

Saturated fat as compared to unsaturated fats and different sources of carbs in relation to coronary heart disease

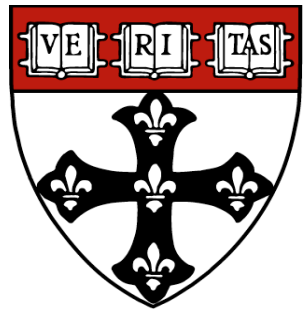
Frank Hu, MD, PhD

Professor of Nutrition and Epidemiology

Harvard School of Public Health

Professor of Medicine

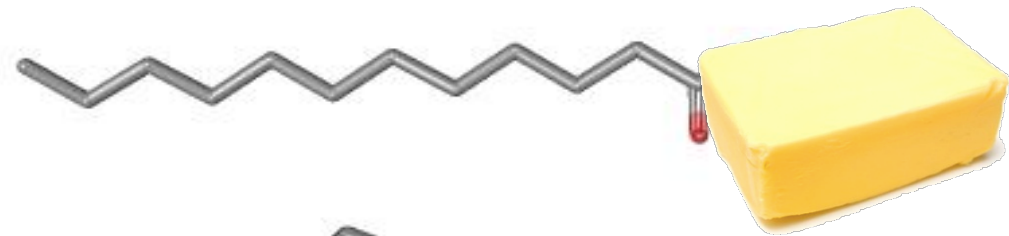
Harvard Medical School



FATS

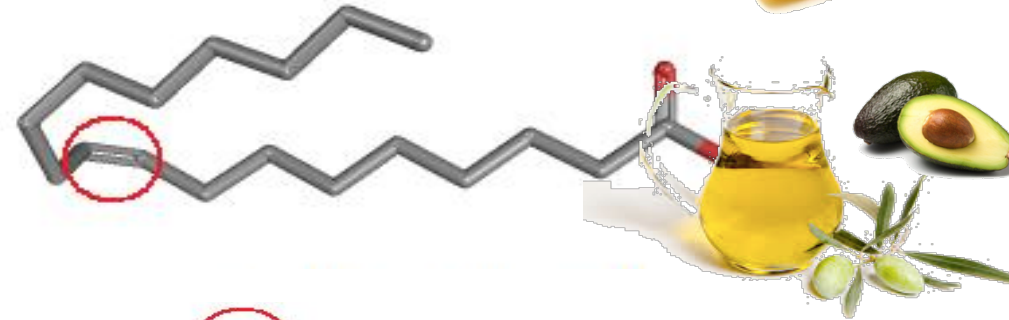
Classification by number (and location) of double bonds and carbon chain length

Saturated



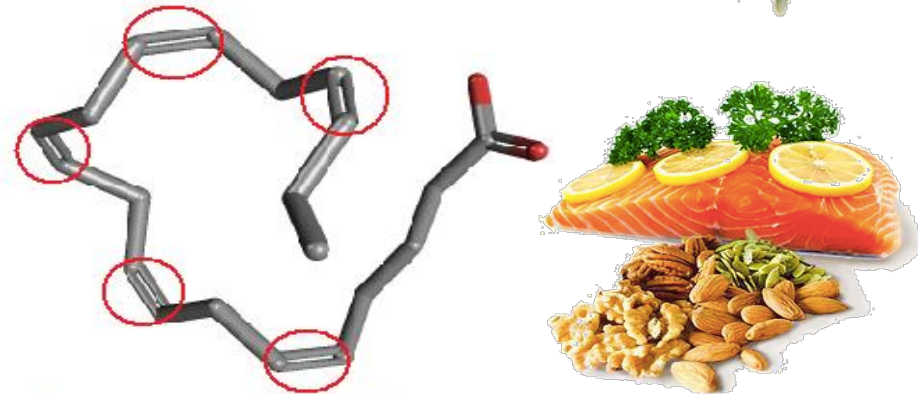
Monounsaturated

(One double bond)



Polyunsaturated

(Many double bonds)



