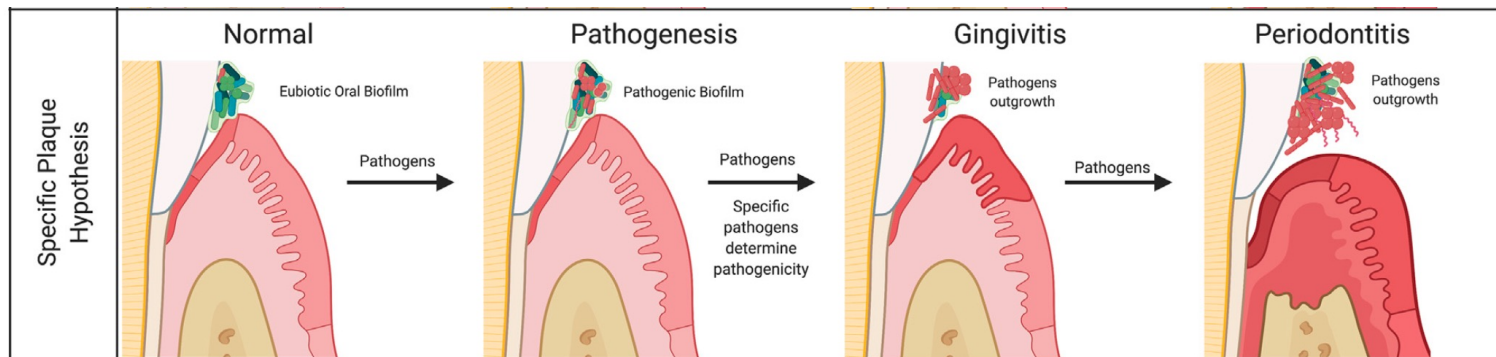
I. Hipótesis de placa no específica (Miller WD, 1890 y Theilade E, 1986)



Tomado de: Radaic A & Kapilla YL, Computational and Structural Biotechnology Journal, 2021

Teorías respecto al origen microbiano de las enfermedades periodontales

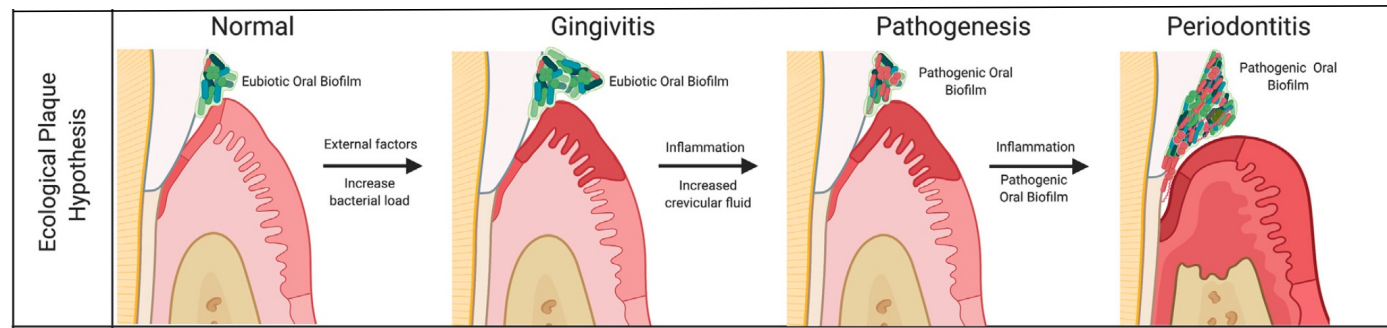
II. Hipótesis de placa específica (Löesche W., 1976)



Tomado de: Radaic A & Kapilla YL, Computational and Structural Biotechnology Journal, 2021

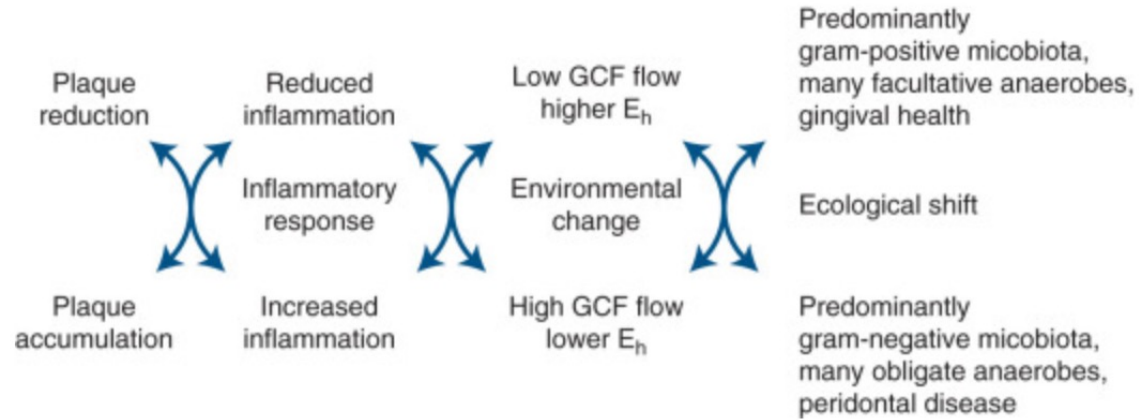
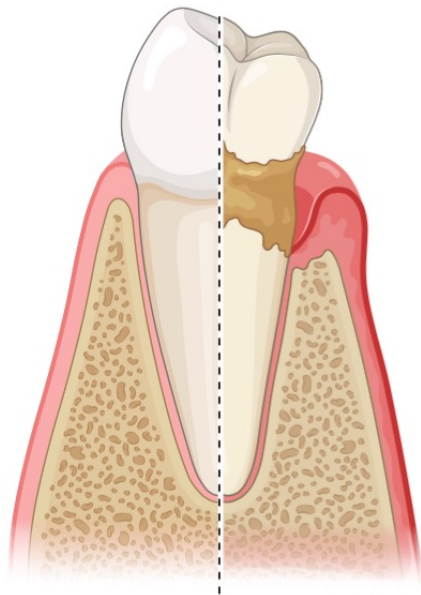
Teorías respecto al origen microbiano de las enfermedades periodontales

III. Hipótesis de placa ecológica (Marsh PD, 1994)



Tomado de: Radaic A & Kapilla YL, Computational and Structural Biotechnology Journal, 2021

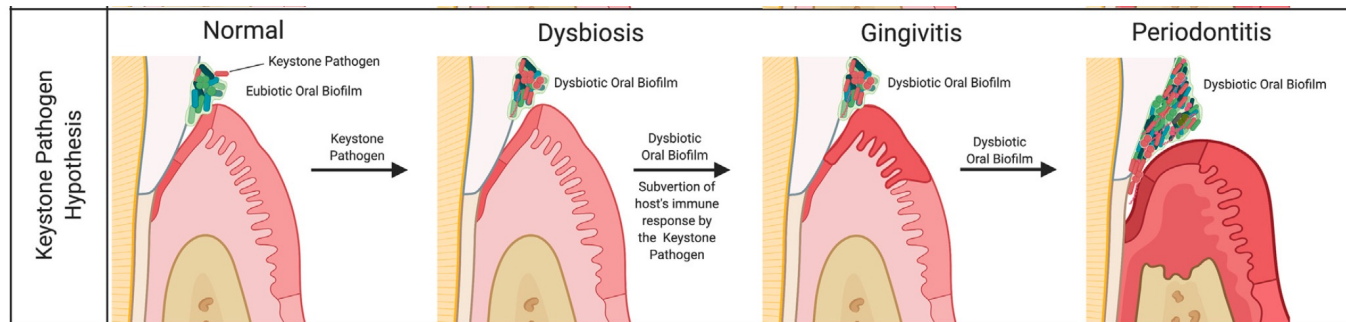
Hipótesis de placa ecológica



Adapted from Marsh PD: Microbial ecology of dental plaque and its significance in health and disease. *Adv Dent Res* 8:263, 1994.

