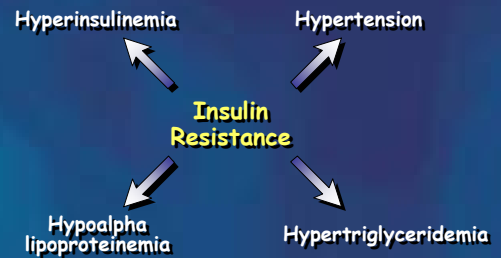


Dairy Products, the Metabolic Syndrome and Cardiovascular Disease Lessons from Canada

Benoît Lamarche, PhD, FAHA

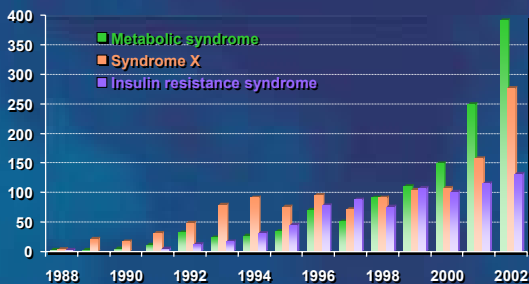
Institute on Nutraceuticals and Functional Foods, Laval University, Québec, Canada

Syndrome X *The Banting Lecture*



Reaven, Diabetes 1988

Syndrome X is fashionable?



Syndrome X

14 years after Reaven...

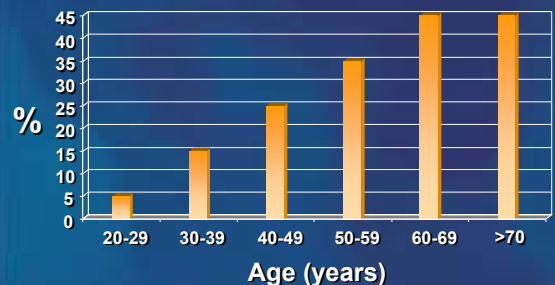
- Insulin resistance
- Hyperinsulinemia
- Hypertriglyceridemia
- Reduced HDL cholesterol
- Small, dense LDL
- Hyperapo B
- Hypertension
- Impaired fibrinolytic activity
- Inflammation

Clinical identification of the metabolic syndrome ATPIII

- **Waist circumference**
 - Men > 102 cm (40 in)
 - Women > 88 cm (35 in)
- **TG**
 - ≥ 150 mg/dl (1.7 mmol/l)
- **HDL-C**
 - Men < 40 mg/dl (1.0 mmol/l)
 - Women < 50 mg/dl (1.3 mmol/l)
- **Blood pressure**
 - ≥ 130/ ≥ 85 mm Hg
- **Fasting glucose**
 - ≥ 110 mg/dl

JAMA 2001;285:2486-97

Metabolic Syndrome: Prevalence in US Adults NHANES III



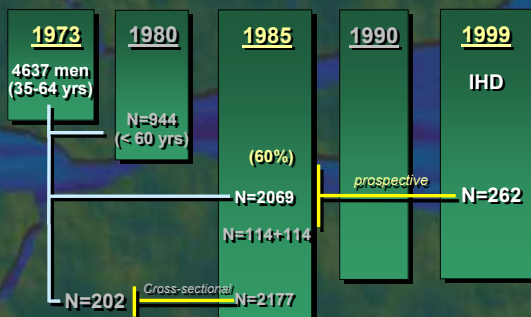
Ford et al JAMA 2002;287:356

The metabolic syndrome and the risk of CVD

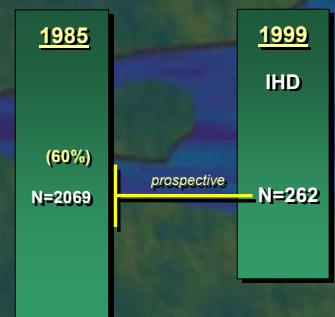
CVD/CHD	Definition	Prevalence	Risk
Onat, Atherosclerosis 2002	NCEP	27% men 38% women	RR=1.7
Isomaa, Diabetes Care 2001	WHO	15% men 10% women	RR=3.0
Lakka, JAMA 2002	NCEP/WHO	9%/15% men	RR=2.0-3.0
Ridker, Circulation 2003	NCEP	24% women	RR=3.0-5.0
Bonora, Diabetes Care 2003	NCEP/WHO	18%/34% Men + women	RR=2.0-3.0



