# Discussion Document on the setting of maximum and minimum amounts of vitamins and minerals in foodstuffs

## Comments by ERNA (European Responsible Nutrition Alliance)[1]

**29/09/06**

ERNA would like to thank the European Commission for the consultation it is launching on the setting of minimum and maximum amounts of vitamins and minerals in foodstuffs and would like to offer its contribution to the debate. ERNA has been working on the scientific aspects of this issue and has developed a risk management model that illustrates how the risk management process of establishing such maximum amounts in food supplements and fortified foods can be done, in line with the principles laid down in legislation. We are very grateful that our model has been included in the discussion paper for consideration and would welcome any comments or suggestion to be communicated to us. An application with new intake data, including children, is underway and will be published at a later time.

In this paper we would like to offer our views on the nine questions that are posed in the discussion paper, as discussed with our scientific experts.

- **Where there is not yet a scientifically established numerical tolerable upper intake levels for several nutrients, what should be the upper safe levels for those nutrients that should be taken into account in setting their maximum levels?**

There are several potential reasons why EFSA has not established numerical tolerable upper intake levels (UL).[2] In order to assess these reasons, a case-by-case analysis of the EFSA opinion needs to be carried out. From such analysis, it becomes clear that for most of the nutrients where no UL has been established this is because at current intakes from foods, fortified foods and

[1] The European Responsible Nutrition Alliance is representing the major European food supplement manufacturers and suppliers. It was established in 1998 and is striving for a common European approach towards food supplements that reflects the interests of both consumers and industry. Recent achievements include the development of a Risk Management Model for the Setting of Maximum Levels of Vitamins and Minerals in Food Supplements and a number of scientific fact sheets on vitamins, minerals and other substances. For more information see: www.erna.org.

[2] European Food Safety Authority: Compilation of the Scientific Opinions on Tolerable Upper Intake Levels for Vitamins and Minerals; 2006;
http://www.efsa.europa.eu/etc/medialib/efsa/science/nda/110.Par.0003.File.dat/upper_level_opinions_hi-part11.pdf
http://www.efsa.europa.eu/etc/medialib/efsa/science/nda/110.Par.0004.File.dat/upper_level_opinions_hi-part21.pdf
http://www.efsa.europa.eu/etc/medialib/efsa/science/nda/110.Par.0005.File.dat/upper_level_opinions_hi-part31.pdf

food supplements, no evidence of adverse effects has been found. In the absence of any evidence to set a UL, there may also be no rationale for setting a maximum level for food fortification or for food supplements. This approach could apply to vitamins $B_1$, $B_2$, $B_{12}$, biotin, pantothenic acid, vitamin K and trivalent chromium.

For a number of other nutrients such as vitamin C and manganese, UL were not established because of limited data, but in these cases there was evidence of potential risk at excessive intakes. In such cases, evidence from international risk assessments and UL established by other organisations[3] may be taken into consideration, as well as a case-by-case qualitative risk assessment.

A qualitative risk assessment may contribute to an understanding of current usage without reported adverse effects. Nevertheless it may be desirable to provide safeguard against a future possibility of habitual excessive intake of any micronutrient resulting from changing habits and product creation and availability. Two recently published reports, from FAO/WHO[4] and IADSA[5], propose a method for achieving such assurance.

The Report of FAO/WHO has recommended an approach based on the highest observed intake (HOI) without recognized adverse effect. An essentially similar approach has been taken by IASDA where the term observed safe level (OSL) was used. OSL may be more precautionary in its derivation than HOI although it may well be seen to be synonymous with HOI. In both circumstances – either in case of no reported adverse effects or in case of very low risk of an adverse effect - it is desirable to ascertain a "UL". The procedure recently published by IADSA is recommended for obtaining an OSL or HOI.

The criteria for the use of this procedure are:
- No adverse health effects have been established
- One or more satisfactory studies on humans are available
- The highest intake reliably observed is taken as the OSL/HOI.

