

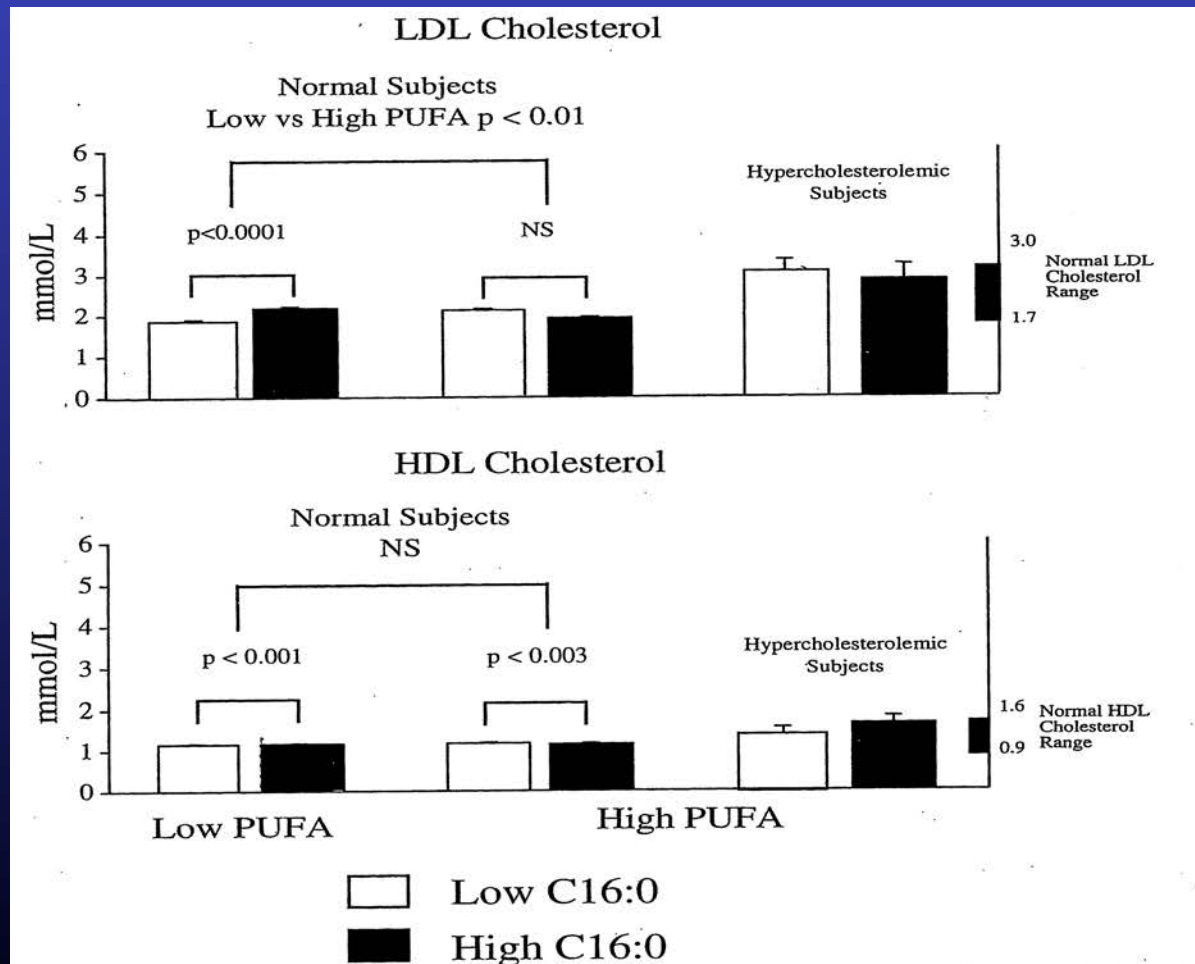
Comparison of an Interesterified Stearic-Rich Fat with Palm Oil on Blood Lipids and Plasma Glucose in a North American Population

