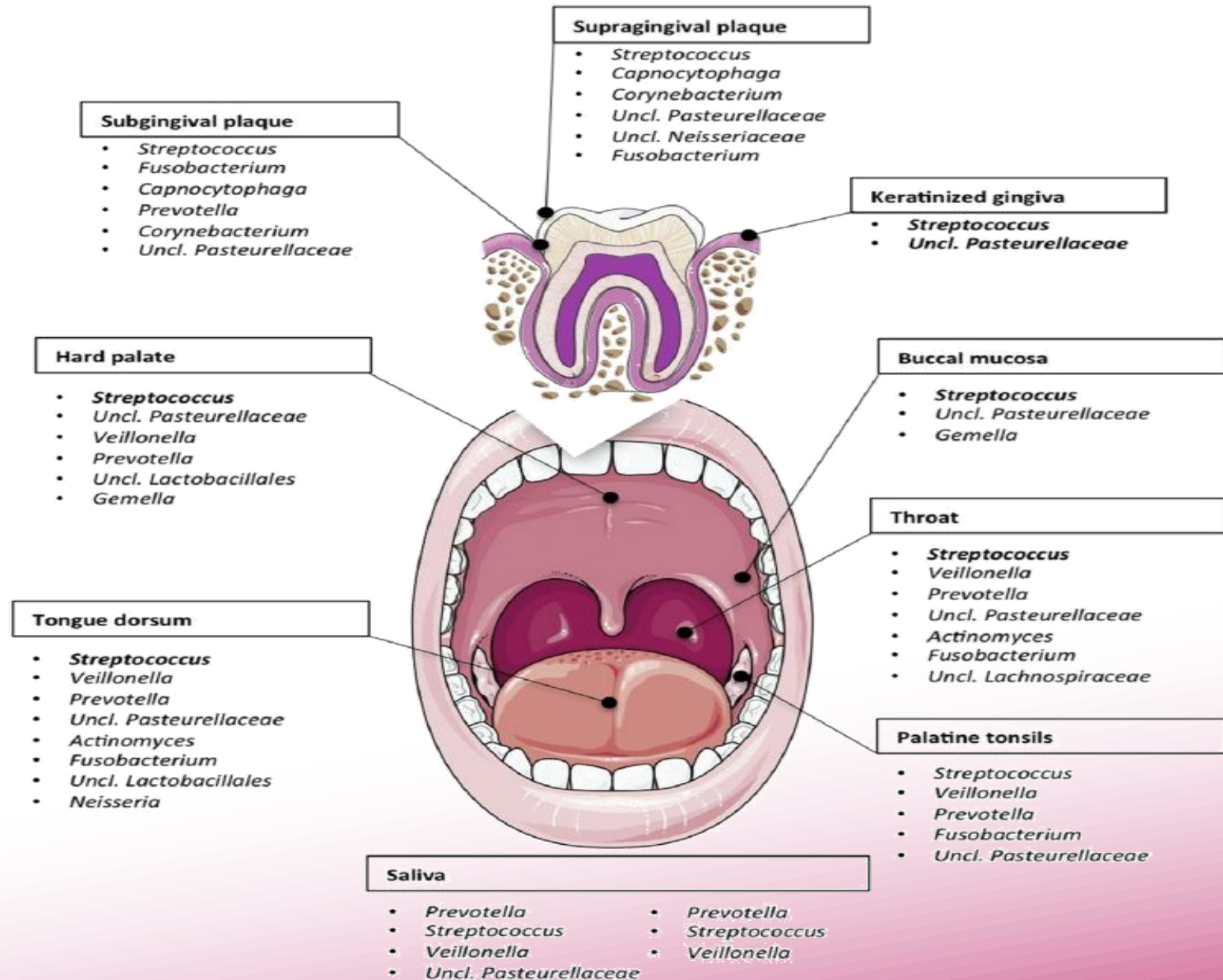


**Probiotic support for
the oral microbiota –
A key player in systemic health**

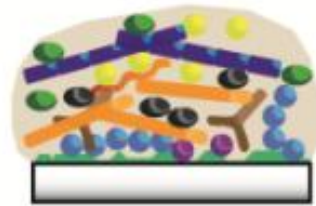
The oral microbiota

- Entirety of all microorganisms in the oral cavity
- Second largest microbial community in humans
- Amazing diversity
 - Around 800 to 1,000 different types of bacteria
- As unique as a fingerprint
 - Core microbiome and variable microbiome
- Different surfaces
 - Hard and soft tissue of the teeth and oral mucosa, tongue, tonsils,...

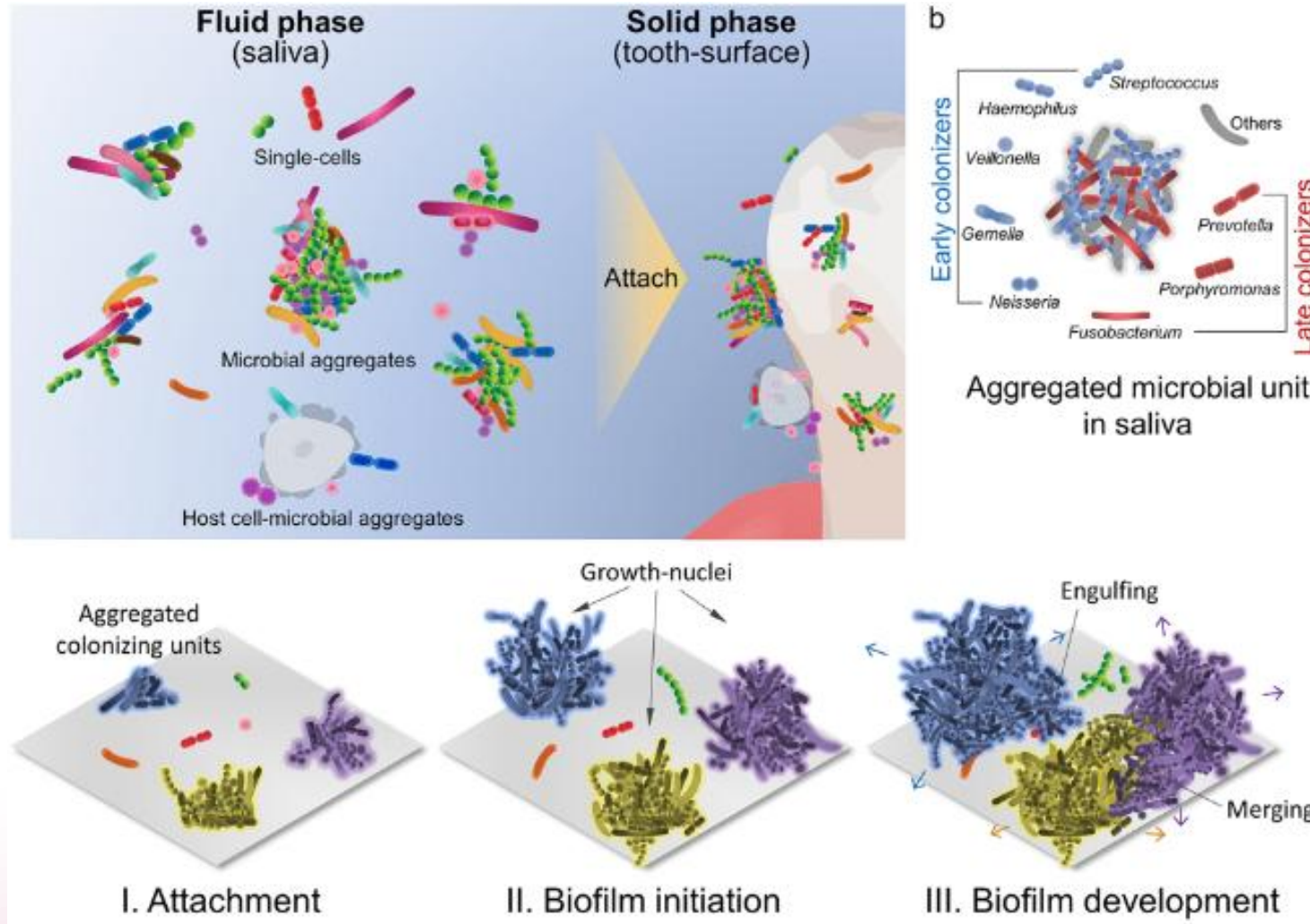
Every corner of the mouth has its own microbiota



