

MONOSODIUM GLUTAMATE:

Demystifying the Controversy & Discovering the Possibilities

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Disclosures

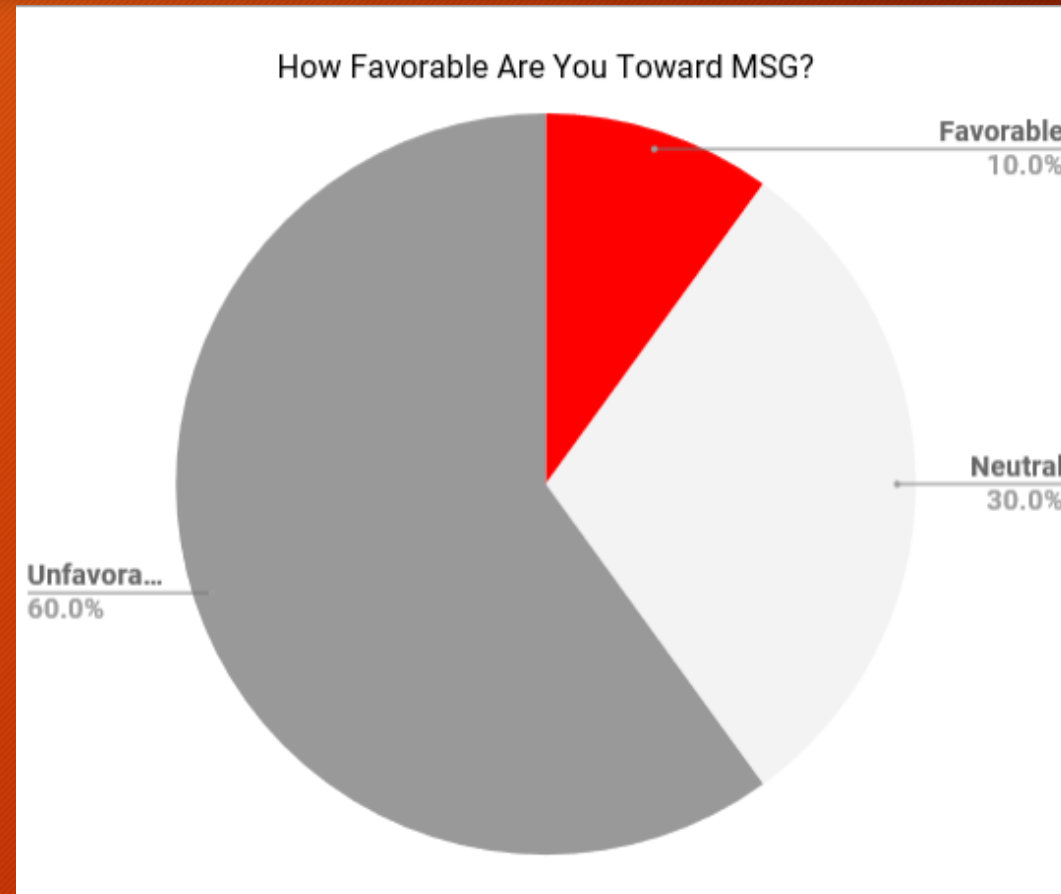
- Consultation
- Counsel
- Speaking
- Writing
- Development of education materials
- Florida Department of Citrus
- National Dairy Council/American Dairy Association Northeast
- National Cattlemen's Beef Association
- Calorie Control Council
- Glutamate Association
- McCormick Science Institute

MSG Perception Among Dietitians

More than half are not favorable toward MSG.

The majority are interested in the science, safety, and sodium reduction benefits of MSG, & the global history and culinary applications.

Many are familiar with glutamate and umami but don't understand the association with MSG.



Source: Ajinomoto Registered Dietitian Nutritionist (RDN) Survey of 800 RDNs, Edelman Intelligence, 2018.

MSG Perception Among Culinary Professionals / Students



Chefs are generally positive or neutral toward MSG, but only 58% know that MSG provides food with umami flavor.

While some believe MSG is generally unhealthy, they are unable to articulate precisely why this is.

Chefs are far more likely to get food information from their colleagues (78%) than from any other source.

