



# **Watch Your Mouth!**

## **The Role of the Oral Microbiome in Systemic Health**

**Presented by Jocelyn Strand, ND**



# Oral Health Statistics

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- Up to 77% of American adults over 30 years of age suffering from gingival or periodontal disease
- 700+ species of bacteria in the mouth, with a mean of 296
- 1 milliliter of saliva =  $10^8$  microorganisms
- We swallow one liter or more of saliva each day!



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6057715/>  
<https://www.nature.com/articles/sj.bdj.2016.865>  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5274568/>

Photo provided by Barbara Tritz, Queen of Dental Hygiene





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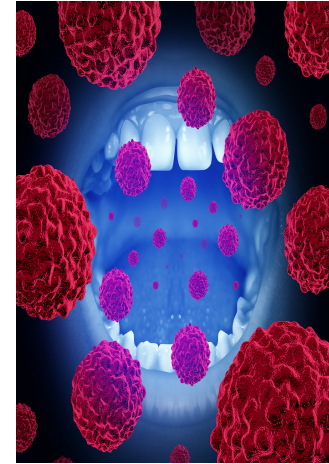
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# Oral Ecology and the Microbiome

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The mouth is not a homogenous environment for resident microbiota and offers several distinct habitats for microbial colonization:

- Tongue
- Attached gingiva
- Cheek
- Lip
- Hard and soft palate
- Teeth (the only natural non-shedding surfaces of the body, which provide a great opportunity for the formation of biofilm and a secure haven for microbial persistence)
- Additional non-shedding surfaces in the mouth include: dental restorations, crown and bridgework, removable prostheses and implants

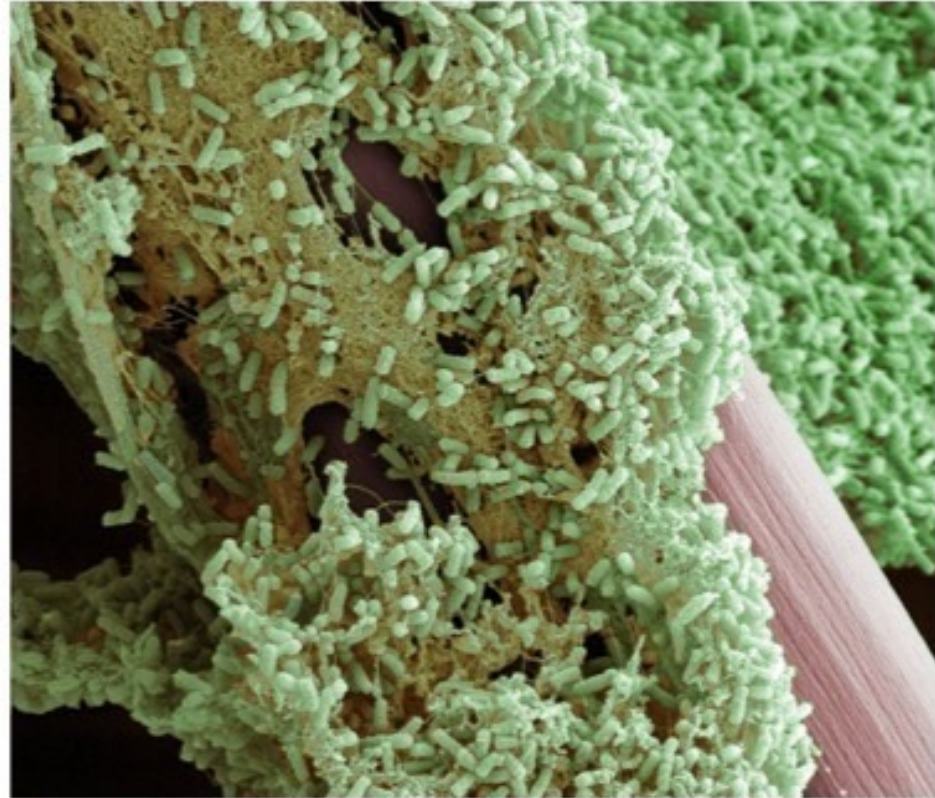


# Oral Biofilms

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Biofilm on a toothbrush bristle



Biofilm on a toothbrush bristle (higher magnification)

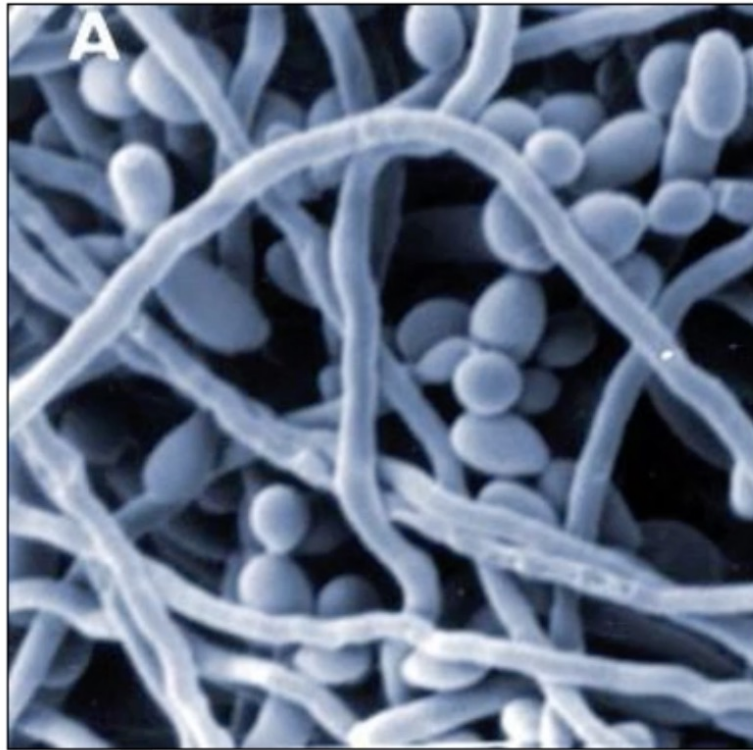


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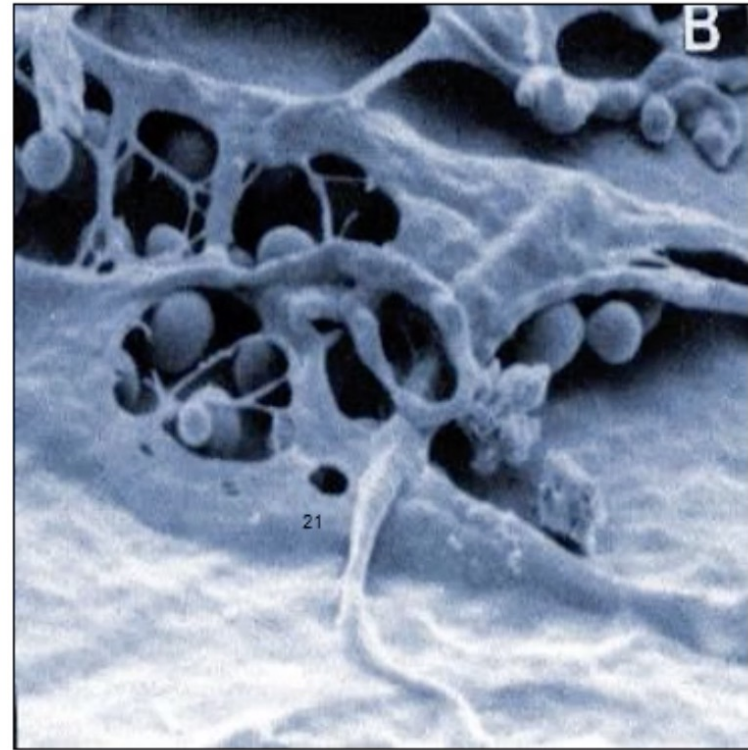
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# Fungal– Candida Biofilm



Candida



Candida Biofilm

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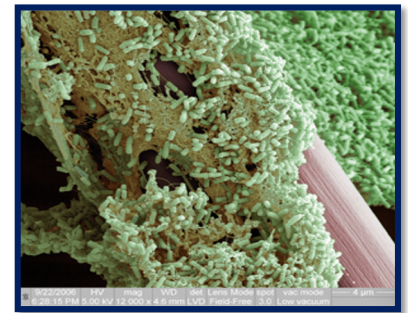
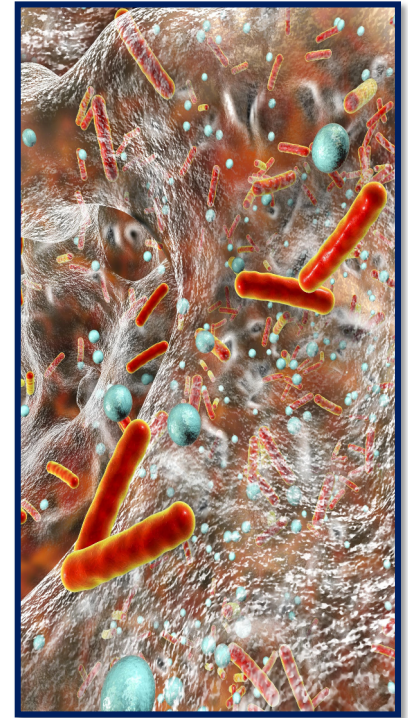


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# What are biofilms?

- Biofilms are communities of microbial cells surrounded by a secreted polymer, called the extracellular polymeric substance or EPS which is an inflammatory endotoxin.
- Composed of multiple organisms, including both aerobic and anaerobic bacteria and/or fungal species
- More than 80% of all microbial infections have developed biofilms beginning in as little as two weeks from the onset of infection
- Biofilm bacteria can resist up to 5000 times the antibiotic concentration that would normally be needed to resolve infections.
- Biofilms in the GI tract often contain LPS Endotoxin from Gram negative bacteria. Intestinal permeability can translocate the LPS.



# Oral Ecology and the Microbiome

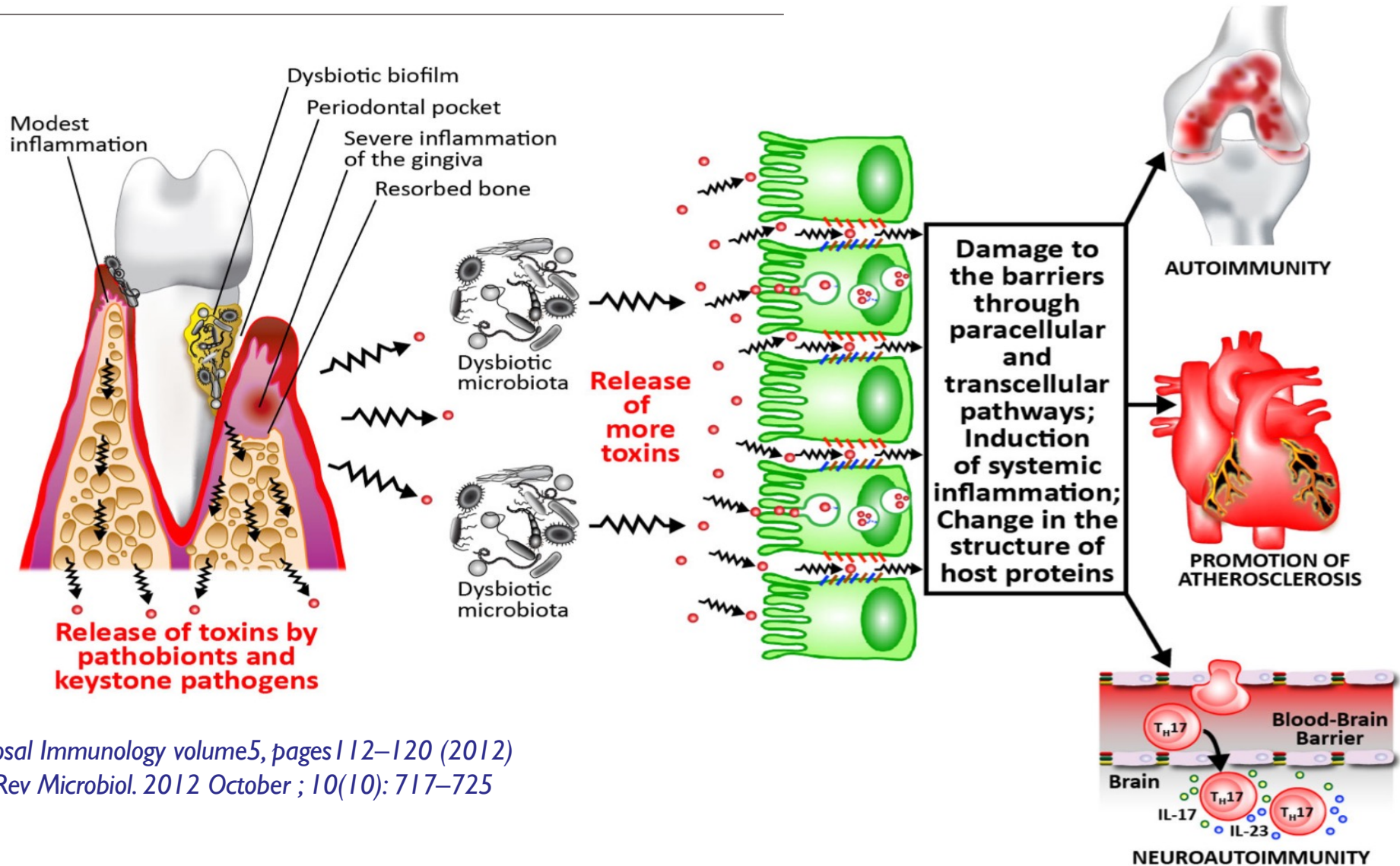
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- The distinct, non-shedding structure of teeth (smooth surfaces, pits and fissures, proximal sites and exposed roots) enables large masses of microbes to accumulate as dental plaque biofilm
- The plaque biofilm is not naturally shed as it accumulates, which is a key driver of dysbiosis in the absence of proper oral hygiene to disrupt and remove it.
- If not removed, certain bacteria are able to emerge and an incipient dysbiosis develops.





