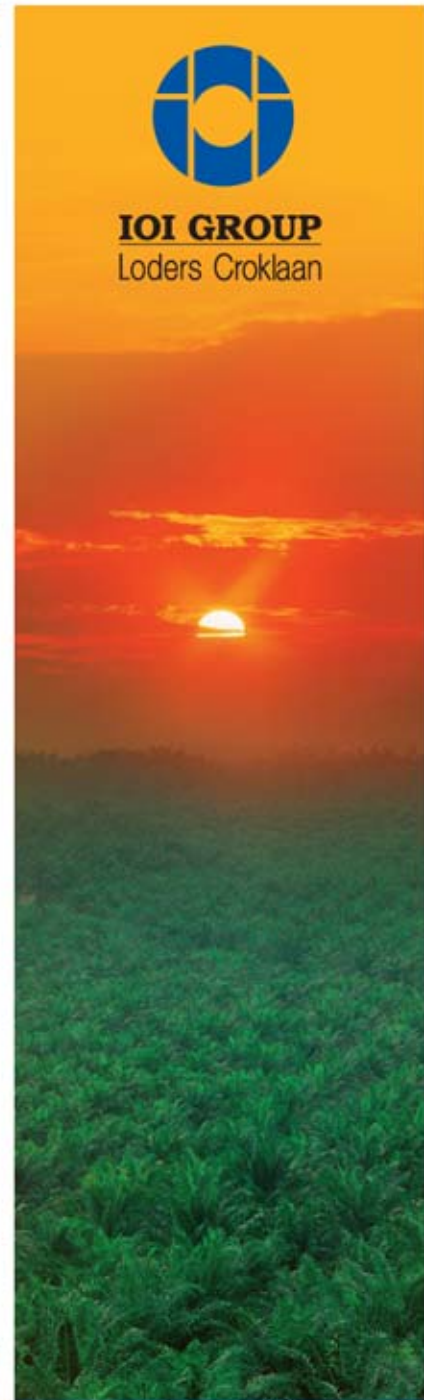




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The Dietary Saturated Fat Hypothesis - Fact or Fiction?

Gerald P. McNeill, PhD
Director R&D, Loders Croklaan



The Diet-Heart Hypothesis

Early data in 1950's appeared to show a relationship between dietary fat (esp. saturated fat), serum cholesterol and heart disease



Large study performed to validate the theory – Seven Countries Study

The Traditional Diet-Heart Paradigm



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The Seven Countries Study

Dr. Ancel Keys

- The Diet-Heart theory was tested by surveys carried out from 1958 to 1970, in 18 areas of 7 countries, 12,700 participants
- Finland, Netherlands, Italy, Greece, Yugoslavia, Japan, USA
- Measured heart disease rates, total cholesterol, diet
- “Proved” the Diet Heart Theory was correct



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The Seven Countries Study

Total cholesterol correlated with heart disease within regions, but not across regions

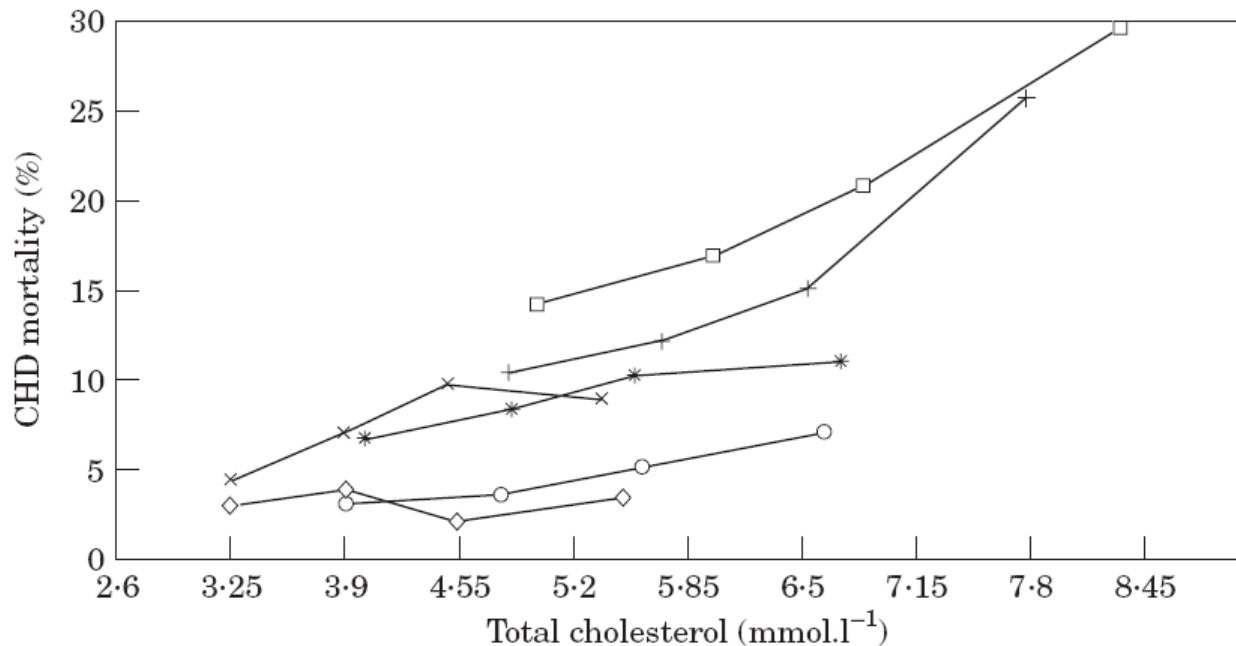


Figure 2 25-year coronary heart disease mortality rates to baseline cholesterol quartile, adjusted for age, smoking and blood pressure. □—□=Northern Europe; +—+=U.S.A.; ×—×=Serbia; *—*=Inland Southern Europe; ◇—◇=Japan; ○—○=Mediterranean Southern Europe.

