SCIENTIFIC OPINION

Scientific Opinion on the substantiation of health claims related to hydroxypropyl methylcellulose (HPMC) and maintenance of normal bowel function (ID 812), reduction of post-prandial glycaemic responses (ID 814), maintenance of normal blood cholesterol concentrations (ID 815) and increase in satiety leading to a reduction in energy intake (ID 2933) pursuant to Article 13(1) of Regulation (EC) No 1924/2006[1]

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

This scientific output, published on 9 December 2010, replaces the earlier version published on 19 October 2010[4].

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 (EC) No 1924/2006. This opinion addresses the scientific substantiation of health claims in relation to hydroxypropyl methylcellulose (HPMC) and maintenance of normal bowel function, reduction of post-prandial glycaemic responses, maintenance of normal blood cholesterol concentrations and increase in satiety leading to a reduction in energy intake. The scientific substantiation is based on the information provided by the Member States in the consolidated list of

[1] On request from the European Commission, Question No EFSA-Q-2008-1599, EFSA-Q-2008-1601, EFSA-Q-2008-1602, EFSA-Q-2008-3665, adopted on 09 July 2010.

[2] Panel members: Carlo Agostoni, Jean-Louis Bresson, Susan Fairweather-Tait, Albert Flynn, Ines Golly, Hannu Korhonen, Pagona Lagiou, Martinus Løvik, Rosangela Marchelli, Ambroise Martin, Bevan Moseley, Monika Neuhäuser-Berthold, Hildegard Przyrembel, Seppo Salminen, Yolanda Sanz, Sean (J.J.) Strain, Stephan Strobel, Inge Tetens, Daniel Tomé, Hendrik van Loveren and Hans Verhagen. Correspondence: nda@efsa.europa.eu

[3] Acknowledgement: The Panel wishes to thank for the preparatory work on this scientific opinion: The members of the Working Group on Claims: Carlo Agostoni, Jean-Louis Bresson, Susan Fairweather-Tait, Albert Flynn, Ines Golly, Marina Heinonen, Hannu Korhonen, Martinus Løvik, Ambroise Martin, Hildegard Przyrembel, Seppo Salminen, Yolanda Sanz, Sean (J.J.) Strain, Inge Tetens, Hendrik van Loveren and Hans Verhagen. The members of the Claims Sub-Working Group on Gut/Immune: Maria Carmen Collado, Miguel Gueimonde, Daisy Jonkers, Martinus Løvik, Bevan Moseley, Maria Saarela, Seppo Salminen, Stephan Strobel, and Hendrik van Loveren. The members of the Claims Sub-Working Group on Cardiovascular Health/Oxidative Stress: Antti Aro, Marianne Geleijnse, Marina Heinonen, Ambroise Martin, Wilhelm Stahl and Henk van den Berg. The members of the Claims Sub-Working Group on Weight Management/Satiety/Glucose and Insulin Control/Physical Performance: Kees de Graaf, Joanne Harrold, Mette Hansen, Mette Kristensen, Anders Sjödin and Inge Tetens.

[4] After publication of this opinion, the following changes have been made in the summary of the opinion on page 2: "The Panel considers that maintenance of normal bowel function is a beneficial physiological effect." has been replaced with "The Panel considers that maintenance of normal bowel function might be a beneficial physiological effect." in order to reflect the conclusions of the NDA Panel as outlined in the main text of the opinion.

Suggested citation: EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA); Scientific Opinion on the substantiation of health claims related to hydroxypropyl methylcellulose (HPMC) and maintenance of normal bowel function (ID 812), reduction of post-prandial glycaemic responses (ID 814), maintenance of normal blood cholesterol concentrations (ID 815) and increase in satiety leading to a reduction in energy intake (ID 2933) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 2010;8(10):1739. [23 pp.]. doi:10.2903/j.efsa.2010.1739. Available online: www.efsa.europa.eu/efsajournal.htm

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 hydroxypropyl methylcellulose (HPMC). The Panel considers that hydroxypropyl methylcellulose (HPMC) is sufficiently characterised.

Maintenance of normal bowel function

The claimed effect is "bowel function". The target population is assumed to be the general population. In the context of the proposed wordings, the Panel assumes that the claimed effect refers to aspects of maintaining bowel regularity and maintaining normal bowel function. The Panel considers that maintenance of normal bowel function might be a beneficial physiological effect.