Saturated Fatty Acid Source, Metabolism, and Functions

	Short chain		Medium chain		Long chain				Odd chain		Very long chain		
	4:0	6:0	8:0	10:0	12:0	14:0	16:0	18:0	15:0	17:0	20:0	22:0	24:0
Foods with high contents													
Endogenous synthesis	Part								No		Yes		
Absorption	Portal circulation												
					lymphatic system								
Metabolism	Ready to use energy	β-oxidation		Energy storage, cell membrane, elongation and desaturation									
Biological effects	Genetic regulation Induce apoptosis in tumor cells Induce colonic mucosa growth Regulate immune response	Antiviral activity Suppress body fat accumulation		Antiviral Antibacterial	Protein myristoylation Activation of ALA to EPA and DHA β-cell apoptosis Suppress insulin expression Thrombogenic	Signal transduction Thrombogenic Protein palmitoylation Insulin resistance Suppress fatty acid oxidation β-cell apoptosis Suppress insulin expression	Converted to 18:1n-9 and 16:1n-9 increases postprandial lipemia (weaker effects vs. 16:0) increases coagulation (weaker effects vs. 16:0)			components of ceramides and sphingomyelins Suppress apoptosis			

Recent Debate

REVIEW

Annals of Internal Medicine

Association of Dietary, Circulating, and Supplement Fatty Acids With Coronary Risk

A Systematic Review and Meta-analysis

Rajiv Chowdhury, MD, PhD; Samantha Warnakula, MPhil*; Setor Kunutsor, MD, PhD; Francesca Crowe, PhD; Heather A. Ward, PhD; Laura Johnson, PhD; Oscar H. Franco, MD, PhD; Adam S. Butterworth, PhD; Alioune D. Ndiaye, MD, PhD; Simon G. Thompson, FMedSci; Kay-Tee Khaw, FMedSci; Dariush Mozaffarian, MD, DrPH; John P. A. Ioannidis, MD, PhD; Emanuele Di Angelantonio, MD, PhD*

Conclusion: Current evidence does not clearly support cardiovascular guidelines that encourage high consumption of polyunsaturated fatty acids and low consumption of total saturated fats.

Recent Debate



The New York Times

The Opinion Pages | CONTRIBUTING OP-ED WRITER

Butter Is Back

MARCH 25, 2014



Mark Bittman

Julia Child, goddess of fat, is beaming somewhere. Butter is back, and when you're looking for a few chunks of pork for a stew, you can resume searching for the best pieces — the ones with the most fat. Eventually, your friends will stop glaring at you as if you're trying to kill them.

That the worm is turn



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Saturated fat as compared to unsaturated fats and sources of carbohydrates in relation to risk of coronary heart disease

J American College Cardiology 2015

Changes of multivariable hazard ratios of CHD with isocaloric substitution effect for saturated fatty acid (% of energy)

Isocaloric substitution of SFA **by** equivalent energy from

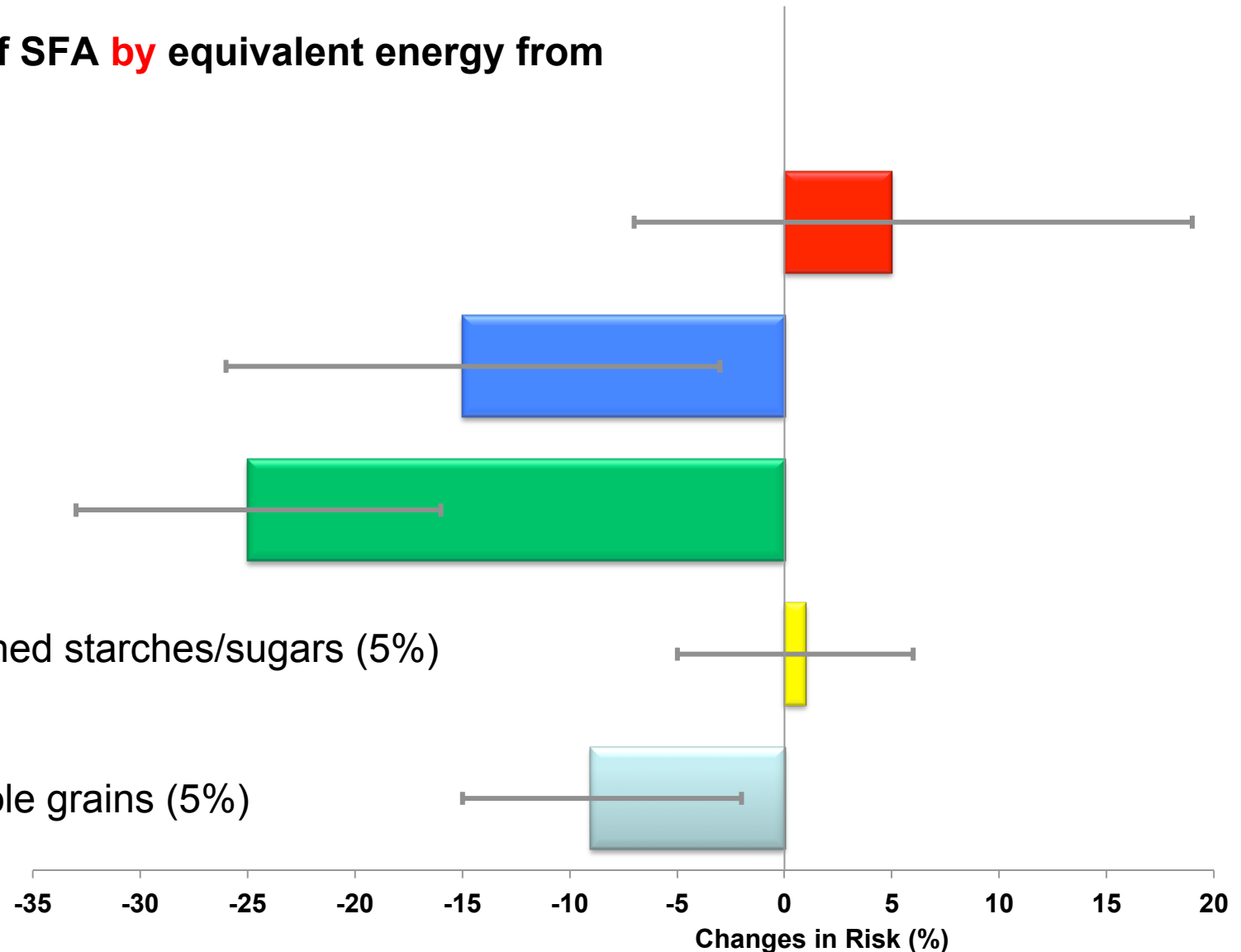
Trans fat (2%)