Teorías respecto al origen microbiano de las enfermedades periodontales

IV. Keystone Pathogen Hypothesis (Hajishengallis et al., 2012)

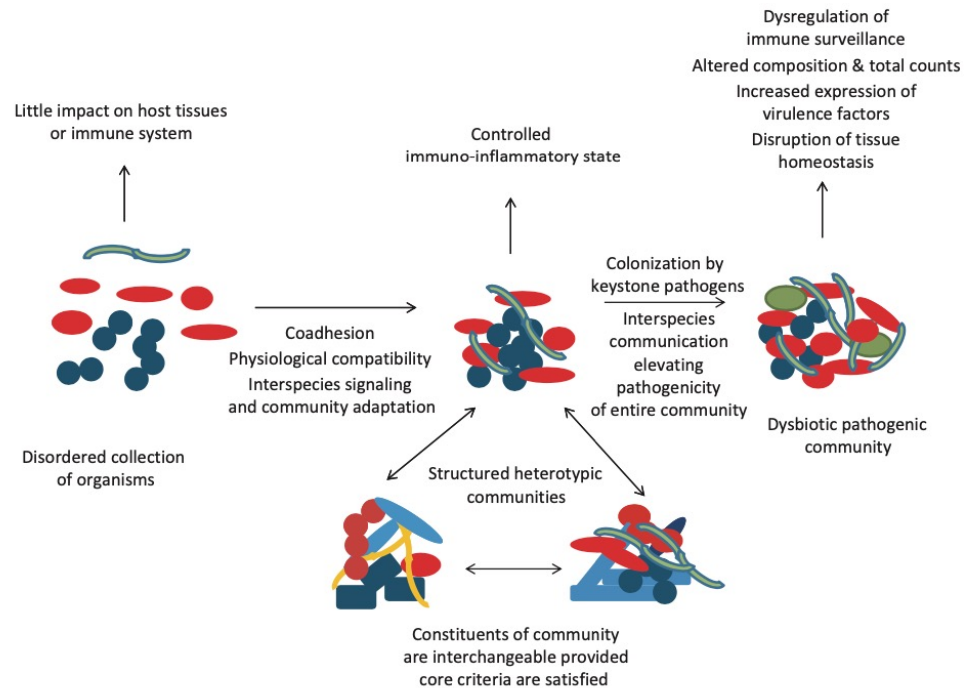


Tomado de: Radaic A & Kapilla YL, Computational and Structural Biotechnology Journal, 2021

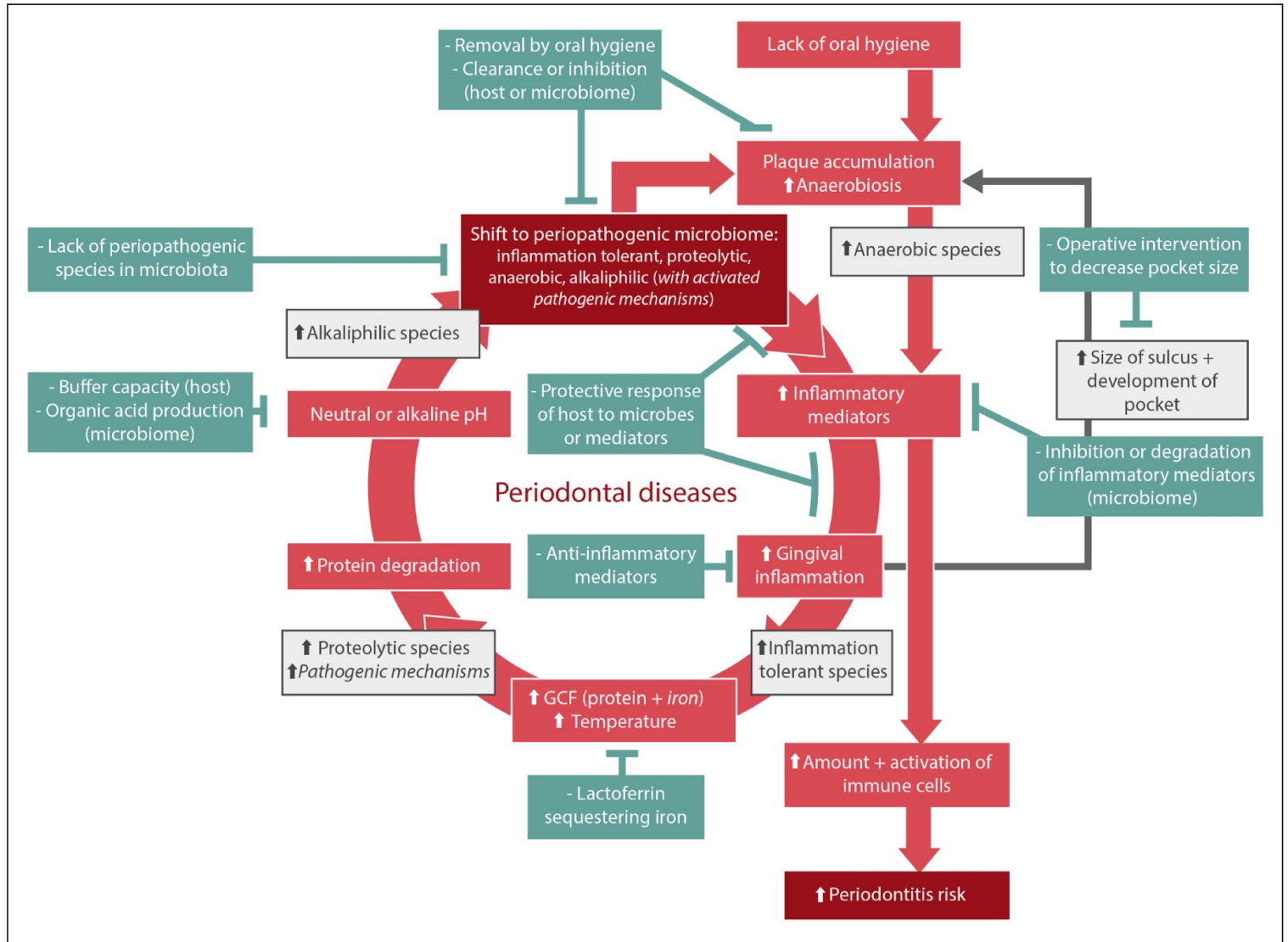
Hajishengallis et al., Nature Reviews Microbiology 2012.

Teorías respecto al origen microbiano de las enfermedades periodontales

V. Polymicrobial Synergy and Dysbiosis Model (Hajishengallis et al., 2012)



Visión actualizada cambios ecológicos asociados a enfermedades periodontales



Ahora
viajemos un
poco al
pasado....



Estudios clásicos – *reconociendo el origen de las enfermedades periodontales*

Experimental Gingivitis in Man

BY HARALD LÖE,* D.D.S., DR. ODONT., ELSE THEILADE,** D.D.S. AND
S. BÖRGLUM JENSEN,*** D.D.S., LIC. ODONT., AARHUS, DENMARK

INCREASING evidence from different fields of dental research has indicated that oral deposits play a major role in the development and maintenance of periodontal disease.