No references were provided from which conclusions could be drawn for the scientific substantiation of the claimed effect.

On the basis of the data presented, the Panel concludes that a cause and effect relationship has not been established between the consumption of HPMC and maintenance of normal bowel function.

Reduction of post-prandial glycaemic responses

The claimed effect is "uniform blood sugar levels". The target population is assumed to be individuals willing to reduce their post-prandial glycaemic responses. In the context of the proposed wordings, the Panel assumes that the claimed effect refers to a reduction of post-prandial glycaemic responses. The Panel considers that a reduction of post-prandial glycaemic responses (as long as post-prandial insulinaemic responses are not disproportionally increased) may be a beneficial physiological effect.

In weighing the evidence, the Panel took into account that one human intervention study adequately powered and conducted observed a significant effect of HPMC on the reduction of post-prandial glycaemic responses in obese non-diabetic men and women, that these results are supported by evidence obtained in non insulin-dependent diabetic subjects, and that evidence for a biologically plausible mechanism by which HPMC could exert the claimed effect has been provided.

The Panel concludes that a cause and effect relationship has been established between the consumption of HPMC and a reduction of post-prandial glycaemic responses.

The Panel considers that in order to obtain the claimed effect at least 4 g of HPMC per meal should be consumed. The target population is adults willing to reduce their post-prandial glycaemic responses.

Maintenance of normal blood cholesterol concentrations

The claimed effect is "maintenance of normal cholesterol levels". The target population is assumed to be the general population. In the context of the proposed wordings, the Panel assumes that the claimed effect refers to the maintenance of normal blood cholesterol concentrations. The Panel considers that maintenance of normal blood cholesterol concentrations is a beneficial physiological effect.

In weighing the evidence, the Panel took into account that in one study including 160 subjects with adequate follow-up (six weeks), viscous HPMC at daily doses of 5 to 7.5 g per day split in at least two doses had shown a significant reduction in serum total and LDL-cholesterol concentrations. The cholesterol-lowering effect had been documented also in some short-term intervention studies over 1-2 weeks at higher doses of intake, the effect appeared to be dose and viscosity-dependent, and that evidence for a biologically plausible mechanism by which HPMC could exert the claimed effect has been provided.

The Panel concludes that a cause and effect relationship has been established between the consumption of HPMC and maintenance of normal blood cholesterol concentrations.

The Panel considers that in order to obtain the claimed effect at least 5 g per day of HPMC should be consumed in two or more servings. The target population is adults.

Increase in satiety leading to a reduction in energy intake

The claimed effect is "satiety". The target population is assumed to be the general population. The Panel considers that an increase in satiety leading to a reduction in energy intake, if sustained, might be a beneficial physiological effect.

No references were provided from which conclusions could be drawn for the scientific substantiation of the claimed effect.

On the basis of the data presented, the Panel concludes that a cause and effect relationship has not been established between the consumption of HPMC and a sustained increase in satiety leading to a reduction in energy intake.

KEY WORDS

Hydroxypropyl methylcellulose (HPMC), bowel function, post-prandial glycaemic responses, blood cholesterol, satiety, energy intake, health claims.

TABLE OF CONTENTS

BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION

See Appendix A

TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

See Appendix A

EFSA DISCLAIMER

See Appendix B

INFORMATION AS PROVIDED IN THE CONSOLIDATED LIST

The consolidated list of health claims pursuant to Article 13 of Regulation (EC) No 1924/2006[5] submitted by Member States contains main entry claims with corresponding conditions of use and literature for similar health claims. EFSA has screened all health claims contained in the original consolidated list of Article 13 health claims which was received by EFSA in 2008 using six criteria established by the NDA Panel to identify claims for which EFSA considered sufficient information had been provided for evaluation and those for which more information or clarification was needed before evaluation could be carried out[6]. The clarifications which were received by EFSA through the screening process have been included in the consolidated list. This additional information will serve as clarification to the originally provided information. 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 hydroxypropyl methylcellulose (HPMC).

HPMC is a food additive (Codex Alimentarius E 464) used as an emulsifier, or as a thickening and suspending agent, which forms colloids when dissolved in water. The viscosity of HPMC is directly related to the concentration of the methoxy group (the higher the concentration the more viscous). HMPC is non-available for digestion in the human intestine. Analytical methods have been developed for the analysis of HMPC.