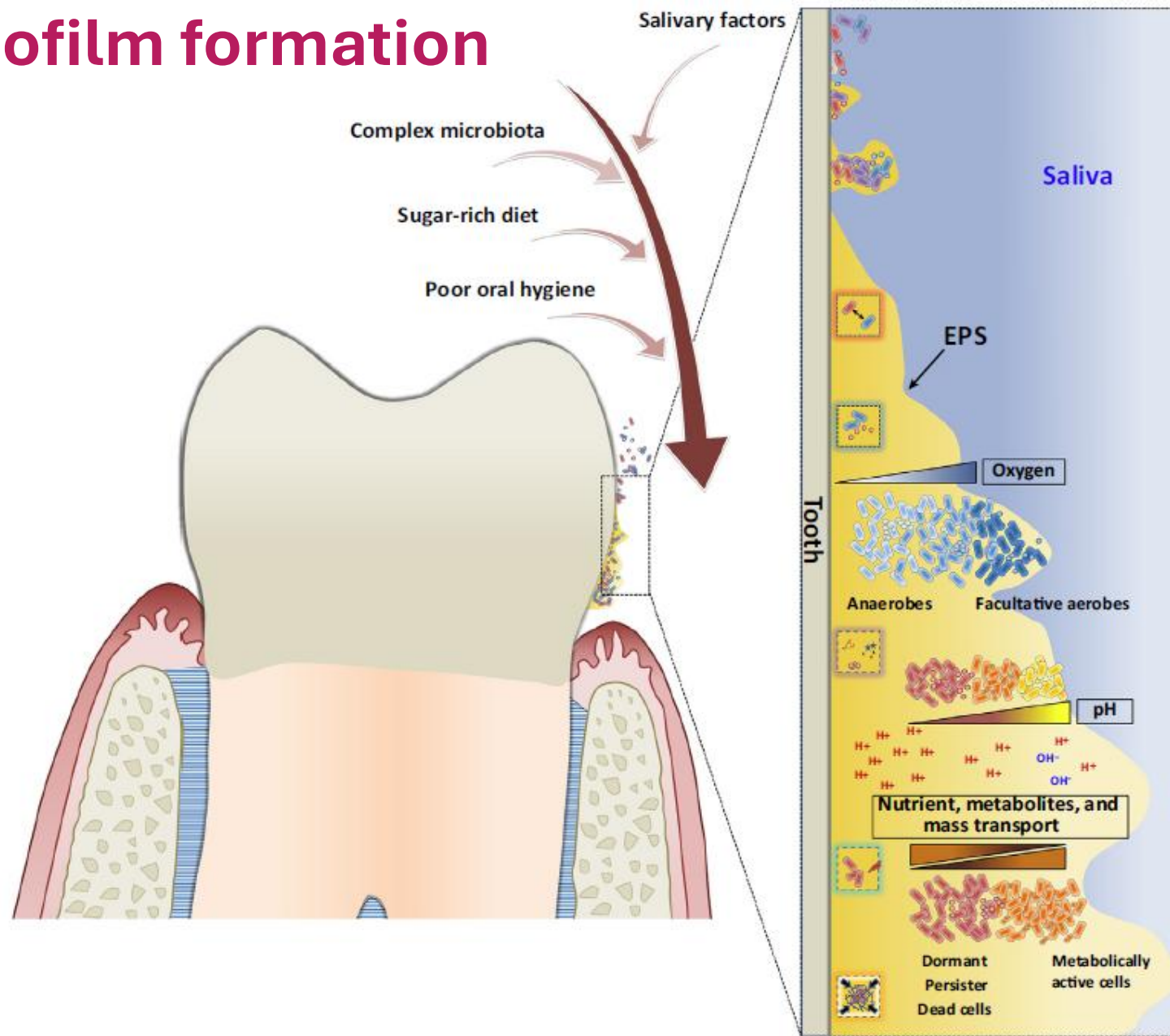
Plaque synthesis



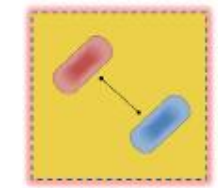
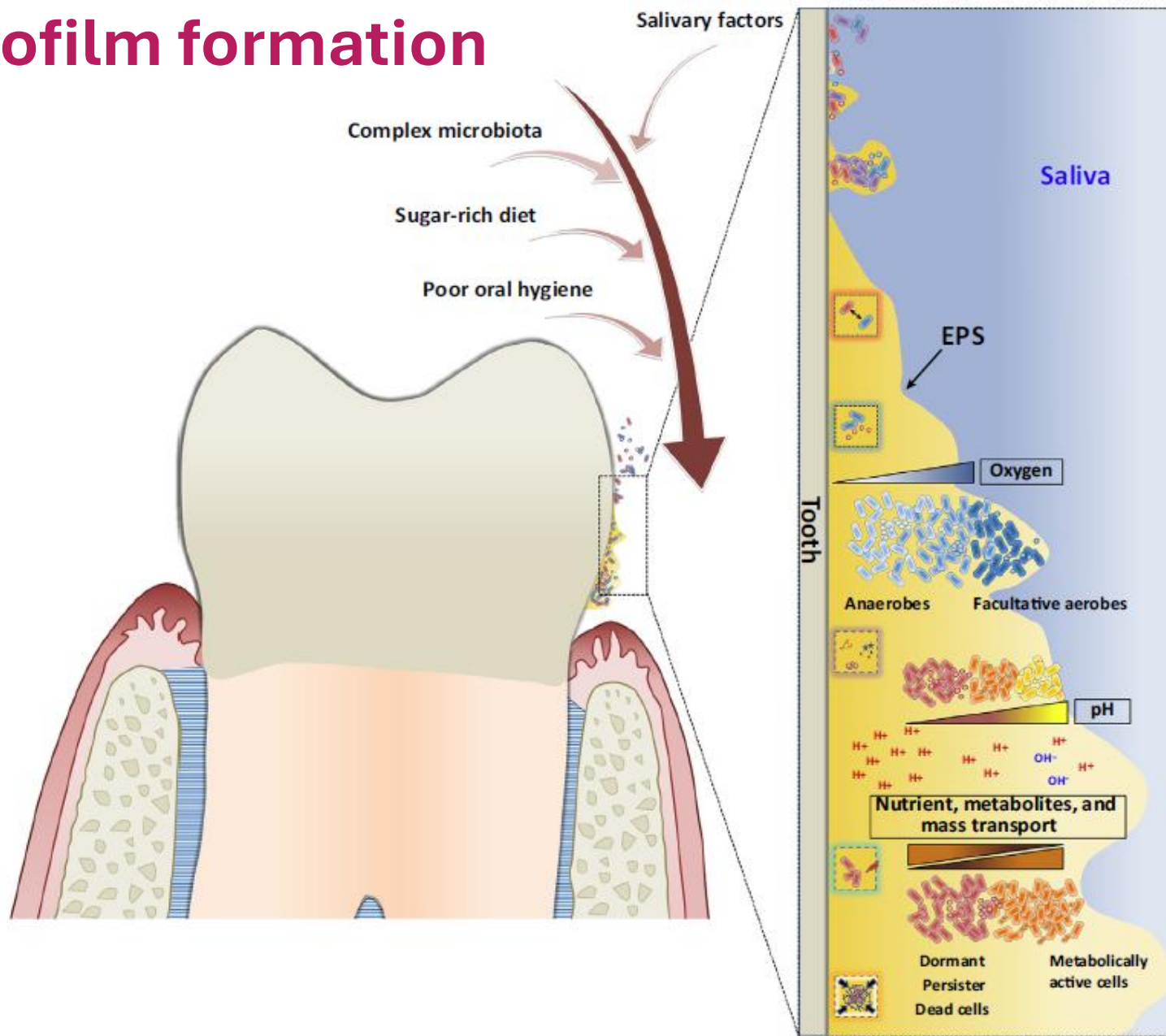
Polymicrobial aggregates in human saliva



