

Protective effects of linoleic acid against dyslipidemia

Not all fats in the diet have the same effect on the amount of cholesterol in the blood. The poly-unsaturated fatty acids in vegetable oils have little effect, and are thought to be largely due largely to a poly-unsaturated fatty acid known as linoleic acid.

Page et al., *Circulation* 15: 97 (1957)

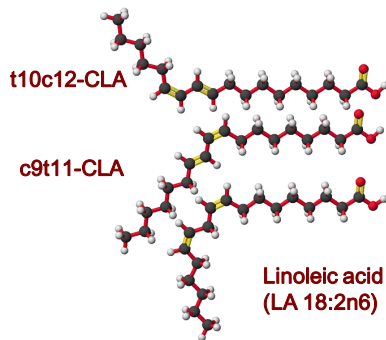
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Sources of linoleic acid



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Conjugated linoleic acids (CLA)



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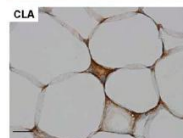
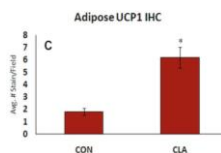
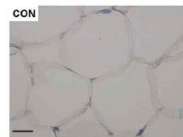
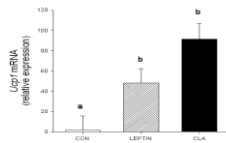
Conjugated Linoleic Acid

- Oil Fraction of Ruminant Products
- White Button Mushrooms
- Dietary supplements



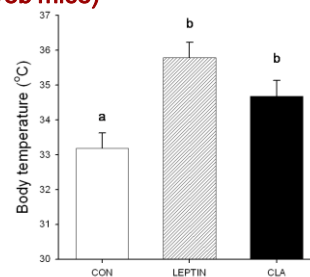
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Burn it



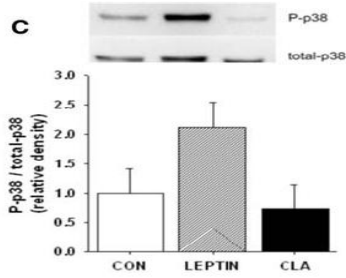
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CLA Increases Basal Temperature (ob/ob mice)



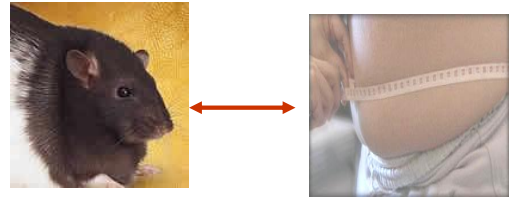
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CLA Induces thermogenesis without β 3-adrenergic signaling



Wendel et al., 2009

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Ohio State University

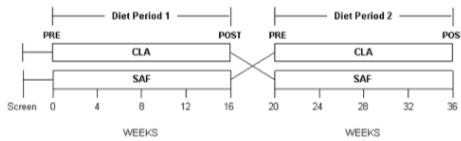
Women's Diabetes Study



- N=55 PM women
- Age 58 ± 7
- BMI 36.8 ± 6
- Diabetes - 9.9 yrs

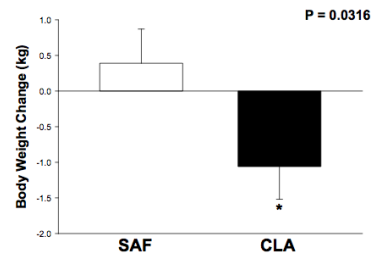
Medication Classes

Sulfonylureas	13
Biguanides	13
Thiazolidinediones	5
Incretin Mimetic	0
α -Glucosid inhibitor	1
Combination Therapy	22



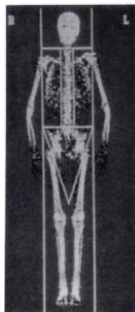
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CLA reduces body weight



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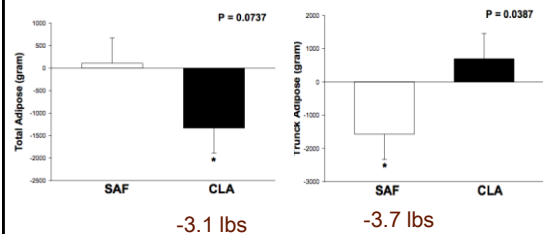
How do fats alter components of MetS?



