

Broad. Range. Immune. Support.

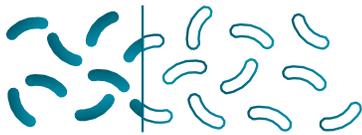
Ingredient Overview

Patented | GRAS | Vegetarian | Allergen-free | Non-GMO | Heat-stable

IMMUSE[®]
(LC-Plasma)

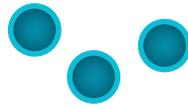
IMMUSE® Science Snapshot

What are Paraprobiotics?



Paraprobiotics like IMMUSE® (*Lactococcus lactis* JCM 5805) are defined as dead bacteria or dead probiotics with health benefits.*

What are Plasmacytoid Dendritic Cells (pDC)?



pDCs are a rare subset of immune cells that have been described as the commander-in-chief or leader of the immune system.*

IMMUSE®: Novel Immune Support

25+ Studies
11 Human Trials

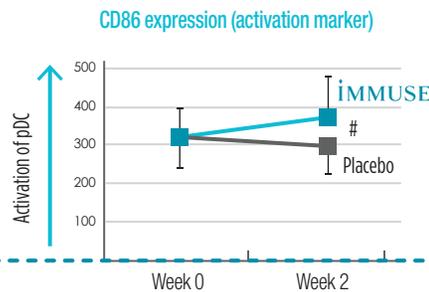
Researched by Kirin and backed by more than 25 studies, including 11 human trials, IMMUSE is the first paraprobiotic to directly activate plasmacytoid dendritic cells, consequentially providing comprehensive immune support.*

Key IMMUSE® Studies

IMMUSE activates pDC*¹

Researchers studied the effects of IMMUSE and its ability to increase pDC activation markers in fifty-one healthy subjects in a gold-standard trial.

■ IMMUSE® ■ PLACEBO

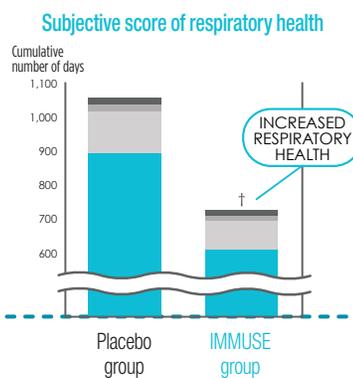


IMMUSE significantly increased CD86, a key activation marker of pDC, in the group who ingested IMMUSE.*

IMMUSE supports respiratory health*²

Researchers carried out a randomized, double-blind study on 213 healthy subjects during the winter season.

■ Severe ■ Moderate ■ Mild ■ Slight

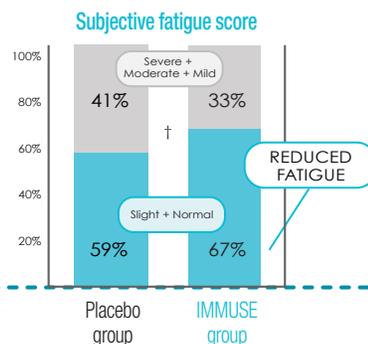


Measured over a 10-week period, individuals who consumed yogurts formulated with IMMUSE, increased respiratory health.*

Supports exercise performance by activating the immune system*¹

Researchers carried out a randomized, double-blind study on fifty-one male athletes part of a university sports club. (Accumulated subjective symptoms of physical condition and fatigue after exercise.)

† Statistically significant ($p < 0.05$)



Individuals who consumed IMMUSE increased their respiratory health, followed by reduced fatigue level.*

Unlock the key to comprehensive immune support with IMMUSE®*

1. Komano Y, et al., Efficacy of heat-killed *Lactococcus lactis* JCM 5805 on immunity and fatigue during consecutive high intensity exercise in male athletes: A randomized, placebo-controlled, double-blinded trial. *J Int Soc Sports Nutr.* 2018;15(1):39.
2. Sugimura T, et al., Effects of oral intake of plasmacytoid dendritic cells-stimulative lactic acid bacterial strain on pathogenesis of influenza-like illness and immunological response to influenza virus. *British Journal of Nutrition.* 2015;114(5):727-733.

*This information is only intended for business-to-business use. It must not be passed to the final consumer of your products. The information contained herein is based on our current knowledge and contains scientific, quality and technical information to help our trade customers understand more about our ingredients and the science behind them. The statements have not been approved by the European Food Safety Authority or the European Commission. It is your responsibility to comply with all relevant EU and national laws when issuing commercial communications about your finished products.

IMMUSE® Scientific Advantages

Over the last several years **immune support** has become one of the top three reasons why consumers purchase supplements. Furthermore, according to a recent consumer survey, 60% of consumers worldwide are conscious about their immunity. *Nutrition Business Journal* predicts the immune health supplements market to reach \$5.2B in supplement sales, a 51.2% growth from 2019. With this increase in demand, consumers are looking to innovative ingredients and functional foods and beverages to keep their immune system in balance.

60% of consumers worldwide

Are conscious about their immunity

\$5.2 Billion

Immune Health Dietary Supplement Market

51.2% Growth

IMMUSE®, a novel paraprobiotic strain, *Lactococcus lactis* strain Plasma (LC-Plasma), discovered by KIRIN has been shown to:

1. Provide clinically researched immune support*
2. Activate the immune system via pDC (plasmacytoid dendritic cells)*
3. Proactively support the immune system*
4. Stimulate the body's natural defenses*

What is IMMUSE®?

