UMAMI

The Source of
Delicious & Healthy Living

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IMPROVING LIVES *through* NUTRITION

Objectives & Activities 1:

Promote, advance and disseminate scientific knowledge of food and nutrition

- Organise scientific conferences/seminars
- Publish Malaysian Journal of Nutrition/ Berita NSM
- Consultation with health, regulatory & scientific bodies
- Research on specific community groups

Objectives & Activities 2:

Promote healthy nutrition and active living amongst the community

- Conduct roadshows, exhibitions, talks & workshops for the public
- Implement community nutrition programmes, e.g. Nutrition Month Malaysia, Women@Heart
- Publish educational materials

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Editorial Committee

Umami

The 5th Basic Taste

Taste is an important aspect of eating. Appealing taste provides a broader range of options for people from all age-range to enjoy a variety of nutritious food.

In 1908, Dr Kikunae Ikeda discovered that glutamate (an amino acid) was a key flavour element in konbu stock which is traditionally used in Japanese cuisine in much the same way that bouillon is used in Western cuisine. He named the taste of glutamate as "Umami".

Glutamate taste receptor was found on the tongue in year 2000. Since then, Umami taste has been recognised as the 5th basic taste, alongside sweet, sour, salty and bitter.

This booklet provides an understanding of Umami taste, including the sources of Umami from natural foods and seasonings. The potential beneficial effects of Umami on taste and food consumption shall be discussed.

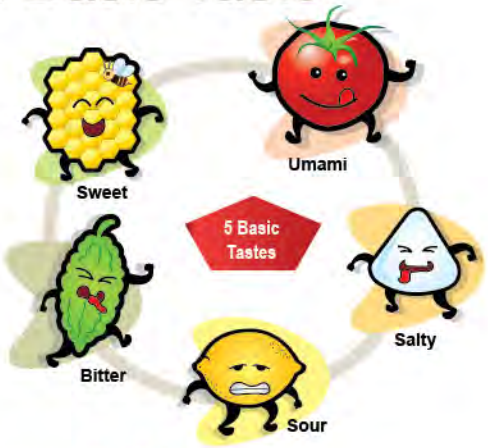
Dr Tee E Siong
President
Nutrition Society of Malaysia

Umami - The Fifth Basic Taste

The Meaning of Umami:

We are taught from an early age that there are four basic tastes – sweet, salty, sour and bitter. But what describes the taste of chicken soup? The answer is Umami, which is the 5th basic taste, usually defined as meaty, savoury or broth-liked taste.

In Malay language, Umami is described as "rasa macam daging" while "xian wei" (鲜味) is commonly used to define Umami in Chinese language.



The Meanings of 5 Basic Tastes to Human Body

Basic Taste	Taste Stimulus	Indicates
Sweet	Sucrose (Sugar)	Energy source
Sour	Acetic acid (Vinegar)	Organic acid
Salty	Sodium Chloride (Salt)	Mineral source
Bitter	Quinine (Drugs)	Harmful/toxic
Umami	Glutamate (MSG-Umami Seasoning)	Amino acid intake

For example, sweetness helps to identify energy-rich food while Umami taste indicates the presence of amino acid in food.

Do you know..?

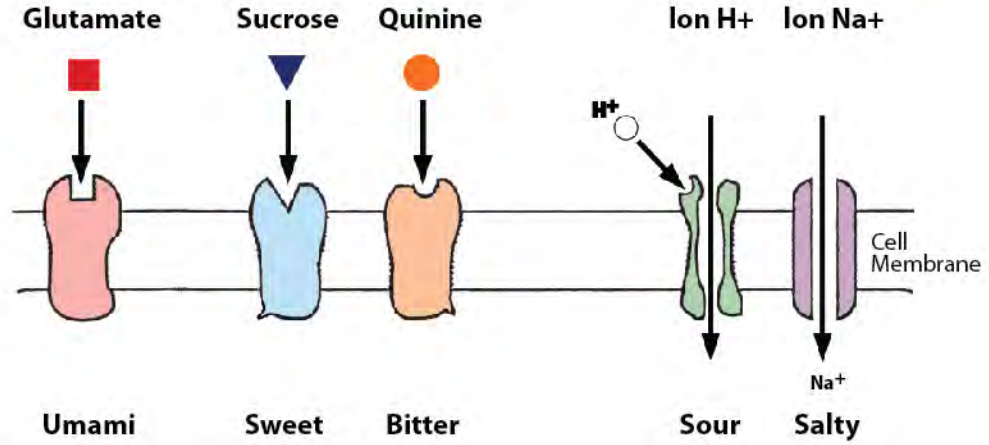
Though most of the time, bitterness serves as a warning sign of poisons, not all bitter substances are toxic to us. The bitterness in bitter gourd and some other vegetables is due to alkaloids. As our bodies interpret bitterness as toxicity, so automatically, most kids tend to resist vegetables that come with bitter taste.