The Panel considers that the food constituent, hydroxypropyl methylcellulose (HPMC), which is the subject of the health claims is sufficiently characterised.

2. Relevance of the claimed effect to human health

2.1. Maintenance of normal bowel function (ID 812)

The claimed effect is "bowel function". The Panel assumes that the target population is the general population.

In the context of the proposed wordings, the Panel assumes that the claimed effect refers to aspects of maintaining bowel regularity and normal bowel function. Changes in bowel function within the normal range e.g. reduced transit time, increased frequency of bowel movements or bulk of stools might be interpreted as improvement of bowel function.

The Panel considers that maintenance of normal bowel function might be a beneficial physiological effect.

[5] 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.

[6] Briefing document for stakeholders on the evaluation of Article 13.1, 13.5 and 14 health claims: http://www.efsa.europa.eu/en/ndameetings/docs/nda100601-ax01.pdf

2.2. Reduction of post-prandial glycaemic responses (ID 814)

The claimed effect is "uniform blood sugar levels". The Panel assumes that the target population is individuals willing to reduce their post-prandial glycaemic responses.

In the context of the proposed wordings, the Panel assumes that the claimed effect refers to a reduction of post-prandial glycaemic responses.

Postprandial glycaemia is interpreted as the elevation of blood glucose concentrations after consumption of a food and/or meal. This is a normal physiological response that varies in magnitude and duration and may be influenced by the chemical and physical nature of the food or meal consumed, as well as by individual factors (Venn and Green, 2007). The evidence provided does not establish that decreasing post-prandial glycaemic responses in subjects with normal glucose tolerance is a beneficial physiological effect. However, it may be beneficial to subjects with impaired glucose tolerance as long as post-prandial insulinaemic responses are not disproportionally increased. Impaired glucose tolerance is common in the general population of adults.

The Panel considers that reduction of post-prandial glycaemic responses (as long as post-prandial insulinaemic responses are not disproportionally increased) may be a beneficial physiological effect.

2.3. Maintenance of normal blood cholesterol concentrations (ID 815)

The claimed effect is "maintenance of normal cholesterol levels". The Panel assumes that the target population is the general population.

In the context of the proposed wordings, the Panel assumes that the claimed effect refers to the maintenance of normal blood cholesterol concentrations.

Low-density lipoproteins (LDL) carry cholesterol from the liver to peripheral tissues, including the arteries. Elevated LDL-cholesterol, by convention >160 mg/dL (>4.14 mmol/L), may compromise the normal structure and function of the arteries. High-density lipoproteins (HDL) act as cholesterol scavengers and are involved in the reverse transport of cholesterol in the body (from peripheral tissues back to the liver).

The Panel considers that maintenance of normal blood cholesterol concentrations is a beneficial physiological effect.

2.4. Increase in satiety leading to a reduction in energy intake (ID 2933)

The claimed effect is "satiety". The Panel assumes that the target population is the general population.

Satiety is the decrease in the motivation to eat after consumption of food. The effect may persist up to several hours, may reduce energy intake either at the next meal or across the day and, if sustained**,** may lead to a reduction in body weight.

The Panel considers that an increase in satiety leading to a reduction in energy intake, if sustained, might be a beneficial physiological effect.

3. Scientific substantiation of the claimed effect

3.1. Maintenance of normal bowel function (ID 812)

Four references were cited to substantiate the claim. One was a technical report and three were references to regulatory frameworks. None of these references are related to HPMC. The Panel

considers that no conclusions can be drawn from these references for the scientific substantiation of the claim.

The Panel concludes that a cause and effect relationship has not been established between the consumption of HPMC and maintenance of normal bowel function.

3.2. Reduction of post-prandial glycaemic responses (ID 814)

Nine references were cited to substantiate the claim. Some references investigated the effects of food constituents other than HPMC (e.g. methylcellulose, ethylhydroxyethyl cellulose) on effects other than post-prandial blood glucose responses (e.g. safety aspects). The Panel considers that no conclusions can be drawn from these references for the scientific substantiation of the claim.

