

ListShield™

Introduction

ListShield™ is an all-natural, non-chemical antimicrobial preparation for controlling the foodborne bacterial pathogen *Listeria monocytogenes*. The active ingredients of **ListShield™** are naturally occurring bacteriophages that selectively and specifically kill *L. monocytogenes*. **ListShield™** is specifically designed for treating foods that are high risk for *L. monocytogenes* contamination. It can also be used to eliminate or significantly reduce the levels of *L. monocytogenes* on non-food contact equipment, surfaces, etc. in food processing plants and other food establishments. **ListShield™** is ideal for use in HACCP programs that have identified *L. monocytogenes* control as a potential problem.

Bacteriophages

Bacteriophages (or phages) are nature's way of destroying bacteria. A bacteriophage is a virus that is harmless to humans, animals, and plants but is very effective in killing bacteria. Specific phages kill specific bacteria. Bacteriophages are *the* most ubiquitous organisms on Earth, with their numbers estimated to be in the 10^{30} – 10^{32} range. They are naturally occurring and are commonly found almost everywhere, including in the water we drink and fresh foods we eat.

Bacteriophages provide an all-natural, nontoxic, safe and effective means for significantly reducing or eliminating disease-causing bacteria that are sometimes present in foods or in food processing environments. For example, for direct food applications, the approach of using phage-containing food safety products is based on adding the appropriate concentration of lytic bacteriophages active against the pathogenic bacteria contaminating the foods. If the foods are contaminated with pathogenic bacteria targeted by the bacteriophage preparations, the phages will eliminate or significantly reduce the concentrations of those bacteria in the foods, thus making them safer to eat. For more information, please see our short video:

<http://www.youtube.com/intralytix>



ListShield™ is *the* choice for eliminating or significantly reducing contamination of food with specific pathogenic bacteria because it:

- Complies with FDA food additive regulations, for direct application to meat and poultry products that meet the ready-to-eat definition (21 CFR § 172.785).
- Is FSIS-listed as safe and suitable for use as processing aid with no labeling requirements when applied to various ready-to-eat meat and poultry products (FSIS Directive 7120.1).
- Is GRAS for direct application to fish and shellfish (including smoked varieties; e.g., smoked salmon), fresh and processed fruits, fresh and processed vegetables, and dairy products (including cheese) (GRN No. 528).
- Is EPA-registered for application on various non-food contact equipment, surfaces, etc. in food processing plants and other food establishments (EPA Registration #74234-1).
- Is Health Canada approved for use on ready-to-eat meat and poultry, smoked salmon, fresh-cut apples, and long leaf lettuce (iLONO).
- Is National Food Service of Israel approved as a food processing aid for the treatment of ready-to-eat meat and poultry products (Ref: 70275202).
- Is certified both Kosher and Halal.
- Is OMRI listed (“organic”).

- Does not contain preservatives.
- Is cost effective and cost competitive.
- Is effective under a wide range of food storage conditions (e.g. 2°C – 42°C).
- Is all natural and not genetically modified (non-GM).
- Does not alter food flavor, aroma, or nutritional value.

Product Information

ListShield™ is a unique and proprietary blend of six individual lytic phages that provides broad protection against *Listeria monocytogenes*. **ListShield™** is a clear-to-opalescent, odorless liquid with a pH of 6.5 - 7.5.

ListShield™ significantly reduces or eliminates contamination levels of its targeted, susceptible *L. monocytogenes* strains in various foods.

ListShield™ is an all-natural product. It does not alter the general composition, taste, aroma, or color of foods.

ListShield™ is non-corrosive to processing equipment. It requires low or no upfront investment in machinery and is cost-competitive when compared to alternative technologies.

A Material Safety Data Sheet for **ListShield™** is available at www.intralytix.com and can also be requested directly from Intralytix.

ListShield™ won the 2006 Popular Science “Best of What’s New” award in the Health category.

ListShield™ won the 2010 Frost & Sullivan North American Technology “Innovation of the Year” award for its phage-based disinfection technology.



Application

ListShield™ is marketed as a concentrated, aqueous, phage preparation that must be stored refrigerated (2-8°C) and then diluted with clean water prior to application. The packaging is labeled with clear instructions for use; bilingual instructions (e.g., English and Spanish) are available upon request. Usage instructions are laminated and can be easily displayed in the food-processing environment (e.g., attached to the walls in the food processing plant).

An industrial sprayer may be required for large direct food applications. In cases of smaller bench-scale food applications, a handheld sprayer may be appropriate.

- For direct food applications, the diluted working solution is typically applied directly on food surfaces by spraying at a concentration of approximately 1 - 2 mL per 250 sq. cm. of food product surface.
- For foods with complex surfaces, application rate is usually 1 - 4 mL of the diluted working solution per lb of food. Contact Intralytix for suggestions regarding the application rate for your foods.
- For environmental applications, the diluted working solution is typically applied onto the surfaces by spraying, or with a cloth, mop, or sponge, so that the targeted surface is thoroughly covered. About 50 mL of the diluted working solution will treat approximately 4 ft² of surface.

Intralytix works closely with all customers to identify the optimal intervention spots and treatment regimens for each individual customer/ production facility and provides an ongoing assistance with product use and applications.

Storage

ListShield™ should be stored refrigerated (at 2-8°C) in the original unopened container. Once opened, the contents should be used within two weeks. The expiration date of **ListShield™** may be sequentially extended in 6 months intervals, if its potency is found to meet the specifications at the end of the expiration date. Intralytix can assist with potency determination if required.

All packaging is recyclable and is specifically designed to withstand the moderately humid and cold environment recommended for storage.