1 lb. adipose = 3500 kcal

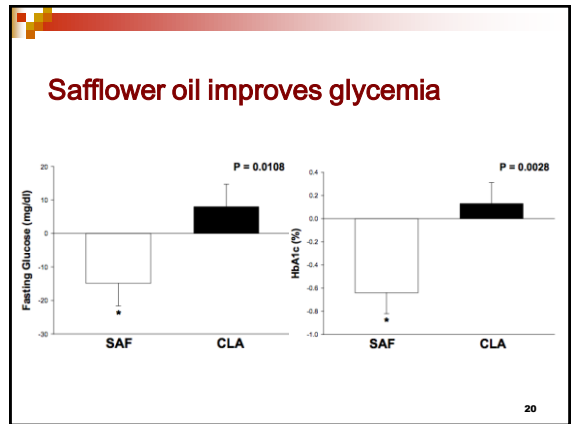
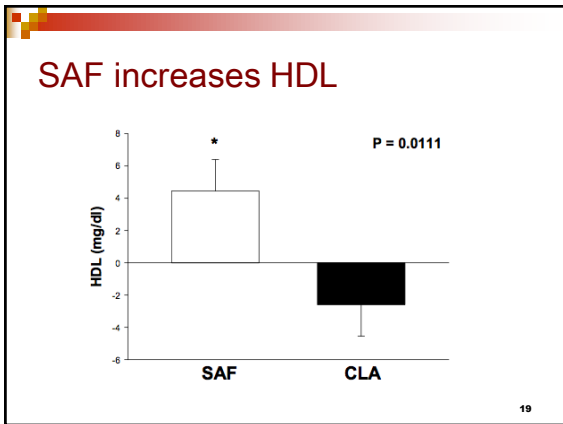
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CLA lowers total adipose SAF lowers trunk adipose



Norris et al., 2009

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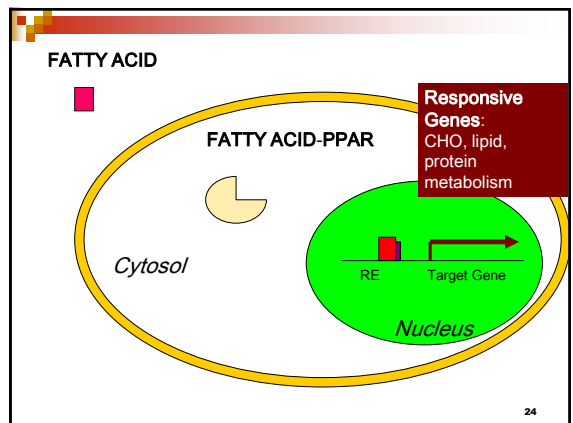
- ### So Far
- #### In Postmenopausal women with T2 DM:
- CLA
 - reduces BMI and adipose mass
 - **no effect** on markers of glycemia
 - SAF
 - reduces trunk adipose mass, HbA1C, glycemia
 - increases HDL and lean body mass
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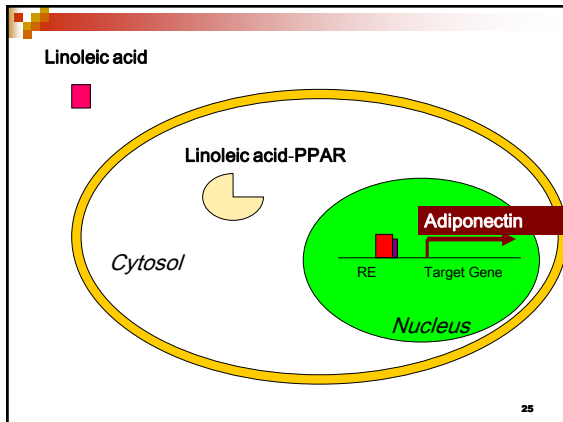
- ### Detangle effects of oils on components of MetS
- Dyslipidemia
 - Insulin resistance
 - Obesity
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Peroxisome Proliferator-Activated Receptors (PPARs)

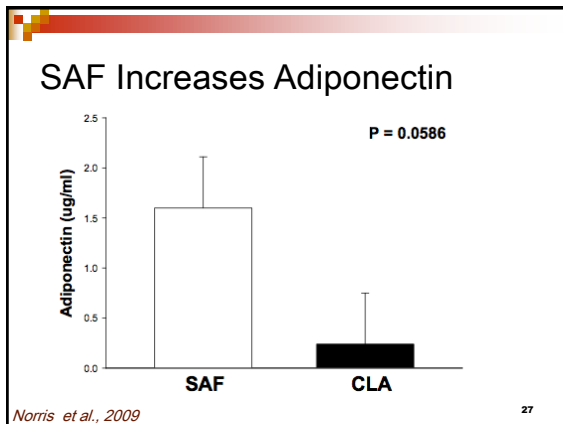
PPAR Isoform	Action	Ligands
PPAR α	Lipid lowering Induce β -oxidation	Fibrate CLA Eicosanoids PUFAs
PPAR γ	Adipocyte differentiation Lipid mobilizer	TZDs Eicosanoids PUFAs

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- ## Adiponectin
- PPAR γ -responsive gene
 - Produced in adipose
 - ~0.01% of all plasma proteins (5-10 ug/ml)
 - Multiple forms
 - Receptors in all tissues
 - Induces AMPK signaling
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- ## Summary: Proposed Mechanisms
- CLA and SAF oil have different effects on body composition and metabolism
 - Fatty acids affect health by changing gene expression and metabolism
 - As little as 1½ teaspoon (8 ml) added per day
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Take Home Messages

