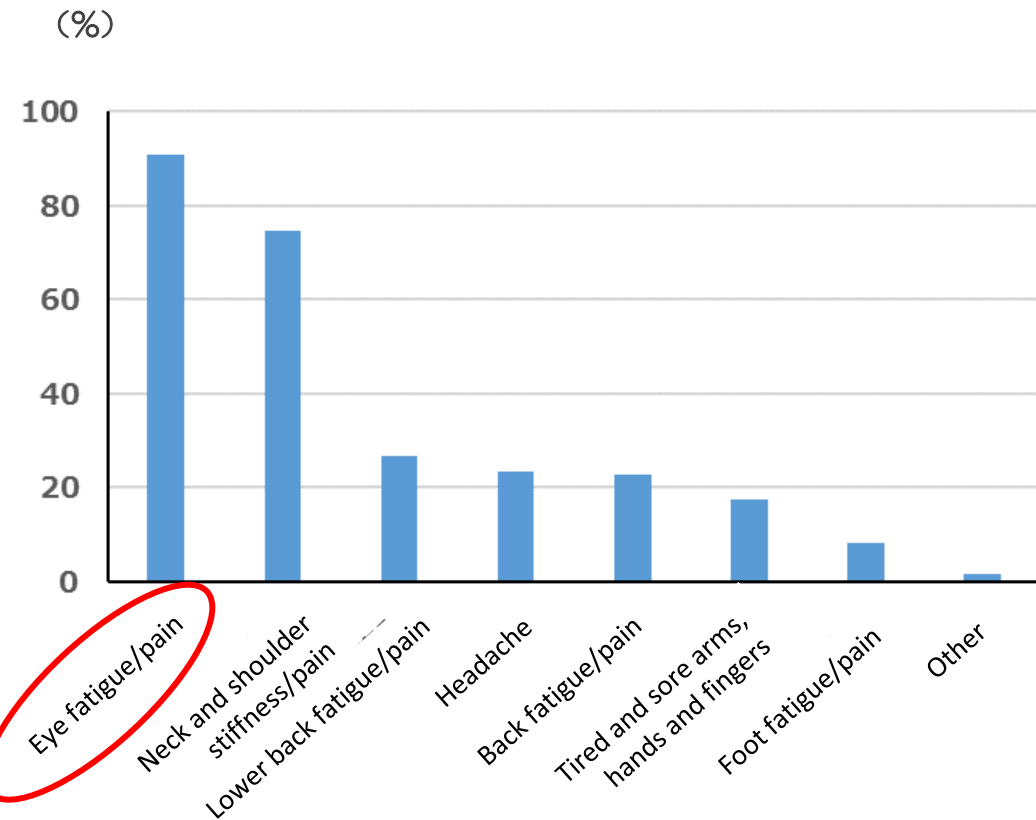


Background of this technology

As our society ages and digitalization advances, eye fatigue is becoming an issue

Physical fatigue and symptoms felt due to digital work

Source: Survey on Technological Innovation and Labour 2008 (Ministry of Health, Labour and Welfare)