MSG Perception Among Consumers

About half of consumers (48%) are not favorable toward MSG, but don't know why

While majority of registered dietitian nutritionists (87%) are familiar with the term umami, many consumers are not (only 25% are aware)

Some consumers mistakenly believe that glutamate is associated with gluten

Consumers want to hear more about MSG's health benefits, safety and the natural occurrence of glutamate



Source: Ajinomoto Segmentation Survey of 1,500 general population consumers and 2,000 food forward consumers, Edelman Intelligence, 2018.

MSG Ground Zero: The Power of Perception & Beliefs

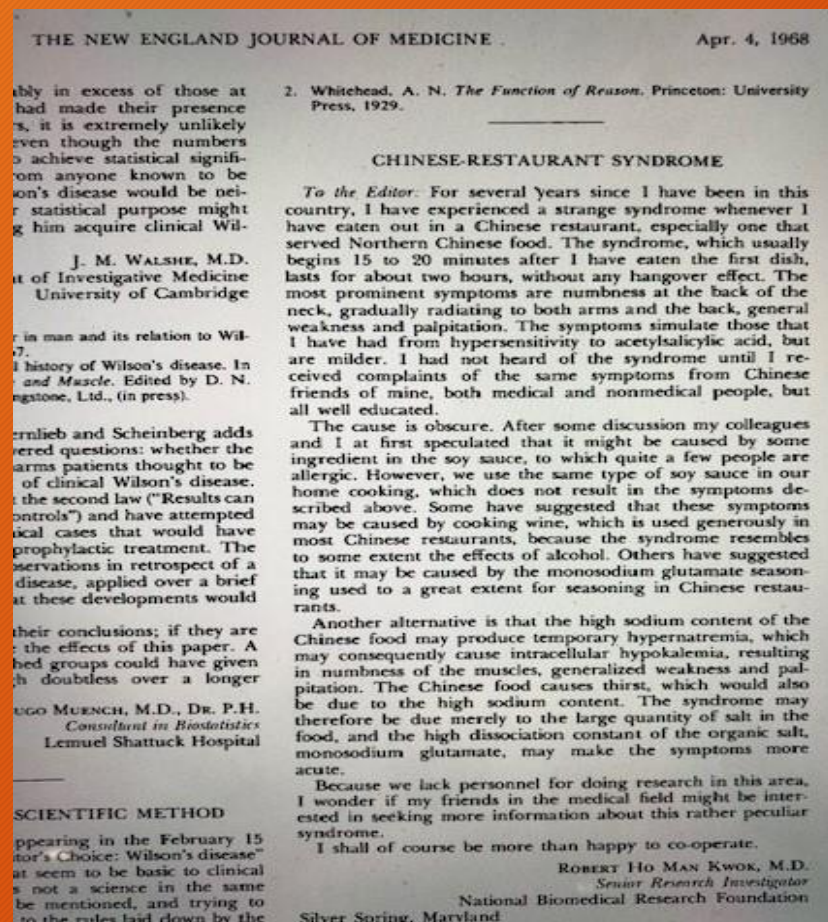
The New England
Journal of Medicine
April 4, 1968
CHINESE-RESTAURANT
SYNDROME

1 LTE in 1968, in the *New England Journal of Medicine* by a physician, Dr. RHM Kwok

Symptoms after eating a meal at a Chinese restaurant

He *SPECULATED* that MSG was 1 possibility, but offered other possibilities as well.

MSG Ground Zero: The Power of Perception & Beliefs



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MSG Ground Zero: The Power of Perception - & Research

Decades of research, mostly on animals

Huge amounts of MSG used in studies, far more than could ever be consumed in food.

Taken in other ways than humans would consume it (fed through a tube into the stomach or gut, injected into the bloodstream, etc.)

MYTHS CONTINUE *TODAY*



Free glutamate: “no longer bound to other amino acids, and may therefore be absorbed much more rapidly, causing spikes in the concentration of glutamate in the blood.”

FACT: 95% of glutamate, free or bound - is NEVER ABSORBED and stays in the gut.

