

MSG – Flavor Enhancer or Deadly Killer

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Abstract

MSG has been used as a food additive ever since it was first isolated early in the 20th century in Japan. Its base amino acid occurs naturally in many foods. It is added at various stages in food production as it enhances food flavor. High controversy persists since the late 1960s. Many claim harmful effects due to it. But corporate interests claim lack of concrete evidence.

Keywords: *MSG, monosodium glutamate, glutamic acid, hydrolyzed protein, amino acid, food additive.*

Introduction

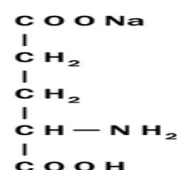
Monosodium glutamate ("MSG") is a chemical, used to enhance the flavor of many types of food. It is a sodium salt of glutamic acid, the base of glutamine and an amino acid. Amino acids are the building blocks of proteins, which in turn are the building blocks of cells as well as nutrients and products of cells. Thus amino acids are a basic unit of living creatures. Glutamic acid is an amino acid abundant in both plant and animal protein. It is a non-essential amino acid, i.e., the body can produce its own glutamic acid, and does not depend upon getting glutamic acid from ingested food (Truth in Labeling 2007).

Food manufacturing and chemical plants produce glutamic acid commercially. Its use in food began in the early 1900s as a component of a flavor enhancer called "monosodium glutamate." However glutamic acid, produced outside the body (for use in food, drugs, dietary supplements, cosmetics, fertilizers, personal care products, etc), can cause brain lesions, neuroendocrine disorders, learning disabilities, neurodegenerative diseases, adverse reactions, etc. in humans and animals. All commercially produced glutamic acid is termed "MSG" - it **places humans at risk.**

Monosodium glutamate – MSG

Description

MSG is a sodium salt of glutamic acid. It is usually a white powder. Water ionizes it into free sodium ions and glutamic acid, which is an organic compound consisting of five carbon atoms. It has a carboxylic (-COOH) group and an amino (-NH)₂ group attached to an "alpha" carbon atom (a carbon atom joined directly to the - COOH group). It is an alpha amino acid. The carbon chain molecule can be represented as follows (Wikipedia 2006):



Kombu and other seaweeds have been added to food in Japan to enhance flavor, since thousands of years ago. In 1908 a Japanese scientist discovered that the active ingredient in kombu is glutamic acid.

MSG has a distinctive taste that falls outside the region of the four classic tastes: sweet, sour, salty, and bitter. This taste is called "Umami," also referred to as "Xien Wei" in Chinese or "savory, "broth-like" or "meaty taste" in English. Due to this special taste contained in MSG, many food producers use this to enhance the flavor of their product

and thereby increase sales (see Fig. 1).

Industrial production of glutamic acid for use as food additive "monosodium glutamate" commenced in 1910. From 1910 until 1956, the process was slow and costly.

During the Second World War American quartermasters noticed enhanced taste of Japanese army rations. They introduced monosodium glutamate to the food industry after the war.

The Japanese succeeded in producing glutamic acid by means of bacterial fermentation in 1956. Large-scale production of glutamic acid (food additive "monosodiumglutamate") began after intense research identified microorganism strains for starting requisite cultures through fermentation. Processed free glutamic acid useage exploded worldwide (Truth in Labeling 2007). Some food that contains MSG is shown in Fig. 1 (Wikipedia 2006).

Fig. 1. Some food containing MSG (Wikipedia 2006).



Many Thai food products contain MSG, introduced in various areas of food production. For example, seasoning products such as "Ajinomoto," (Ajinomoto Co., LTD. 2002) "Ros Dee," "Ros Dee Krua Krob Ros," and "Lite Sugar"; beverage products such as "Birdy," "Birdy Rio," and "Calpico"; instant noodle products such as "Yum Yum," "Mama," and "Wai Wai"; processed food products such as "Birdy 3 in 1" and "Birdy Coffee Candy"; frozen food products such as "Quick Meal" and "Ajinomoto Frozen Food"; animal nutrition products such as "L-Lysine," "L-Threonine," and "L-Tryptophan," etc.

Findings from research on neurotoxicity and on injury to the developing infant's endocrine system, made baby food industry voluntarily remove monosodium glutamate from their products in the early 1970s. But they often left free glutamic acid in their products, as "autolyzed yeast and hydrolyzed vegetable protein (HVP)". Today free glutamic acid is ubiquitous in processed food.

The Glutamate Association was formed in 1977, but the members of the organization are not officially listed. It is a trade group that conducts promotional and lobbying efforts related to MSG usage (MSGFacts 2006).