PC work



Online lessons



Aging



Smartphones

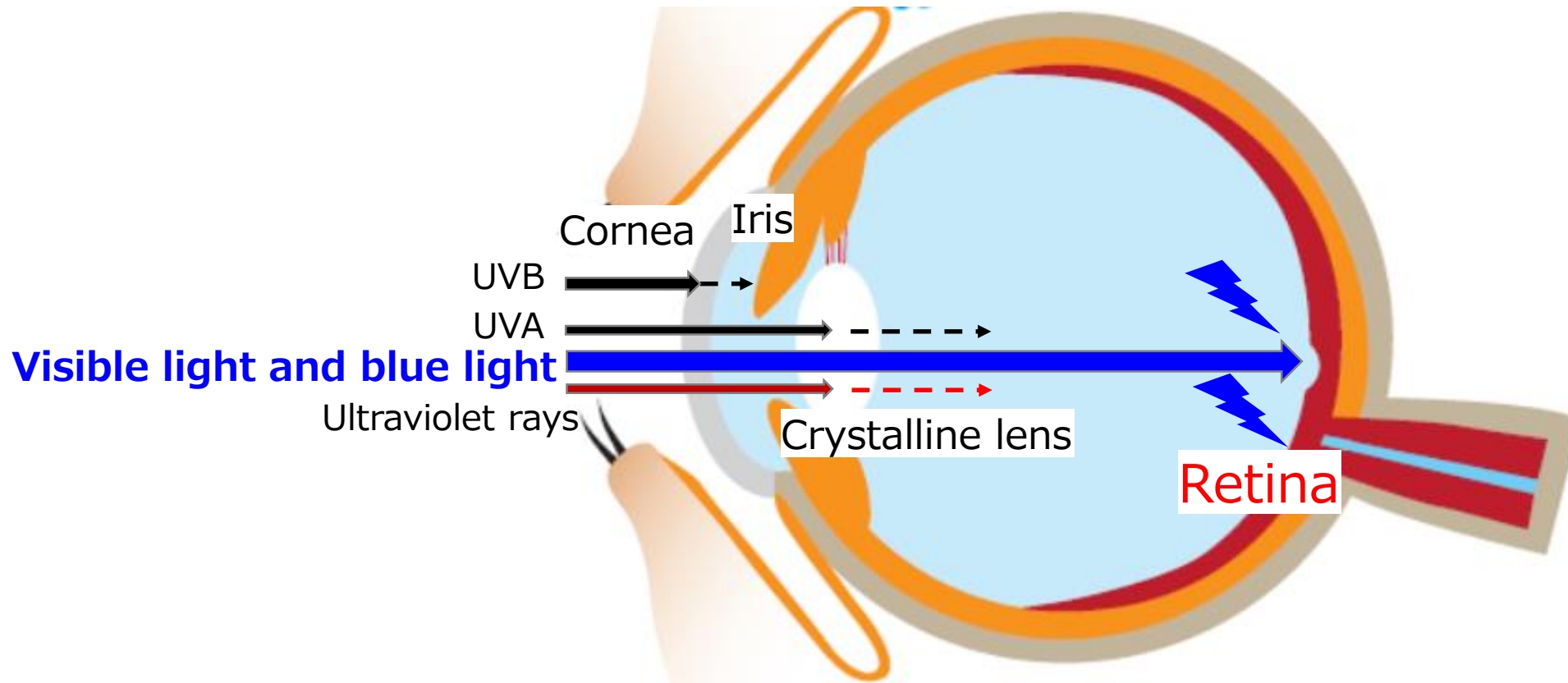


VR goggles

About eye fatigue

Visible light and blue light can cause inflammation of the retina

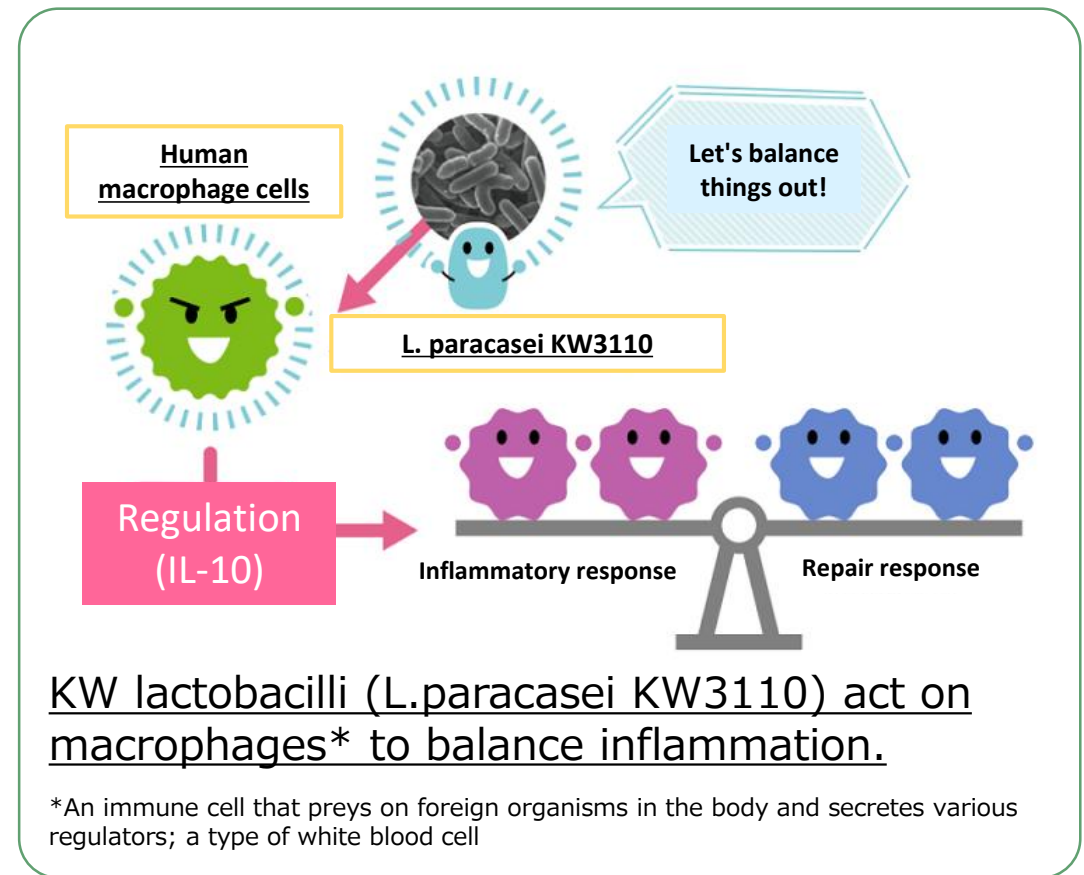