SAFETY - The Basics



FDA: “Generally Recognized as Safe₁”

Average glutamate production by the body₂: 50 grams/day

Average adult consumption₂:

- Glutamate: 13.0 grams/day
- MSG: 0.55 grams/day

1-<https://www.fda.gov/food/food-additives-petitions/questions-and-answers-monosodium-glutamate-msg>

2-<https://glutamate.org/basic/glutamate-and-the-human-body/>

SAFETY: Conclusions of a 2017 Review & Update of MSG

Human body does NOT discriminate between Glu in food and Glu as a seasoning.

Compartmentalized in the human body

Most glutamate does NOT cross biological membranes

95% of glutamate is metabolized by gut cells as an energy source; serves as a substrate for metabolites in the liver

Normal food use does NOT elevate plasma levels

ADI is NOT attainable when consumed in the diet

SOME SIGNIFICANT FLAWS IN GLUTAMATE RESEARCH



Studies often use MSG in isolation. We ALWAYS eat it in with food.

Injected vs. oral? Injected = Irrelevant. We only take MSG orally.

Neurotoxicity in mice? This has never been replicated in primates.



MSG: Enough to give you a headache...NOT

Among symptoms of “Chinese Restaurant Syndrome” are a “severe pulsing headache.”

There is no scientifically established link between monosodium glutamate and migraine headaches.

This has never been replicated in DB-PC trials. These symptoms were reported in similar numbers by subjects who received placebos. No credible, controlled research studies - over several decades -- have found a link between MSG and headaches.

2018: International Headache Society removes MSG from its list of factors that cause headache



SAFETY: Conclusions of a 2017 Review & Update of MSG



**“But it’s different for me.
I’m really sensitive to MSG.”**

“Scientists have NOT been able to consistently elicit reactions in DOUBLE-BLIND STUDIES WITH ‘SENSITIVE’ individuals,” using MSG or a placebo in food.”

How much MIGHT it take to produce even *MILD* symptoms?

UNDESERVED REPUTATION?

MSG

"CHINESE RESTAURANT SYNDROME" For a historical review of dietary habits and related health problems, including "Chinese Restaurant Syndrome," please refer to the following link: <http://www.msg.org.uk>

NC(CC(=O)O)C(=O)O

GLUTAMIC ACID
Naturally occurring amino acid

NC(CC(=O)O)C(=O)[O-]

GLUTAMATE
Deprotonated form of glutamic acid

[Na+].[O-]C(=O)C(C(N)=O)C(=O)O

MONOSODIUM GLUTAMATE (MSG)
Sodium salt of glutamic acid

There is **NO CHEMICAL DIFFERENCE** between naturally occurring glutamate ions and the glutamate ions present in MSG. They've both treated exactly the same by our bodies.

GLUTAMATE GIVES FOODS AN 'UMAMI' FLAVOUR. FOODS WHICH NATURALLY CONTAIN FREE GLUTAMATE INCLUDE:

- TOMATOES (found in MSG)
- PARMESAN (found in MSG)
- MUSHROOMS (found in MSG)
- SOY SAUCE (found in MSG)
- POTATOES (found in MSG)

0.55 GRAMS PER DAY
Amount of MSG ingested by the average consumer in the UK

3 GRAMS AT ONCE
Amount of MSG without food needed to observe mild symptoms in a small number of people

DAILY WE INGEST 20-40 TIMES MORE
NATURALLY OCCURRING GLUTAMATE THAN WE DO MSG

SCIENTIFIC EVIDENCE Double-blind studies haven't found any links to unpleasant symptoms at normal dietary levels of MSG.

NEUROTOXICITY? Toxic dose requires amounts of 10-15g/kg body weight, and is similar to that of common table salt.

FLAVOUR WITHOUT? Natural or MSG makes little or no difference to taste, and is similar to natural MSG.

INJECTAL? Many concerns of MSG are based on the effects of injected MSG, not on oral ingestion, as normally we ingest it orally.

INJECTION VS. ORAL Studies that look at the effects of injected MSG may have been misleading, as normally we ingest it orally.