Biofilm formation

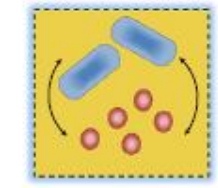


Biofilm formation



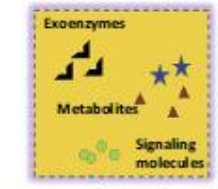
Competition

Competition



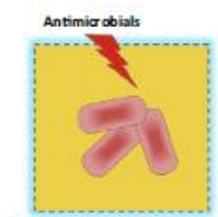
Symbiosis/ cooperation

Symbiosis/
co-operation



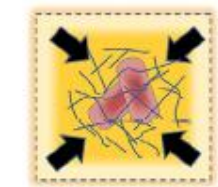
Enzyme/biomolecule retention-diffusion

Enzymes/ biomolecule diffusion-retention



Protection/resistance

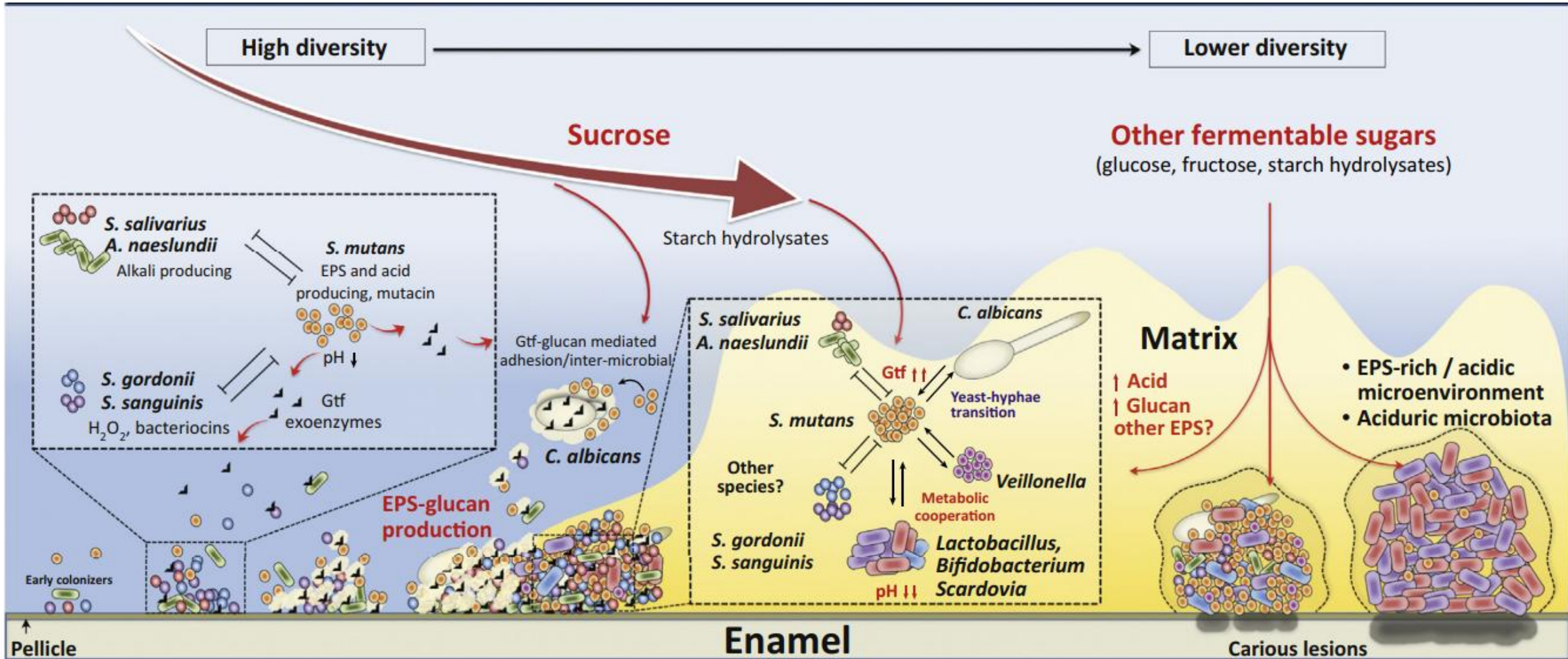
Protection/resistance



Mechanical strength

Mechanical strength

Life on teeth – a battlefield

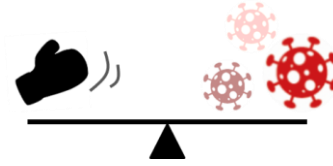


**Probiotics
as a natural defense against
oral pathogens**

Mechanisms of the probiotic defense

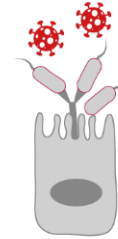
1 Immune system modulation

- Blocking of proinflammatory processes
- Stimulation of **anti-inflammatory reactions**



2 Receptor blockade

- Adhesion to the epithelial surfaces of the nasopharynx
- **Blocks bacterial docking stations**



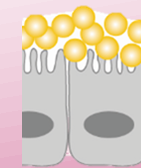
3 Antibacterial & antiviral substances

- Production of **bacteriocins** that inhibit bacterial and viral growth



4 Reinforcement of the mucosal barrier

- Stimulation of the mucus production
- Protection of mucosal cells

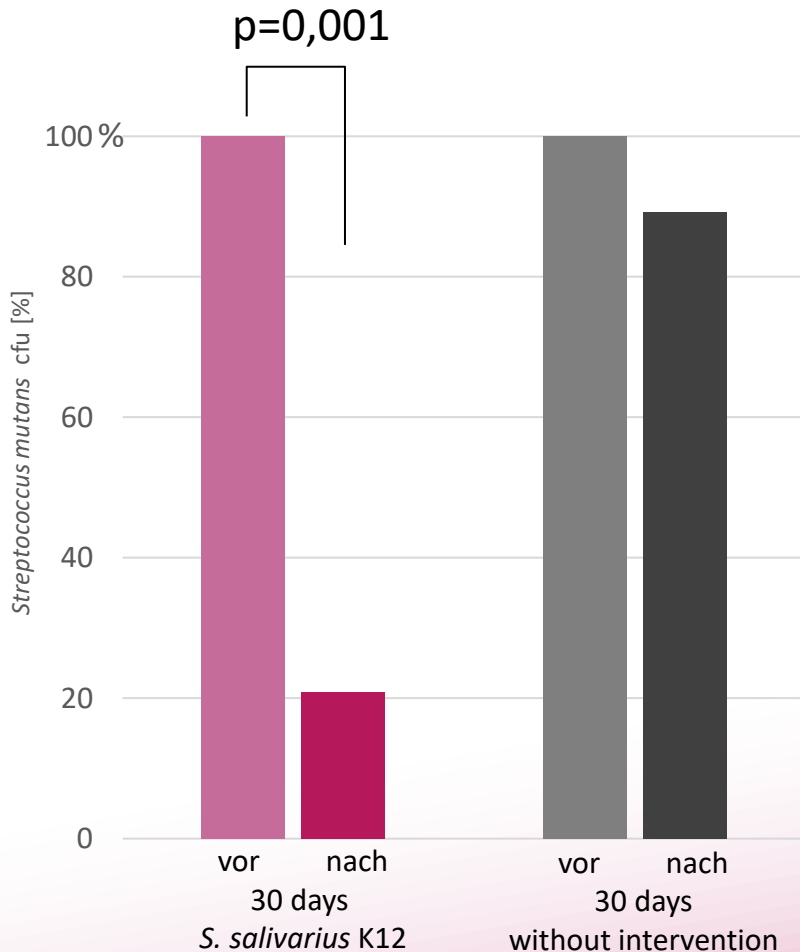


Streptococcus salivarius K12

Natural commensal of **oral cavity** that colonizes the oral cavity and the digestive tract as one of the **predominant species** within a few minutes after birth

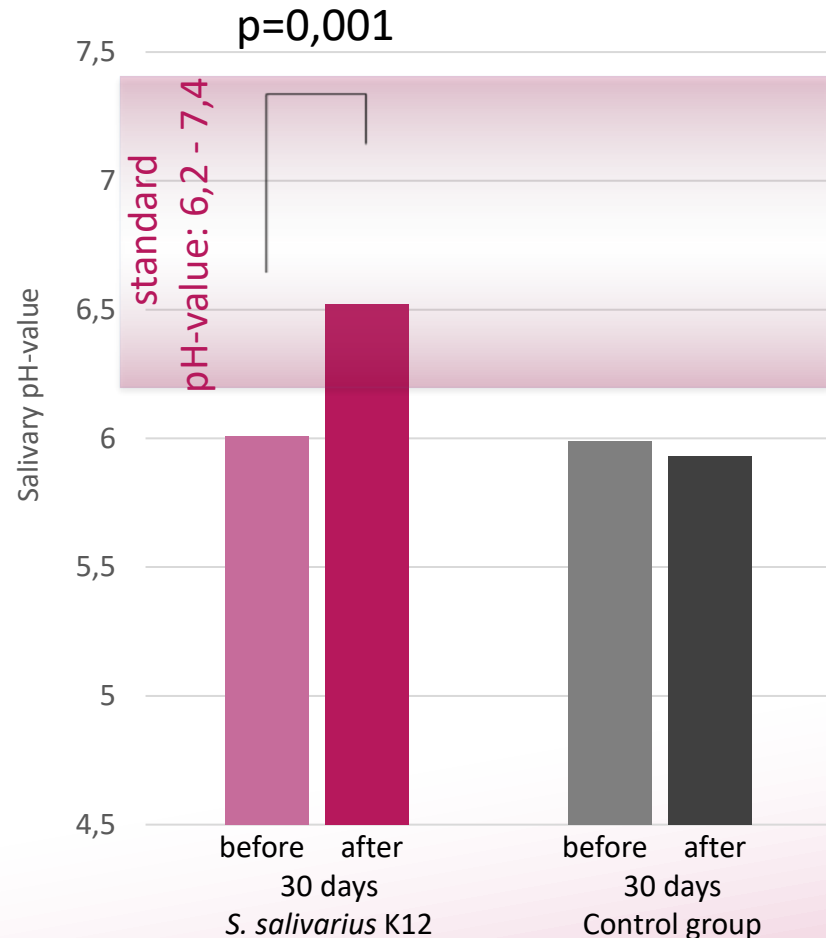


S. salivarius K12 inhibits the growth of cariogenic *Streptococcus mutans*



A 30 days *S. salivarius* K12 application significantly (-79%) reduces ***Streptococcus mutans*** numbers.

