

The taste or smell of foods can affect aging, say scientists

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Lee and Artan's research was featured as the cover title of *Genes & Development*. Inhibition of sensory neurons in *C. elegans* increases life span by decreasing the level of an insulin-like peptide, INS-6, and subsequently activating the FOXO transcription factor. Shown here is a fluorescence analysis of transgenic worms deficient in the sensory transduction gene *tax-4* that are expressing either red fluorescent protein (RFP) or green fluorescent protein (GFP) fused to promoters of the FOXO targets *dod-11* or *sod-3*, respectively. Inhibition of sensory neural function by *tax-4* mutation increases *dod-11* and *sod-3* expression in the nonneuronal as well as neuronal tissues. Credit: Genes & Development (CSH Press)

Animals can perceive changes in many environmental factors such as temperature and the taste or smell of foods. This is achieved by specialized nerve cells called sensory neurons. Interestingly, sensory neurons have been known to control the rate of aging in various animals, including the tiny free living roundworm *C. elegans*.

The impairment of sensory neurons has been known to delay aging by switching on the action of a well-known anti-aging protein called FOXO. FOXO then turns on the gene's encoding proteins that protect cells and repair damages in various body parts. However, how sensory neurons influence the activity of the anti-aging FOXO proteins in an entire animal has remained a mystery.

Prof. Seung-Jae Lee and PhD candidate Murat Artan at Pohang University of Science and Technology (POSTECH), Korea, hypothesized that the smell or taste of food acts on sensory neurons, which may produce a type of aging hormone. This aging hormone may be delivered to various body parts and may affect the action of FOXO proteins. The team discovered that the smell or taste of food can directly shorten lifespan by affecting sensory neurons that produce insulin-6, an insulin hormone-like factor. They also showed that insulin-6 from sensory neurons alters the action of FOXO in various tissues. Their findings were published in *Genes & Development* as the cover article.

They then attempted to turn on the function of only a pair of food-sensing sensory neurons by a blue light, a technique called optogenetics, to mimic the taste of food. Prof. Lee and Mr. Murat discovered that blue light itself can decrease the lifespan of animals through producing insulin-6 hormone that leads to the reduction of FOXO action without food taste or smell.

It has been shown that perception of food increases the level of blood insulin hormone levels in humans. In addition, many biological processes

related to aging are similar in *C. elegans* and mammals which include humans. Therefore, the team concluded that it is unsurprising to find that food smell or taste play similar roles in the aging of mammals via [sensory neurons](#) and hormones like [insulin](#).

Provided by Pohang University of Science & Technology (POSTECH)

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