DECADES OF RESEARCH HAVE CONCLUDED:
THERE IS NO CLEAR EVIDENCE LINKING DIETARY LEVELS OF MSG TO UNPLEASANT SYMPTOMS

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VERY SMALL number of people may exhibit symptoms, *IF*:

- 3 grams MSG are taken all at once, **AND**
- Without food, on an empty stomach

You'd have to eat these amounts of food:

- 250 gm (8.8 oz.) parmesan cheese
- 300 gm (~ 10.5-oz.) soy sauce
- 4.2 Kg (~9.2 lb.) of tomatoes

WHY MSG is safe...and DESIRABLE

2 components:

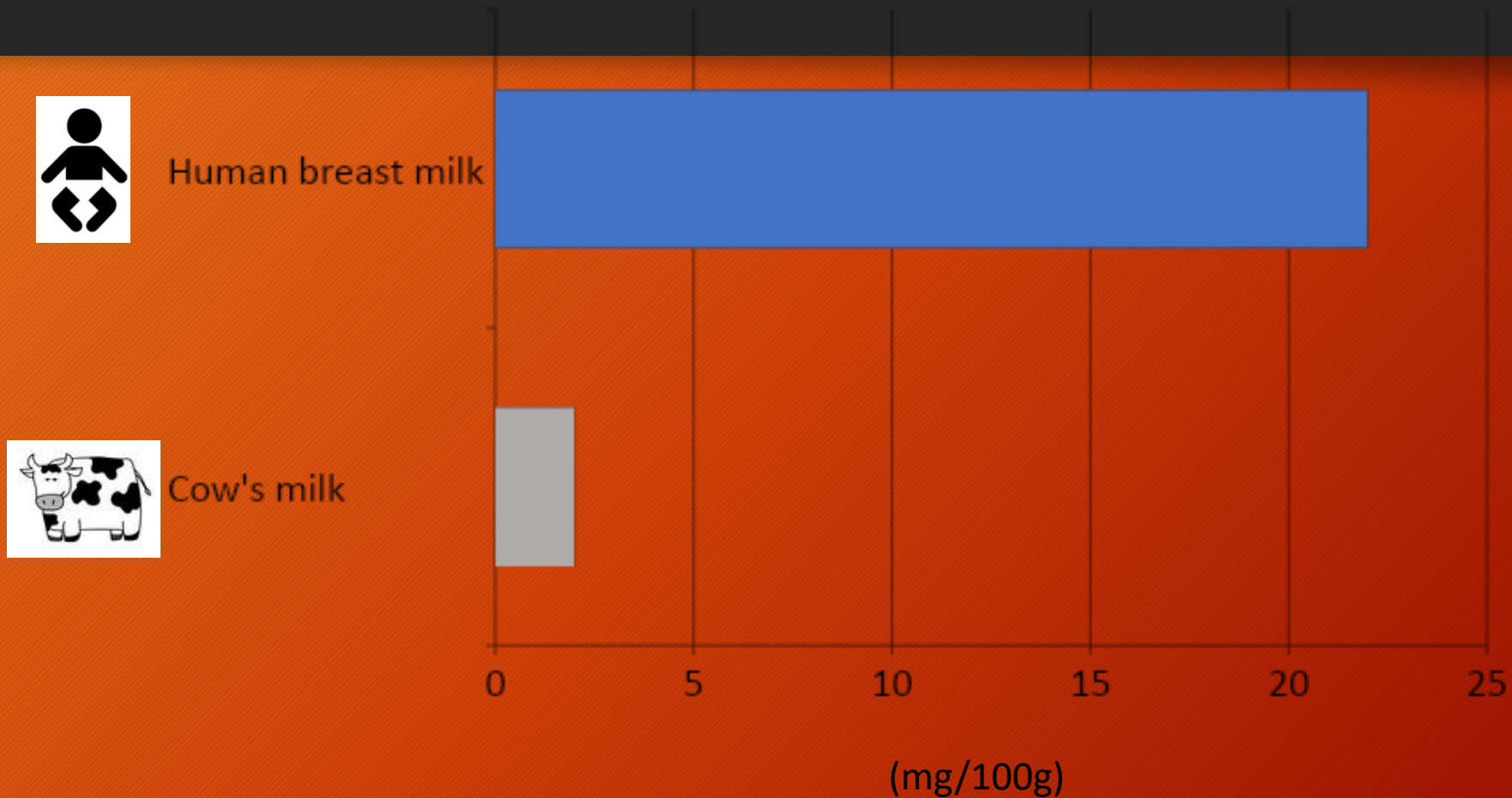
- Sodium & Glutamate
- Separates into a sodium molecule and the glutamate molecule in the presence of aqueous solutions (any time water is present)

Glutamate:

- An amino acid humans ALREADY MAKE internally
- Glutamate is part of EVERY protein food, both plant- and animal-based.

