

Effect Of Palm Oil, Margarine, Butter, And Sunflower Oil On The Serum Lipids And Lipoproteins Of Normocholesterolemic Middle-aged Men

Wood, R., K. Kubena, et al. (1993). "Effect of palm oil, margarine, butter, and sunflower oil on the serum lipids and lipoproteins of normocholesterolemic middle-aged men." J. Nutr. Biochem. 4: 286-97.

ABSTRACT: Twenty-nine healthy middle-aged men participated in a Latin square-designed study containing six dietary fats: butter; crude palm oil; hard margarine; refined palm oil; 80% refined palm oil + 20% sunflower oil blend; and sunflower oil. Each diet period was 6 weeks in duration followed by 6 weeks of habitual diet. Test fats were consumed in ice cream, milk, cookies, and as spreads and represented 50% of the total fat energy (38%) on all diets. Serum lipid responses to the high level of test fats in the diets were small relative to habitual diet values. Large changes in quantity and type of fatty acids consumed daily were not reflected in the fatty acid composition of the total serum lipids. Butter did not elevate total serum cholesterol or low density lipoprotein (LDL) cholesterol relative to habitual diet levels, but these values were significantly higher than sunflower oil-diet and palm oil-diet values. The sunflower oil diet produced the most dramatic changes: total serum cholesterol was reduced significantly relative to all diets except margarine, and apolipoprotein B values were the lowest of any diet. Unfortunately, the desirable high density lipoprotein (HDL) cholesterol and apolipoprotein A1 were also reduced on the sunflower oil diet. Diets containing either crude or refined palm oil did not elevate total serum cholesterol relative to habitual diet values or LDL cholesterol or apolipoprotein levels relative to any diet. Unexpectedly, the refined palm oil diet HDL-cholesterol and apolipoprotein A1 levels were the highest of all diets and significantly higher than sunflower oil diet values. The hard margarine diet, containing 26% trans fatty acids, reduced apolipoprotein B values relative to habitual diet levels, but HDL cholesterol was reduced significantly relative to the refined palm oil diet values. Comparison of the diet's fatty acid compositions suggests the decrease in the HDL cholesterol on the hard margarine diet is attributable to the trans fatty acids. The data indicate that the trans fatty acids, produced during the partial hydrogenation of fats and oils, are not neutral and adversely affect serum lipid profile.

Characteristics Of Subjects

Subjects	Age (years)	Cholesterol levels (mmol/l)	Body weight (kg)
Male* (n=29)	41 8	< 6.2	83.5 10

*Nonsmokers and no medication

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Fatty Acid Composition Of Dietary Test Fats

Dietary test fats	Percentages				
	14:0	16:0	18:0	18:1	18:2
BU	10.3	31.3	15.5	29.2	3.9
CPO	-	37.3	3.4	45.7	10.6
PAR	0.5	12.5	7.9	59.9	14.1
RPO	-	42.0	4.5	40.6	8.9
SPO	-	29.5	4.6	33.0	24.9
SUN	-	7.9	4.9	17.5	65.2

BU = butter; CPO = crude palm oil; PAR = Parkay margarine; RPO = refined palm oil; SPO = 80% RPO and 20% sunflower oil; SUN = sunflower oil.

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Comparison Of The Energy And Proximate Composition Of The Various Diets Fed, As Determined From Diet Records

Diet / test fat	Composition				
	Energy (kJ)	*Protein (g)	*CHO (g)	*Fat (g)	Chol. (mg)
Baseline	9562	91	264	96	328
BU	9863	87	286	96	372
CPO	10240	87	302	99	282
PAR	10027	91	281	101	243
RPO	10387	92	290	106	262
SPO	9834	88	276	99	273
SUN	10261	93	287	103	269

*carbohydrate: 46-50% of energy

*Protein: 14-16% of energy

*Fat: 36-38% of energy

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Fatty Acid Composition Of Serum Of Pooled Weeks 5&6 For The Various Dietary Fats