NOHA, Nutrition for Optimal Health Association, Inc., (NOHA 2008a) whose mission is to promote education and scientific knowledge of nutrition and preventive health to professionals, students, and the public as a means of achieving and encouraging optimal health, is responsible for exposing deceptions of the glutamate industry.

An article, "The Toxicity / Safety of Processed Free Glutamic Acid (MSG) a Study in Suppression of Information", by NOHA Board Member Adrienne Samuels, revealed a history of the many deceptions used by manufacturers (MSGFacts 2006).

The paper exposed cooperation between the glutamate industry and government departments, especially the FDA. Scientists at many prestigious universities have found flaws in research on the MSG "safety".

USA boards of so-called "independent" organizations usually consist of glutamate industry representatives and friends. For example, a glutamate industry researcher and spokesman, is also a member of the Scientific Advisory Board of the Center for Science in the Public Interest (MSGFacts 2006).

This allowed registration of Auxigro, containing processed free glutamic acid as a growth enhancer, in January 14, 1998. The EPA (U.S. Environmental Protection Agency) gave permission to spray it on all agricultural products. Auxigro produces false signals telling plants that they are under "stress." The plants respond by absorbing additional nutrients from the soil and grow much larger, resulting in increased yields.

Dangers

President of the Truth in Labeling Campaign and NOHA Board Member Jack Samuels gave an excellent lecture, February 14, 2000, on the dangers and hidden sources of processed free glutamic acid at Evanston's Whole Foods Market (Truth in Labeling 2005).

Glutamic acid is a neurotransmitter that excites neurons all over the body. This electrical firing of neurons makes food with added free glutamic acid taste good.

Glutamate receptors are present in the central nervous system, mouth, lungs, intestines, muscle, and other "peripheral" locations.

Free glutamic acid can cause problems. Brains have many receptors for glutamic acid and some areas, (eg. hypothalamus) do not have an impermeable blood-brain barrier. Thus free glutamic acid from food sources can get into the brain, injuring and frequently killing neurons. Many allergic reactions have been reported (Tidwell J. 2006). Observable reactions range from mild and transitory to debilitating and life threatening.

The first published report of an adverse reaction to MSG appeared in 1968 (Kwok 1968). The first evidence that MSG caused brain damage in the form of retinal degeneration was published in 1957 (Lucas and Newhouse 1957); and the first published report of brain lesions, obesity, and other disturbances in mice treated with monosodium glutamate was published in 1969 (Olney 1969).

Free Glutamic Acid Reactions in Sensitive People (NOHA 2008b)

Cardiac

Arrhythmias
Extreme rise or drop in blood pressure
Rapid heartbeat (tachycardia), Angina

Circulatory

Swelling Muscular
Flu-like achiness, Joint pain, Stiffness

Neurological

Depression

Dizziness, Light-headedness, Loss of balance
Disorientation, Mental confusion

Anxiety, Panic attacks
Hyperactivity, Behavioral problems in children
Lethargy, Sleepiness, Insomnia
Migraine headache. Numbness or paralysis
Seizures, Slurred speech

Gastrointestinal

Diarrhea
Nausea/vomiting
Stomach cramps
Irritable bowel, Bloating

Respiratory

Asthma, Shortness of breath
Chest pain, Tightness
Runny nose, Sneezing

Skin

Hives or rash. Mouth lesions
Temporary tightness or partial paralysis
(numbness or tingling) of the skin Flushing

Urological

Swelling of prostate Nocturia

Visual

Blurred vision, Difficulty focusing

Substances with Hidden MSG

MSG can be hidden when used in processed food, dietary supplements, cosmetics, personal care products, and drugs; in waxes applied to fresh fruits and vegetables; as ingredients in pesticides, fungicides, fertilizers, and plant growth enhancers. They remain in the edible portion of the plant.

A number of methods are available for producing MSG. All of these methods can kill brain cells, and cause neuroendocrine disorders, neurodegenerative disease, and adverse reactions in humans and animals.

In the *Code of Federal Regulations*, the Food and Drug Administration (FDA) identifies two classes of commercial glutamic acid when used as a food additive (FDA 1989, FDA 1990).

Class I. Glutamic acid can be produced by breaking down protein into its constituent

amino acids. It can also be produced by bacteria that synthesize and excrete glutamic acid. Regardless of process, if the glutamic acid is refined to about 99%, the FDA requires the ingredient/product be identified on food labels as "monosodium glutamate" (FDA 1990).

However since 1995, products that contain 79% free glutamic acid (remainder = salt, moisture, and up to 1% contaminants), is called "monosodium glutamate" by the U.S. FDA. It must be labeled as such (FDA 1995).

Class II. When protein breaks down and refinement results in an ingredient/product that is less than 99% pure glutamic acid, the product is referred to as a "hydrolyzed protein product" (HPP). There are many HPP, each of which must be assigned its own unique "common or usual name."

