

***Lactococcus lactis* strain Plasma Stars in New Products**

Kirin discovers lactic acid bacterium that activates "commander in chief" of immune system

An aging population and increased interest in wellness are driving demand for health-supporting foods that fit people's lifestyles. In response, we have formed a group-wide joint research team to leverage our experience and expertise in biotechnology and fermentation. Based on its scientific studies, this joint R&D team applies its findings to the development of food products for healthy living.

Lactococcus lactis strain Plasma was discovered by our joint team in 2011. This is the only lactic acid bacterium that has

been confirmed to directly activate Plasmacytoid dendritic cells (pDCs) — which together act as the "commander in chief" of the immune system. The team's findings on the unique activity of *Lactococcus lactis* strain Plasma have been met with critical acclaim following presentations at medical conferences and publication in respected journals.



IP Health-supporting food products based on scientific research
DEVELOPMENT





Targeting healthcare professionals

Kirin Group companies are applying the fruits of this research to their businesses. Koiwai, Kirin Beverages, and Kyowa Hakko Bio have rolled out products incorporating *Lactococcus lactis* strain Plasma in the yoghurt (probiotic drink), soft drink, and dietary supplement categories, respectively. In 2017 we unified the branding of our own *Lactococcus lactis* strain Plasma formulated products and partnered with external companies to grow this market.

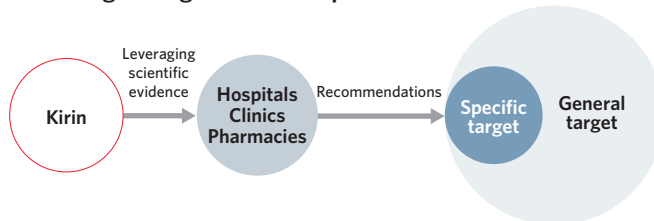
In addition, we have developed products specifically to be marketed through healthcare professionals, including doctors, pharmacists, nurses and nutritionists. The first such product, launched in December 2017, is a chewable supplement that can be taken without water.

Academic journals, worldwide, have published 13 of our research team's papers about *Lactococcus lactis* strain Plasma functionality. These articles have been cited frequently by other researchers in their own research papers.

Meanwhile, we are educating the public about *Lactococcus lactis* strain Plasma. Based on expert opinion and the scientifically verified efficacy of *Lactococcus lactis* strain Plasma, we have also begun promoting it through specialists advising those with elevated health concerns — such as the elderly and

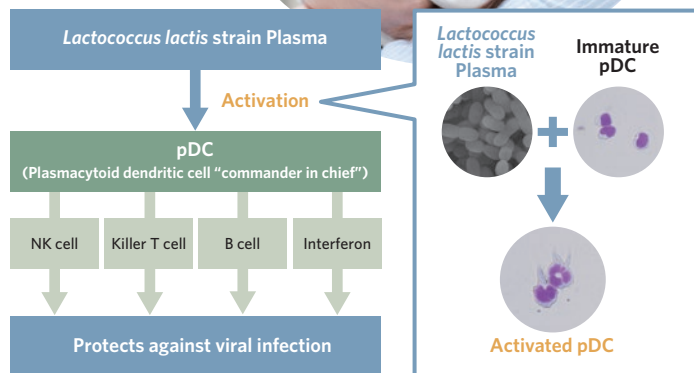
parents of small children. As we raise awareness of *Lactococcus lactis* strain Plasma among the general population and bolster our unified marketing efforts, the Kirin Group is helping to meet the health challenges that today's society faces.

Working through healthcare professionals



Plasmacytoid dendritic cells (pDCs) are directly activated by *Lactococcus lactis* strain Plasma

Various types of immune cells work together to protect against viral infection. But conventional lactic acid bacteria can stimulate only a few of these, such as NK cells. In contrast, *Lactococcus lactis* strain Plasma directly activates pDCs, which act together in the role of "commander in chief" of the immune system. This greatly increases the anti-viral potential of the peripheral immune function.



Further information is available in "The *Lactococcus lactis* strain Plasma anti-viral defense mechanism."