An-Najah National University
Faculty of Agriculture & Veterinary Medicine

"Monosodium *Glutamate*"

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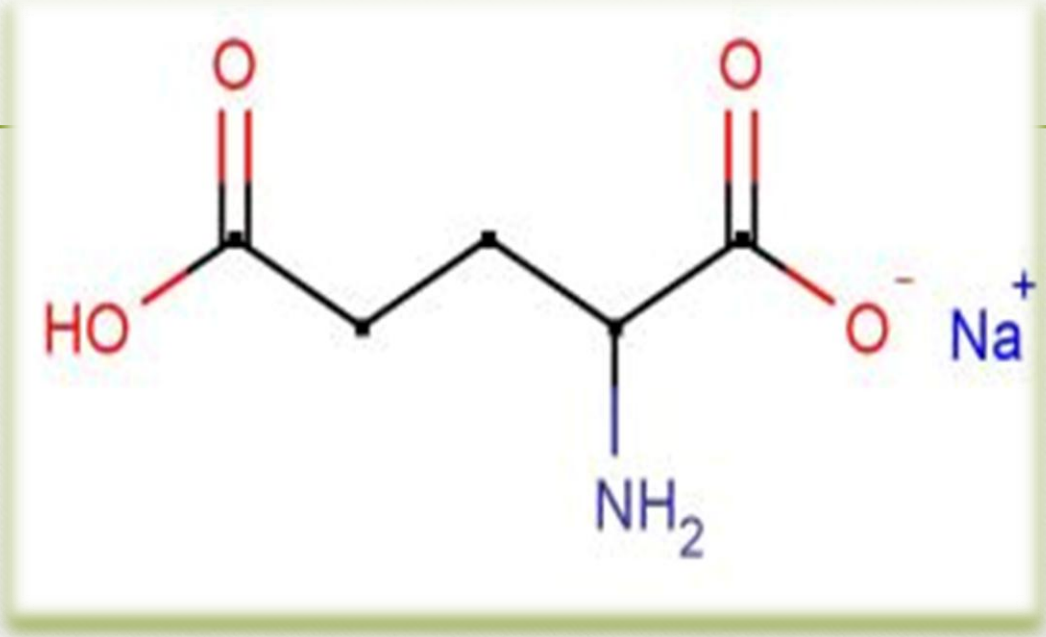
Objectives

- Understand the difference between natural and manufactured glutamate
- Acknowledge the potential relationship between MSG & appetite
- Learn the effects of MSG during pregnancy & in offspring
- Know how much MSG is consumed & where it is hidden

What is Monosodium Glutamate (MSG)?

Glutamate is one of the most common amino acids found in nature. It is the main component of many proteins and peptides, and is present in most tissues. Glutamate is also produced in the body and plays an essential role in human metabolism.

Chemical structure of MSG



The History of MSG

Asians had originally used the “kombu” seaweed’s broth as a flavor enhancer, without understanding that glutamic acid was its flavor-enhancing component. In 1908, a multi-million-dollar industry was born when Professor Kikunae Ikeda of the University of Tokyo isolated monosodium glutamate using kombu. He noted that the Glutamate had a distinctive taste, different from sweet, sour, bitter and salty; he gave this taste the name “umami”. Umami,

Professor Kikunae Ikeda

In 1909 MSG entered the marketplace as Aji-no-moto, a product so successful the company reorganized itself around the substance. Today, the Ajinomoto Group's 15 factories supply about one third of the 1.5 million-tons of MSG sold annually.

A slow and costly extraction process was used to produce MSG until 1956, when the Japanese succeeded in producing glutamic acid by means of fermentation; large-scale production of MSG began – the American ideal of Chinese Food was changed forever. The substance caught on rapidly in the U.S. By the 1960s, Accent, a leading brand of MSG had become a household name.

Sources of MSG:

Glutamate occurs naturally in virtually all foods including :

- meat, fish, poultry
- breast milk
- Cow's milk
- Tomatoes
- Mushrooms
- Grapes, sultanas, raisins, wine
- Plums, prunes
- Broccoli, spinach
- Green peas

The typical glutamate content of various foods is given in Table 1.