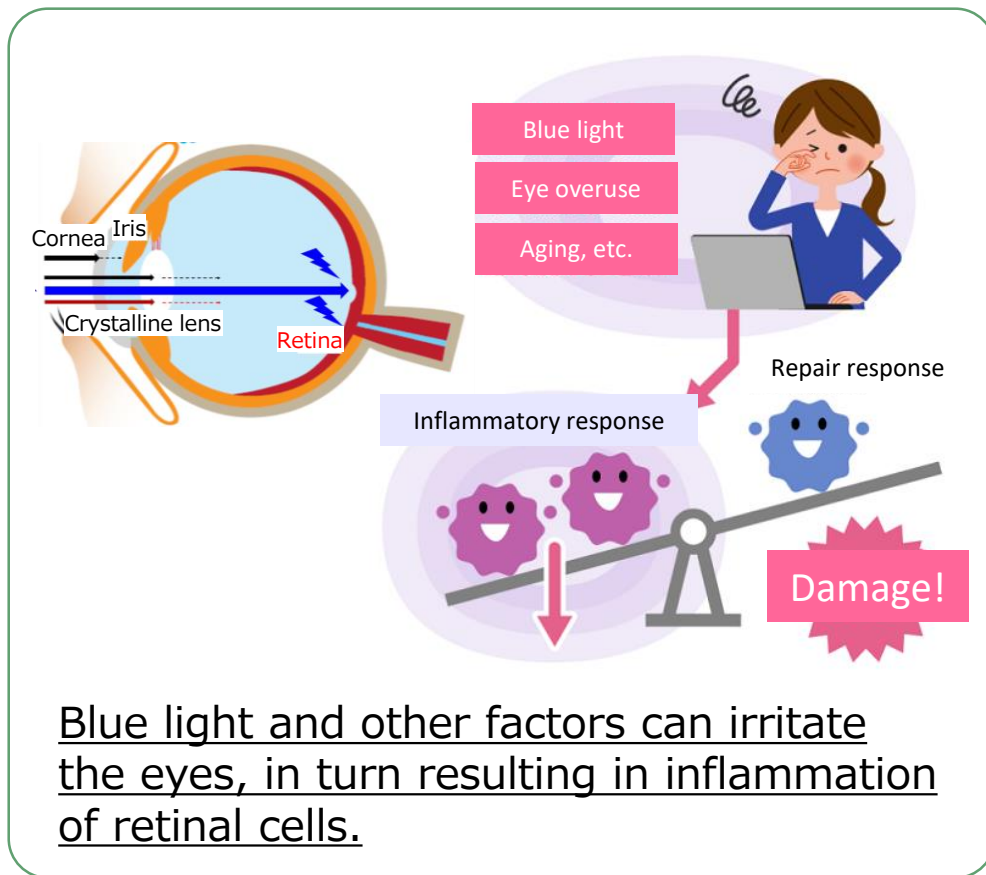
→ Visible light and blue light reach the retina at the back of the eye. Excessive exposure to these lights damages the retina and triggers an inflammatory response.



