
International Task Force for Prevention Of Coronary Heart Disease



Coronary heart disease and stroke: Risk factors and global risk

Slide Kit 4

PROCAM
(**P**rospective **C**ardiovascular **M**ünster Heart Study)

Determinants of mortality

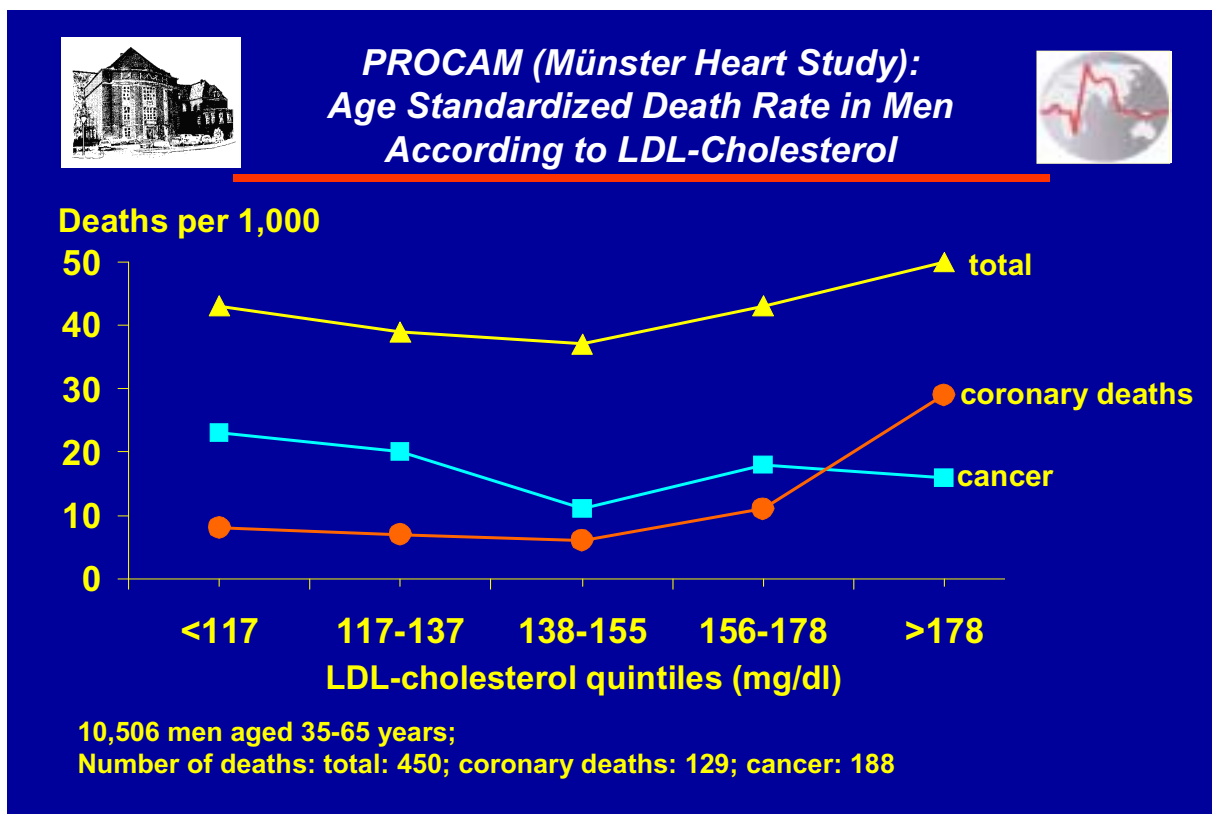
Determinants of mortality in the PROCAM Study,
data were derived in 10,856 men aged 35 to 64 years.
Mean follow-up period 8.1 years, Range 5 to 18 years.
Cullen P, Schulte H, Assmann G. Circulation 1997; 96:2128-2136.

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Slide 1:

PROCAM (Münster Heart Study): Age standardized death rate in men according to LDL cholesterol

