



CONFERENCE  
*TRANS FATS IN FOOD: CONSUMER PROTECTION AND CHALLENGES  
FOR FOOD INDUSTRY*

## Setting the scene...

# Impact of trans fats on health

## *EFSA's work related to trans Fatty acids*

**Prof. Ambroise Martin**

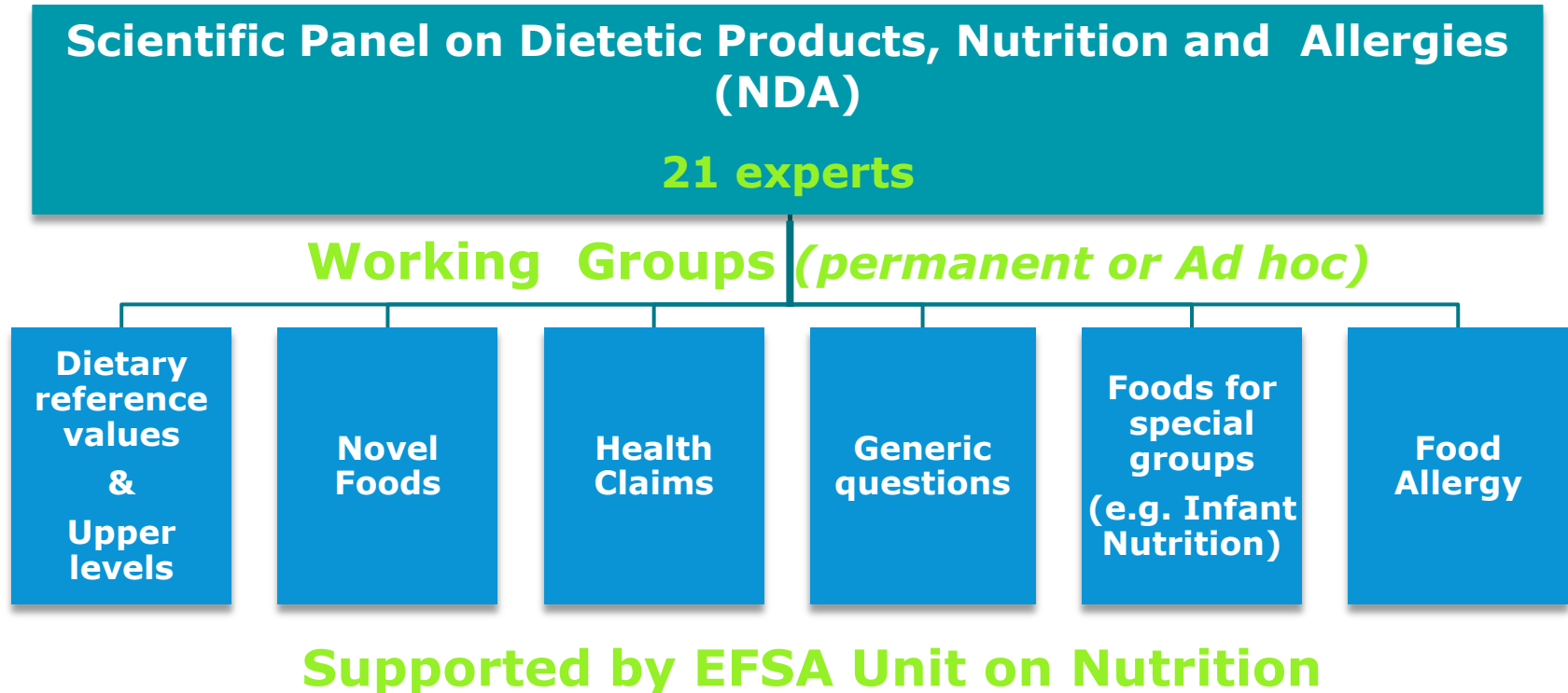
*Member of the EFSA WG on DRVs (former chair 2006-2015)  
and NDA Panel 2006-2015 (former chair 2012-2015)*

