

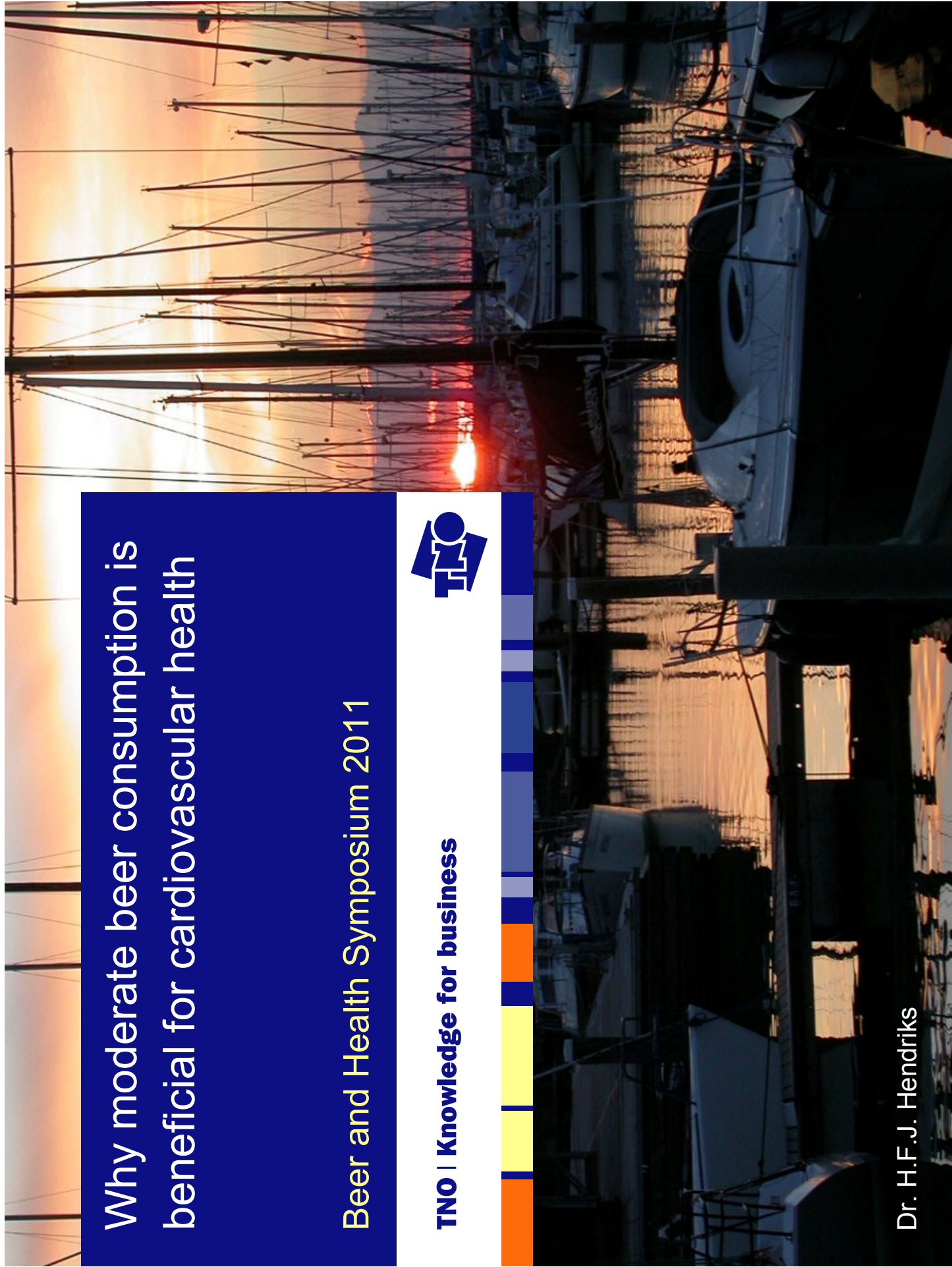
Why moderate beer consumption is  
beneficial for cardiovascular health