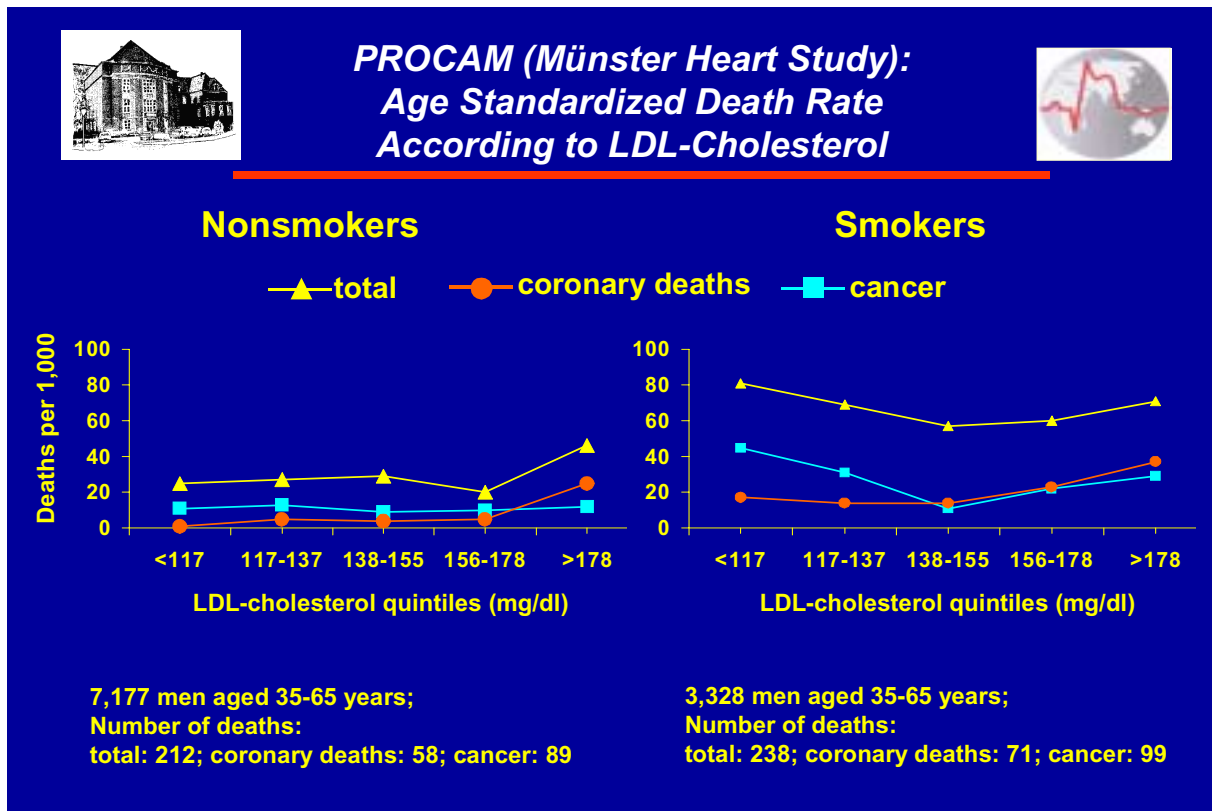


Age standardized death rate in men according to LDL cholesterol

This slide shows the mortality rate expressed in death per 1000 over 10 years of follow-up among 10,506 men aged 35-65 years in the PROCAM study. As can be seen, the overall mortality shows a J-shaped relationship with the LDL cholesterol level. The excess mortality at lower cholesterol levels is due to an increase in the incidence of cancer (see also *Circulation* 1997; 96:2128-2136). At higher levels of LDL cholesterol the excess mortality was explained by an increase in incidence of coronary heart disease..

Slide 2:

**PROCAM (Münster Heart Study):
 Age standardized death rate in smokers and non-smokers according to
 LDL cholesterol**

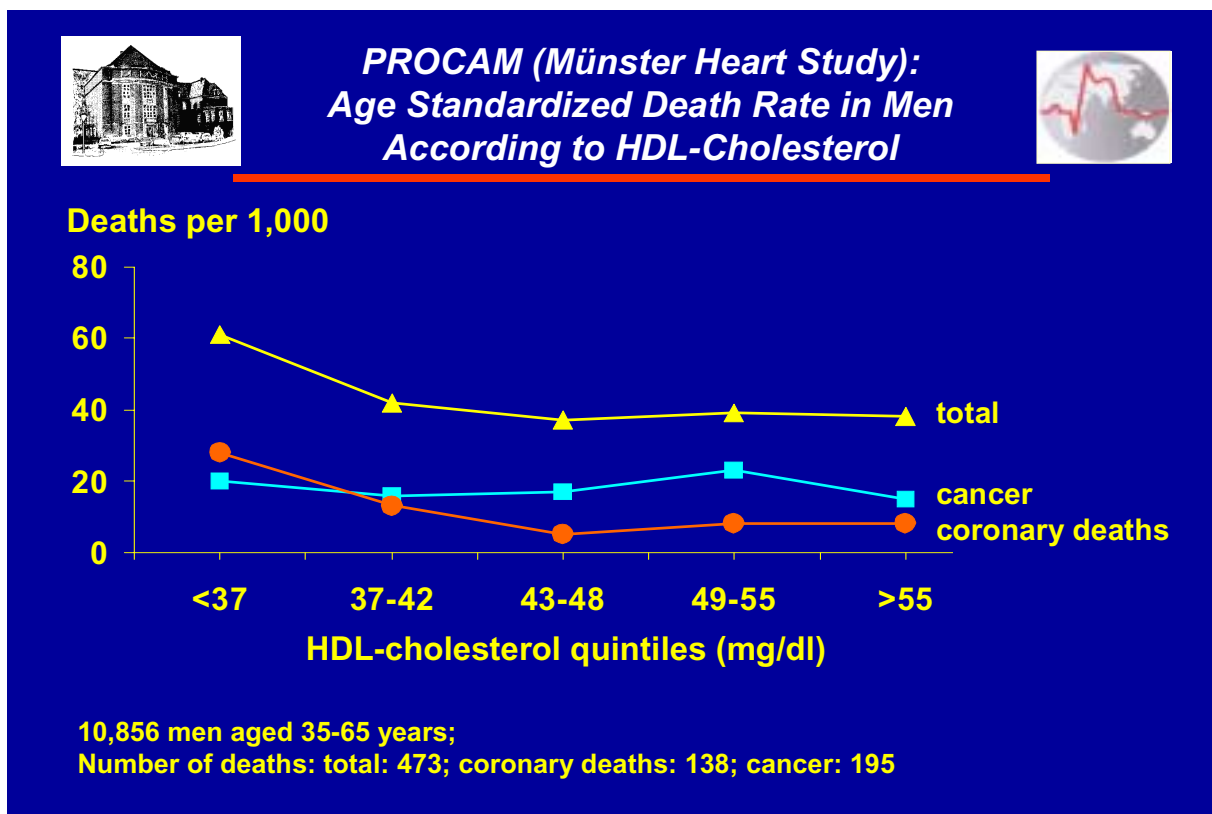


**Age standardized death rate in smokers and non-smokers according to
 LDL cholesterol**

The right side of this slide shows the age standardized death rate in smokers according to LDL cholesterol, the left side of the slide shows the age standardized death rate in non-smokers according to LDL cholesterol. As can be seen, the U-shaped relationship between LDL cholesterol and total mortality was evident only in smokers. As shown in the overall group (slide 1), the increase in mortality at lower LDL cholesterol levels was explained entirely by an increase in cancer. Many of these cancers were smoking-related (Circulation 1997; 96:2128-2136). In non-smokers, there is no excess mortality at lower cholesterol levels. In both, smokers and non-smokers, the increased mortality at higher LDL cholesterol levels is due to an increase in coronary heart disease.

Slide 3:

PROCAM (Münster Heart Study): Age standardized death rate in men according to HDL cholesterol

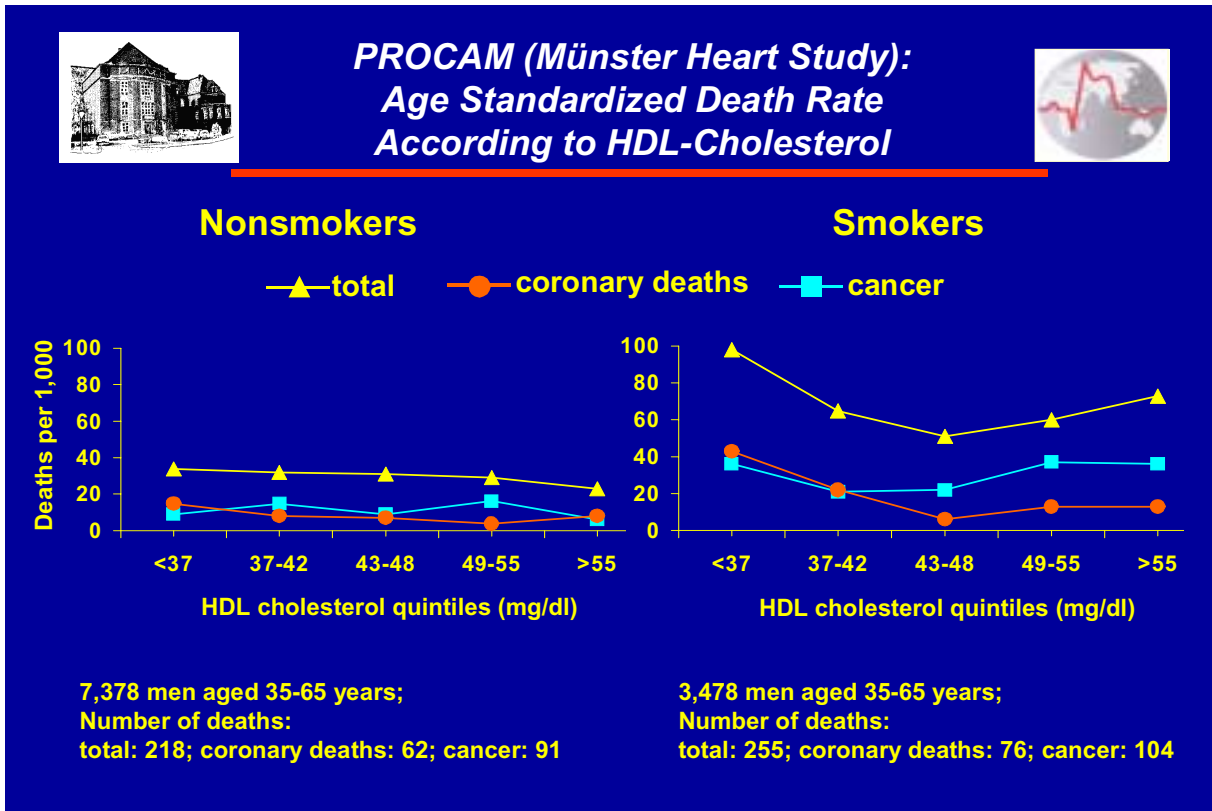


Age standardized death rate in men according to HDL cholesterol

This slide shows the age standardized death rate of all 10,856 men aged 35-65 years in the PROCAM Study. In the overall group, there is an increase in total mortality at low HDL cholesterol levels which is explained entirely by increase in coronary death.

Slide 4:

**PROCAM (Münster Heart Study):
 Age standardized death rate in smokers and non-smokers according to
 HDL cholesterol**

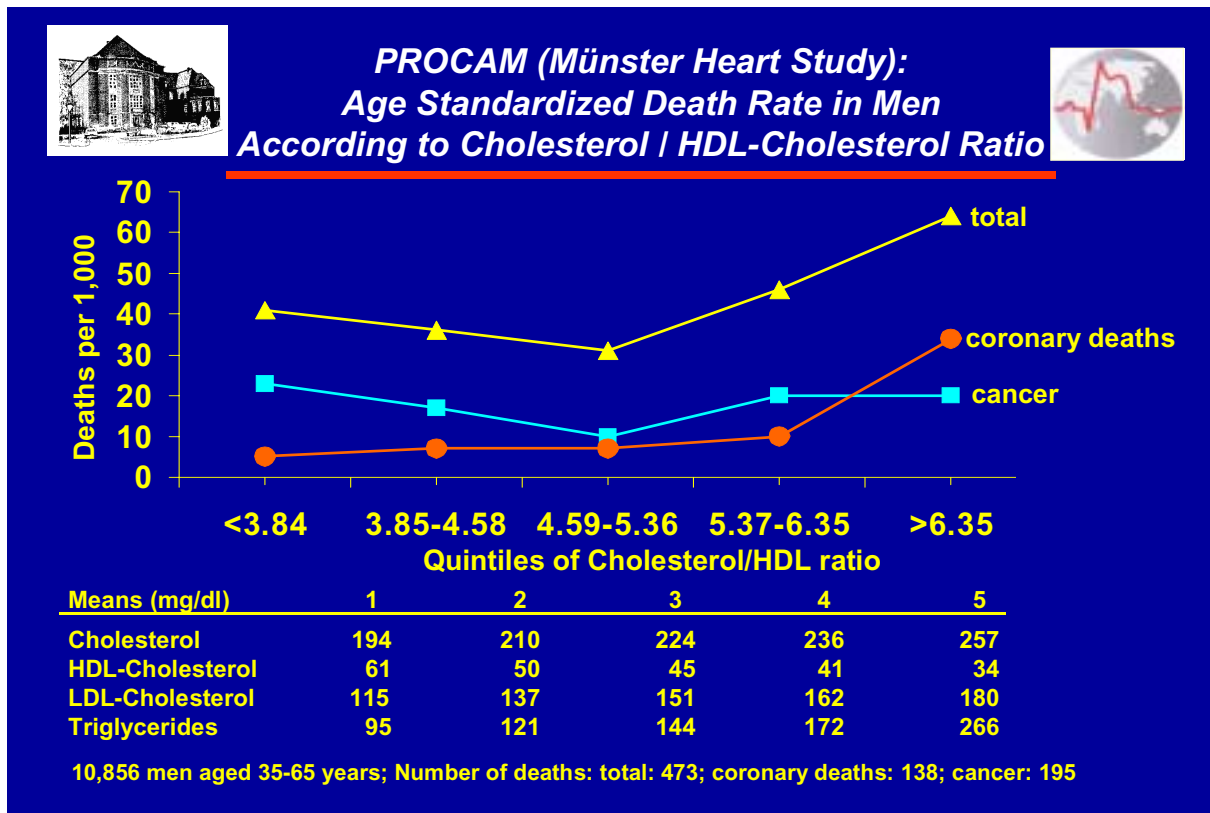


Age standardized death rate in smokers and non-smokers according to HDL cholesterol

When the cohort of men is divided into smokers and non-smokers, it is clear that there is no significant change in mortality with HDL cholesterol levels in non-smokers. In smokers, however, there was a U-shaped relationship between HDL cholesterol level and total mortality. This was explained at the lower levels of HDL cholesterol principally by an increase in coronary heart disease..

Slide 5:

**PROCAM (Münster Heart Study):
 Age standardized death rate in men according to cholesterol /
 HDL cholesterol ratio**

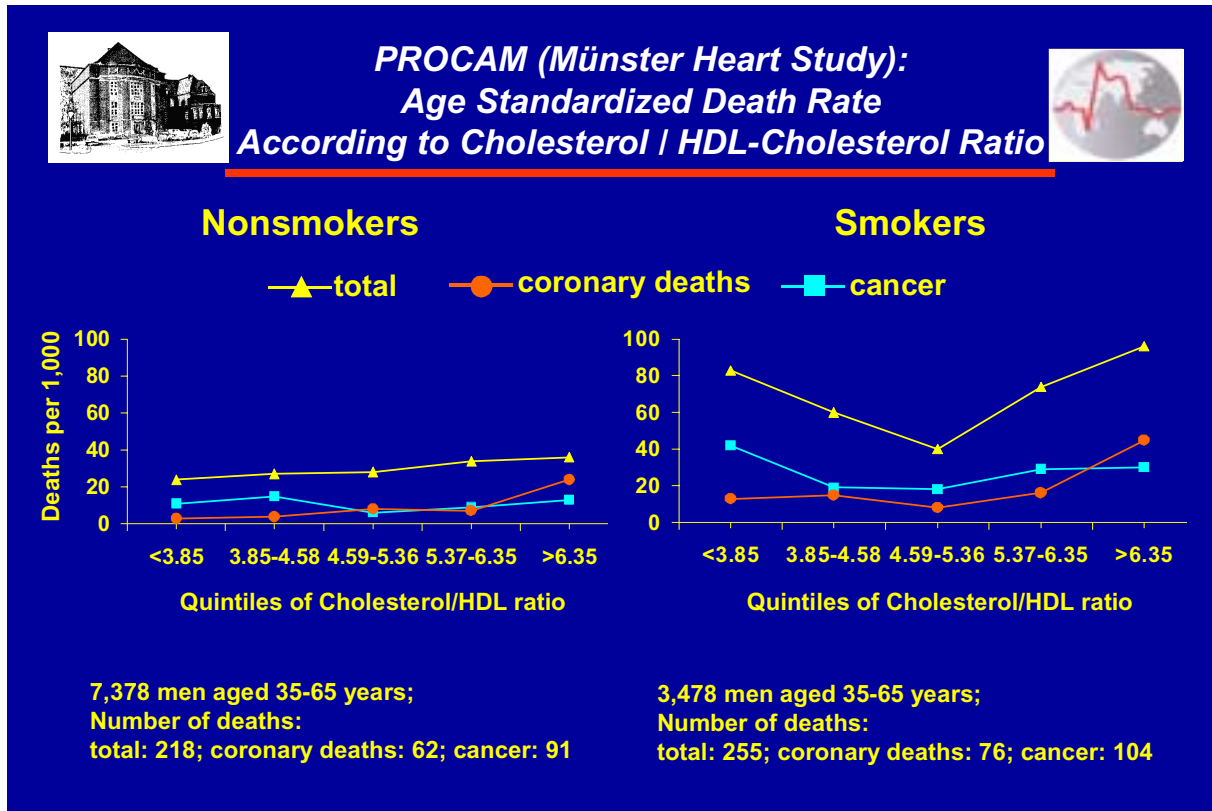


**Age standardized death rate in men according to cholesterol /
 HDL cholesterol ratio**

This slide shows that there was a J-shaped relationship between mortality and the ratio of total to HDL-cholesterol. This is explained at lower cholesterol to HDL-cholesterol ratios by an increase in the cancer mortality and the higher total cholesterol to HDL cholesterol ratio by an increase in coronary heart disease mortality. It is interesting to note that low levels of the total / HDL cholesterol ratio, related to low LDL-cholesterol and high HDL-cholesterol levels, may indicate an increased risk of total mortality due to cancer. Thus, the combination of low LDL-cholesterol and high HDL-cholesterol levels may not be prognostically favorable in every case!

Slide 6:

PROCAM (Münster Heart Study):
Age standardized death rate in smokers and non-smokers according to total cholesterol / HDL cholesterol ratio



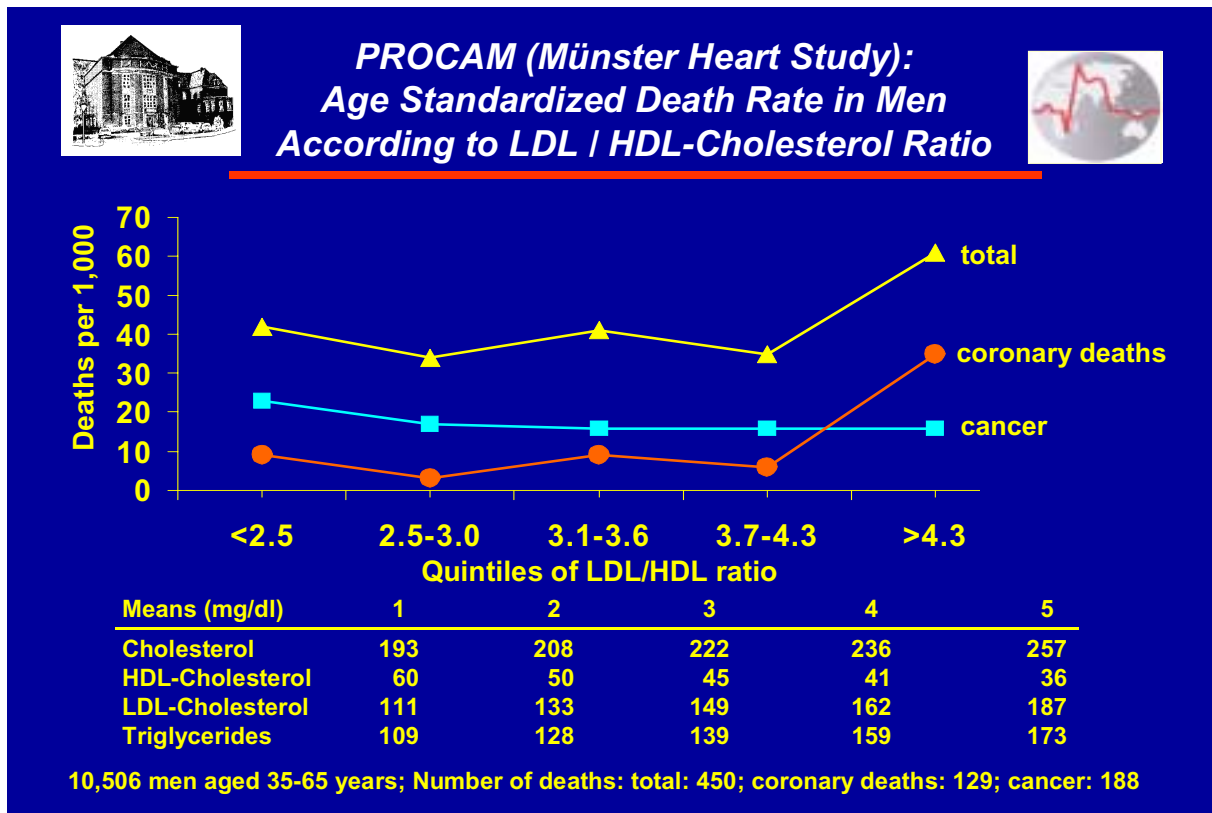
Age standardized death rate in smokers and non-smokers according to total cholesterol / HDL cholesterol ratio

This slide shows the death rate according to the total to HDL cholesterol ratio in non-smokers on the left and in smokers on the right. In non-smokers total mortality, CHD mortality and cancer mortality showed no relationship to the cholesterol / HDL cholesterol ratio. In smokers (right side of slide), however, there is a dramatic U-shaped relationship between total mortality and the total cholesterol / HDL cholesterol ratio. At low total / HDL cholesterol ratios, this increase in mortality is explained entirely by an increase in cancer death. At high total cholesterol / HDL cholesterol ratios the increase in mortality is essentially explained by an increase in coronary death.