The Umami Receptors

Umami was recognised as the 5th basic taste when scientists found the Umami taste receptors on our tongue in year 2000.

The relationship between taste substances and taste receptors is similar to that between a key and a keyhole. For example, when glutamate binds to Umami taste receptors, perception of Umami will be formed in the brain. This helps us to recognise Umami taste from the food that we eat.

The picture below shows the process how we respond to the 5 basic tastes.



Taste receptors

Do you know..?

Spiciness is not a taste in the technical sense because the sensation does not arise from taste buds. Foods like chilli peppers directly activate other nerve fibers independent of taste; the sensation is interpreted as "hot" from the stimulation of pain/temperature fibers on the tongue.

Umami Sources

Umami Sources from Natural Foods

Glutamate is an amino acid that provides us Umami taste. It is the most important source of Umami and is found abundantly in many types of natural foods.

Below are the Umami-rich foods which are commonly found on our dining table. The free glutamate content of these foods are shown in mg/100g.


Roasted Chicken (22mg)


Beef Steak (10mg)


Parmesan Cheese (1680mg)


Scallop (140mg)


Mushroom (42mg)

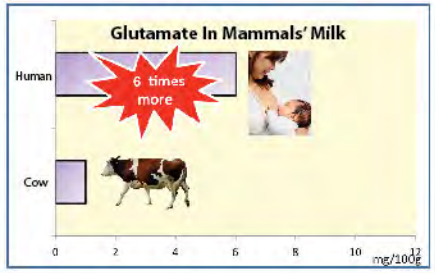

Sweet Corn (106mg)


Fresh Tomato (246mg)


Green Tea (660mg)

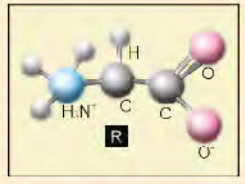
Baby's best food is mother's breast milk in which over 50% of total free amino acids is glutamate. Thus, all breastfed babies first taste Umami via their mother's breast milk. Glutamate is actually 4-6 times more abundant in human breast milk than in cow's milk.

Sarwar, G., Botting, H. G., Davis, T.A., Darling, P., Pencharz, P.B. (1998). Free amino acids in milk of human subjects, other primates and non-primates. Br J Nutr.79(2):129-31



Do you know..?

Amino acids serve as the main building blocks for protein. More than 20 types of cells in plants and animals depend on amino acids in order to survive. Amino acids account for about 20% of human body, It is the 2nd highest after water (60%) in terms of volume. Besides, amino acids are essential in our daily life, serving vital functions in medical care, beauty care, health and sports, as well as in our daily diet.



Basic structure of amino acid

Umami Sources from Seasonings

A great variety of Umami-rich seasonings are used in different cuisines across the globe.


Belacan
Malaysia


Fish Sauce
Thailand


Beef Extract
United Kingdom


Soy Sauce
China


Miso Paste
Japan

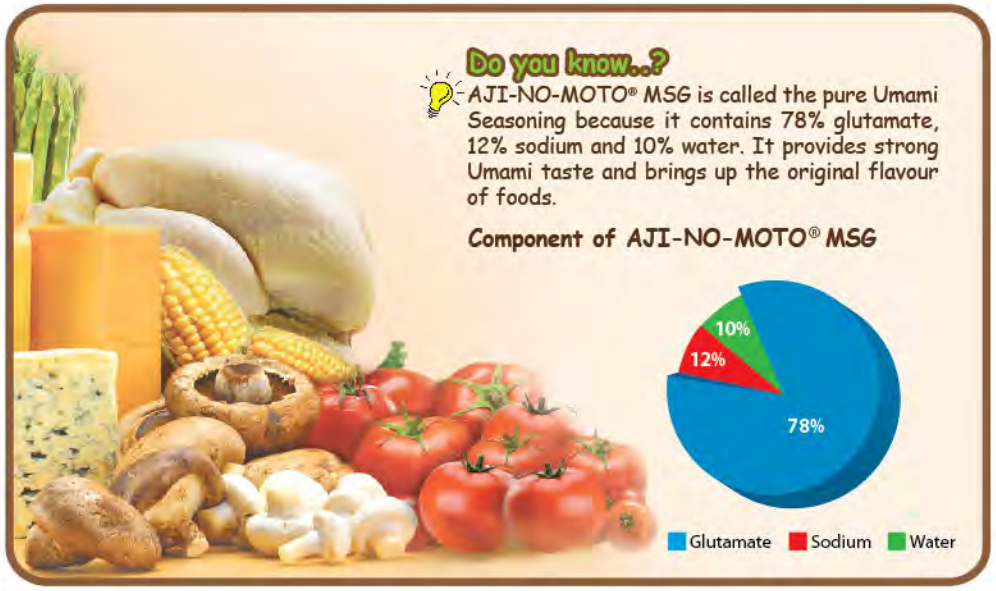

Tomato Ketchup
United States of America

Do you know..?