The Québec Cardiovascular Study



The Québec Cardiovascular Study



Baseline characteristics of incident IHD cases and IHD-free men

Variables	IHD-free men N=1748	IHD-cases N=219	% Diff	P
Age (years)	56.1 ± 6.8	58.8 ± 7.4	4.9%	<0.001
Body mass index, kg/m ²	26.0 ± 3.6	26.6 ± 4.2	2.2%	0.06
Systolic blood pressure, mmHg	129 ± 17	139 ± 19	7.2%	<0.001
Type 2 diabetes mellitus, %	4.5%	10.1%	5.6	<0.001
Smokers, %	21.8%	30.4%	8.6%	0.006
Total cholesterol, mmol/L	5.7 ± 1.0	6.0 ± 1.0	5.1%	<0.001
LDL cholesterol, mmol/L	3.9 ± 0.9	4.1 ± 0.9	6.5%	<0.001
Triglycerides, mmol/l	1.84 ± 1.22	2.01 ± 1.20	8.9%	0.06
HDL cholesterol, mmol/L	1.04 ± 0.26	1.00 ± 0.25	-3.5%	<0.001
Cholesterol/HDL cholesterol	5.8 ± 1.8	6.4 ± 2.1	9.7%	0.002
LDL % _{<255A} , %	39.8 ± 20.5	43.7 ± 19.5	9.8%	0.01
C-reactive protein, mg/L*	3.4 ± 6.5	4.3 ± 7.0	23.5%	0.003
Interleukin-6, mg/L*	1.27 ± 1.23	1.61 ± 1.85	26.4%	<0.001
% MS	21.7%	34.3%	12.6%	<0.001

*Reported as geometric means

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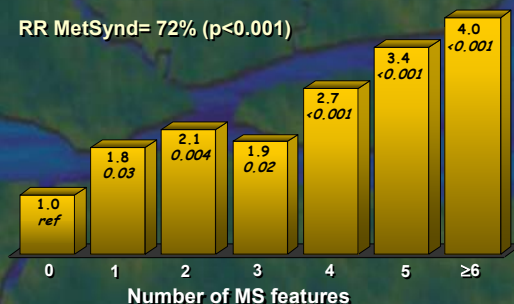
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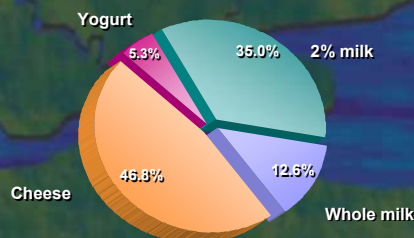
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13-Year relative risk of IHD according to number of MS features

RR MetSynd= 72% (p<0.001)



Dairy consumption in 1985



Baseline characteristics of milk vs no milk

Variables	<1.2 (N=988)	>1.2 N=979	% Diff	P
Dairy products/day	0.6 ± 0.4	2.4 ± 1.2	294.3%	<0.001
Age (years)	56.3 ± 7.0	56.5 ± 7.0	0.4%	0.47
Body mass index, kg/m ²	26.0 ± 3.8	26.2 ± 3.6	0.0	0.30
Systolic blood pressure, mmHg	131.5 ± 17.9	129.4 ± 16.4	-1.6%	0.007
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Smokers, %	26.1%	19.3%	-6.8%	<0.001
LDL cholesterol, mmol/L	3.9 ± 0.9	3.8 ± 0.9	-2.2%	<0.04
Apolipoprotein B, mg/dl	119 ± 32	116 ± 30	-2.3%	0.05
Triglycerides, mmol/l	1.89 ± 1.29	1.83 ± 1.15	-3.3%	0.26
HDL cholesterol, mmol/L	1.04 ± 0.27	1.02 ± 0.26	-1.8%	0.12
LDL % _{<255A} , %	40.4 ± 20.9	39.9 ± 20.1	-1.2%	0.59
Insulin, pmol/l	74.2 ± 39.4	74.9 ± 39.5	1.0%	0.69
C-reactive protein, mg/L*	3.6 ± 6.9	3.4 ± 6.2	-6.1%	0.46
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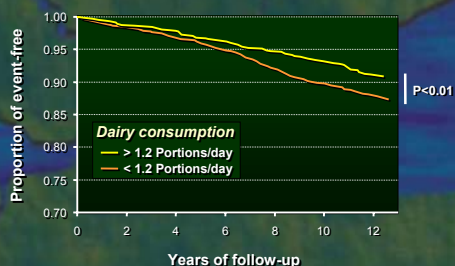
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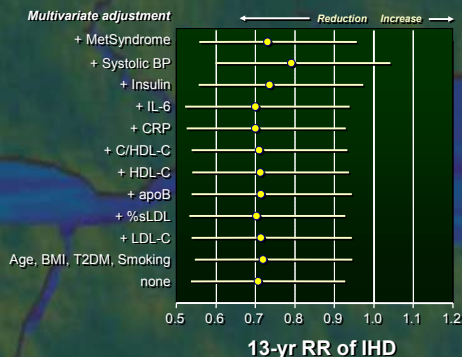
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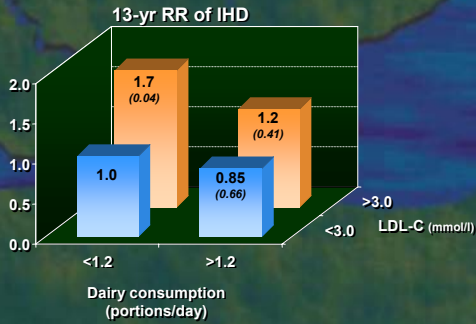
13-yr survival analysis according to dairy product consumption