S. salivarius K12 ameliorates the salivary pH-value



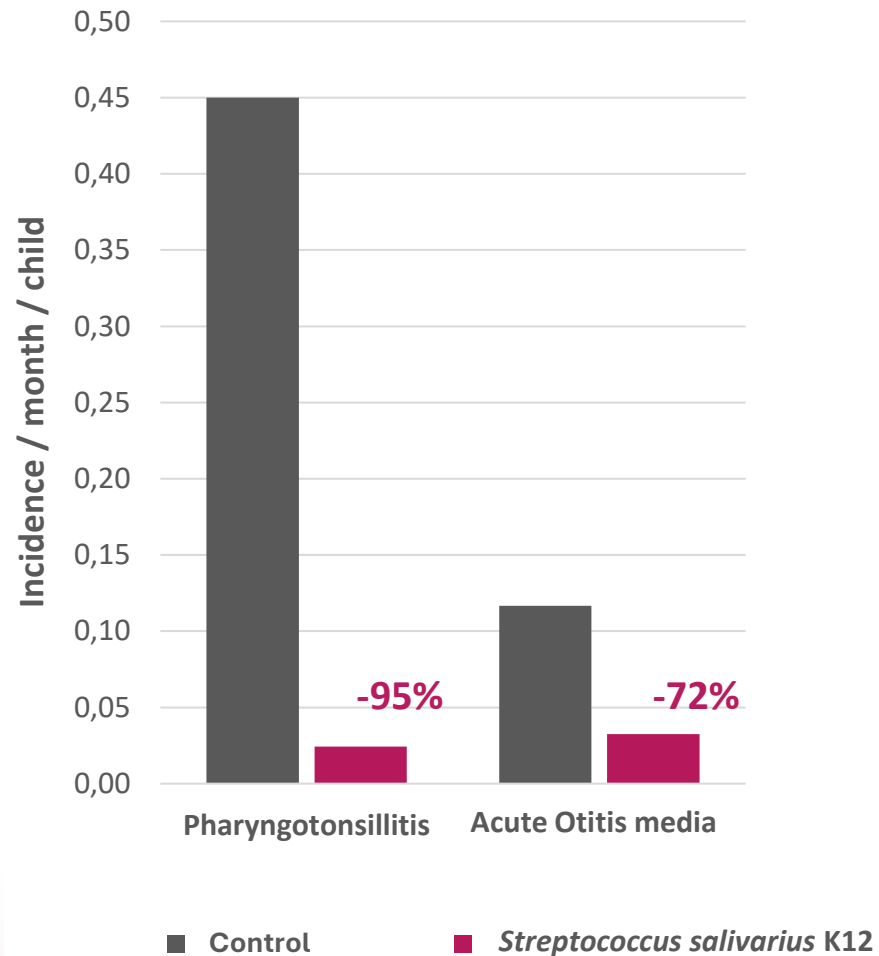
pH-value in the oral cavity:

ideally around 7.0

(Standard value pH=6,2 - 7,4)*

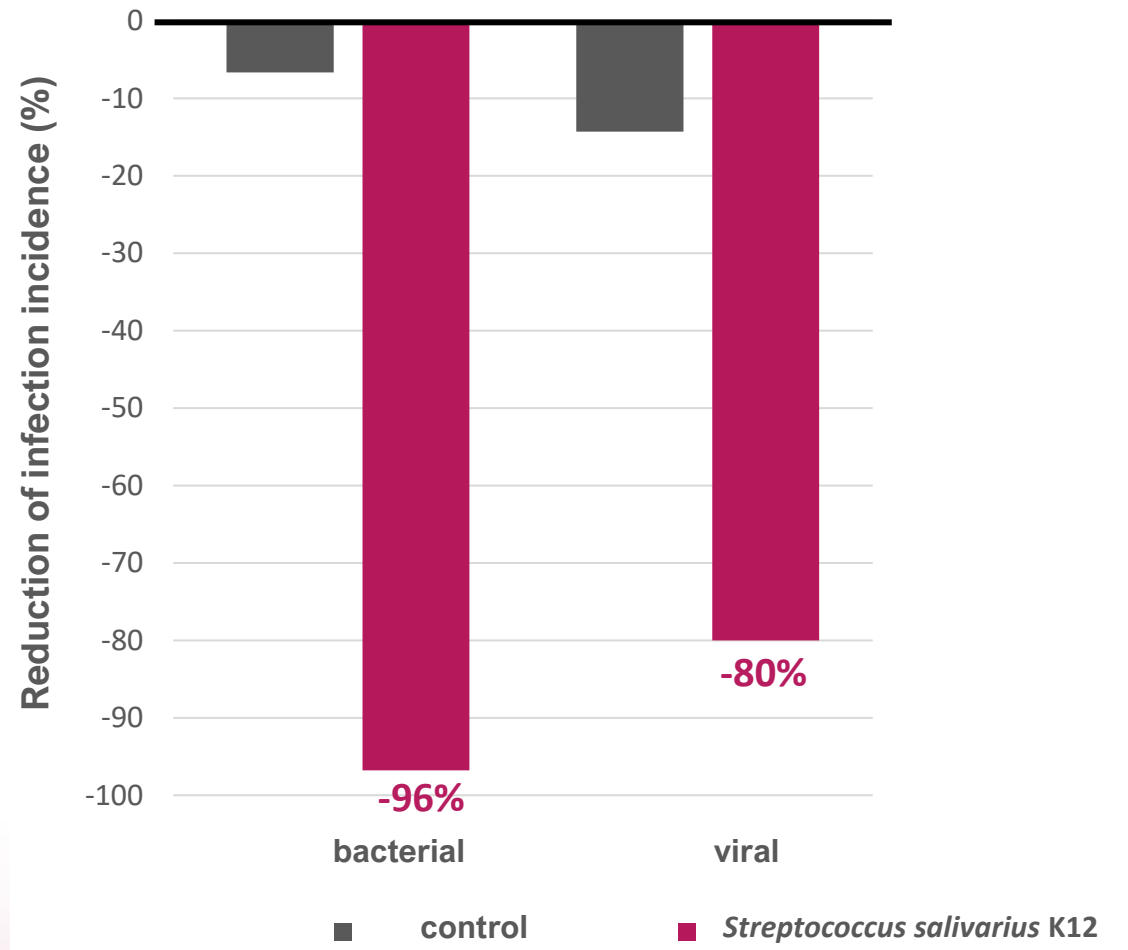
The lower pH-value the stronger is the demineralization of the tooth enamel.

Streptococcus salivarius K12 lozenge prevents ear and throat infections

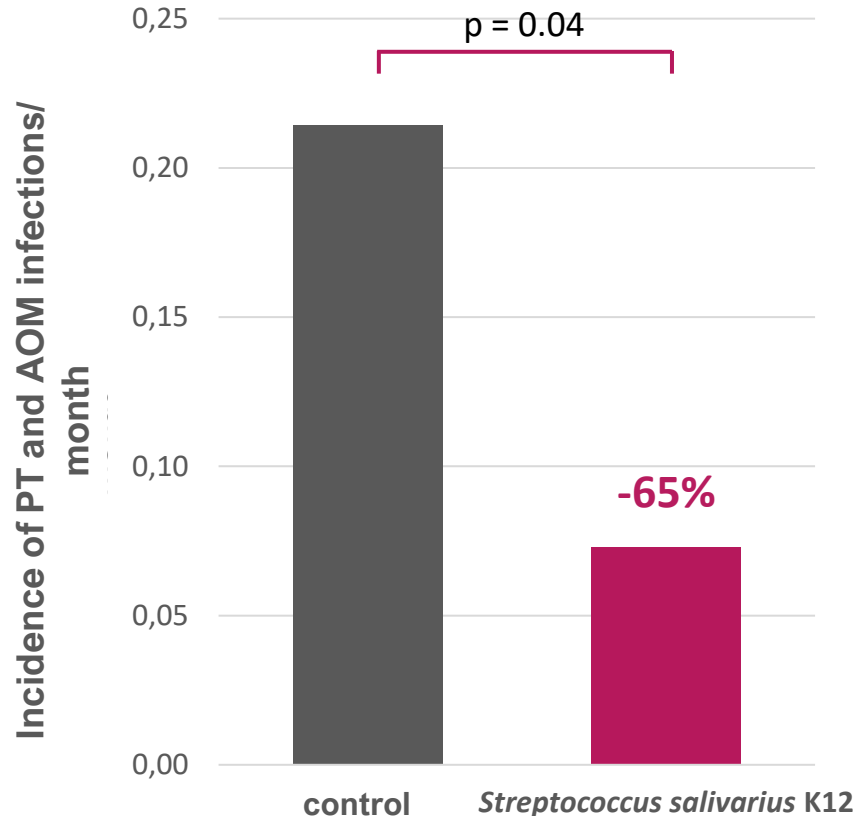


Highly significant reduction of bacterial pharyngotonsillitis and acute otitis media.