# Systemic Implications of Oral Imbalance



*Mucosal Immunology* volume5, pages 112–120 (2012)

*Nat Rev Microbiol.* 2012 October ; 10(10): 717–725

# Oral Biofilms

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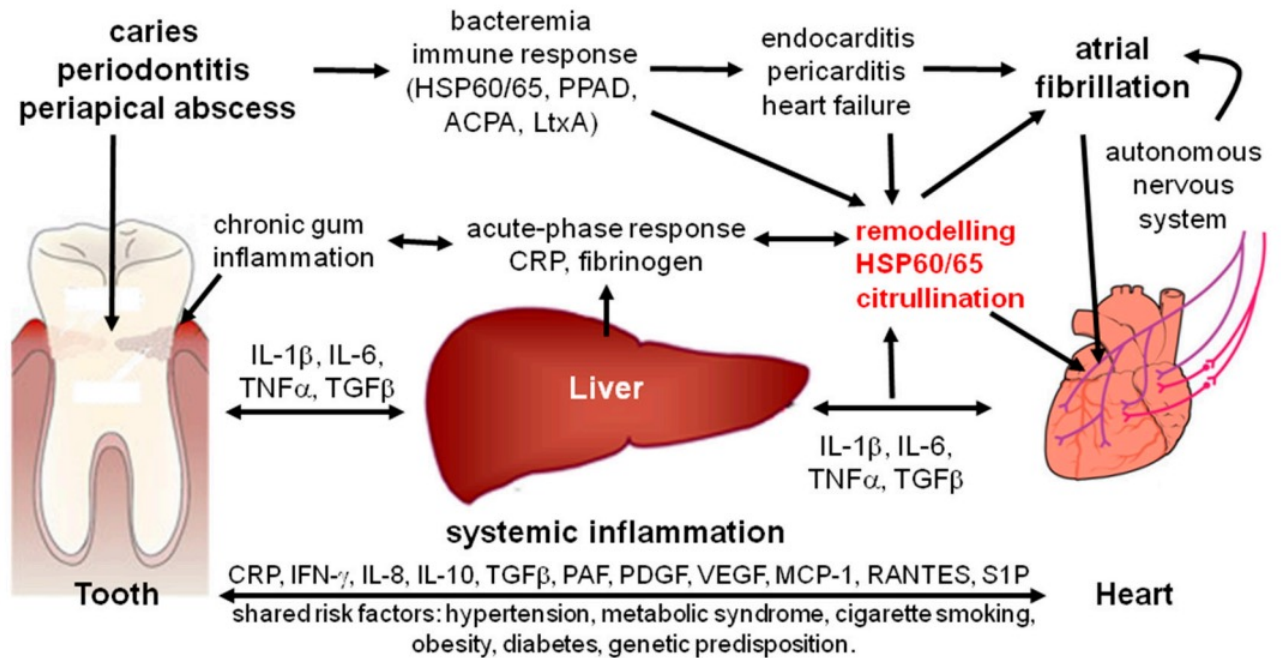
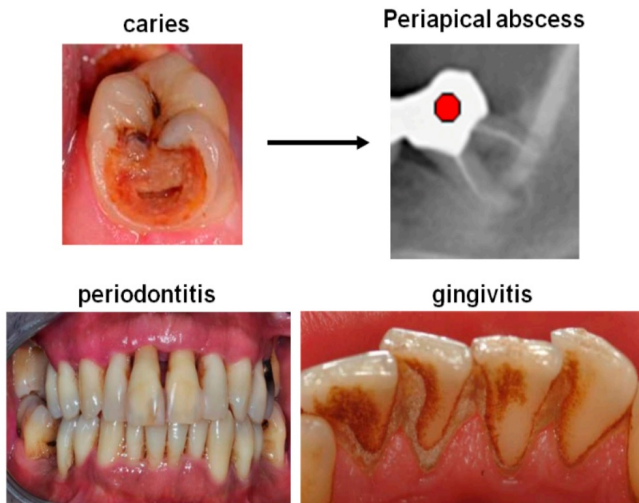
**Periodontal Disease-Associated Biofilm**  
Periodontal disease is among the most common oral infectious disease associated with the establishment of a highly pathogenic biofilm that triggers an immune/inflammatory host response, leading to the destruction of supporting periodontal tissues and eventual tooth loss.

“Due to the anatomical proximity of the periodontal biofilm to the gingival blood stream, periodontal pockets may act as reservoirs of microbial pathogens and their products, as well as inflammatory mediators and immunocomplexes that can disseminate to other sites in the body.”

Colombo APV, Magalhaes CB, Hartenbach FARR, do Souto RM, da Siva-Boghossian. Periodontal-disease-associated biofilm: A reservoir for pathogens of medical importance. Microbial Pathogenesis. 94 (2016); 27-34.

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# Transient Bacteremia and Microbial Shift Disease



Curr Allergy Asthma Rep. 2014 Jan; 14(1): 407.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5960472/>



# Oral Health and CVD

## The Endotoxin Connection – Leaky Mouth:

The research published in the Journal of Dental Research found that people with untreated tooth infections are 2.7 times more likely to have cardiovascular problems, such as coronary artery disease, than patients who have had treatment of dental infections.

### Periodontal Disease Can Affect Your Heart & Body

Emerging evidence shows a relationship between periodontal disease, cardiovascular disease and other chronic diseases — the common link is **inflammation**.

The presence of periodontal diseases may be associated with heart attacks, strokes, kidney disease, diabetes, preterm births and prosthetic joint complications.

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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5960472/>

# The Mouth – Lung Connection



## HHS Public Access

Author manuscript

*Annu Rev Physiol.* Author manuscript; available in PMC 2017 February

Published in final edited form as:

*Annu Rev Physiol.* 2016 February 10; 78: 481–504. doi:10.1146/annurev-physiol-021115-105238.

## The Microbiome and the Respiratory Tract

The most abundant phyla are Bacteroidetes and Firmicutes; prominent genera uniformly include *Prevotella*, *Veillonella*, and *Streptococcus* (27, 30, 70). **Microbiota of the lung more closely resemble those of the mouth** (its primary source community) than those of other body sites

Michigan 48109

At It is plausible but unproven that the bulk of physiological **microaspiration occurs during sleep**, when subjects are supine and protective laryngeal and cough reflexes are depressed.

Advanced techniques of microbial identification have revealed that the lungs, previously  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4751994/pdf/nihms756902.pdf>



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Author manuscript

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## The Microbiome and the Respiratory Tract

Robert P. Dickson<sup>1</sup>, John R. Erb-Downward<sup>1</sup>, Fernando J. Martinez<sup>2</sup>, and Gary B. Huffnagle<sup>1,3</sup>

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“In every lung disease studied to date, the lung microbiome is altered compared with that of healthy controls.”

Michigan 48109

### Abstract

Although the notion that “the normal lung is free from bacteria” remains common in textbooks, it is virtually always stated without citation or argument. The lungs are constantly exposed to diverse communities of microbes from the oropharynx and other sources, and over the past decade, novel culture-independent techniques of microbial identification have revealed that the lungs, previously

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4751994/pdf/nihms756902.pdf>



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# Oral Health and Autoimmune Disease



Article

## Autoimmune Diseases and Oral Health: 30-Year Follow-Up of a Swedish Cohort

Anna Julkunen <sup>1</sup> , Anna Maria Heikkinen <sup>1</sup>, Birgitta Söder <sup>2,\*</sup> , Per-Öst Sanna Toppila-Salmi <sup>1</sup>  and Jukka H. Meurman <sup>1</sup> 

Received: 26 August 2017; Accepted: 19 December 2017; Published: 22 December 2017

**Abstract:** Oral infections up-regulate a number of systemic inflammatory responses and may play a role in the development of systemic diseases. We investigated the association between oral health and autoimmune diseases in a cohort of Swedish adults. Hypothesis was that oral health associates with incidence of autoimmune diseases. Overall 1676 subjects aged 30–40 years old from Stockholm County (Sweden) participated in this study in 1985. Subjects were randomly selected from the registry file of Stockholm region and were followed-up for 30 years. Their hospital and open health care admissions (World Health Organization) were retrieved from the Swedish national health register. The oral health variables were stratified into high and low plaque index. Autoimmune diseases were detected from the data. Plaque index was  $\geq$  median 35 (70%) vs.  $<$  median 35 (30%). The prevalence of autoimmune diseases was compared between subjects with and without autoimmune disease. Our study hypothesis was partly confirmed. The result showed that subjects with a higher plaque index, marker of poor oral hygiene, were more likely to develop autoimmune diseases in 30 years.

1676 subjects aged 30–40 years old from Stockholm County (Sweden) participated in this study in 1985. Subjects were randomly selected from the registry file of Stockholm region and were followed-up for 30 years

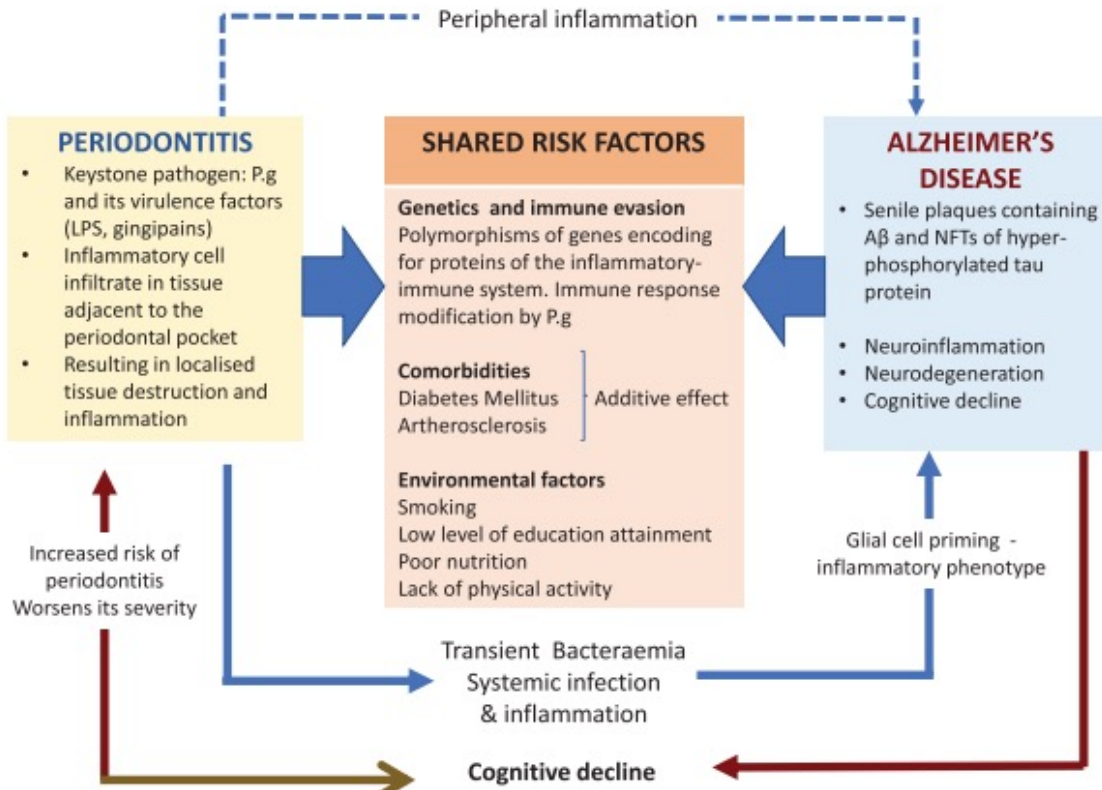
The result showed that subjects with a higher plaque index, marker of poor oral hygiene, were more likely to develop autoimmune diseases in 30 years.