MUFA (5%)

PUFA (5%)

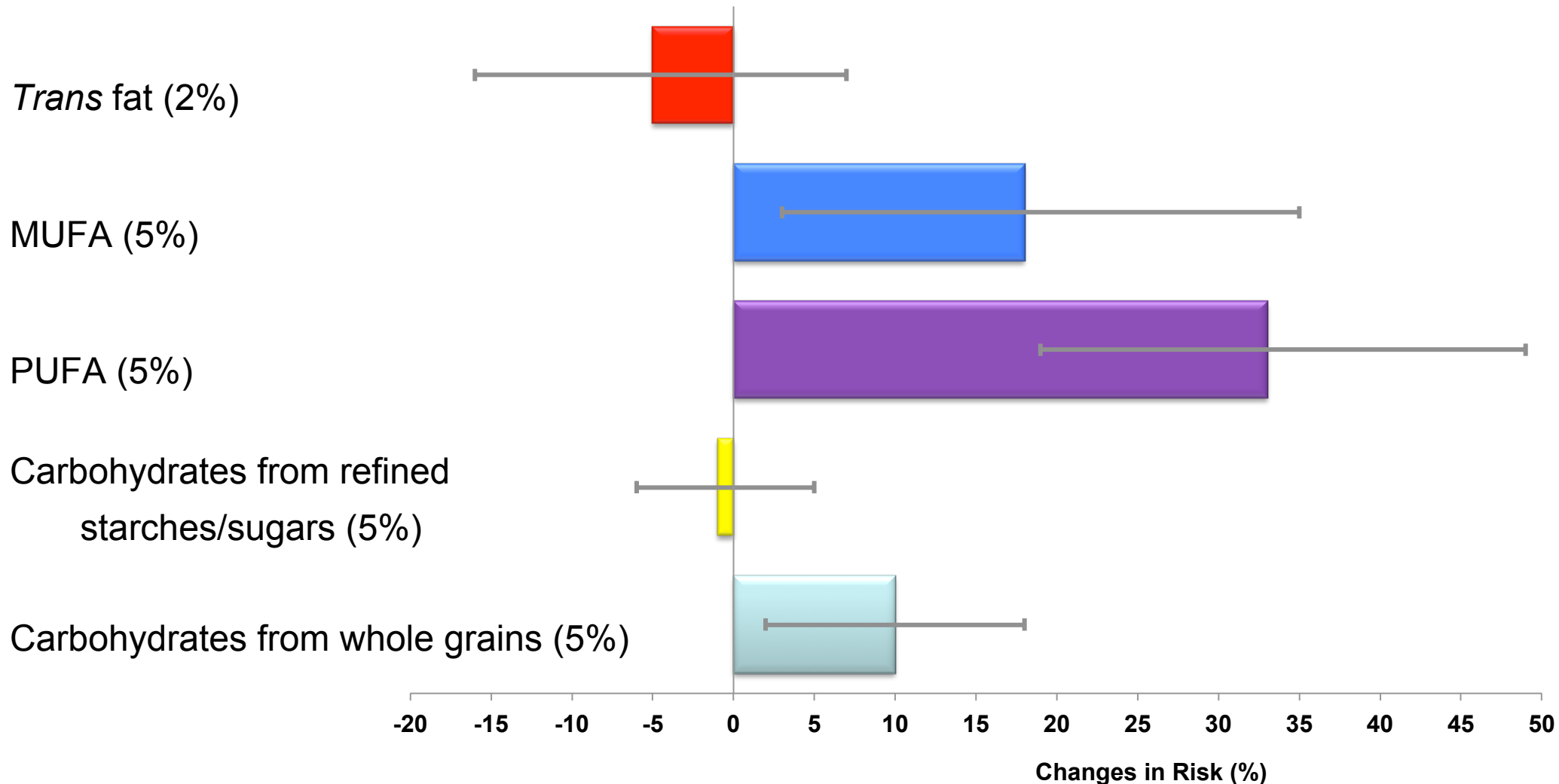
Carbohydrates from refined starches/sugars (5%)