***Vilnius, Lithuania, 19 September 2017***

# OUTLINE

- EFSA's role in nutrition
- *Initial Opinion on Trans Fatty acids (TFA) – 2004*
- As a basis for a consistent approach on TFA in different areas:
  - Dietary reference values (DRVs) on lipids – 2009
  - Food-Based Dietary guidelines - 2010
  - Nutrient profiles - 2008
  - Health claims – 2011
  - *(CLA in dietary supplements excluded – specific opinions as novel food and health claim)*

# PRODUCTION OF EFSA'S SCIENTIFIC ADVICE ON NUTRITION



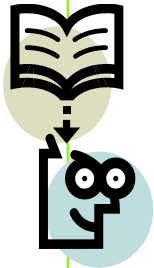
# EFSA'S ROLE IN NUTRITION

## EFSA founding Regulation (EC) 178/2002

### *EFSA to provide*

**Scientific advice**, *scientific or technical support on human nutrition in relation to EU legislation*

**Assistance concerning management or communication on nutritional issues linked to EU health programmes**, *at request of the Commission*



# START OF THE TFA STORY - 1990

THE NEW ENGLAND JOURNAL OF MEDICINE

Aug. 16, 1990

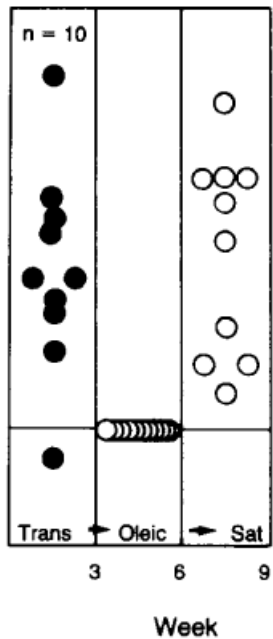
Vol. 323 No. 7

TRANS FATTY ACIDS AND LIPOPROTEIN LEVELS — MENSINK AND KATAN

439

## EFFECT OF DIETARY TRANS FATTY ACIDS ON HIGH-DENSITY AND LOW-DENSITY LIPOPROTEIN CHOLESTEROL LEVELS IN HEALTHY SUBJECTS

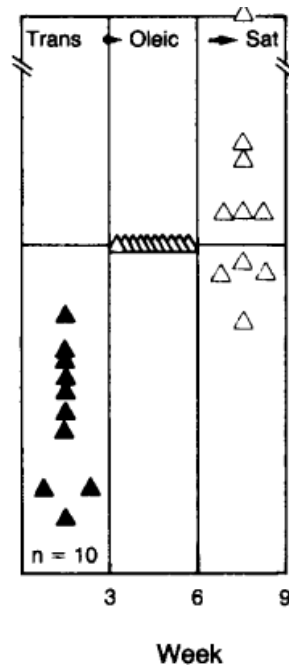
RONALD P. MENSINK, PH.D., AND MARTIJN B. KATAN, PH.D.



Expected effect on LDL - cholesterol

Unexpected effect on HDL - cholesterol

« Big shock » in the community of lipidologists!  
Whereas they were thought to have the same impact on cardiovascular risk than SFA, TFA were indeed found to be worse...



# A GROWING INTEREST FOLLOWING THE « PRINCEPS PAPER »

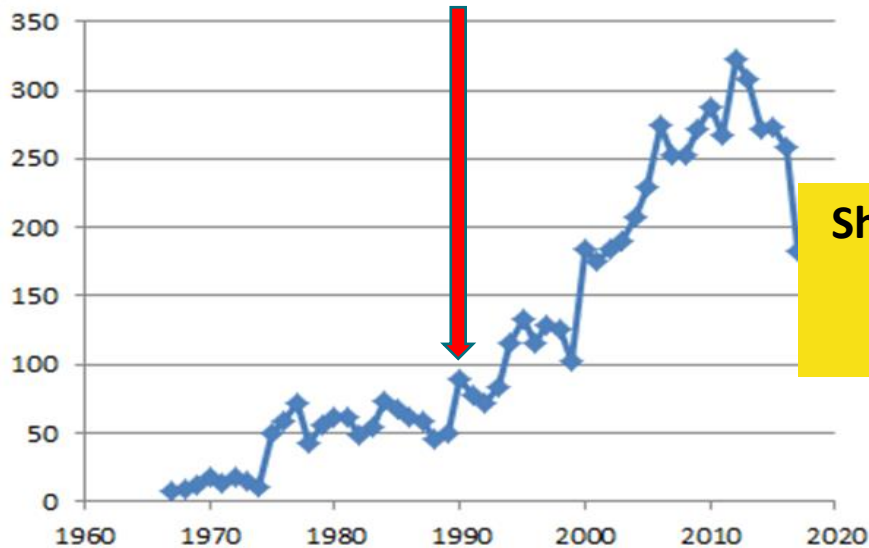
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## EFFECT OF DIETARY TRANS FATTY ACIDS ON HIGH-DENSITY AND LOW-DENSITY LIPOPROTEIN CHOLESTEROL LEVELS IN HEALTHY SUBJECTS