Though Umami was discovered more than 100 years ago, the key Umami substance (glutamate) has a longer history in cooking. It is interesting to note that fish sauce was used by Ancient Greeks and Romans. Fish sauce produced in ancient times most likely had a high level of glutamate as the production methods were similar to those of the fish sauces in Southeast Asia today. Therefore, the appreciation of glutamate taste or Umami can be traced back to over 2,500 years ago.


Fish sauce was produced around the Mediterranean Coast and Black Sea

Natural Process to Produce Umami-Rich Foods / Seasonings



Discovery of **Umami**

The Story of Professor Kikunae Ikeda which Began in 1899...

Do you know..?
Konbu is an edible kelp or seaweed from the family Laminariaceae. It is widely eaten in East Asia.

In 1908, Prof Kikunae Ikeda identified glutamate, which was found in konbu as the source of the 5th basic taste and named it as "Umami".

Umami was the combination of 2 Japanese words, "umai" that means delicious and "mi" that means taste.

Umami describes savoury, meaty or brothy taste that balances all other tastes and brings up the original flavours of foods.

Benefits of **Umami** Taste

Enhance Flavour of Food

Umami not only adds savoury taste in foods, but it is also able to harmonise the taste of all ingredients to produce a full-bodied blend of flavour sensation in a dish.

Do you know..?

Zucchini / summer squash is rich in vitamins (A, B, C), minerals (manganese, potassium, magnesium, phosphorus) and very high in dietary fiber. To attract people to take this nutritious food, a small amount of MSG can be added to balance up the flavour of zucchini and increase its mouth-fullness for the next bite.

Cairncross, S.E. and Sjostrom, L.B. (1950), Flavor profiles - a new approach to flavor problems. Food Technology 4:308-311
Caul, J.F. (1957). The profile method in flavor analysis.Advanced Food Research, 7:1-6 Academic Press, New York, NY.

Promote Nutrients Intake of The Elderly and Children

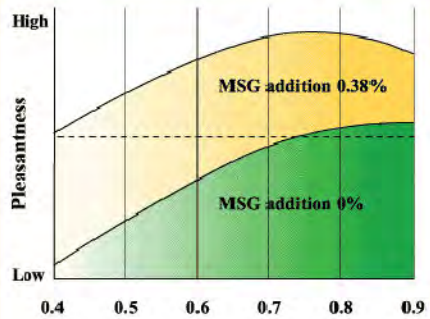
Umami taste enhances the flavour of foods and encourages the elderly and young children to obtain an optimum amount of nutrients through a variety of food intake.

This results in an overall improvement of health status and quality of life for the elderly and children.

Reduce Sodium Intake up to 30%

According to WHO, a long period of high sodium intake may increase the risk of getting high blood pressure and other non-communicable diseases. One of the main sources of sodium comes from table salt.

Human sensory tests showed that food palatability increased by adding table salt into food. However, by using a small amount of MSG, the sodium intake can be reduced up to 30% while maintaining the palatability.



Yamaguhi, S. and Takahashi, C. (1984). Interactions of monosodium glutamate and sodium chloride on saltiness and palatability of a clear soup. Journal of Food Science 49 (1): 82-85.

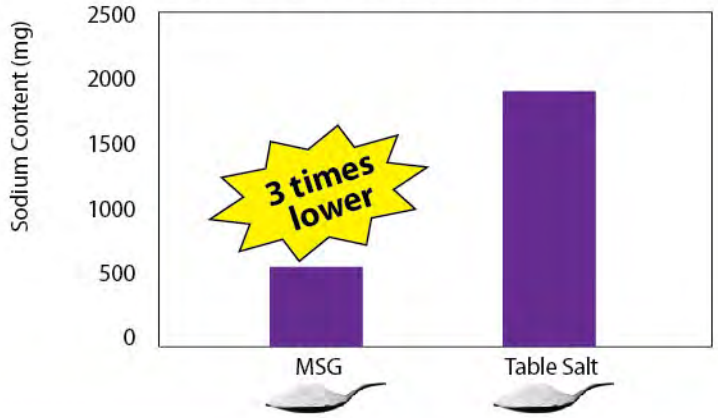
Roininen K. et al. (1996) Effect of umami taste on pleasantness of low-salt soups during repeated testing. Physiol. Behav. 60: pp. 953.