Carbohydrates from whole grains (5%)



Changes of multivariable hazard ratios of CHD with isocaloric substitution effect by saturated fatty acid (% of energy)

Isocaloric substitution of SFA **for** equivalent energy from



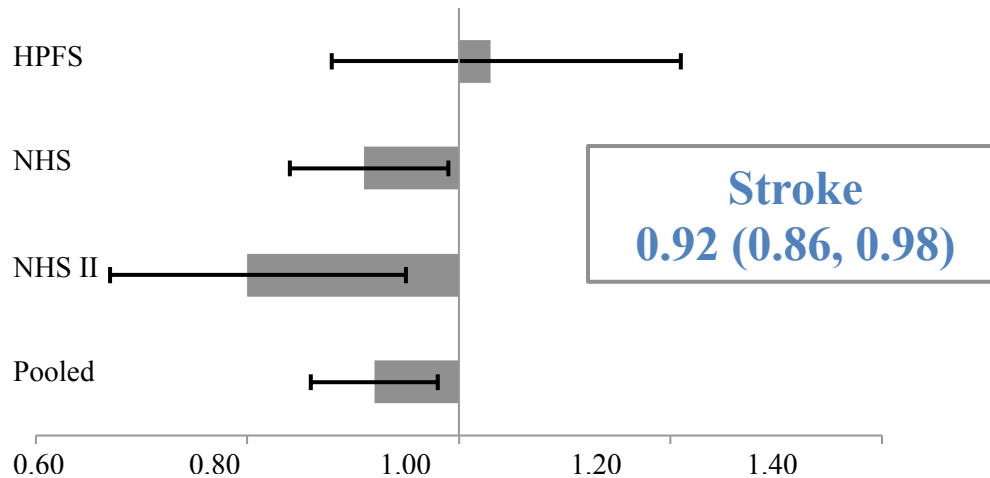
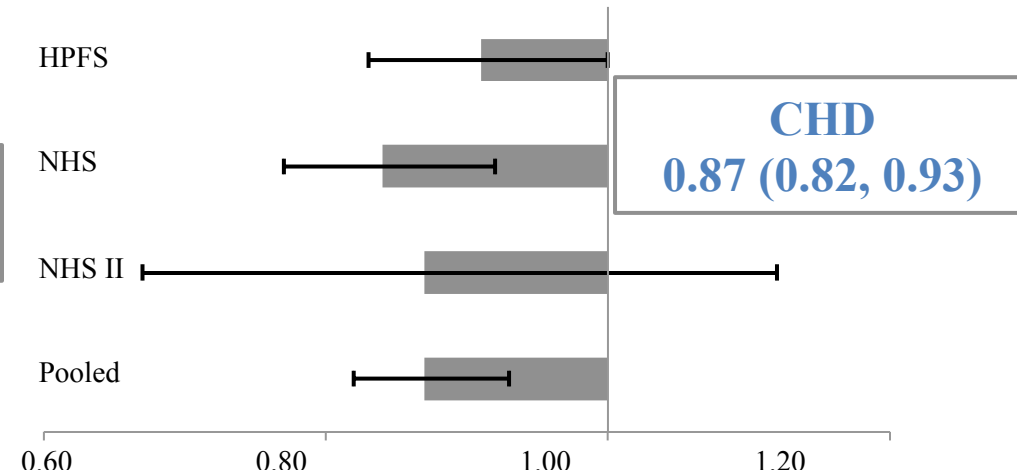
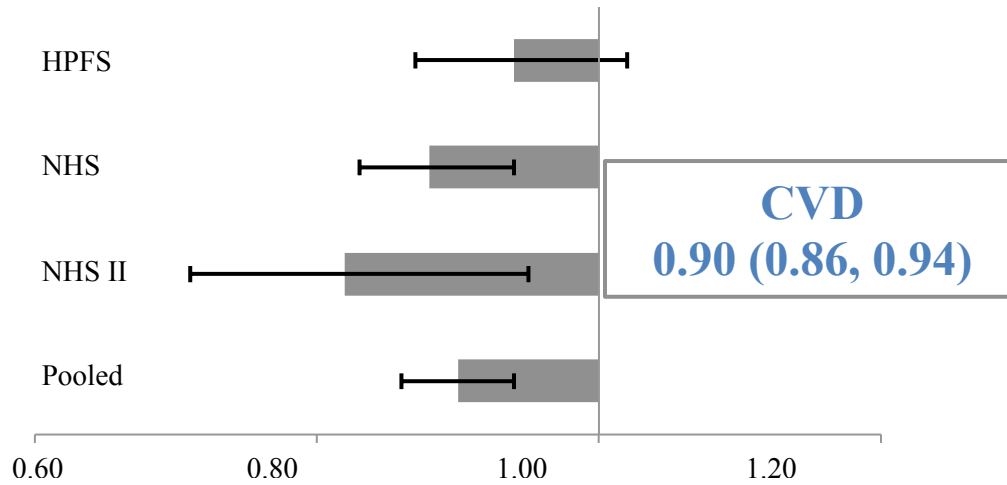
CONCLUSION