Eur Heart J, Vol. 20, issue 11, June 1999



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The Seven Countries Study

- Different regions within countries did not correlate heart disease with total cholesterol
- E. Finland vs W. Finland - 5X diff in heart disease
- Corfu vs Crete (Greece) - 4X diff in heart disease



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The Diet-Heart Paradigm ?

Ancel Keys, Time Magazine, Jan. 13, 1961



“The U.S. diet is 40% fat, and most of that is saturated fat—the insidious kind... ”



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The Framingham Heart Study Boston University

- **Commenced 1948 - measured connection between lifestyle and heart disease in town of Framingham, MA.**
- **Full blood analysis every 2 years.**
- **>15,000 participants over 3 generations.**
- **Discovered relationship with smoking, age, gender, blood pressure, LDL, HDL and heart disease.**



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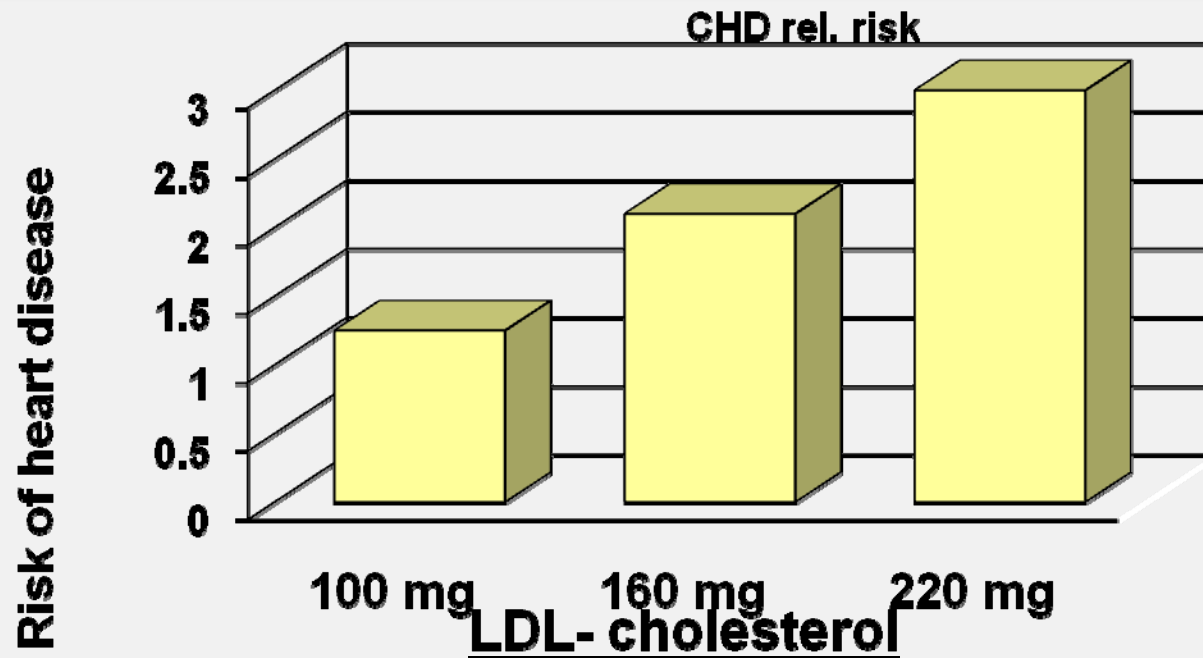




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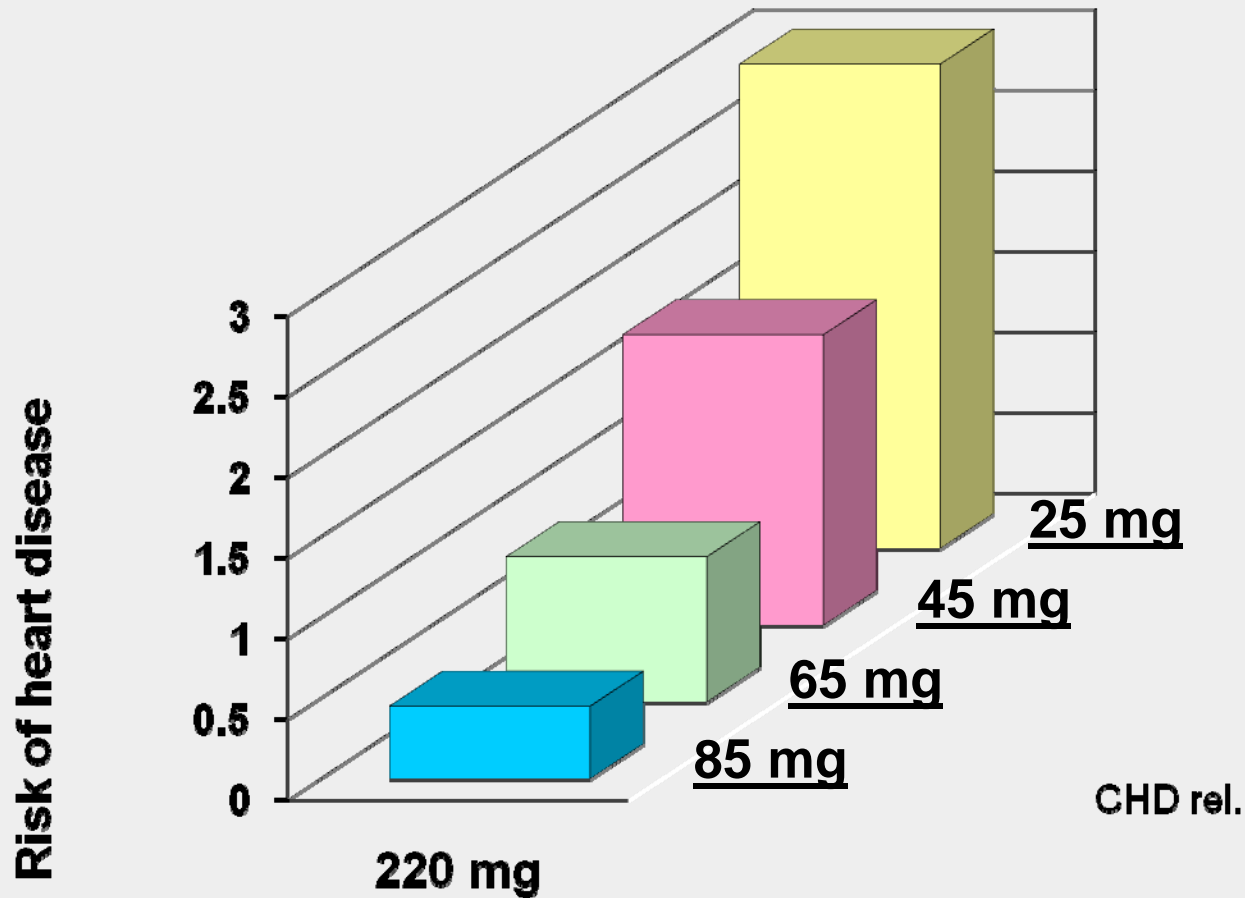
LDL increases risk for CHD

