SATURATED FATTY ACIDS :

FRIENDS OR FOES ?

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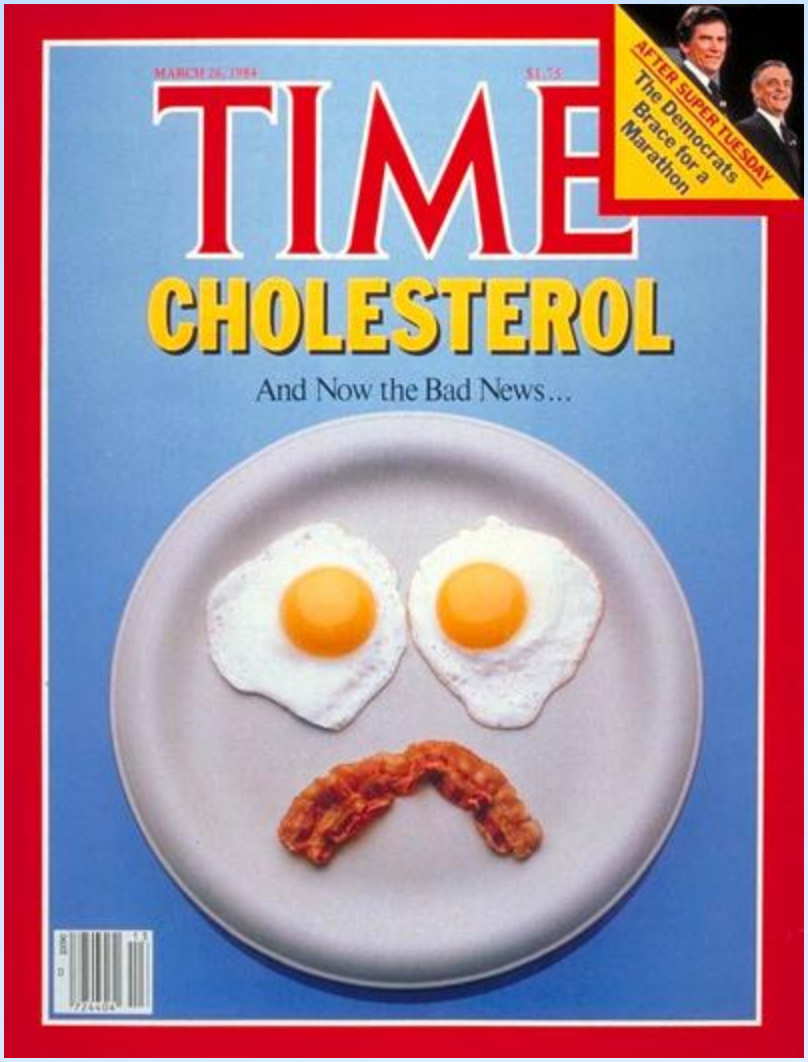
Conflict of interest
regarding this presentation:

I have no conflict of interest to report in relation to this presentation.


MARCH 26, 1984
$1.75
TIME
CHOLESTEROL
And Now the Bad News...
AFTER SUPER TUESDAY
The Democrats Brace for a Marathon

1984

Scientists labeled Saturates the ennemies, Why they were wrong ?

Saturated fatty acids are nutrients, not poisons

The good question is only :

Which dose and which limit for every specific saturated FA ?

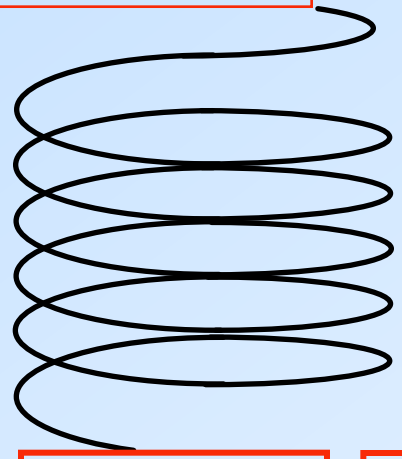
Juin 2014

SATURATED FATTY ACIDS

- We make them
- We eat them
- Metabolism
- Important specific functions
- Problems with CVD and MS biomarkers