RONALD P. MENSINK, PH.D., AND MARTIJN B. KATAN, PH.D.



**Sharp increase in the number of scientific papers published per year on « trans fatty acids »**  
*Source: Pubmed*

# The EUROPEAN TRANSFAIR STUDY 1995 - 1996

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Volume 351, No. 9109, p1099, 11 April 1998

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 Research Letters

### Intake of trans fatty acids in western Europe: the TRANSFAIR study

on behalf of the TRANSFAIR Study Group, [Geert van Poppel](#)

Published: 11 April 1998

DOI: [http://dx.doi.org/10.1016/S0140-6736\(98\)24015-3](http://dx.doi.org/10.1016/S0140-6736(98)24015-3)

**Around 1300 food items  
Collected and analyzed  
for TFA**

**In 14 European countries**

*Belgium, Denmark,  
Finland, France,  
Germany, Greece, Italy,  
Iceland, the Netherlands,  
Norway, Portugal, Spain,  
Sweden and the United  
Kingdom*

# The EUROPEAN TRANSFAIR STUDY 1995 - 1996

## Calculation of TFA intakes using national food consumption data

Eur J Clin Nutr. 1999 Feb;53(2):143-57.

### **Intake of fatty acids in western Europe with emphasis on trans fatty acids: the TRANSFAIR Study.**

Hulshof KF<sup>1</sup>, van Erp-Baart MA, Anttolainen M, Becker W, Church SM, Couet C, Hermann-Kunz E, Kesteloot H, Leth T, Martins I, Moreiras O, Moschandreas J, Pizzoferrato L, Rimestad AH, Thorgeirsdottir H, van Amelsvoort JM, Aro A, Kafatos AG, Lanzmann-Petithory D, van Poppel G.

***“CONCLUSION: The current intake of TFA in most Western European countries does not appear to be a reason for major concern. In several countries a considerable proportion of energy was derived from SFA. It would therefore be prudent to reduce intake of all cholesterol-raising fatty acids, TFA included.”***

**Indeed, not the same concern for all.... !!**



# RISK ASSESSMENT & RISK MANAGEMENT IN THE EU

***Discrepancies between Member States about the Danish proposal of a national legislation on TFA was the driver for the EC to request Efsa advice on TFA***



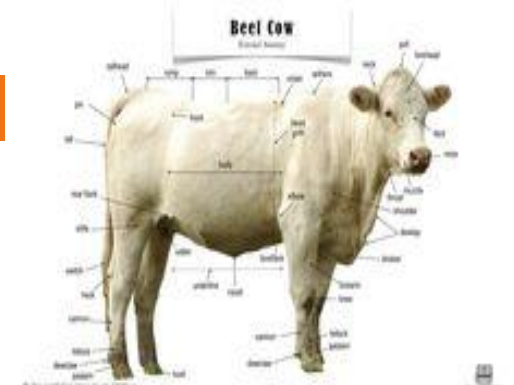
## EUROPEAN COMMISSION MANDATE TO EFSA ON *TRANS* FATTY ACIDS (TFA)

**Opinion of the Scientific Panel on Dietetic Products, Nutrition and Allergies on a request from the Commission related to the presence of *trans* fatty acids in foods and the effect on human health of the consumption of *trans* fatty acids  
(Request N° EFSA-Q-2003-022)  
(adopted on 8 July 2004)**

