Amino acid functions and technical applications

Approach

▶ Enhancing Life with Amino Acids
▶ Examples of the Functions and Technical Applications of Amino Acids (Japanese only)

The Ajinomoto Group business began in 1909 with the launch of umami seasoning *AJI-NO-MOTO*®. Dr. Kikunae Ikeda, a chemist, discovered a taste derived from traditional Japanese *kombu dashi* (kelp stock) that had yet to be recognized in the world. He succeeded in extracting the amino acid glutamate from the *kombu dashi* in 1908. Dr. Ikeda called this taste umami, inventing a method to produce umami seasonings made from glutamate that impart everyday umami and delicious tastes. Then, our founder, Saburosuke Suzuki II, received a request for commercialization from him and launched the seasoning as *AJI-NO-MOTO*® in 1909.

Since that time, we have worked diligently to evaluate and unlock the power of amino acids to discover how they can be used in different ways to improve society.

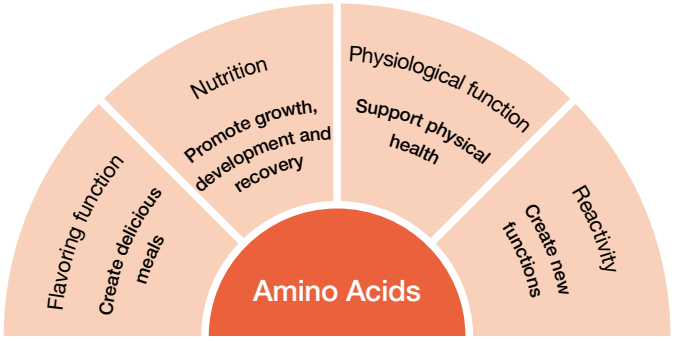
Approaches that utilize the functions of amino acids

About 20% of the human body is made of proteins. These proteins are made up of 20 different types of amino acids. Amino acids form nearly 100,000 kinds of proteins through various combinations.

Some amino acids are made in the body; however, there are nine amino acids, called essential amino acids, that can only be obtained through foods. Because amino acids provide important functions in maintaining life, humans must ingest a sufficient amount of amino acids in balance with other nutrients through daily diets.

Amino acids provide four functions: flavoring function, nutritional function, physiological function, and reactivity. The Ajinomoto Group uses the functions of amino acids and technologies (including design, exploration, manufacturing, and evaluation) to create a variety of innovations. We grow our businesses in foods and seasonings, as well as in healthcare and electronic materials, by combining functions of amino acids.

The four benefits of amino acids



Contribution to Solve Food and Health Issues

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Performance

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Innovations utilizing the functions of amino acids

The Ajinomoto Group takes advantage of the functions of amino acids to provide solutions to a variety of social issues, including health, well-being, and sustainable foods for the future. We focus on solving nutritional issues through the use of amino acids, bringing innovations to the world with advanced technologies. Our highest priorities focus on offering delicious salt reduction and optimizing protein intake.

To achieve these priorities, we propose well-balanced nutrition without compromising on taste, food access and the local way of life.

Proposing health and nutritional value based on scientific evidence

The Ajinomoto Group leverages our world-class expertise on amino acids to develop and sell products that support comfortable lifestyles. We also offer amino acid compounds and product design solutions for BtoB customers. By adding various amino acid functions to food, we help consumers easily ingest these compounds to experience the health and nutritional value of amino acids. We call this series of BtoBtoC initiatives our downstream strategy, which we pursue in Japan and overseas.