Our observations, together with evidence from previous studies, indicate that evidence-based population-level and individual-level recommendations to reduce SFA consumption should specify replacing SFAs with PUFAs, MUFAs, or high-quality carbohydrates.

Dairy fat

- Dairy fat consists of ~60% saturated fat
 - Mostly long-chain saturated FAs, lauric acid, myristic acid, palmitic acid, and stearic acid
 - Increases LDL → increase risk of CVD
- Dairy fat consists of 5% trans fatty acids and small amounts of 15:0, 17:0
 - Cannot be synthesized by humans → Biomarkers for dairy fat intake?
 - Trans-palmitoleic acid (trans 16:1n-7): associated with higher HDL, lower triglycerides and blood pressure
 - With a lower fasting insulin level and incident diabetes
 - No associations between trans-palmitoleic acid and IHD or stroke

HR and 95% for CVD associated with substitution of vegetable fat for dairy fat (5%E)



Unpublished data

Coconut Oil: Super Food or Super Hype?



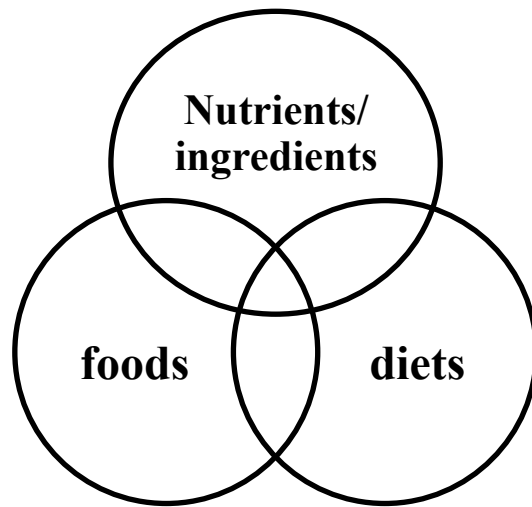
- Coconut oil claims are based on the reported benefits of MCTs. Coconut oil contains some medium-chain fatty acids - caprylic (7.4%) and capric (5.9%) but more long-chain SAFs: lauric acid (44%), myristic acid, and palmitic acid.
- MCTs (i.e., capric and caprylic acid) are claimed to be more efficiently metabolized and less likely stored as fat, but the evidence is limited
- (*DeLany et al. Am J Clin Nutr. 2000;72:905-911*)
- Coconut oil cannot be assumed to have the same health effects as MCTs because it contains primarily lauric/myristic rather than caprylic or capric acid, (*Vannice and Rasmussen. J Acad Nutr Diet. 2014;114:136-153*)

