

SCIENTIFIC OPINION

Scientific Opinion on the substantiation of health claims related to methylsulfonylmethane alone or in combination with glucosamine hydrochloride and maintenance of joints (ID 395, 1616, 1617) pursuant to Article 13(1) of Regulation (EC) No 1924/2006¹

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)²

European Food Safety Authority (EFSA), Parma, Italy

SUMMARY

Following a request from the European Commission, the Panel on Dietetic Products, Nutrition and Allergies was asked to provide a scientific opinion on a list of health claims pursuant to Article 13 of Regulation 1924/2006. This opinion addresses the scientific substantiation of health claims in relation to methylsulfonylmethane, either alone or in various combinations with glucosamine hydrochloride and the maintenance of joints. The scientific substantiation is based on the information provided by the Member States in the consolidated list of Article 13 health claims and references that EFSA has received from Member States or directly from stakeholders.

The food constituent that is the subject of the health claims is methylsulfonylmethane, either alone or in combination with glucosamine hydrochloride. The Panel considers that methylsulfonylmethane and glucosamine hydrochloride are sufficiently characterised.

The claimed effects are “joint health” and “joint support”. The Panel assumes that the target population is the general population. The Panel considers that maintenance of normal joints is beneficial to human health.

In weighing the evidence, the Panel took into account that the evidence provided does not establish that patients with osteoarthritis are representative of the general population with respect to the status of joint tissues, or that results obtained in studies on subjects with osteoarthritis can be extrapolated to the maintenance of normal joints in the general population.

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2 Panel members: Jean-Louis Bresson, Albert Flynn, Marina Heinonen, Karin Hulshof, Hannu Korhonen, Pagona Lagiou, Martinus Løvik, Rosangela Marchelli, Ambroise Martin, Bevan Moseley, Hildegard Przyrembel, Seppo Salminen, Sean (J.J.) Strain, Stephan Strobel, Inge Tetens, Henk van den Berg, Hendrik van Loveren and Hans Verhagen.
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On the basis of the data available, the Panel concludes that a cause and effect relationship has not been established between the consumption of methylsulfonylmethane, either alone or in combination with glucosamine hydrochloride, and the maintenance of normal joints.

KEY WORDS

Methylsulfonylmethane, glucosamine hydrochloride, joints, health claims.

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The members of the Claims Sub-Working Group on Bone/Teeth/Connective Tissue: Rikke Andersen, Olivier Bruyère, Albert Flynn, Ingegerd Johansson, Jukka Meurman and Hildegard Przyrembel.

INFORMATION AS PROVIDED IN THE CONSOLIDATED LIST

The consolidated list of health claims pursuant to Article 13 of Regulation (EC) No 1924/2006³ submitted by Member States contains main entry claims with corresponding conditions of use and literature from similar health claims. The information provided in the consolidated list for the health claims which are the subject of this opinion is tabulated in Appendix C.

ASSESSMENT

1. Characterisation of the food/constituent

The food constituent that is the subject of the health claims is methylsulfonylmethane (MSM), either alone or in combination with glucosamine hydrochloride.

MSM is about one-third sulphur and a metabolite of dimethylsulfoxide (DMSO).

Glucosamine is an amino monosaccharide where a hydroxyl group (-OH) is replaced with an amino group (-NH₂) (2-amino-2-deoxy-D-glucose). The raw material is derived from chitin, a biopolymer present in the exoskeleton of marine invertebrate animals (Foot and Mulholland, 2005). Glucosamine is usually formulated as the hydrochloride salt or as glucosamine sulphate.

The Panel considers that the food constituent, MSM, either alone or in combination with glucosamine hydrochloride, is sufficiently characterised.

2. Relevance of the claimed effect to human health

The claimed effects are “joint health” and “joint support”. The Panel assumes that the target population is the general population.

In the context of the proposed wordings, the Panel notes that these claimed effects relate to the maintenance of normal joints.

The Panel considers that maintenance of normal joints is beneficial to human health.

3. Scientific substantiation of the claimed effect

Two systematic reviews and two double-blind, placebo-controlled trials have been provided for the substantiation of the claimed effect (Usha and Naidu, 2004; Kim et al., 2006; Ameye and Chee, 2006; Brien et al., 2008).