The influence of HPMC on postprandial glucose and insulin responses was investigated in 31 overweight and obese non-diabetic men and women (Maki et al., 2007). Test meals containing 75 g carbohydrate plus 4 or 8 g HPMC or 8 g cellulose (control) were administered to all subjects in a randomised, double-blind fashion, and at least 72 hours apart. Venous blood samples for plasma glucose and serum insulin analyses were collected at 15, 30, 45, 60, 90, 120, 150, and 180 minutes from the start of meal consumption. A sample size of 28 subjects was calculated to detect a difference of 12 % in the incremental area under the glucose concentration curve across interventions with a power of 80 % ($\alpha = 0.05$ after corrections for comparisons vs control) assuming a pooled SD of 20 %. Peak glucose was significantly lower ($P < 0.001$) after both HPMC-containing meals (7.4 mmol/L [4 g] and 7.4 mmol/L [8 g]) compared with the control cellulose (8.6 mmol/L). The incremental area under the curve for glucose and insulin, and peak insulin concentration from 0 to 120 minutes were also significantly reduced after both HPMC doses versus control (all $P < 0.01$), as was the incremental area for glucose from 0 to 180 minutes. No dose-response relationship was observed in this study.

Reppas et al. (1993) investigated the effects of 10 g HPMC added to a standard carbohydrate test meal on post-prandial blood glucose and insulin responses in non diabetic subjects with hypercholesterolaemia (n=10) and in non insulin-dependent diabetic subjects (n=10) following a randomised, double-blind, placebo controlled, cross-over design. Diabetic subjects were asked to discontinue oral hypoglycaemic medications for at least three elimination half-lives before the study. Blood samples were taken at 60, 75, 90, 120, and 150 minutes after consumption of the test meal. No differences between HPMC and placebo were observed for glucose and insulin peaks, or for glucose and insulin areas under the curve in non diabetic subjects. In diabetic subjects, blood glucose concentrations were significantly lower at the 60, 75, 90, 120 and 150-minute sampling times during the HMPC phase compared to placebo, leading to a significant decrease of 14.8 % in the area under the curve. Insulin concentrations were significantly lower during HPMC administration compared to placebo at time 120 minutes, whereas insulin areas under the curve were not affected by the treatment. The Panel considers that the mechanism by which HPMC appears to exert the claimed effect is a delay in glucose absorption in the intestinal tract (see paragraph below), which is unlikely to be affected by the pathophysiology of diabetes mellitus. Therefore, results obtained in non insulin-dependent diabetic subjects not on hypoglycaemic medications can be extrapolated to non-diabetic subjects with, for example, impaired glucose tolerance. The Panel notes that, in the light of the power calculations performed by Maki et al. (2007), the sample size (n=10) of the non-diabetic subjects considered in this study may have been insufficient to observe a significant effect of HPMC on post-prandial blood glucose responses in that population subgroup.

Two intervention studies in dogs using HPMC in glucose solutions at different concentrations to yield low (5,000 cP measured at 37 °C and at a shear rate of 1 s^{-1}), medium (15,000 cP) or high (30,000 cP) viscosities suggest that the effect of HPMC on post-prandial blood glucose concentrations is mediated by a delay in glucose absorption in the intestinal tract, which is dependent on the viscosity and osmolarity (glucose concentration) of the solution (Reppas and Dressman, 1992; Reppas et al., 1999).

In weighing the evidence, the Panel took into account that one human intervention study adequately powered and conducted observed a significant effect of HPMC on the reduction of post-prandial glycaemic responses in obese non-diabetic men and women, that these results are supported by evidence obtained in non insulin-dependent diabetic subjects, and that evidence for a biologically plausible mechanism by which HPMC could exert the claimed effect has been provided.

The Panel concludes that a cause and effect relationship has been established between the consumption of HPMC and a reduction of post-prandial glycaemic responses.

3.3. Maintenance of normal blood cholesterol concentrations (ID 815)

Among the references provided in relation to this claim were those which investigated the effects of food constituents other than HPMC (e.g. methylcellulose, ethylhydroxyethyl cellulose, starch, oats, wholegrain, etc.) on effects other than blood lipids (e.g. post-prandial blood glucose responses, bowel function, safety aspects, etc.). The Panel considers that no conclusions can be drawn from these references for the scientific substantiation of the claim.