**Keywords:** autoimmune disease; oral health; association; plaque index; follow-up study

# Mouth-Brain Connection

## Review

### *Porphyromonas gingivalis* is a Strong Risk Factor for Alzheimer's Disease



“It is clear from the human and proof of concept studies in animal models that whole bacteria and their constituent endo/exotoxins **enter the central nervous system**... It is imperative that the oral health component is included as a **modifiable risk factor** in AD public health messages along with other preventative advice such as **keeping active, eating healthily, and exercising**”

# Porphyromonas gingivalis

## Cardiovascular

Atherosclerotic cardiovascular disease  
Myocardial Infarction  
Abdominal aortic aneurism  
Hypertension

## Oncology

Squamous cell carcinoma  
Esophageal cancer  
Pancreatic cancer

## Metabolic

Diabetes  
NAFLD

## Pulmonary

Pneumonia  
COPD

## Neurological

Alzheimer's disease  
Depression

**Rheumatological** – Rheumatoid arthritis

**Obstetrics** – poor pregnancy outcomes

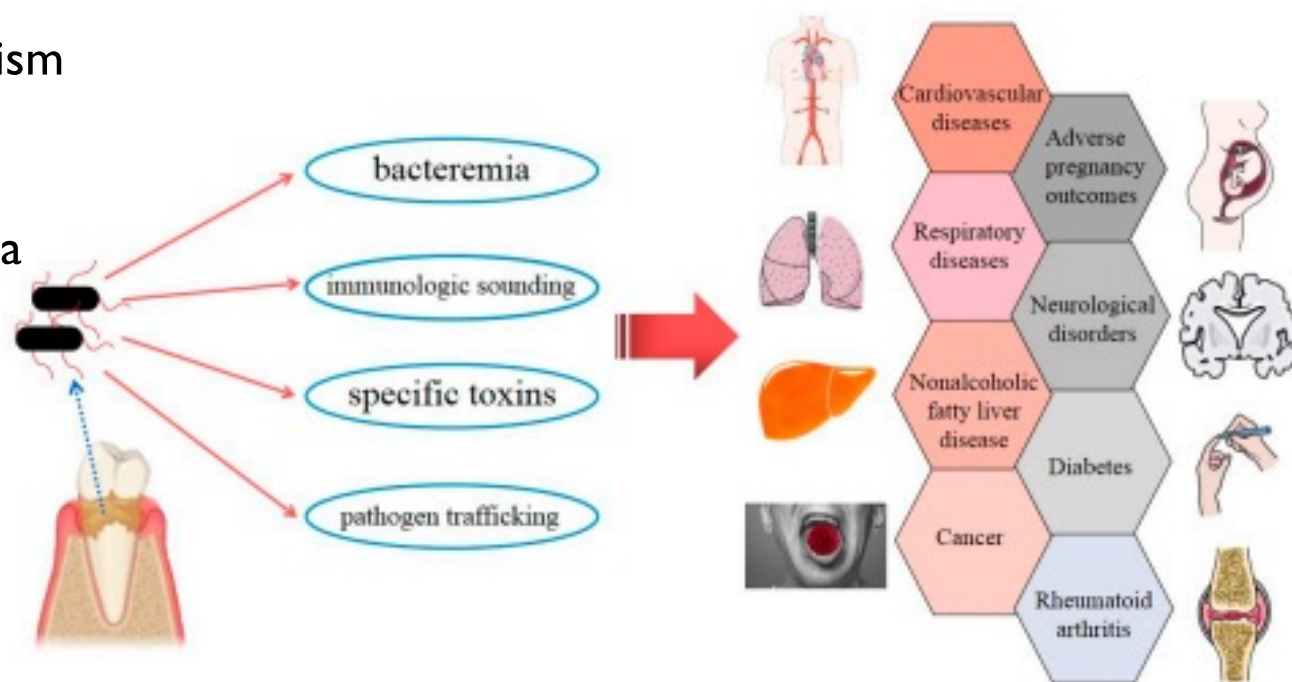
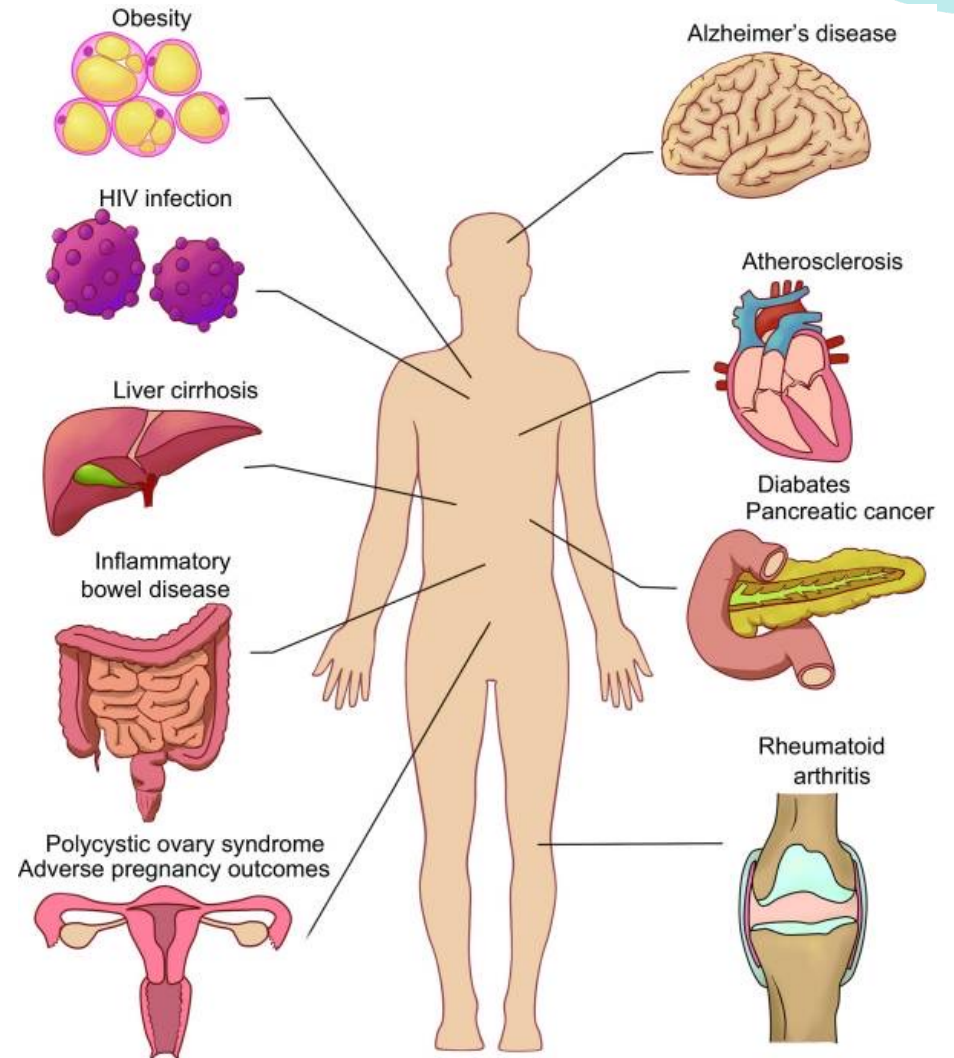


Figure 4. Strategies by which *Porphyromonas gingivalis* can invade the whole body, along with simple a schematic representation of *Porphyromonas gingivalis*-associated systemic diseases.

# Systemic Implications of Oral Imbalance

“Less than 1 minute after an oral procedure, organisms from the infected site may have reached the heart, lungs, and peripheral blood capillary system”.



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5960472/>



# The Oral Systemic Link

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## Erectile Dys function

Published March 2016

## Cardiovascular diseases:

Heart attack:

Published April 2016, February 2016

Stroke:

published 2016, published 2012

## Atherosclerosis

published May 2016

## Vascular diseases

published 2006, published 2010

## Alzheimer's disease

published September 2015

## Pancreatic Cancer

published May-June 2014

## Breast Cancer

published 2015

## Kidney Disease

published February 2016

## Respiratory Infections

published October 2014

## Esophageal cancer

published January 2016

## HIV activation due to Periodontal Disease

published 2015

## Prostate Disease

published February 2015

## Rheumatoid Arthritis

published 2013

## Diabetes

published February 2015

## Still Birth

published 2010

## Preterm & Low Birth Weight

published 2010

## Colorectal Cancer

published February 2015

## Oral Cancer

published 2012

## Stomach Ulcers

published 2002

## Stomach Cancer

published February 2016

## Diabetes

published Oct/Dec 2014

## Lung Cancer

published April 2016

# Systemic Implications of Oral Imbalance

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- Rheumatoid arthritis
- Adverse pregnancy outcomes
- Inflammatory bowel disease and colorectal cancer Respiratory tract infections
- Meningitis or brain abscesses
- Lung, liver or splenic abscesses
- Appendicitis
- Pneumonia
- Diabetes

\*Killian M, Chapple ILC, Hanning M, Marsh PD, Meuric V, Pedersen AML, et al. The oral microbiome – an update for oral healthcare professionals. *Brit Dental J.* Nov 2016; vol. 221(10): 657-666.



# Oral-Gut Microbiome Connection



*Candida albicans* colonizes the gastrointestinal tract from the mouth

## Investigating Colonization of the Healthy Adult Gastrointestinal Tract by Fungi

Thomas A. Auchtung,<sup>a</sup> Tatiana Y. Fofanova,<sup>a</sup> Christopher J. Stewart,<sup>a</sup> Andrea K. Nash,<sup>a</sup> Matthew Jonathan R. Gesell,<sup>a</sup> Jennifer M. Auchtung,<sup>a</sup> Nadim J. Ajami,<sup>a</sup> Joseph F. Petrosino<sup>a</sup>

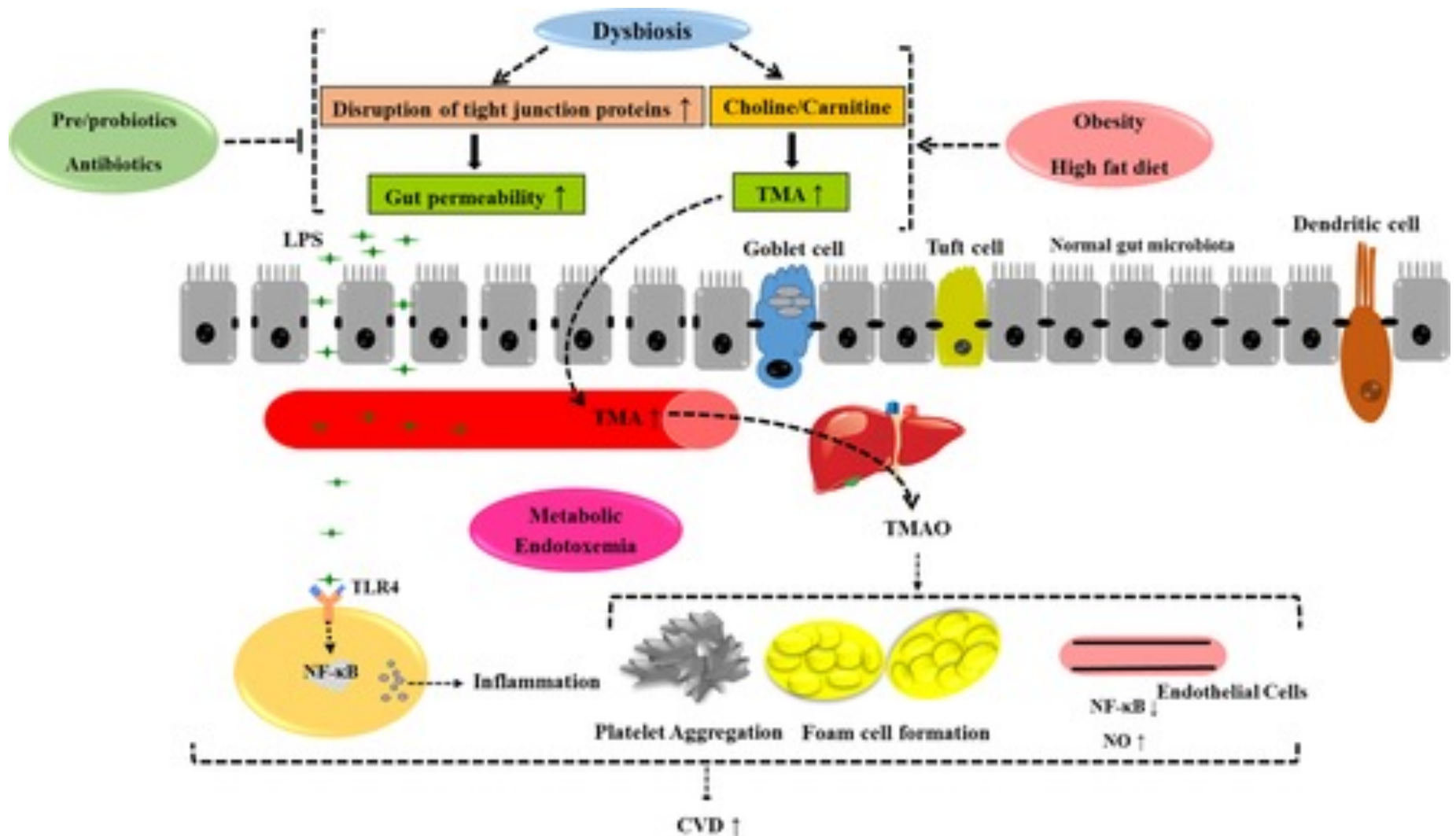
<sup>a</sup>Alkek Center for Metagenomics and Microbiome Research, Department of Molecular Virology and Microbiology, Baylor College of Medicine, Houston, Texas, USA