(Framingham Hear Study; Am J Med. 1977 May;62:707-14.)



HDL reduces risk for CHD

(Framingham Hear Study; Am J Med. 1977 May;62:707-14.)



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Framingham Heart Study;

Can J Cardiol. 1988 Jul;4 Suppl A:5A-10A

- **“... factors other than total or low density lipoprotein (LDL) cholesterol must be considered when evaluating CAD risk.”**
- **“... low levels of high density lipoprotein (HDL) cholesterol are as much a risk factor for CAD as high LDL cholesterol.”**
- **“The best simple test for predicting CAD is the ratio of total:HDL cholesterol.”**

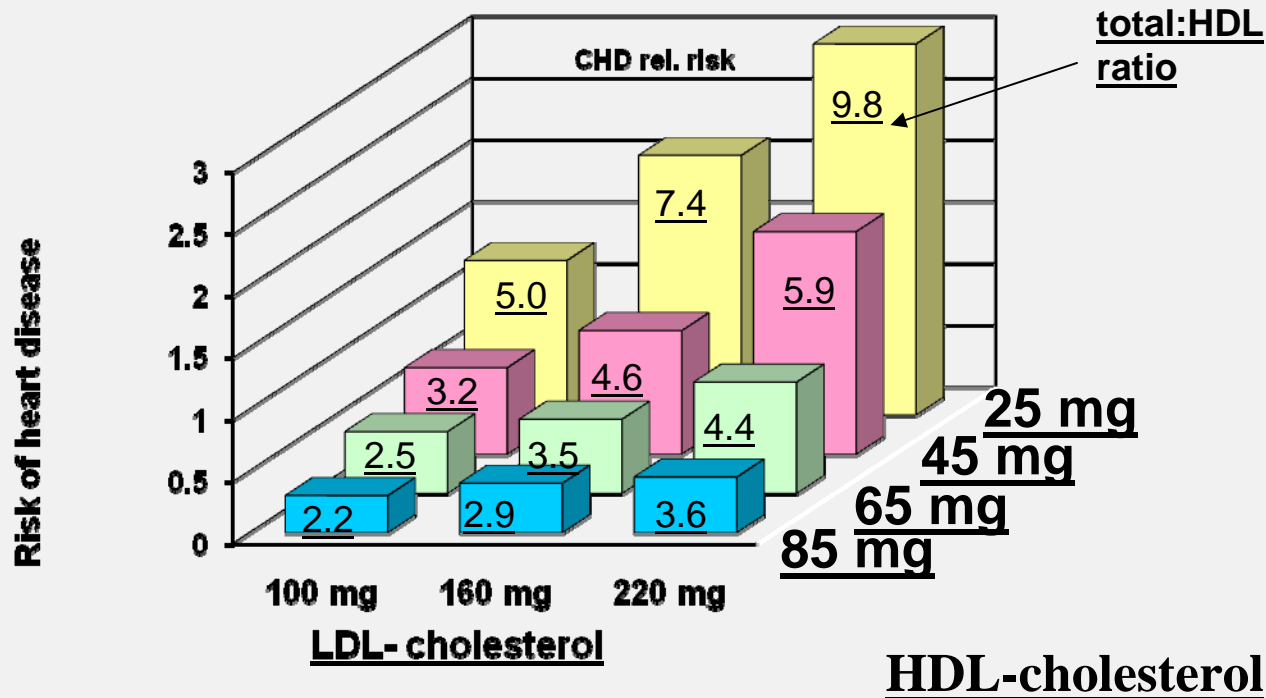


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HDL and LDL combined is a powerful risk factor for CHD

(Framingham Hear Study; Am J Med. 1977 May;62:707-14.)



Numbers on bars indicate total:HDL ratios



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The Role of HDL in risk of heart disease for dietary fatty acids

- **Saturated fat increases total and LDL cholesterol**
“bad fat”, artery clogging