Where reliable toxicological data is available from animal studies it should be used as a check on the derived OSL/HOI. Should there be a defined toxicity from animal studies at a level of consumption that is less than the proposed

[3] e.g. UK Food Standards Agency Expert Vitamins and Minerals Group (EVM): safe upper levels for vitamins and minerals (2003);
http://www.food.gov.uk/multimedia/pdfs/vitmin2003.pdf;
Institute of Medicine, Institute of Medicine of the National Academies: Food and Nutrition Board (USA): Dietary Reference Intakes (1997-2001);
http://www.iom.edu/?id=3788&redirect=0

[4] WHO report WHO - ILO - UNEP International Programme on Chemical Safety (IPCS): A Model for Establishing Upper Levels of Intake for Nutrients and Related Substances: Report of a Joint FAO/WHO Technical Workshop on Nutrient Risk Assessment, 2-6 May 2005; http://www.who.int/entity/ipcs/highlights/full_report.pdf

[5] International Alliance of Dietary / Food Supplement Associations (IADSA): The Risk Assessment and Safety of Bioactive Substances in Food Supplements; 2006;
http://www.iadsa.org/data/PDF/INFPDF53.PDF

for an OSL/HOI, then none can be deduced and assessment must await new critical data from human sources.

Furthermore, a review mechanism could be put in place so that any maximum level could be re-evaluated and changed in the light of new evidence. This could mean an increase of the maximum level in the case of diminished safety issues or when new benefits are identified at higher levels, a decrease if other safety issues arise.

**- For some vitamins and minerals the risk of adverse effects, even at high levels of intakes, appears to be extremely low or non-existent according to available data. Is there any reason to set maximum levels for these vitamins and minerals?**

The answer is no. For a number of nutrients there is no evidence of risk or observations of adverse effects at current levels of intake (See question 1). There are therefore no scientific arguments or objective grounds for setting a maximum level for food fortification or for food supplements.

However, if the risk manager would judge that setting of maximum levels in food supplements and fortified foods to avoid unlimited additions would be appropriate measures, such levels should be established on EU level and sufficiently high to reflect current safe practice and avoid reformulation of products. One example could be the maximum levels established by the UK EVM group which are the current standard in the UK,[6] reviewed and updated by the FAO/WHO procedure to establish HOI or the essentially similar approach of IADSA to establish OSL (see response to question 1).

Maximum levels for vitamins and minerals in fortified foods and food supplements need to take into consideration a number of variables. One is the current intake of these nutrients from all dietary sources; another is information on how this intake will evolve over time in the population. The ERNA/EHPM risk management model[7] that is included in the annex to the EC Discussion paper allows for assessment of these variables and offers a model that can be reapplied when new data become available.
The information on evolution of intake, taken to apply the model comes from the comparison of surveys carried out in 1986/87 and 2000/01 (NDNS) in the UK, a liberal market place where fortified foods and food supplements coexist in the absence of maximum levels. It is worthy to note that increase of intake by more than 20% was only evident for Vitamin C and Vitamin B6. For minerals an increase exceeding 5% was only observed for calcium. The current intake data were therefore based on the 97.5 percentile intakes from

[6] The UK EVM report (see footnote 3) dates from 2003. ERNA would like to point to the fact that the scientific evidence for preformed retinol, beta-carotene and manganese would need to reviewed and updated using the FAO/WHO procedure to establish HOI or the essentially similar approach of IADSA to establish OSL.

[7] European Responsible Nutrition Alliance (ERNA) – European Association of Health Product Manufacturers (EHPM): Vitamin and Mineral Supplements: a risk management model; 2005; http://www.erna.org/data/pdf/INF206.pdf

foods including fortified foods and then increased by 150% as a precautionary risk management factor for vitamins (based on the highest change, namely vitamin C data) and 110% for minerals (based on calcium data). Also noteworthy was the fact that mean intakes for several micronutrients actually declined over the period of the NDNS, e.g. for copper, zinc and magnesium.

- **Where we set maximum levels, do we inevitably also have to set maximum amounts for vitamins and minerals separately for food supplements and fortified foods in order to safeguard both a high level of public health protection and the legitimate expectations of the various food business operators? Are there alternatives?**

The answer is yes. The UL set by the SCF and EFSA represents amounts of vitamins and minerals that can be ingested safely over a lifetime. Models to establish maximum levels for addition to foods and food supplements should base themselves upon the highest intakes in the population from all dietary sources (as represented by the 97.5$^{th}$ percentile) on a nutrient-by-nutrient basis.

The development of a 'maximum total intake' from which arbitrary proportions are split between fortified foods and food supplements is unscientific and simplistic. For one thing, the vast majority of foods and food supplements will not contain vitamins and minerals at the maximum allowed levels. For many nutrients, particularly minerals, used in food fortification, the levels used are self-limiting for technical and taste reasons. Furthermore, the amounts of nutrients to be added for making a 'source' and 'high' content claim under the upcoming Claims legislation, namely 15% RDA and 30% RDA per 100 g/100 ml, respectively, represents another bench mark for addition of vitamins and minerals to foods.

