This is provisional English translation of an excerpt from the original full report.

Risk Assessment Report

Magnesium stearate

(Food Additives)

Food Safety Commission of Japan (FSCJ)
November 2016

ABSTRACT

FSCJ conducted a risk assessment of magnesium stearate (CAS No. 557-04-0, as magnesium stearate), a food additive used as manufacturing agent, based on results from various studies.

The data used in the assessment include genotoxicity, repeated dose toxicity, carcinogenicity and reproductive and developmental toxicities as well as human data on magnesium stearate, calcium stearate, stearic acid and magnesium salt as test substances.

1. Pharmokinetics

FSCJ took into consideration the pharmokinetic studies of magnesium stearate, calcium stearate and magnesium salt to assess the pharmokinetics of magnesium stearate as an additive because upon ingestion a part of magnesium stearate is likely to be dissociated into magnesium ion and stearic acid anion.

In the lumen of small intestine, dietary triacylglycerols are degraded into free fatty acids and monoacylglycerols, then absorbed. Some fatty acids undergo the beta-oxidation and are stored in the adipose tissue as triacylglycerols. FSCJ considered that stearic acid, dissociated from food additive magnesium stearate, is absorbed and metabolized in the body in the same manner as stearic acid from dietary triacylglycerols.

As for magnesium, FSCJ considered it appropriate to refer to the findings from a recent review by Blaine et al. Two articles in Japanese subjects (Suzuki and Nishimura, 1984 as well as Kamiya, 1956) were also available, but were not respected to because long time has passed since these studies were completed, statistical analysis has not been performed, and their scientific opinion is comparably different from today's theory. According to Blaine et al., the total body magnesium content in adults is approximately 24g, and normal total serum magnesium concentration is in the range of 0.7-1.1 mmpl (1.7-2.6 mg/dl).

FSCJ considered that focus should be paid on magnesium homeostasis because serum magnesium concentration is regulated by interplay between intestinal and renal transport as well as bone exchange. Furthermore, magnesium transporters and transport processes have been identified.

On the basis of the findings of calcium stearate, FSCJ considered that magnesium stearate in the form of metal soap, which is not separated into magnesium cation and stearic acid anion, is not absorbed within the intestinal tract but excreted in feces.

2. Toxicity

Taking into account the pharmokinetics of magnesium stearate, FSCJ assessed the toxicity of the additive considering various toxicity studies of stearic acid and other magnesium salts as necessary.

FSCJ judged that the additive magnesium stearate has no genotoxicity relevant to human health.

FSCJ evaluated the results of repeated dose toxicity as well as reproductive and developmental toxicity studies of magnesium stearate as a test substance, and concluded that the study designs were not adequate to derive no observed adverse effect level (NOAEL), however, noted that attention should be paid on the fact that no toxicological effects were observed in the highest dose group at a concentration of 5% in the repeated dose toxicity study.

NOAEL could not be derived either on repeated dose toxicity study of stearate owing to limitation of the study design.

FSCJ evaluated the acute toxicity, repeated dose toxicity, carcinogenicity, reproductive and developmental toxicity studies of magnesium salt. NOAELs were derived from several of the studies, and the lowest NOAEL was 37 mg/kg bw/day in a 90-day repeated dose toxicity study in rats (Takizawa et al., 2005). FSCJ concluded that the item does not pose safety concerns because all of the NOAELs derived exceeded the tolerable upper intake levels (ULs) (350 mg/adult/day, 6.4 mg/kg bw/day for adult and 5mg/kg bw/day for children) established in the Dietary Reference Intakes for Japanese (2015) or by Institute of Medicine (IOM).

3. Estimated daily intake

FSCJ estimated the daily intake of magnesium stearate to be 246 mg/person/day (equivalent to 4.46 mg/kg bw/day) if the standard for magnesium stearate, as an additive, is revised. On the basis of the estimated daily intake of magnesium stearate, FSCJ estimated that daily intake of stearic acid and magnesium contained in additive magnesium stearate to be 237 mg/person/day (equivalent to 4.30 mg/kg bw/day) and 10.2 mg/person/day (equivalent to 0.185 mg/kg bw/day), respectively.

Stearic acid and magnesium are dietary nutrients. Therefore, FSCJ estimated daily intake of stearic acid and magnesium from food sources to be 3.26 g/person/day and 246 mg/person/day, respectively.

4. Conclusion

FSCJ judged that magnesium stearate has no genotoxicity relevant to human health, and therefore considered it possible to specify an acceptable daily intake (ADI).

A NOAEL could not be derived from the repeated dose toxicity study of magnesium stearate. However, toxic effect was not observed in the highest dose group (ratio of the substance to the feed is 5%) described in the Guidelines for the Risk Assessment of Food Additives[1].

The NOAELs derived from toxicity studies of magnesium salts all exceeded both the ULs established in the dietary reference intakes for Japanese (2015) and by IOM. A NOAEL could not be derived from repeated dose toxicity study of stearic acid.

Magnesium stearate did not show apparent toxicological effects in repeated dose studies where sufficiently high dose is administered compared to the estimated daily intake. Stearic acid and magnesium are dietary nutrients with a long history of human consumption. The estimated daily intakes of stearic acid and magnesium used in food additives are significantly lower than those from food sources.

Based on the above, the assessed item is considered to be of no concern for food safety as long as used appropriately as a food additive, and FSCJ concluded that it is not necessary to specify the ADI.

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[1] Guidelines for the Risk Assessment of Food Additives (Decision of the Commission dated May 2010): When the substance is administered by feeding, care should be taken to prevent nutritional disturbance. In general, the ratio of the substance to the feed does not have to exceed 5% (W/W).