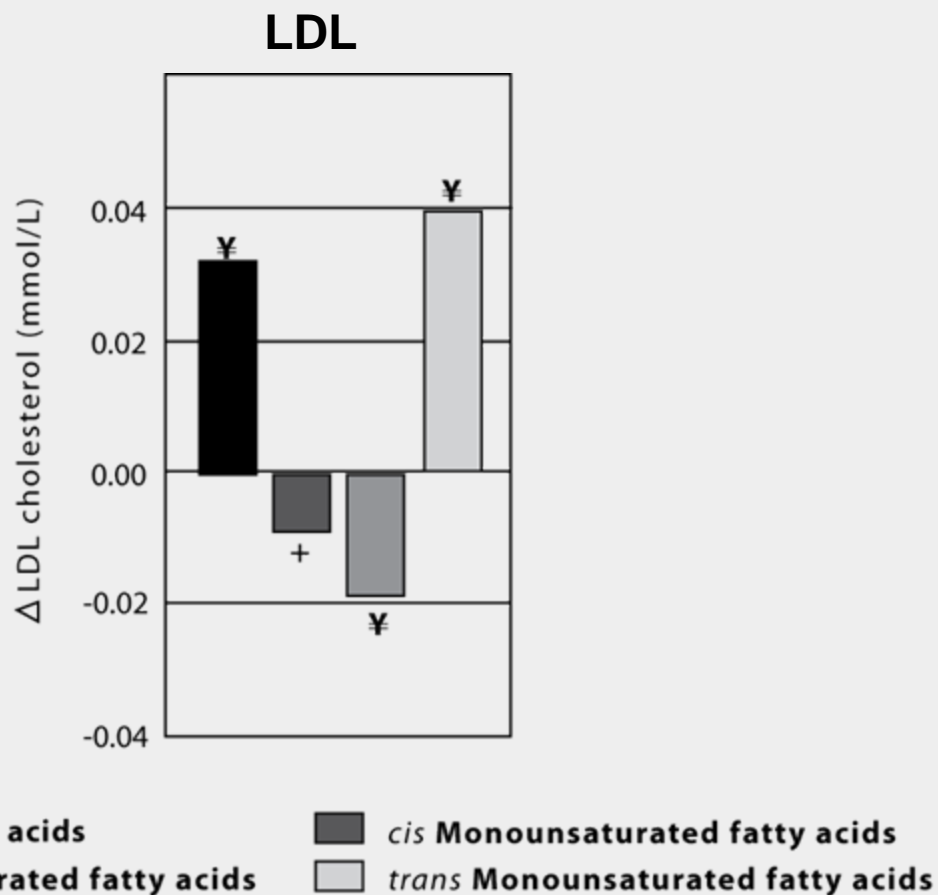
- **Unsaturated fat decreases total and LDL cholesterol**
“good fat”, heart healthy



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Saturates and Cholesterol



Mensink *et al.*, Maastricht University (65 studies combined)

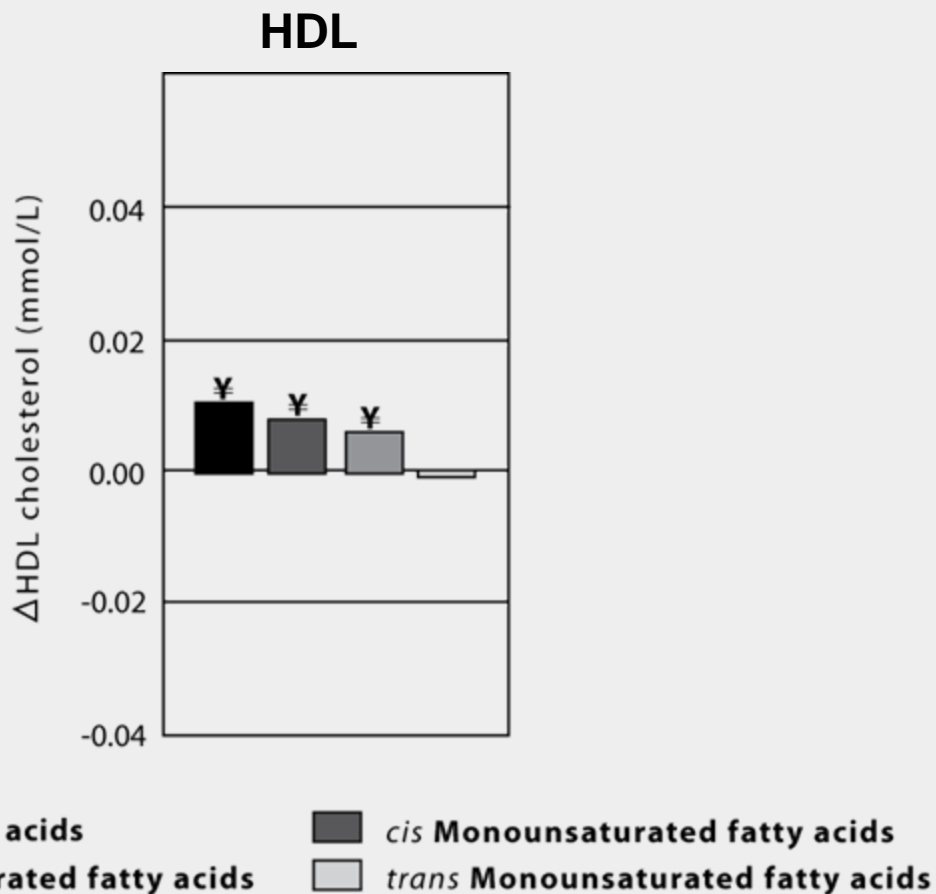
Am J Clin Nutr 2003;77:1146–55



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Saturates and Cholesterol



Mensink *et al.*, Maastricht University

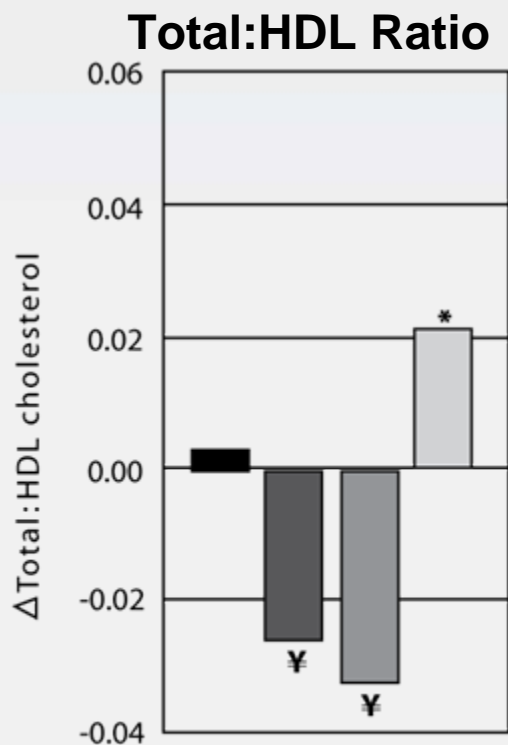
Am J Clin Nutr 2003;77:1146–55



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Saturates and Cholesterol



- Saturated fatty acids
- cis Monounsaturated fatty acids
- cis Polyunsaturated fatty acids
- trans Monounsaturated fatty acids