Example:

In a liter of Chicken Soup A & B, when we replace 3.3g of salt with 3.8g of MSG, it is able to reduce about 30% of sodium in Soup B.

The 3 times lower sodium content in MSG (12%) compared to table salt (40%) helps in reducing sodium intake in our daily diet.

Sodium Content in One Teaspoon of MSG and Table Salt

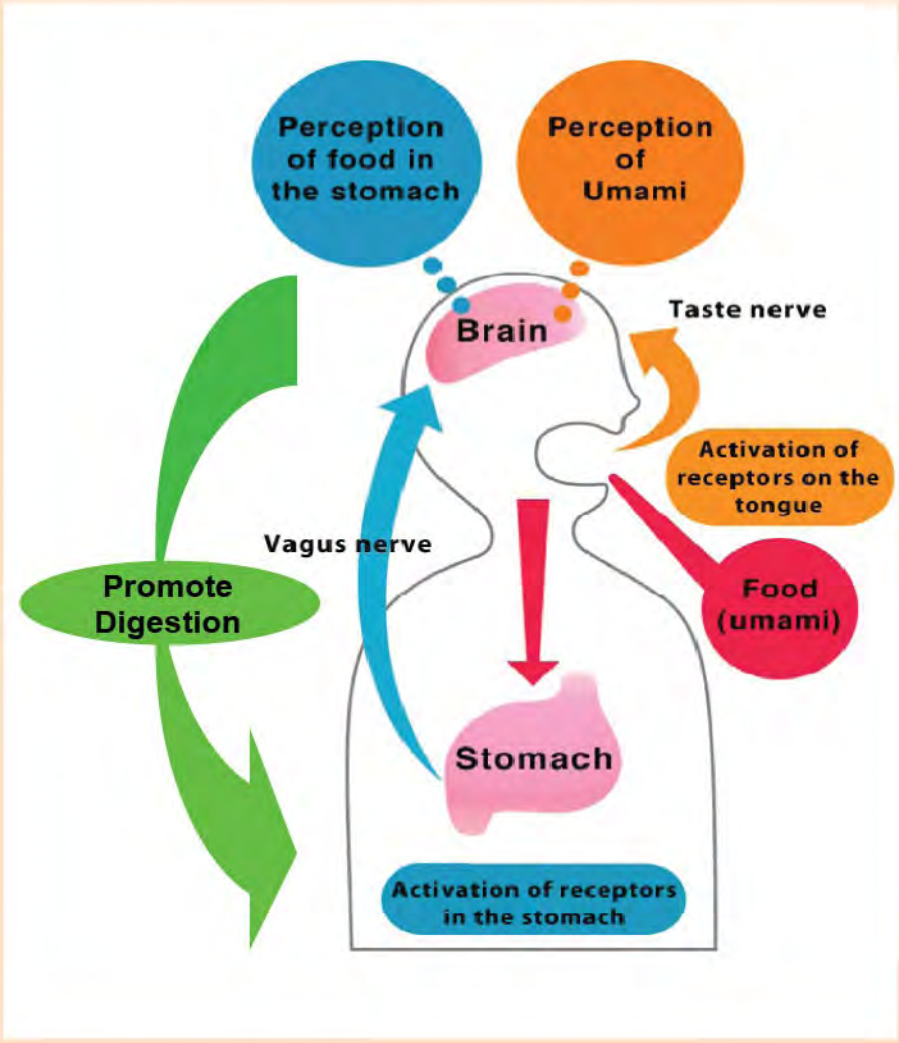


Promote Protein Digestion & Absorption in Human Body

Umami receptors on our tongue help us to recognise Umami taste from the food that we eat.

In year 2006, scientists discovered that Umami receptors also exist in the stomach which function with our brain in promoting protein digestion and absorption in the human body.

San Gabriel, A. M., Maekawa, T., Uneyama, H., Yoshie, S. & Torri, K. (2007). mGluR1 in the fundic glands of rat stomach. FEBS Lett. 581, 1119-1123, US National Library of Medicine, National Institutes of Health.