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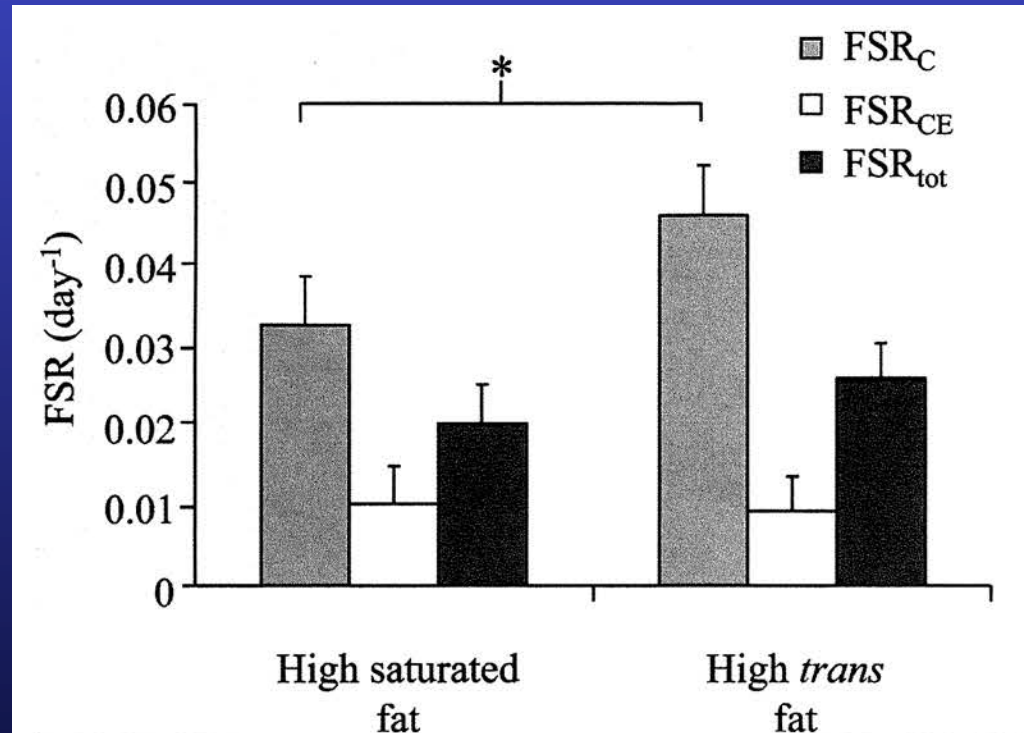
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The effect of palmitic acid on plasma lipoprotein cholesterol values in subjects consuming diets high or low in linoleic acid



Effect of diet treatment on mean FSR for free cholesterol, cholesteryl ester and total cholesterol



The fractional synthetic rate of free cholesterol increases significantly when a high *trans* fat diet is consumed ($p < 0.05$)

Objective

To assess if consumption of a “usual” higher amount of saturated fatty acid in the form of interesterified fat results in higher total cholesterol, LDL cholesterol or cholesterol synthesis.

Is interesterified fat more cholesterolemic compared to palm oil.

Study Design

- 30 subjects recruited
- 3 Diet Treatments in randomized order
- Diets provided:
 - Saturated (Palm)
 - Interesterified fat
 - Trans fatty acid
 - at a higher level of 18:2 n-6 intake
- Diet treatments for 2 weeks
- 15 subjects completed all aspects

Subject anthropometric variables at baseline

Age (y)	38 ± 19
Body Fat (%)	30.4 ± 16.8
Weight (kg)	79.7 ± 4.5
BMI (kg/m ²)	26.5 ± 1.1

Subject biochemical variables at baseline

T3	5.21 ± 0.86
T4	16.2 ± 1.8
Glucose (mmol/L)	4.98 ± 0.12
Total cholesterol (mmol/L)	4.79 ± 0.33
LDL-c (mmol/L)	3.00 ± 0.25
HDL-c (mmol/L)	1.23 ± 0.09
Triglyceride (mmol/L)	1.23 ± 0.17
Non-HDL-c (mmol/L)	3.56 ± 0.29
TC:HDL	4.03 ± 0.30

Fatty acid content of the dietary treatments (as % kcal)

Fatty Acid	Palm	Interesterified	Trans
16:0	9.5	7	6.2
18:0	2.2	4	2.3
18:1 n-9	10.9	9.4	12.2
18:2 n-6	6.8	7.8	7.8
18:3 n-3	1.1	1.6	1.5

Subject anthropometric variables after consuming each dietary fat treatment

	Palm	Interesterified	Trans	P-value*
Age				
Body fat %				
Weight (kg)	80.0 ± 4.4	79.4 ± 4.6	79.4 ± 4.4	0.46
BMI (kg/m ²)	26.5 ± 1.0	26.3 ± 1.1	26.3 ± 1.1	0.49

*P-value for comparison of the 3 diet treatments using ANOVA. Data are presented as mean ± SEM except for age and body fat % which are presented as mean ± SD.