About this technology

KW lactobacilli balance repair and inflammation

Inflammation of retinal cells causes eye fatigue.
KW lactobacilli shift the balance toward repair.

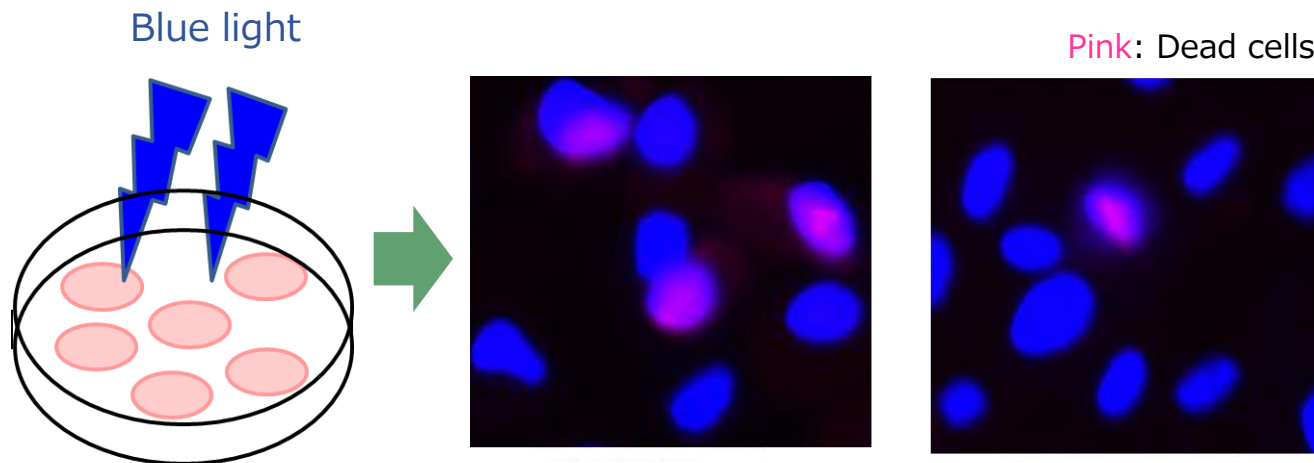


About this technology

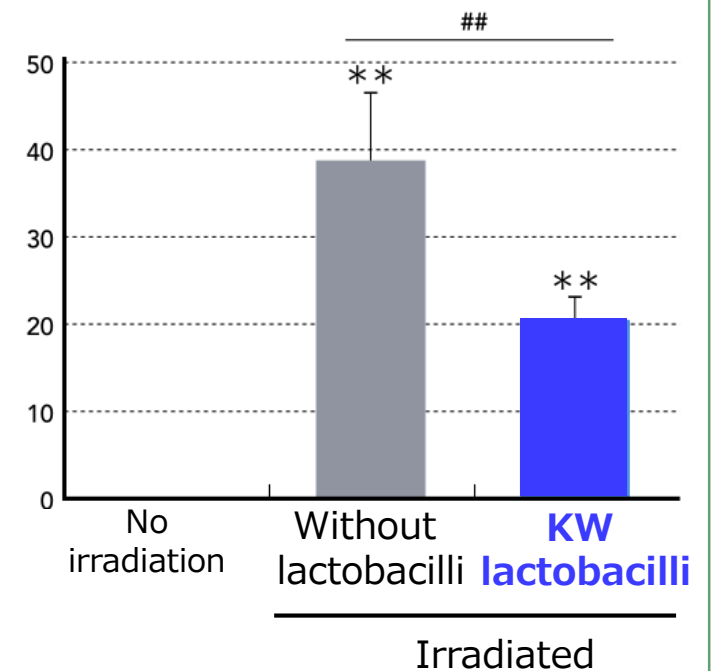
KW lactobacilli reduce damage caused to the retina by blue light and aging

Macrophage cell supernatant stimulated with KW lactobacilli was added to human retinal cell lines. These were then irradiated with blue light, and cell death rates were evaluated.