Slide 7:

PROCAM (Münster Heart Study):

Age standardized death rate in men according to LDL / HDL cholesterol ratio

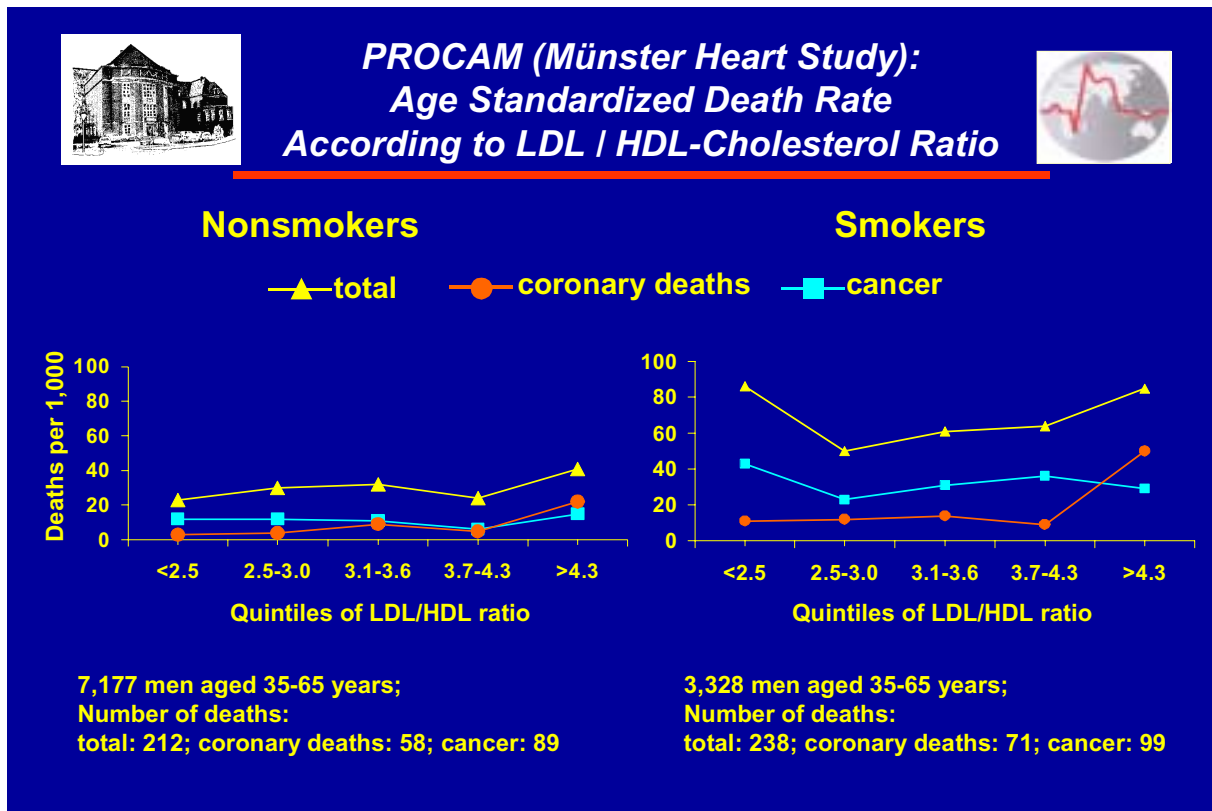


Age standardized death rate in men according to LDL / HDL cholesterol ratio

This slide shows the overall mortality according to the LDL / HDL cholesterol. In this overall group, the most significant feature is an increase in total mortality at high levels of LDL / HDL cholesterol. This is entirely explained by the increase in coronary death.

Slide 8:

**PROCAM (Münster Heart Study):
 Age standardized death rate according to LDL / HDL cholesterol ratio in
 smokers and non-smokers**