Umami Recipes

Vegetables Bean Curd Soup (8 servings)

Ingredients:

2 tsp	Corn oil
4 L	Basic vegetable stock
120g	Cabbage, sliced
5g	Spring onion, chopped
3 tsp	Salt
3 dashes	White pepper powder

Cut into cubes:

80g	Carrot
40g	Dried mushroom, soaked
2 pieces	Bean curd

Method:

1. Heat oil in a pot, add mushrooms, bean curd and all vegetables, sweat for a few minutes.
2. Pour in vegetable stock and simmer until vegetables are cooked.
3. Season with salt and pepper. Serve hot with chopped spring onion.

*To make basic vegetable stock, boil 100g onion, 50g carrot, 50g celery in water. Strain and use to prepare vegetables beancurd soup.

Healthier Option:
Replacing 1 tsp of salt with ½ tsp of AJI-NO-MOTO®(the pure Umami Seasoning) is able to reduce about 250 mg of sodium intake per serving.

According to the Malaysian Dietary Guidelines (NCCFN, 2010), individuals should not eat more than 5g of salt per day (2,400mg sodium).

Chicken Curry (6 servings)

Ingredients:

5 tbsp	Cooking oil
3 pcs	Chicken thigh, cut into 6 pieces each
300g	Potato, cut into halved wedges, pre-steamed until half-cooked
500 ml	Water
150g	Thick coconut milk
1 tsp	Sugar
3 tsp	Salt

C:

1	Shallot, sliced
4cm	Cinnamon stick
2	Cardamom
2	Clove
1	Star anise
2 stalks	Curry leaf

D: blended finely

120g	Shallot
2 clove	Garlic
10g	Ginger
½ tsp	Tamarind paste, mixed with 1 tbsp of water
25g	Curry powder
1 tbsp	Chilli powder

Method:

1. Heat oil in a wok. Sauté ingredients C until fragrant.
2. Add in blended ingredients D, continue to sauté until aromatic.
3. Add in chicken and stir for about 1 minute.
4. Pour in water and bring to a boil. Add in pre-steamed potato and season with salt.
5. Finally pour in thick coconut milk, simmer until small boil. Turn off heat and serve warm.

Healthier Option:
Replacing 1 tsp of salt with ½ tsp of AJI-NO-MOTO®(the pure Umami Seasoning) is able to reduce about 335 mg of sodium intake per serving.

According to the Malaysian Dietary Guidelines (NCCFN, 2010), individuals should not eat more than 5g of salt per day (2,400mg sodium).

Frequently Asked Question about MSG

What is MSG?

Monosodium Glutamate (MSG) is the sodium salt of glutamic acid. Glutamic acid is naturally present in our bodies and many types of natural foods.

How MSG is made and is it safe to eat?

MSG is made from natural ingredients such as molasses from sugar cane or tapioca through fermentation, a similar process used in making, 'tapai', 'tempoyak', vinegar, soy sauce and yogurt. U.S. Food and Drug Administration (USFDA) considers the addition of MSG to foods to be "generally recognized as safe" (GRAS). Although some people identify themselves as sensitive to MSG, in studies with such individuals given MSG or a placebo, scientists have not been able to consistently demonstrate that such reactions are triggered.

Does the human body process the glutamate occurring naturally in foods differently from the glutamate added to foods in the form of monosodium glutamate?

No. The glutamate naturally present in food and the glutamate derived from MSG are identical. They are digested and absorbed in the same way from the intestine. Once they are ingested, our bodies make no distinction between glutamate from foods such as tomatoes and glutamate from MSG. In fact, research has shown that glutamate from food or from MSG is important for the normal functioning of the digestive system.

How much of MSG should we add in food?

Results of taste panel studies indicate that a small amount of 0.1-0.8 % MSG by weight in food provides optimum enhancement of the food's natural flavour. Like salt, MSG is a self-limiting substance - once the effective amount is used, adding more MSG contributes little or even diminish the palatability of foods.

Does MSG cause hair loss?

There is no scientific evidence for this concern. Hair loss may be caused by several factors namely genetic, stress, hormonal changes, structural hair defects or medication.

Does MSG cause thirst?

There is no scientific evidence for the claim. The physiology of thirst is related to the homeostasis of sodium in our body. Thirstiness is the physiological need for large amounts of water that appears after severe loss of blood, sweat during a very strenuous exercise or a high sodium intake. It takes time to happen.
Although MSG contains sodium, its sodium content is only 12% compared to 40% found in table salt. Thus, the thirst-response due to MSG if any should be far less than table salt.

Sources:
U.S. Food and Drug Administration (USFDA) - http://www.fda.gov/Food/FoodIngredientsPackaging/ucm328728.htm
International Glutamate Information Service (IGIS) - http://www.glutamate.org/faqs/faqs.html
Ajinomoto (M) Berhad - http://www.ajinomoto.com.my/2009/en/features/features_msg_faq.html