- To take into account the evidence on all TFA in foods, naturally present and those occurring from manufacturing process.
- To advise on any specific effects of TFA on health (if any, whether the effects differ according to the food source, and compare to other types of fatty acids), whether the effects are associated with a specific intake level of TFA in the context of the overall diet.
- To advise on methods of analysis that can distinguish TFA, naturally present in fats vs those formed during processing of fats, oils or foods)

# THREE DIETARY SOURCES OF TRANS FATS

- bacterial transformation of unsaturated fatty acids in the rumen of **ruminant animals**
- **industrial hydrogenation** (used to produce semi-solid and solid fats that can be used for the production of foods such as margarines, shortenings, and biscuits) and **deodorisation** (a necessary step in refining) of unsaturated vegetable oils (or occasionally fish oils) high in polyunsaturated fatty acids
- during **heating and frying** of oils at high temperatures



# DIETARY INTAKES

- **TRANSFAIR study (1995-1999, 14 European countries):**
  - ✓ **Mean intakes of TFA in the EU:** from 1.2 to 6.7 g/d and 1.7 to 4.1 g/d among men and women, respectively, corresponding to **0.5-2.1 % and 0.8-1.9 % of total energy intake**, respectively;
  - ✓ **Mean intakes of saturated fatty acids (SFA):** from 10.5 to 18% of total energy intake;
  - ✓ **Isomers of 18:1 (oleic acid)** contributed 54-82% of the total TFA;
  - ✓ TFA from ruminant fat ranged from about 30 to 80% of total TFA, corresponding to 0.3-0.8% of total energy intake.
- **More recent dietary surveys indicate that the intakes of TFA have decreased in a number of EU countries, mainly due to reformulation of food products, e.g. fat spreads, to reduce the TFA content**

# HEALTH EFFECTS - 1

- Consumption of **diets containing TFA**, like **diets containing mixtures of SFA**, consistently **increases serum LDL cholesterol (LDL-C)**, compared with consumption of diets containing *cis*-monounsaturated or *cis*-polyunsaturated fatty acids.
- The effect shows a **linear dose response** with serum LDL-C indicating that effects are proportional to amounts of TFA consumed.
- Elevated LDL-C has been causally linked to coronary heart disease (CHD); thus, **higher intakes of TFA may increase risk for CHD**.
- The available evidence does **not provide a definitive answer** to the question of **whether TFA have an effect on LDL-C different to a mixture of SFA on a gram-for-gram basis**.
- Evidence for a possible **relationship of TFA intake with other adverse health effects** (e.g. cancer, type 2 diabetes or allergy) is **weak or inconsistent**

## HEALTH EFFECTS - 2

- Evidence from controlled human intervention studies also indicates that consumption of diets containing TFA results in **decreased serum HDL cholesterol (HDL-C)**, compared with consumption of diets containing SFA, cis-monounsaturated or cis-polyunsaturated fatty acids. The relationship shows a **linear dose response**. As a consequence of their effects on LDL-C and HDL-C, **TFA, relative to other fatty acids, increase total cholesterol to HDL-C ratio.**
- Lowered HDL-C levels and increased total cholesterol to HDL-C ratio have been shown to be associated with an **increased risk of cardiovascular disease** (CVD) in epidemiological studies.

# EUROPEAN COMMISSION MANDATE TO EFSA ON DIETARY REFERENCE VALUES

**Scientific Opinion on Dietary Reference Values for fats, including saturated fatty acids, polyunsaturated fatty acids, monounsaturated fatty acids, *trans* fatty acids, and cholesterol  
(Request N°EFSA-Q-2008-466)  
(adopted on 4 December 2009)\***

- TFA are **not synthesised by the human body** and are **not required in the diet**. Therefore, no Population Reference Intake, Average Requirement, or Adequate Intake is set.

*(\* Internationally recognized experts of lipids in general and TFA in particular worked as rapporteurs for the initial report of this opinion)*

# DIETARY INTAKES

- Intake of TFA in the EU has decreased considerably over recent years, owing to reformulation of food products.
- UK: average intake of TFA has been halved to **< 1% of total energy intake**.
- France: intakes have decreased by 40 % and are, on average, **1% of total energy intake** in adults (0.6 % from ruminant sources and 0.4 % from other sources).
- Denmark, Finland, Norway and Sweden: average intakes of TFA have decreased to around **0.5 to 0.6 % of total energy intake**.