All the human studies presented on the effects of MSM, either alone or in combination with glucosamine hydrochloride, on joint health (e.g. joint pain, joint structure/function) have been conducted in patients with clinical diagnosis of (primarily knee) osteoarthritis (OA). OA is the most common joint disease worldwide (Issa and Sharma, 2006; Corti and Rigon, 2003; Arden and Nevitt, 2006) and a major cause of disability (Hunter et al., 2008; Pollard and Johnston, 2006; Sarzi-Puttini et al., 2005; Ethgen et al., 2004).

The Panel considers that the evidence provided does not establish that patients with OA are representative of the general population with regard to the status of joint tissues, or that results

³ Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. OJ L 404, 30.12.2006, p. 9–25.

obtained in studies on subjects with OA relating to the treatment of symptoms of this disease (e.g. erosion of articular cartilage, reduced mobility of joints) can be extrapolated to the maintenance of normal joints in the general population.

The Panel concludes that a cause and effect relationship has not been established between the consumption of MSM, either alone or in combination with glucosamine hydrochloride, and the maintenance of normal joints.

CONCLUSIONS

On the basis of the data presented, the Panel concludes that:

- The food constituent, MSM, either alone or in combination with glucosamine hydrochloride, which is the subject of the health claims, is sufficiently characterised.
- The claimed effects are “joint health” and “joint support.” The target population is assumed to be the general population. Maintenance of normal joints is beneficial to human health.
- A cause and effect relationship has not been established between the consumption of MSM, either alone or in combination with glucosamine hydrochloride, and the maintenance of normal joints.

DOCUMENTATION PROVIDED TO EFSA

Health claims pursuant to Article 13 of Regulation (EC) No 1924/2006 (No: EFSA-Q-2008-1182, EFSA-Q-2008-2352, EFSA-Q-2008-2353). The scientific substantiation is based on the information provided by the Member States in the consolidated list of Article 13 health claims and references that EFSA has received from Member States or directly from stakeholders.

The full list of supporting references as provided to EFSA is available on: <http://www.efsa.europa.eu/panels/nda/claims/article13.htm>

REFERENCES

- Ameye LG and Chee WS, 2006. Osteoarthritis and nutrition. From nutraceuticals to functional foods: a systematic review of the scientific evidence. *Arthritis Res. Ther.* 8, R127.
- Arden N and Nevitt MC, 2006. Osteoarthritis: epidemiology. *Best Pract. Res. Clin. Rheumatol.* 20, 3-25.
- Brien S, Prescott P, Bashir N, Lewith H, Lewith G, 2008. Systematic review of the nutritional supplements dimethyl sulfoxide (DMSO) and methylsulfonylmethane (MSM) in the treatment of osteoarthritis. *Osteoarthritis Cartilage* 16, 1277-1288.
- Corti MC and Rigon C, 2003. Epidemiology of osteoarthritis: prevalence, risk factors and functional impact. *Ageing-Clinical & Experimental Research* 15, 359-363.
- Ethgen O, Vanparijs P, Delhalle S, Rosant S, Bruyere O, Reginster JY, 2004. Social support and health-related quality of life in hip and knee osteoarthritis. *Qual. Life Res.* 13, 321-330.
- Foot M and Mulholland M, 2005. Classification of chondroitin sulfate A, chondroitin sulfate C, glucosamine hydrochloride and glucosamine 6 sulfate using chemometric techniques. *J. Pharm. Biomed. Anal.* 38, 397-407.
- Hunter DJ, McDougall JJ, Keefe FJ, 2008. The symptoms of osteoarthritis and the genesis of pain. *Rheum. Dis. Clin. North. Am.* 34, 623-643.