Mensink *et al.*, Maastricht University

Am J Clin Nutr 2003;77:1146–55



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The Nurses Health Study (2005)

(Harvard School of Public Health)

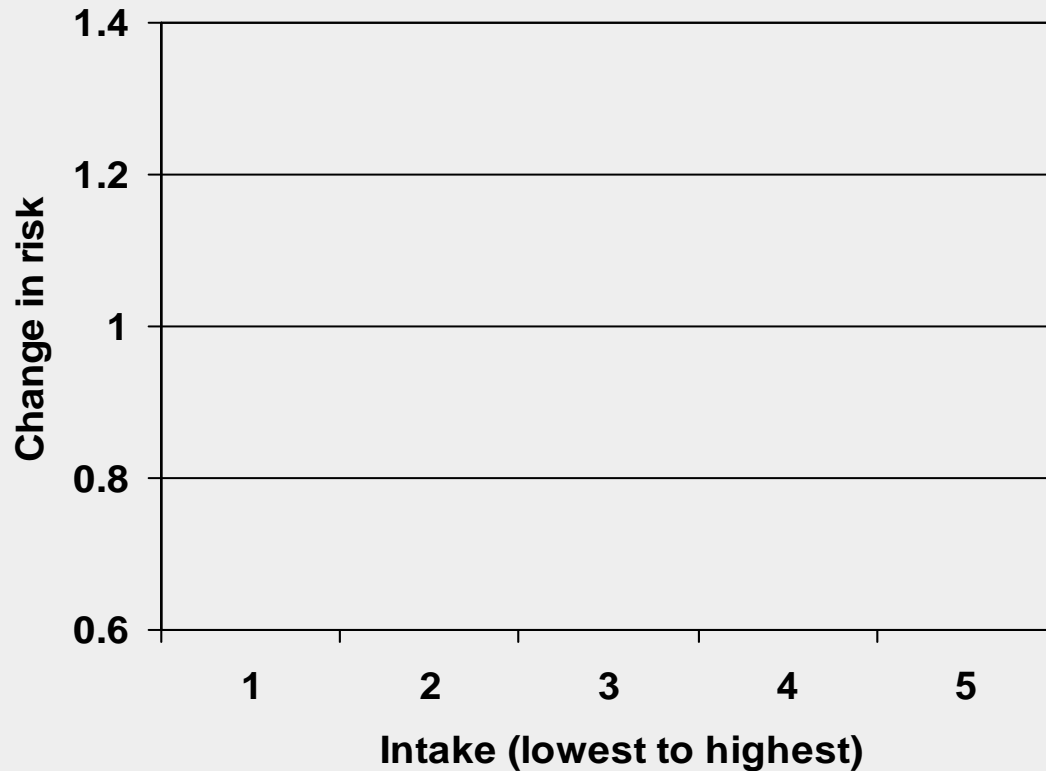
- **“Observational” study**
 - **120,000 participants, over 20 years**
 - **Measure composition of individual diets**
- **Correlate heart disease with different fats in diet**



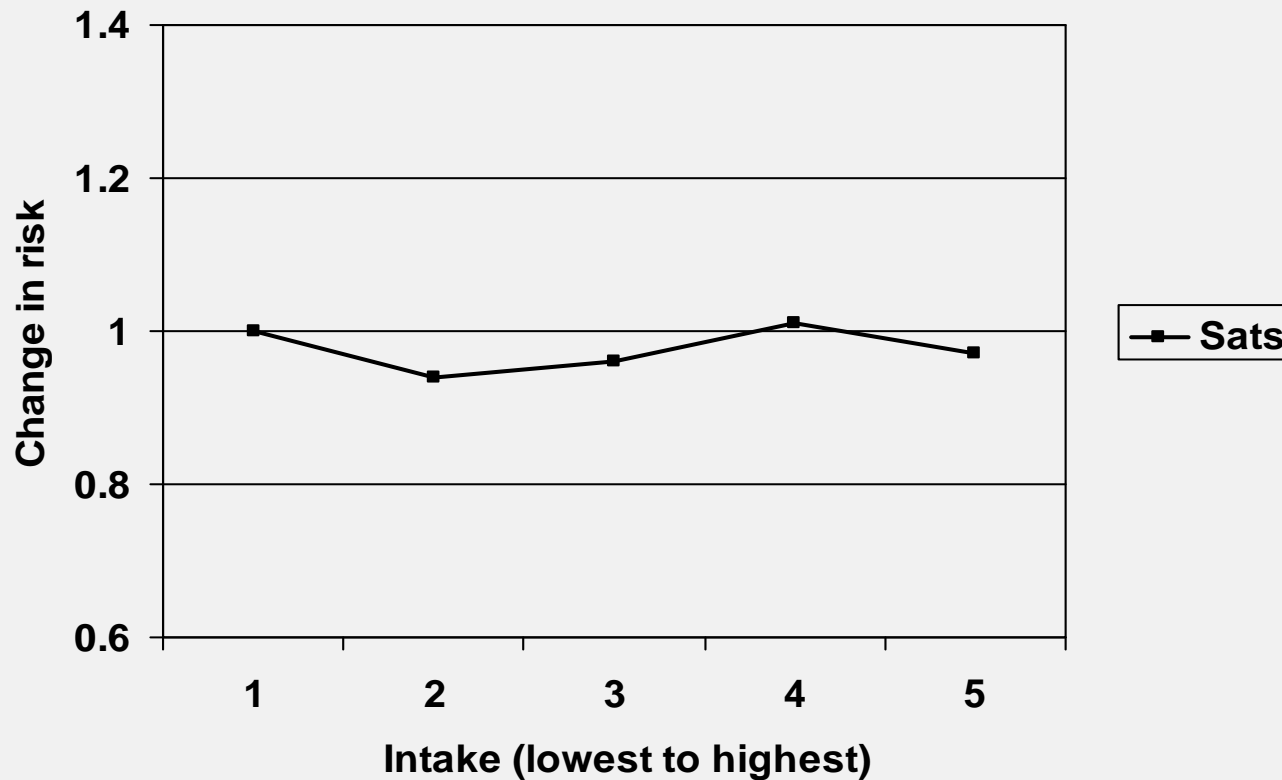
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Results – relative risk of heart disease, with increasing intake of particular fats