Subject biochemical variables after consuming each dietary fat treatment

	Palm	Interesterified	Trans	P-value*
Glucose (mmol/L)	4.7 ± 0.1	4.8 ± 0.1	4.8 ± 0.1	0.57
Insulin	7.3 ± 1.5	7.0 ± 1.2	8.1 ± 1.6	0.38
CRP	1265 ± 528	794 ± 277	972 ± 331	0.57
IL-6	3.8 ± 0.9	3.5 ± 0.8	4.4 ± 0.8	0.29
IL-10	1.0 ± 0.5	0.9 ± 0.5	0.8 ± 0.5	0.17
TNF- α	2.0 ± 1.4	2.2 ± 1.5	1.9 ± 1.3	0.25

*P-value for comparison of the 3 diet treatments using ANOVA. Data are presented as mean ± SEM.

Subject plasma lipid level after consuming each dietary fat treatment

	Palm	Interesterified	Trans	P-value ²
Total cholesterol ¹	4.2 ± 0.3	4.1 ± 0.3	4.1 ± 0.3	0.71
LDL-c ¹	2.6 ± 0.2	2.6 ± 0.2	2.6 ± 0.2	0.74
HDL-c ¹	1.1 ± 0.1	1.0 ± 0.1	1.1 ± 0.1	0.64
Triglyceride ¹	1.2 ± 0.2	1.0 ± 0.1	1.1 ± 0.2	0.21
TC:HDL	4.1 ± 0.3	4.2 ± 0.3	4.2 ± 0.3	0.82

¹ in mmol/L

² P-value for comparison of the 3 diet treatments using ANOVA. Data are presented as mean ± SEM.

Change in anthropometric and biochemical variables with diet treatment

(as % change from baseline)

	Palm	Interesterified	Trans	P-value
Weight	0.4 ± 0.7	-0.6 ± 0.4	-0.3 ± 0.8	0.39
BMI	0.2 ± 0.8	-0.8 ± 0.5	-0.6 ± 0.9	0.39
Glucose	-5.6 ± 2.2	-1.8 ± 1.5	-4.1 ± 1.3	0.16
TC	-12.9 ± 2.9	-13.8 ± 2.9	-15.7 ± 2.7	0.74
LDL-c	-13.3 ± 5.1	-10.4 ± 3.4	-14.7 ± 3.0	0.63
HDL-c	-14.4 ± 4.3	-16.6 ± 4.9	-5.7 ± 12.1	0.55
TG	5.5 ± 12.4	-8.8 ± 11.4	-8.7 ± 11.6	0.34
TC:HDL	3.6 ± 3.8	6.2 ± 5.1	6.7 ± 5.6	0.73

P-value for comparison of the 3 diet treatments using ANOVA. Data are presented as mean ± SEM.