Some HPP products include "calcium caseinate," "sodium caseinate," "autolyzed yeast," "hydrolyzed protein," "hydrolyzed vegetable protein," "hydrolyzed animal protein," "yeast extract," and "textured vegetable protein." All of these invariably contain commercially manufactured glutamic acid (MSG).

All HPP contains various free amino acids, small peptides, and even some protein in addition to glutamic acid, dependent on starting material, protein breakdown method used, and hydrolysis degree. All HPP also contain contaminants, just as all "monosodium glutamate," contain contaminants.

To be able to use processed free glutamic acid in their products, the glutamate industry and companies, including pharmaceutical firms, improperly claim that the term "MSG" only applies to monosodium glutamate in food ingredients. They pretend not to know that monosodium glutamate is just glutamic acid, freed from protein through a manufacturing process (processed free glutamic acid), salt (sodium), and moisture. It is the processed free glutamic acid that MSG-sensitive people react to.

Regardless of the name of the ingredient or product, consumers may react to processed free glutamic acid that is contained in any food ingredient or product. Because MSG-sensitive

people may react to all ingredients and products that contain processed free glutamic acid, they refer to such ingredients and products as containing "MSG."

Humans who suffer adverse reactions to monosodium glutamate also suffer adverse reactions to HPP (Schwartz 1988). Also, they will suffer on ingestion of reaction flavors, which are MSG produced by combining specific amino acids, reducing sugars, animal or vegetable fats or oils, and optional ingredients including hydrolyzed vegetable protein.

The glutamate industry often uses reaction flavors in ingredients labeled "flavor," or "flavoring," (often preceded by the word "natural"). They use these "reaction flavors" as "clean label" alternatives to "monosodium glutamate" and various HPP. "Clean label" ingredients are ingredients that consumers rarely recognize as containing MSG (Truth in Labeling 2007).

The young are most at risk from MSG. The blood brain barrier is not fully developed in the young; and cannot protect against toxins that enter the blood. Glutamic acid can also penetrate the placental barrier.

"Since free glutamic acid is cheap and since its neurotoxic nerve stimulation enhances so wonderfully the flavor of basically bland and tasteless foods, such as many low-fat and vegetarian foods, manufacturers are eager to go on using it and do *not* want the public to realize any of the problems" (NOHA 2008b).

Thus glutamate (MSG) manufacturers and processed food industries are always trying to disguise the MSG added to food. A partial list of the most common names for disguised MSG is shown in Table 1. Also, aspartate and L-cystine, the powerful excitotoxins, are frequently added to foods. Normally **NO LABELING** is required in most countries.

The FDA allows MSG to be "hidden" in food (FDA 1995). For example, addition of sugar must be disclosed; but many MSG-containing ingredients added to "flavor," "flavoring," "natural flavoring," "stock," or "broth," are exempt; not even the "common or usual names" need be disclosed.

Table 1. Food additives that contain MSG or Excitotoxins (Wikipedia 2006).

| Always | Frequently | Maybe |
|----------------------------------|-----------------------------------|--------------------------|
| Monosodium Glutamate | Malt Extract | Carrageenan |
| Hydrolyzed Vegetable Protein | Malt Flavoring | Enzymes |
| Hydrolyzed Protein | Bouillon | Soy Protein Concentrate |
| Hydrolyzed Plant Protein | Broth | Soy Protein Isolate |
| Plant Protein Extract | Stock | Whey Protein Concentrate |
| Sodium Caseinate | Flavoring | Whey protein |
| Calcium Caseinate | Natural Flavors/ Flavoring | Whey protein isolate |
| Yeast Extract | Natural Beef Or Chicken Flavoring | Protease |
| Textured Protein (Including TVP) | Seasoning | Protease enzymes |
| Autolyzed Yeast | Spices | Anything enzyme modified |
| Hydrolyzed Oat Flour | Flavors(s) & Flavoring(s) | Soy sauce |
| Corn Oil | Natural Pork Flavoring | Soy sauce extract |
| Glumate | Maltodextrin | Soy protein |
| Glutamic acid | Citric acid | |
| Gelatin | Ultra-pasteurized | |
| Mono-potassium glutamate | Barley malt | |

The FDA also waives disclosure for the inclusion of MSG produced during product processing. MSG can be produced during processing if protease enzymes in the presence of any form of protein are included in an ingredient/product. “Under certain conditions, if a product contains protein, the addition of protease enzymes during processing will produce MSG in the end product of the food being packaged or manufactured” (FDA 1995).

It is extremely important to the glutamate

industry that consumers should believe that processed free glutamic acid (MSG) is identical to the glutamic acid in intact protein and in higher organisms, like the human body (Truth in Labeling 2007).