Beer and Health Symposium 2011



**TNO | Knowledge for business**

Dr. H.F.J. Hendriks



# Content

- Moderate beer (alcohol) consumption and health
- Coronary heart disease and other cardiovascular diseases
- Underlying mechanism
- Other life style factors
- Conclusion



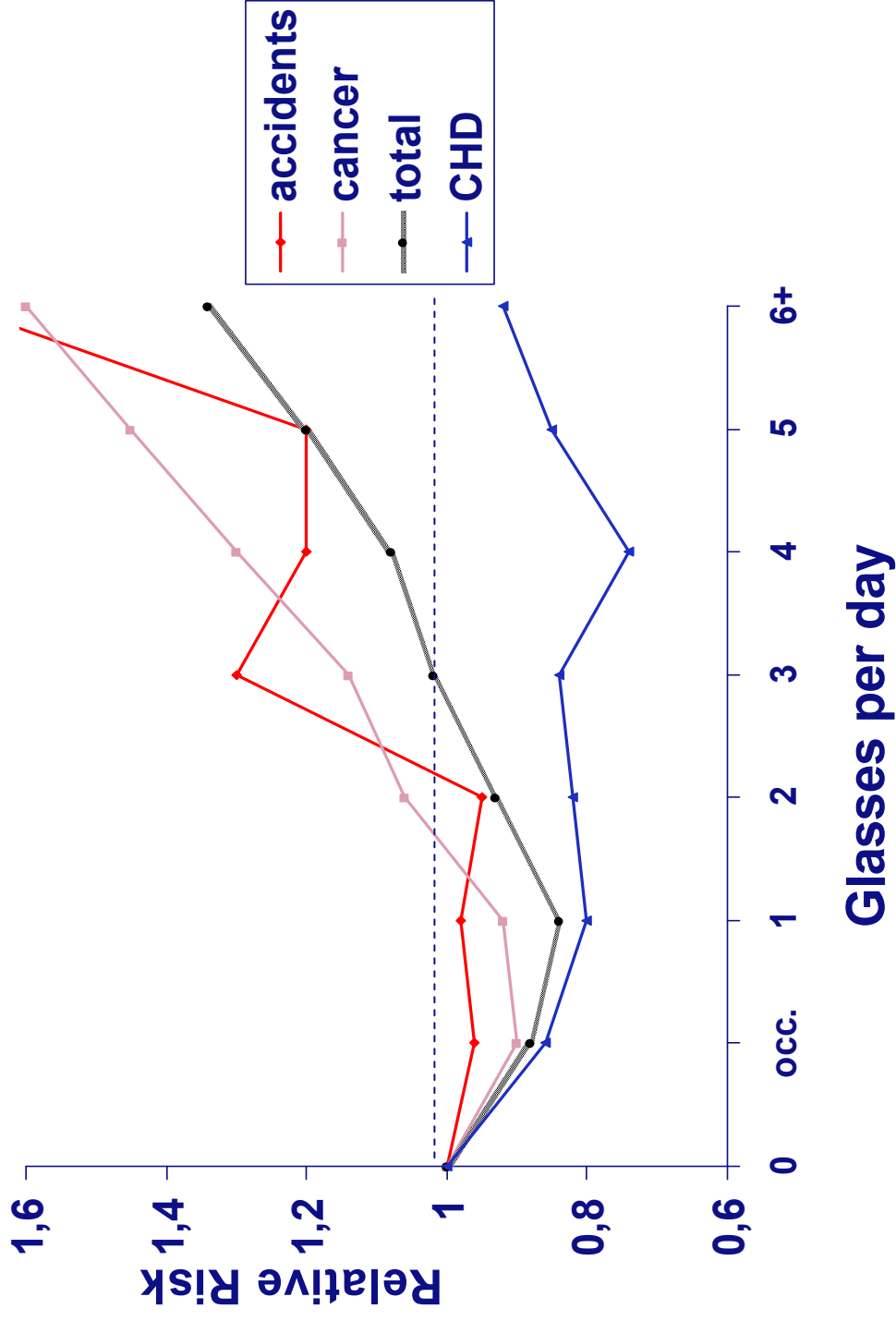


# Oktoberfesten München have started



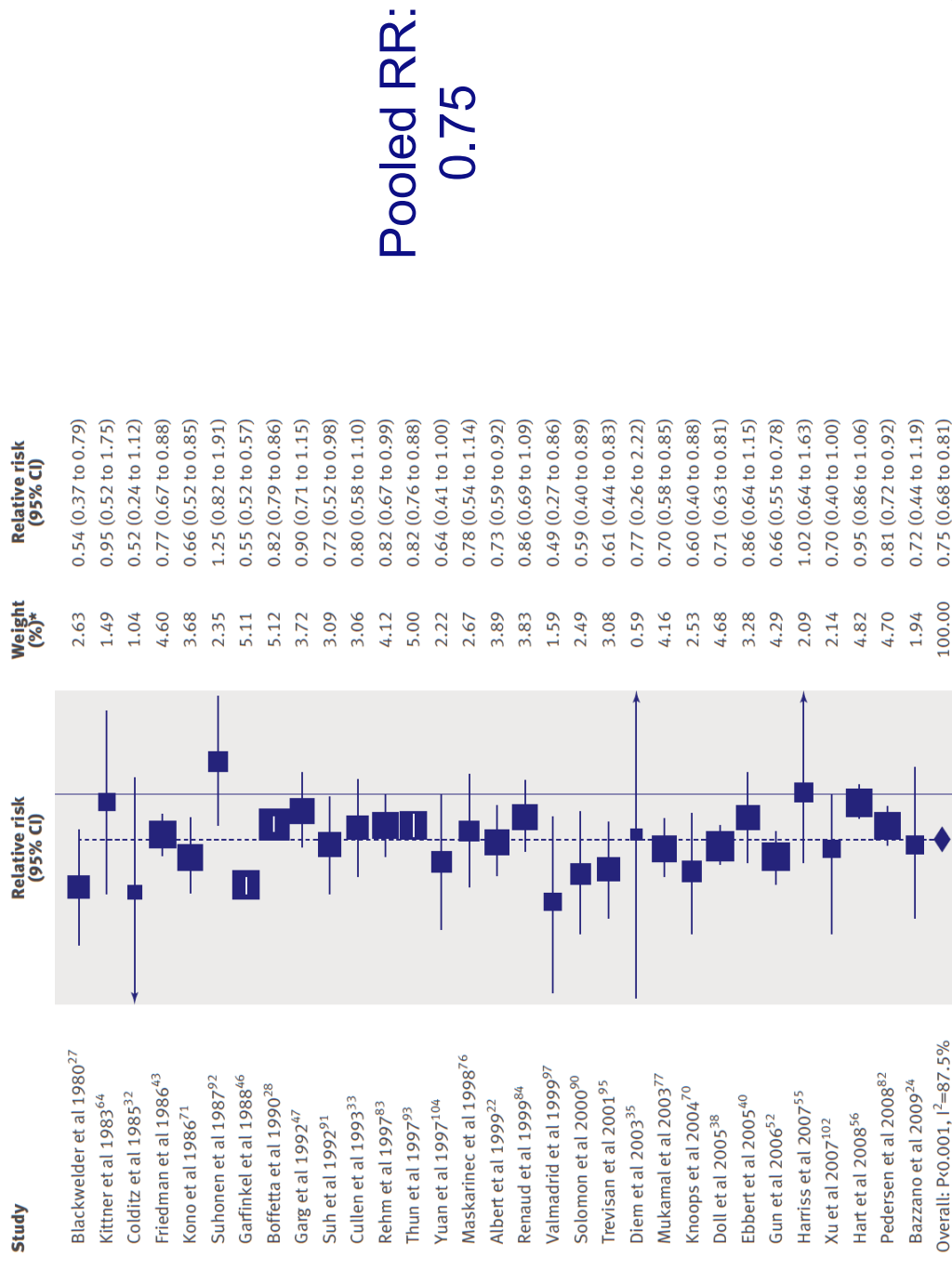
# Moderate alcohol consumption and health