A approach, more scientific than just an arbitrary split, would be to 'categorise' the nutrients on a case-by-case basis. Taking appropriate measures for each of the groups seems a logical and practical method for risk management. The ERNA/EHPM illustrates how a model could be used to test the sensitivity and specificity for different scenarios and input variables.

The ERNA categorisation is:

**Group A** No evidence of risk within ranges currently consumed; does not represent a risk to human health. This is the case for vitamins B1, B2, B12, K, biotin, pantothenic acid and chromium.

**Group B** Low risk of exceeding the UL (from all sources). This is the case with for vitamins B6, C, D, E, nicotinamide, molybdenum, phosphorus, selenium, magnesium, folic acid.

**Group C** Potential risk of exceeding the UL. This is the case for Vitamin A, beta-carotene (in smokers), calcium, copper, fluoride, iodine, iron, manganese and zinc

Interestingly, also the ILSI[8], Danish[9] and German[10] model come to a similar risk categorisation as the ERNA/EHPM model, so a broad consensus appears to exist in this respect. But as to the approach for setting maximum levels, it is strange that few of the models take a differentiated approach.

Three of the models (AFSSA, ILSI, DK) only concern fortification.
The French AFSSA model[11] takes on nutritional need as the primary objective for setting maximum levels for food fortification. This approach does not seem in line with the criteria of the fortification Regulation itself, which specify that maximum amounts shall be set taking into account upper safe levels of vitamins and minerals established by scientific risk assessment based on generally acceptable scientific data, taking into account, as appropriate, the varying degrees of sensitivity of different groups of consumers and intakes of vitamins and minerals from other dietary sources. It specifies only in second order that due account shall also be taken of reference intakes of vitamins and minerals for the population.
The ILSI model does not consider food supplement use as being substantial and focuses solely on food fortification. It does not use detailed intake data but mean of data available.
The Danish model is a refinement of the ILSI model. It is based on the most sensitive population, Danish intake data and the assumption of current intake of one multivitamin food supplement a day in the Danish population.
The German BfR model starts from a scientific risk assessment, which is later on only applied to two nutrients (Vitamin B6 and potassium). For the others a conservative nutritional need approach is used, assuming the daily consumption of two food supplements and two fortified foods, containing nutrients at maximum level. The model does not consider that for fortified foods, not all foods are fortifiable (only 30-50%), that not all fortifiable foods are fortified (estimated maximum: only 50%), that not all fortified foods are consumed daily, that not all fortified foods are fortified up to the maximum level because of cost implications or technological limitations (organoleptic, stability, …), that criteria for “source of” and “high in” nutrition claims will in most cases determine levels added, that not al nutrients are used for food

[8] International Life Science Institute (ILSI): Vitamins and Minerals: a model for safe addition to foods; Eur J Nutr 2003; 42:118-130; http://europe.ilsi.org/file/ilsieuroope-vitandmineralsarticle.pdf

[9] Danmarks Fødevareforskning (Danish Institute for Food and Veterinary Research - DFVF): A Safe Strategy for Addition of Vitamins and Minerals to Foods; Eur J Nutr 2005; DOI: 10.1007/s00394-005-0580-9

[10] Bundesinstituts für Risikobewertung (Federal Institute for Risk assessment - BfR): Verwendung von Vitaminen in Lebensmitteln (Use of Vitamins in Foods); 2005; http://www.bfr.bund.de/cm/238/verwendung_von_vitaminen_in_lebensmitteln.pdf; Verwendung von Mineralstoffen in Lebensmitteln (Use of Minerals in Foods); 2005; http://www.bfr.bund.de/cm/238/verwendung_von_mineralstoffen_in_lebensmitteln_bfr_wissenschaft_4_2004.pdf

[11] Agence Française de Sécurité Sanitaire des Aliments (French Agency for Food sanitary Safety - AFSSA - Fr). Cahier des charges pour le choix d'un couple Nutriment-Aliment Vecteur (Specification for the selection of a Nutrient-Vector Food Pair 2003); http://www.afssa.fr/ftp/afssa/actu/CDCversionfinale.pdf

fortification, and that the contribution of fortified foods to the mean highest intake in the population is low. Neither does it consider that not all consumers take food supplements (15-20%), that not all food supplements are used daily or over long periods, that not all food supplements contain the maximum levels of nutrients, that consumption of food supplements is conscious, that labelling is a valid risk management option for informing consumers on responsible use of food supplements, that contribution of food supplements to the mean highest intake is low and multiple use of similar food supplements is rare.