In a double-blind, placebo controlled, parallel intervention study (Maki et al., 1999), 160 subjects with low-density lipoprotein (LDL) cholesterol levels between 130 and 200 mg/dL (3.36 and 5.17 mmol/L) and triglycerides <300 mg/dL (3.39 mmol/L) were randomised to consume HPMC at doses of 2.5 g per day (n=36), 5 g per day (n=39), 7.5 g per day (n=41), or placebo (microcrystalline cellulose, n=38) for six weeks. The four intervention groups were comparable for baseline characteristics and an intention-to-treat analysis was used. A significant 12 % reduction in LDL-cholesterol concentrations was observed with the 5 g and 7.5 g HPMC doses compared to placebo. No significant differences were observed between the two doses. It is unclear from the study whether the significant difference observed between the 2.5 g per day dose and the 5 and 7.5 g per day doses was owing to the higher dosage or to the twice-daily dosing schedule followed in the high doses only. The 5 g per day dose showed similar effects on total and LDL-cholesterol concentrations in two weeks when taken either with or between meals (Maki et al., 2000).

Dressman et al. (1993), in a double-blind, randomised crossover trial, studied the effects of large amounts (30 g per day, three 10 g doses consumed with meals) of pre-hydrated, high molecular weight (K8515) HPMC in 10 healthy men for one week and found a significant 32 % (mean decrease -1.45 mmol/L or -56 mg/dL) reduction in total cholesterol concentrations and a significant 38 % decrease in LDL-cholesterol concentrations (-1.10 mmol/L or -42 mg/dL) compared to placebo. In 12 hypercholesterolaemic subjects, the same dose reduced total cholesterol by 21 % and LDL-cholesterol by 31 % as compared with placebo in two weeks. The Panel notes the small sample size and duration of the study.

Swidan et al. (1996) performed a randomised, double-blind, cross-over, placebo controlled study in 12 hypercholesterolaemic subjects to assess the effects of 20 g per day HPMC consumed for one week in cookies and in a jelly compared to placebo (no HPMC). Compared to the control, total cholesterol and LDL-cholesterol concentrations were significantly reduced by 14 ± 8 % and 19 ± 13 % with the cookie formulation and by 19 ± 7 % and 26 ± 6 % with the jelly formulation, respectively.

Studies in dogs and *in vitro* suggested that the development of viscosity was slower in the cookie formulation. This difference may have been responsible for the attenuated cholesterol-lowering effect observed in the cookie formulation compared to the jelly formulation.

Reppas et al. (2009) investigated the effects of medium, high, and ultra-high viscosity HPMC (in a sugar-free gelatin dessert consumed at breakfast, lunch and dinner for a total of 15 g per day) compared to placebo (no HPMC) for one week in 12 mildly hypercholesterolaemic subjects

(8 female) in a placebo-controlled, single-blind, cross-over intervention study. Total cholesterol concentrations decreased significantly by 9.3 %, 16.9 %, and 13.8 % and LDL-cholesterol concentrations significantly decreased by 10.6 %, 18.2 % and 17 % in the medium, high and ultra-high viscosity HPMC groups, respectively, compared to placebo. In 40 subjects (20 female), doses of 5 g per day (n=10) and 15 g per day (n=20) of ultra-high viscosity HPMC versus placebo (n=10) were studied over eight weeks following a randomised, double-blinded, placebo-controlled, parallel design. Total and LDL-cholesterol concentrations decreased by 7 % and 8 %, respectively, with the 5 g dose and by 12 % and 15 %, respectively, with the 15 g per day dose.

The effect of HPMC on blood (LDL) cholesterol concentrations is likely to depend on its viscosity, which reduces the reabsorption of bile acids, increases the synthesis of bile acids from cholesterol, and reduces circulating blood cholesterol concentrations.

In weighing the evidence, the Panel took into account that in one study including 160 subjects with adequate follow-up (six weeks), viscous HPMC at daily doses of 5 to 7.5 g per day split in at least two doses had shown a significant reduction in serum total and LDL-cholesterol concentrations. The cholesterol-lowering effect had been documented also in some short-term intervention studies over 1-2 weeks at higher doses of intake, the effect appeared to be dose and viscosity-dependent, and that evidence for a biologically plausible mechanism by which HPMC could exert the claimed effect has been provided.

The Panel concludes that a cause and effect relationship has been established between the consumption of HPMC and maintenance of normal blood cholesterol concentrations.

3.4. Increase in satiety leading to a reduction in energy intake (ID 2933)

Twenty-four references were cited to substantiate the claim. These references were narrative reviews or intervention studies on the effects of dietary fibre in general or fibre types other than HPMC (e.g. pectins, guar gum, oat fibre) on appetite ratings, energy intake, body weight or outcomes unrelated to energy intake (e.g. bowel function). No studies investigating the effects of HPMC on satiety or energy intake have been provided. The Panel considers that no conclusions can be drawn from these references for the scientific substantiation of the claim.