Saturated fatty acids
« We do synthesize them» : (human, animals, plants…)

Sugars, starch, alcohol…….



synthesis

Palmitic acid | 16:0

elongation

Stearic acid | 18:0

Aarsland 2008, Chong 2008, Forsythe 2008, Wilke 2009

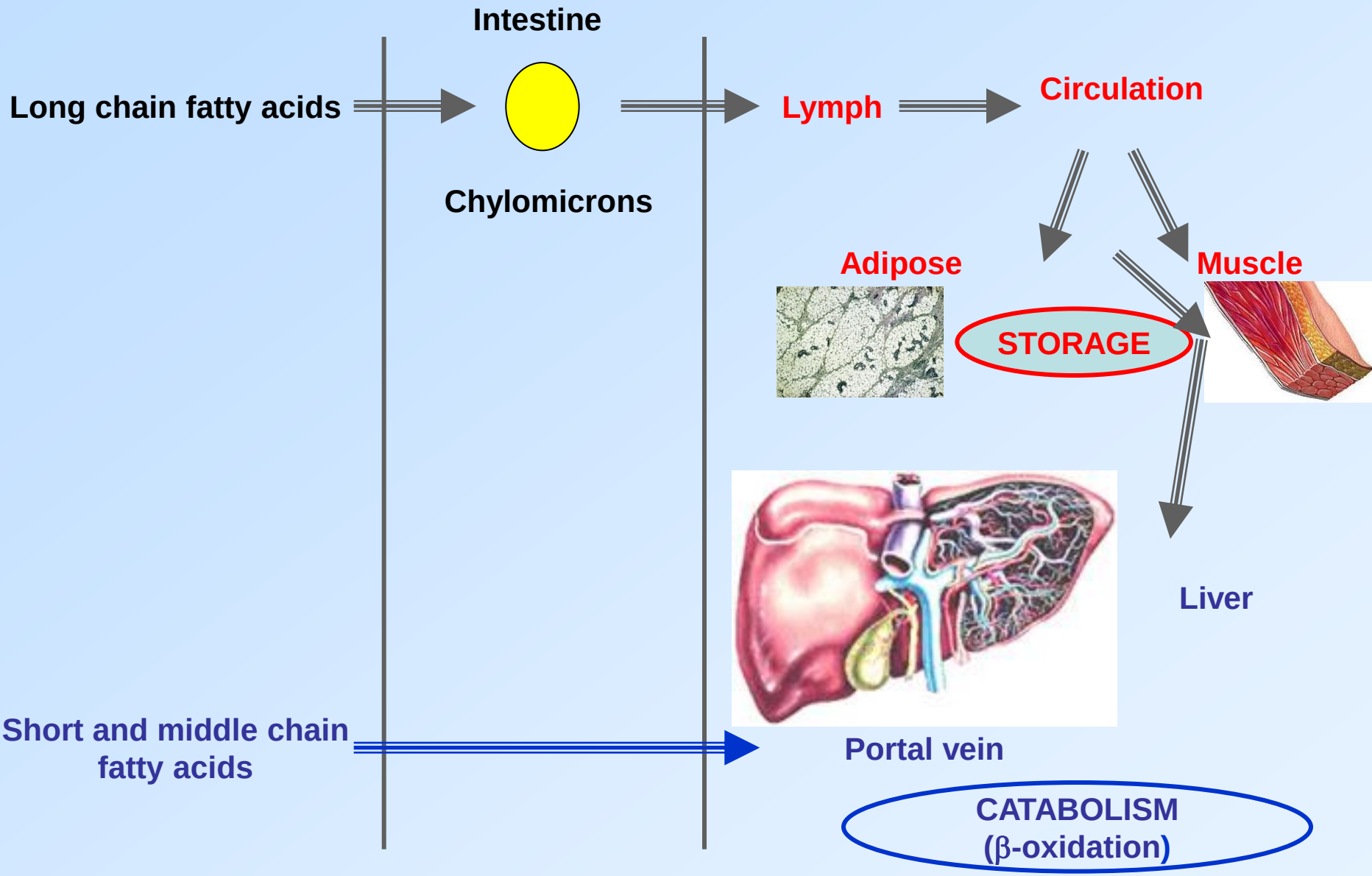
SATURATED FATTY ACIDS

- We make them
- We eat them
- Metabolism
- Important specific functions
- Problems with CVD and MS biomarkers