IMMUSE is the first lactic acid bacteria that has been clinically researched to directly activate pDC, a rare subset of immune cells, to provide comprehensive innate and adaptive immune support.* IMMUSE is supported by more than 25 studies including 11 human clinical trials. IMMUSE is also self-affirmed GRAS and applicable to wide variety of applications including tablets, capsules, RTD beverages and foods.



What is a Paraprobiotic?

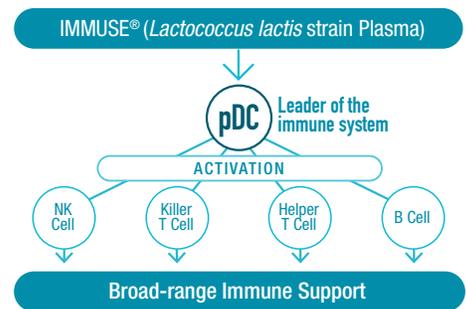
Paraprobiotics are inactivated (non-viable) probiotics with health benefits similar to those provided by live probiotics. Paraprobiotics also provide the added advantage that they have a longer shelf-life and play a vital role in improving immune health by supporting immune-modulation.* IMMUSE, a patented paraprobiotic, is a heat-killed *Lactococcus lactis* strain Plasma (LC-Plasma) that has been shown to provide novel immune support.*

Bridging the Gap

The immune system is a complex structure that resides throughout our body. It contains many immune cell types, such as NK cells, T cells, B cells, Dendritic cells, Macrophages, and others that keeps your immune system functioning. Many of these cells are divided into two areas, innate and adaptive. The innate immune system provides the body, the first-line of defense against foreign substances. The adaptive immune system is more specialized and creates "muscle memory" to make the immune system quicker and more resilient the next time it comes in contact with a pathogen.

Unlike most immune cells, pDC straddle between innate and adaptive immune systems, playing a pivotal role within the immune system.* pDC have been described as leader of the immune system or

commander-in-chief, since they activate key immune cells and provide more comprehensive immune support.*



Pioneering Fermentation

Kirin has widely been recognized as a fermentation leader for over 130-years. As part of the Kirin group, here at Kyowa HAKKO, we're committed to improving lives through health science. In partnership with Kirin and Koiwai Dairy, a leading manufacturer of dairy products, we discovered the power of lactic acid bacteria for proactively managing immune health.*

Why IMMUSE?

A strong immune system is critical for good health. Add IMMUSE, a novel paraprobiotic, to your next immune health formula and get your customer's immune system on the offense.*

- Activates pDC, leader of the immune system*
- Backed by more than 25 studies
- Provides year-round immune support*

We're ready to fulfill your order at our JFS-C certified facility.

For GRAS, non-GMO, allergen-free, heat-killed powder, visit IMMUSEhealth.com

IMMUSE® Marketing Advantages



Superior Formulation Benefits

Manufacturers and formulators will love the more practical benefits of IMMUSE®.

- **Paraprobiotic.** IMMUSE is a paraprobiotic, so no need to worry about the survivability of bacteria like you do with probiotics.
- **Heat-stable.** IMMUSE is heat-killed probiotic that is shelf-stable and heat resistant, which means no refrigeration is needed.
- **Can be formulated in foods and beverages.** IMMUSE is self-affirmed GRAS and its efficacy has been proven in various foods and beverages over the last 10+ years.
- **Pure.** IMMUSE is a pure heat-killed powder that doesn't contain any food additives, artificial colors, artificial flavor or preservatives.
- **Vegetarian.** No animal origin material is used in IMMUSE.
- **Allergen-free.** IMMUSE doesn't contain any preservatives, artificial flavor or colors, wheat, grains, nuts, eggs, dairy, seafood, and animal derivatives.

- **Fermentation.** IMMUSE is produced using an innovative fermentation process.
- **Patented.** Kirin owns the global patent (US09549956) on IMMUSE.
- **Non-GMO.**

IMMUSE® Product Applications

IMMUSE is a unique health ingredient that can be incorporated into a wide range of finished products designed to support immunity, productivity and overall performance:

- Dietary supplements
- Cereals
- Protein bars
- Yogurts
- RTD beverages

IMMUSE is Backed by Kyowa Hakko

Kyowa Hakko is an international health ingredient manufacturer and a world leader in the development, manufacturing and marketing of nutraceuticals, pharmaceuticals and food

products. As a part of Kyowa's dedication to ongoing scientific research, quality management and consumer education, IMMUSE leads the way in immune health research.



Broad-Range Immune Support

IMMUSE activates pDC (plasmacytoid dendritic cells) which are crucial to stimulating your body's natural defenses.*



Sports Nutrition Support

IMMUSE proactively supports the immune system for exercise.*



Productivity Support

IMMUSE's immune-supporting properties may also promote productivity at work.*

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IMMUSE®

Generate breakthrough sales with IMMUSE, an ingredient designed to provide comprehensive immune support.*

For more information on IMMUSE, visit IMMUSEhealth.com.



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