- Issa SN and Sharma L, 2006. Epidemiology of osteoarthritis: an update. *Curr. Rheumatol. Rep.* 8, 7-15.
- Kim LS, Axelrod LJ, Howard P, Buratovich N, Waters RF, 2006. Efficacy of methylsulfonylmethane (MSM) in osteoarthritis pain of the knee: a pilot clinical trial. *Osteoarthritis Cartilage* 14, 286-294.
- Pollard B and Johnston M, 2006. The assessment of disability associated with osteoarthritis. *Curr. Opin. Rheumatol.* 18, 531-536.
- Sarzi-Puttini P, Cimmino MA, Scarpa R, Caporali R, Parazzini F, Zaninelli A, Atzeni F, Canesi B, 2005. Osteoarthritis: an overview of the disease and its treatment strategies. *Arthritis Rheum.* 35 (1 Suppl 1), 1-10.
- Usha PR and Naidu MU, 2004. Randomised, Double-Blind, Parallel, Placebo-Controlled Study of Oral Glucosamine, Methylsulfonylmethane and their Combination in Osteoarthritis. *Clin. Drug. Investig.* 24, 353-363.

APPENDICES

APPENDIX A

BACKGROUND AND TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

The Regulation 1924/2006 on nutrition and health claims made on foods⁴ (hereinafter "the Regulation") entered into force on 19th January 2007.

Article 13 of the Regulation foresees that the Commission shall adopt a Community list of permitted health claims other than those referring to the reduction of disease risk and to children's development and health. This Community list shall be adopted through the Regulatory Committee procedure and following consultation of the European Food Safety Authority (EFSA).

Health claims are defined as "any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health".

In accordance with Article 13 (1) health claims other than those referring to the reduction of disease risk and to children's development and health are health claims describing or referring to:

- a) the role of a nutrient or other substance in growth, development and the functions of the body; or
- b) psychological and behavioural functions; or
- c) without prejudice to Directive 96/8/EC, slimming or weight-control or a reduction in the sense of hunger or an increase in the sense of satiety or to the reduction of the available energy from the diet.

To be included in the Community list of permitted health claims, the claims shall be:

- (i) based on generally accepted scientific evidence; and
- (ii) well understood by the average consumer.

Member States provided the Commission with lists of claims as referred to in Article 13 (1) by 31 January 2008 accompanied by the conditions applying to them and by references to the relevant scientific justification. These lists have been consolidated into the list which forms the basis for the EFSA consultation in accordance with Article 13 (3).

ISSUES THAT NEED TO BE CONSIDERED

IMPORTANCE AND PERTINENCE OF THE FOOD⁵

Foods are commonly involved in many different functions⁶ of the body, and for one single food many health claims may therefore be scientifically true. Therefore, the relative importance of food e.g. nutrients in relation to other nutrients for the expressed beneficial effect should be considered: for functions affected by a large number of dietary factors it should be considered whether a reference to a single food is scientifically pertinent.

⁴ OJ L12, 18/01/2007

⁵ The term 'food' when used in this Terms of Reference refers to a food constituent, the food or the food category.

⁶ The term 'function' when used in this Terms of Reference refers to health claims in Article 13(1)(a), (b) and (c).

It should also be considered if the information on the characteristics of the food contains aspects pertinent to the beneficial effect.

SUBSTANTIATION OF CLAIMS BY GENERALLY ACCEPTABLE SCIENTIFIC EVIDENCE

Scientific substantiation is the main aspect to be taken into account to authorise health claims. Claims should be scientifically substantiated by taking into account the totality of the available scientific data, and by weighing the evidence, and shall demonstrate the extent to which:

- (a) the claimed effect of the food is beneficial for human health,
- (b) a cause and effect relationship is established between consumption of the food and the claimed effect in humans (such as: the strength, consistency, specificity, dose-response, and biological plausibility of the relationship),
- (c) the quantity of the food and pattern of consumption required to obtain the claimed effect could reasonably be achieved as part of a balanced diet,
- (d) the specific study group(s) in which the evidence was obtained is representative of the target population for which the claim is intended.

EFSA has mentioned in its scientific and technical guidance for the preparation and presentation of the application for authorisation of health claims consistent criteria for the potential sources of scientific data. Such sources may not be available for all health claims. Nevertheless it will be relevant and important that EFSA comments on the availability and quality of such data in order to allow the regulator to judge and make a risk management decision about the acceptability of health claims included in the submitted list.

