Diet supplemented with specific probiotic bacterial strain increases mice lifespan

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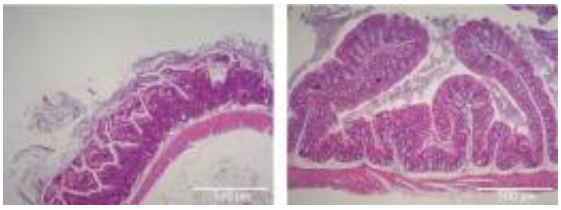

Figure 1: Compared with untreated aging mice (left), LKM512 maintains a healthy gut lining in treated aging mice (right) (scale bar, 500 μm). Credit: Reproduced from Ref. 1 © 2011 Mitsuharu Matsumoto et al.

The mammalian gut is home to hundreds of bacterial species that contribute to food digestion and, in some cases, inflammatory gut diseases. Probiotics, beneficial bacterial species, can enhance gut health by keeping the resident bacteria in check. Now, a team of researchers at the RIKEN Innovation Center in Wako, including Mitsuharu Matsumoto, report that administration of the probiotic bacterial strain Bifidobacterium animalis subspecies lactis LKM512 to mice can lengthen their lifespan.

Matsumoto and colleagues previously showed that LKM512 could reduce inflammatory markers in elderly humans and modify the makeup of intestinal bacteria, but the effects of it on lifespan still required investigation. After starting 10-month-old mice on a diet including LKM512 for 11 months, the researchers found that LKM512-treated

mice lived longer, had fewer skin lesions, and had better hair quality than untreated mice.

Analyses of the gut of these mice revealed elevated gene expression in some bacterial species compared with control mice, indicating that LKM512 may improve gut health indirectly by regulating the levels of other bacterial species. The LKM512 treatment also prevented some age-related changes in bacterial composition of the gut, suggesting that the probiotic treatment protects the gut from developing characteristics associated with aging.

Acting as a barrier between the bacteria and food within the gut and the rest of the human body is an important role of the gut lining. Breakdown of this lining can cause infectious or inflammatory diseases. The researchers found that the gut of LKM512-treated mice served as a stronger barrier than the gut of control mice. LKM512 seemed to perform this function by increasing the expression of various proteins that maintain the tight connection between gut epithelial cells.

Polyamines are chemicals that reduce inflammation, and their levels decrease as an individual ages. Matsumoto and colleagues observed increases in intestinal polyamine levels in LKM512-treated mice, which may be caused by the greater numbers of bacteria promoted by LKM512. The increase in polyamines caused by LKM512 appeared to reduce inflammation in the body of the mice, as inflammatory markers in the blood and urine were lower in LKM512-treated mice compared with controls. In aged mice treated with LKM512, inflammatory marker levels were similar to those observed in younger mice, indicating that adults can benefit from probiotics.

“In future work, we hope to clarify the effectiveness of LKM512 in humans,” explains Matsumoto. If the findings extend to humans, inclusion of LKM512 into the human diet could enhance overall health

and increase the human lifespan.

More information: Matsumoto, M., et al. Longevity in mice is promoted by probiotic-induced suppression of colonic senescence dependent on upregulation of gut bacterial polyamine production. PLoS ONE 6, e23652 (2011).

Matsumoto, M., Ohishi, H. & Benno, Y. Impact of LKM512 yogurt on improvement of intestinal environment of the elderly. FEMS Immunology & Medical Microbiology 31, 181–186 (2001).

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