**ABSTRACT** A wide diversity of fungi have been detected in the human gastrointestinal (GI) tract with the potential to provide or influence important functions. However, many of the fungi most abundant in food or the oral cavity. This study shows a sustained influence on human members of the GI tract from true oral cavity. The 18S rRNA operon's second intergenic region was used to identify stool, saliva, and food of individuals on controlled diets. Unlike most bacterial taxonomic units (OTUs) detected in saliva and/or food, the 18S rRNA and sequencing of the 18S rRNA using alternative methods, failed to detect

*"Just as the Centers for Disease Control and Prevention recommends maintaining good oral health for preventing mouth, throat or esophagus candidiasis, patients suffering from or at risk for developing a gastrointestinal disease might also benefit from increasing the attention that they pay to dental hygiene."*

*"This suggests that the oral cavity may be the primary source of C. albicans detected in the stool of healthy people. Indeed, the fungal component of dental plaque of at least one cohort has been shown to be dominated by C. albicans. Taking additional measures to further reduce oral C. albicans levels, such as extra flossing and attention to elimination of plaque and reduction of consumption of refined sugars, may reduce levels of C. albicans in stool even further."*

# Chronic Inflammation as a Result of Dysbiosis

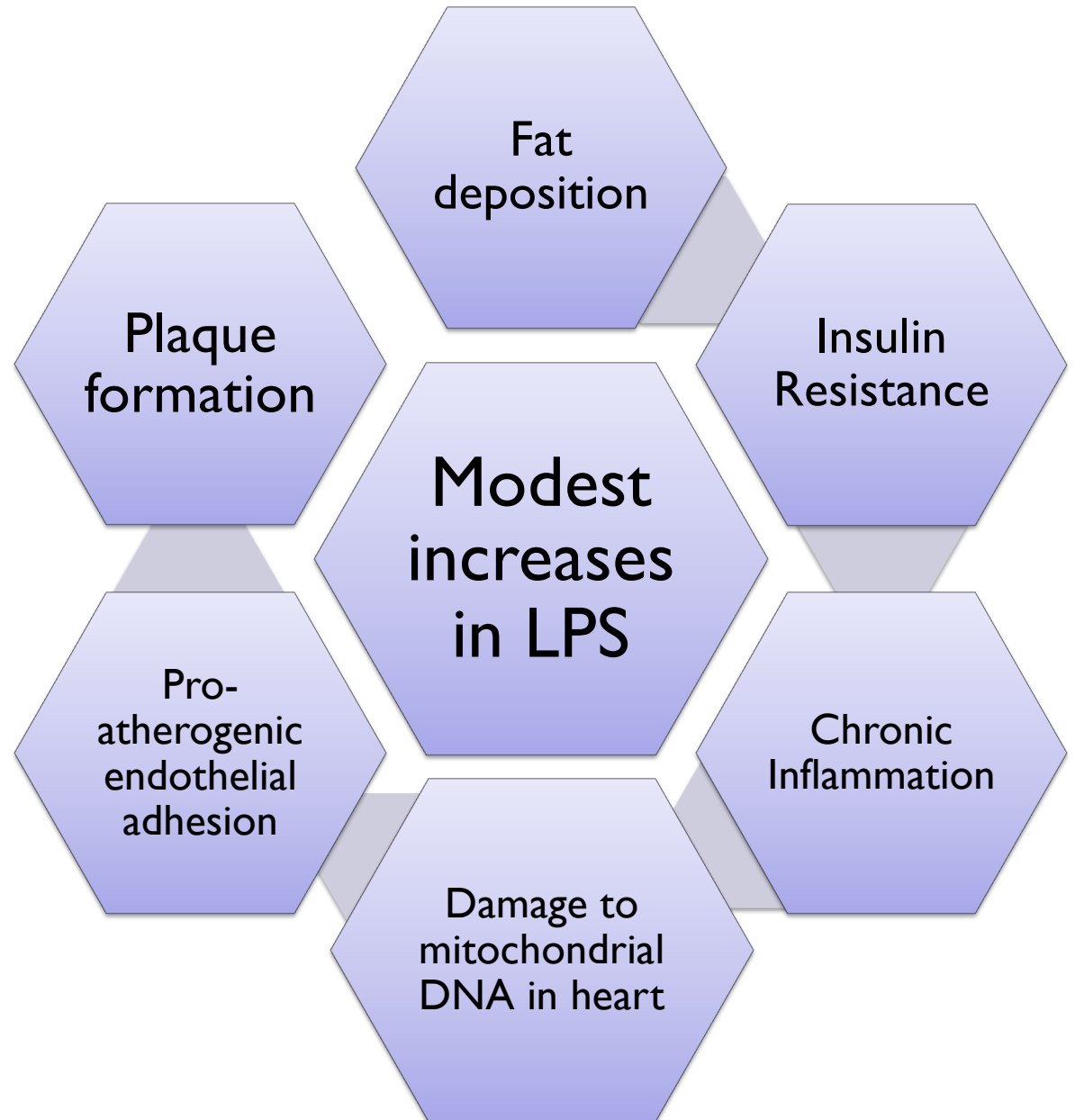


# LPS induces inflammation

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## Metabolic Endotoxemia

- Defined as a 2-3-fold increase in LPS
- Commonly found in CVD patients



# Cardiovascular Statistics

- CVD is the leading cause of death in the US, affecting 48% of adults
- CAD is the most prevalent
- Stroke is second most prevalent
- 90% of stroke risk is due to modifiable factors
- HTN is the most common form of CVD is a a major modifiable risk factor for many other CVDs - including acute coronary syndrome, cardiomyopathy, CHF, pulmonary HN and stroke
- Inflammation and endothelial dysfunction play a major role here. How do we address that?



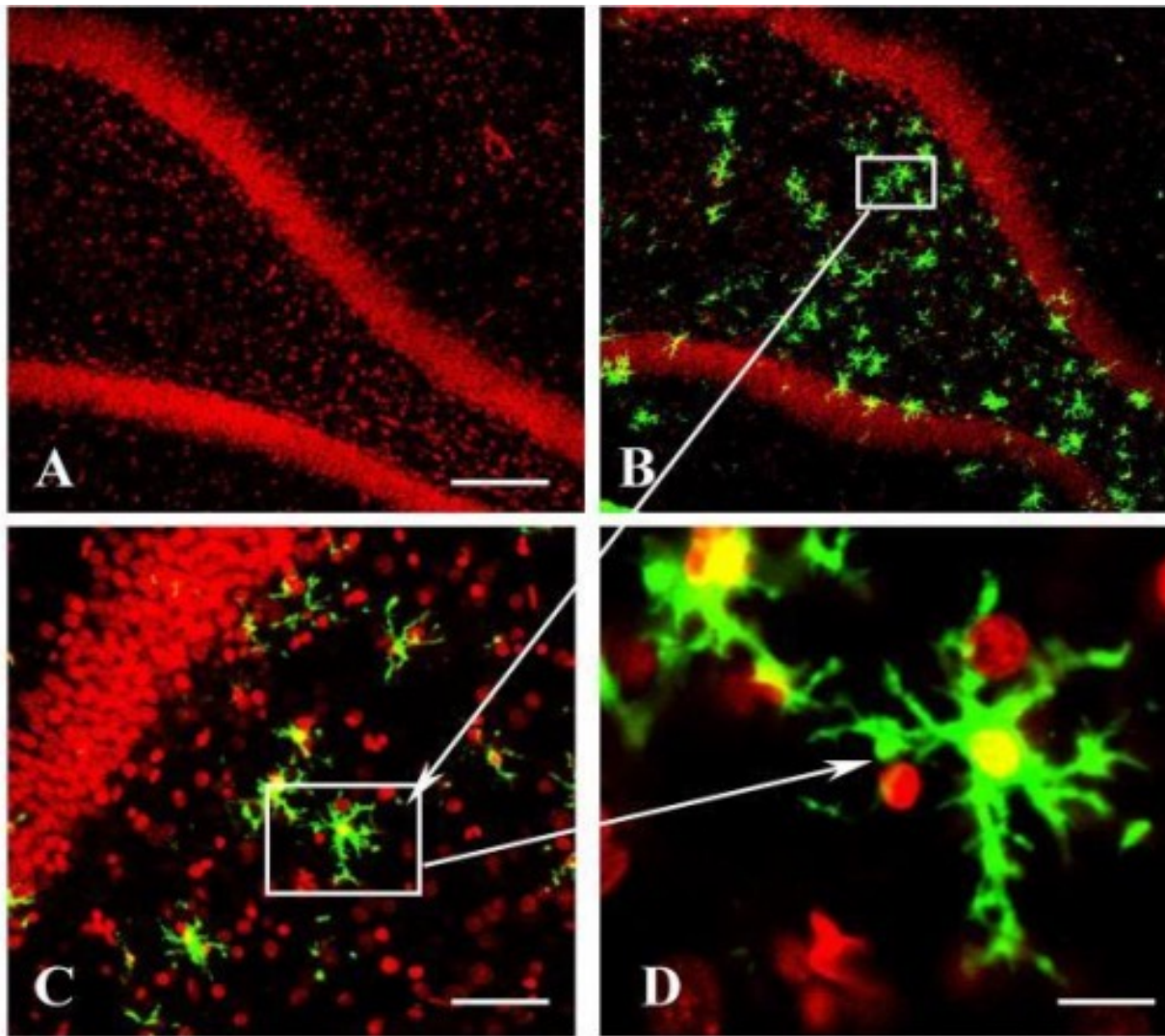


# Translocation – Another Mechanism



*Bacteria stained with a fluorescent bacterial DNA probe show up as red biofilm microcolonies within the green tissues of a diseased carotid arterial wall. (Image: David Davies, University of Binghamton)*

# LPS in the Brain



Neuro-inflammation from LPS  
endotoxin plays a prominent role in  
the progression of Alzheimer's  
disease

Chronic brain inflammation leads to  
a decline in hippocampal NMDA-R1  
receptors