Estudios clásicos – *reconociendo el origen de las enfermedades periodontales*

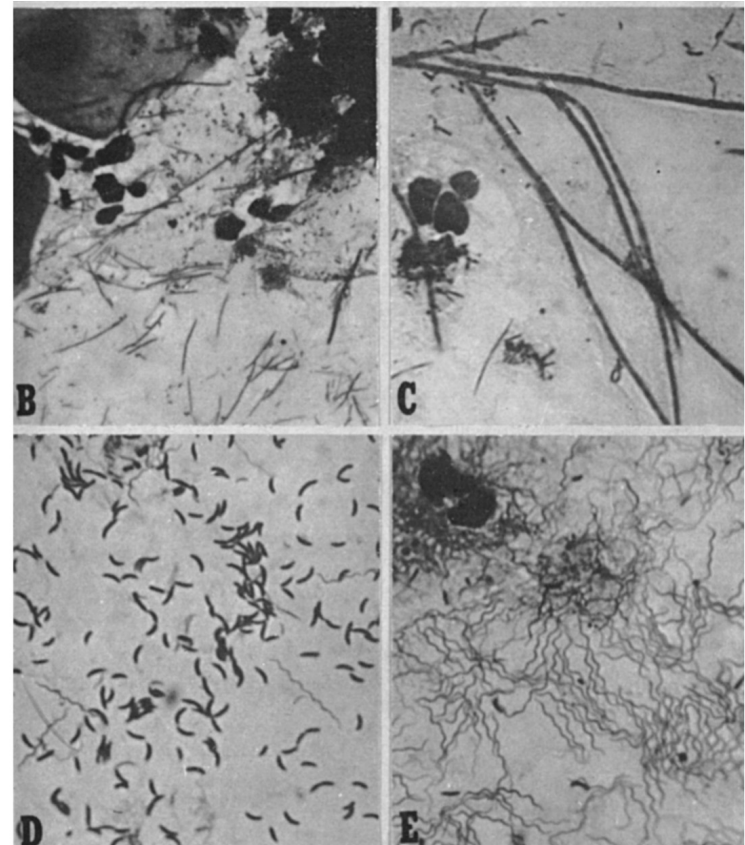
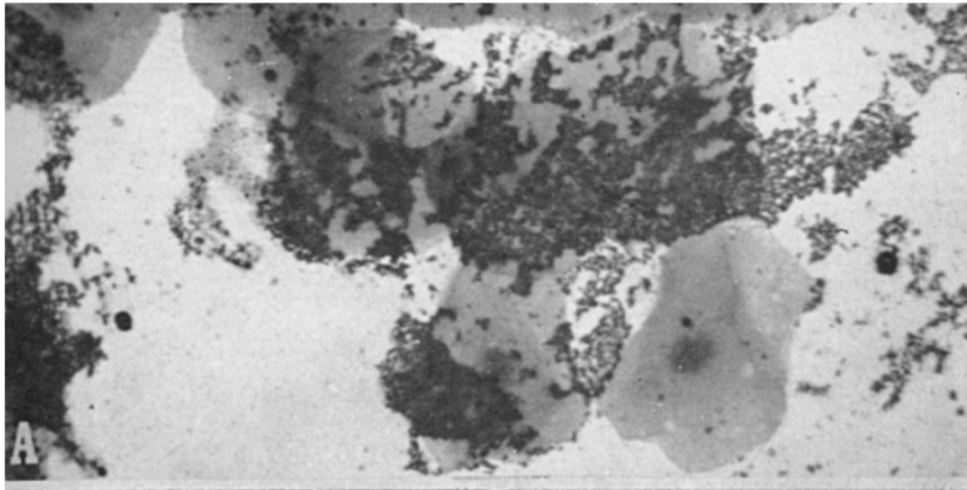


Fig. 1. Microphotographs of impression preparations from the gingival margin during the period of no hygiene. Gentian violet. A: Predominantly cocciform microflora and desquamated epithelial cells in early phase of no hygiene. (x 460). B: Filamentous organisms and leukocyte accumulations seven days after withdrawal of toothbrushing. (x 730). C: Higher magnification of filaments and fusobacteria from preparation shown in B. (x 1150). D: Concentration of vibrios. Same preparation as E. (x 1150). E: Spirochetes and vibrios predominate after two weeks of no hygiene and three days before clinical gingivitis could be diagnosed (x 1150).

Estudios clásicos – *reconociendo el origen de las enfermedades periodontales*

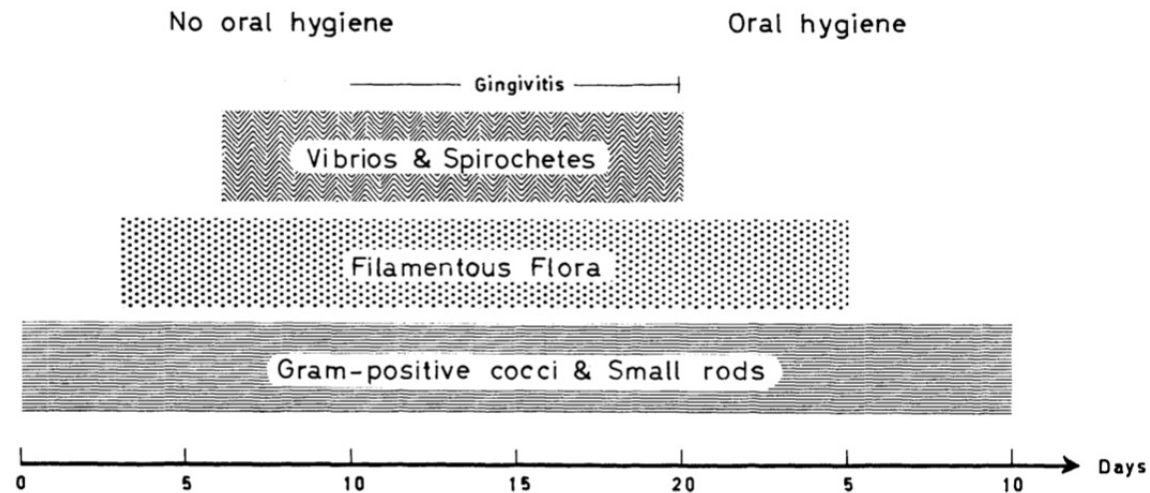


Fig. 3. Trends in the changes in the microflora of the gingival margin during the periods of no oral hygiene and oral hygiene.

Estudios clásicos – *reconociendo el origen de las enfermedades periodontales*

SHORT COMMUNICATION

ENHANCEMENT OF ALVEOLAR BONE LOSS IN GNOTOBIOTIC MICE HARBOURING HUMAN GINGIVAL BACTERIA

R. J. GIBBONS and S. S. SOCRANSKY

Forsyth Dental Centre and Harvard School of Dental Medicine, Boston, Mass., U.S.A.

