

## SCIENTIFIC OPINION

### **Scientific Opinion on the substantiation of health claims related to iodine and thyroid function and production of thyroid hormones (ID 274), energy-yielding metabolism (ID 274), maintenance of vision (ID 356), maintenance of hair (ID 370), maintenance of nails (ID 370), and maintenance of skin (ID 370) pursuant to Article 13(1) of Regulation (EC) No 1924/2006<sup>1</sup>**

**EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)<sup>2</sup>**

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 (EC) No 1924/2006. This opinion addresses the scientific substantiation of health claims in relation to iodine and the following claimed effects: thyroid function and production of thyroid hormones, energy-yielding metabolism, maintenance of vision, maintenance of hair, maintenance of nails, and maintenance of skin. 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 iodine which is a well recognised nutrient and is measurable in foods by established methods. The Panel considers that iodine is sufficiently characterised.

The Panel concludes that a cause and effect relationship has been established between the dietary intake of iodine and normal thyroid function and normal production of thyroid hormones, normal energy-yielding metabolism, and maintenance of normal skin.

The Panel considers that, in order to bear the claim, a food should be at least a source of iodine as per Annex to Regulation (EC) No 1924/2006. Such amounts can be easily consumed as part of a balanced diet. The target population is the general population.

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1 On request from the European Commission, Question No EFSA-Q-2008-1061, EFSA-Q-2008-1157, EFSA-Q-2008-1143, adopted on 02 July 2009.

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The Panel concludes that a cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal vision, maintenance of normal hair, and maintenance of normal nails.

**KEY WORDS**

Iodine, thyroid function, thyroid gland, thyroid hormones, 3,5,3'-triiodothyronine, T3, 3,5,3',5'-tetraiodothyronine, thyroxine, T4, energy yielding metabolism, vision, hair, nails, skin, health claims.

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## **BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION**

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## **TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION**

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## **EFSA DISCLAIMER**

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## INFORMATION AS PROVIDED IN THE CONSOLIDATED LIST

The consolidated list of health claims pursuant to Article 13 of Regulation (EC) No 1924/2006<sup>3</sup> 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 subject to 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 iodine, which is a well recognised nutrient and is measurable in foods by established methods.

Iodine occurs naturally in foods and is authorised for addition to foods (Annex I of the Regulation (EC) No 1925/2006<sup>4</sup> and Annex I of Directive 2002/46/EC<sup>5</sup>). This evaluation applies to iodine naturally present in foods and those forms authorised for addition to foods (Annex II of the Regulation (EC) No 1925/2006 and Annex II of Directive 2002/46/EC).

The Panel considers that the food constituent, iodine, which is the subject of the health claims, is sufficiently characterised.

### 2. Relevance of the claimed effect to human health

#### 2.1. Thyroid function and production of thyroid hormones (ID 274)

The claimed effects are “thyroid function” and “production of thyroid hormones”. The Panel assumes that the target population is the general population.

The Panel considers that normal thyroid function and normal production of thyroid hormones are beneficial to human health.

#### 2.2. Energy-yielding metabolism (ID 274)

The claimed effect is “energy metabolism”. The Panel assumes that the target population is the general population.

The Panel considers that normal energy-yielding metabolism is beneficial to human health.

#### 2.3. Maintenance of vision (ID 356)

The claimed effects are “eye health” and “visual function”. The Panel assumes that the target population is the general population.

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<sup>3</sup> 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.

<sup>4</sup> Regulation (EC) No 1925/2006 of the European Parliament and of the Council of 20 December 2006 on the addition of vitamins and minerals and of certain other substances to foods. OJ L 404, 30.12.2006, p. 26–38.

<sup>5</sup> Directive 2002/46/EC of the European Parliament and of the Council of 10 June 2002 on the approximation of the laws of the Member States relating to food supplements. OJ L 183, 12.7.2002, p. 51–57.

“Eye health” has not been defined in the list. From the proposed wordings the Panel assumes that the claimed effect relates to maintenance of normal vision.

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

#### **2.4. Maintenance of hair (ID 370)**

The claimed effect is “hair, nails skin”. The Panel assumes that the target population is the general population.

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

#### **2.5. Maintenance of nails (ID 370)**

The claimed effect is “hair, nails skin”. The Panel assumes that the target population is the general population.

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

#### **2.6. Maintenance of skin (ID 370)**

The claimed effect is “hair, nails skin”. The Panel assumes that the target population is the general population.

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

### **3. Scientific substantiation of the claimed effect**

Iodine is an essential constituent of the thyroid hormones, which have important modifying or permissive roles in growth and development and there is a large body of evidence indicating a crucial role for iodine in growth and development (Sadler et al., 1999; IoM, 2002; Garrow et al., 2000; Strain and Cashman, 2002). A wide spectrum of iodine deficiency disorders (IDD) have been observed, depending on the degree of deficiency and the life stage at which the deficiency occurs. These disorders range from mild goitre to the most severe forms of endemic cretinism (congenital, severe, irreversible mental and growth retardation). Other symptoms of severe IDD (arising from iodine deficiency in the foetus) include deaf-mutism, squint, disorders of stance and gait, and dry skin and swollen subcutaneous tissue (Delange, 2000; EVM, 2003; WHO, 2007).