The Panel concludes that a cause and effect relationship has not been established between the consumption of HPMC and a sustained increase in satiety leading to a reduction in energy intake.

4. Panel's comments on the proposed wording

4.1. Reduction of post-prandial glycaemic responses (ID 814)

The Panel considers that the following wording reflects the scientific evidence: "Hydroxypropyl methylcellulose contributes to a reduction of the blood glucose rise after meals".

4.2. Maintenance of normal blood cholesterol concentrations (ID 815)

The Panel considers that the following wording reflects the scientific evidence: "Hydroxypropyl methylcellulose contributes to the maintenance of normal blood cholesterol levels".

5. Conditions and possible restrictions of use

5.1. Reduction of post-prandial glycaemic responses (ID 814)

The Panel considers that in order to obtain the claimed effect, at least 4 g of HPMC per meal should be consumed. The target population is adults willing to reduce their post-prandial glycaemic responses.

5.2. Maintenance of normal blood cholesterol concentrations (ID 815)

The Panel considers that in order to obtain the claimed effect, at least 5 g per day of HPMC should be consumed in two or more servings. The target population is adults.

CONCLUSIONS

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

- The food constituent, hydroxypropyl methylcellulose (HPMC), which is the subject of the health claims is sufficiently characterised.

Maintenance of normal bowel function (ID 812)

- The claimed effect is "bowel function". The target population is assumed to be the general population. Maintenance of normal bowel function is a beneficial physiological effect.
- A cause and effect relationship has not been established between the consumption of HPMC and maintenance of normal bowel function.

Reduction of post-prandial glycaemic responses (ID 814)

- The claimed effect is "uniform blood sugar levels". The target population is assumed to be individuals willing to reduce their post-prandial glycaemic responses. A reduction of post-prandial glycaemic responses (as long as post-prandial insulinaemic responses are not disproportionally increased) may be a beneficial physiological effect.
- A cause and effect relationship has been established between the consumption of HPMC and a reduction of post-prandial glycaemic responses.
- The following wording reflects the scientific evidence: "Hydroxypropyl methylcellulose contributes to a reduction of the blood glucose rise after meals".
- In order to obtain the claimed effect at least 4 g of HPMC per meal should be consumed. The target population is adults willing to reduce their post-prandial glycaemic responses.

Maintenance of normal blood cholesterol concentrations (ID 815)

- The claimed effect is "maintenance of normal cholesterol levels". The target population is assumed to be the general population. Maintenance of normal blood cholesterol concentrations is a beneficial physiological effect.
- A cause and effect relationship has been established between the consumption of HPMC and maintenance of normal blood cholesterol concentrations.
- The following wording reflects the scientific evidence: "Hydroxypropyl methylcellulose contributes to the maintenance of normal blood cholesterol levels".
- In order to obtain the claimed effect, at least 5 g per day of HPMC should be consumed in two or more servings. The target population is adults.

Increase in satiety leading to a reduction in energy intake (ID 2933)

- The claimed effect is "satiety". The target population is assumed to be the general population. An increase in satiety leading to a reduction in energy intake, if sustained, might be a beneficial physiological effect.
- A cause and effect relationship has not been established between the consumption of HPMC and a sustained increase in satiety leading to a reduction in energy intake.

DOCUMENTATION PROVIDED TO EFSA

Health claims pursuant to Article 13 of Regulation (EC) No 1924/2006 (No: EFSA-Q-2008-1599, EFSA-Q-2008-1601, EFSA-Q-2008-1602, EFSA-Q-2008-3665). 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

Dressman JB, Adair CH, Barnett JL, Berardi RR, Dunn-Kucharski VA, Jarvenpaa KM, Parr DD, Sowle CA, Swidan SZ, Tobey SW and Reppas C, 1993. High-molecular-weight hydroxypropylmethylcellulose. A cholesterol-lowering agent. Archives of Internal Medicine, 153, 1345-1353.

Maki KC, Davidson MH, Malik KC, Albrecht HH, O'Mullane J and Daggy BP, 1999. Cholesterol lowering with high-viscosity hydroxypropylmethylcellulose. American Journal of Cardiology, 84, 1198-1203.