**- The Commission would appreciate receiving available information on intakes of vitamins and minerals or indications of the best sources providing such data at EU level.**

There are quite some intake data available, with the UK as the most comprehensive and detailed. Other sources of intake data include Irish Universities Nutrition Alliance (IUNA), the North-South Ireland Food Consumption Survey 2001, Gezondheidsraad, Enkele belangrijke ontwikkelingen in de voedselconsumptie (2002), Turrini A, Saba A, Perrone D, Cialfa E & D'Amiels A (2001). Data from the European Prospective Investigation into Cancer and Nutrition (EPIC) may also be considered, These data were collected in 10 countries across the EU (23 centres and half million people) and included collection of information on diet as well as biological samples for analysis of nutritional status. Finally, many research centres may have unpublished data and results of intake surveys that can be submitted on request.

One inconvenience is that these data bases are incompatible, even at the level of micronutrients. Currently there are a number of projects in progress to improve this situation:

- A project to create a complete European data base is under active discussion and development by EFSA (Phillippe Verger, Research Unit INRA;. Met@risk: EFSA Colloquium No 3, Brussels, April 2005).

- The development of such a data base of consumption at nutrient level is in progress through the TNO coordinated EFCOSUM Project.

- A EU 6$^{th}$ framework funded project, EFCOVAL (European Food Consumption Validation) aims to develop and validate a method for assessing food consumption and nutrient intake across Europe.

- The 6$^{th}$-framework EUROFIR (European Food Information Resource) project develops a European food composition databank.

- A revision of the ERNA/EHPM model, including application with new intake data is currently underway (including data from Poland, Belgium and Ireland).

**- If such existing data refer only to the intake in some Member States, can they be used for the setting of legitimate and effective maximum levels of vitamins and minerals at European level? On the basis of what adjustments, if any?**

The answer is yes. An analysis of existing intake data from several Member States does not show marked differences. If the highest intakes (as represented by the 97.5th percentile) are grouped and the mean highest intake (NHI) is used as a basis for applying the models, this would certainly be representative of population intakes of macro- and micronutrients.

Furthermore, the most representative data for applying a model would be the Member State with the highest intake from all sources. Best candidate for this would be UK because data for intake surveys would reflect intakes of nutrients in a liberal market place, where both fortified foods and food supplements coexist.
Therefore these data were primarily used for the application of the ERNA/EHPM model.

For the micronutrients categorized into the potential risk group (see above answer to question 3) it should be practicable to check exposure using current ULs as determined by the SCF/EFSA against exposure using national data. Should a risk be exposed, then that particular nutrient would have to be regulated downwards to accommodate the risk until the doubt was either confirmed or refuted when re-examined with the data of the completed EFCOSUM project.

**- Should the intake from different population groups be taken into account in the setting of maximum levels of vitamins and minerals*?***

The derivation of ULs for the essential nutrients is based on the principle that the most sensitive members of the general population must be protected from the adverse effects of high nutrient intakes. So, UL established on the basis of scientific risk assessment already take into consideration the most vulnerable groups of the population. The extent to which ULs for a subpopulation are considered separately from the general population is an area of scientific judgement, and the nutrients are usually assessed on a case-by-case basis.

We acknowledge nevertheless that it might be appropriate for consumer confidence to have maximum levels set for two groups, adults including young adults, and children (4 up to 10 years of age). In this case, UL for children will need to be used in the models. The US FNB and the SCF/EFSA have made extrapolations from adult ULs for children, on the basis of known differences in body weight, body size, physiology and metabolism of the nutrient concerned.

An application of the ERNA/EHPM model specifically for children is underway and will be published at a later time.

**- Taking into account all the above-mentioned considerations, how far should PRIs/RDAs be taken into account when setting maximum levels for vitamins and minerals?**

PRIs/RDAs should only be taken into account in setting minimum levels to avoid deficiency conditions, the situation for which they were developed.

The setting of maximum levels should be based on scientific risk assessment, as is specified in the criteria of the legislation (see point 3). The use of arbitrary multiples or fractions of RDAs/PRIs to set ULs are no longer acceptable from the scientific risk assessment point of view or as an objective approach to risk management. RDA's can be considered as a marker for the lowest end of the range of safe intake for each nutrient but cannot be used in risk assessment to establish upper safe levels. It should be noted that in the past, the practice in several member states[12,13,14,15] of systematically applying RDA-based maximum levels for addition of nutrients to foods and food supplements has been judged incompatible with the provisions of the European Treaty.[16]

However, RDA's can be used as an indicator to help establish the extent of the range of safe intake and could form an approach to help clarify the relative safety of each nutrient for the population. If the UL and RDA are closer together, the safe range of intake is relatively small. Where the UL and RDA are further apart, the safe range of intake is relatively large. The RDA as an 'indicator' can therefore be taken into account in establishing the breadth of the range of safe intake and for risk characterisation.