#### **3.1. Thyroid function and production of thyroid hormones (ID 274)**

Iodine is an essential dietary element for mammals being required for the synthesis of the thyroid hormones thyroxine (T<sub>4</sub>, 3,5,3',5'-tetraiodothyronine), containing 65 % by weight of iodine, and its active form T<sub>3</sub> (3,5,3'-triiodothyronine), containing 59 % by weight of iodine, as well as the precursor iodotyrosines (SCF, 2002).

The Panel concludes that a cause and effect relationship has been established between the dietary intake of iodine and normal thyroid function and normal production of thyroid hormones.

#### **3.2. Energy-yielding metabolism (ID 274)**

The biological function of the thyroid hormones T<sub>4</sub>, T<sub>3</sub> and of iodotyrosines encompasses the regulation of energy-yielding metabolism and endocrine function by cellular oxidation, calorogenesis,

thermo-regulation, intermediate metabolism, protein and enzyme synthesis, nitrogen retention, gluconeogenesis and pituitary gonadotropins (SCF, 2002).

The Panel concludes that a cause and effect relationship has been established between the dietary intake of iodine and normal energy-yielding metabolism.

### **3.3. Maintenance of vision (ID 356)**

One reference was cited to substantiate the claim effect. The reference was a study on distribution of iodine in a porcine eye model following iontophoresis (Rieger et al., 1995).

The Panel notes that squint and eye problems result from severe foetal iodine deficiency rather than from IDD onset in adulthood.

The Panel notes that iodine has no specific role in the eye.

The Panel concludes that a cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal vision.

### **3.4. Maintenance of hair (ID 370)**

Six references were cited to substantiate the claimed effect. Five were textbooks and one was an opinion of a scientific body. One of the references provided state that iodine supplements have been claimed to assist in the treatment of hair loss, but does not provide any further information in relation to the claimed effect (EVM, 2003). The Panel notes that the references cited did not provide any scientific data that could be used to substantiate the claimed effect.

The Panel concludes that a cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal hair.

### **3.5. Maintenance of nails (ID 370)**

Six references were cited to substantiate the claimed effect. Five were textbooks and one was an opinion of a scientific body. One of the references cited state that iodine supplements have been claimed to assist in the maintenance of healthy nails, but does not provide any further information in relation to the claimed effect (EVM, 2003). The Panel notes that the references cited did not provide any scientific data that could be used to substantiate the claimed effect.

The Panel concludes that a cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal nails.

### **3.6. Maintenance of skin (ID 370)**

Early symptoms of hypothyroidism include dry and itchy skin, whereas clammy skin is a common symptom of hyperthyroidism (EVM, 2003).

The Panel concludes that a cause and effect relationship has been established between the dietary intake of iodine and maintenance of normal skin.

#### 4. Panel's comments on the proposed wording

##### 4.1. Thyroid function and production of thyroid hormones (ID 274)

The Panel considers that the following wording reflects the scientific evidence: "Iodine contributes to the normal production of thyroid hormones and normal thyroid function."

##### 4.2. Energy-yielding metabolism (ID 274)

The Panel considers that the following wording reflects the scientific evidence: "Iodine contributes to normal energy-metabolism."

##### 4.3. Maintenance of skin (ID 370)

The Panel considers that the following wording reflects the scientific evidence: "Iodine contributes to maintenance of normal skin."

#### 5. Conditions and possible restrictions of use

The Panel considers that in order to bear the claims a food should be at least a source of iodine as per Annex to Regulation 1924/2006. A Tolerable Upper Intake Level (UL) has been established for iodine as 600 µg/day in adults and during pregnancy and lactation. For children and adolescents UL was established as 200 µg/day for 1-3 years, 250 µg/day for 4-6 years, 300 µg/day for 7-10 years, 450 µg/day for 11-14 years and 500 µg/day for 15-17 years (SCF, 2002). The target population is the general population.

#### CONCLUSIONS

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

- The food constituent, iodine, which is the subject of the health claims, is sufficiently characterised.

##### Thyroid function and production of thyroid hormones (ID 274)

- The claimed effects are "thyroid function and production of thyroid hormones". The target population is assumed to be the general population. Normal thyroid function and normal production of thyroid hormones are beneficial to human health.
- A cause and effect relationship has been established between the dietary intake of iodine and normal thyroid function and normal production of thyroid hormones.
- The following wording reflects the scientific evidence: "Iodine contributes to the normal production of thyroid hormones and normal thyroid function."

##### Energy-yielding metabolism (ID 274)

- The claimed effect is "energy metabolism". The target population is assumed to be the general population. Normal energy-yielding metabolism is beneficial to human health.
- The Panel concludes that a cause and effect relationship has been established between the dietary intake of iodine and normal energy-yielding metabolism.
- The following wording reflects the scientific evidence: "Iodine contributes to normal energy yielding metabolism."