848

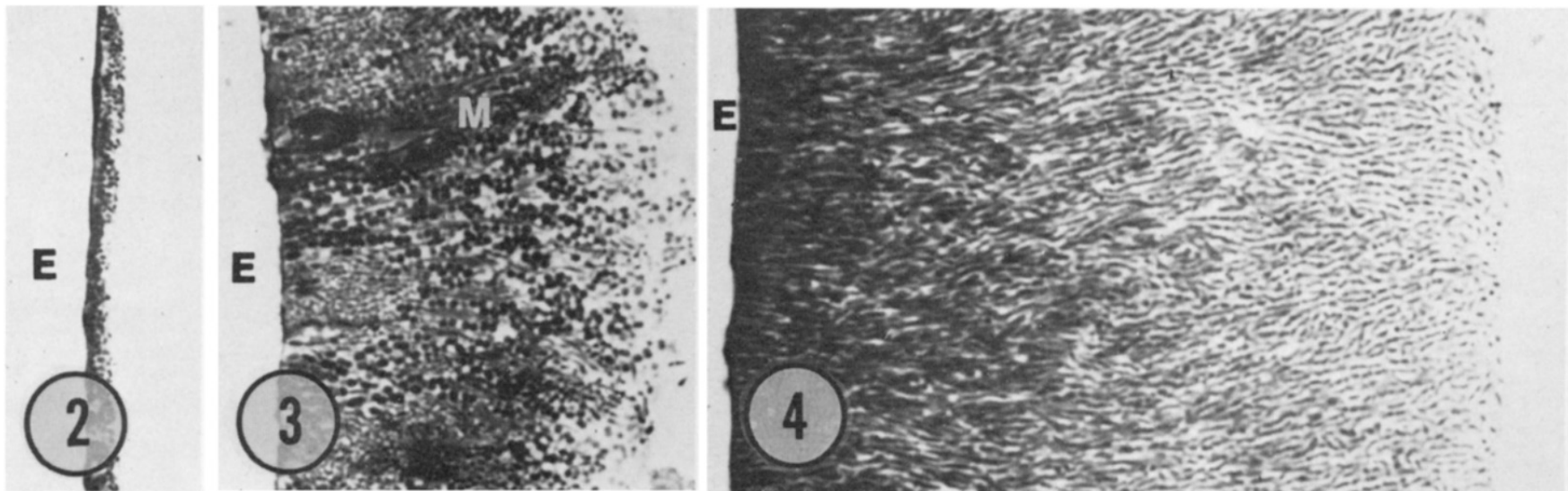
R. J. GIBBONS AND S. S. SOCRANSKY

the bone loss induced by human gingival debris was statistically more severe than in the germ free controls in both experiments ($p < 0.02$). In the experiments with older animals, the eight organism defined flora also induced significant bone loss ($p < 0.02$). The conventional mouse flora enhanced bone loss, but the increase was not statistically significant. None of the mice developed massive plaque accumulations typical of

¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

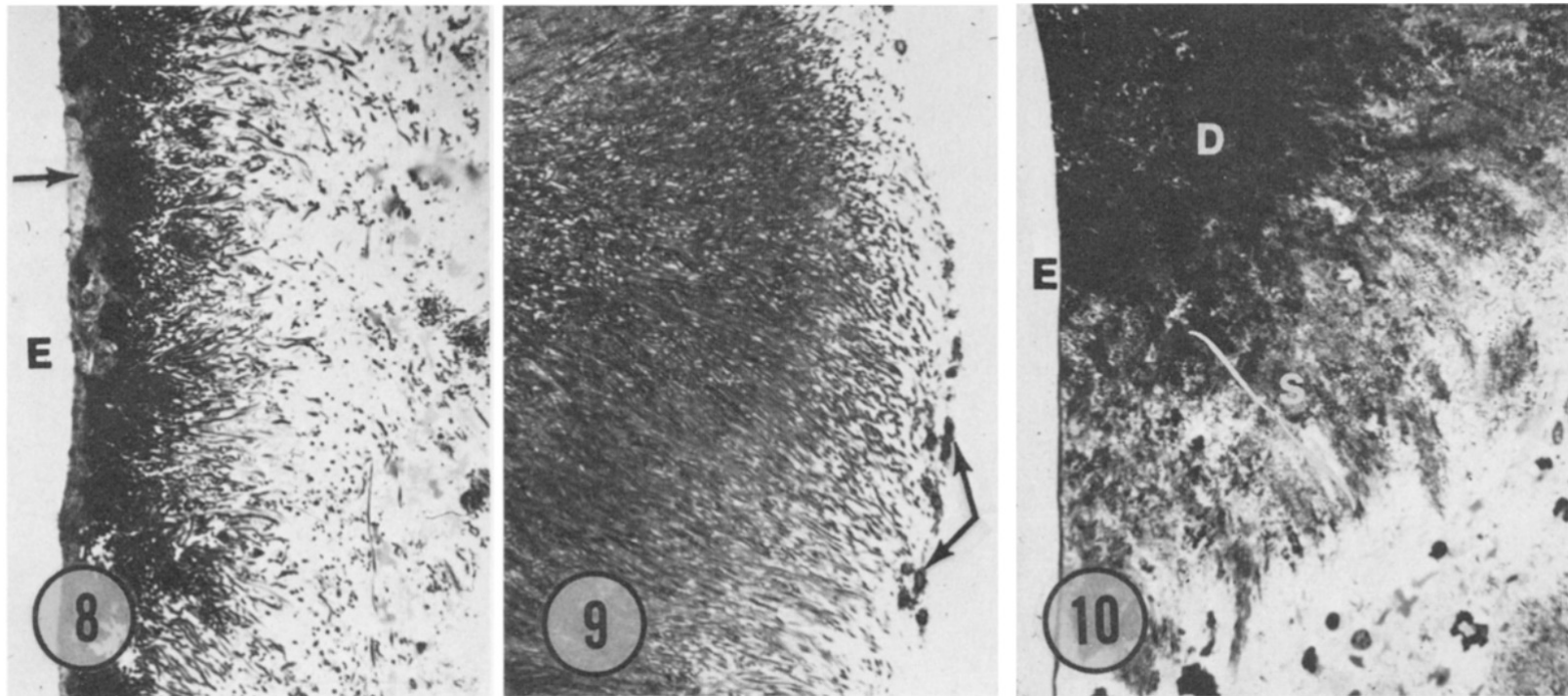
Técnicas de Microscopía

Microbiota compatible con a salud periodontal



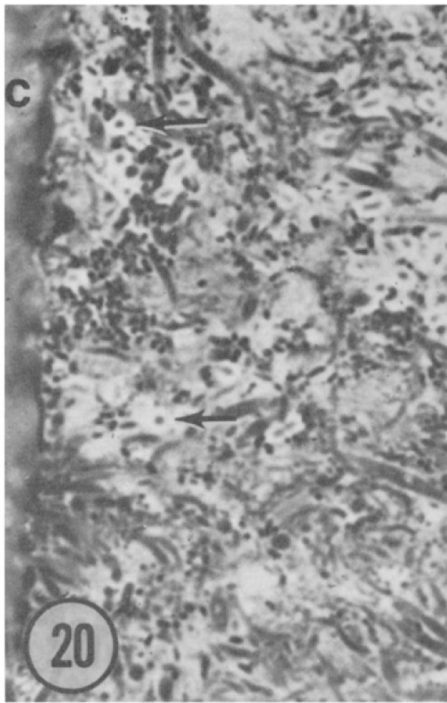
¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

Microbiota asociada a gingivitis

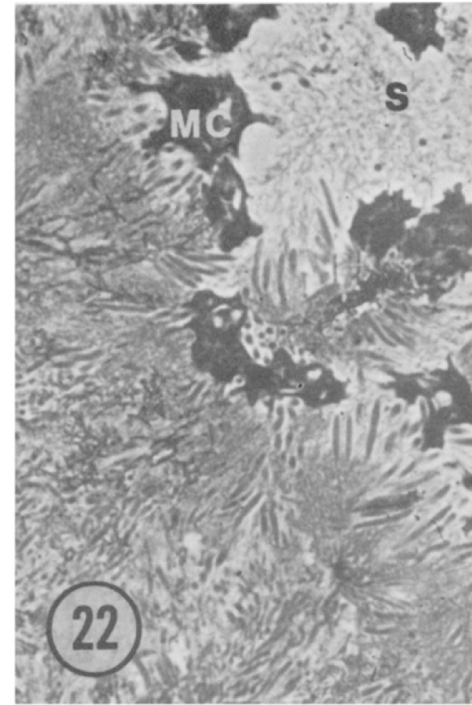
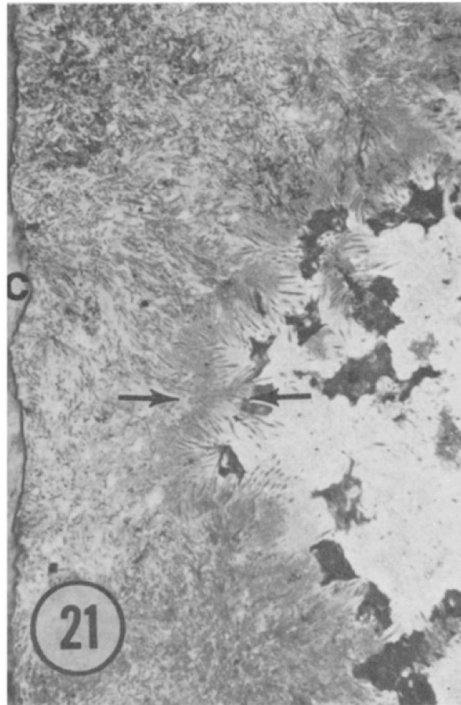


¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

Microbiota asociada a periodontitis



C: Cemento



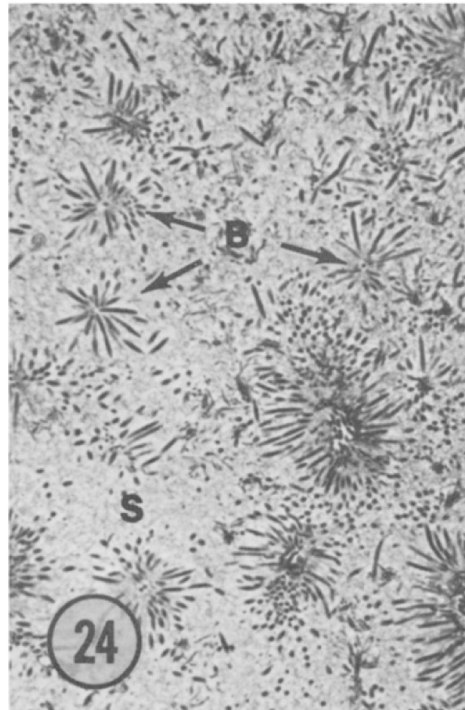
MC: Células del hospedero
S: Áreas ricas en espiroquetas

¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

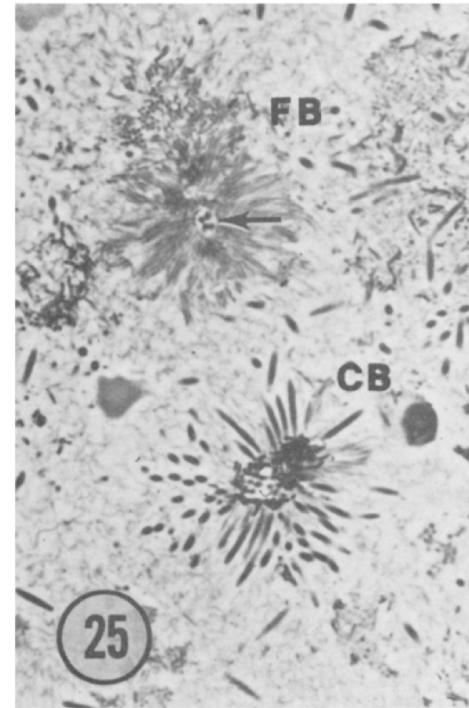
Microbiota asociada a periodontitis



S: Áreas ricas en espiroquetas



B: "Test-tube brush formations"



FB: Fine test tube formations
CB: Coarse test tube formations

¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

- Primeras investigaciones también se enfocan en la caracterización de especies bacterianas a través del cultivo microbiológico clásico

The predominant cultivable microflora of advanced periodontitis

JÖRGEN SLOTS

Department of Periodontology and Department of Microbiology, Royal Dental College, Copenhagen, Denmark

ABSTRACT – A study on the predominant cultivable microorganisms harbored in the base of deep periodontal pockets of eight patients aged 34–48 years was carried out using the roll tube culture technique. From a total of 475 isolates, 425 (89.5 %) were obligate anaerobes, 356 (74.9 %) were Gram-negative, and 441 (92.8 %) were categorized as rods. *Bacteroides melaninogenicus* and *Fusobacterium nucleatum* constituted the majority of the isolates in seven samples, but their mutual proportions differed considerably between the samples. One sample was dominated by *Actinomyces* species. Some periodontopathic potentials of the predominating Gram-negative rods are summarized.

(Accepted for publication 23 May 1976)

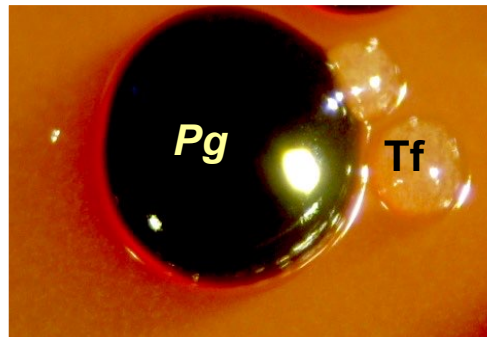
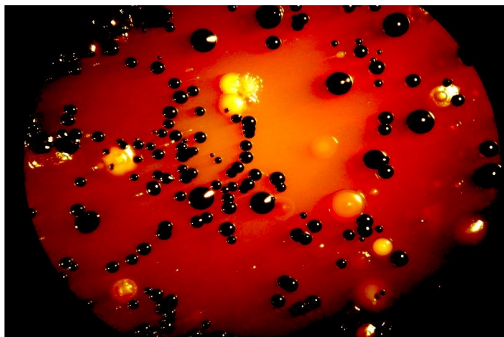
Cultivo Microbiológico



Jarra de anaerobiosis



Cámara de Anaerobiosis

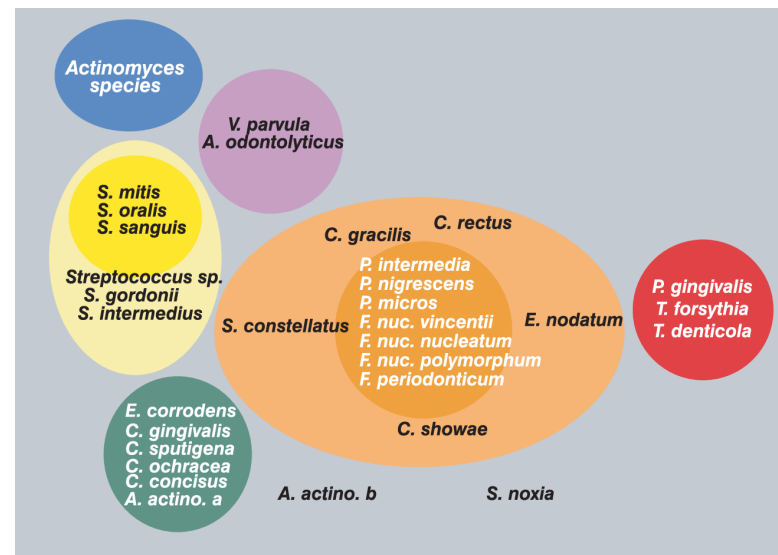


Imágenes de colonias bacterianas, Laboratorio Microbiología Oral, FOUCH. Crédito: Profs. Nora Silva y Marta Gajardo

¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

Reference	Technique	Key findings
Socransky et al., 1998 ⁷	Evaluated 40 species in subjects with and without periodontitis via checkerboard DNA-DNA hybridization.	<ul style="list-style-type: none"> ■ Identification of five complexes of tightly associated species. ■ The red complex (<i>Tannerella forsythia</i>, <i>Porphyromonas gingivalis</i> and <i>Treponema denticola</i>) showed a strong positive correlation with periodontitis severity.

Tomado de Diaz PI, Hoare A, Hong BY. J Calif Dent Assoc. 2016 Jul;44(7):421-35.