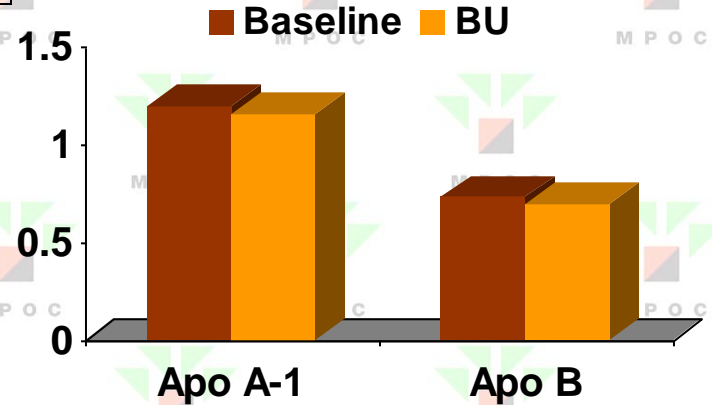
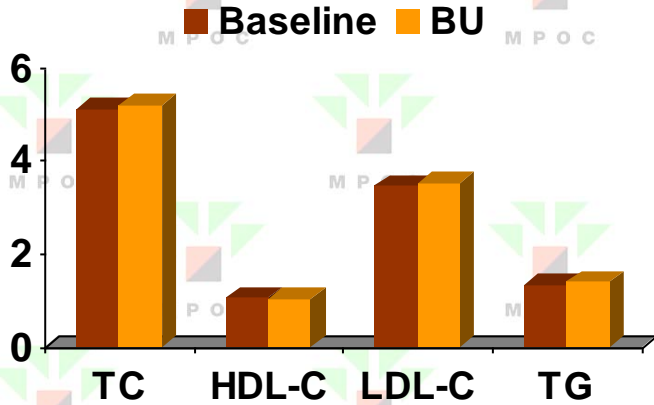
Diet/test fat	Fatty acid percentages						
	14:0	16:0	16:1	18:0	18:1	18:2	20:4
Baseline	1.2	22.6	2.0	6.0	18.8	28.0	4.0
BU	1.3	24.3	1.8	6.9	19.6	28.4	4.7
CPO	1.1	25.3	1.9	6.4	20.6	26.6	4.0
PAR	1.0	22.3	1.6	6.0	19.6	28.8	4.3
RPO	1.0	26.0	1.7	6.5	20.9	26.6	4.0
SPO	1.0	25.3	1.6	6.7	19.9	28.7	4.1
SUN	1.1	23.1	1.5	7.0	16.8	32.4	4.2

**Linoleic acid content in SUN diet was 62% of total fatty acids.

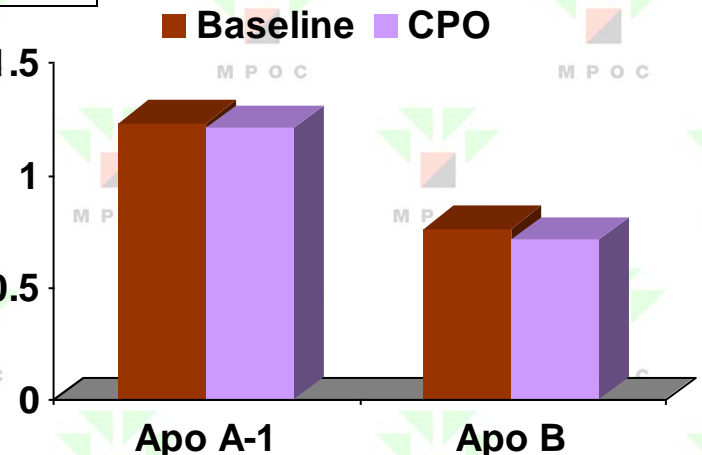
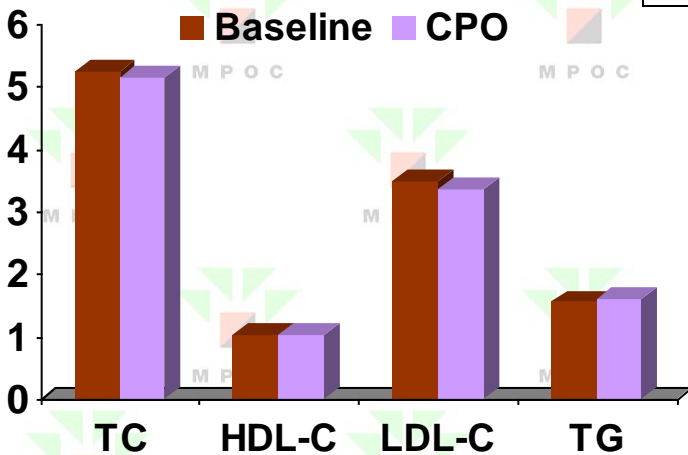
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Comparison of mean Fifth and Sixth Week Serum Lipid Concentrations with Two Point-Baseline Values for Various Dietary Fats Consumed by Free Living Males