This approach was adopted in the ERNA/EHPM model to develop a 'Population Safety Index' for the quantitative risk characterisation of nutrients into 3 categories (see point 3). In the case of Group C nutrients, the UL is close to the RDA and therefore risk of exceeding the UL is a real possibility, especially in the higher intake groups (97.5$^{th}$ percentile). However, in such

[12] European Court of Justice: Case 387/99: Judgment of the Court (Sixth Chamber) of 29 April 2004. Commission of the European Communities v. Federal Republic of Germany. European Court Reports 2004: I-3751; Official Journal of the European Community C118:2; 30 April 2004.

[13] European Court of Justice: Case 24/00: Judgment of the Court (Sixth Chamber) of 5 February 2004. Commission of the European Communities v. French Republic. European Court Reports 2004: I-1277; Official Journal of the European Community C85:2-3; 3 April 2004

[14] European Court of Justice: Case 150/00: Judgment of the Court (Sixth Chamber) of 29 April 2004. Commission of the European Communities v. Republic of Austria. European Court Reports 2004: I-3887; Official Journal of the European Community C118:3; 30 April 2004

[15] European Court of Justice: Case 192/01: Judgment of the Court (Sixth Chamber) of 23 September 2003. Commission of the European Communities v. Kingdom of Denmark. European Court Reports 2003: I-9693; Official Journal of the European Community C275:12; 15 November 2003

[16] European Communities: Consolidated version of the treaty establishing the European Community. Official Journal of the European Community C325:33-184; 24 December 2002; http://europa.eu.int/eur-lex/lex/en/treaties/dat/12002E/pdf/12002E_EN.pdf

case risk of intake below the RDA or even deficiency is also real, especially in the lower intake groups (2.5$^{th}$ percentile). In such case the RDA needs to be carefully considered in establishing max levels.

**- Should the minimum amount of a vitamin or a mineral in a food to which these nutrients are added be the same as the significant amount required to be present for a claim and/or declaration of the nutrient in nutrition labelling? Should different minimum amounts be set for certain nutrients in specific foods or categories of foods? If yes, on what basis?**

If no claim is made, no minima should be set. The amount added is of no regulatory significance provided no claim is made and provided the product is not packed to imply benefit from the vitamin/mineral/trace element added.

For claims for nutrients in conventional and fortified foods, there is a need for consistency across several legislative instruments, namely the Nutrition Labelling Directive (under review), the addition of vitamins and minerals and certain other substances in food Regulation, and the Regislation on nutrition and health claims made on foods. It seems appropriate to maintain consistency for the 15% RDA per 100 g/100 ml or per specified portion size / unit dose as the basis for a 'significant amount' and the minimum to make a claim on a food.

**- Should minimum amounts for vitamins and minerals in food supplements also be linked to the significant amounts that should be present for labelling purposes or should they be set in a different way?**

The Food Supplements Directive states that the Nutrition Labelling Directive 90/496/EC does not apply to food supplements. The minimum amounts should relate to the use of the (RLVs) RDAs set by SCF/EFSA for both foods and food supplements. The definition of a food supplement refers to concentrated sources of nutrients, and hence the 'minimum' criteria are not directly relevant.

**Conclusions:**

The main conclusion of the scientific and legal arguments in relation to the setting of maximum amounts of vitamins and minerals in foods is that such amounts cannot be set in an arbitrary way but should be set based on scientific risk assessment, taking into consideration genuine safety concerns where appropriate. This is in line with the principles laid down in the food supplements Directive and the fortification Regulation, with European Court of Justice court rulings and the fundamental rules of international trade.
The ERNA risk management model, that is included as one of the models in the discussion document, sets out a scientific methodology for a risk management approach that takes into consideration the risk characterisation of the different nutrients, 97$^{th}$ percentile intake data of foods including fortified

foods, evolution in intake and allowance for future trends. This basic approach, that can be summarised as presented in the table below, is currently being applied with new intake data from a number of member states. An application with intake data for children is underway and will be published at a later time.