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### **Expert Opinion: Monosodium Glutamate**

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Monosodium glutamate is a flavor enhancer that is added to many foods but which also occurs naturally. MSG is the sodium salt of one of the most common amino acids in the human body. The breakdown of proteins can result in the formation of free glutamate, also known as monosodium glutamate (MSG) when combined with sodium. In this case, the presence of MSG does not need to be disclosed on the label; MSG only has to be labeled when added as a direct ingredient per federal regulation.

MSG occurs naturally in virtually all foods. A study from the U.S. Food and Drug Administration measured levels of free, naturally-occurring glutamate in variety of foods some of which are listed below (1):

Fresh tomatoes	2270 ppm
Tomato paste	6240-6360 ppm
Corn	240-500 ppm
Parmesan cheese	3640-12,700 ppm
Soy sauce	490-10,200 ppm

Reports of MSG sensitivity have existed for many years (2, 3). The classic example of MSG sensitivity is the MSG-Symptom Complex, formerly called the "Chinese Restaurant Syndrome", a mild, subjective, and transient syndrome characterized by 1) a burning sensation of the back of the neck, forearms and chest; 2) facial pressure or tightness; 3) chest pain; 4) headaches; 5) nausea; 6) upper body tingling and weakness; 7) palpitations; 8) numbness in the back of the neck, arms, and back; 9) bronchospasm (in asthmatics only), and 10) drowsiness (2). Numerous human challenge trials have been conducted in an attempt to confirm the existence of the MSG-Symptom Complex.

Most subjects experienced no symptoms or no differences existed in the frequency of reactions to MSG versus placebos. A few individuals may react with such mild, subjective symptoms when exposed to doses of MSG in excess of 3 g (2, 3). While it is not impossible to ingest 3 g of MSG in a single meal, it would be a very uncommon occurrence. Further, symptoms have only occurred in the absence of food. In a study of 130 individuals with self-reported reactions to MSG who participated in a double-blind, placebo-controlled challenge protocol that used up to 5 gm of MSG given without food, symptoms were more common (38.5%) with MSG compared to placebo (13.1%) (4). However, on subsequent rechallenge, the results were inconsistent (4). The responses were not observed when MSG was given with food (4).

What does all of this mean? In our expert opinion, the MSG-Symptom Complex has not been firmly established and, if it occurs at all, it occurs only at very high levels of human exposure, i.e. >2.5-3 gm in the absence of food. An expert panel formed by the Federation of American Societies for Experimental Biology (FASEB) with sponsorship of the U.S. Food & Drug Administration arrived at the very same interpretation of the data.

MSG ingestion has also been linked to asthma (5, 6). A total of 29 cases of MSG-induced asthma have been reported in the medical literature (6). However, there is only one report of MSG-induced asthma that was confirmed in a rigorously controlled, double-blind challenge study (7). The remainder of the cases are anecdotal reports or reports of single-blind challenges performed in patients with a history of unstable asthma and conducted with placebos administered first in the challenge sequence (research with such subjects and other agents has demonstrated a distinct order effect where the last substance administered is the one most likely to elicit a reaction no matter what it is; in such circumstances, the conclusion would be that the reaction is a result of the unstable asthma rather than the agent being administered) (5, 6). Any positive responses have tended to occur following challenge with rather large doses of MSG of 2 g or more. In a study of 100 asthmatics (30 with a history of asthma attacks after eating MSG containing foods and 70 with a negative history of MSG-induced asthma) undergoing challenge with up to 2.5 gm of MSG, compared to placebo, no significant response in lung function was observed (8). Thus, even in history positive patients, the existence of MSG-induced asthma has not been conclusively established (9).

Other reactions have also been attributed to MSG ingestion. However, most of these reports were either anecdotal or were conducted with very poor experimental designs. Kenney (10), in a rigorous double-blind, placebo-controlled study, failed to confirm MSG as a cause of severe symptoms in six subjects reporting histories of severe reactions attributed to MSG.

In summary, no evidence exists to suggest that adverse reactions occur to the level of MSG found in the typical consumer's diet either as the naturally occurring amino acid or as a result of its use as a flavor enhancer. The existing evidence certainly indicates that free glutamic acid/MSG is safe for consumption for the vast majority of consumers. If any adverse reactions occur at all, they occur only in rarely encountered individuals who ingest very high amounts of MSG on an empty stomach. Many foods contain natural high levels of free glutamic acid.

#### **References:**

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