Maki KC, Davidson MH, Torri S, Ingram KA, O'Mullane J, Daggy BP and Albrecht HH, 2000. High-molecular-weight hydroxypropylmethylcellulose taken with or between meals is hypocholesterolemic in adult men. Journal of Nutrition, 130, 1705-1710.

Maki KC, Carson ML, Miller MP, Turowski M, Bell M, Wilder DM and Reeves MS, 2007. High-viscosity hydroxypropylmethylcellulose blunts postprandial glucose and insulin responses. Diabetes Care, 30, 1039-1043.

Reppas C and Dressman JB, 1992. Viscosity modulates blood glucose response to nutrient solutions in dogs. Diabetes Research and Clinical Practice, 17, 81-88.

Reppas C, Adair CH, Barnett JL, Berardi RR, DuRoss D, Swidan SZ, Thill PF, Tobey SW and Dressman JB, 1993. High viscosity hydroxypropylmethylcellulose reduces postprandial blood glucose concentrations in NIDDM patients. Diabetes Research and Clinical Practice, 22, 61-69.

Reppas C, Greenwood DE and Dressman JB, 1999. Longitudinal versus radial effects of hydroxypropylmethylcellulose on gastrointestinal glucose absorption in dogs. European Journal of Pharmaceutical Sciences, 8, 211-219.

Reppas C, Swidan SZ, Tobey SW, Turowski M and Dressman JB, 2009. Hydroxypropylmethylcellulose significantly lowers blood cholesterol in mildly hypercholesterolemic human subjects. European Journal of Clinical Nutrition, 63, 71-77.

Swidan SZ, Reppas C, Barnett JL, Greenwood DE, Tallman AM, Tobey SW and Dressman JB, 1996. Ability of two comestible formulations of hydroxypropylmethylcellulose to lower serum cholesterol concentrations. European Journal of Pharmaceutical Sciences, 4, 239-245.

Venn and Green, 2007. Glycemic index and glycemic load: measurement issues and their effect on diet-disease relationships. European Journal of Clinical Nutrition, 61, 122-131.

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 foods[7] (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 FOOD[8]

Foods are commonly involved in many different functions[9] 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.

[7] OJ L12, 18/01/2007
[8] The term 'food' when used in this Terms of Reference refers to a food constituent, the food or the food category.
[9] 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 hydroxypropyl methylcellulose (HPMC), including conditions of use from similar claims, as proposed in the Consolidated List.

ID	Food or Food constituent	Health Relationship	Proposed wording
812	Hydroxypropyl methylcellulose (HPMC) Dietary fibre	Bowel function	"HPMC promotes good digestive health and regularity." "HPMC promotes good digestive health." "HPMC promotes regularity." "HPMC helps maintain good digestive health and regularity." HPMC helps maintain good digestive health." "HPMC helps maintain regularity." "HPMC helps promote better digestion." "Soluble fibre such as HPMC helps promote better digestion." "HPMC helps promote better digestion." "HPMC helps promote a healthy digestive system." "Soluble fibre such as HPMC promotes a healthy digestive system." "HPMC promotes a healthy digestive system." "HPMC/ dietary fibre helps to maintain normal bowel/colonic function." "HPMC/dietary fibre promotes regularity." "HPMC/dietary fibre ensures a healthy digestive system/function."
	Conditions of use - Conditions of "source of" (3 g/100 g) from Health Claims regulation 1924/2006, specific conditions of use are listed in the list of references. There is no upper safe limit. HPMC Acceptable Daily Intake (ADI) is "not specified" as adopted in 1994 by the Scientific Committee on Food for five closely related cellulose derivatives, including hydroxypropyl methyl cellulose. A 2007 'Safety assessment of hydroxypropyl methylcellulose as a food ingredient' by G.A. Burdock published in Food and Chemical Toxicology (Elsevier) states that "These data indicate that at the current level of intake, HPMC does not pose a health		