# DENMARK AS AN EXAMPLE

*Food Nutr Res.* 2008; 52: 10.3402/fnr.v52i0.1651.

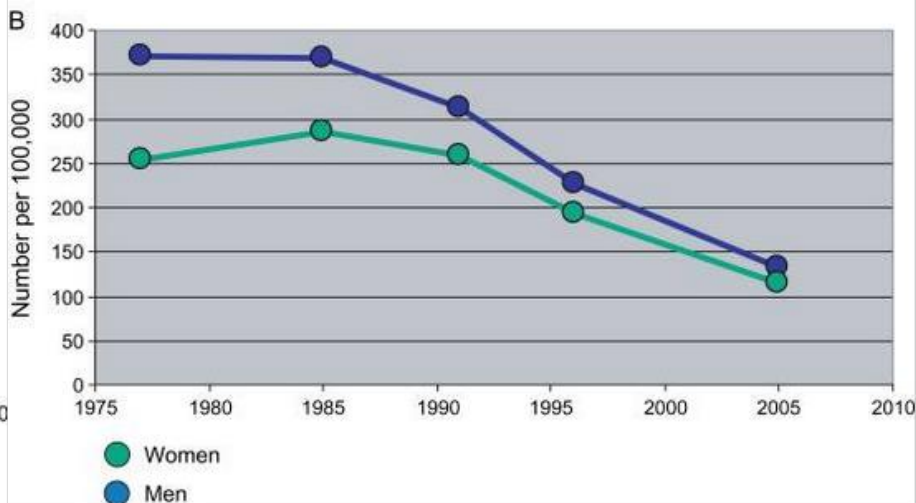
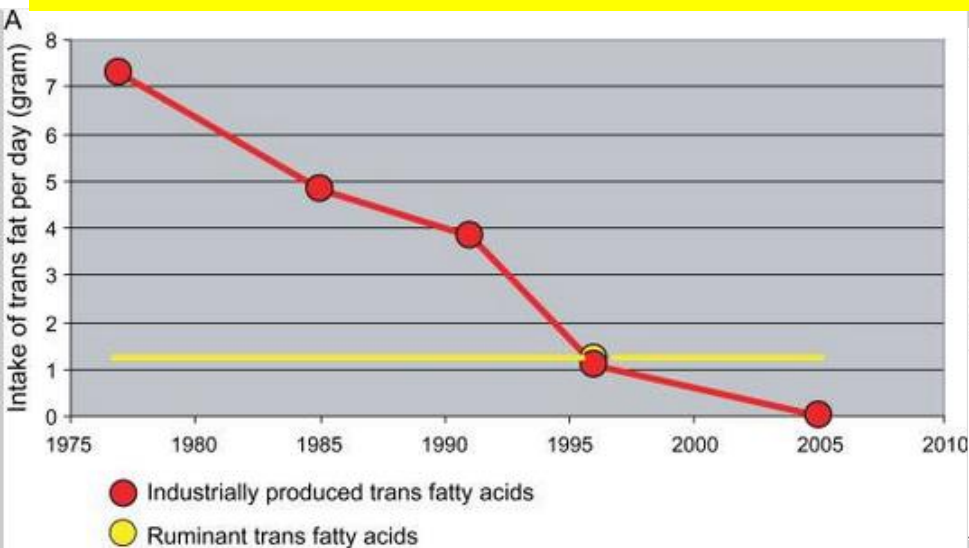
PMCID: PMC2596737

Published online 2008 Mar 12. doi: [10.3402/fnr.v52i0.1651](https://doi.org/10.3402/fnr.v52i0.1651)

## Ruminant and industrially produced *trans* fatty acids: health aspects

Steen Stender,<sup>1</sup> Arne Astrup,<sup>2</sup> and Jørn Dyerberg<sup>1</sup>

### Evolution of Trans Fat intake along time and mortality curves of coronary heart disease ....



# HEALTH EFFECTS

- Same for LDL-c and HDL-c as in the 2004 Opinion.
- Consumption of diets containing trans-monounsaturated fatty acids also results in **reduced blood HDL cholesterol** concentrations and **increases the total cholesterol to HDL cholesterol ratio**.
- TFA from **ruminant sources** have **adverse effects** on blood lipids and lipoproteins **similar to those from industrial sources** when consumed in equal amounts.
- Epidemiological evidence is insufficient to establish whether there is a difference between ruminant and industrial TFA consumed in equivalent amounts on the risk of coronary heart disease.