Butter

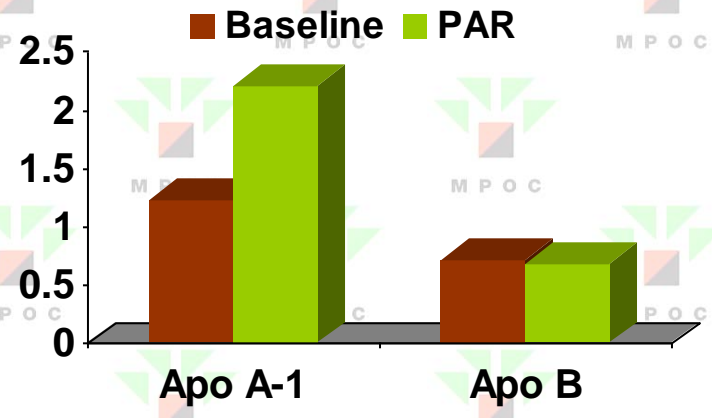
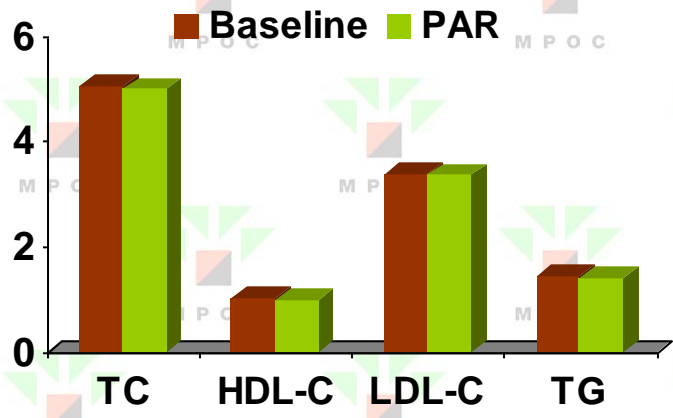


Crude Palm Oil

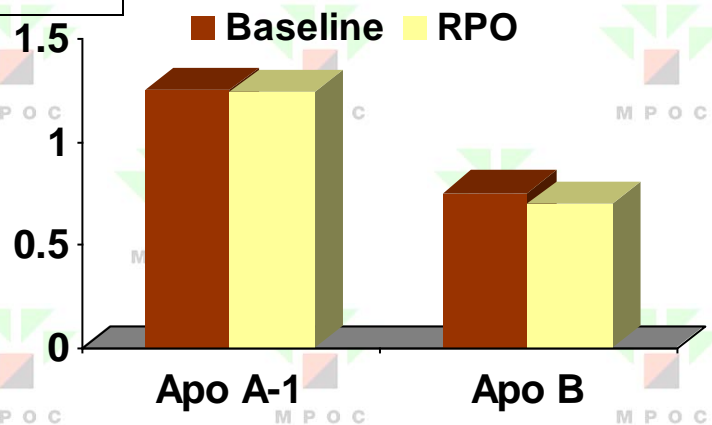
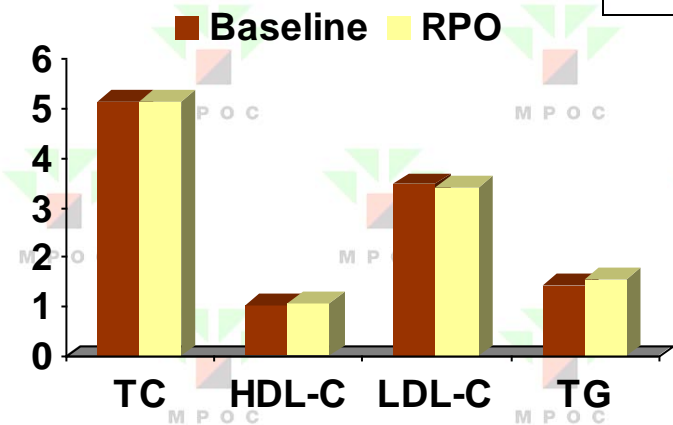