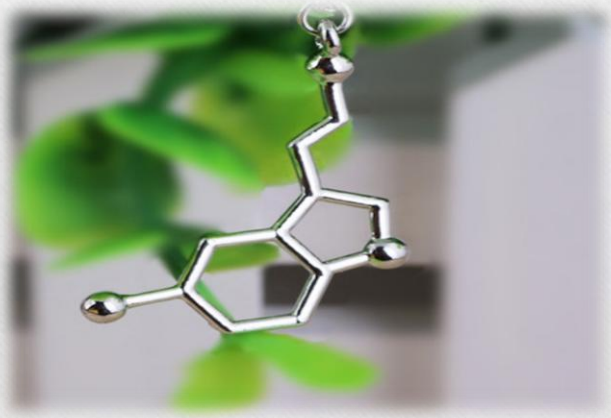
Food	Bound glutamate (mg/100g)	Free glutamate (mg/100g)
Milk/dairy products: Cow's milk Human milk Parmesan cheese	819 229 9847	2 22 12 00
Poultry products: Eggs Chicken Duck	1583 3309 3636	23 44 69
Meat: Beef Pork	2846 2325	33 23
Fish: Cod Mackerel Salmon	2101 2382 2216	9 36 20
Vegetables: Peas	5583	20 0
Corn	1765	13 0
Carrots	218	33
Spinach	289	39
Tomatoes	238	14 0
Potato	280	18 0

Production of Monosodium glutamate

MSG has been produced by three methods:

- hydrolysis of vegetable proteins with hydrochloric acid to disrupt peptide bonds (1909–1962)
- direct chemical synthesis with acrylonitrile (1962–1973).
- bacterial fermentation (the current method).

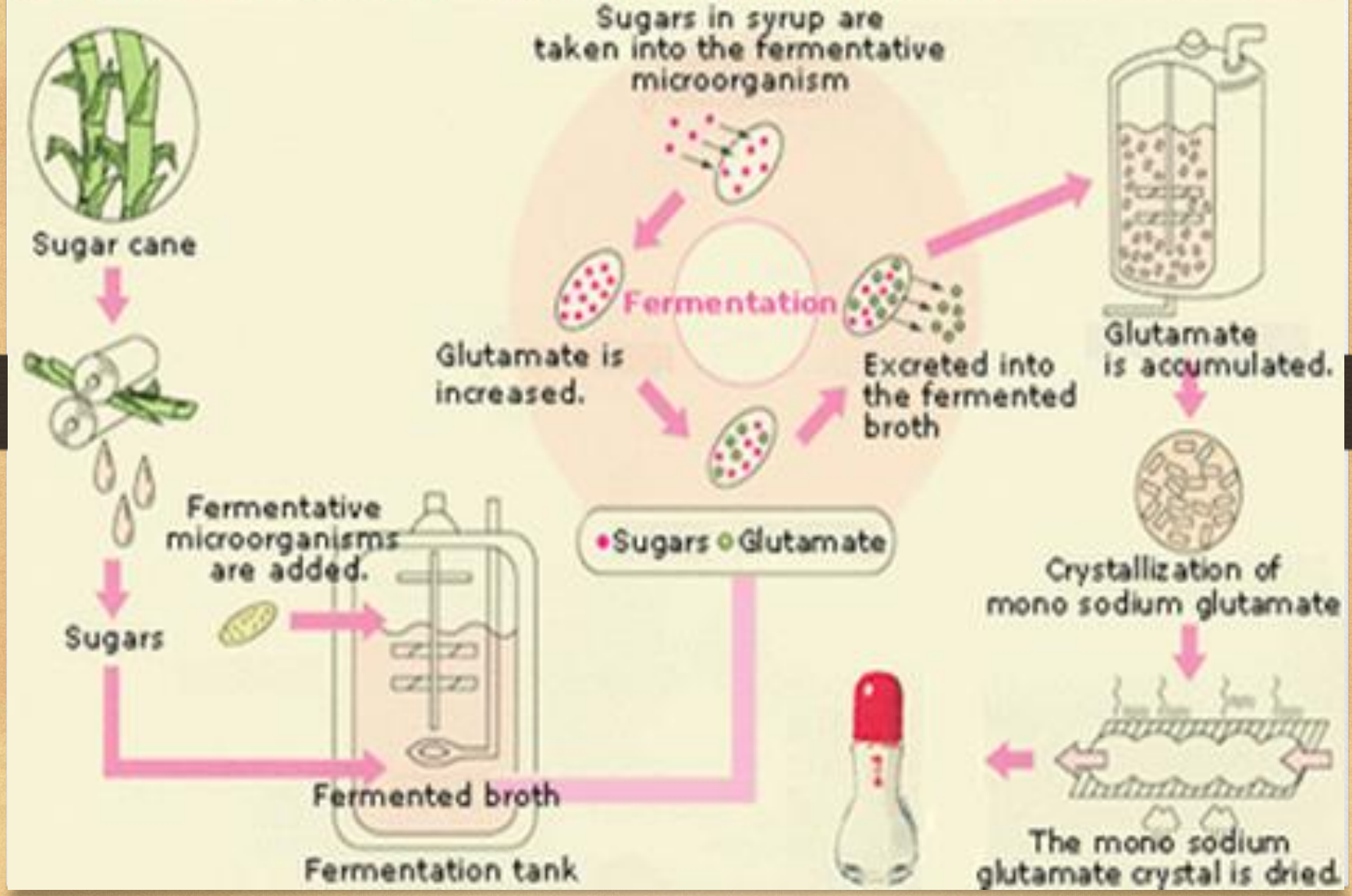
Wheat gluten was originally used for hydrolysis because it contains more than 30 g of glutamate and glutamine in 100 g of protein. As demand for MSG, increased, chemical synthesis and fermentation were studied. The polyacrylic fiber industry began in Japan during the mid-1950s, and acrylonitrile was adopted as a base material to synthesize MSG.



