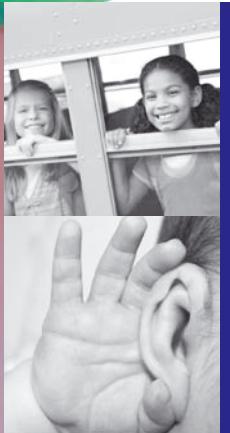
A photograph of a smiling family of three: a woman, a man, and a young boy. They are all wearing green shirts. The woman is in the center, the man is behind her, and the boy is in the foreground. They are all smiling and looking towards the camera.

Advanced Oral Cavity Probiotic that Protects
the Gateway to the Body's Health



 **FRUTAROM**
FOUNDED 1933

What is BLIS K12?

BLIS K12 is the world's first advanced probiotic for the oral cavity (mouth) and upper respiratory tract. It is a specific strain of *Streptococcus salivarius*, a common oral bacteria.

The strain specific actions of K12 help provide a natural defense against bacterial sore throat and ear infections. Additionally, K12 can promote fresh breath and boost our immune system's defenses.

The K12 strain was originally isolated from the mouth of a healthy child who was tracked for several years and did not develop sore throats. Scientists discovered that this particular K12 strain of *S. salivarius* secretes powerful antimicrobial molecules called **BLIS**, (Bacteriocin-Like-Inhibitory Substances), with the ability to destroy harmful bacteria such as the bacteria responsible for "strep" sore throat and other upper respiratory infections.



Why Oral Probiotics?

The mouth is an entry point for pathogens as it comes into contact with billions of bacteria. The microorganisms in our mouth are a first line of defense against pathogens and an important part of our immune health. If a healthy balance of oral

bacteria is thrown off by stress, exposure to disease or antibiotics, it can quickly lead to problems such as throat infections, ear infections and bad breath.

By promoting a healthy balance of bacteria in the mouth and upper respiratory tract, BLIS K12 can help protect the gateway to our body's health.

Why is BLIS K12 so unique?

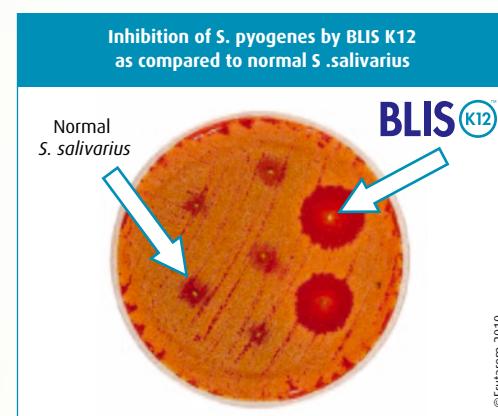
S. salivarius is one of the most numerous beneficial bacteria found in the mouth of healthy individuals. However, only a small amount of people produce a kind of *S. salivarius* with BLIS K12 activity.

Most probiotic bacteria, including *S. salivarius*, compete with other microorganisms for space and nutrients in the oral cavity and in this way, act to maintain a healthy balance of oral bacteria. BLIS K12 works beyond competitive inhibition. It secretes two anti-microbial proteins called Salivaricin A and Salivaricin B which destroy undesirable bacteria, making it more effective at fighting off pathogens.

When BLIS K12 enters the mouth, it attaches to cells in the oral cavity and colonizes. By colonizing, BLIS K12 crowds out pathogenic bacteria, keeping them from adhering to the host. The final antibacterial punch comes from the production of BLIS molecules,

Salivaricins A and B. Many potential pathogens are susceptible to these Salivaricins, including the bacteria that cause sore throats, bad breath and those that cause respiratory tract and ear infections.

In addition to its ability to inhibit pathogens, BLIS K12 can communicate with certain cells in the mouth, stimulating them to boost our immune system defenses.



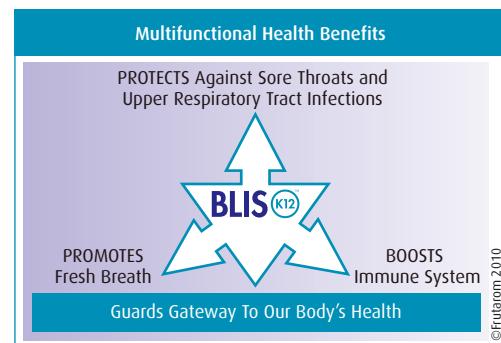
This figure illustrates the more potent activity of BLIS K12 in inhibiting the strep throat causing bacteria *S. pyogenes* as compared to normal *S. salivarius*.