“Complejos bacterianos”

SS Socransky et al. J Clin Periodontol. 1998 Feb;25(2):134-44.

¿ Cómo se han ido apreciando los cambios microbianos asociados a las enf. periodontales ?

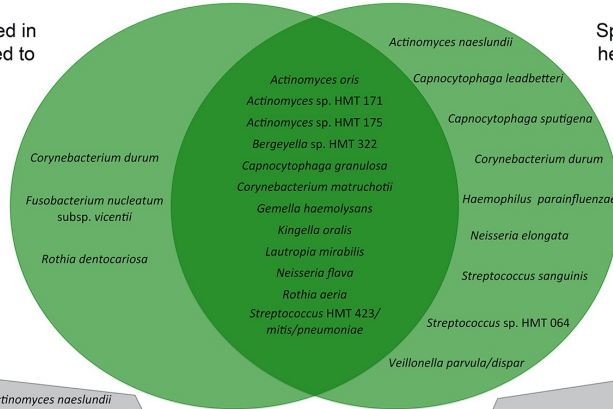
- Diversas técnicas de biología molecular – utilizando un marcador presente en todas las bacterias (gen 16S rDNA)

Studies of the Subgingival Microbiome in Different Periodontal Conditions Using High-Throughput Sequencing of the 16S rRNA Gene		
Reference	Methods	Key findings
Health versus periodontitis		
Griffen et al., 2012 ¹⁴	29 periodontally healthy controls and 29 subjects with chronic periodontitis (shallow and deep sites were sampled).	<ul style="list-style-type: none"> ■ 16 phyla, 106 genera and 596 species identified. 81 percent of sequences could be mapped to cultivated species. ■ Community profiles were different in health and disease with higher diversity in periodontitis. ■ 123 species-level phylotypes were enriched in periodontitis, while 53 were enriched in health. ■ Shallow pockets of periodontitis subjects showed preponderance of disease-associated organisms. ■ The major health-associated species are suppressed but not lost in periodontitis.
Abusleme et al., 2013 ¹⁵	22 subjects with chronic periodontitis and 10 healthy controls. Periodontitis subjects sampled at two sites with 5 mm probing depth (one with bleeding). Total load and load of specific genera measured via real time qPCR.	<ul style="list-style-type: none"> ■ Communities in health and periodontitis differed with higher diversity in periodontitis. ■ 46 species-level phylotypes were enriched in periodontitis and 14 were enriched in health. ■ Defined core subgingival species as those present in a majority of subjects and at equal relative abundance in health and disease. <i>F. nucleatum</i> is the most abundant core species. ■ Bleeding was associated with higher bacterial load. ■ Shifts from health to periodontitis resemble ecological succession without replacement of health-associated species.
Hong et al., 2015 ¹⁷	34 subjects with chronic periodontitis compared to 79 healthy subjects sequenced by the Human Microbiome Project. Diabetics and subjects with chronic kidney disease included in the periodontitis group.	<ul style="list-style-type: none"> ■ Communities in health and periodontitis differed. ■ No demographic or medical characteristics of periodontitis subjects were associated with specific microbial profiles. ■ Two types of microbiome profiles seen in periodontitis (clusters A and B), with the cluster B community showing a positive correlation with periodontitis extent. ■ Two types of microbiome profiles seen in health (clusters L and S).
Kirst et al., 2015 ¹⁶	25 subjects with chronic periodontitis and 25 healthy controls.	<ul style="list-style-type: none"> ■ Communities in health and periodontitis differed. ■ 18 species-level phylotypes enriched in periodontitis and five enriched in health. ■ Microbial diversity was not significantly different between health and periodontitis.

Tomado de Diaz PI, Hoare A, Hong BY. J Calif Dent Assoc. 2016 Jul;44(7):421-35.

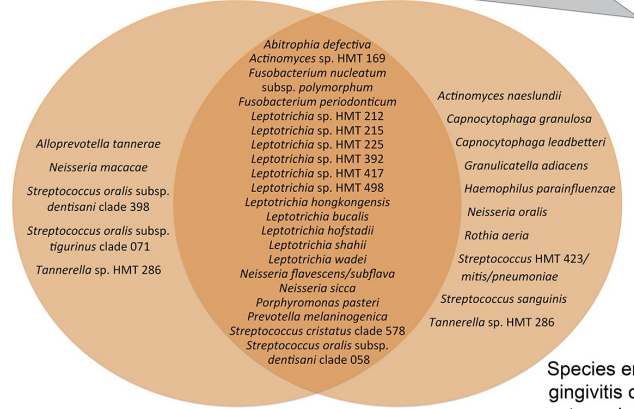
Salud vs Gingivitis vs Periodontitis

Species enriched in health compared to gingivitis

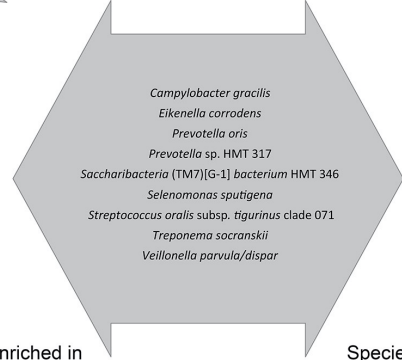


Species enriched in health compared to periodontitis

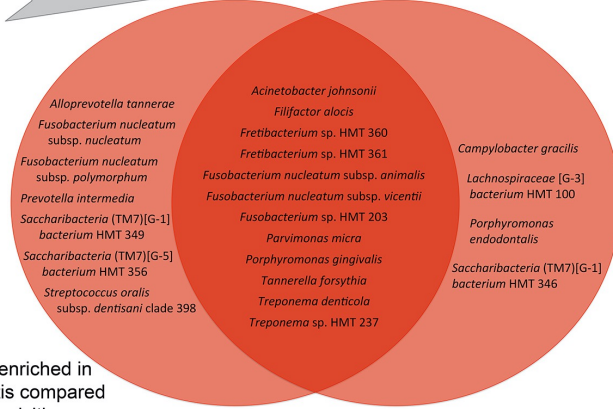
Species enriched in gingivitis compared to health