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Margarine

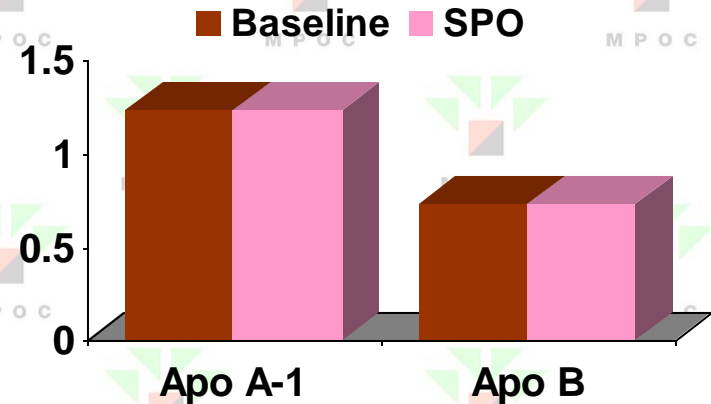
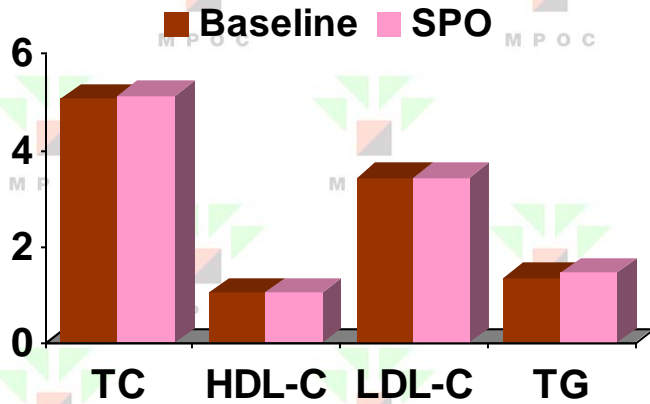


Refined Palm oil

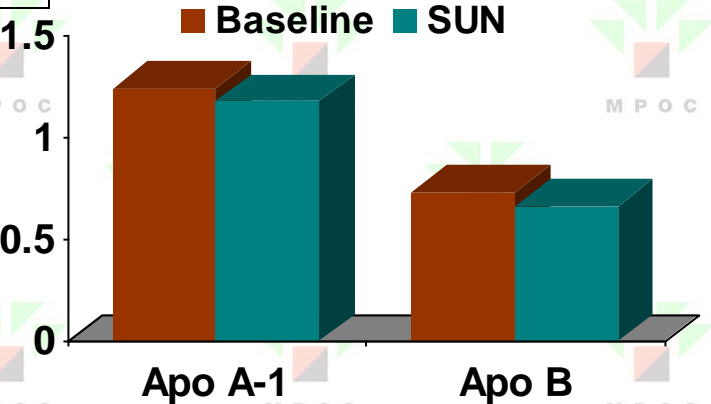
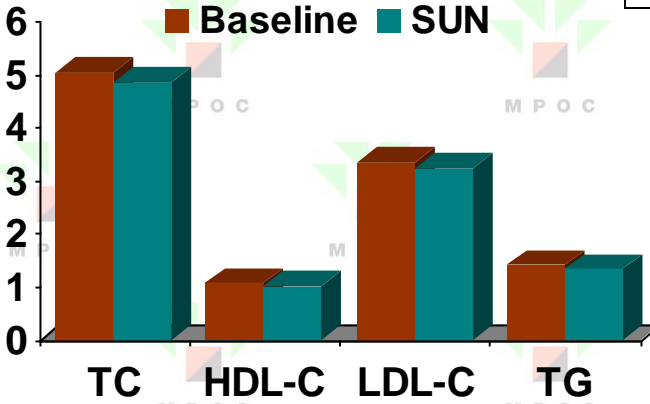


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80% RPO + 20% SUN



Sunflower oil



Conclusion

The replacement of nearly half the fat in the diet with various types of fats, ranging from saturated to highly polyunsaturated has only marginal effects on the serum lipid profile of healthy middle-aged men when compared to their habitual diet.

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