

Before we get into the analysis of the accident data collected last week, I draw your attention to an article in today's Vancouver Sun.

FROM PAGE A1

Test best for people in middle risk range: official

"It's sort of a political process in the sense that if well-respected doctors are receptive to it, then it will be accepted. In my opinion, it's definitely a test that would be useful in patients in the middle risk range," said Hill, an associate professor at the University of BC, and director of the atherosclerosis laboratory at the Providence Heart and Lung Institute.

A normal range of the enzyme has not yet been established for clinical purposes. In a group of 180 patients who had angiograms but no evidence of heart disease, levels ranged from 60 nanograms per millilitre (ng/ml) to 123, while in a group of 705 patients with coronary artery disease, ranges were 62 to 138 ng/ml.

More patients in the heart disease group also smoked, had diabetes, a family history of heart disease, higher waist measurements and body mass index and worse cholesterol levels.

Hill said the acceptable or normal range of the enzyme would likely depend on age but generally speaking, a level over 120 ng/ml appears to put individuals at a higher risk of death.

The study was conducted by analysing frozen, stored blood samples from nearly 900 patients at St. Paul's and Vancouver General hospitals who had angiograms in the 1990s. The samples were checked for levels of the myeloperoxidase (MPO) enzyme.

Scientists John Hill, Dr. Jiri Frohlich and Claire Heslop then used the provincial vital statistics mortality database to determine deaths to the end of 2007. After about 13 years of followup, there were 257 deaths in the group of patients whose average age was 60. Of the 257 deaths, 117 were caused by cardiovascular disease.

In healthy people, the enzyme is useful for battling bacterial infections but in those with cholesterol-blocked blood vessels (also known as plaque lesions), it creates oxidative stress, damaging arterial tissues.

Risk of dying as predicted by MPO enzyme levels

Survival curves for cardiovascular mortality by myeloperoxidase (MPO) ranges.