The scientific evidence about the role of a food on a nutritional or physiological function is not enough to justify the claim. The beneficial effect of the dietary intake has also to be demonstrated. Moreover, the beneficial effect should be significant i.e. satisfactorily demonstrate to beneficially affect identified functions in the body in a way which is relevant to health. Although an appreciation of the beneficial effect in relation to the nutritional status of the European population may be of interest, the presence or absence of the actual need for a nutrient or other substance with nutritional or physiological effect for that population should not, however, condition such considerations.

Different types of effects can be claimed. Claims referring to the maintenance of a function may be distinct from claims referring to the improvement of a function. EFSA may wish to comment whether such different claims comply with the criteria laid down in the Regulation.

WORDING OF HEALTH CLAIMS

Scientific substantiation of health claims is the main aspect on which EFSA's opinion is requested. However, the wording of health claims should also be commented by EFSA in its opinion.

There is potentially a plethora of expressions that may be used to convey the relationship between the food and the function. This may be due to commercial practices, consumer perception and linguistic or cultural differences across the EU. Nevertheless, the wording used to make health claims should be truthful, clear, reliable and useful to the consumer in choosing a healthy diet.

In addition to fulfilling the general principles and conditions of the Regulation laid down in Article 3 and 5, Article 13(1)(a) stipulates that health claims shall describe or refer to "the role of a nutrient or other substance in growth, development and the functions of the body". Therefore, the requirement to

describe or refer to the 'role' of a nutrient or substance in growth, development and the functions of the body should be carefully considered.

The specificity of the wording is very important. Health claims such as "Substance X supports the function of the joints" may not sufficiently do so, whereas a claim such as "Substance X helps maintain the flexibility of the joints" would. In the first example of a claim it is unclear which of the various functions of the joints is described or referred to contrary to the latter example which specifies this by using the word "flexibility".

The clarity of the wording is very important. The guiding principle should be that the description or reference to the role of the nutrient or other substance shall be clear and unambiguous and therefore be specified to the extent possible i.e. descriptive words/ terms which can have multiple meanings should be avoided. To this end, wordings like "strengthens your natural defences" or "contain antioxidants" should be considered as well as "may" or "might" as opposed to words like "contributes", "aids" or "helps".

In addition, for functions affected by a large number of dietary factors it should be considered whether wordings such as "indispensable", "necessary", "essential" and "important" reflects the strength of the scientific evidence.

Similar alternative wordings as mentioned above are used for claims relating to different relationships between the various foods and health. It is not the intention of the regulator to adopt a detailed and rigid list of claims where all possible wordings for the different claims are approved. Therefore, it is not required that EFSA comments on each individual wording for each claim unless the wording is strictly pertinent to a specific claim. It would be appreciated though that EFSA may consider and comment generally on such elements relating to wording to ensure the compliance with the criteria laid down in the Regulation.

In doing so the explanation provided for in recital 16 of the Regulation on the notion of the average consumer should be recalled. In addition, such assessment should take into account the particular perspective and/or knowledge in the target group of the claim, if such is indicated or implied.

TERMS OF REFERENCE

HEALTH CLAIMS OTHER THAN THOSE REFERRING TO THE REDUCTION OF DISEASE RISK AND TO CHILDREN'S DEVELOPMENT AND HEALTH

EFSA should in particular consider, and provide advice on the following aspects:

- Whether adequate information is provided on the characteristics of the food pertinent to the beneficial effect.
- Whether the beneficial effect of the food on the function is substantiated by generally accepted scientific evidence by taking into account the totality of the available scientific data, and by weighing the evidence. In this context EFSA is invited to comment on the nature and quality of the totality of the evidence provided according to consistent criteria.
- The specific importance of the food for the claimed effect. For functions affected by a large number of dietary factors whether a reference to a single food is scientifically pertinent.

In addition, EFSA should consider the claimed effect on the function, and provide advice on the extent to which:

- the claimed effect of the food in the identified function is beneficial.