Sodium & glutamate are absorbed separately, same as with food

Human breast milk contains 10x the free glutamate as cow's milk



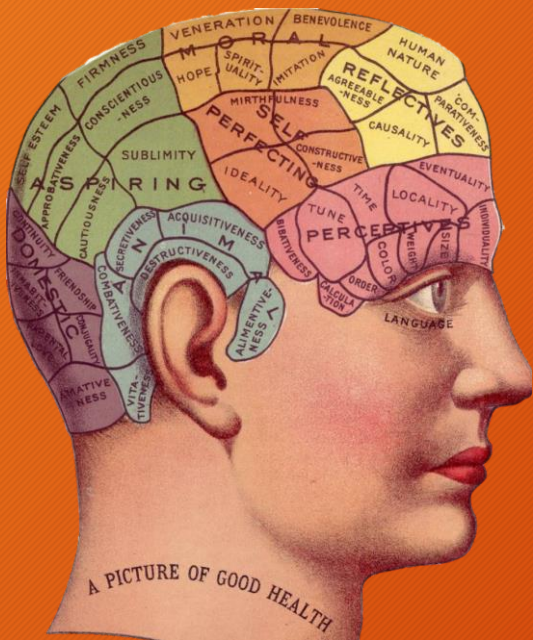
The Guts of Glutamate

>95% of glutamate is NEVER ABSORBED

Stays in the lower GI tract (colon)

Glutamate is the most prevalent amino acid in the gut - most of the dietary glutamate we eat is used as fuel by the cells in the digestive tract.

Umami taste receptors



Family of protein receptors responsible for discriminating between sweet, bitter, and umami tastes. Each taste bud has 50-100 “receptor” cells.

Recognition of a specific taste, like umami, by the receptor, triggers a cascade of signals. This causes the release of neurotransmitters that activate areas of the brain where taste is processed.

Umami receptors also help trigger the neurotransmitters involved in mediating the satiety response.

Because glutamate is present in so many essential foods, it's felt that this ability to detect the presence of glutamate as “umami” was essential for survival.

San Gabriel et al. AJCN 2009, 90(3):743S-746S

Zhang et al. Proceedings of the NAS, 105(52): 20930-20934.

Glutamate: “Tasted” By Other Organs

Umami “taste receptor” cells are present in other organs than the tongue (especially the gut & pancreas)

Instead of transmitting signals directly to the brain, they send signals that trigger the release of hormones that influence & regulate blood glucose levels, insulin levels, appetite, & satiety.

GLUTAMATE BENEFITS

The Fun Stuff

MSG Helps Increase Satiety

Carrot soup:

- Plain
- With added whey protein
- Both soups offered WITH and WITHOUT additional MSG (5 gm)

Meal given 2 hours after the soup

RESULTS:

- Food intake was similar for all groups, BUT, subjective appetite was significantly lower only after the soup with added protein AND MSG.
- Soup with *added protein AND MSG*: reduced blood glucose levels and increased post-treatment insulin level, even though food intake was the same.

How Does MSG Work to Increase Satiety?

Anderson et al 2017 Appetite: “MSG increased fullness and reduced desire to eat, as well as subjective appetite, and when added to protein decreased blood glucose and increased insulin.”

Protein has long been known to promote satiety. The ability to taste glutamate (umami) may be a way of detecting the presence of protein in foods, and this may contribute to satiety. E.g. glutamate may be a “proxy” for the presence of protein.

2019 Dietary Reference Intakes for Sodium

All ages, male and female:

- 2,300 mg/day, maximum, for chronic disease risk reduction

Children 9-13 years:

- “Reduce intake if above 1,800 mg/day.”

Children 4-8 years:

- “Reduce intake if above 1,500 mg/day.”

Children 1-3 years:

- “Reduce intake if above 1,200 mg/day.”