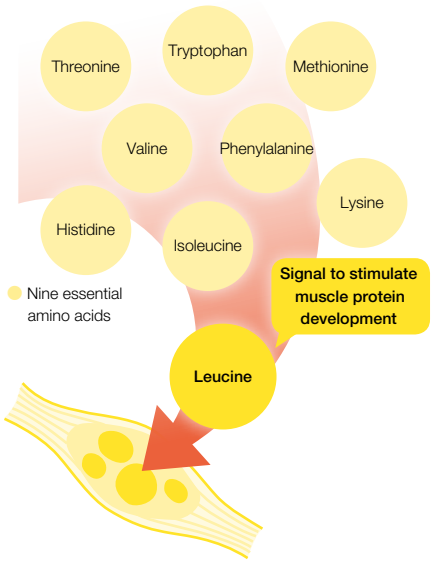
Based on this strategy, we offer to our BtoB customers Amino Acid Prime Mix, a line of optimally formulated amino acid ingredients for food and beverage products.

Contribution to Solve Food and Health Issues

Amino Acid Prime Mix ingredients

Essential amino acid mix with 40% leucine

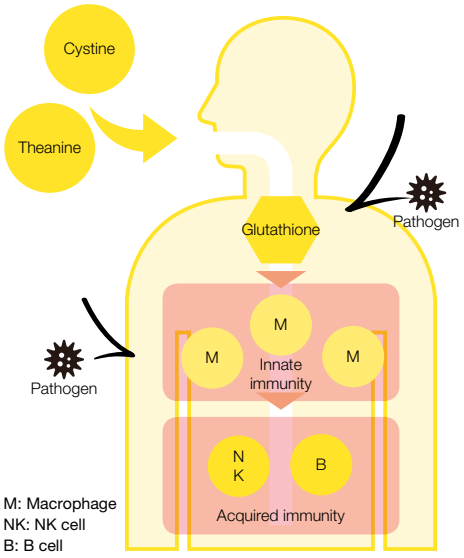
Function: **Maintains and improves muscle mass and strength**



Of nine amino acids, leucine works as a signal to simulate muscle development. This 40% leucine formulation supports efficient integration of essential amino acids in the body for enhanced muscle mass and strength.

Cystine and theanine[1] mix

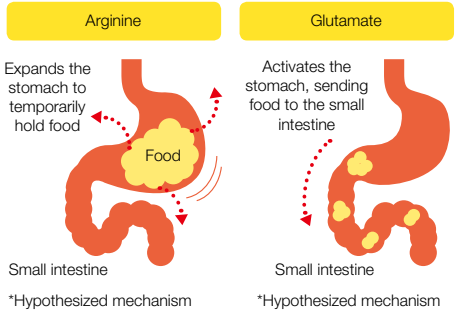
Function: **Boosts immunity**



Cystine and theanine support the production of glutathione[2], an antioxidant. Glutathione boosts one's ability to fight pathogens by helping to activate the innate and acquired immune systems.

Arginine and glutamate mix

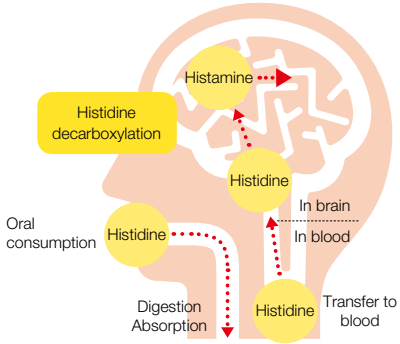
Function: **Improves gastric motility and appetite**



Arginine and glutamate work to alleviate stomach discomfort from food by promoting gastric motility.

Histidine and vitamin B6 mix

Function: **Alleviates fatigue, improves work efficiency**



Histidine is used to make histamine, levels of which decline in the brain as a result of stress and sleep deprivation. Histidine thus alleviates fatigue and improves efficiency in tasks requiring simple memory and decision-making. Vitamin B6 aids histidine action.

[1] An amino acid found in tea leaves. A derivative of glutamic acid, theanine when consumed is broken down into glutamic acid and ethylamine in the body.

[2] An important antioxidant for many living organisms, glutathione is formed by joining three amino acids, glutamic acid, cysteine, and glycine, in that order. The amino acid cystine alone increases glutathione levels, but adding the glutamic acid derivative theanine increases glutathione levels even more significantly.