# DIETARY RECOMMENDATION

- Dietary TFA are provided by several fats and oils that are also important sources of essential fatty acids and other nutrients, thus.
  - ✓ there is a limit to which the intake of TFA can be lowered without compromising adequacy of intake of essential nutrients;
  - ✓ **intake of TFA should be as low as possible within the context of a nutritionally adequate diet.** Setting a threshold is a management decision in a given dietary context
- Therefore, limiting the intake of TFA should be considered when establishing nutrient goals and recommendations.

# TFA IN FOOD-BASED DIETARY GUIDELINES – 2010

On the basis of the 2004 opinion on TFA and the 2009 DRV opinion on fat

SCIENTIFIC OPINION

Scientific Opinion on establishing Food-Based Dietary Guidelines<sup>1</sup>

EFSA Panel on Dietetic Products, Nutrition, and Allergies (NDA)<sup>2,3</sup>

**TFA are mentioned:  
Like for any nutrient, need of a country-specific  
analysis of the public health relevance**

4.	Scientific process in setting FBDG .....	
4.1.	Identification of diet-health relationships .....	
4.2.	Identification of country-specific diet-related health problems .....	
4.3.	Identification of nutrients of public health importance .....	
4.4.	Identification of foods relevant for FBDG .....	
4.4.1.	Food groups that are sources of nutrients of public health importance ...	
4.4.2.	Food groups with established relationships to health .....	
4.5.	Identification of food consumption patterns .....	
4.6.	Testing and optimising FBDG .....	
4.7.	Graphical representations of the FBDG .....	

# Efsa ADVICE ON NUTRIENT PROFILES - 2008

*The EFSA Journal* (2008) 644, 1-44

Parma, 25 February 2008

Final

**THE SETTING OF NUTRIENT PROFILES FOR FOODS BEARING  
NUTRITION AND HEALTH CLAIMS PURSUANT TO ARTICLE 4 OF  
THE REGULATION (EC) ° No 1924/2006**

Scientific Opinion of the Panel on Dietetic Products, Nutrition and Allergies

(Request N° EFSA-Q-2007-058)

- Trans fatty acids might be included for some food groups
- but are of decreasing public health importance as intakes in the EU have declined considerably.

## EFSA ADVICE ON HEALTH CLAIMS

**Scientific Opinion on the substantiation of a health claim related to “low fat and low trans spreadable fat rich in unsaturated and omega-3 fatty acids” and reduction of LDL-cholesterol concentrations pursuant to Article 14 of Regulation (EC) No 1924/2006 (Request N° EFSA-Q-2009-00458) (adopted on 13 May 2011)**

Mandate:

- Replacing SFA and TFA by *cis*-monounsaturated fatty acids (*cis*-MUFA) and *cis*-polyunsaturated fatty acids (*cis*-PUFA) decreases blood LDL-cholesterol concentration.

## SCIENTIFIC SUBSTANTIATION OF THE CLAIM

- The evidence provided by consensus opinions/reports from authoritative bodies and reviews shows that there is consensus on the role of *trans*-MUFA in increasing total and blood LDL-cholesterol concentrations compared to *cis*-MUFA or *cis*-PUFA.
- Foods containing TFA typically contain high amounts of SFA, which are likely to have similar effects to TFA on LDL-cholesterol concentrations on a gram-for-gram basis.
- The effects of replacing marginal amounts of TFA in foods high in SFA may be small as compared to the effects of replacing SFA in those foods.

## CONCLUSION ABOUT THE CLAIM

- A cause and effect relationship has been established between the consumption of mixtures of dietary SFA and an increase in LDL-cholesterol concentrations.
- Replacement of significant amounts of mixed SFA by *cis*-MUFA and/or *cis*-PUFA in foods or diets on a gram-per-gram basis reduces LDL-cholesterol concentrations.
- The Commission authorised health claim:
  - “Replacing saturated fats with unsaturated fats in the diet has been shown to lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease”.
  - Authorised conditions of use: “The claim may be used only for food which is high in unsaturated fatty acids, as referred to in the claim HIGH UNSATURATED FAT as listed in the Annex to Regulation (EC) No 1924/2006. The claim may only be used on fats and oils”.