Streptococcus salivarius K12 reduces bacterial and viral ENT infections



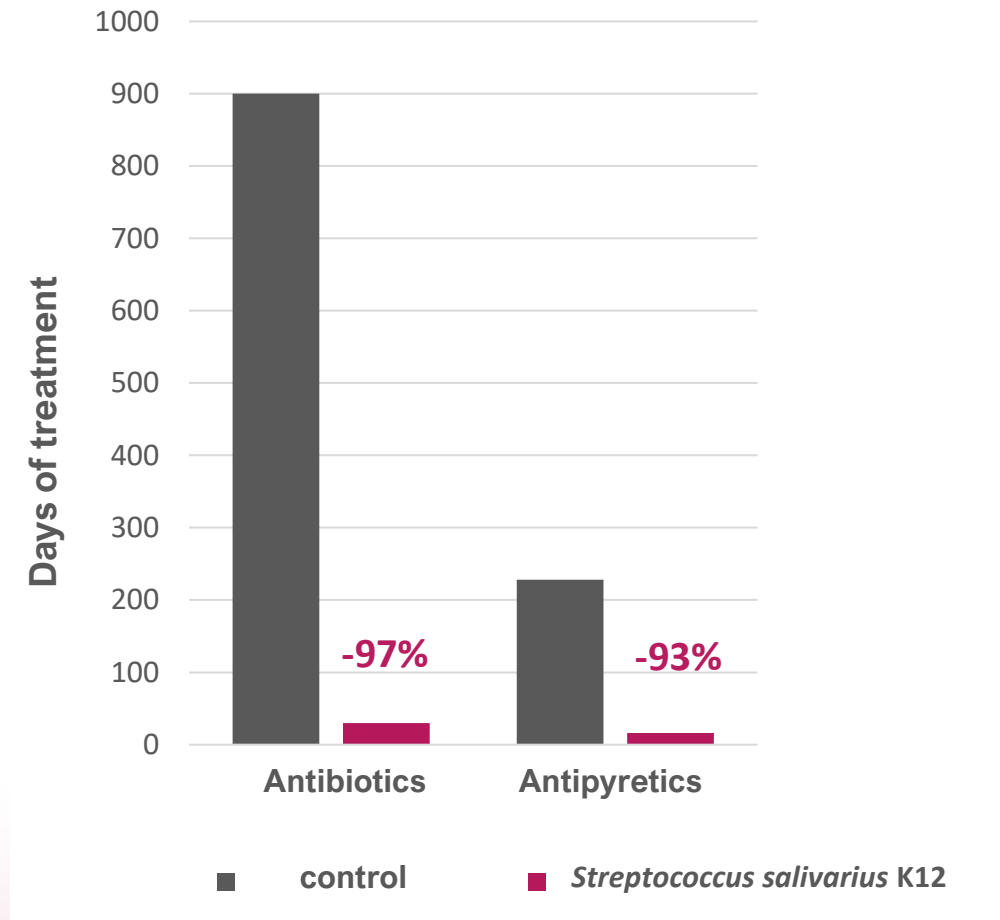
Visible effects even 6 months after treatment with *Streptococcus salivarius* K12



Significant reduction in bacterial ENT infections in the 6 subsequent months.

PT, Pharyngotonsillitis;
AOM, acute Otitis media

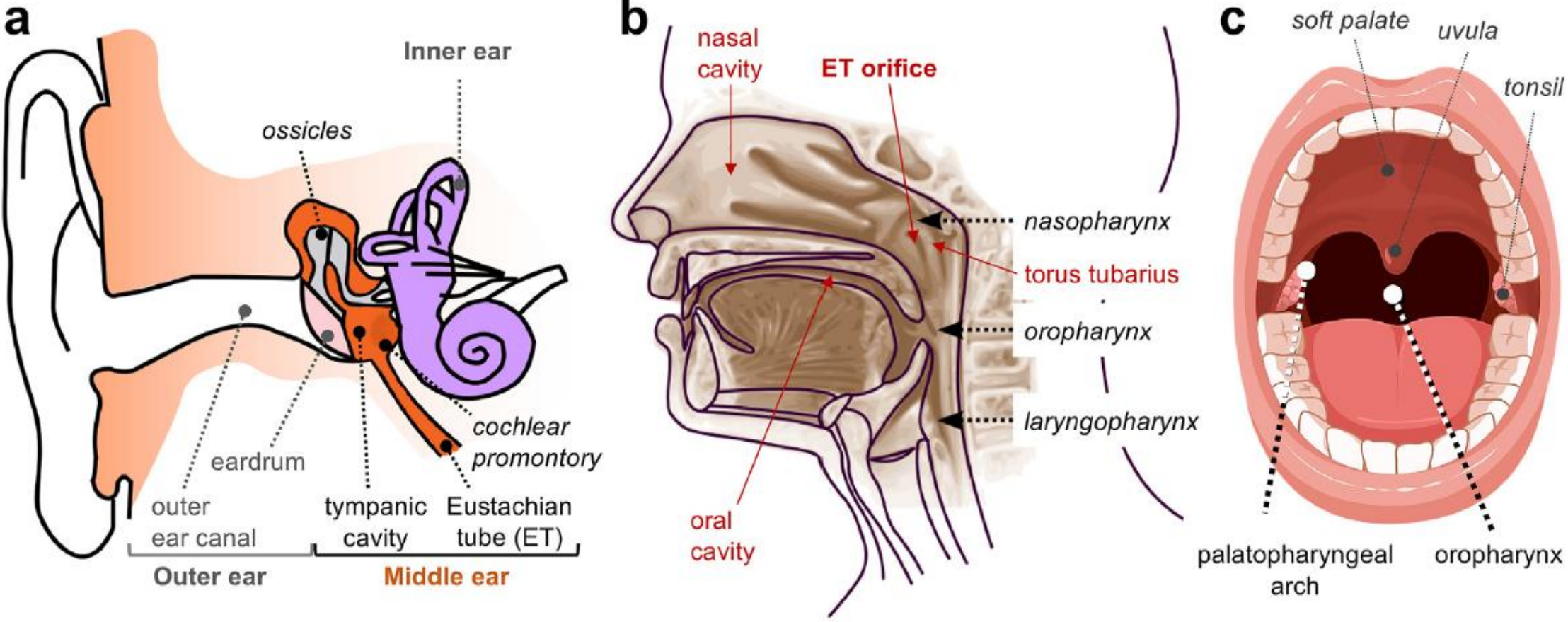
Streptococcus salivarius K12 significantly reduces the intake of antibiotics and antipyretic painkillers



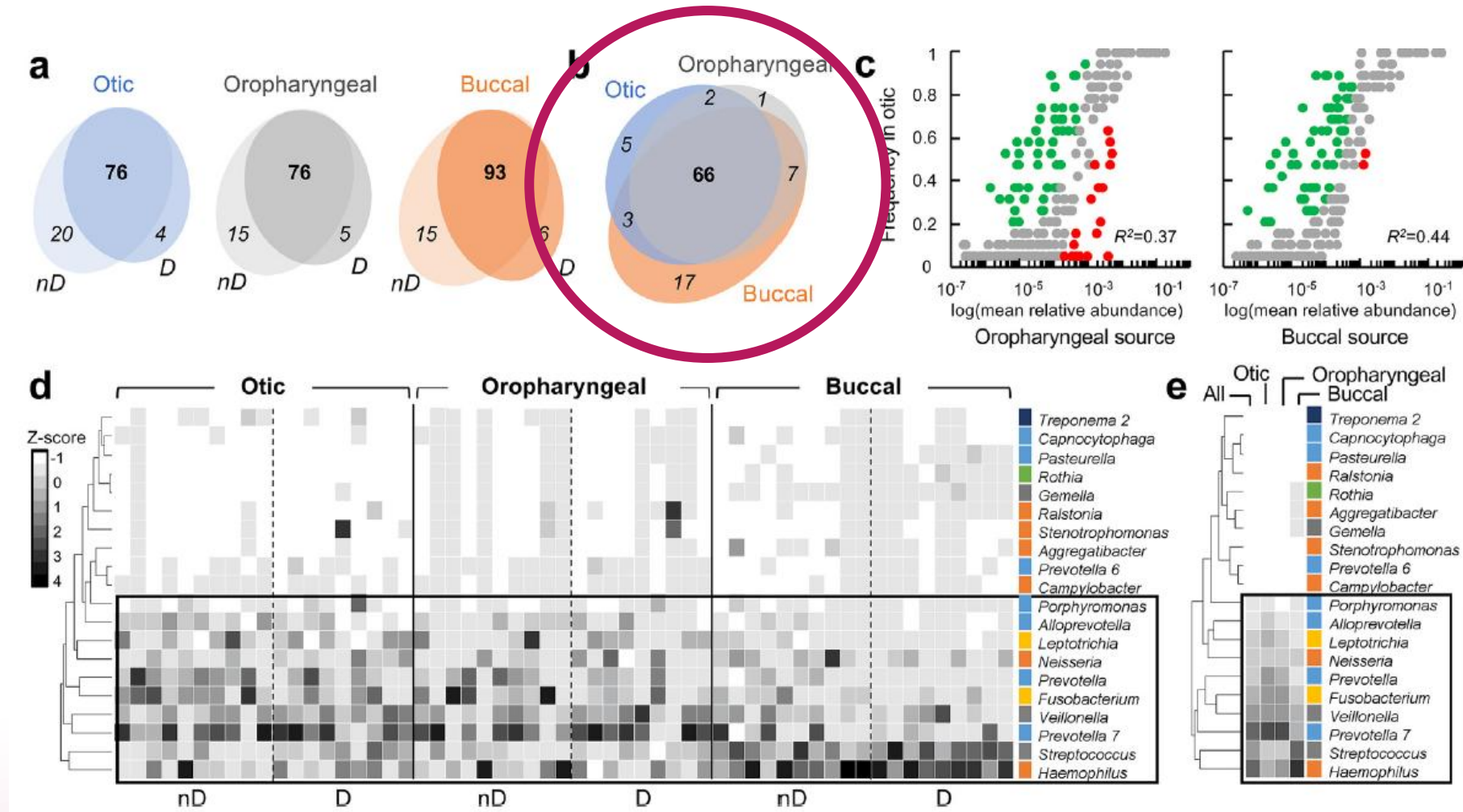
Streptococcus salivarius K12 reduces the treatment with:

- **Antibiotics (-97%)**
- **Antipyretics (-93%)**

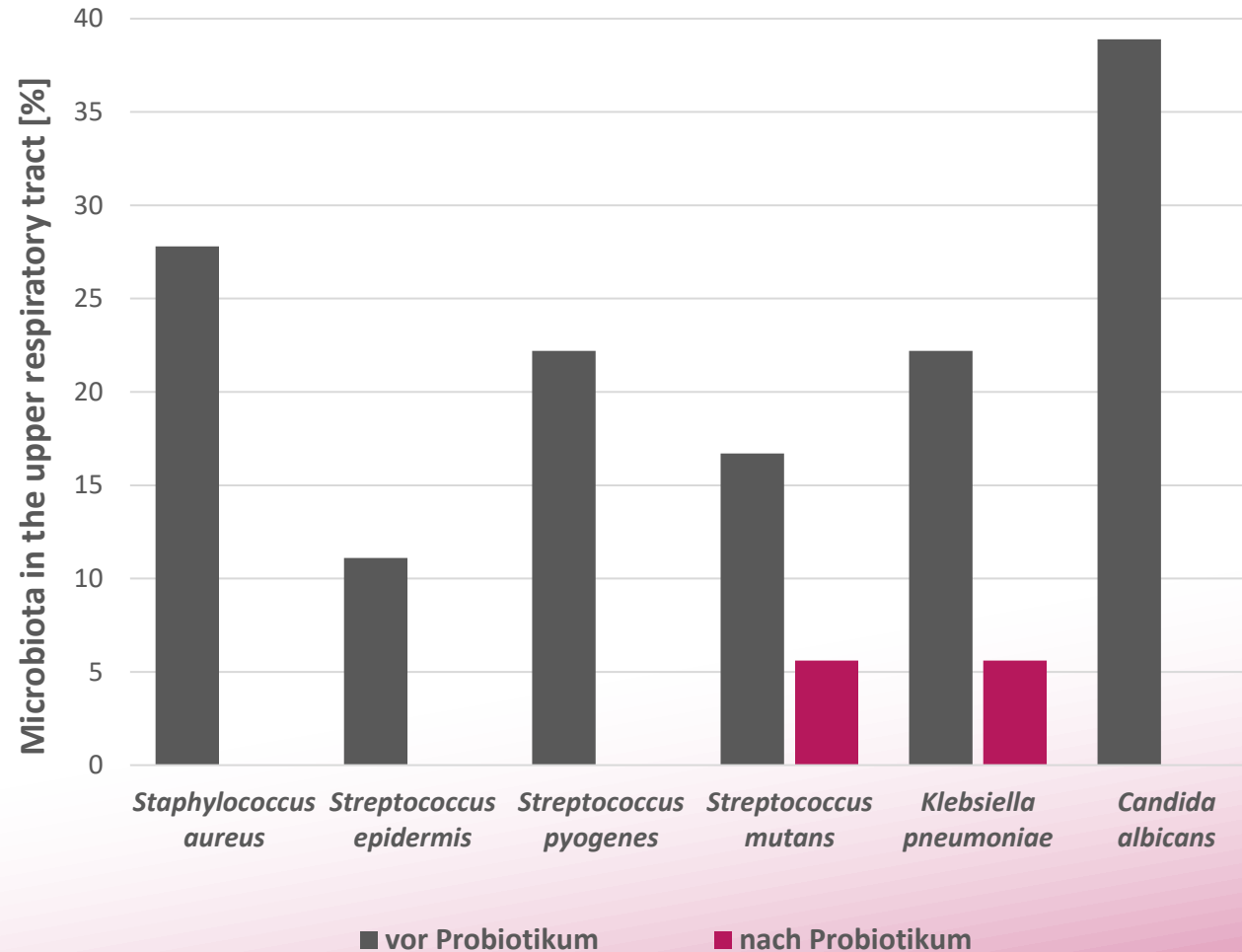
The mouth-nose-ear-connection



Microbiome relationship between mouth, nose, and ear

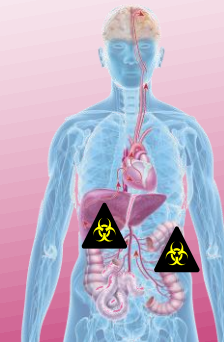
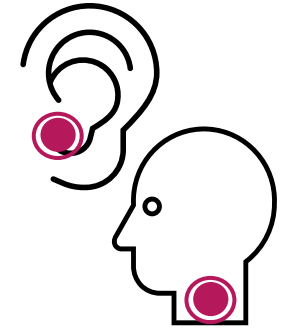


Streptococcus salivarius K12 displaces pathogenic bacteria in the upper respiratory tract