IOM Sodium Reduction Strategy Report

Current sodium intake: >3,400 mg/day

According to the report, consumers:

- *“have gradually grown accustomed to saltier foods...but research indicates that this trend can be reversed as well. People's tastes can be reset to prefer less salty flavor through subtle reductions over time, studies show.”*



SODIUM: With MSG, Less IS More

MSG is LOWER in sodium than regular salt:

- 1 gm table salt: approx. 390 mg sodium
- 1 gm MSG: approx. 120 mg. sodium

Has 2/3 LESS sodium than regular salt

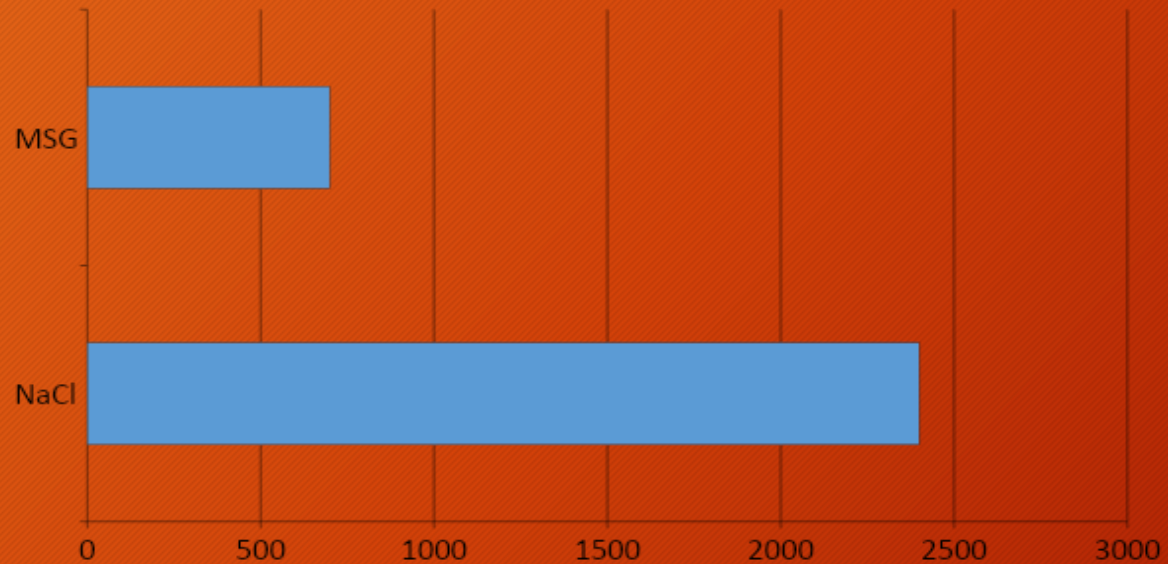
Useful tool for reducing dietary sodium while *improving* taste

MSG can help people achieve dietary goals

- Increases the palatability of vegetables & legumes



Sodium in Salt vs. MSG (1 tsp.)



1/2 MSG, 1/2 Salt = 40% sodium reduction

Summary: Why Use MSG



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- Safety of MSG:
 - Repeatedly reviewed & verified by global regulatory agencies
 - GRAS status in the US.
 - REMOVED AS A HEADACHE TRIGGER by the International Headache Society



Summary: Why Use MSG



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Glutamate is naturally present in numerous foods (cheese, tomatoes, mushrooms, meat, breast milk)



It's added as a seasoning to many dishes and savory snacks.

Glutamate **ENHANCES** the flavor of foods because it adds **UMAMI**, one of the 5 basic tastes.

MSG has **2/3 LESS** sodium than table salt, while **ENHANCING FLAVOR &** decreasing the need for salt by up to 40%



Summary: Why Use MSG

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Glutamate: present in numerous common foods

Used as a seasoning in savory foods

ENHANCES flavor by adding *umami*

Contains 2/3 LESS sodium

ENHANCES flavor while **REDUCING** sodium



WHERE CAN YOU FIND PURE MSG?



“Anywhere fine foods are sold”

ADDITIONAL RESOURCES

WhyUseMSG.com

MSGFacts.com



**THANK YOU!
QUESTIONS?**

WWW.CUTTOTHECHASENUTRITION.COM



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