Human retinal cells No lactobacilli KW lactobacilli



Cell death rate after blue light irradiation



Cell death rate suppressed !

About this technology

Ingestion of KW lactobacilli improves eye fatigue after digital tasks

25 people suffering from eye fatigue were asked to take capsules that contained or did not contain KW lactobacilli every day for eight weeks, and to perform digital tasks. Eye fatigue after work was compared by using flicker values* as an indicator.

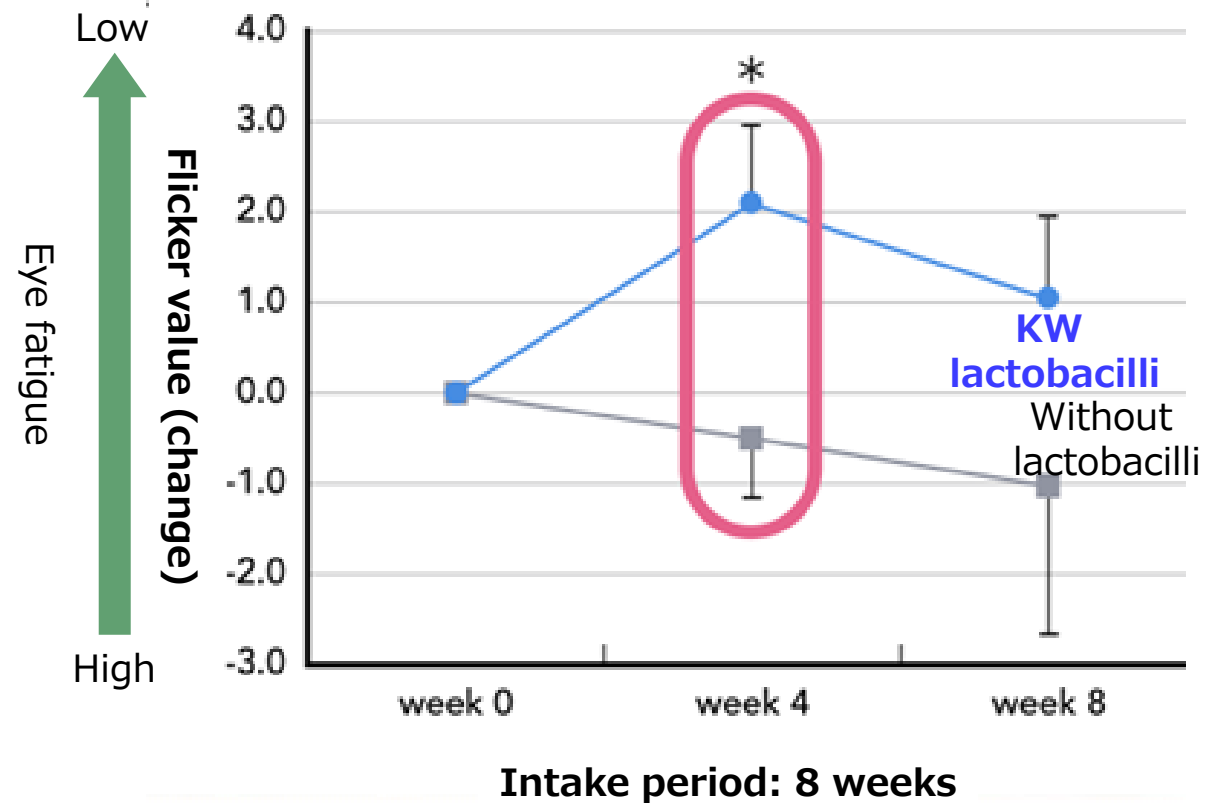
*Limit speed at which progressively faster flashing of light remains perceptible. Fatigue is known to reduce perceptibility.