Fermentation Process: which achieved in three steps:

- Production of cane molasses ,starch, sugar beets
- Fermentation
- Purification

Production of mono sodium glutamate by fermentation



Advantages and disadvantages of monosodium glutamate in food

Advantages:

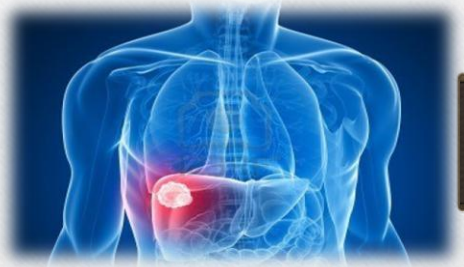
- **Sodium Reduction**

- **Flavor:**

- **Replacing salt with MSG May also reduce the risk of stomach and esophageal cancer**

Disadvantages:

- MSG and neurological effects
- Effect the regular functioning of the brain.
- Monosodium glutamate causes obesity.
- Asthma exacerbations
- Food Allergies
- Rapid, fluttering heartbeats (heart palpitations)



Is MSG safe?

In general, the use of MSG is not a health hazard to consumers. Regulatory authorities and scientists worldwide, including Health Canada, have reviewed the safety of MSG. However, some individuals who consume MSG may exhibit an allergic-type reaction or hypersensitivity. For those people, the effects of consuming food containing MSG may include containing MSG may include a burning sensation , facial pressure, headache, nausea and chest pains appearing about 20 minutes after consumption and disappearing about two hours later. adverse health effects. People sensitive enough to be affected are advised to avoid the use of this substance.

MSG And Pregnancy

There is no evidence that MSG during pregnancy has any effect on the developing baby. MSG does not cross the placenta if you eat it during pregnancy. When you are nursing, it is not associated with elevated levels in breastmilk. Moreover, it is not associated with any risk of infertility.

If you like, foods containing MSG, you can continue to enjoy them in moderation. However, if you do feel sensitive to MSG outside of pregnancy, it makes sense to continue to avoid the foods that trigger your symptoms.

Search Tool: Questionnaire

The study was conducted on a sample of (40) questionnaire distributed to students from An - Najah National University. The sample was randomly selected. The results were as follows:

Research Results

- The results of the questionnaire analysis show that the consumption of mono sodium glutamate is higher than that of meat.
- After asking several questions about the effect of monosodium glutamate on human performance, it was found that its consumption often leads to nausea and sometimes stomach pain, headaches and allergies.

Research Results

- While studies suggest that mono-sodium glutamate increases weight, the findings in the current study suggest that eating products containing mono-sodium glutamate does not affect the weight of their bodies.
- The study also noted that eating products containing monosodium glutamate moderately does not affect the health of pregnant women

- https://www.foodinsight.org/Content/76/Glutamate-and-Monosodium-Glutamate.pdf
- MONOSODIUM GLUTAMATEA Safety Assessment
- Uses, effects and properties of monosodium glutamate (MSG) on food & nutrition
- https://www.foodstandards.gov.au/publications/documents/MSG%20Technical%20Report.pdf
- https://www.livestrong.com/article/495019-monosodium-glutamate-benefits/
- https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/food-additives/monosodium-glutamate-questions-answers.html