

September 25, 2020

Kirin Holdings Company, Limited

DeNA Co.

Kirin and DeNA Conduct First-ever Genetic Joint Study on the Relationship between Ocular Symptoms and Immune Response in Japanese subjects

- Research recognized at Human Genome Meeting and Japanese Society of Anti-Aging Medicine
- Relationship between ocular health and immune system response further supported
- Results support the benefits of Kirin's *"iMUSE eye Lactobacillus paracasei strain KW"*

TOKYO, September 25, 2020 - Kirin Holdings Company, Limited (Kirin) and DeNA Life Science Inc. (DeNA Life Science), a subsidiary of DeNA Co., Ltd. (DeNA), announced that a joint genetic-approach research has been conducted regarding the immune system and ocular benefits. It is the first of its kind in Japanese subjects. The research comprehensively investigates the association between immune-related genes and ocular symptoms in Japanese subjects, as well as a genome-wide association analysis (GWAS) to comprehensively search for genetic factors associated with these symptoms.

The results of this research were presented at the Human Genome Meeting 2020 held in April 2020 and the 20th Annual Meeting of the Japanese Society of Anti-Aging Medicine held on September 25 of the same year. The results further support the effects of ocular health benefits from **inside the body** as opposed to outside it via the immune system.

● **Research Objective**

Recently, the involvement of inflammation in age-related ocular diseases such as age-related macular degeneration has been reported, and it has been suggested that immune responses that control inflammation may affect ocular health. Therefore, we conducted this study to explore the relationship between age-related ocular symptoms and immune responses. While some methods such as eye drops and lutein intake are expected to have a mitigating or preventive effect on ocular disorders, a survey* on health concerns showed that eyes and eyesight was still recognized as the most important of all health issues, suggesting a fundamental solution was desired. On the other hand, recent scientific studies have suggested that the human immune system, which is involved in maintaining health in various parts of the body, is also involved in the eye health. In this study, we investigated the relationship between ocular symptoms and immune responses in Japanese people using genetic studies and explored the evidence for this.

*Web-based survey of 10,000 people (Kirin survey)

● Research Methods

A total of 1,998 Japanese people registered with MYCODE, a direct-to-consumer genetic testing service provided by DeNA Life Science, participated in the study with their consent. Participants were asked to complete a questionnaire survey on eye strain, dry eye and presbyopia. We also analyzed the association of three genes (IL1 β , IL10, and NLRP3) in the participants' genetic information of approximately 750,000 SNPs (single nucleotide polymorphism) with the body's immune response, particularly towards inflammation.

● Research results

This study suggests that there may be an association between symptoms of eye strain and presbyopia and immune responses related to inflammation. Further studies, including clinical studies based on the results of this study, are expected to elucidate the mechanisms underlying between immune responses and eye health, including the relationship between these ocular symptoms and ocular diseases*¹.

*1: The approximately 3 billion base pairs in human beings differ between races and individuals, and when only one base is replaced by another, it is called an SNP.

● Research Summary at the Human Genome Meeting 2020

Title: Research on Eye and Immunity in Japanese

Announcement date: April 5 to April 8, 2020

Location: Web-based

Presenters: Keito Yoshimura and Keisuke Kobayashi

Website: <http://hugo-hgm2020.org>

● Research Summary at the 20th Annual Meeting of the Japanese Society of Anti-Aging Medicine

Title: Research on Age-related Eye Disease and Immunity in Japanese

Announcement date: September 25 to September 27, 2020

Location: Web-based

Presenter: Yuji Morita

Website: <https://www.c-linkage.co.jp/jaam2020/>

● Kirin's Initiatives

The Kirin Group Vision 2027 sets out the broad goal of creating value across the world of food & beverages to pharmaceuticals and becoming a global leader in CSV*². To augment the Group's existing Food & Beverages Domain and Pharmaceuticals Domain, the Kirin Group has launched a new Health Science domain to help people stay fit and healthy by leveraging advanced fermentation and biotechnology the Group has amassed over the years. The Kirin Group has been researching immunity for 35 years and has made it a pillar of its business

*2: Creating Shared Value. Creating shared value that can be shared with customers and society.

One example of leveraging the Group's 35 years of research is in the discovery and usage of *Lactobacillus paracasei* KW3110. The Kirin Groups' proprietary *Lactobacillus paracasei* strain KW (*L. paracasei*

KW3110) activate the immune cells, and macrophages, which in turn work to mitigate eye fatigue. *iMUSE eye Lactobacillus paracasei* strain KW was launched in November 2019.

Outline

- Product name: "*iMUSE eye Lactobacillus paracasei* strain KW"
- Release date: Thursday, November 14, 2019
- Quantity (1 package): 13.2g (0.22g x 60 capsules)
- Price: 3,311 yen per bag (tax included)
- Distributed by: Kyowa Hakko Bio Co.
- Functional ingredients and content (per 2 capsules 0.44g)
Lactobacillus paracasei strain KW (*L. paracasei* KW3110) 50 mg (50 billion)



-Indication (Report No. E170)
This product contains *Lactobacillus paracasei* strain KW (*L. paracasei* KW3110).
(KW3110) has been reported to reduce eye fatigue in people who are experiencing eye fatigue.
*This product has been reported to the Commissioner of the Consumer Affairs Agency as a product that indicates that a specific health purpose can be expected on the responsibility of the business. However, unlike food for specified health uses, this product has not been individually reviewed by the Commissioner of the Consumer Affairs Agency.
This product is not intended to diagnose, treat or prevent disease. The diet is based on staples, staples, and side dishes, with a balanced diet.

[DeNA's Initiatives in Healthcare]

DeNA provides a variety of health care services and joint research projects with the aim of achieving better health and longevity for all people using health big data. Since 2015, DeNA has engaged in the MYCODE Research project, which promotes community-derived science by building a community where members who have received the MYCODE direct-to-consumer genetic testing service can consent to participate in research and contribute to scientific development.

<https://healthcare.dena.com/projects/researches>

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