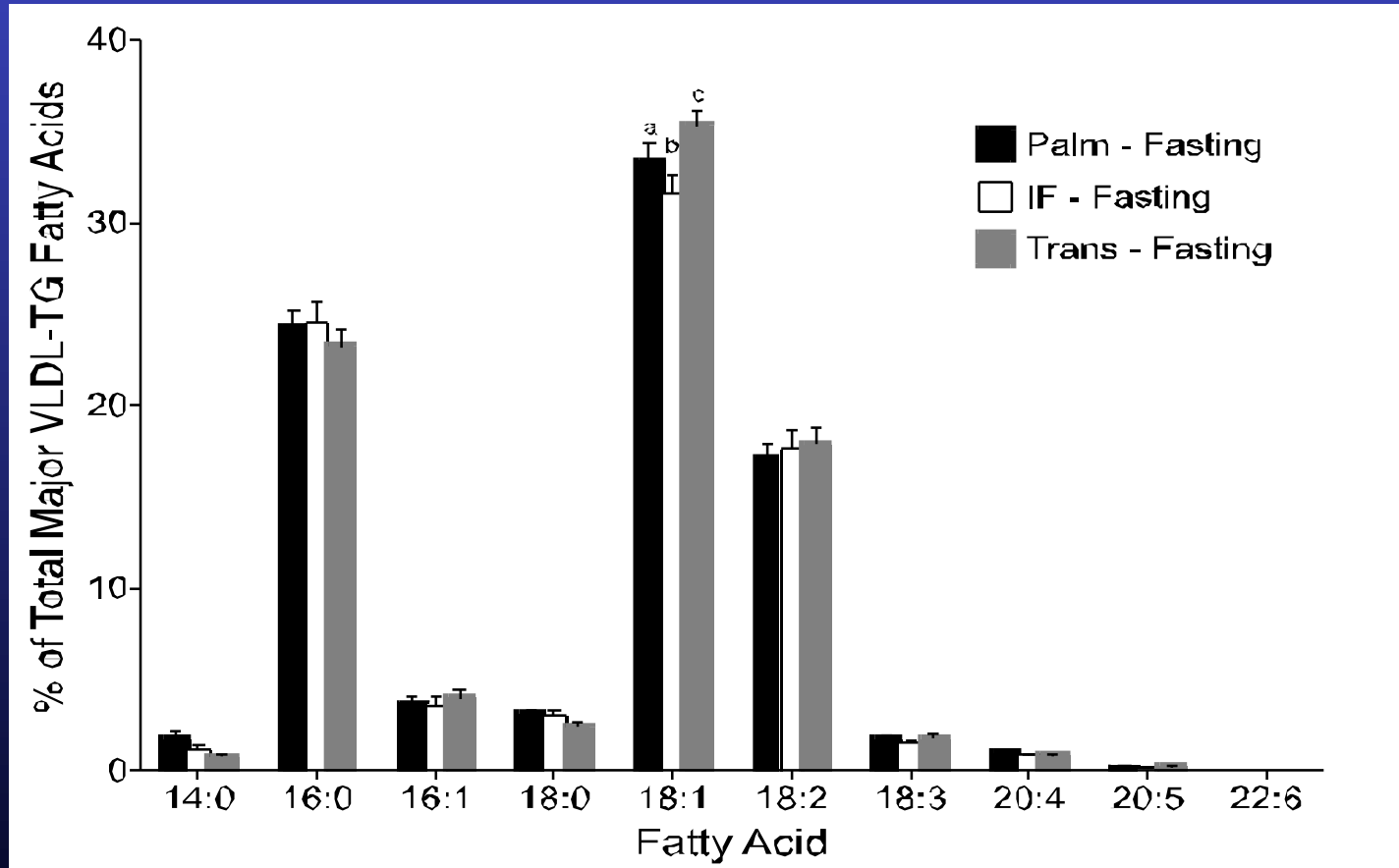
Fractional synthesis rate of FC and CE in the LDL and plasma fraction in subjects fed three different diet fat treatments - 5 hrs

	Palm	Interesterified	Trans	Pooled \pm SEM
LDL-FC-FSR P (%)	1.22	1.49	1.45	\pm 0.12
LDL-CE-FSR P (%)	0.3	0.84	0.37	\pm 0.21
Plasma FC-FSR P (%)	2.67	2.85	2.42	\pm 0.28
Plasma CE-FSR P (%)	0.59	0.97	1.01	\pm 0.69

Fractional synthesis rate of FC and CE in the LDL and plasma fraction in subjects fed three different diet fat treatments - 24 hrs

	Palm	Interesterified	Trans	Pooled \pm SEM
LDL-FC-FSR P (%)	7.63	6.82	8.29	\pm 0.36
LDL-CE-FSR P (%)	1.07	1.87	1.31	\pm 0.24
Plasma FC-FSR P (%)	8.12	7.97	8.52	\pm 0.32
Plasma CE-FSR P (%)	2.12	2.38	2.59	\pm 0.83

Fatty acid composition of plasma VLDL triglyceride after each diet treatment



Conclusions

- Analysis of metabolic hormones, glucose, insulin, inflammatory markers and lipoprotein cholesterol levels indicated no effect of the dietary fat treatments.
- Effect of diet fat on cholesterol synthesis occurs in the postprandial period
- Favorable effects of palm oil on cholesterol synthesis rate compared to other diet fats tested should be assessed in the early postprandial period.
- When palm oil and interesterified fats are compared the potential of interesterification to produce TG stereoisomers not normally found in food could play a role.