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Food Chemistry Division – EuCheMS position on Trans Fatty Acids

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One of the **Food Chemistry Division - EuCheMS's** mission is to provide independent, evidence-based scientific and technical opinions on food quality and safety. FCD EuCheMS, representing the food chemical societies of all EU member states as well Russia, Turkey and Israel is deeply interested in all the topics correlated to the presence of natural occurring or technological/environmental contaminants and xenobiotics in foods. This document represents an independent scientific voice about the problems correlated with the presence of Trans Fatty Acids in food.

ABSTRACT
Based on the scientific evidence today, there is a consensus that the consumption of TFAs should be lowered. However, not enough is known at present to have a sufficiently solid base for the setting of a legal limit for TFAs in food.
The above elaborations of various known and yet-unknown aspects suggest strongly the funding of a broad range of activities, informing the Commission on health effects of TFAs.
Learning more about the mechanisms responsible for detrimental and possible beneficial effects of trans fats in the diet is essential to learn more about the dietary contributions to cardiovascular disease today.
In agreement with several "nutrition-driven" Associations and Advisory Boards, the FCD EuCheMS supports a food-based approach through a diet that includes regular consumption of fatty fish, nuts and seeds, low-fat dairy products, vegetables, fruits, whole grains, and legumes, reducing red and processed meats (particularly sausages and cured meats) and, finally, reducing foods containing TFAs. This recommendation is made within the context of recent rapidly evolving science highlighting the influence of dietary fats and specific fatty acids on human health.
As a first step, and parallel with the research effort, extending the nutrition declaration (Art. 30 (EU) No 1169/2011) to include trans fatty acids is recommended, as well as an effort to harmonize the current different national recommendations. This will undoubtedly lead to a lowering of TFAs in food due to evolving pressure by sensitized consumers.
FCD-EuCheMS is confident that all these efforts, correlated with the application of a specific risk assessment method based on the scientific and epidemiologic evidence, will eventually lead to the setting of legal limits for TFAs in food.

Recommended Actions by the Commission

On regard of the current state of the art on trans fatty acids, also considering the policy makers debate and the current evaluation of the presence of trans fatty acids in foods, the Division of Food Chemistry - EuCheMS suggests:

1. Further funding of research of the metabolic role and fate of single-unsaturated trans fatty acids;
2. funding of research on the occurrence and metabolic fate of polyunsaturated trans linolenic and linoleic acids in animals and humans;
3. funding of research on possible interactive effects of TFAs with other dietary components or ingredients (e.g. oxidized sterols; sugar content), poorly investigated until today;
4. funding of research on TFAs formation during food processing, also considering the effect of novel technologies (thermal and non-thermal approaches);
5. establishing validated analytical methodology for TFAs testing in foods and feeds, enlarging the data base on TFAs available in Europe;
6. starting and mediating an ongoing institutionalized dialogue between research, industry and EFSA.

All these researches can probably to improve the knowledge about the real risk correlated to the exposure of TFAs in foods, allowing more data to set limits (if - and when - EU will decide to adopt this strategy at policy level).

Scientific Rationale and International positions on Trans Fatty Acids

A trans fatty acid (TFA) is a mono- or polyunsaturated fatty acid with at least one double bond in trans geometric configuration. The naturally occurring fatty acids in plant-derived foods are present in “cis” form. Specific trans fatty acids from natural source are described in scientific literature (e.g. the ruminant trans fats, characterized by cardio-protective role and other benign activities, as demonstrated in some studies). Rumenic acid, C18:2 9cis, 11trans, mainly found in milkfat (as 85-90% of total Conjugated Linoleic Acids, CLA) from dairy products and ruminant meat, is an example of trans fatty acids from “natural” origin (rumen), linked to beneficial effects in humans. Rumenic acid as confirmed by many *in vivo* studies, could prevent atherosclerosis from developing, even if the putative ruminant CLA’s impact on other diseases (e.g. obesity, diabetes, cancer) awaits to be established with more studies, since so far no conclusive results have been reached. Ruminant TFA sources contribute between 0.3 and 0.8% of the daily energy intake depending on dietary habits across Europe.

The formation of trans fatty acids in foods is mainly a result of the partial catalytic hydrogenation of oils, an industrial process that increases the melting point of oils and leads to products, which are solid at room temperature. The hydrogenated oils are also less sensitive to oxidation. Other

sources of TFAs are the bleaching and deodorization during the refining of oils: it is well established knowledge that bleaching main effect is the isomerization of monoenoic, depending on temperature and amount of bleaching earth, while deodorization effect is the isomerization of polienoic (Mariani, 1991). Some studies report also the formation of TFAs by cooking at very high temperature, e.g frying foods. Elaidic acid (C18:1 trans-9) and Vaccenic acid (C18:1 trans-11) are two examples of isomers of oleic acid (C18:1 cis-9) commonly occurring in processed foods.