	risk to humans."		
ID	**Food or Food constituent**	**Health Relationship**	**Proposed wording**
814	Hydroxypropyl methylcellulose (HPMC) Dietary Fibre	Uniform blood sugar levels	-"HPMC helps keep blood sugar levels more uniform for people with normal blood sugar levels." - "Soluble fibre such as HPMC helps keep blood sugar levels more uniform for people with normal blood sugar levels." -"HPMC helps maintain normal blood glucose levels for people with blood glucose levels in the normal range." -"Dietary fibre induces a low glycemic response." -"Dietary fibre helps to control/balance blood insulin/glucose levels." -"HPMC helps keep blood sugar levels more uniform for people with normal blood sugar levels." - "Soluble fibre such as HPMC helps keep blood sugar levels more uniform for people with normal blood sugar levels."
	Conditions of use - Products carrying the claim should contain a single serving of 1 gram per serving. Recommended daily use is 2 grams per day. There is no upper safe limit. HPMC Acceptable Daily Intake (ADI) is "not specified" as adopted in 1994 by the Scientific Committee on Food for five closely related cellulose derivatives, including hydroxypropyl methyl cellulose. A 2007 'Safety assessment of hydroxypropyl methylcellulose as a food ingredient' by G.A. Burdock published in Food and Chemical Toxicology (Elsevier) states that "These data indicate that at the current level of intake, HPMC does not pose a health risk to humans.		
ID	**Food or Food constituent**	**Health Relationship**	**Proposed wording**
815	Hydroxypropyl methylcellulose (HPMC) Dietary Fibre	Maintenance of normal cholesterol levels	-"HPMC helps maintain normal cholesterol levels for people with cholesterol levels in the normal range." -"Soluble fibre such as HPMC helps maintain normal cholesterol levels for people with cholesterol

			levels in the normal range.”
	Conditions of use - Products carrying the claim should contain a single serving of 1.25 grams per serving. Recommended daily use is 2.5 grams per day. There is no upper safe limit. HPMC Acceptable Daily Intake (ADI) is “not specified” as adopted in 1994 by the Scientific Committee on Food for five closely related cellulose derivatives, including hydroxypropyl methyl cellulose. A 2007 ‘Safety assessment of hydroxypropyl methylcellulose as a food ingredient’ by G.A. Burdock published in Food and Chemical Toxicology (Elsevier) states that "These data indicate that at the current level of intake, HPMC does not pose a health risk to humans."		
ID	**Food or Food constituent**	**Health Relationship**	**Proposed wording**
2933	Hydroxypropyl methylcellulose (HPMC) Voedingsvezel	Verzadiging	Oplosbare vezels zoals HPMC helpen gewichtscontrole doordat het helpt je langer vol te voelen.” “HPMC helpt gewichtscontrole doordat het helpt je langer vol te voelen.” “Oplosbare vezels zoals HPMC helpen gewichtscontrole doordat het helpt je langer vol te voelen en het hongergevoel te onderdrukken.” “HPMC helpt gewichtscontrole doordat het helpt je langer vol te voelen en het hongergevoel te onderdrukken.” “Oplosbare vezels zoals HPMC helpen het behouden van je gewicht doordat het helpt je langer vol te voelen.” ”HPMC helpt het behouden van je gewicht doordat het helpt je langer vol te voelen.” “Oplosbare vezels zoals HPMC helpen het behouden van je gewicht doordat het helpt je langer vol te voelen en het hongergevoel te onderdrukken.” “HPMC helpt het behouden van je gewicht doordat het helpt je langer vol te voelen

			voelen en het hongergevoel te onderdrukken." "Levensmiddelen rijk aan vezels helpen je langer vol te voelen en helpen het behouden van je gewicht."
	Conditions of use - Gebruiksvoorwaarden om te voldoen aan de definitie "rijk aan vezels" (6g/100g) en "bevat minstens 5 g voedingsvezels per portie die redelijkerwijs in 1 dag kan worden geconsumeerd". Er is geen veiligheidslimiet in dosering. HPMC Aanvaardbare Dagelijkse Inname (ADI) is "niet gespecificeerd" aangenomen in 1994 door het "Scientific Committee on Food" voor vijf sterk gerelateerde cellulose derivaten, inclusief hydroxypropyl methyl cellulose. Een 2007 'Safety assessment' van hydroxypropyl methylcellulose als levensmiddelen ingredient' door G.A. Burdock gepubliceerd in Food and Chemical Toxicology (Elsevier) stelt dat "Deze gegevens aangeven dat op het huidige consumptie-niveau HPMC geen gezondheidsrisico vormt voor mensen.		
	Comments from Member States No reaction received by 01-06-2009		

GLOSSARY AND ABBREVIATIONS

cP	centipoise
HPMC	Hydroxypropyl methylcellulose
LDL	Low density lipoproteins