Flicker measuring instrument ▶

Eye fatigue after digital task

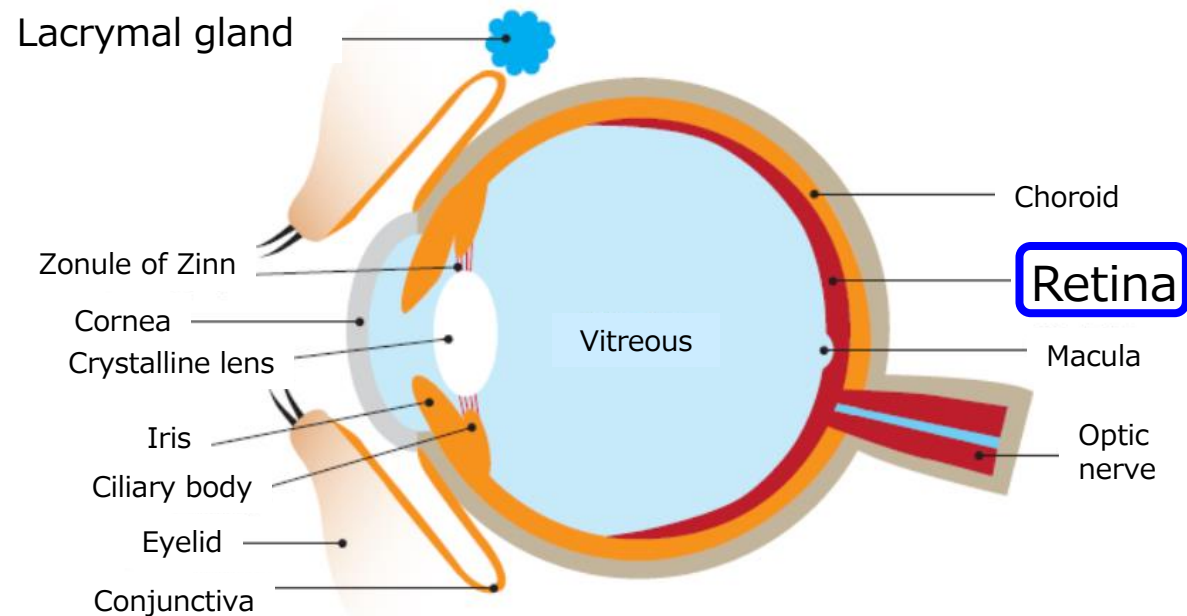
Source : *Nutrients*, 2018



Uniqueness and advantages of this technique

Plasma lactobacillus is the only lactobacillus that has been shown to have a positive effect on the eyes

→ Unlike conventional approaches, KW lactobacilli are distinguished by their ability to provide support from the inside through their effect on immunity. Only KW lactobacilli have been found to have a positive effect on the eyes



Eye drops → External care → Cornea

Blueberry Lutein → Pigment supplement → Macula Retina

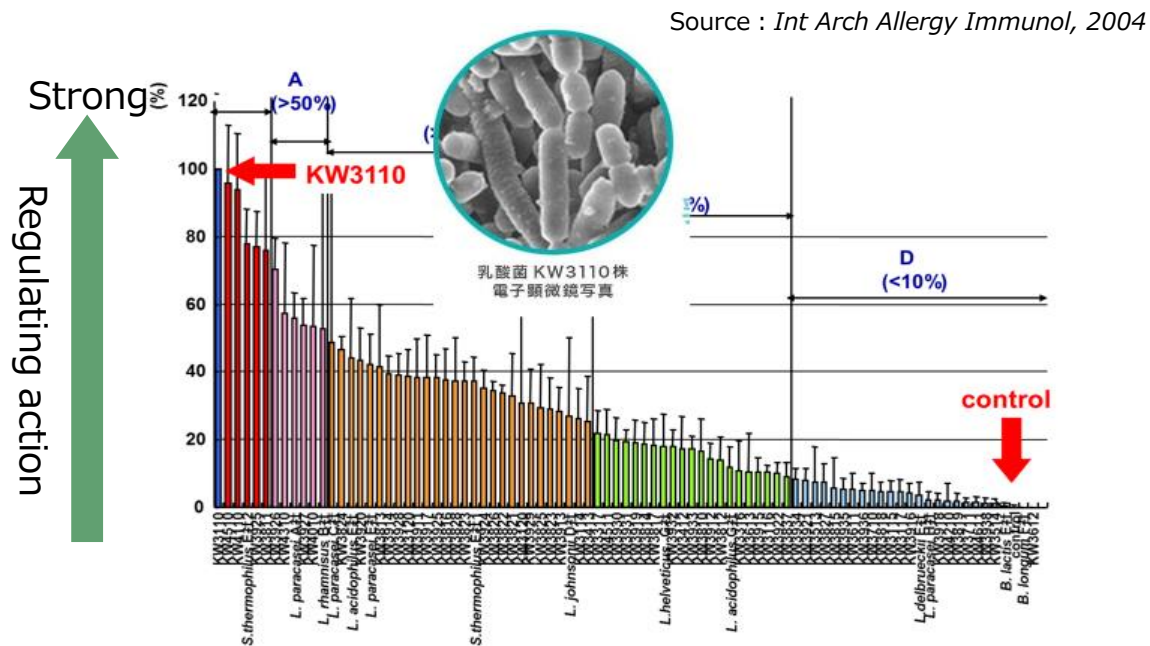
KW lactobacilli → Internal care → Retina