Due to their high melting points trans fatty acids (TFAs) have been widely used in the food industry since the 1950s, particularly to produce shortenings and margarine. In recent years, the industry has seriously tackled the problem, combining the hydrogenation techniques also with inter- and trans esterification, as well as using highly specific catalysts capable of limiting the formation of trans fatty acids. The outcome was a serious reduction of the TFAs content in some foods, allowing a reduction of the toxicological risk.

However, there is currently broad scientific consensus that high consumption of trans fats in the diet significantly increases the risk of coronary heart disease (CHD). Moreover, a diet rich in TFAs may also be associated with increased risk of other cardiovascular diseases, and other chronic pathologies, like obesity and type 2 diabetes. As is well known, the main dietary sources of industrial trans fats are partially hydrogenated vegetable oils, largely and commonly used in shortenings and margarines, generally used in the baking industry as well as butter replacements in households (table margarines, baking). The European consumer's exposure to TFAs depends on the TFA content of the local food supply. TFAs in high temperature fried fats in foods, biscuits, cakes, pop corns, deep fried foods and some sauces make considerable contributions. The intake of trans fatty acids is however significantly influenced by individual food preferences and the significant variations in the local food available. In countries where industrially processed food makes a high proportion of the diet, intake is logically higher than in areas where people prefer unprocessed, "natural" food. Thus, the lowest intake is found in the Mediterranean countries. To support the widely-accepted impact of a high TFA consumption on health, it has been shown that increased TFA consumption from industrial origin (>1.5% of the total energy intake, TEI) is positively correlated with a higher risk of cardiovascular disease (CVD). However, no significant association has been observed between the usual intake of natural TFAs (up to 1.5% of the TEI) and coronary risk.

The World Health Organization (WHO) suggests that the removal of partially hydrogenated vegetable oils from the food supply would result in substantial health benefits, following several scientific studies. The US Food and Drug Administration (FDA) declared in 2015 that partially hydrogenated oils (PHOs), until recently considered as "safe", must be removed by food manufacturers from foods, starting from 2018. Four EU Member States have set legal limits on industrially produced trans fats in foods (Austria, Denmark, Hungary and Latvia). Denmark was the first Member State of the European Union to limit the trans fats content with a law in 2003.

Subsequently, similar national limitations were introduced in Austria (2009), Hungary (2013) and Latvia (2015). Voluntary measures to reduce the TFA content are taking place in Belgium, Germany, the Netherlands, Poland, the United Kingdom and Greece. National dietary recommendations on TFAs have been issued in Bulgaria, Malta, Slovakia, Switzerland, the United Kingdom, Finland and extra-European Countries (e.g. Israel). Anyway, different trans fat policies were adopted around the world: national mandatory trans fat labelling, national trans fat ban, voluntary trans fat limits, mandatory trans fat labelling with voluntary limits, local mandatory trans fat labelling, local trans fat bans and State, provincial or territorial trans fat bans (Bull World Health Organ 2013; 91:262–269H).

FCD – EuCheMS highlights that a study reports that Denmark's food policy, restricting the content of artificial trans fats in certain ingredients in its food supply, has been followed by a decrease in CVD mortality rates (Brandon J. et al., 2016). It is recommended to repeat such a study on a wider geographical basis to establish the effect of the reduction of TFAs in foods.

There has been growing pressure by consumer associations and by stakeholders involved in food safety concern to establish a EU limit for TFAs in foods. The EU Commission in a 2015 Report concluded that a legal limit for industrial TFAs content would indeed be the most effective measure for tackling the problem. Moreover, some technical solutions to mitigate TFAs in foods are available, the "intelligent" reformulation as well as the "*ingredient and food design*" strategy using healthy sources of fats (and fat mimics or replacers) being probably the most promising solutions.

FCD-EuCheMS agrees with the EU's Parliament reports as well as with other action of the Commission regarding food safety, more particularly focusing on the presence of fatty acids in foods. EuCheMS suggest highlighting at European level the critical aspects of trans fatty acids in foods, confirming the probable need of a legal limit. Moreover, FCD-EuCheMS suggest paying attention to the different classes of foods, population groups and food preferences, respectively dietary habits.

EuCheMS opinion

Dietary fat for the healthy infant and adult population should provide a significant percentage of energy. This fraction of nutrients must contain balanced proportions and amounts of omega 3 and omega 6 unsaturated fatty acids, with a concurrent reduction of saturated fatty acids and TFAs.
Industry must evaluate the technological consequences and communicate the findings concerning the reduction of TFAs in processed foods. EU Parliament and Commission must seriously consider the setting of legal limits, differentiated for the various foods. Particular regard must be given to the more susceptible consumers exposed to TFAs (children). The implementation of these limits must be introduced in close communication with food industry. The reformulation of foods, the application of "mitigation" technological strategies during fat refining and processing as well as

the use of fat replacers in foods probably must be considered the best route to reduce the toxicological risk. Anyway, the concept of "voluntary" reformulation as well as the inclusion of TFA content in the nutrition declaration (legally not possible in the EU) leave it to the food Companies to decide whether (or not) to reformulate products or to inform consumers about TFA presence. Moreover, more research is required to improve the knowledge about the fate of TFAs from foods in humans, clarifying their effective biological role.

Essential key references

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