### **Maintenance of vision (ID 356)**

- The claimed effect is “Eye health/visual function”. The target population is assumed to be the general population. Maintenance of normal vision is beneficial to human health.
- The Panel concludes that a cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal vision.

### **Maintenance of hair (ID 370)**

- The claimed effect is “hair, nails skin”. The target population is assumed to be the general population. Maintenance of normal hair is beneficial to human health.
- The Panel concludes that a cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal hair.

### **Maintenance of nails (ID 370)**

- The claimed effect is “hair, nails skin”. The target population is assumed to be the general population. Maintenance of normal nails is beneficial to human health.
- A cause and effect relationship has not been established between the dietary intake of iodine and maintenance of normal nails.

### **Maintenance of skin (ID 370)**

- The claimed effect is “hair, nails skin”. The target population is assumed to be the general population. Maintenance of normal skin is beneficial to human health.
- A cause and effect relationship has been established between the dietary intake of iodine and maintenance of normal skin.
- The following wording reflects the scientific evidence: “Iodine contributes to maintenance of normal skin.”

### **Conditions and restrictions of use**

- The Panel considers that in order to bear the claims a food should be at least a source of iodine as per Annex to Regulation 1924/2006. The target population is the general population.

### **DOCUMENTATION PROVIDED TO EFSA**

Health claims pursuant to Article 13 of Regulation (EC) No 1924/2006 (No: EFSA-Q-2008-1061, EFSA-Q-2008-1157, EFSA-Q-2008-1143). 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**

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- IoM (Institute of Medicine), 2002. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. National Academies Press, Washington D.C.
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- Strain JJ and Cashman KD, 2002. Minerals and trace elements. In *Introduction to Human Nutrition*, MJ Gibney, HH Vorster, FJ Kok, eds, Blackwell Publishing, Oxford.
- SCF (Scientific Committee on Food), 2002. Opinion of the Scientific Committee on Food on the Tolerable Upper Intake Level of Iodine.
- WHO (World Health Organization), 2007. Iodine deficiency in Europe. A continuing public health problem. Published jointly with UNICEF.

## APPENDICES

### APPENDIX A:

#### BACKGROUND AND TERMS OF REFERENCES AS PROVIDED BY THE EUROPEAN COMMISSION

The Regulation 1924/2006 on nutrition and health claims made on foods<sup>6</sup> (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<sup>7</sup>

Foods are commonly involved in many different functions<sup>8</sup> 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.

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<sup>6</sup> OJ L12, 18/01/2007

<sup>7</sup> The term 'food' when used in this Terms of Reference refers to a food constituent, the food or the food category.

<sup>8</sup> 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 constituent or food, a positive assessment of its safety, nor a decision on whether magnesium 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 wording of the claim and the conditions of use as proposed by the applicant may be subject to changes, pending the outcome of the authorisation procedure foreseen in Article 18(4) of Regulation (EC) No 1924/2006.

APPENDIX C

Table 1. Main entry health claims related to Iodine, including conditions of use from similar claims, as proposed in the Consolidated List.

ID	Food or Food component	Health Relationship	Proposed wording
274	Iodine	Thyroid function and production of hormone, energy metabolism	<ul style="list-style-type: none"> <li>- is needed for growth and function of the thyroid gland;</li> <li>- is essential for the production of thyroid hormones;</li> <li>- is needed for energy metabolism.</li> </ul>
	<p><b>Conditions of use</b></p> <ul style="list-style-type: none"> <li>- Must at least be a source of mineral/s as per annex to regulation 1924/2006</li> <li>- At least 15 % RDA per 100 g/100 ml/per serving (90/496/EEC)</li> <li>- Food supplement with 50-150mg of iodine in the daily dose</li> <li>- Milks, buttermilks and milk drinks with iodine content of 14-17 µg/100 g, 28-34 µg/serving</li> <li>- Adults: 100-400 mg iodine daily.</li> <li>- Pregnant women: 130-290 mg iodine daily.</li> <li>- 10-100 µg, upper level 150 µg</li> <li>- May be administered in combination with vitamin D and selenium.</li> <li>- Applicable to both children and adults</li> </ul>		
356	<b>Food or Food component</b>	<b>Health Relationship</b>	<b>Proposed wording</b>
	Iodine	Eye health/visual function	<ul style="list-style-type: none"> <li>- is important for visual function and eye moisture.</li> </ul>
<p><b>Conditions of use</b></p> <ul style="list-style-type: none"> <li>- Minimum 15% RDA</li> </ul>			
370	<b>Food or Food component</b>	<b>Health Relationship</b>	<b>Proposed wording</b>
	Iodine	Hair, nail, skin	<ul style="list-style-type: none"> <li>- may contribute to preserve healthy hair, nails and skin.</li> </ul>
<p><b>Conditions of use</b></p> <ul style="list-style-type: none"> <li>- 3-10 mg, upper level 14 mg</li> <li>- young and adults</li> </ul>			

## **GLOSSARY / ABBREVIATIONS**

IDD	Iodine deficiency disorders
UL	Tolerable Upper Intake Level