Eat right, live longer: Could a moderate protein diet be the coveted elixir of youth?

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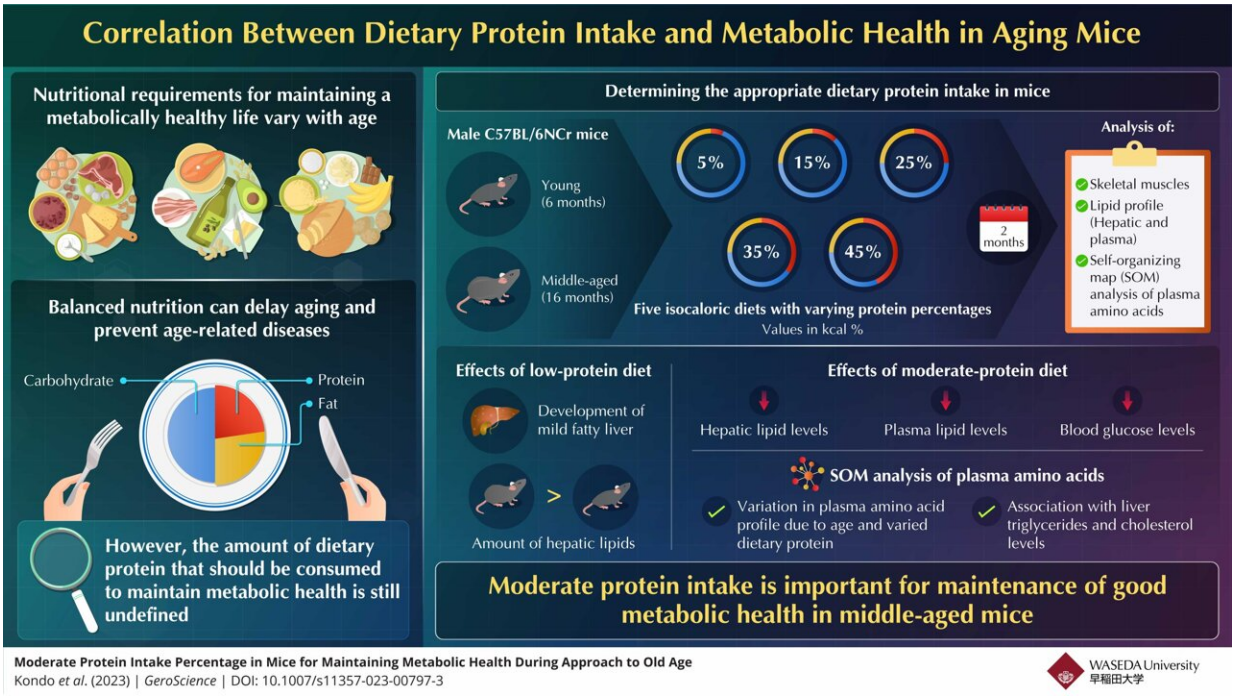

In a new study by Waseda University researchers, young and middle-aged mice were fed isocaloric diets with varying amounts of protein. Mice consuming moderate amounts of dietary proteins (25% and 35%) exhibited lower blood glucose, and hepatic and plasma lipid levels. Credit: Yoshitaka Kondo from Waseda University

As the proverb "You are what you eat" goes, the type of food we consume influences our health and longevity all through our lives. In

fact, there is a direct association between age-related nutritional requirements and metabolic health. Optimal nutrition according to age can help maintain metabolic health, thereby improving the health span (period of life without diseases) and lifespan of an individual.

Different nutritional interventions involving varied calorie and protein intake have been known to improve the health and lifespan of rodents and primates. Furthermore, recent studies have also reported the association of dietary macronutrients (proteins, carbohydrates, fats) with cardio-metabolic health and aging in mice. However, the amount of protein that must be consumed to maintain metabolic health is not known.

In a new study published in *GeroScience*, a team of researchers led by Assistant Professor Yoshitaka Kondo from Waseda University, Japan, investigated the amount of dietary protein needed to improve metabolic health in mice approaching old age.

The team recruited young (6 months old) and middle-aged (16 months old) male C57BL/6NCr mice who were fed isocaloric diets with varying protein content (5 to 45 %) for two months. After two months, the effect of varying protein diets was assessed based on measurements of skeletal muscle weight, liver and plasma lipid profiles, and self-organizing map (SOM) cluster analysis of plasma amino acid profiles.

When asked about the motivation behind their study, Kondo explains, "The optimal balance of macronutrients for ideal health outcomes may vary across different life stages. Previous studies show the possibility of minimizing age-specific mortality throughout life by changing the ratio of dietary protein to carbohydrates during approach to old age in mice. However, the amount of protein that should be consumed to maintain metabolic health while approaching old age is still unclear."

The team observed that the consumption of a low-protein diet led to the development of mild fatty liver, with increased levels of hepatic lipids in middle-aged mice as compared to young mice. In contrast, a moderate-protein diet led to reduced blood glucose concentrations and lipid levels in both liver and plasma. These findings indicate that a moderate-protein diet (25% and 35%) kept both young and middle-aged mice metabolically healthier.

On examining the effect of varying protein diets on plasma amino acid concentrations in mice of both age groups, the researchers observed that the plasma concentration of individual amino acids varied with age and varying dietary protein content. This was further validated using SOM analysis of the plasma amino acids. Furthermore, the plasma amino acid profiles revealed using SOM analysis showed the correlation between different protein intake and the varying amounts of hepatic triglycerides and cholesterol levels.

Discussing the impact of their study on public health, Kondo remarks, "Protein requirements change through the course of life, being higher in younger reproductive mice, reducing through middle age, and rising again in older mice as protein efficiency declines. The same pattern is likely to be observed in humans. Therefore, it could be assumed that increasing daily protein intake in meals could promote metabolic health of people. Moreover, ideal dietary macronutrient balance at each life stage could also extend health span."

In conclusion, a balanced diet with moderate amounts of protein could be the key to a long and healthy life.

More information: Yoshitaka Kondo et al, Moderate protein intake percentage in mice for maintaining metabolic health during approach to old age, *GeroScience* (2023). DOI: 10.1007/s11357-023-00797-3

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