after Bofetta and Garfinkel (1990) Epidemiology 1:342-348



# Forest plot of mortality from CORONARY HEART DISEASE associated with alcohol consumption

Ronksley PE et al, BMJ (2011) 342:d671

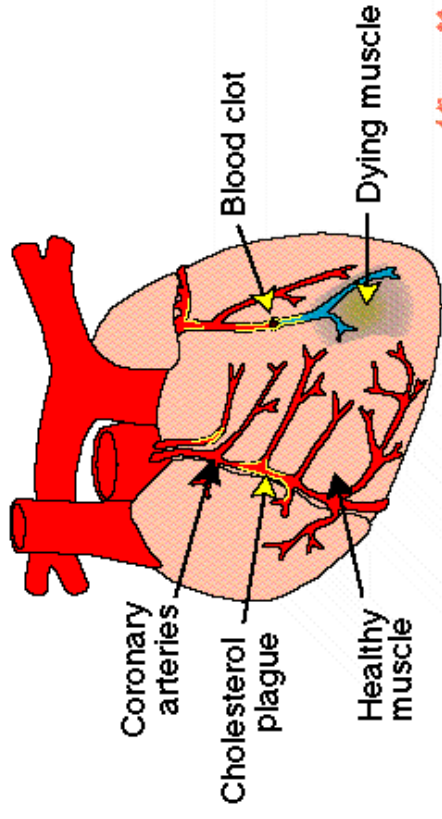


Pooled RR:  
0.75



