

Key points

- Inhibits a wide range of oral pathogens
- Competitively blocks binding of *S. pyogenes* to human cells
- Epidemiological studies support the protective role BLIS K12 plays in preventing tonsillitis and ear infections

What is BLIS K12?

Streptococcus salivarius K12 (BLIS K12™) is the world's first bacterial replacement probiotic specifically derived from the human oral cavity and designed for delivery and use in the oral cavity. The strain was identified from a 6 year longitudinal study of school children assessing their frequency of strep throat. A correlation was identified between the presence of unique variants of the natural human tongue bacterium *S. salivarius* and an observed reduced rate of strep throat infection¹. Strain K12 (Figure. 1) was isolated and studied to identify what beneficial properties it had.

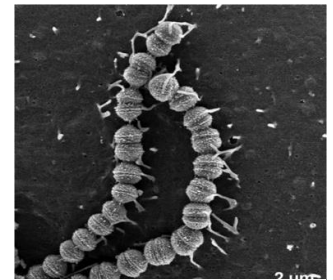


Figure 1. Electron micrograph of *S. salivarius* K12 on the surface of a human epithelial cell

What evidence is there for efficacy?

Inhibition of Pathogens

Using a standard laboratory test, *S. salivarius* K12 inhibited the growth of 100% of *S. pyogenes* strains, as well as a range of other pathogenic bacteria (Table 1). This activity has been characterized as being due to the action of special antimicrobial peptides, known as bacteriocins, called salivaricin B².

Epidemiological studies

A number of studies have shown that naturally occurring *S. salivarius* populations producing bacteriocin like inhibitory substances similar to that of BLIS K12 reduce the acquisition rates of *S. pyogenes* (Figure. 2) and the prevalence of sore throats^{1,3} in children.

Table 1. Inhibition of key pathogens by BLIS K12™

Bacterial Species	No. Strains inhibited/tested	Disease association
<i>Streptococcus pyogenes</i>	22/22	Acute pharyngitis
<i>Streptococcus pneumoniae</i>	5/5	Pneumonia, ear infections
<i>Prevotella intermedia</i>	3/3	Periodontal disease/gingivitis
<i>Porphyromonas gingivalis</i>	2/2	Periodontal disease/gingivitis
<i>Streptococcus agalactiae</i>	4/4	Neonatal sepsis and meningitis

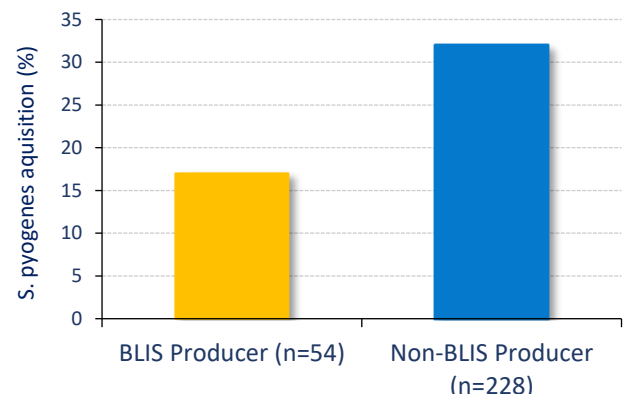


Figure 2. *S. pyogenes* acquisitions in children during the 10 month study period

Recurrent tonsillitis and ear infections

In a retrospective, observational study, daily administration of BLIS K12 (90-day treatment, 9 month follow up) in children showed significantly fewer strep throat infections compared with untreated control (Figure. 3)⁴. This study protocol has been carried out a few more times in children and independent meta-analysis⁵ of trials^{4,7,8} found that this effect was statistically significant. In a similar study carried out in adults, also with a history of recurrent strep throat, daily administration of BLIS K12 reduced the number of episodes (>80%) during the 3 month treatment period compared to 38% increase in infection in the untreated subjects (Figure. 4)⁶. The rates of streptococcal pharyngeal infections in children were reduced in the BLIS K12 treatment group by 90% when compared over the previous year⁷. In a more recent study daily administration of BLIS K12 to healthy children attending their first year of kindergarten was associated with a significant reduction in episodes of streptococcal pharyngitis and acute otitis media, compared to an untreated control group⁸ (Figure. 5). This further highlights the protective effect of BLIS K12 in preventing recurrent tonsillitis and ear infections.