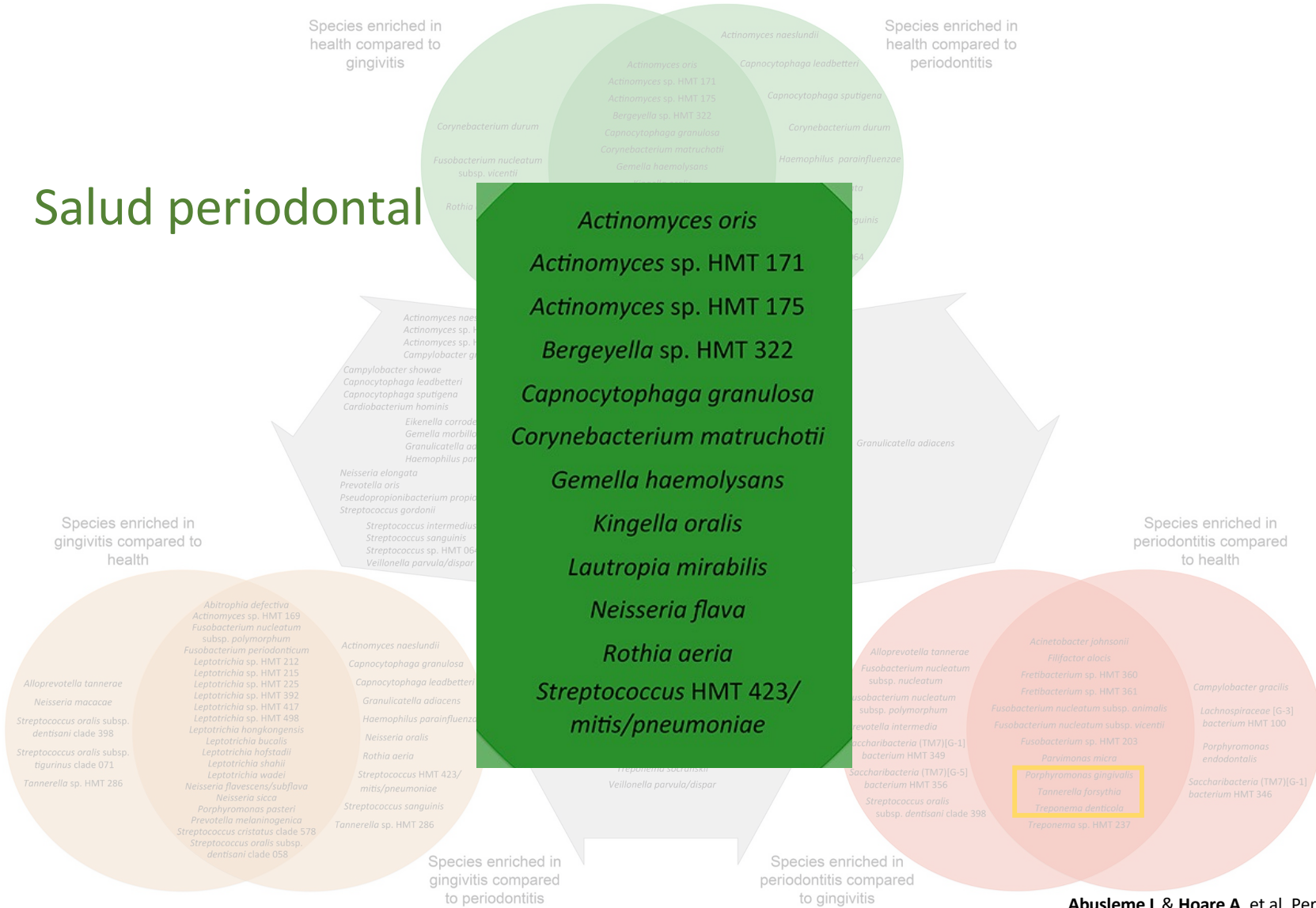
Species enriched in gingivitis compared to periodontitis



Species enriched in periodontitis compared to gingivitis



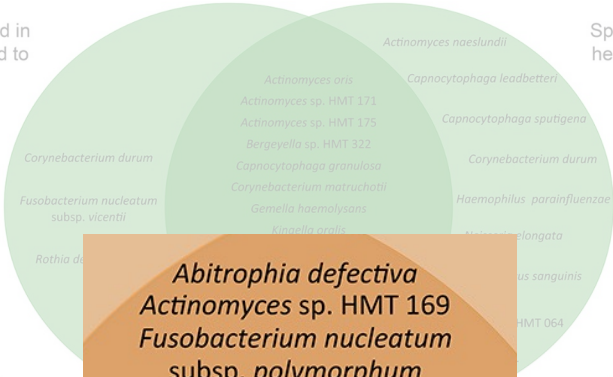
Salud periodontal



Gingivitis

Species enriched in health compared to gingivitis

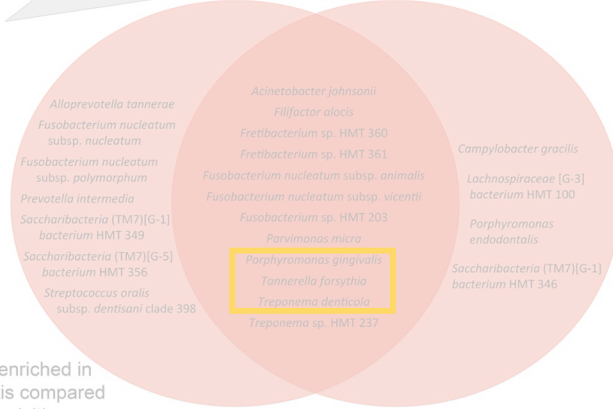
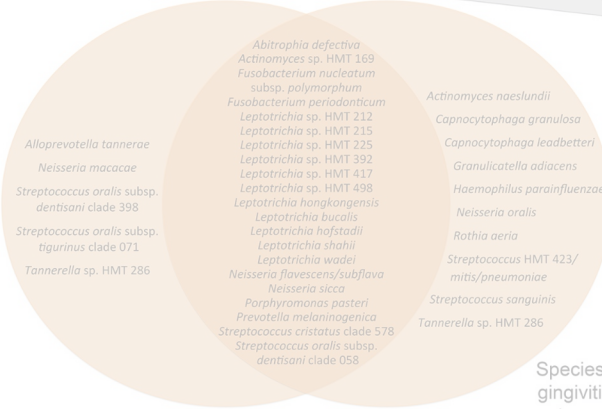
Species enriched in health compared to periodontitis



Abitrophia defectiva
***Actinomyces* sp. HMT 169**
Fusobacterium nucleatum* subsp. *polymorphum
Fusobacterium periodonticum
***Leptotrichia* sp. HMT 212**
***Leptotrichia* sp. HMT 215**
***Leptotrichia* sp. HMT 225**
***Leptotrichia* sp. HMT 392**
***Leptotrichia* sp. HMT 417**
***Leptotrichia* sp. HMT 498**
Leptotrichia hongkongensis
Leptotrichia bucalis
Leptotrichia hofstadii
Leptotrichia shahii
Leptotrichia wadei
Neisseria flavescens/subflava
Neisseria sicca
Porphyromonas pasteri
Prevotella melaninogenica
***Streptococcus cristatus* clade 578**
***Streptococcus oralis* subsp. *dentisani* clade 058**

Species enriched in gingivitis compared to health

Species enriched in periodontitis compared to health



Species enriched in gingivitis compared to periodontitis

Species enriched in periodontitis compared to gingivitis

Periodontitis



El microbioma asociado a salud, gingivitis y periodontitis

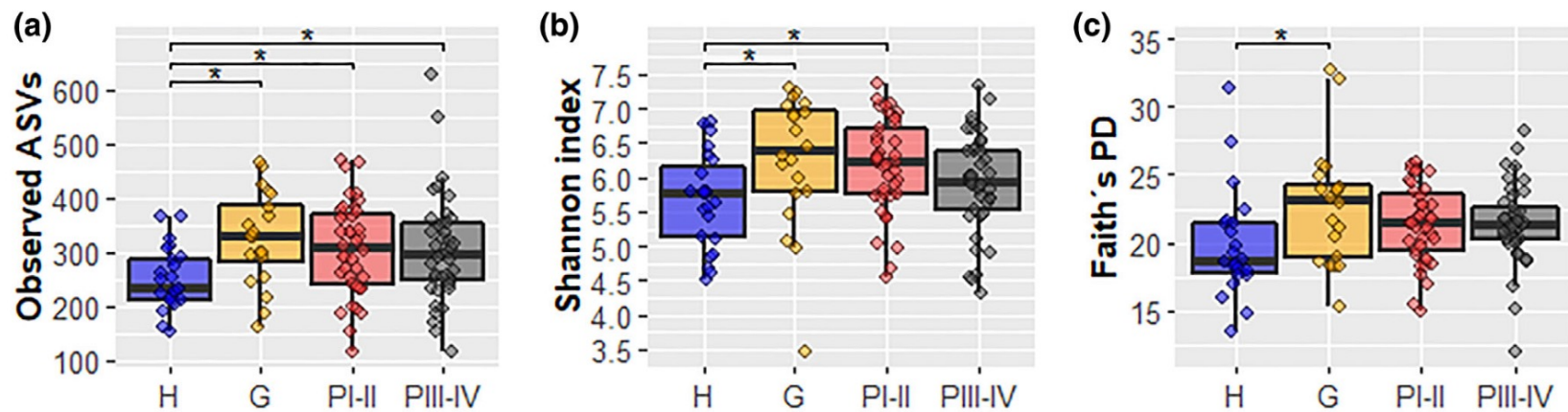
Received: 1 August 2022 | Revised: 4 February 2023 | Accepted: 10 February 2023