LPS causes activated Microglia

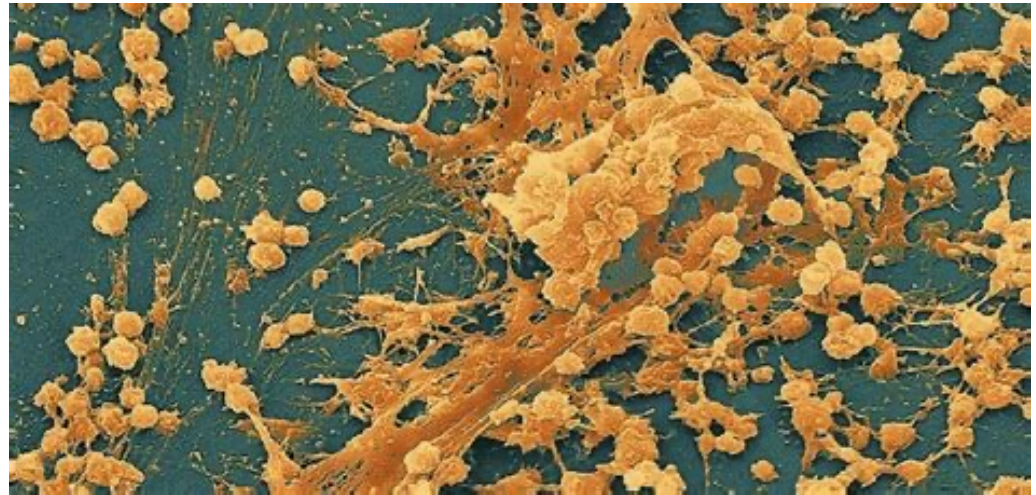
Figure 1: Confocal microscope images of activated microglial cells MHC II (green OX-6 positive) in the Dentate Gyrus. Rats infused with aCSF (A) had only a few activated microglia scattered throughout the brain. Chronic infusion of LPS into the 4th ventricle produced high activated microglia distributed throughout the hippocampus (B). Higher magnifications of an activated microglia (C, D)

Rosi S, Ramirez-Amaya V, Hauss-Wegrzyniak B, Wenk GL - J Neuroinflammation (2004)



# Biofilms

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- LPS and other metabolites produced continually
- Ineffective immune response generating chronic inflammation
- Inflammatory damage to hepatocytes.
- Retention of toxins in the extracellular matrix (heavy metals, organophosphates)
- Retention of endogenously produced toxins (oxalates, ROS)
- Ongoing source of dysbiotic organisms preventing balance in the GI tract.

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# Clinical Botanical Medicine

SECOND EDITION • REVISED AND EXPANDED

Eric Yarn  
Kathy Abascal  
Robert Ross

Mary A.

Historically, combinations of herbs (usually referred to as formulae, in some cases combining as many as 20– 30 herbs) were commonly employed. This exponentially increases the range of possible interactions between the constituents in the various herbs themselves as well as in the human body... We have empirical knowledge of plants based on millennia of use...Plants often have a positive synergistic effect on medicines such as antibiotics and chemotherapeutic agents. The complexity of botanical medicine is ultimately a delight. It is not merely a frustrating obstacle in the way of solidly designed double- blind, randomized, placebo- controlled studies. The full benefit of botanical medicine will be ours only if we are willing to rise to the intellectual challenge that plant use presents.

# Essential Oils

Prevent adhesion and Disrupt or Destroy Biofilm Components

## Selected Antimicrobial Essential Oils Eradicate *Pseudomonas* spp. and *Staphylococcus aureus* Biofilms

Nicole L. Kavanaugh and Katharina Ribbeck

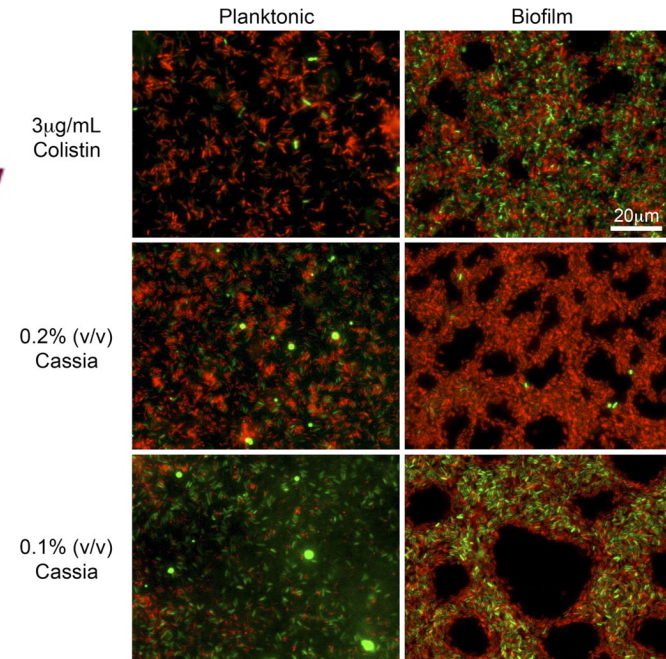
+ Author Affiliations

### ABSTRACT

Biofilms are difficult to eliminate with standard antimicrobial treatments due to their high antibiotic resistance relative to free-living cells. Here, we show that selected antimicrobial essential oils can eradicate bacteria within biofilms with higher efficiency than certain important antibiotics, making them interesting candidates for the treatment of biofilms.



Applied and Environmental  
Microbiology



Cassia oil kills planktonic bacteria and biofilms with comparable efficiency.



# Essential Oils for Antimicrobial Activity Biofilm Removal

## Lavender

- Antiseptic and anti-inflammatory properties
- Used to disinfect hospitals during WWI
- Used for mummification in ancient Egypt
- Extensively used for various respiratory infections
- Calming effect on the nervous system



## Galbanum

- Mentioned in the Old Testament, as well as by Hippocrates
- One of the oldest recorded histories of beneficial use
- Antimicrobial and anti-parasitic
- Traditionally used for healing wounds and infection both internally and externally



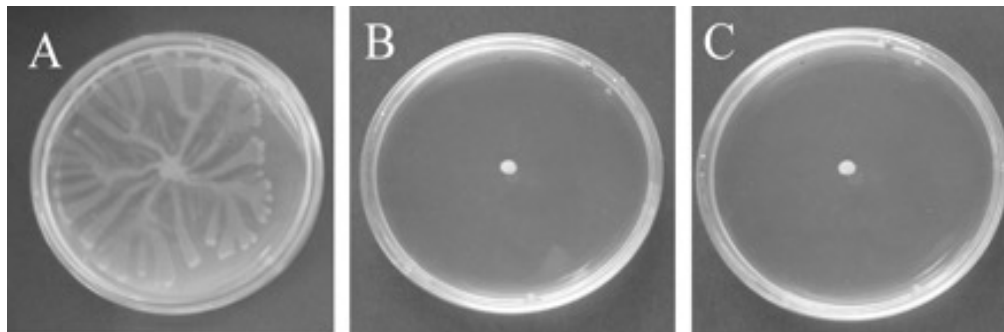


# Condensed Tannins Inhibit Adhesion of Biofilms

Powerful OPC's Control Biofilm Development by Inhibition of Swarming Motility of Pathogenic Organisms

Grape Seed and Bilberry tannins prevent adherence of biofilms and may inhibit swarming motility of bacteria

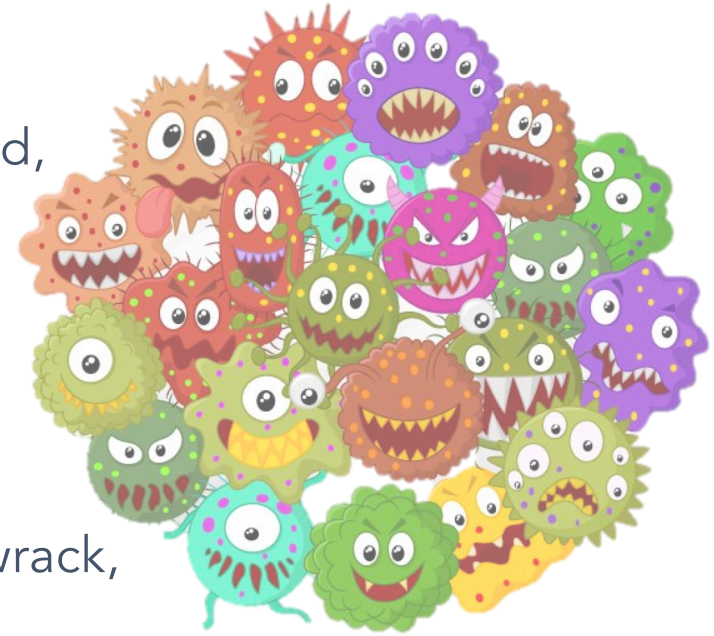
OPC's are also potentiators for Vit C, providing numerous benefits in cellular health and anti-aging medicine



Representative images of *P. aeruginosa* swarming motility under control conditions (A) and in the presence of Cranberry (B) and Pomegranate (C) (both 100  $\mu$ /ml).

# Biofilm Control with Botanicals

- ❧ Inhibition of Quorum Sensing
  - Garlic, oregano, bilberry, bladderwrack, goldenseal
- ❧ Inhibition of Initial Attachment Phase
  - Oregano, thyme, lavender, tea tree, grapeseed, bilberry
- ❧ Inhibition of Swarming Motility
  - Grapeseed, Bilberry
- ❧ Antimicrobial Compounds
  - Goldenseal, black walnut, raspberry, bladderwrack, garlic
- ❧ “Drug Resistance” Efflux Pump Inhibitors
  - Echinacea, gentian, goldenseal, shiitake mushroom, bilberry, black walnut, garlic, gentian, grape seed, olive leaf, lavender oil, oregano oil, tea tree

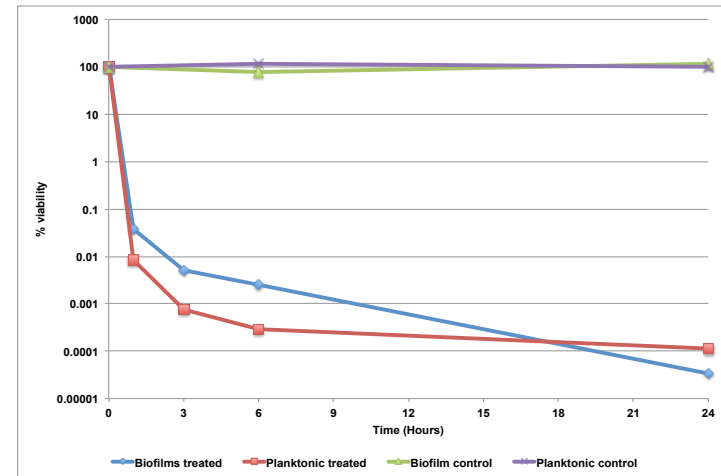


Marques, C. (2013). *Preliminary Report on Activity of Biocidin against Multiple Species of Biofilms* (Rep.). Binghamton University Biological Sciences Dept.

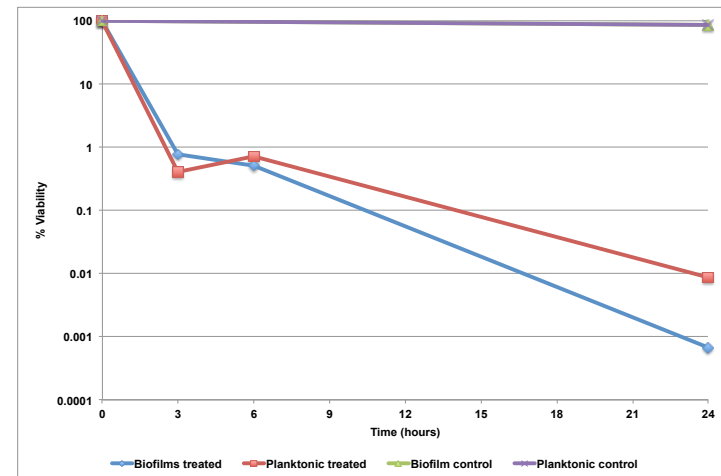
# Biofilm Research Study

- University of Binghamton study showed remarkable effectiveness in addressing biofilms of all yeast and bacteria species tested
- Both planktonic and biofilm communities were tested. Within 24 hours, both were eradicated
- Graph shows results on *E. Coli* and *Pseudomonas*

Subsequently, biofilms were exposed to a fixed concentration of Biocidin® for a period of 24 hours and cell viability was monitored.



**Figure 1.** *P. aeruginosa* biofilms exposed to 50% Biocidin® for a period of 24 hours. At 24 hrs, most of the biofilm and planktonic populations were eradicated.