1. Dietary vegetable oils **still** have a protective role in preventing heart disease and MetS

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AHA Science Advisory

Omega-6 Fatty Acids and Risk for Cardiovascular Disease

A Science Advisory From the American Heart Association Nutrition Subcommittee of the Council on Nutrition, Physical Activity, and Metabolism; Council on Cardiovascular Nursing; and Council on Epidemiology and Prevention

William S. Harris, PhD, FAHA, Chair; Dariush Mozaffarian, MD, DrPH, FAHA; Eric Rimm, ScD, FAHA; Penny Kris-Etherton, PhD, FAHA; Lawrence L. Rudel, PhD, FAHA; Lawrence J. Appel, MD, MPH, FAHA; Marguerite M. Engler, PhD, FAHA; Mary B. Engler, PhD, FAHA; Frank Sacks, MD, FAHA

Circulation 2009

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Research and Practice Innovations
Knowledge of Dietary Fats among US Consumers
 CHUNG-TANG J. LIN, PhD; STEVEN T. YEN, PhD April 2010 Volume 110 Number 4

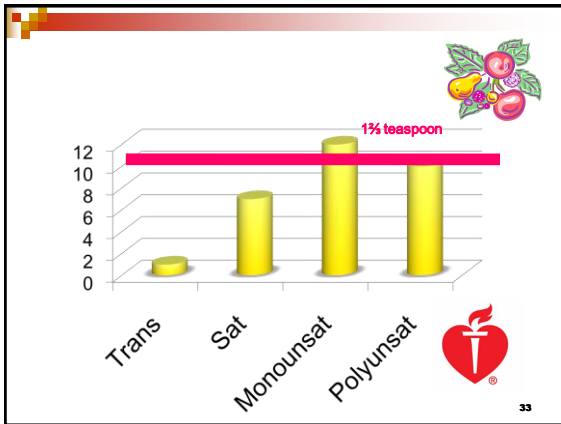
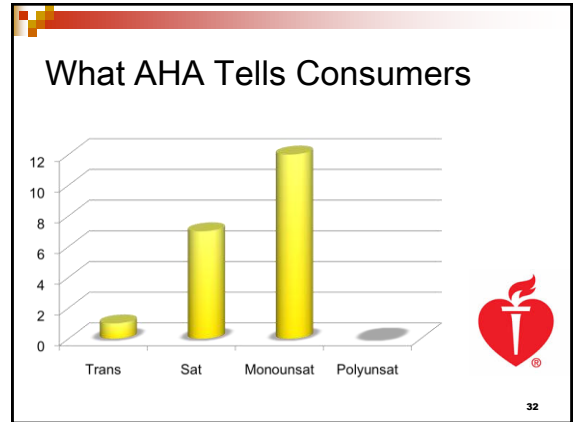
Table 1. Percent of US consumers who were aware of specific dietary fats and the risk of heart disease (HD)

Consumer's belief	Saturated fat	Trans fat	Monounsaturated fat	Polyunsaturated fat
Have heard	62	62	62	62
The fat raises risk of HD	21	21	21	21
The fat lowers risk of HD	51	15	16	16
The fat has no effect on risk of HD	4	7	9	9
Do not know or not sure	50	39	57	59
n	1,330	1,206	1,476	1,204

*Columns do not necessarily sum to 100 due to rounding.

15% of US consumers understand that n6 polyunsaturated fats lower risk for HD

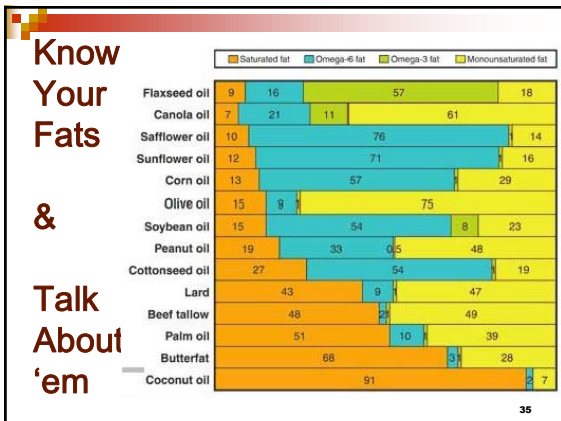
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Take Home Message

2. Keep a sense of humor and a sense of humility

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*Our Lunch at 2012
Integrative Therapies Confer*

California T...
Grilled...
...
... or Hot Coffee
Carrot Cake

CLA = 25 mg
Linoleic acid = 9250 mg

* Contains Tortilla, turkey, vegetables, avocado, cheddar cheese, tomato, watercress, oil-based dressing

Quiz, True or False



1. Kinky fats are good for you.
2. Adding some fats is a good strategy for healthful eating.
3. Healthful diets are always low in fat, taste bad, lack satiation and are, generally, quite boring.