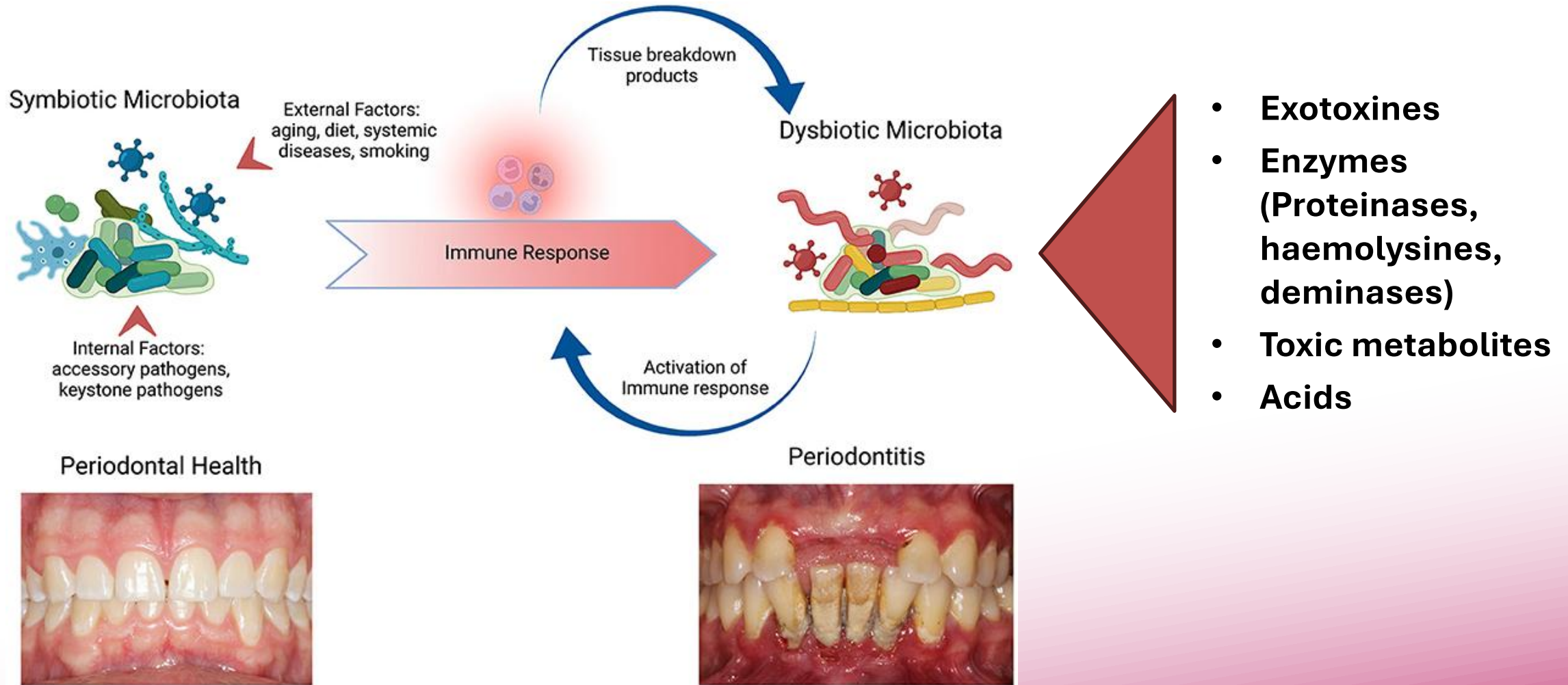


Positive impact of *Streptococcus salivarius* K12

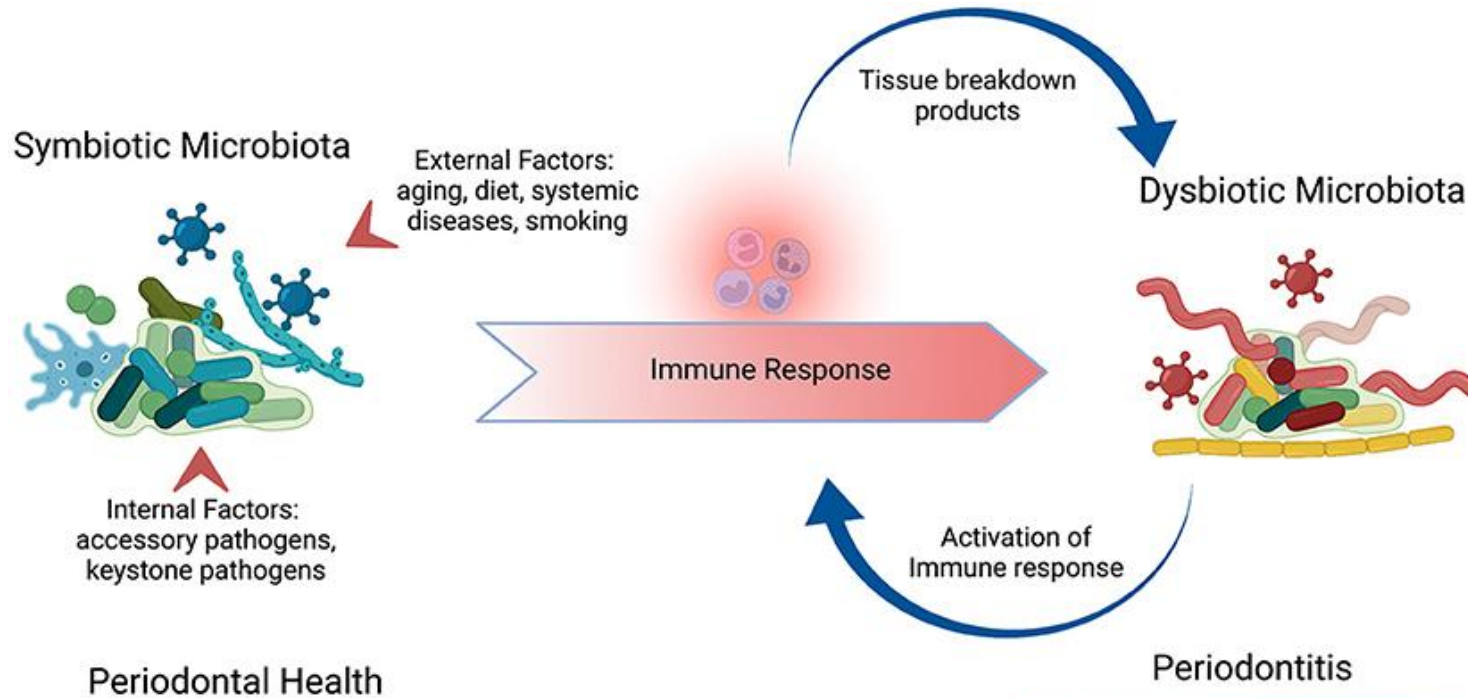
- **reduces** repeated **streptococcal infections** (pharyngitis, tonsillitis and middle ear infections)
- **protects** against **viral ENT infections** (sore throats, colds and the common cold)
 - can reduce the risk of COVID-19 infection
- helps to **prevent halitosis** (bad breath) and **tooth decay**
- **reduces** the use of **antibiotics** and **antipyretics**
- **prevents systemic effects** caused by oral diseases



Periodontitis development



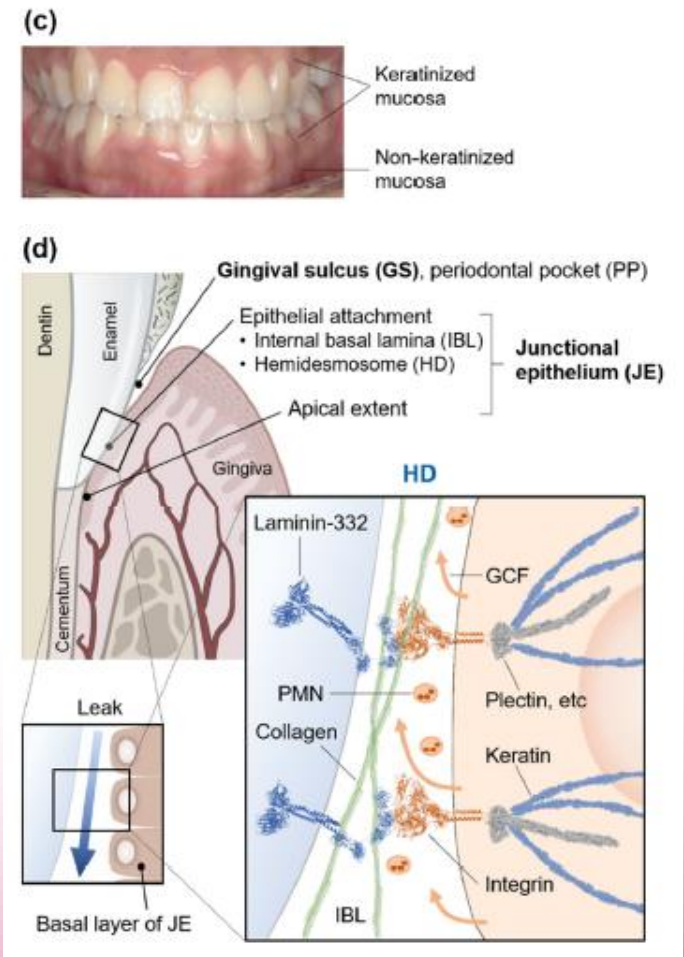
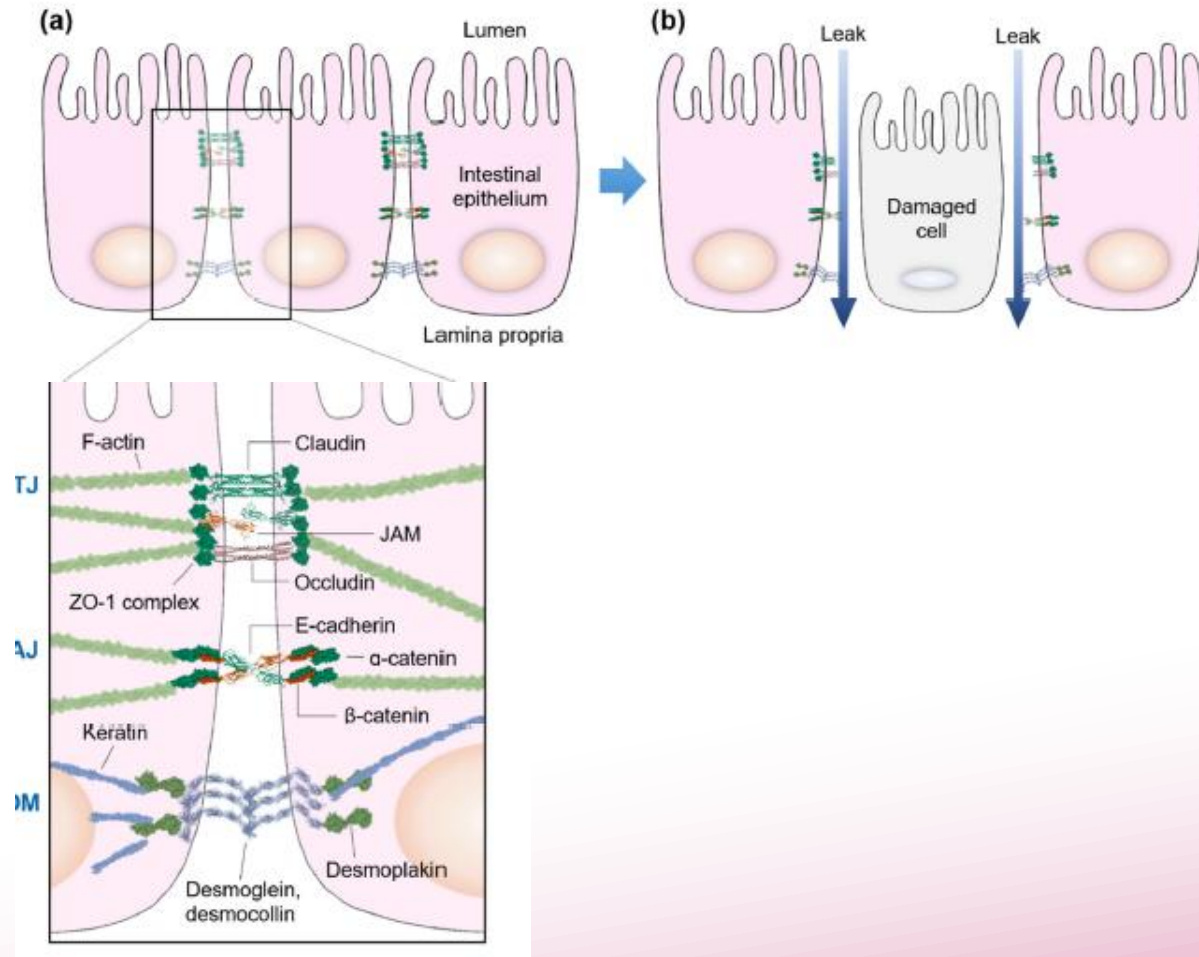
Periodontitis development