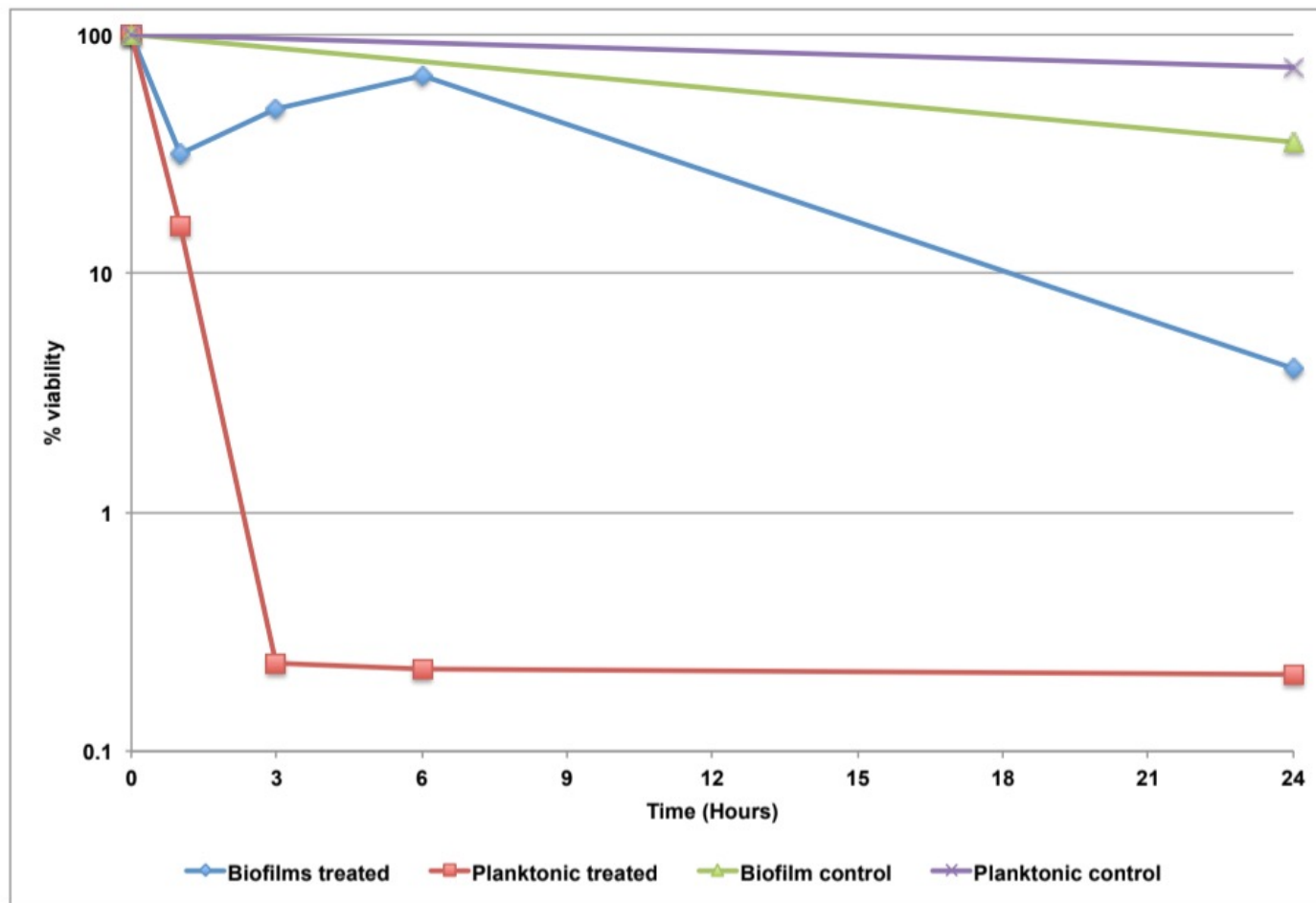


**Figure 2.** *E. coli* biofilms exposed to 50% Biocidin® for a period of 24 hours. At 24 hrs, most of the biofilm and planktonic populations were eradicated.

Marques, C. (2013). *Preliminary Report on Activity of Biocidin against Multiple Species of Biofilms* (Rep.). Binghamton University Biological Sciences Dept.

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# Biofilm Research Study



**Figure 3.** *K. pneumoniae* biofilms exposed to 25% Biocidin® for a period of 24 hours.

Marques, C. (2013). *Preliminary Report on Activity of Biocidin against Multiple Species of Biofilms* (Rep.). Binghamton University Biological Sciences Dept.

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# Biofilm Control with Botanicals

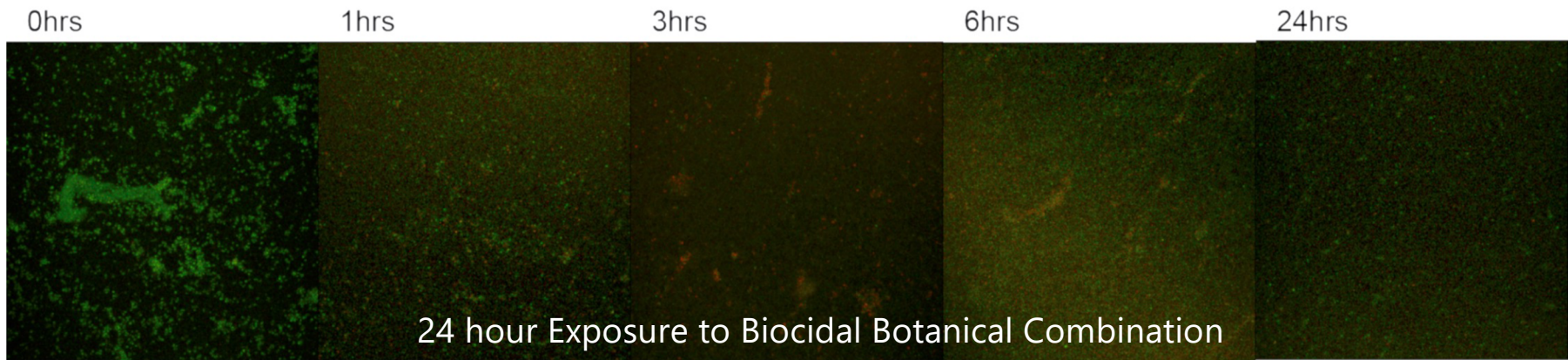
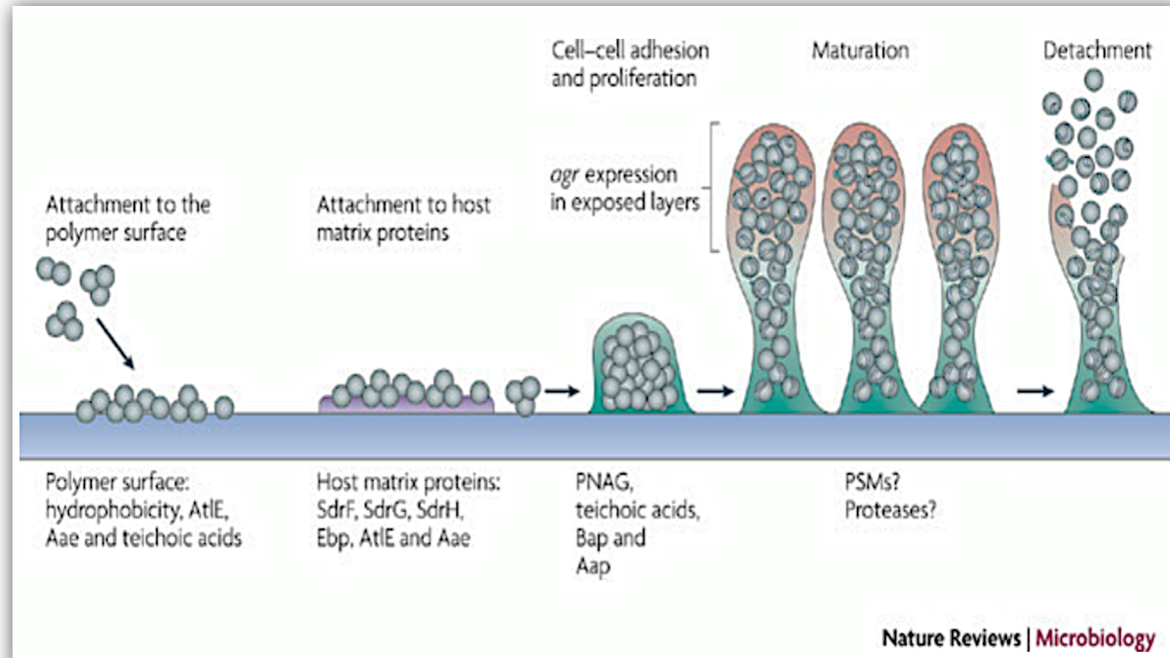
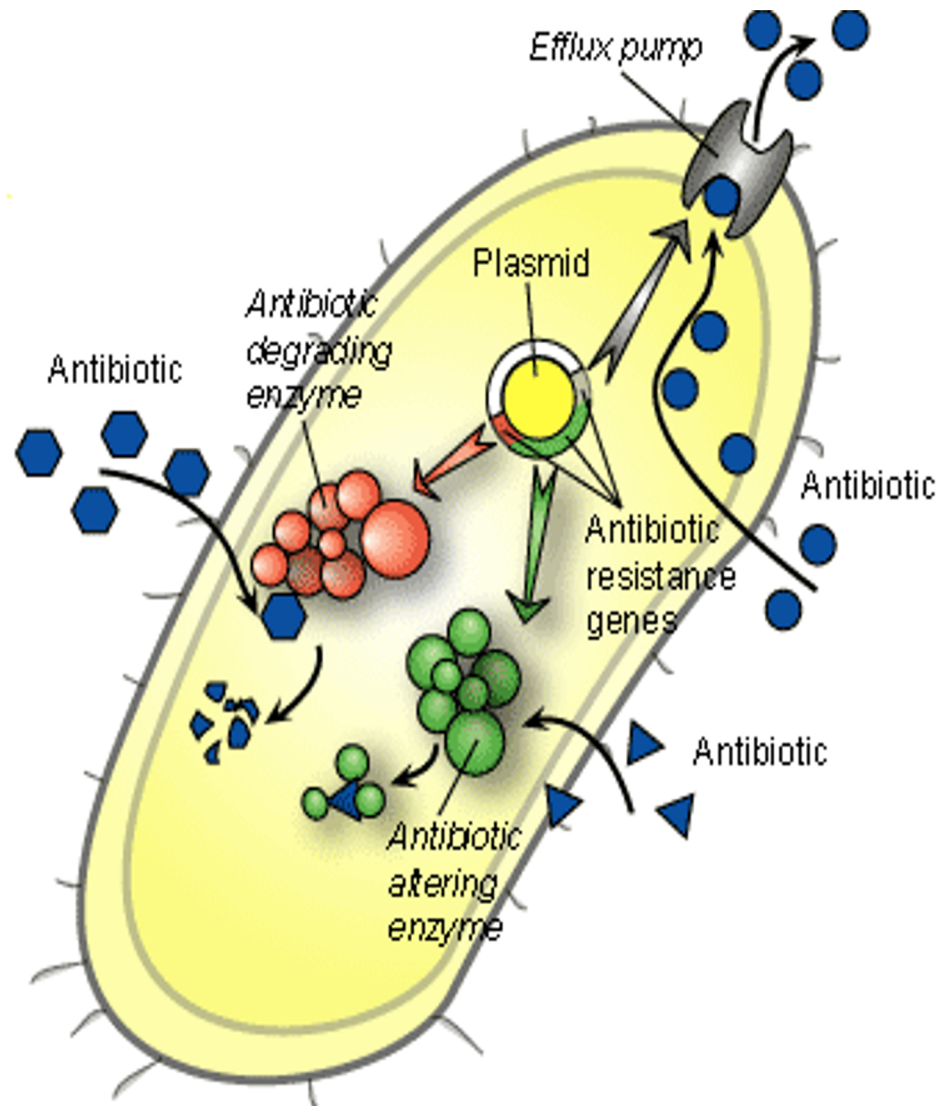


Figure 4. *C. albicans* biofilms exposed to 25% Biocidin® for a period of 24 hours

Marques, C. (2013). Preliminary Report on Activity of Biocidin against Multiple Species of Biofilms (Rep.). Binghamton University Biological Sciences Dept.