SATURATED FATTY ACIDS

- We make them
- We eat them
- Metabolism : differences between SFAs
- Important specific functions
- Problems with CVD and MS biomarkers

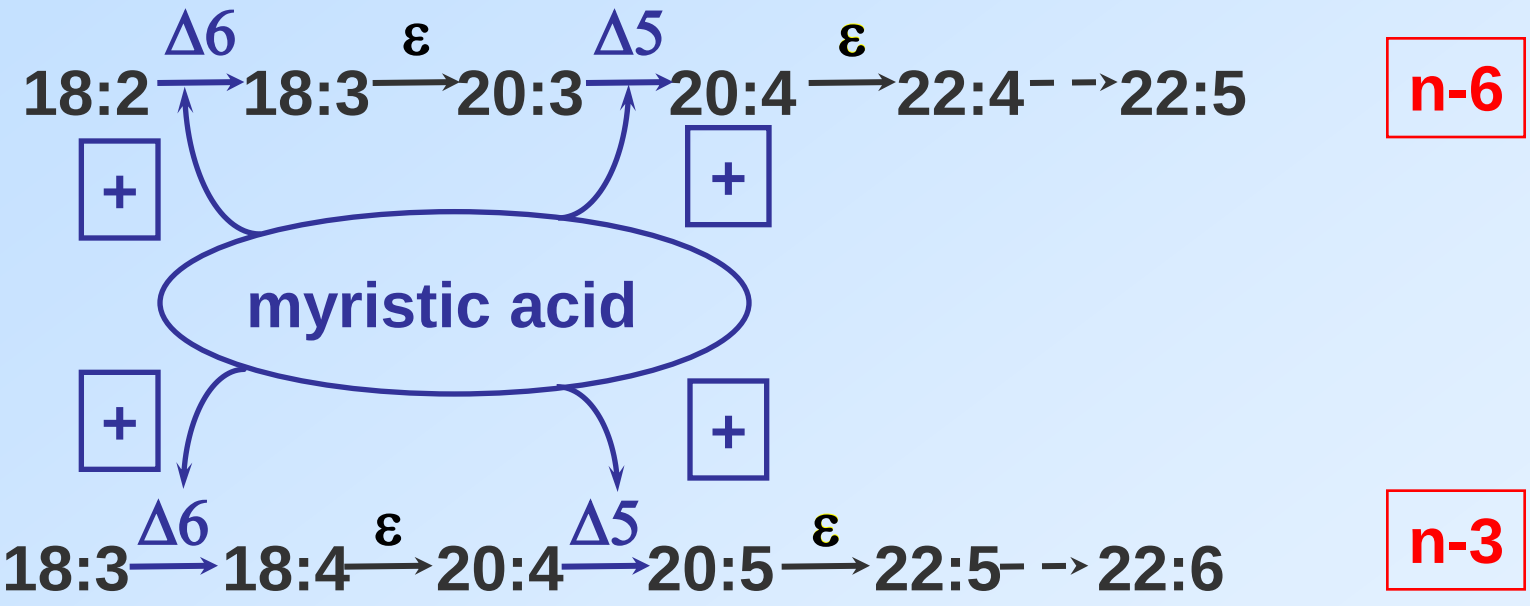
Comparative absorption of saturated fatty acids



SATURATED FATTY ACIDS

- We make them
- We eat them
- Metabolism
- Important specific functions
- Problems with CVD and MS biomarkers

