The nutritional properties of palm oil

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Palm Tree and Fruit
Palm oil

• Palm (mesocarp) oil
  – Crude palm oil – high beta-carotene
    • Refined palm oil – low in beta-carotene
      – Palmolein
      – Super palmolein
  – Palm kernel oil
    • High in medium chain fatty acids
Palm oil and fractions

- Saturates
- Monounsaturates
- Polyunsaturates

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<th>Palm oil</th>
<th>Palm Olein</th>
<th>Super olein</th>
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<tr>
<td>Saturates</td>
<td>50%</td>
<td>40%</td>
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<tr>
<td>Monounsaturates</td>
<td>40%</td>
<td>50%</td>
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<td>Polyunsaturates</td>
<td>10%</td>
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Hierarchy in Scientific Evidence

- Systematic Reviews (Meta-analysis)
- Randomized Controlled Trials
- Other Controlled Trials
- Prospective Cohort studies
- Case – Control studies
- Prevalence studies
- Ecological studies
- Animal studies
The Risk Factors

- Stress
- Smoking
- Overweight
- Blood pressure
- Blood cholesterol
- Exercise
- Diabetes
- Heredity
Blood lipid metrics of risk of CHD

Prospective Studies Collaboration. Lancet 2007;9602:1829-1839
Predicted changes (Δ) in the ratio of serum total to HDL cholesterol and in LDL- and HDL-cholesterol concentrations when carbohydrates constituting 1% of energy are replaced isoenergetically with saturated, cis monounsaturated, cis polyunsaturated, or trans monounsaturated fatty acids.
Predicted changes in the ratio of serum total to HDL cholesterol and in LDL- and HDL-cholesterol concentrations when carbohydrates constituting 1% of energy are replaced isoenergetically with lauric acid (12:0), myristic acid (14:0), palmitic acid (16:0), or stearic acid (18:0).

Predicted changes (Δ) in the ratio of serum total to HDL cholesterol when mixed fat constituting 10% of energy in the "average" US diet is replaced isoenergetically with a particular fat or with carbohydrates.

Effect on risk of CHD events of replacing 5% energy saturated fatty acids from pooled analysis of 11 cohort studies


[Graph showing the effect of replacing saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA) on the risk of CHD events. The graph indicates that replacing SFA and MUFA decreases the risk, while replacing PUFA increases the risk.]
Meta-analysis of trans fatty acids on risk of CHD events

SHS 2006
ATBC 1997
HPFS 1996
NHS1996
Zutphen 2005
All studies

Decreases
Increases
Replacing 2% trans fatty acids with saturated or unsaturated fatty acids reduces risk of CHD

WHO/FAO 2009
The technical need for high melting point fats

- Bakery products
- Spreads
Sources of high melting point fats

• Animal fats – lard/butter/ suet (cholesterol, trans in ruminant fats)
• Partially hydrogenated vegetable oils (trans 15-50% fatty acids)
• Fully hydrogenated and inter-esterified vegetable oils (low trans, high stearic acid rich, but not clean label)
• Palm oil fractions
Comparison of palm oil (PA), soybean oil (SO), peanut oil (PE) and lard (LA) on plasma lipids

The fats differ mainly by the position of saturated fatty acids.

In palm oil they are in the sn-1 and sn-3 position whereas in lard they are in the sn-2 position.
Palm oil

- Palmitic
- Oleic/Linoleic
- Palmitoleic
The sn-2 hypothesis

• “The adverse health effects of animal sources of saturated fatty acids are a consequence of the high proportion of saturated fatty acids in the sn-2 position”
Comparisons of palm olein with partial hydrogenated soybean oil and fully hardened (PHSO and interesterified soybean oil (IE) on plasma total cholesterol (TC), HDL cholesterol (HDL-C) and the TC/HDL ratio

Summary of effects of palm oil on blood lipids and risk of CHD

• The blood cholesterol raising effects of palm oil fractions are lower than predicted from their fatty acid composition
• Palm oil fractions increase HDL cholesterol compared with carbohydrate or trans fatty acids
• The effects of replacing 5% energy as palm oil in the diet is unlikely to influence risk of CHD