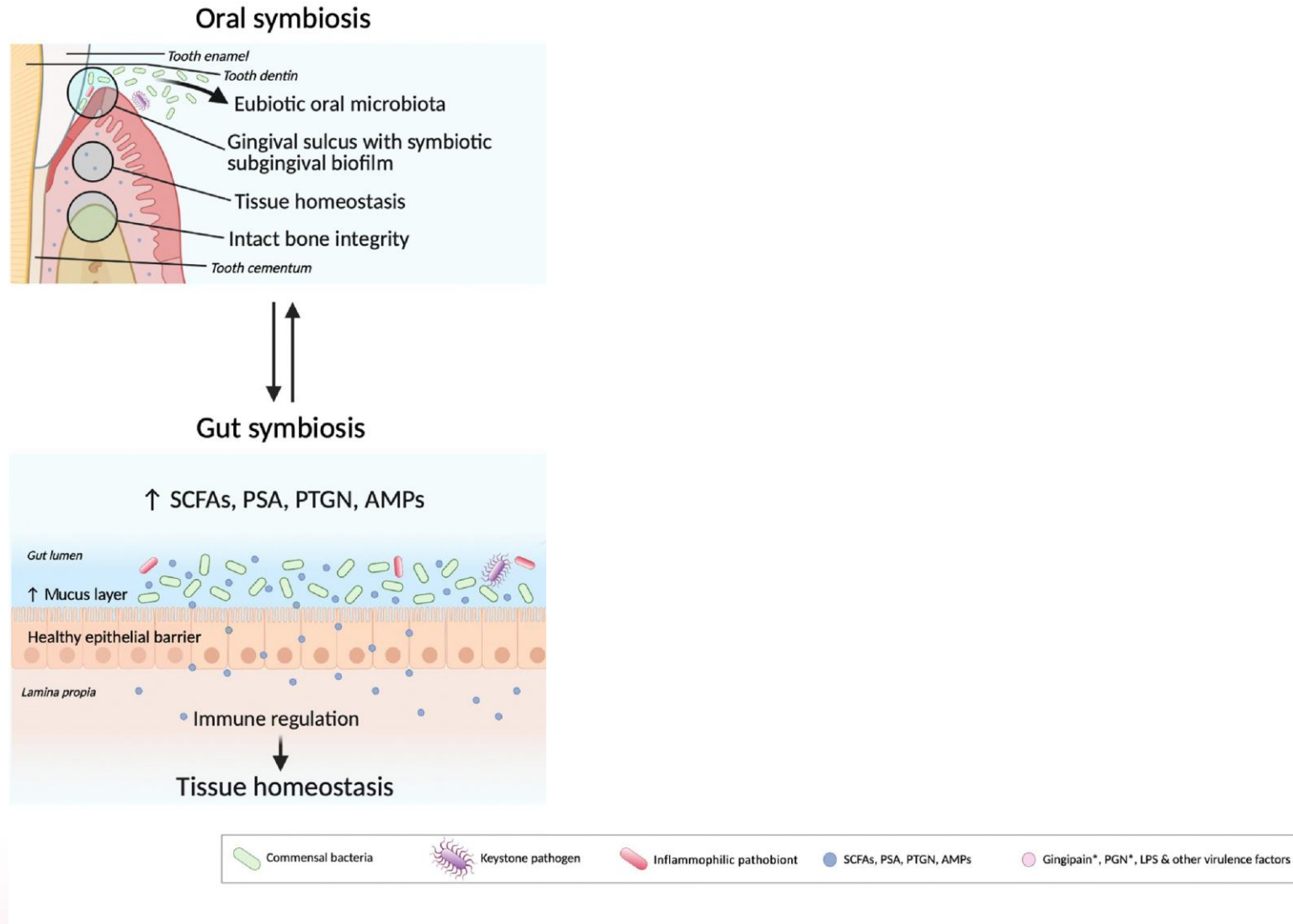
- Exotoxines
- Enzymes (Proteinases, haemolysines, deminases)
- Toxic metabolites
- Acids

Leaky gum with systemic effects!!!

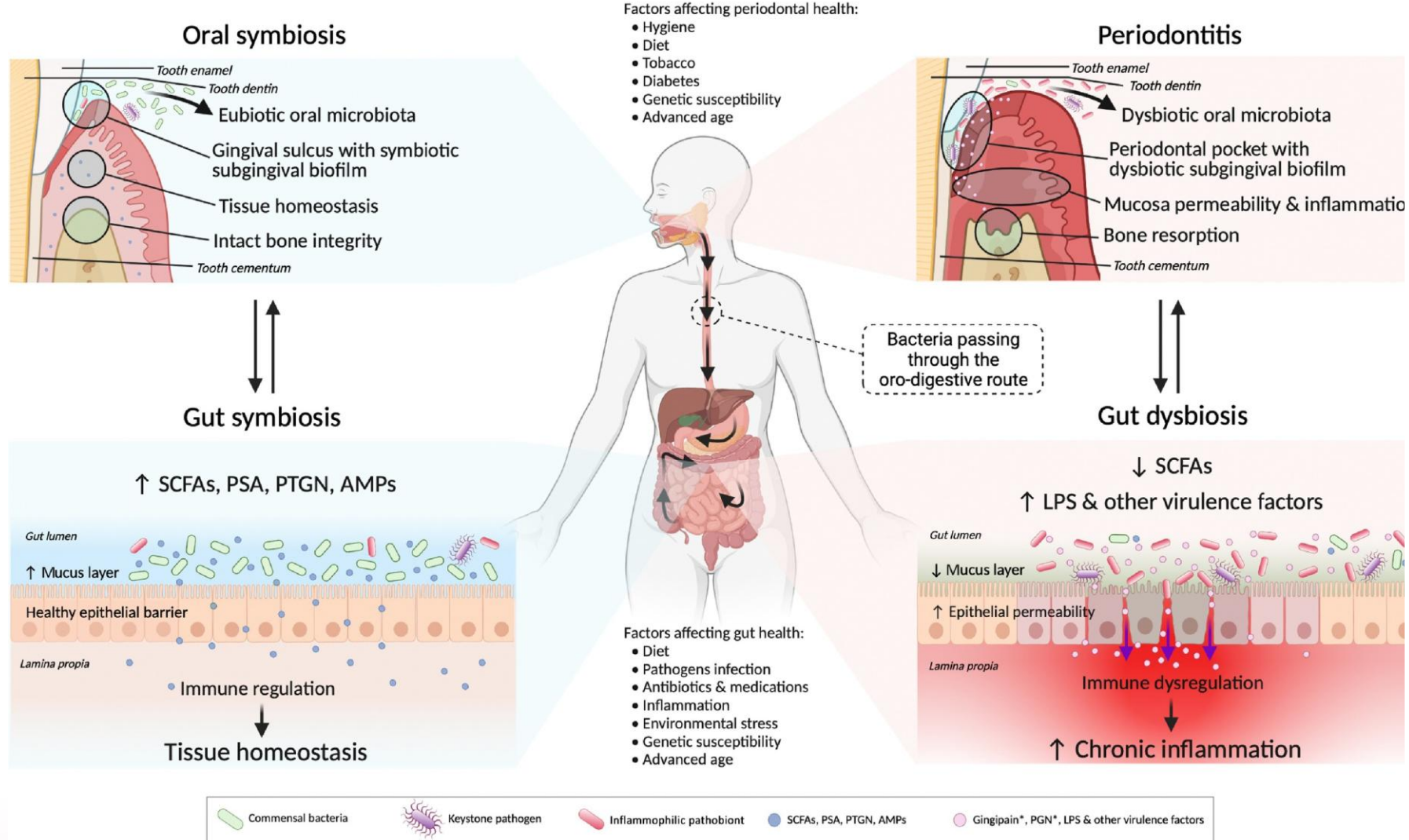
Leaky Gut vs. Leaky Gum



Oral-gut axis



Oral-gut axis



***Streptococcus salivarius* K12 in periodontitis:**

- is able to produce a **proteinaceous small molecule** (not a bacteriocin) capable of **inhibiting IL-6 and IL-8 activation** of primary human gingival fibroblasts by periodontal pathogens.
- is also effective applied **prior to pathogen exposure**.
- does **not alter the native salivary microbiota nor stimulate an immune response**.



reaction
flexibility obstacle
VISION overcome
endurance

believe
determined
positive

Resilience

solution
attitude trouble

power
experience
bounce

idea

optimism

strength

persistent

prevent

educational

change
learning

agility

growth

challenge

motivate

vitality

empowering

grow

action

success

leadership

persistence

positivity

adversity

effort

impossible

possible

optimistic
pressure

active

hope

stability

stronger

defense

teamwork

The image shows a dense field of microscopic, rod-shaped bacteria, likely Bacillus anthracis spores, rendered in a vibrant red color. The bacteria are scattered throughout the frame, with some appearing in sharp focus in the foreground and others blurred in the background, creating a sense of depth. A semi-transparent white rectangular box is centered over the image, containing the text "Hvala vam na pažnji!".

Hvala vam na pažnji!