Some European countries place limits on MSG amounts in processed foods. These restrictions are related to carcinogenic mono and dichloro propanol levels in MSG produced via acid hydrolysis.

Most glutamic acid consumed is from protein where it is connected (bound) to other amino acids in long chains - **bound glutamic acid**. Two forms of glutamic acid found in nature are: L-glutamic acid and D-glutamic acid. Proteins contain L-glutamic acid only. Eating L-glutamic acid (**bound glutamic acid**) only does not cause either brain damage or adverse reactions.

Glutamic acid **outside of protein** is **free glutamic acid**. The glutamic acid in higher organisms, but outside of protein, is always in the same form as the protein glutamic acid i.e., it is L-glutamic acid, only.

The second form of glutamic acid, i.e., **D-glutamic acid, is not found naturally in higher organisms**. It is found naturally only in the cell walls of certain bacteria.

“In the late 1800s and early 1900s, industrialists began to manufacture free glutamic acid. **Manufactured/processed free glutamic acid** (MSG) always contains D-glutamic acid, pyroglutamic acid, and various other contaminants in addition to L- glutamic acid. **Manufactured/processed free glutamic acid** (MSG) causes brain lesions and neuroendocrine disorders in laboratory animals. **Manufactured/processed free glutamic acid** (MSG) also causes adverse reactions which include skin rash, tachycardia, migraine headache, depression, and seizures in humans” (Truth in Labeling 2007).

In natural food substances, amino acids are mostly bound - linked to other amino acids in proteins and peptides. Commercially available (bulk or processed food) free amino acids are manufactured. Free amino acid ingestion is relatively recent.

Bound Glutamic acid, unprocessed protein does not cause problems. People react to free glutamic acid in manufactured food. It

is hidden in ingredients with about 40 different names (NOHA 2008b); the word MSG is excluded from the product labels. In some labels, hidden MSG is disguised as "hydrolyzed", "amino acids", and "protein".

Currently labeling hydrolyzed proteins as pea protein, whey protein, corn protein, etc. is practiced. For example if a pea were whole, it is identified as a pea. If an ingredient is called pea protein, it indicates hydrolyzed pea and processed free glutamic acid (MSG) is present. Wheat protein and soy protein are new additions to the list (Truth in Labeling 2007).

Expensive food additives disodium guanylate and disodium inosinate, work synergistically with inexpensive MSG. Thus, use of these would suggest inclusion of MSG in the product. MSG, hidden in words such as "hydrolyzed," "amino acids," and "protein" is present in soaps, shampoos, hair conditioners, and cosmetics.

Low fat and no fat milk products often include milk solids that contain MSG. Drinks, candy, and chewing gum are potential sources of hidden MSG and of aspartame and neotame.

Aspartic acid, present in neotame and aspartame (NutraSweet) causes MSG type reactions. Some medications, including children's medications, contain aspartame.

Some fluids administered intravenously in hospitals may contain MSG. Binders and fillers for medications, nutrients, and supplements, both prescription and non-prescription, and enteral feeding materials can contain MSG. It seems most live virus vaccines contain MSG (Truth in Labeling 2007).

Some people react to even very small amounts - MSG reactions are dose related. Immediate reaction or delayed response (up to 48 hours) is observed.

FDA defines all MSG as "naturally occurring"(FDA 1995). Beware "Natural" only means that the ingredient started out in nature. "Natural" cannot be equated to "safe."

Thus, even if one thinks MSG is avoided and feel safe, if Asian or Western food that used soy sauce, citric acid, stock, natural pork / beef / chicken flavoring, anything that is enzyme modified have been consumed, then MSG have been taken. Many products without MSG labels often contain MSG or create MSG

during processing (see Table 1).

Some believe that MSG is harmful while others disagree. In spite of a host of research performed, clear cut proof or disproof has not been found. So MSG is still widely used, not only in food, but in other areas too.

Thus, MSG in the form of glutamic acid is used in "fertilizers, fungicides, pesticides, and plant growth enhancer products," such as AuxiGro plant metabolic primer that contains more than 29.2% processed free glutamic acid.

Conclusions

Monosodium glutamate or MSG has been used mainly in the food industry to enhance the food flavor, due to its special taste.

Regarding safety of MSG as a food additive, there is little consensus. Widespread usage in the past indicates that there is no immediate threat. But many firsthand evidence and some studies indicate otherwise.

It is very disturbing that much of the positive MSG information available and the attacks on information indicating danger in MSG usage are from groups backed or funded by large rich businesses.

Finally, sodium is a constituent and hypertensive people should be extra careful about consuming MSG.

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