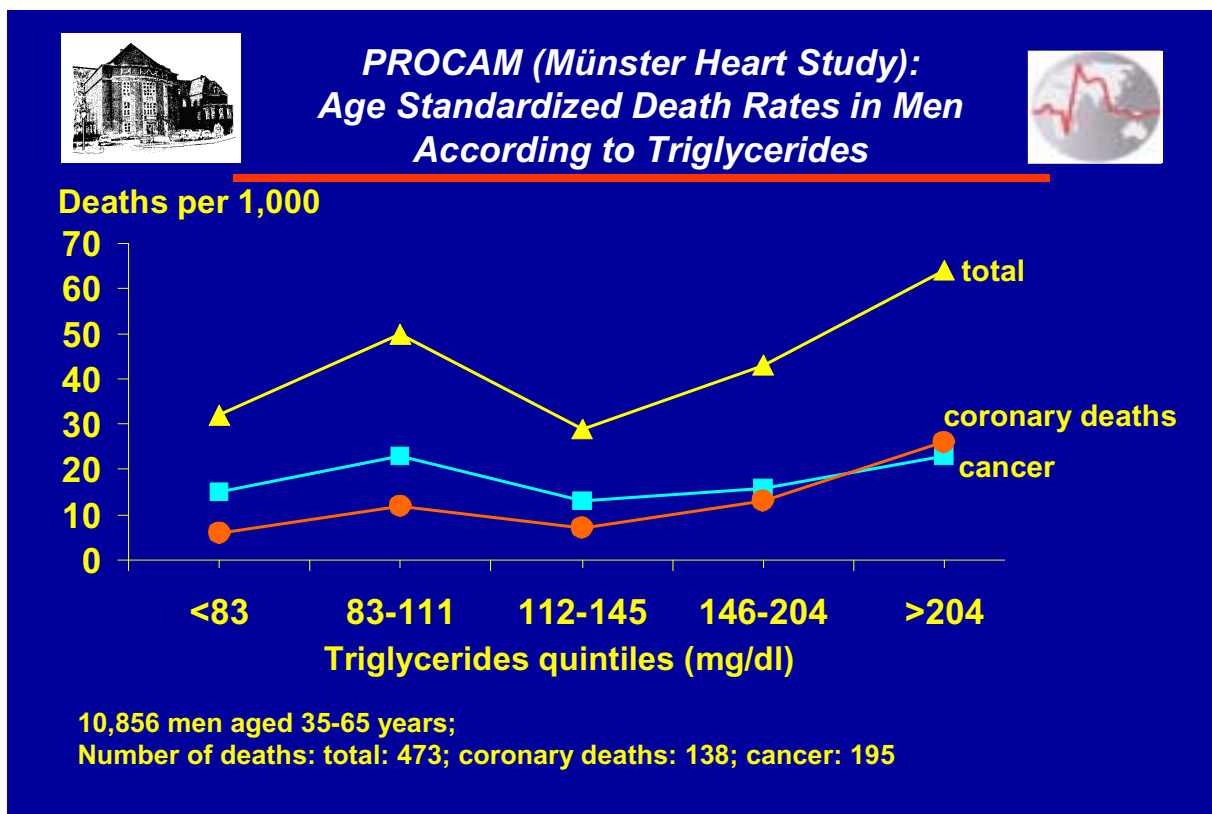


**Age standardized death rate according to LDL / HDL cholesterol ratio in
 smokers and non-smokers**

This slide shows the age standardized death rate in middle aged men in the PROCAM study divided into non-smokers and smokers. On the left side of the slide the mortality data for non-smokers is presented. In non-smokers, there is a slight increase in total mortality at high ratios of LDL / HDL. This is explained mainly by an increase in CHD mortality. In smokers, however, there is a clear U-shaped relationship between the LDL / HDL cholesterol ratio and overall mortality. At low LDL / HDL ratios this is explained by an increase in cancer and at high LDL / HDL ratios by an increase in coronary death.

Slide 9:

PROCAM (Münster Heart Study): Age standardized death rate in men according to triglycerides

