

Dietary Reference Values: a Tool for Public Health

Belgian Dietary Reference Values for Energy and Macronutrients: **FATS**

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FATS

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- **Main source of energy:
9.0 kcal (37.7 kJ)/ g.**
- **Favouring the absorption of fat-soluble nutrients such as vitamins A, D, E and K.**
- **Dietary fats consist mainly of triacylglycerols, less of phospholipids and sterols.**
- **Triacylglycerols are the main components of fatty acids.**
- **Certain fatty acids are essential for vital functions.**



FATS - FATTY ACIDS

- 1. Saturated fatty acids (SFA's):** mainly lauric (C12:0), myristic (C14:0), palmitic (C16:0) and stearic (C18:0) acid
- 2. Mono-unsaturated fatty acids (MUFA's):** mostly oleic (C18:1) acid
- 3. Poly-unsaturated fatty acids (PUFA's):**
 - Essential fatty acids : linoleic (omega-6) and α -linolenic (omega-3) acid
 - Long chain omega-3 fatty acids: EPA & DHA
- 4. Trans fatty acids**



Low-Density Lipoproteins (LDL) Cause Atherosclerotic Cardiovascular Disease (CVD)

- Consistent evidence from genetic, epidemiological and clinical studies unequivocally establishes that elevated LDL causes atherosclerotic CVD.
- Reducing LDL by diet and/or statins is associated with prevention of atherosclerosis and of clinical CVD.



Diet-Heart hypothesis

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. *BMJ*. 2015;351:h3978.

Association of Dietary, Circulating, and Supplement Fatty Acids With Coronary Risk: A Systematic Review and Meta-analysis. *Ann Intern Med*. 2014;160(6):398-406.

Evidence from randomised controlled trials did not support the introduction of dietary fat guidelines in 1977 and 1983: a systematic review and meta-analysis. *Open Heart*. 2015;2(1), e000196.

Re-evaluation of the traditional diet-heart hypothesis: analysis of recovered data from Minnesota Coronary Experiment (1968-73). *BMJ*. 2016;353:i1246.



Fats, Fatty acids and Human Health

- The effects of SFA's, MUFA's and PUFA's should be expressed relative to similar amounts of energy from the other macronutrients that replace the fatty acids under study
- Failure to specify the nutrient of comparison is a major source of confusion
- Inconsistent findings are observed because SFA's have been compared to different macronutrients in different studies.



LDL-Cholesterol reduction from isocaloric replacement of 1% energy from SFA's by

- N-6 PUFA's : - 0.051 mmol/L (-2.0 mg/dL)
- MUFA's : - 0.041 mmol/L (-1.6 mg/dL)
- Carbohydrates : - 0.032 mmol/L (-1.2 mg/dL)

Intake of individual saturated fatty acids and risk of CHD in US men and women: two prospective longitudinal cohort studies^o

73 147 women (Nurses' Health Study)

42 635 men (Health Professionals Follow-up Study)

Free of CHD at baseline

Intake of SFA's measured with repeated FFQ's

Follow-up: 24-28 years

Incidence of coronary heart disease: n = 7035

^oZong G et al. BMJ 2016; 355: i5796

Median SFA intake (12:0-18:0) by quintile in the Nurses' Health Study and in the Health Professionals Follow Up Study

	Median SFA (12:0-18:0) intake, energy %, Quintiles				
	Q1	Q2	Q3	Q4	Q5
Nurses' Health Study	7.6	9.0	10.0	11.0	12.6
Health Professionals Follow Up Study	6.7	8.4	9.6	10.7	12.5

Association between SFA intake (12:0-18:0) and risk of coronary heart disease

	SFA Intake, energy %, quintiles					
Hazard Ratio	Q1	Q2	Q3	Q4	Q5	p
Age adjusted model	1	1.10	1.15	1.31	1.45	< .001
Multivariate model [°]	1	1.06	1.08	1.17	1.18	< .001

[°] : adjusted for age, ethnicity, smoking, alcohol, family history of MI, menopause, physical activity, aspirin use, multivitamin use, baseline hypertension, baseline hypercholesterolemia, BMI, total energy intake.

BMJ 2016; 355: i5796

Hazard Ratio's (95% CI) of CHD for isocaloric replacement of 1% energy from SFA's (12:0-18:0) by

- PUFA's : 0.92 (0.89-0.96) $p < .001$
- MUFA's : 0.95 (0.90-1.01) $p < .08$
- Whole grain carbohydrates : 0.94 (0.91-0.97) $p < .001$
- Plant proteins : 0.93 (0.89-0.97) $p < .001$

Recommendations from ACC/AHA[°] and from EAS/ESC* regarding SFA intake to prevent CVD

ACC/AHA : aim for a dietary pattern that achieves no more than 5 to 6% of calories from saturated fats

EAS/ESC : the consumption of SFA's should be < 10% of the total caloric intake and should be further reduced to < 7% of energy in the presence of hypercholesterolaemia.

[°] Circulation 2014 129(25 suppl2) S76-S99

* Eur Heart J 2016 37: 2999-3058

Fats: DRV's for Belgian adults

	% of Energy	Men (g/day)*	Women (g/day)*
Total Fat	> 20 < 30-35	> 55 < 83-97	> 44 < 66-77
SFA	< 10	< 28	< 22
Atherogenic SFA	<= 8	<= 22	<= 18
MUFA**	10-20	28-55	22-44
PUFA**	5-10	14-28	11-22
n-6	4-8	11-22	8,8-18
LA	4	11	8,8
n-3	1-2	2,8-5,6	2,2-4,4
LNA	1	2,8	2,2
EPA+DHA		0,250-0,500	0,250-0,500
Industrial Trans fatty acids	As low as possible	As low as possible	As low as possible
Cholesterol		< 0,300	< 0,300

*based on a daily energy need of 2500 kcal for men and of 2000 kcal for women

** MUFA's and PUFA's should make up at least two thirds of total fat intake



Fats : DRV's for Belgian infants and children

	0-6 Months, En%	7-12 Months En%	1-3 yrs En%	> 3 yrs En%
Total Fat	40-50	40	35-40	30-35
SFA			8-12	< 10
MUFA			10-20	10-20
PUFA			5-10	5-10
n-6, LA	4	4	4	4
n-3, LNA	1	1	1	1
DHA		100 mg/d	100 mg/d	
EPA+DHA				250-500mg/d
Cholesterol			< 300 mg/d	< 300 mg/d



Fatty acid composition of common foods and fats(gram/100g product)*

	SFA's	MUFA's	PUFA's	n - 6	n - 3
Butter	50	29	3	1.2	0.5
Palm oil	49	37	9	9	0.2
Sunflower oil	11	23	61	61	0.1
Olive oil	15	73	10	7.5	1.3
Beef, entrecote	4.1	4.0	0.1	0.1	0.0
Beef, minced	2.4	1.9	0.3	0.2	0.1
Pork, chops,shoulder	15.6	5.9	5.6	1.8	0.4
Pork, minced	8.0	9.6	2.9	2.5	0.3
Salami	10.9	12.5	3.8	3.3	0.3
Whole milk	2.2	1.0	0.1	0.1	0.0
Cheese, Cheddar	21.7	9.0	1.0	0.6	0.2
Avocado	2.2	13.9	1.6	1.5	0.0
Mackerel	3.3	4.7	2.7	0.3	2.3
Salmon, smoked	2.4	2.8	3.2	0.4	2.5

*Based on NUBEL

**Thank You
for Your Attention**