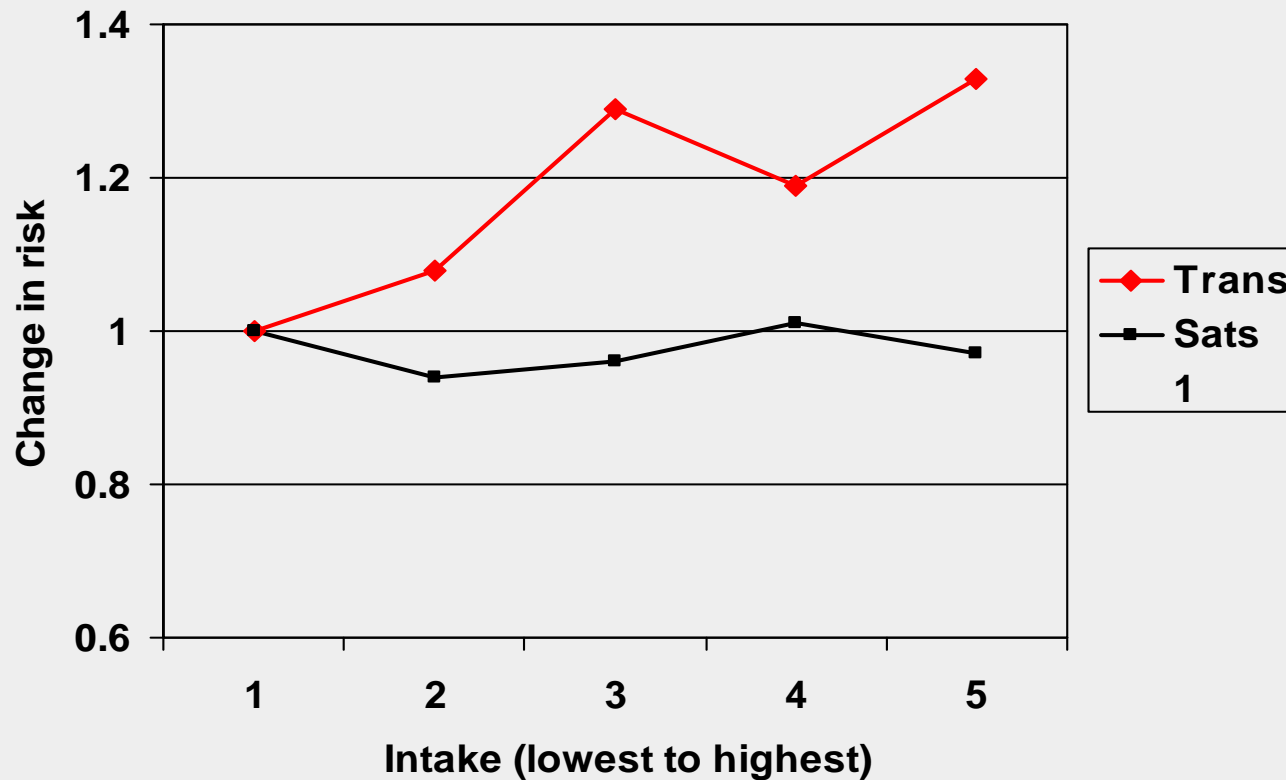


Results – relative risk of heart disease, with increasing intake of particular fats



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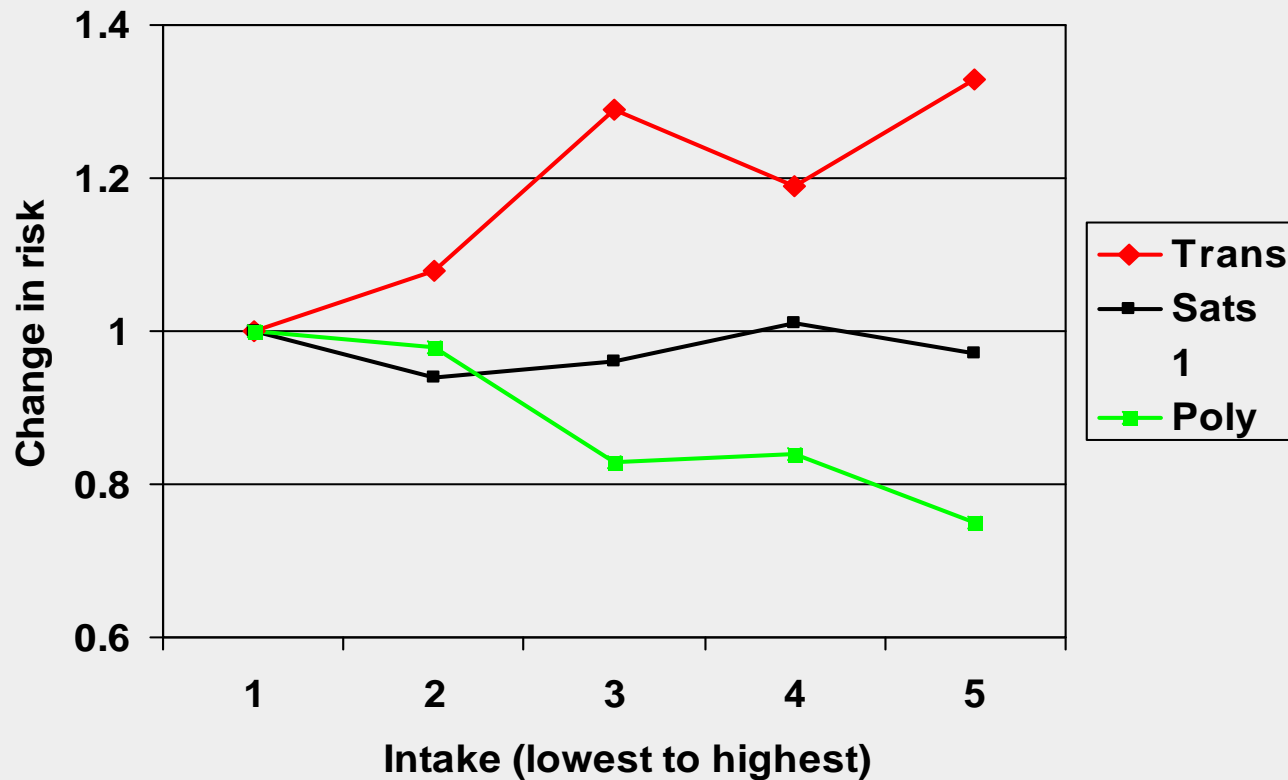
Results – relative risk of heart disease, with increasing intake of particular fats



