

## SCIENTIFIC OPINION

### **Inability to assess the safety of thiamine-enriched yeast added for nutritional purposes as a source of thiamine in food supplements and the bioavailability of thiamine from this source, based on the supporting dossier <sup>1</sup>**

#### **Scientific Statement of the Panel on Food Additives and Nutrient Sources added to Food**

**(Question No EFSA-Q-2005-207)**

**Adopted on 4 June 2009**

#### **PANEL MEMBERS**

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<sup>1</sup> For citation purposes: Scientific Statement of the Panel on Food Additives and Nutrient Sources added to Food on the inability to assess the safety of thiamine-enriched yeast added for nutritional purposes as a source of thiamine in food supplements and the bioavailability of thiamine from this source based on the supporting dossier following a request from the European Commission. *The EFSA Journal* (2009) 1121, 1-6.

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

The European Community legislation lists nutritional substances that may be used for nutritional purposes in certain categories of foods as sources of certain nutrients.

The Commission has received a request for the evaluation of thiamine-enriched yeast added for nutritional purposes to food supplements. The relevant Community legislative measure is:

- Directive 2002/46/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to food supplements<sup>2</sup>.

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

In accordance with Article 29 (1) (a) of Regulation (EC) No 178/2002, the European Commission asks the European Food Safety Authority to provide a scientific opinion, based on its consideration of the safety and bioavailability of thiamine-enriched yeast added to food supplements.

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<sup>2</sup> OJ L 183, 12.7.2002, p.51.

## STATEMENT

### 1. Introduction

Following a request from the European Commission to the European Food Safety Authority (EFSA), the Scientific Panel on Food Additives and Nutrient Sources added to Food (ANS) was asked to provide a scientific opinion on the safety of thiamine-enriched yeast added for nutritional purposes as a source of thiamine in food supplements and on the bioavailability of thiamine from this source.

### 2. Summary of the information provided in the supporting dossier on thiamine-enriched yeast

Thiamine-enriched yeast is derived from cultures of specified strains of *Saccharomyces cerevisiae* grown in the presence of thiamine hydrochloride. Fermentation takes place at a specified temperature and pressure for defined periods of time. This is followed by increasing the temperature to kill the yeast. The cell wall is ruptured enzymatically to release the contents which are then spray dried.

The petitioner has provided some general information on the manufacturing process, but no details on the procedures used to produce thiamine-enriched yeast are provided.

According to the petitioner, thiamine in thiamine-enriched yeast is naturally integrated by the growing yeast into its own structure and occurs therefore, in the way thiamine would be present in any food material.

The petitioner states that during fermentation in the presence of thiamine, a specific strain of *Saccharomyces cerevisiae* produces specific thiamine compounds, the metabolic fate and the biological distribution of which are similar to those from other sources of thiamine in the diet.

The petitioner states that “the integration will be chemically multi-formatted by the organism and therefore, its chemical name, formula, chemical family and CAS Registry Number is undefined”.

Comparative Fourier Transform Infrared (FTIR) spectra of the starter yeast, thiamine, thiamine-enriched yeast, and a simple mixture of yeast and thiamine have been provided.

Thiamine-enriched yeast is described as an amorphous hygroscopic cream/tan-coloured powder with a slight yeast/citrus odour which is water soluble at 20 °C.

According to the petitioner, thiamine is present at 25% of the source. The remaining 75% is made up of enzymatically ruptured yeast cells.

The petitioner also provides microbiological specifications. Specifications for lead, mercury, cadmium and arsenic are not provided.

Specific proposals for use levels for thiamine-enriched yeast were not provided. The petitioner only indicates that thiamine-enriched yeast is to be used to provide a source of thiamine supplied as a nutrient in food supplements. According to the petitioner the quantities added to the food supplements are product dependent, but because of the improved bioavailability are generally lower than those found in other sources of thiamine.

No data were provided on the bioavailability of thiamine from the thiamine-enriched yeast under consideration or on the safety of the source. Vinson *et al.*, (1989) reported that rats fed an unspecified thiamine enriched yeast product had a 1.4 times higher Area under Blood Concentration-Time curve for thiamine than rats given uncomplexed thiamine.

### 3. Assessment

The Panel notes that *Saccharomyces cerevisiae* has a qualified presumption of safety (EFSA, 2008) but considers that this presumption of safety might not be applicable to the specific conditions of culture of the yeast in the presence of a high quantity of thiamine.

According to the petitioner, fermentation in the presence of thiamine within eukaryotic cells will produce thiamine complexes not further defined, but with a metabolic fate and biological distribution similar to those of other sources of thiamine in the diet.

According to the petitioner, from the comparative FTIR spectra it can be deduced that thiamine is in '*biological complex formation*' with yeast. The Panel considers that the FTIR spectra provided do not demonstrate the existence of such complexes.

According to the petitioner, thiamine from thiamine-enriched yeast is safe. Although not explicitly stated in the dossier the argument for the safety of thiamine-enriched yeast appears to be based on thiamine being a normal constituent of the diet, and the long history of use of *Saccharomyces cerevisiae* in fermented food and beverages. The assumption is that, provided there is no overload of normal metabolic pathways, fermentation within eukaryotic cells will produce thiamine complexes, the metabolic fate and the biological distribution of which are similar to those from other sources of thiamine in the diet.

The Panel notes that the petitioner has insufficiently chemically characterised the product and therefore has not demonstrated that the thiamine complexes have a metabolic fate and biological distribution similar to those of other sources of thiamine in the diet.

The Panel also notes that it was not possible to assess the bioavailability of thiamine from thiamine-enriched yeast since neither data nor suitable supporting references were provided.

The Panel further notes that neither safety data nor suitable supporting references were provided to support the assumption of safety of thiamine-enriched yeast.

### CONCLUSIONS

The Panel concludes that due to the lack of an appropriate dossier supporting the use of thiamine-enriched yeast in food supplements, the bioavailability of thiamine from thiamine-enriched yeast and the safety of thiamine-enriched yeast cannot be assessed.

**Key words:**

Food supplements, thiamine, yeast-transformed thiamine, thiamine-enriched yeast.

**DOCUMENTATION PROVIDED TO EFSA**

1. Dossier on Bio-transformed Thiamine Proposed for Addition to Annex II of Directive 2002/46/EC of the European Parliament and of the Council Relating to Food Supplements. Original submission June 2005; Additional information submitted December 2006, January 2008 and October 2008. Submitted by Higher Nature Ltd UK.

**REFERENCES**

EFSA (European Food Safety Authority), 2008. Opinion of the Scientific Panel on Biological Hazards on the maintenance of the list of QPS microorganisms intentionally added to food or feed. *The EFSA Journal* (2008) 923, 1-48.

Vinson JA, Bose P, Lemoine L, Hsiao K (1989) Relative bioavailability of trace elements and vitamins found in commercial supplements. Nutrient availability. Chemical and Biological aspects. Royal Society of Chemistry. pp 125-127.

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## GLOSSARY / ABBREVIATIONS

ANS	Panel on Food Additives and Nutrient Sources added to Food
CAS	Chemical Abstracts Service
EC	European Commission
EFSA	European Food Safety Authority
FTIR	Fourier Transform Infrared