Dairy consumption (above vs. below 1.2 portions/day) and 13-yr relative risk of IHD

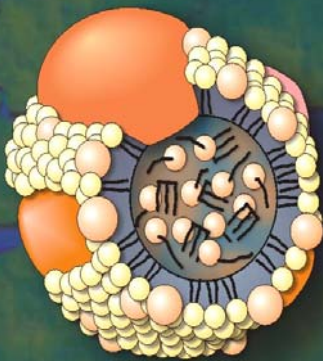


Dairy consumption, LDL-C levels and IHD risk

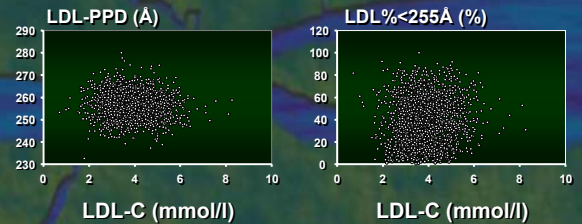


Syndrome X 14 years after Reaven...

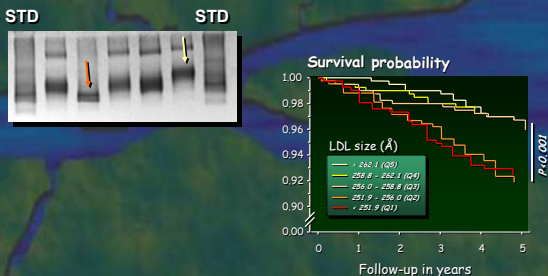
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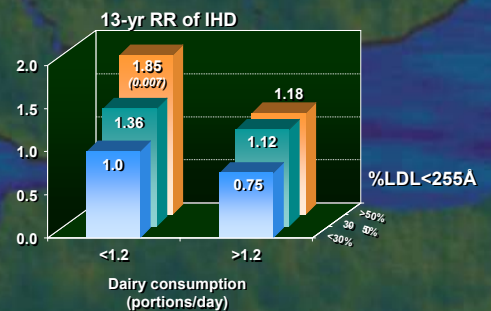
(No) Correlation between LDL size phenotype and LDL-C levels



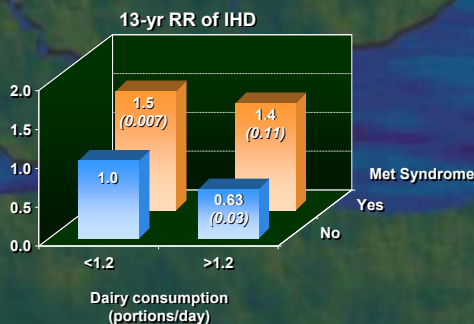
LDL size characterization on PAGGE (2-16%)



Dairy consumption, small dense LDL and IHD risk



Dairy consumption, the metabolic syndrome and IHD risk



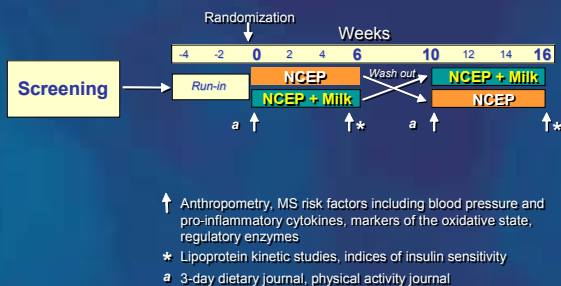
Summary

- These data provide support to the concept that milk and dairy products may in fact have cardioprotective properties.
- Dairy product consumption (>1.2 portions/day) is associated with a ~30% reduction in the 13-yr CHD risk in men.
- The "cardioprotection" associated with dairy product consumption appears to be independent of features of the metabolic syndrome and of LDL-C levels, but not of blood pressure.
- Increased consumption of dairy products appears to attenuate the risk associated with the metabolic syndrome and high LDL-C levels.

Conclusions

- Nutritionists and we as scientists should reconsider promoting the incorporation of milk and dairy products as part of a balanced diet for a better cardiovascular health.

Milk and the metabolic syndrome A clinical study



Acknowledgements

Dr Jean-Pierre Després
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Canada Research Chair in Nutrition and Cardiovascular Health