Health Benefits of BLIS K12

As a result of its multifunctional activity, taking daily doses of BLIS K12:

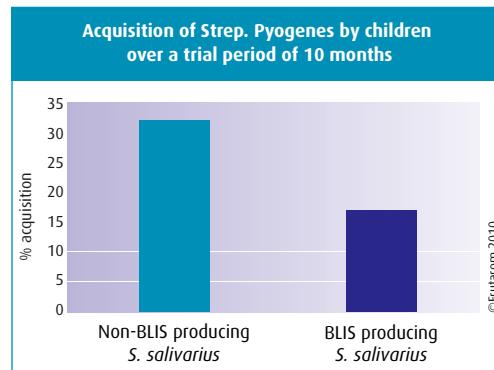
- promotes ear, nose and throat health
- boosts our immune system
- promotes fresh breath



Supported by Proprietary Science

Ear, Nose and Throat Health

BLIS molecules produced by K12 destroy harmful oral bacteria such as *S. pyogenes* the most significant contributor to bacterial sore throats. Studies show that children who naturally have BLIS producing bacteria in their mouths, like BLIS K12, are less likely to acquire sore throats.

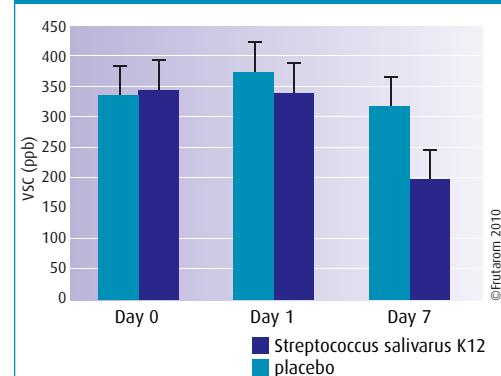


Pilot studies of children with recurrent tonsillitis and otitis media (ear infections) have found that the children experienced reduced numbers of infections after taking BLIS K12.

Bad Breath

Bad breath is mainly caused by the breakdown of proteins on the tongue by certain bacteria, and the subsequent release of volatile sulfur compounds. BLIS K12 inhibits these bacteria and therefore targets the source of bad breath instead of just masking it.

Mean volatile sulphur compound (VSC) levels of mouth air from subjects before and after treatment



Boosting Protective Immunity

Consumption of BLIS K12 stimulates the production of interferon gamma, an immune biomarker, known to contribute to non-specific immunity against many intracellular bacteria and viruses.

At the same time that BLIS K12 can stimulate our protective immunity, cell culture studies have shown that BLIS K12 down-regulates overreaction of our immune system that can happen in response to a pathogenic infection. For example, BLIS K12 can suppress potentially harmful inflammation caused by pathogenic bacteria.



Product Applications

Our team has the technical expertise to assist customers with developing finished products with a high microbial concentration and long-term stability.

Ideal applications for BLIS K12 are those that allow prolonged contact with the mouth, such as:

- **chewable tablets or lozenges**
- **fast-melt tablets**
- **chewing gum**
- **stick packs**
- **powders**

And a range of functional food applications such as:

- **Yogurt**
- **Ice cream**
- **Others**

Advantages of BLIS K12

- **World's first oral cavity probiotic – discovered in the mouth of a healthy child for specific application to the oral cavity and upper respiratory tract**
- **Multifunctional health benefits: naturally promotes ear, nose and throat health, boosts the immune system and reduces bad breath**
- **Proprietary strain of bacteria with potent BLIS antibacterial molecules, Salivaricins A and B**
- **Able to colonize and persist in the mouth**
- **Robust science with over 30 years' research and an extensive collection of peer reviewed papers, articles and book chapters.**
- **Safe and effective for children and adults**
- **Extensive IP program**

Enjoy Health Ingredients

This data is presented in good faith and we made our honest effort to ensure its accuracy. The information is offered for your consideration and is to be used with appropriate professional judgment.

For further information, please contact us.



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