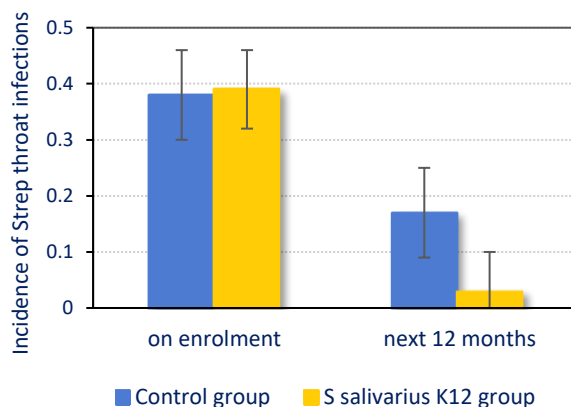


Figure 3. Reduction in strep throat infections following daily dosing of BLIS K12 (control n =54, K12 n = 76)

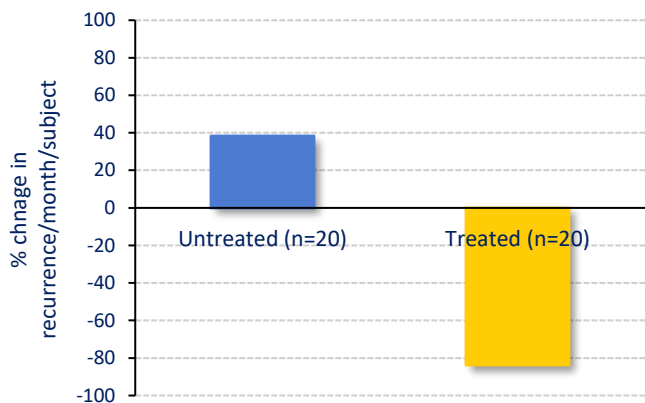


Figure 4. Episodes of recurrent streptococcal infections during the 90 day treatment with BLIS K12 in adults

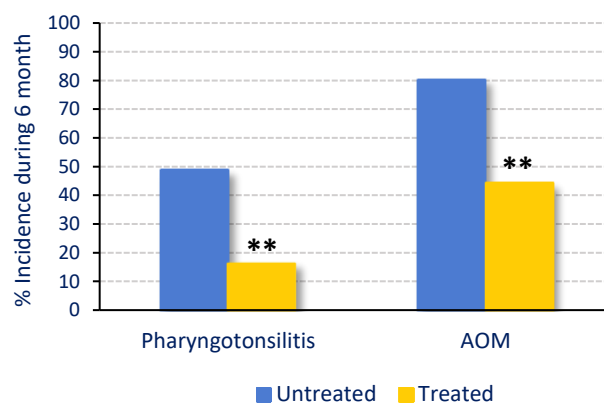


Figure 5. Reduction in the pharyngo-tonsillitis (PT) and acute otitis media (AOM) during the 6-months treatment.

Summary

BLIS K12 is a new generation of advanced probiotic for the oral cavity developed for its ability to naturally produce bacteriocins that have been shown in the lab to inhibit common pathogens such as *Streptococcus pyogenes*, the most significant cause of bacterial sore throats. Clinical studies assessing the efficacy of daily dosing of BLIS K12 demonstrate its ability to promote good oral health through the reduction of recurrent tonsillitis and otitis media (ear infections) episodes.

References

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2. Hyink O et al. Salivaricin A2 and the novel lantibiotic salivaricin B are encoded at adjacent loci on a 190-kilobase transmissible megaplasmid in the oral probiotic strain *Streptococcus salivarius* K12. Appl. Environ. Microbiol. 2007;73:1107-13.
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4. Gregory G et al. Reduction of group A beta-hemolytic streptococcus pharyngo-tonsillar infections associated with use of the oral probiotic *Streptococcus salivarius* K12; a retrospective observational study. Therap. Clin Risk Mgmt. 2016;12: 87-92.
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6. Di Pierro et al. Clinical evaluation of the oral probiotic *Streptococcus salivarius* K12 in the prevention of recurrent pharyngitis and/or tonsillitis caused by *Streptococcus pyogenes* in adults. Expert Opin Biol Ther. 2013;13(3):339-43.
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