German Federal Institute for Risk Assessment

Glutamic acid and glutamates (E 620–E 625): Assessment of health effects through their use as food additives

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"MSG free" – this is how many foods are now being advertised. MSG stands for Monosodium glutamate, but there are actually several types of glutamates that may be used as food additives. These glutamates are the salts of glutamic acid. All of these glutamic compounds give dishes a heartier and enhanced taste. Due to numerous enquiries on this topic, the Federal Institute for Risk Assessment (BfR) hereby shares its state of knowledge on the health assessment of this additive group.

In 2017, the European Food Safety Authority (EFSA) evaluated the use of glutamic acid (E 620) and glutamates as food additives E 621–E 625. EFSA derived an Acceptable Daily Intake (ADI) of 30 mg per kg body weight and day.

EFSA estimated the intake levels of glutamic acid and glutamates, arriving at the following results: At moderate consumption levels of foods containing glutamates as additives as well as naturally occurring or added glutamic acid, all age groups except people aged 65 and over may exceed the ADI. At high consumption levels, all age groups exceed the ADI. The ADI value was derived from animal studies since available human data could not identify any dose-effect relationships.

The use of glutamates as food additives is permitted throughout the EU. People intending to reduce their glutamate intake can check foods' list of ingredients to see if glutamate is listed as an additive and limit the consumption of such products. It should be noted, however, that glutamic acid also occurs naturally in food as a component of proteins and in free form. The BfR continues to advise against using glutamate as a substitute for table salt.

In 2017, the European Food Safety Authority (EFSA) evaluated the use of glutamic acid (E 620) and glutamates (E 621–E 625) as food additives. Glutamates are monosodium glutamate (E 621), monopotassium glutamate (E 622), calcium diglutamate (E 623), monoammonium glutamate (E 624) and magnesium diglutamate (E 625). The evaluation was carried out through the programme to re-evaluate authorised food additives under Regulation (EU) No 257/2010. In doing so, EFSA also considered human data, including data on potential hypersensitivity reactions. However, as these human data were not suitable to identify relevant dose-effect relationships, EFSA did not use them to derive an acceptable daily intake (ADI). The ADI was derived from animal studies, as was done for many other food additives.

For glutamic acid and glutamates (E 620–E 625), a group ADI of 30 mg/kg body weight (bw) per day, expressed as glutamic acid, was derived. If this intake level is exceeded over a longer period of time, adverse effects may occur.

Some clinical reports have described adverse health effects in humans after ingestion of monosodium glutamate (MSG). Sensitive individuals may experience one or more symptoms of the so-called MSG symptom complex, including a burning sensation in the neck, chest pain, nausea, palpitations and weakness, at intakes as low as 42.9 mg/kg bw per day. Higher intakes have been associated with headache (> 85.8 mg/kg bw and day), insulin elevation (> 143 mg/kg bw and day) and increased blood pressure (> 150 mg/kg bw and day).

According to EFSA exposure estimates, at moderate consumption levels of foods containing naturally occurring and added glutamic acid and glutamates as food additives, all age groups

except people aged 65 and above may exceed the ADI. At high levels of consumption, people of all age groups may exceed the ADI. Infants and children can reach intake levels associated with the MSG symptom complex even at moderate consumption levels. However, EFSA has also indicated the need for further data on the possible sources of glutamic acid and glutamates to assess the calculated high intake levels in infants.

It should also be noted that glutamic acid occurs naturally in food as a component of proteins and in free form. Comparatively high levels (in some cases more than 10 g per kg) have been reported for various types of cheese, for example.

Taking EFSA's 2017 opinion into account, the European Commission asked interested economic agents to provide more detailed data on glutamic acid and glutamates by 13 January 2020: They were asked to detail their actual usage and use levels of glutamic acid and glutamates (E 620–E 625) as food additives, and to explain technological necessity. Also, the use of glutamic acids and glutamates as nutrients should be documented along with their occurrence in foods and food ingredients such as yeast extract, soy sauce and protein hydrolysates. As far as the BfR is aware, the data submitted are currently being evaluated at EU level.

In its opinion of 16 July 2003, the BfR advised against using glutamate as a salt substitute. In view of the EFSA opinion and the exposure estimate described therein, this recommendation still applies. Nevertheless, the use of glutamic acid and glutamates (E 620–E 625) in salt substitutes is permitted under Regulation (EC) No 1333/2008. The "quantum satis" principle applies here, according to which the substances "shall be used at a level not higher than is necessary to achieve the intended purpose and provided the consumer is not misled" (Regulation (EC) No. 1333/2008).

Whether these and other regulations on glutamic acid and glutamates (E 620–E 625) can be maintained against the background of the EFSA assessment and the submitted data from industry is currently being reviewed at EU level by the responsible risk managers (European Commission and member states).

EFSA statement: https://www.efsa.europa.eu/en/efsajournal/pub/4910

Further Information on the BfR website on glutamic acids

Opinion (16.07.2003): Hypersensitivity reactions due to glutamate in foods (in German)

https://www.bfr.bund.de/cm/343/ueberempfindlichkeitsreaktionen_durch_glutamat_in_lebensmitteln.pdf

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