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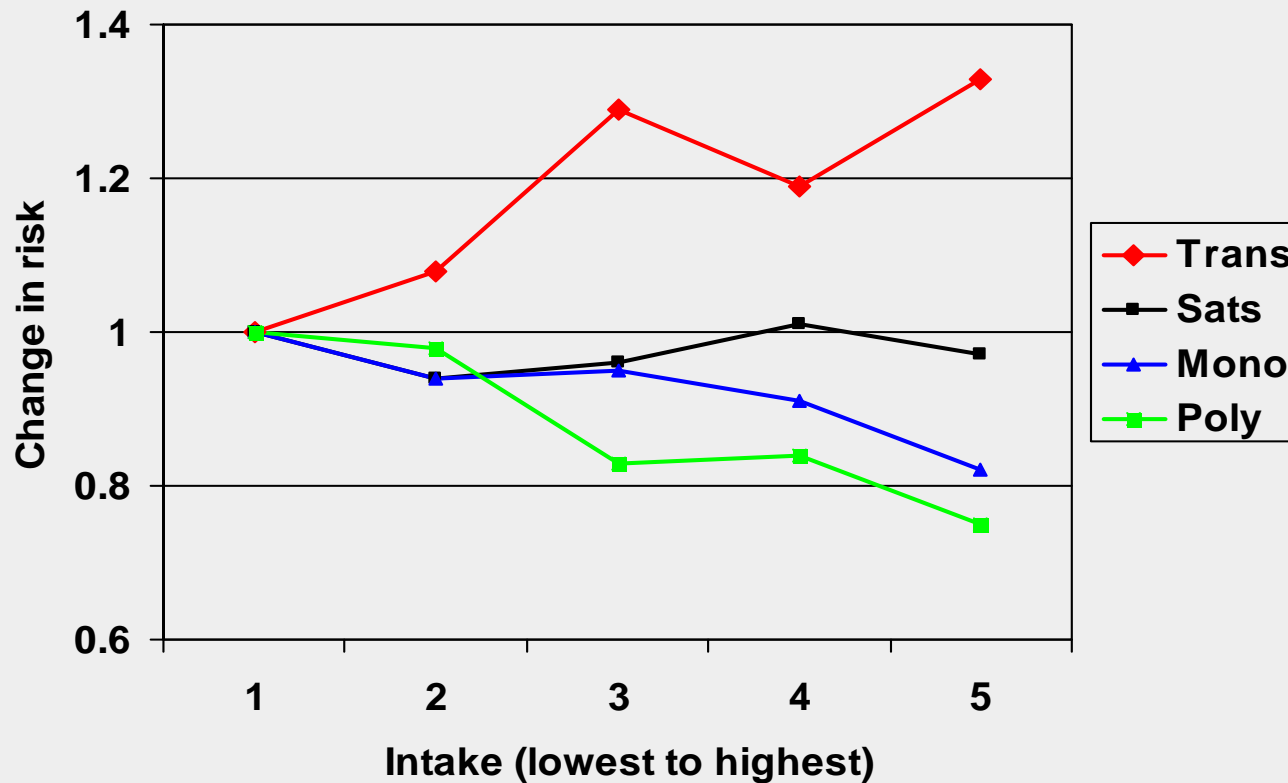


Results – relative risk of heart disease, with increasing intake of particular fats



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Results – relative risk of heart disease, with increasing intake of particular fats



The Wild Card - Trans Fat

- Intervention studies 1970's to 1990's
Objective: reduce saturated fat intake to lower total:HDL ratio
- Example: Am J Clin Nutr 1999;69:632–46
(20 studies combined)
- Resulted in a 10% reduction in total:HDL ratio
Conclusion: reduction in saturated fat reduces risk of CHD
- Problem: dietary trans fat was not measured, or taken into account Data not available in nutrition databases



