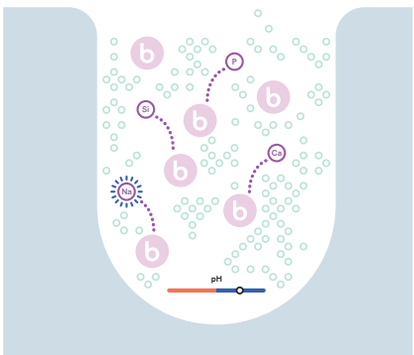
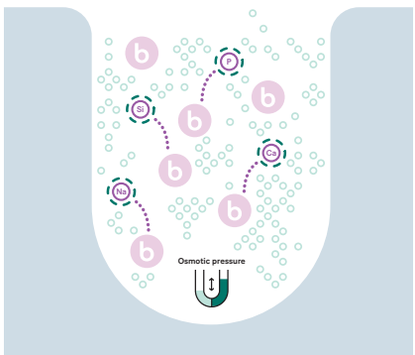
Bacterial growth inhibition of Bonalive® granules

Mechanism

The bacterial growth inhibiting feature of Bonalive® granules is triggered during the granules "Activation" phase presented on the following. This phase consists of two simultaneous chemical and physical processes, occurring once the bioactive glass reacts with body fluids.



1. Sodium (Na) is released from the surface of the bioactive glass and induces an **increase in pH** (alkaline environment), which is not favourable for the bacteria.



2. The released Na, Ca, Si and P ions give rise to an **increase in osmotic pressure** due to an elevation in salt concentration, i.e. an environment where the bacteria cannot grow.

Bonalive® granules | Na, Si, Ca and P ions | Body fluids

These two mechanism will together effectively inhibit the adhesion and colonization of bacteria on the granule surface.

Efficacy

BonAlive® granules effectively inhibits the bacterial growth of more than 50 clinically relevant bacteria (including MRSA, MRSE).

Gram positive bacteria

- Bacillus cereus
- Bifidobacterium adolescentis
- Clostridium difficile
- Clostridium perfringens
- Clostridium septicum
- Corynebacterium ulcerans
- Enerobacter cloacae
- Enterococcus faecalis
- Enterococcus faecium
- Eubacterium lentum
- Listeria monocytogenes
- Micrococcus sp.
- Mycobacterium tuberculosis
- Peptostreptococcus anaerobius
- Peptostreptococcus magnus
- Propionibacterium acnes
- Propionibacterium propionicus
- Staphylococcus aureus
- Staphylococcus epidermidis
- Staphylococcus hominis
- Staphylococcus lugdunensis
- Streptococcus agalactiae
- Streptococcus mutans
- Streptococcus pneumoniae
- Streptococcus pyogenes
- Streptococcus sanguis

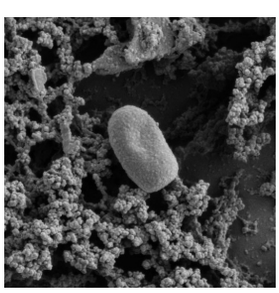
Gram negative bacteria

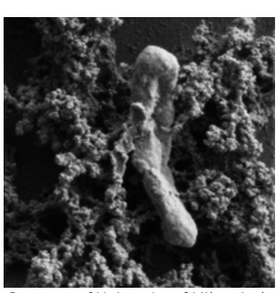
- Acinetobacter baumannii
- Bacteroides fragilis
- Bacteroides thetaiotaomicron
- Chryseobacterium (former Flavobacterium) meningosepticum
- Enterobacter aerogenes
- Enterobacter amnigenus
- Escherichia coli
- Fusobacterium necrophorum
- Fusobacterium nucleatum
- Haemophilus influenzae
- Klebsiella pneumoniae
- Moraxella catarrhalis
- Neisseria meningitidis
- Pasteurella multocida
- Porphyromonas gingivalis
- Prevotella intermedia
- Prevotella melaninogenica
- Proteus mirabilis
- Pseudomonas aeruginosa
- Salmonella typhimurium
- Shigella sonnei
- Veillonella parvula
- Yersinia enterocolitica

Methicillin-resistant bacteria

- Pseudomonas aeruginosa
- Staphylococcus aureus (MRSA)
- Staphylococcus epidermidis (MRSE)

The images illustrate the impact of S53P4 on methicillin-resistant Staphylococcus aureus, Klebsiella pneumoniae and Acinetobacter baumannii. The inhibition of bacterial growth can be seen as changes in the morphology of the bacteria; deformation of the cells and hole formation in the cell membranes.





Courtesy of University of Milan, Italy

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