Summary of Major Conclusions: 2015 DGAC

- Strong evidence: Replacing saturated fat with unsaturated fats, especially PUFAs, reduces LDL-cholesterol and CVD risk
- Strong evidence: Replacing saturated fat with overall carbohydrates does not lower CVD risk
- The Committee recommends retaining the 10 percent upper limit for saturated fat intake.

The Amount of Saturated Fat as % of Calories in Established Healthy Diets

Predimed	9%
DASH	6%
OmniHeart	6%
Lyon Diet Heart	8%
Healthy US pattern (AHEI)	7-8%
Healthy vegetarian	5-7%



Interconnections among dietary patterns, foods, and nutrients

Tapsell, Hu



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What's new in 2015 DGAC report?

- Focus on dietary patterns or overall nutrition quality rather than individual nutrients – one size doesn't fit all
- Silent on upper limit for total fat: types of fat are more important
- Retain 10% upper limit on saturated fat
- Not carrying forward the upper limit on dietary cholesterol: eggs (moderate amount) can be included as part of a healthy diet
- Consider environment: reduce red meat for health of human/ planet
- Set a 10% calorie upper limit on added sugars
- Retain 2300 mg/day sodium limit for the general population
- Coffee consumption as part of a healthy diet/lifestyle
- Farm-raised and wild-caught seafood are equally nutritious in terms of n-3
- Promote “Culture of health”: Accessible, affordable, and normative

POLITICO *Pro*

Attack on meat has industry seeing red

Industry sharpens its knives over a federal nutrition panel's advice.

By **CHASE PURDY** | 2/19/15 1:17 PM EST | Updated 2/20/15 10:54 AM EST



Congress To Nutritionists: Don't Talk About The Environment

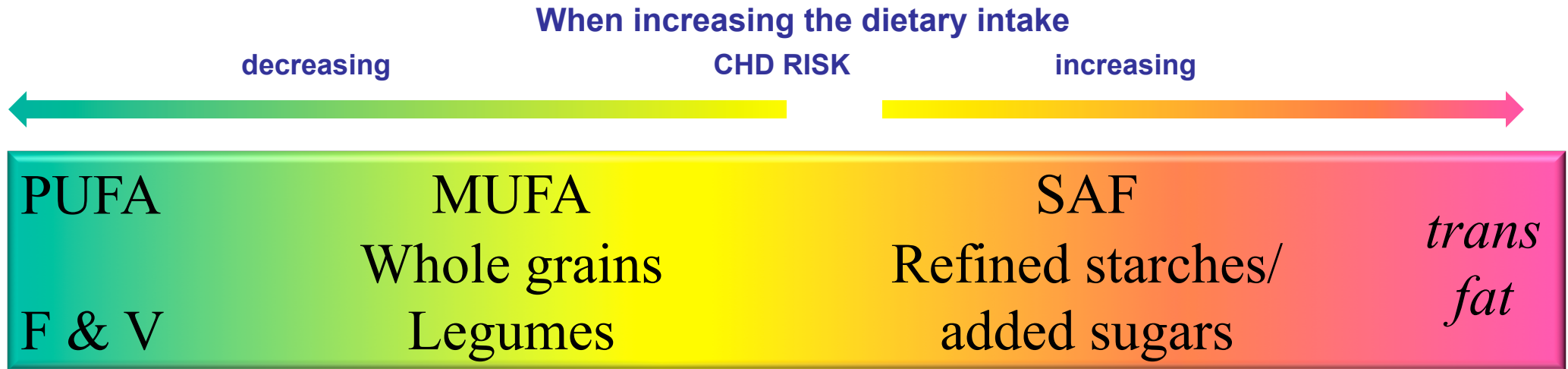
DECEMBER 15, 2014 3:25 AM ET



DAN CHARLES



Types of Fats and Carbs



Healthy dietary patterns can be achieved in many ways and should be tailored to the individual's food and cultural preferences and health conditions.

----2015 DGAC report