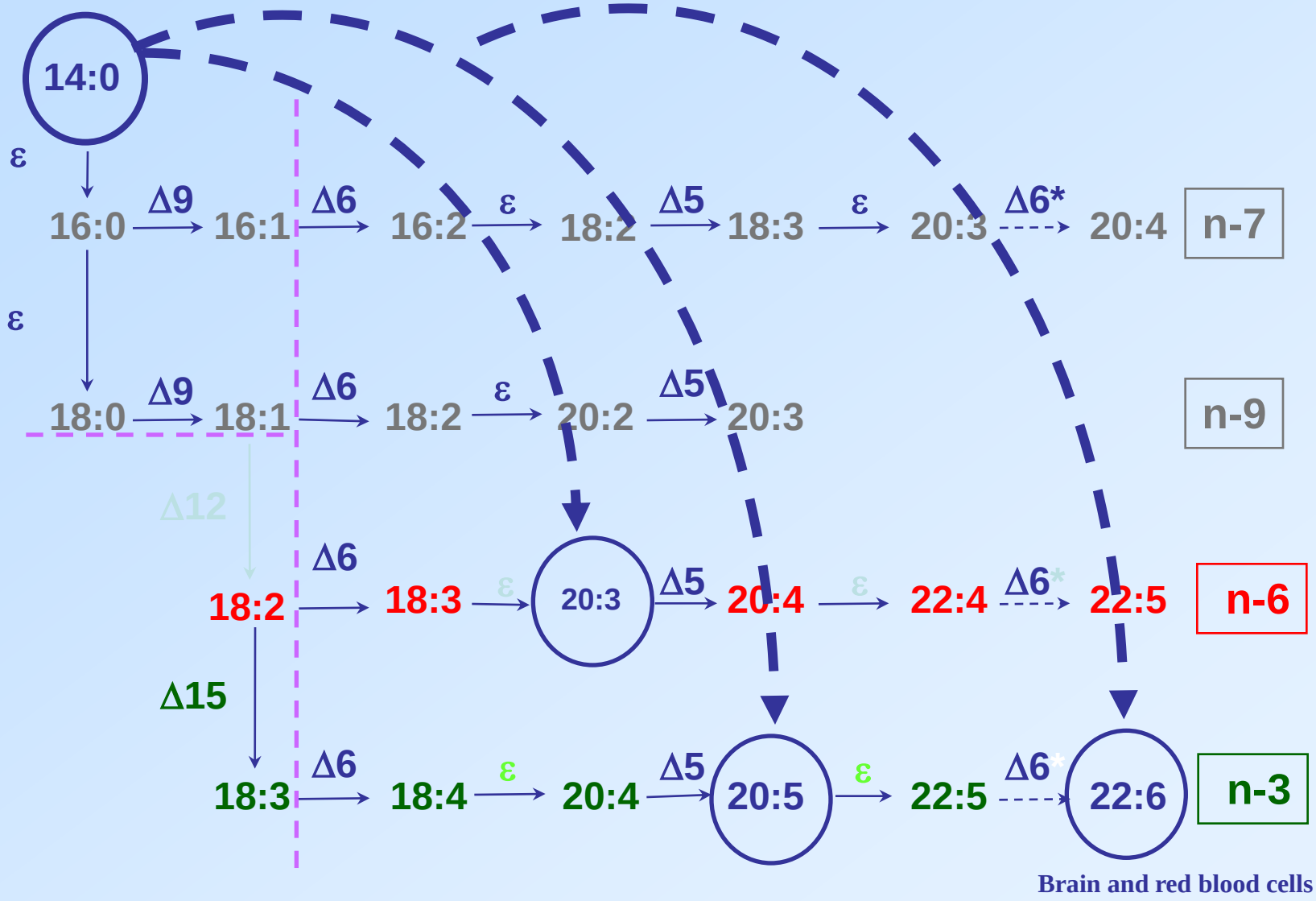
Role of myristic acid on PUFA metabolism (in vitro)



NADH-cyt b5 reductase, component of desaturase complex is myristoylated

Jan et al., 2004; Beauchamp et al., 2007

Effect of myristic acid on PUFAs composition in the rat *in vivo* and in human



Rioux et al., 2005, Dabadie et al., 2005, Rioux et al., 2008

Saturated fatty acids functions at a glance

(in addition to energetical function)

C4 butyric

C6 caproïc

C8 caprylic

C10 capric

C12 lauric

C14 myristic

C16 palmitic

C18 stearic

C20 arachidic

C22 behenic

C24 lignoceric

- **Inhibition of tumor proliferation *in vivo* and *in vitro***
- **Induction of apoptosis**
- **Less fat deposition**
- **Colon and smooth muscle cells**
- **C8 ↓ VLDL secretion (inhibition of apo B synthesis)**
- **Hypocholesterolemic effect (C8, C10)**
- **Antiviral role**
- **ghrelin acylation (C8)**