# NO NEW REQUEST ON TFA SINCE 2011

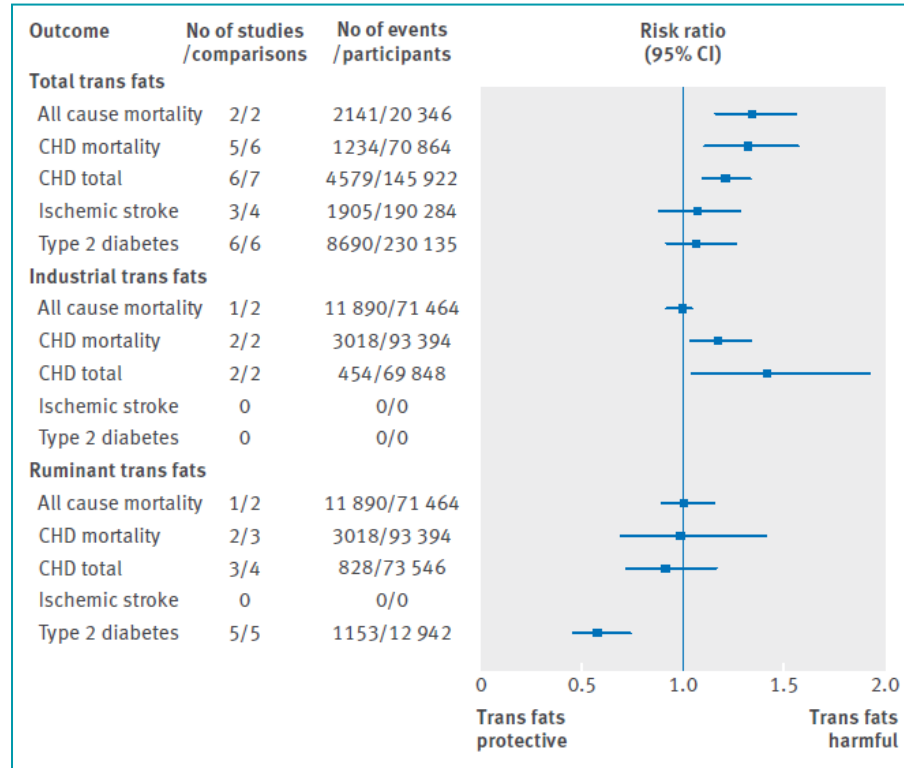
- No reason to think that the perspective on TFA should change,
- Rather, confirmations of the risks

e.g.

Intake of saturated and trans unsaturated fatty acids and risk of all cause mortality, cardiovascular disease, and type 2 diabetes: systematic review and meta-analysis of observational studies

Russell J de Souza,<sup>1,2,3,4</sup> Andrew Mente,<sup>1,2,5</sup> Adriana Maroleanu,<sup>2</sup> Adrian I Cozma,<sup>3,4</sup> Vanessa Ha,<sup>1,3,4</sup> Teruko Kishibe,<sup>6</sup> Elizabeth Uleryk,<sup>7</sup> Patrick Budyłowski,<sup>4</sup> Holger Schünemann,<sup>1,8</sup> Joseph Beyene,<sup>1,2</sup> Sonia S Anand<sup>1,2,5,8</sup>

doi: 10.1136/bmj.h3978 | *BMJ* 2015;351:h3978 | [thebmj](http://thebmj.com)



## OVERALL HIGHLIGHTS

- ❑ **Consumption of diets containing TFA consistently increases serum LDL cholesterol.**
- ❑ **Consumption of diets containing *trans*-MUFA also results in reduced blood HDL cholesterol concentrations and increases the total cholesterol to HDL cholesterol ratio.**
- ❑ **Intake of TFA should be as low as possible in the context of a nutritionally adequate diet.**
- ❑ **The intake of TFA should be lowered without compromising the adequacy of intake of essential nutrients.**

# THANK YOU