# Efflux Pump Inhibitor

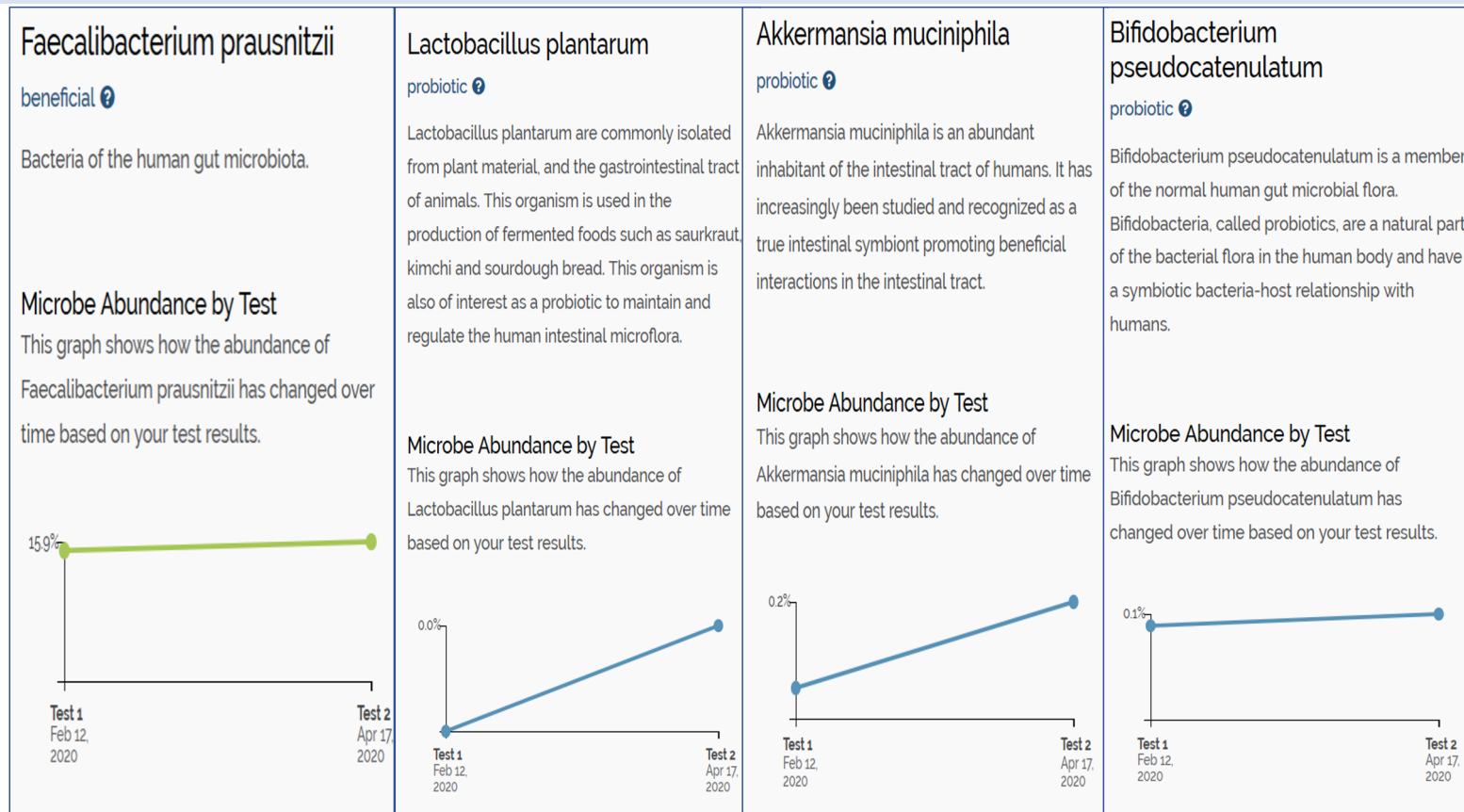
- Tannins, berberine, and certain phenolics have useful effects as efflux pump inhibitors
- Efflux pumps play a role in production of ECM as well as resistance to antimicrobials



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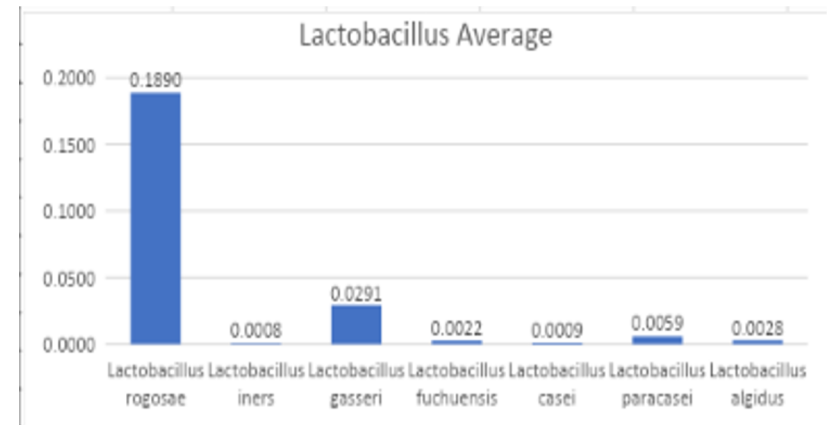
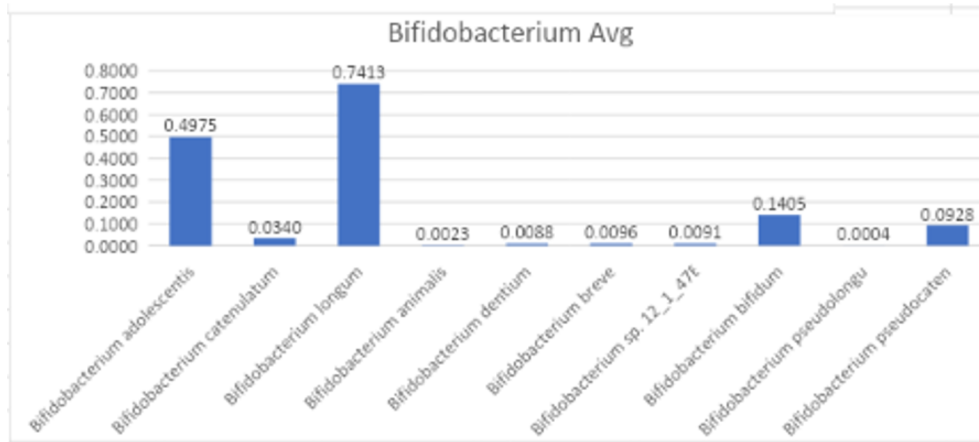
# Biocidin and the Microbiome

Pilot study shows that Biocidin does not cause damage to beneficial and probiotic microorganism. On the contrary, in repeat testing of 4 individuals, those organisms often increased. Notably, *Akkermansia muciniphila* increased in all four of the participants who have completed testing.



# Probiotic Abundance

	Kit ID													
Probiotic Organisms Abundance(%):	23000064	23000099	23000065	23000096	23000070	23000078	23000061	23000068	23000057	23000090	23000101	23000060	23000084	23000085
Akkermansia muciniphila	0%	0.33%	0.05%	0.19%	0%	0%	0.94%	11.26%	0.06%	1.31%	0.03%	1.36%	0.28%	2.13%
Oxalobacter formigenes	0.03%	0.10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bifidobacterium pseudocatenulatum	0.09%	0.04%	0.08%	0.09%	0.01%	0.03%	0%	0%	0.16%	0.35%	0%	0%	0%	0%
Bifidobacterium longum	0.27%	0.04%	0%	0%	0.33%	0.32%	0.20%	0.13%	0.67%	3.45%	0%	0%	0.94%	0.75%
Lactococcus lactis	0.00%	0.01%	0.01%	0.02%	0.01%	0%	0.14%	0.11%	0.02%	0.07%	0.08%	0.25%	0.14%	0.02%
Bifidobacterium pseudolongum	0.01%	0.00%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lactobacillus plantarum	0%	0%	0%	0.01%	0%	0%	0%	0%	0%	0%	0%	0.02%	0%	0%
Bifidobacterium bifidum	0%	0%	0%	0%	0.26%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Streptococcus thermophilus	0%	0%	0%	0%	0.01%	0%	0.04%	0.01%	0%	0.06%	0.73%	0.08%	0.07%	0%
Bifidobacterium adolescentis	0%	0%	0%	0%	0%	0.08%	2.05%	1.51%	0%	0%	0%	0%	0%	0%
Lactobacillus reuteri	0%	0%	0%	0%	0%	0%	0%	0.01%	0%	0%	0%	0%	0%	0%
Bifidobacterium sp.12_1_47BFAA	0%	0%	0%	0%	0%	0%	0%	0%	0.02%	0.17%	0%	0%	0.03%	0.02%
Saccharomyces cerevisiae	0%	0%	0%	0%	0%	0%	0%	0%	0.04%	0%	0%	0%	0%	0%
Bifidobacterium breve	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.04%	0%	0%	0%	0.02%
Lactobacillus paracasei	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.11%	0.03%	0%	0%
Lactobacillus casei	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.01%	0%	0%
Lactobacillus rhamnosus	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.44%	0%	0%
<b>Total Abundance</b>	<b>0.40%</b>	<b>0.52%</b>	<b>0.14%</b>	<b>0.31%</b>	<b>0.62%</b>	<b>0.43%</b>	<b>3.37%</b>	<b>13.03%</b>	<b>0.97%</b>	<b>5.45%</b>	<b>0.95%</b>	<b>2.19%</b>	<b>1.46%</b>	<b>2.94%</b>





- Biocidin®
  - Flagship product, utilized by health professionals for 30+ years
- 11 Total products in the Bio-Botanical Research line:
  - 7 Biocidin® delivery systems:
    - Biocidin Liquid
    - Liquid Filled Capsules
    - Biocidin LSF (Liposomal)
    - Biocidin Throat Spray
    - Megacidin Throat Spray
    - Dentalcidin Toothpaste
    - Dentalcidin LS Oral Solution
  - 4 Support products:
    - G.I Detox+
    - Olivirex
    - Proflora 4R
    - Biotonic
- 3<sup>rd</sup> Party tested ingredients



# Biocidin®

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- Potent broad-spectrum, selectively supports simultaneous clearance of multiple classes of harmful organisms
- Disrupts and dismantles biofilm formations
- Clinical research shows immunomodulatory activity



# Biocidin Testing

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- 250,000+ CDSAs performed
- Biocidin® was the most HIGHLY SENSITIVE substance

*“Biocidin has been the most broadly acting and powerful agent evaluated.”*

-Martin Lee, PhD,

Former Director, Genova Diagnostics



# Biocidin® LSF

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- Biocidin® in liposomal form
  - Unique sunflower phospholipid coating delivery
  - 75% quicker intracellular uptake
- Preferred delivery for bloodstream/lymph circulation
- Preliminary data shows intracellular penetration
- Preferred delivery for topical use
- 1 pump LSF = 5 drops Biocidin® Liquid
- 10-20 minutes prior to meals is ideal





# GI Detox™ +

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- Helps cleanse and supports microbiome balance
- Recommended for use with Biocidin®
- US sourced ingredients
  - Scrupulous quality control
  - Designed to protect motility
- Flavorless can be opened if needed- into water, juice, or applesauce
- Empty stomach, 1-2 hours away from food and supplementation, 60 capsules per bottle



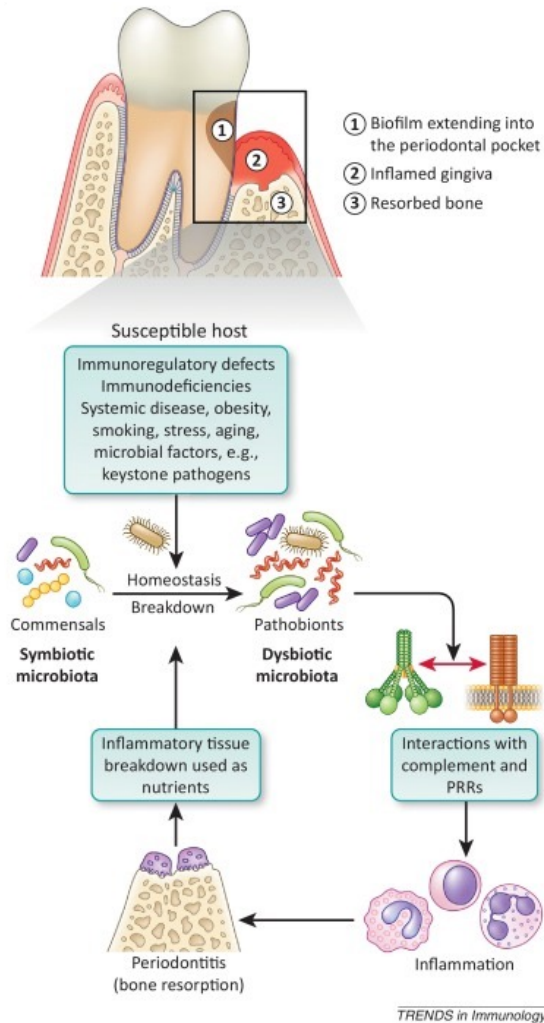
# Dentalcidin™

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- Broad-spectrum toothpaste, 3oz travel-friendly pump
- 20% Biocidin® Liquid - excellent support for biofilms and plaque
- Zeodent® silica assists in gentle cleansing and promotes whitening
- Freshens breath, tastes great, and perfect for children and adults
- Free of sugar, gluten, fluoride, and artificial flavorings and colors
- For additional support for healthy gums, use with Dentalcidin™ LS
- Perfect for daily or intermittent use, pea sized amount



# Therapeutic Toothpaste



- The mechanical action of brushing combined with chemical properties of the toothpaste make it an excellent media to introduce antimicrobials
- Toothpastes specific formulated with microbial load and biofilms in mind:
  - Essential Oil Blend (Spearmint, Peppermint, Tea Tree, Cinnamon, and Clove Bud), Royal Jelly, Bilberry extract, Noni, Milk Thistle, Echinacea, Goldenseal, Shiitake, White Willow, Garlic, Grapeseed extract, Black Walnut (hull and leaf), Raspberry, Fumitory, Gentian, Tea Tree oil, Galbanum oil, Lavender oil, Oregano oil
- Patient is to brush 2-3x daily in acute phase

# Dentalcidin™ LS

- Liposomal Biocidin® in 1oz pump
- Concentrated solution for additional oral support
- CoQ10 and quercetin have been shown to support healthy oral tissue
- Clove and myrrh add additional support
- Pleasant taste - great for children and adults
- Pilot studies indicates results in as little as 4-8 weeks of use\*
- 1-2 pumps (add water if needed), swish 1-2 minutes, spit out after use

CoQ10 deficiency is observed in those with periodontal disease and likely depleted during the inflammatory process.