DOI: 10.1111/jcpe.13793

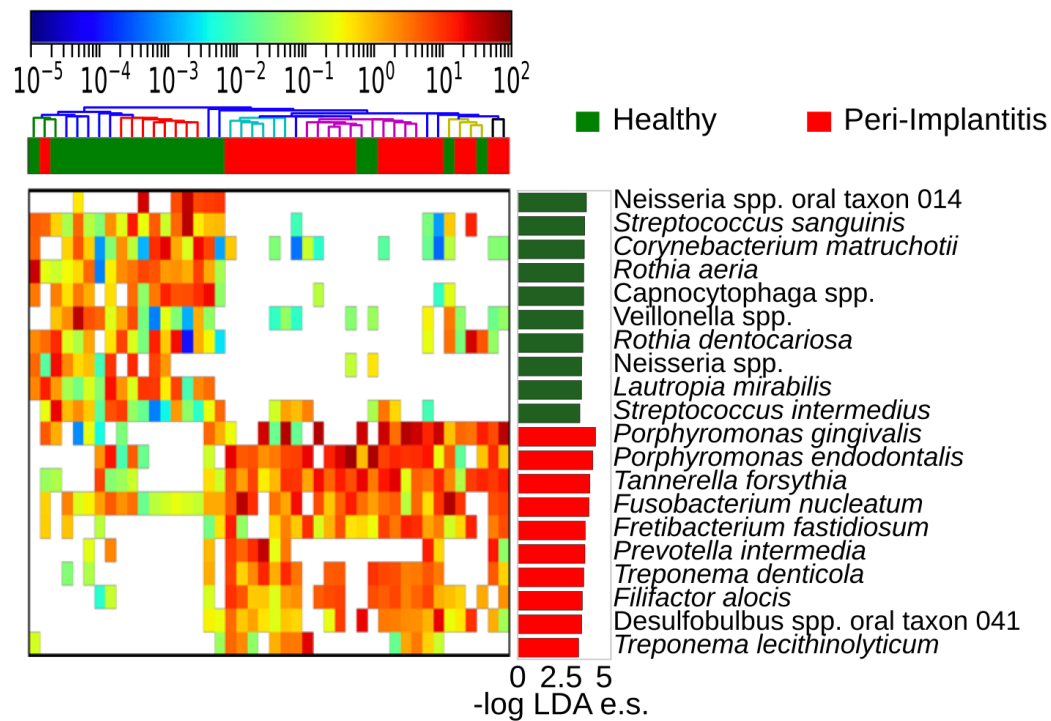
ORIGINAL ARTICLE

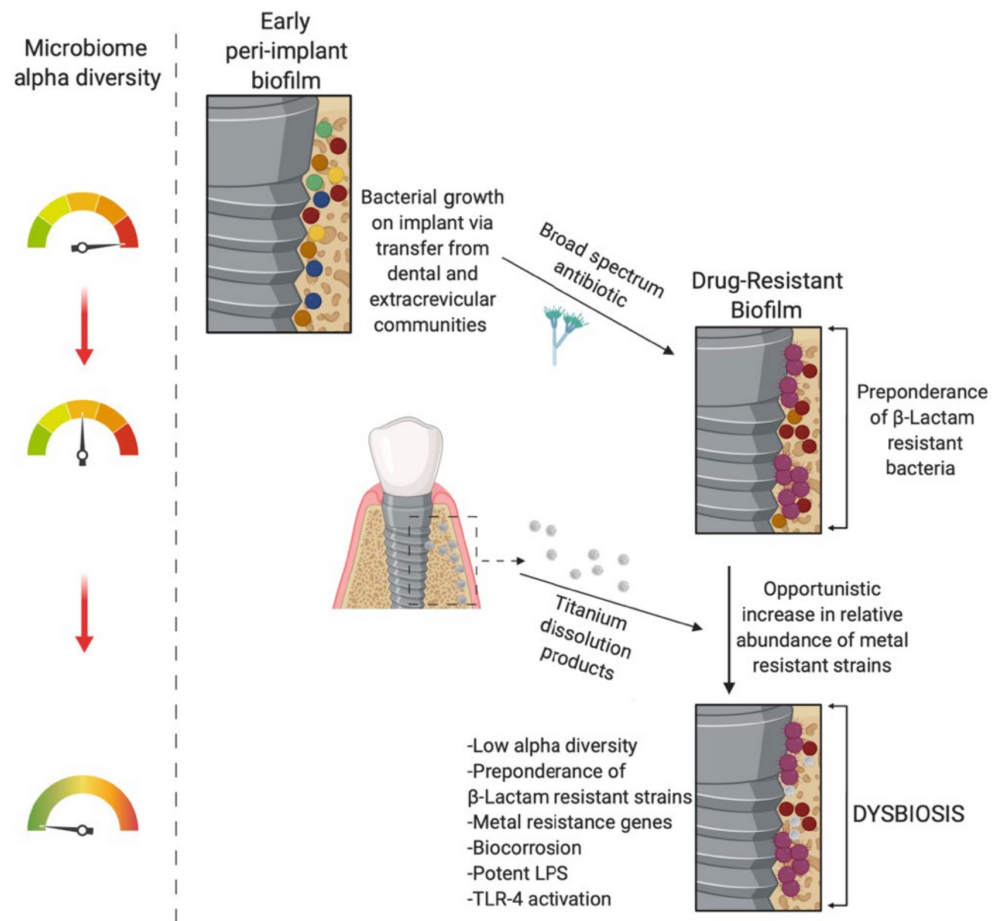
Journal of Clinical
Periodontology WILEY

Subgingival microbiome in periodontal health, gingivitis and different stages of periodontitis



El microbioma asociado a salud y peri-implantitis



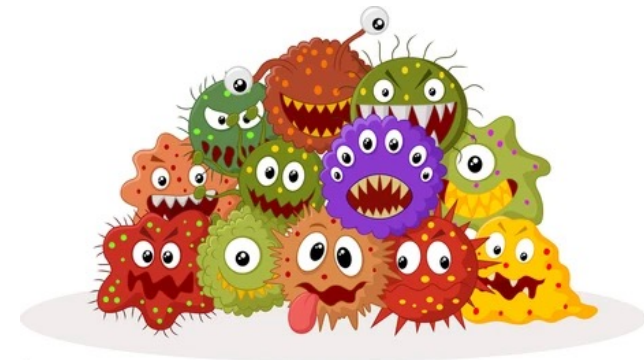


Teorías actuales de la disbiosis microbiana a nivel peri-implantar

FIGURE 1 Theoretical model of local and environmental factors that lead to reduced microbiome alpha diversity and dysbiosis in peri-implant disease, as observed by Daubert et al and Dabdoud et al.^{8,75} LPS, lipopolysaccharide; TLR-4, toll-like receptor 4 [Colour figure can be viewed at wileyonlinelibrary.com]

Ideas más importantes

- El microbioma subgingival tiene un papel indiscutido en la iniciación y progresión de las enfermedades periodontales y peri-implantarias
- Es ampliamente aceptado que las comunidades polimicrobianas del área subgingival, instigan la destrucción de los tejidos periodontales y peri-implantarios
- Existe disbiosis en la composición, estructura y función de las comunidades bacterianas asociadas a las enfermedades periodontales y peri-implantarias



¡Gracias por su atención!