Survival

100%

90%

80%

70%

60%

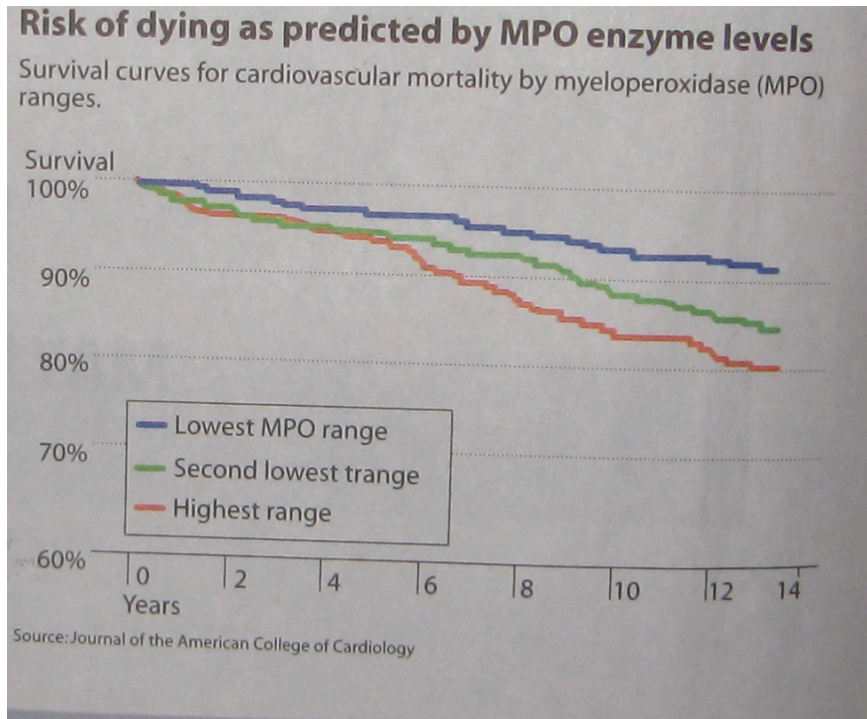
0 2 4 6 8 10 12 14

Years

— Lowest MPO range
— Second lowest range
— Highest range

Source: Journal of the American College of Cardiology

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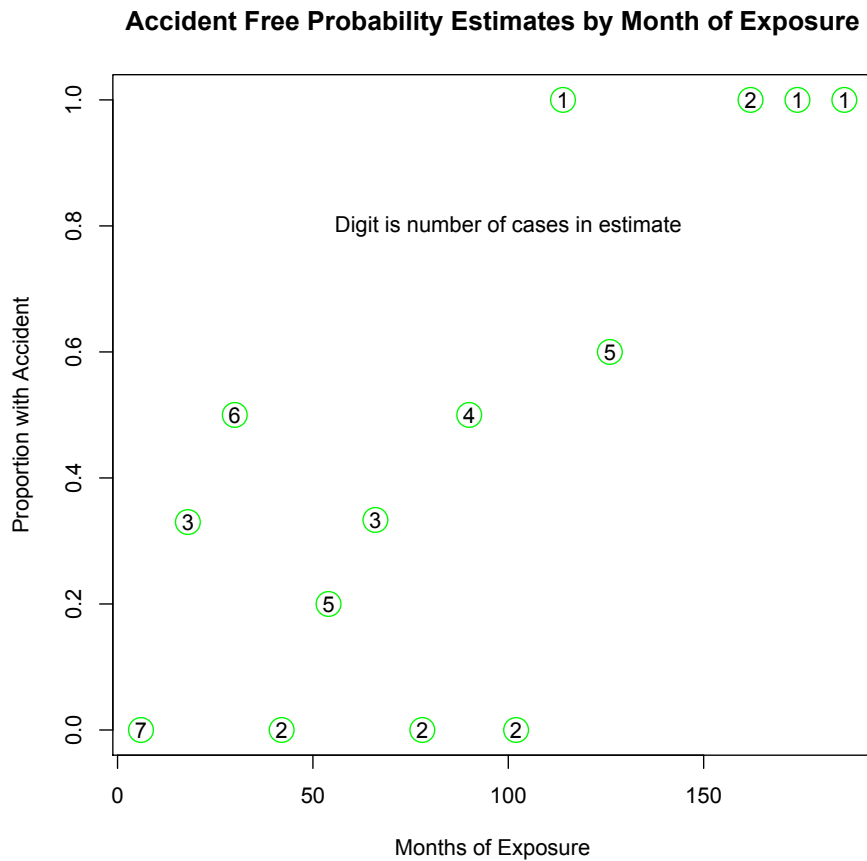
Do these approximately straight lines reflect a constant hazard per year? About 0.6%, 1.0% or 1.6% for the three survival curves?

Here is the result of the analysis of those little slips of paper. There were only 44 submissions – too bad so few were at this class. Nevertheless, the analysis worked out fairly well.

First, here is the data with the exposure grouped into 12 month periods.

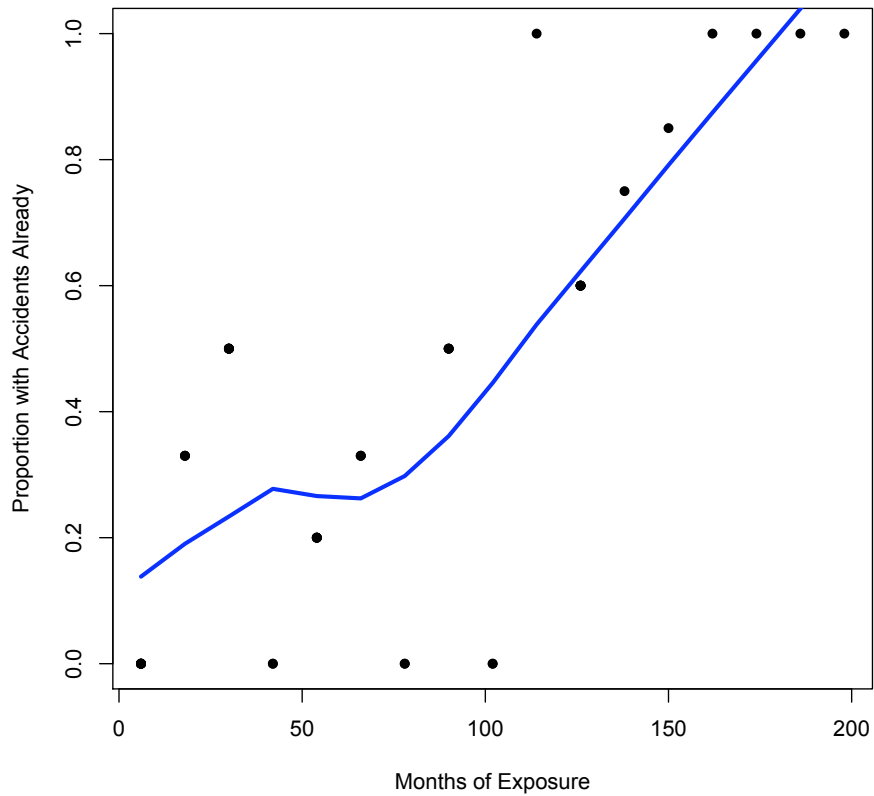
```
> exposure (months)
[1] 6 18 30 42 54 66 78 90 102 114
[11] 126 138 150 162 174 186
> count (number of students)
[1] 7 3 6 2 5 3 2 4 2 1 5 0 0 2 1 1
> accidents (number answering Yes)
[1] 0 1 3 0 1 1 0 2 0 1 3 0 0 2 1 1
> a.over.c (proportion with Yes)
[1] 0,.33,.5,0,.2,.33,0,.5,0,1,.6,NA,NA,1,1,1
```

The plot of this data is:



We can smooth the relationship taking account of the numbers in each estimate.

Smoothed Probability Estimates for Accidents



Note that a reasonable approximation would be to say that the probability increases from 0 to 1 over about 180 months, so the slope of the approximating line would be about $1/180 = 0.055$ or a bit more than $1/2$ of 1 percent.

In other words, the chance that any particular student will be involved in an accident next month is about 1 in 180 or a bit more than $1/2$ of 1 percent.