Background of this technology (base technology and its history)

Results of KW lactobacilli research

→ KW lactobacilli were identified in 2000 in the course of research in the field of immunity, which is one of the Kirin Group's strengths. We have since continued our research on allergy symptoms, and have discovered a novel effect on eye fatigue. Research is continuing in greater depth.

Amount of IL-12 secreted when various lactic acid bacteria are added to immune cells



Out of a large number of lactobacilli, KW lactobacilli were found to exhibit the strongest regulating action on the immune imbalance that causes allergies

Benefit for allergic conditions



New function

Benefit for eye fatigue

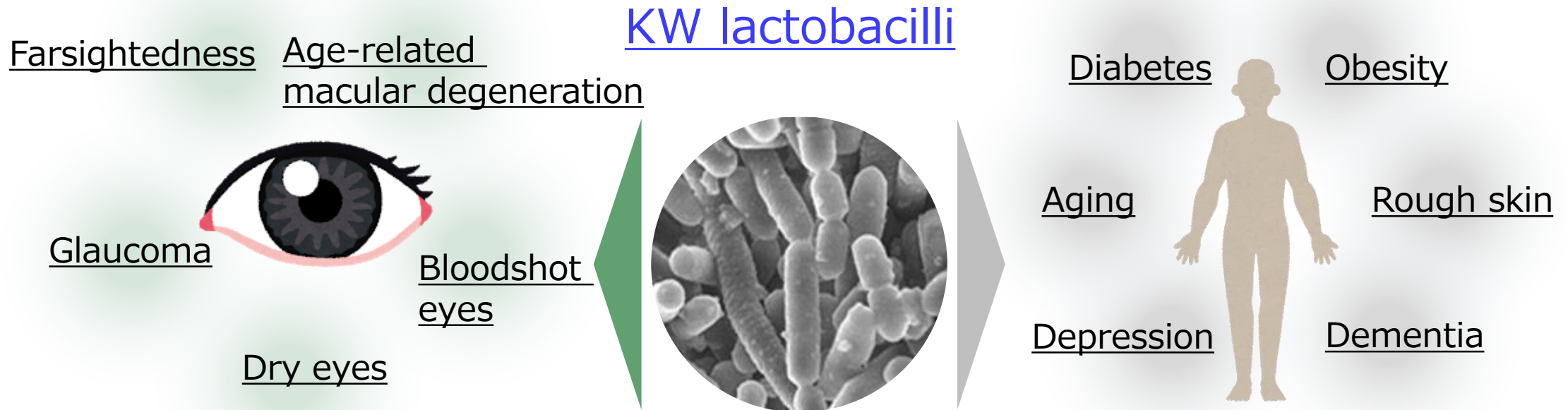


Future potential

Potential future applications of KW lactobacilli

■ There are many more symptoms involving the eyes in addition to fatigue

■ Inflammation can trigger various health conditions



Looking forward, we hope to expand the range of disorders that can be relieved with KW lactobacilli by leveraging their characteristics — namely, the ability to provide care for the retina from the inside and reduce inflammation