- **Specific acylation of proteins**
- **Activation of conversion from C18:3 n-3 towards EPA + DHA**
- **Activation of sphingolipids synthesis**

Saturated fatty acids functions at a glance

(in addition to energetical function)

C4 butyric

C6 caproïc

C8 caprylic

C10 capric

C12 lauric

C14 myristic

C16 palmitic

C18 stearic

- Componant of sphingolipids
- « non specific » acylation of some proteins
- 1 / 3 of phospholipids fatty acids : structural role
- Active desaturation to oleic acid

C20 arachidic

C22 behenic

C24 lignoceric

- Nervous structure (myelinisation)

Saturated fatty acids functions at a glance

(in addition to energetical function)

C4 butyric

C6 caproïc

C8 caprylic

C10 capric

C12 lauric

C14 myristic

C16 palmitic

C18 stearic

C20 arachidic

C22 behenic

C24 lignoceric

SO WHAT ?

Non essential nutrients with important functions

SATURATED FATTY ACIDS

- **We make them**
- **We eat them**
- **Metabolism**
- **Important specific functions**
- **Problems with CVD and MS biomarkers ?**

Then | **Epidemiological studies (cohorts)**

Association between SFA and CVD risk :

⊕	⊖	Neutral
Garcia 1980	Gillman 1997	Shekelle 1981
Mc Gee 1984	He 2003	Kushi 1985
Esrey 1996	Mozzafarian 2004	Posner 1991
Boniface 2002	Jakobsen 2009	Ascherio 1996
Jakobsen 2004	Yamagashi 2009	Pietinen 1997
Xu 2006	Jakobsen 2010 (MI)	Tucke 2005
		Leosdottir 2007

- Meta-analysis (Siri-Tarino 2010) : 21 cohorts

”Overall, despite the conventional wisdom that reduced dietary saturated fat intake is beneficial for CVD health, there is no significant evidence for concluding that dietary saturated fat is associated with an increased risk of CHD or CVD”

- Other meta-analysis: O’Sullivan, 2013; Chowdhury, 2014; Harcomb, 2015, De Souza 2015

➡ ***same results***

- In CAD patients: Puaschitz et al., 2015 *No association either*

Saturated fatty acids functions

Problems ?

C4 butyric

C6 caproïc

C8 caprylic

C10 capric

- No problem with the CVD risk !

C12 lauric

C14 myristic

C16 palmitic

Problem with the CVD risk :
Deleterious effects …. <u>in case of excess</u>
Accumulation of palmitic acid : endogenous + exogenous origins

C18 stearic

C20 arachidic

C22 behenic

C24 lignoceric

- No problem with the CVD risk !

CONCLUSION – SUMMARY

- No reason for considering SFA “en bloc” anymore, in term of structure and metabolism, in term of functions and in term of deleterious effect as well.

- Absence of evidence for deleterious effects, need of more precise epidemiological studies (different saturated fatty acids, dose-effects approach, controls…) for the deleterious effects in case of excess

➡ ***Which saturated FA to limit ? And at which level ?***

ANC : NON ESSENTIAL FA : SATURATED FA

For an adult at 2000-2200 kcal/day
Values expressed in % total energy.

		Minimal physiological requirement	RISK PREVENTION					ANC 2010
			Metabolic syndrome, diabetes, obesity	Cardio-vascular diseases	Cancers : breast, colon	Neuro-psychiatric pathologies	Other pathologies : Macular degeneration	
NON ESSENTIAL FA	Lauric acid (C12:0) + myristic acid (C14:0) + palmitic acid (C16:0)	-	-	≤ 8	_	-	-	≤ 8
	Total Saturated FA	-	-	≤ 12	≤ 12	-	-	≤ 12
	Oleic acid C18:1 n-9	-	-	≤ 20	-	-	-	15 - 20
	Others non essential FA	-	-	-	-	-	-	-

Lack of coherent data

Value obtained from epidemiological association studies, in the absence of intervention studies.

Data obtained from breast cancer only