- a cause and effect relationship has been established between consumption of the food and the claimed effect in humans and whether the magnitude of the effect is related to the quantity consumed.
- where appropriate, the effect on the function is significant in relation to the quantity of the food proposed to be consumed and if this quantity could reasonably be consumed as part of a balanced diet.
- the specific study group(s) in which the evidence was obtained is representative of the target population for which the claim is intended.
- the wordings used to express the claimed effect reflect the scientific evidence and complies with the criteria laid down in the Regulation.

When considering these elements EFSA should also provide advice, when appropriate:

- on the appropriate application of Article 10 (2) (c) and (d) in the Regulation, which provides for additional labelling requirements addressed to persons who should avoid using the food; and/or warnings for products that are likely to present a health risk if consumed to excess.

APPENDIX B

EFSA DISCLAIMER

The present opinion does not constitute, and cannot be construed as, an authorisation to the marketing of the food/food constituent, a positive assessment of its safety, nor a decision on whether the food/food constituent is, or is not, classified as foodstuffs. It should be noted that such an assessment is not foreseen in the framework of Regulation (EC) No 1924/2006.

It should also be highlighted that the scope, the proposed wordings of the claims and the conditions of use as proposed in the Consolidated List may be subject to changes, pending the outcome of the authorisation procedure foreseen in Article 13(3) of Regulation (EC) No 1924/2006.

APPENDIX C

Table 1. Main entry health claims related to methylsulfonylmethane alone or in combination with glucosamine hydrochloride, including conditions of use from similar claims, as proposed in the Consolidated List.

ID	Food or Food constituent	Health Relationship	Proposed wording
395	Methylsulfonylmethane (MSM)	Joint health	Methylsulfonylmethane is important for the creation of collagen and proper formation of cartilage and bone tissue.
	Conditions of use - 500 mg for 12 weeks.		
1616	Methylsulfonylmethane (MSM)	Joint support	For joint maintenance Helps maintain proper functioning of joints, tendons and ligaments
	Conditions of use - 500 to 1000mg/day. - Food supplement with 500mg-6g of methyl sulphonyl methane in the daily dose. - Minimum 1500 mg/day Effective Dosage Range 1500-6000 mg/day. - 500 mg three times daily up to 3 g twice daily.		
1617	Methylsulfonylmethane (MSM) in combination with glucosamine HCl	Joint support - synergistic effect	Synergistic combination for joint maintenance
	Conditions of use - Number of nutrients/other substances that are essential to claimed effect: 5 Names of nutrient/other substances and Quantity in Average daily serving: 360 milligrams glucosamine sulphate, 275 milligrams chondroitin sulphate, 200 milligrams methylsulphonylmethane, 50milligrams devil's claw, 25milligrams vitamin C Weight of average daily food serving: 700 milligram(s) Daily amount to be consumed to produce claimed effect: 1400 milligram(s) Number of food portions this equates to in everyday food portions: 2 Are there factors that could interfere with bioavailability: Yes Please give reason: do not store above 25 degrees C Length of time after consumption for claimed effect to become apparent: 4-6 weeks Is there a limit to the amount of food which should be consumed in order to avoid adverse health effects: Don't Know - Glucosamine (1246.5mg/ day) + MSM (1500mg/day) - Number of nutrients/other substances that are essential to claimed effect: 4 Names of nutrient/other substances and Quantity in Average daily serving:200mg methylsulphonylsulphate, 275mg chondroitin sulphate, 350mg glucosamine sulphate, 25mg vitamin c Weight of average daily food serving: 400 milligram(s) Daily amount to be consumed to produce claimed effect: 800 milligram(s) Number of food portions this equates to in everyday food portions: 2 Are there factors that could interfere with bioavailability: Yes Please give reason: do not store above 25 degrees C Length of time after consumption		

	<p>for claimed effect to become apparent: 4-6 weeks Is there a limit to the amount of food which should be consumed in order to avoid adverse health effects: Don't Know</p> <ul style="list-style-type: none">- Tagesdosis: 500 mg–Erwachsene.- 200 mg pro Tag.
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GLOSSARY / ABBREVIATIONS

DMSO	Dimethylsulfoxide
MSM	Methylsulfonylmethane
OA	Osteoarthritis