*Int J Vitam Nutr Res. 1973; 43(1):84-92.*



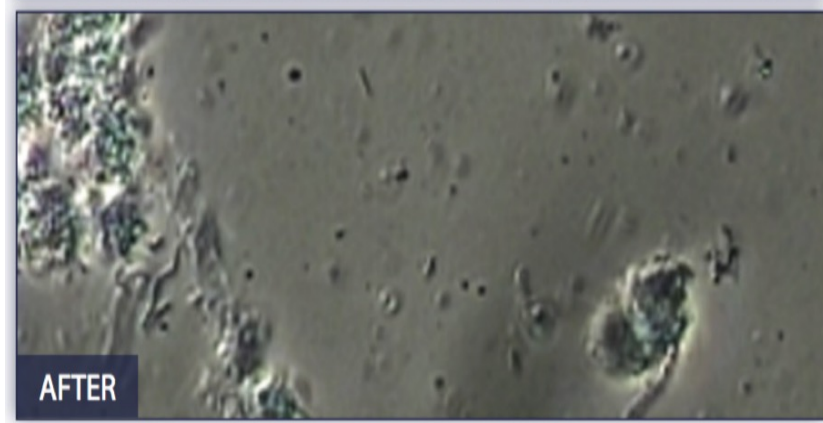
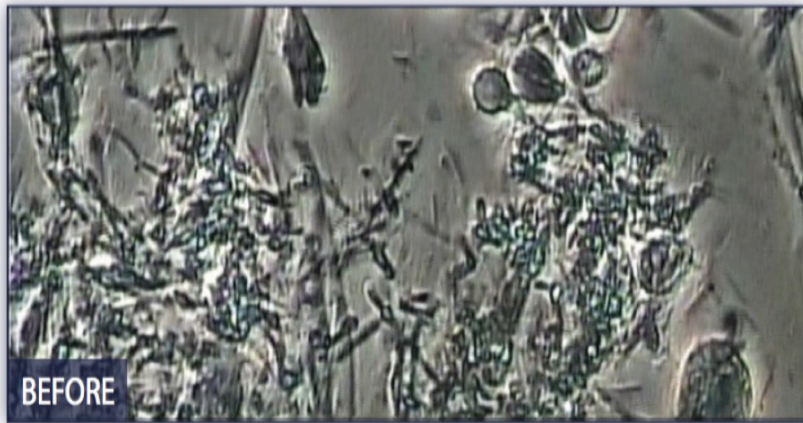
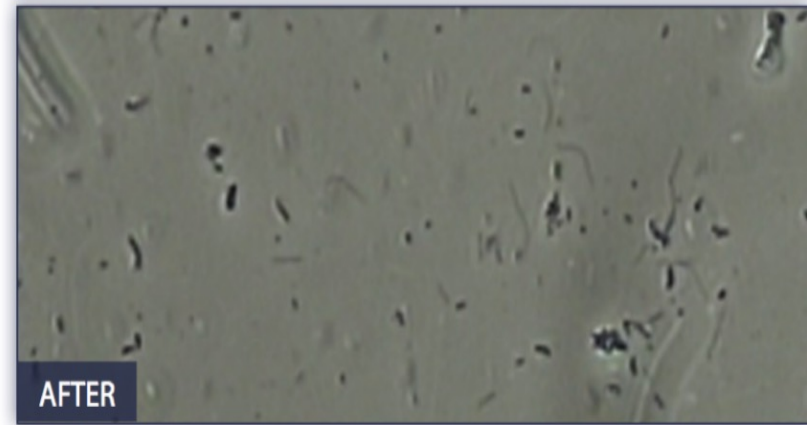
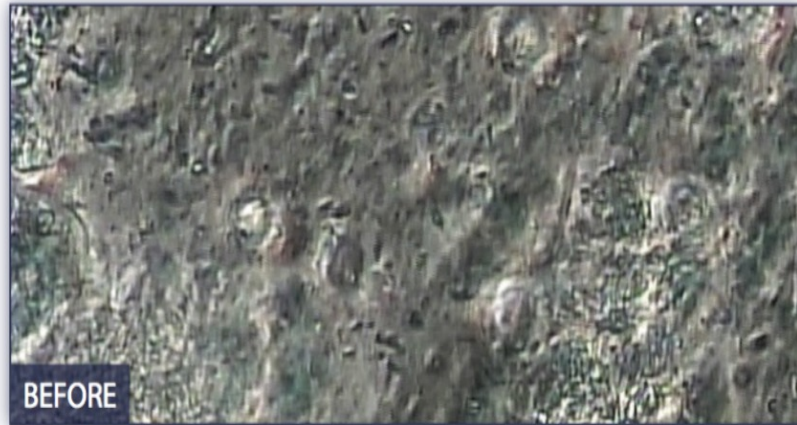


# Mouth-Brain Connection

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- “Topical application of CoQ10 to the periodontal pocket was evaluated with and without subgingival mechanical debridement. In the first three-week period, significant reduction in gingival crevicular fluid flow, probing depth and attachment loss were found and significant improvements in modified gingival index” *Mol Aspects Med.* 1994; 15 Suppl():s241-8.
- CoQ10 deficiency is observed in those with periodontal disease and likely depleted during the inflammatory process *Int J Vitam Nutr Res.* 1973; 43(1):84-92
- Quercetin is one of the most well studied flavonoids with benefits ranging from (but not limited to) anti-viral, anti-thrombotic and anti-histamine
- Quercetin inhibits plaque formation, has antibacterial properties including against strep *Am J Dent.* 1996 Dec; 9(6):236-9.; *Arch Pharm Res.* 1990;13:211–3.
- May also reduce gum hypersensitivity and improve wound healing

# Dental Pilot Research



*“The Liposomal botanicals used in our study appear to be a wonderful adjunct in the treatment of periodontal disease. This statement is based on actual controlled pilot studies that I have performed clinically in my office. The periodontal study was utilizing classic clinical periodontal parameters and phase contrast microscopy.”*

*~John A. Rothchild, DDS, MAGD, IMD, DAAPM, NMD, IBDM.*



Video Credit: Dr. Barbara Tritz, Queen of Dental Hygiene





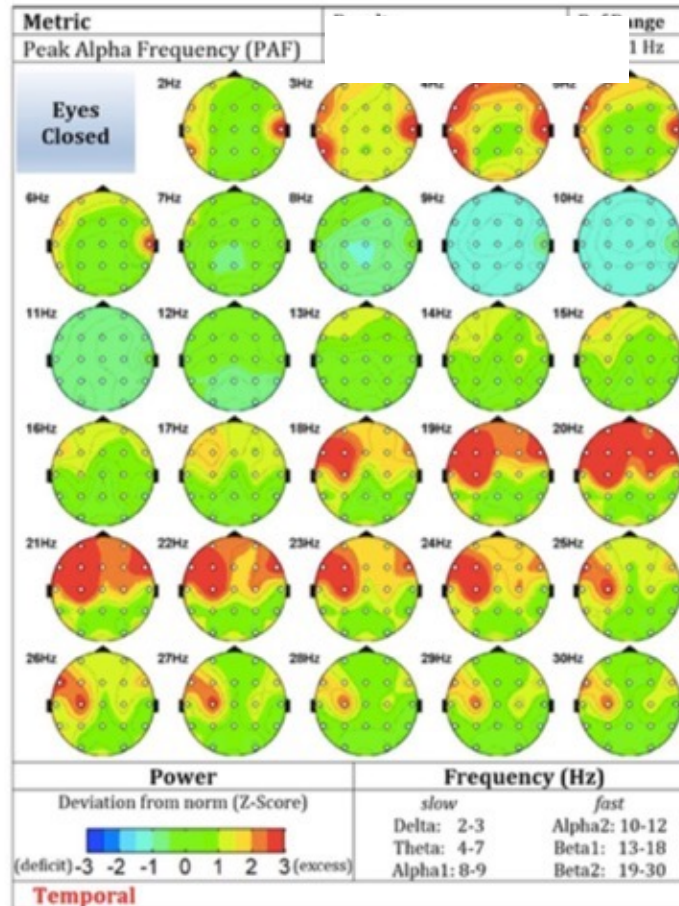
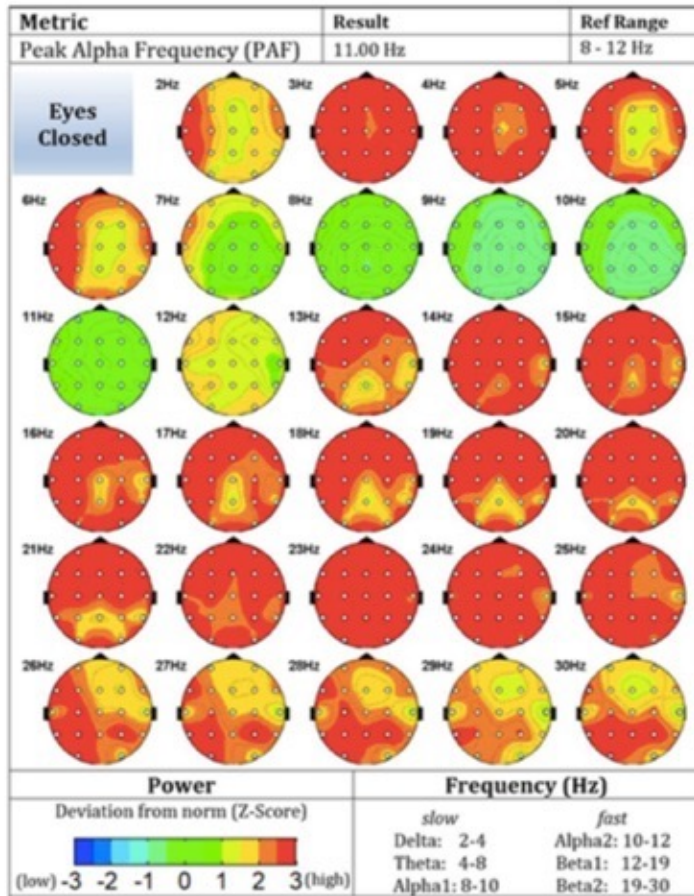
Video Credit: Dr. Barbara Tritz, Queen of Dental Hygiene



# Case Study - Dysbiosis and Systemic Inflammation

11.21.18 Baseline

7.9.19 Post - Susan



Improved alpha peak

Much improved delta and theta power.

Much improved reduction in what is believed to be neuro-inflammation

**Bioclear Cleansing Kit**

- ❖ Biocidin Liquid
- ❖ GI Detox+
- ❖ Proflora

NeuroRead

Addressing inflammation in the gut resulted in reduced inflammation in the brain



Thank You!



**Bioctidin**<sup>®</sup>

Clinically Effective • Evidence-Based