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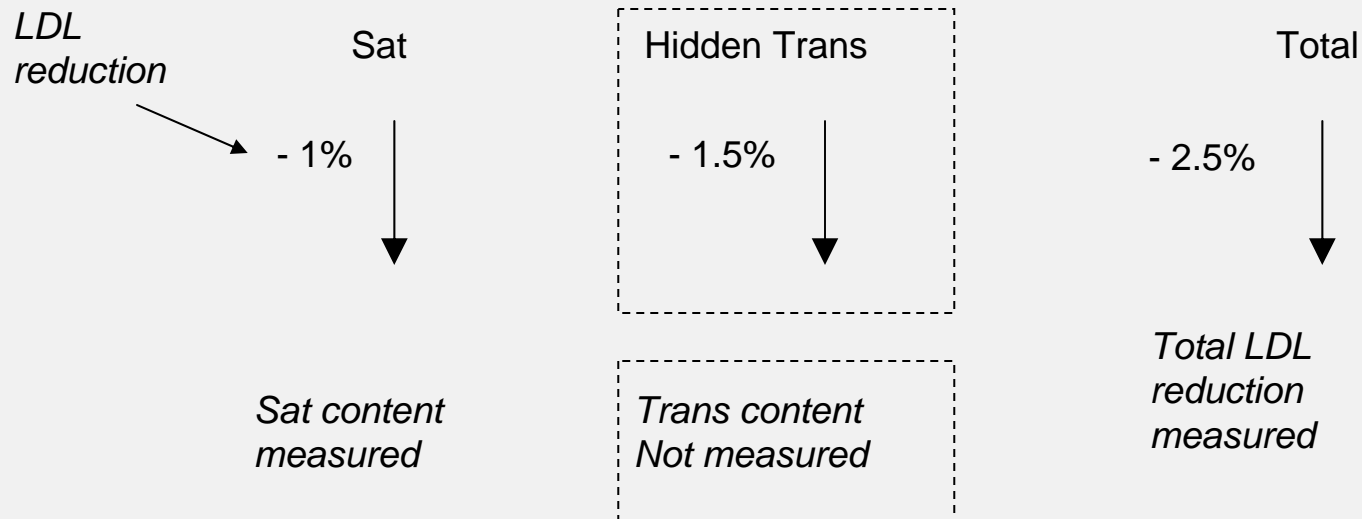


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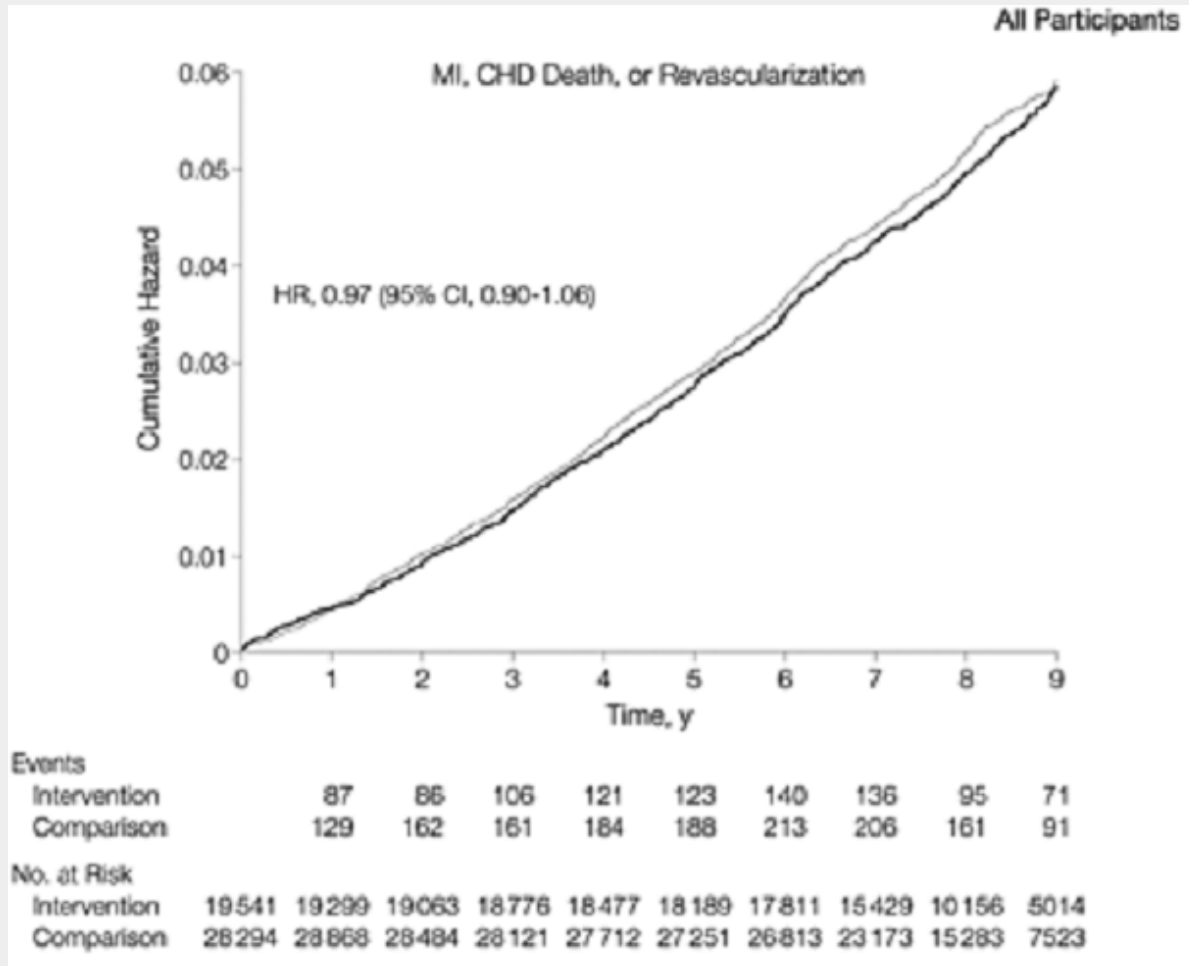
Intervention studies – Reducing Saturated fat

Reducing saturates *appears* to reduce total:LDL ratio in products that contain partially hydrogenated oils

1970's – 1990's: trans fat not measured



Women's Health Initiative



BV Howard et al, JAMA 295: 655-666, 2006



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The Dietary Saturated Fat Hypothesis - Fact or Fiction?

- Take HDL into account – Saturates are OK

More Fiction than Fact

- The trans fat wild card – “lost generation” of dietary research
- The last 20 years of modern research - “saturates don’t really do anything”



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