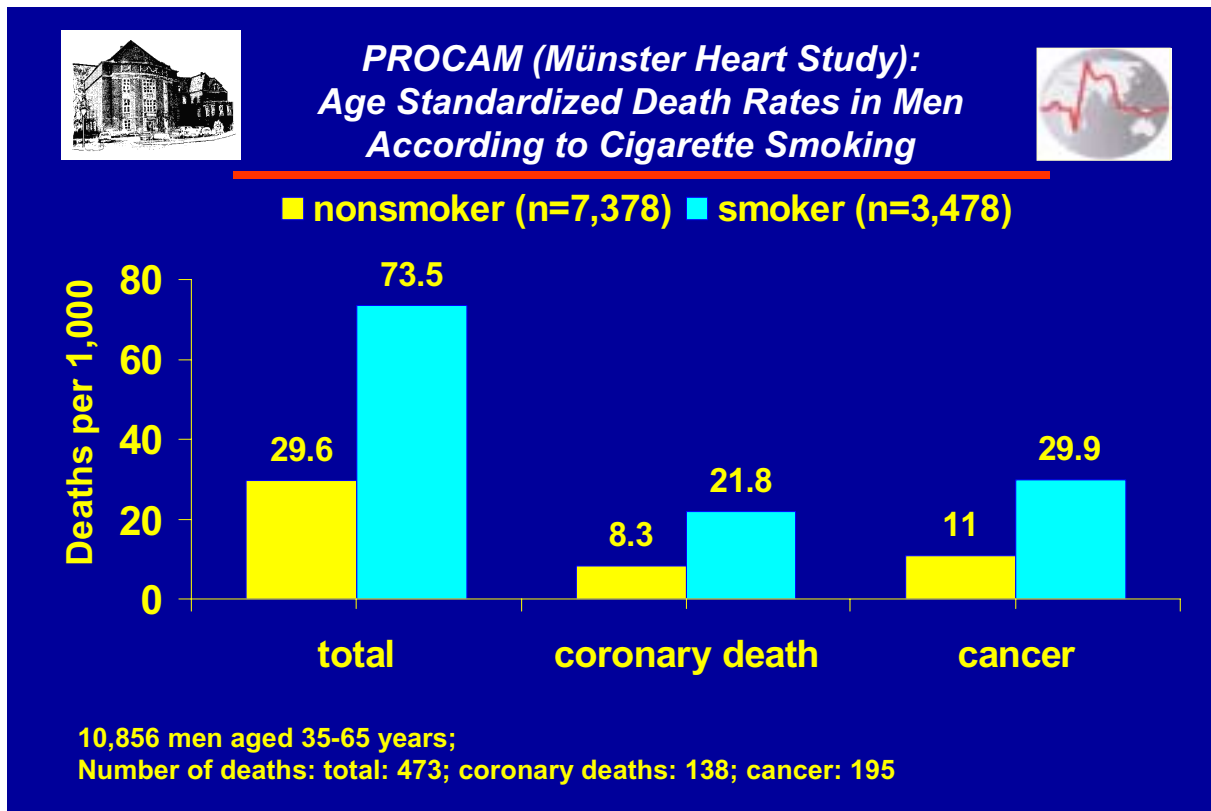


Age standardized death rate in men according to triglycerides

This slide shows the total mortality, coronary mortality, and cancer mortality according to triglyceride levels in middle aged men in the PROCAM Heart Study. Total mortality increased approx. 2-fold from 20 per 1000 to 40 per 1000 across the triglyceride range from 83-204 mg/dl. This increase in total mortality was largely explained by a triglyceride related increase in coronary death. Cancer mortality by contrast showed no relationship to triglyceride levels.

Slide 10:

PROCAM (Münster Heart Study): Age standardized death rate in men according to Cigarette Smoking

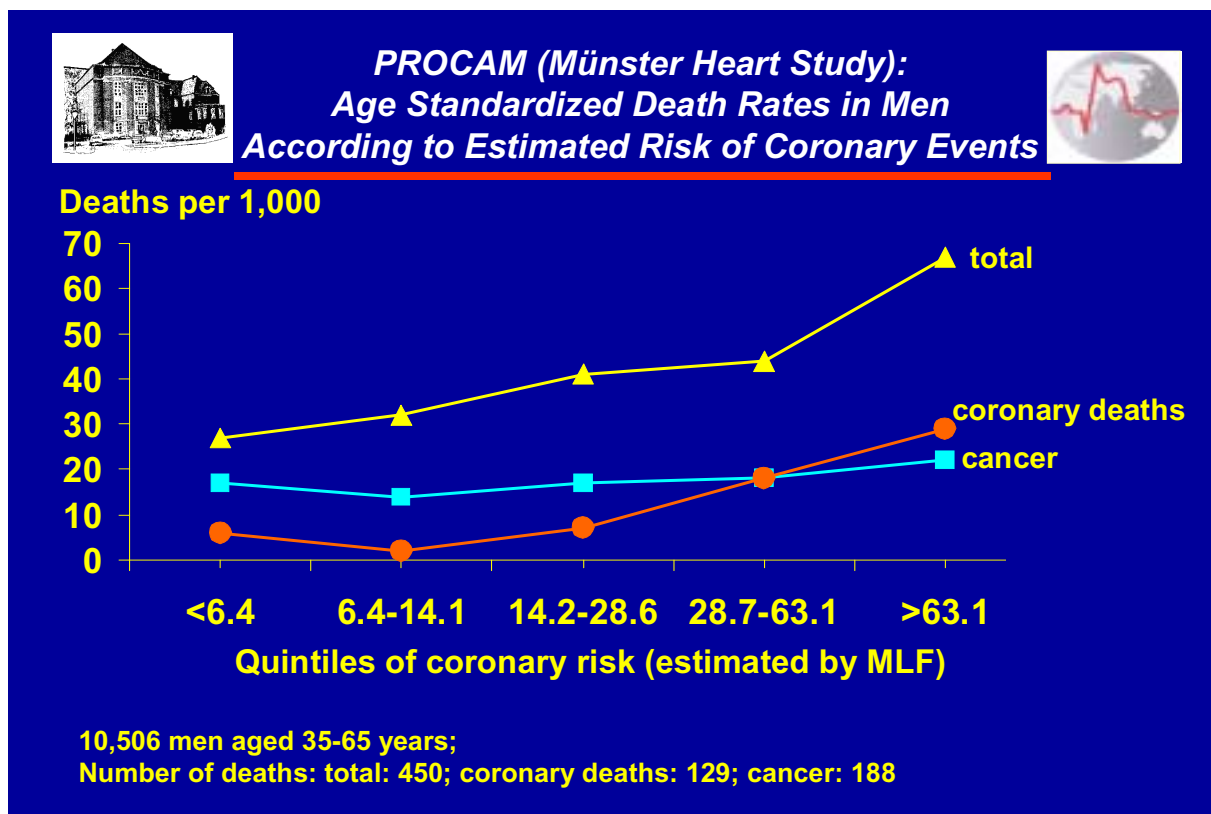


Age standardized death rate in men according to Cigarette Smoking

The ill-effects of smoking cannot be over-emphasized. This is clear from this slide which shows that the total mortality among middle age men who smoked in PROCAM was 2 ½ times that of men who did not smoke. This increase was explained largely by an almost 3-fold increase in coronary death and a 2-fold increase in death from cancer.

Slide 11:

**PROCAM (Münster Heart Study):
Age standardized death rates in men according to quintiles of the
PROCAM algorithm**



**Age standardized death rates in men according to quintiles of the
PROCAM algorithm**

This slide shows the total mortality, coronary mortality, and cancer-related mortality among middle aged men in the PROCAM Study according to quintiles of the PROCAM algorithm. Total mortality increased with increasing quintiles of the PROCAM algorithm in particular between the 4th and 5th quintile. This increase was explained almost entirely by a parallel increase in coronary death rates. Note that cancer mortality bore no relationship to the PROCAM algorithm, indicating that the risk factors for coronary heart disease make little contribution to cancer.