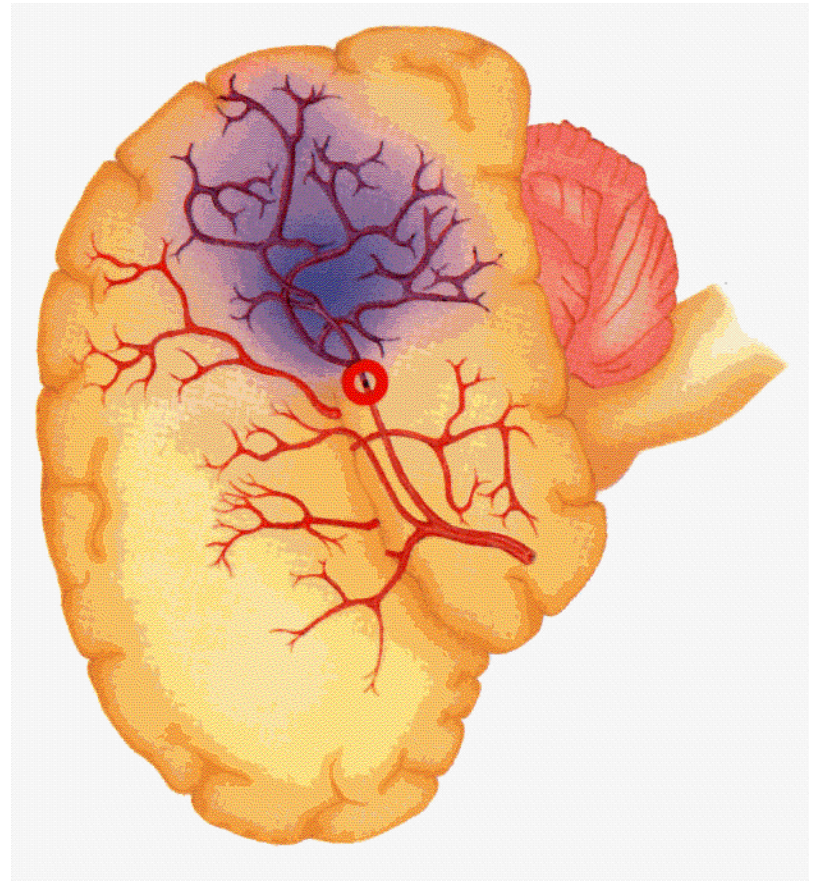
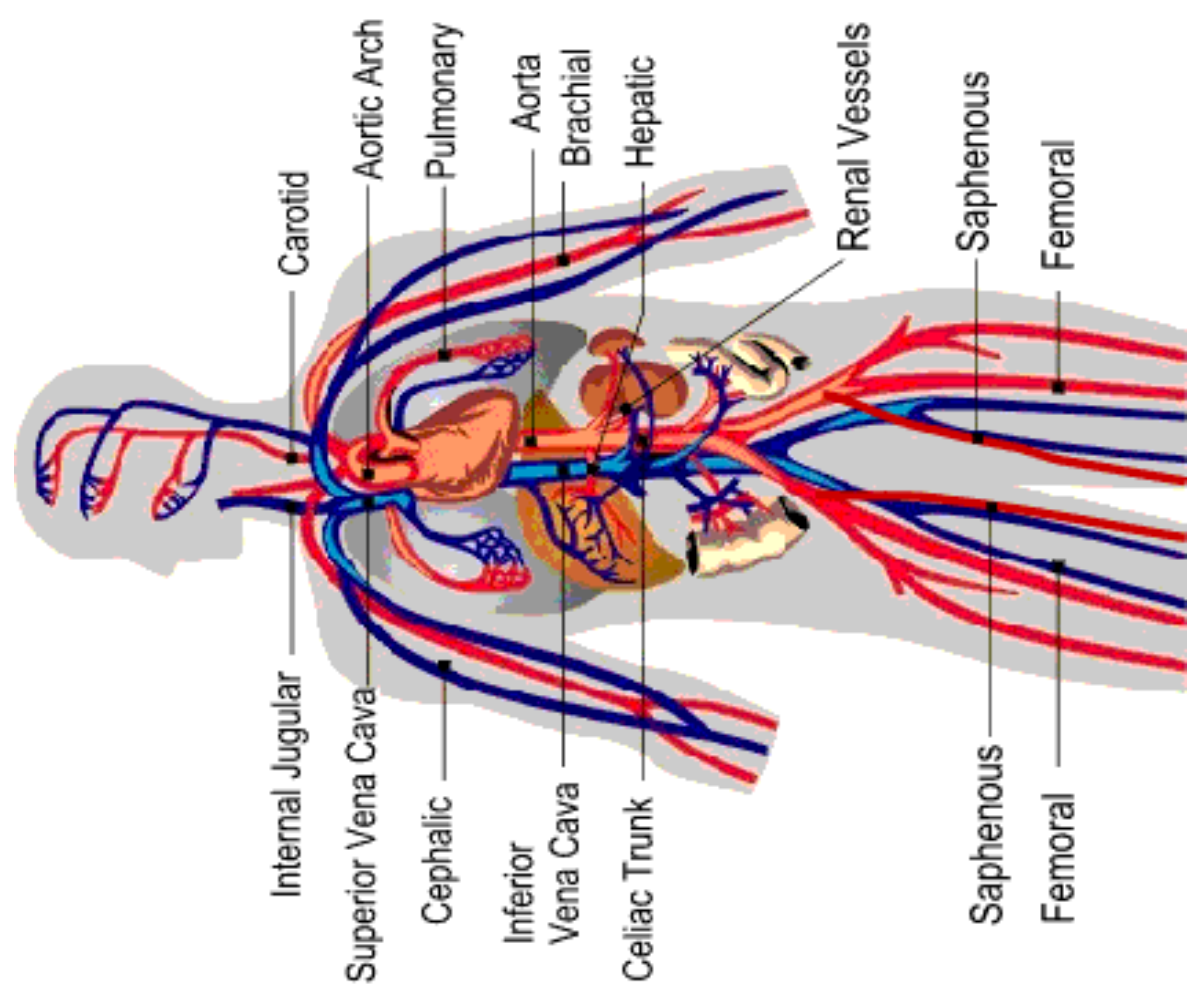
\*Weight from random effects analysis





*Attenwall*

### Heart Attack



# Relative risk of *PERIPHERAL ARTERIAL DISEASE* according to level of alcohol intake

Camargo CA, et al (1997) *Circulation* 95:577-80

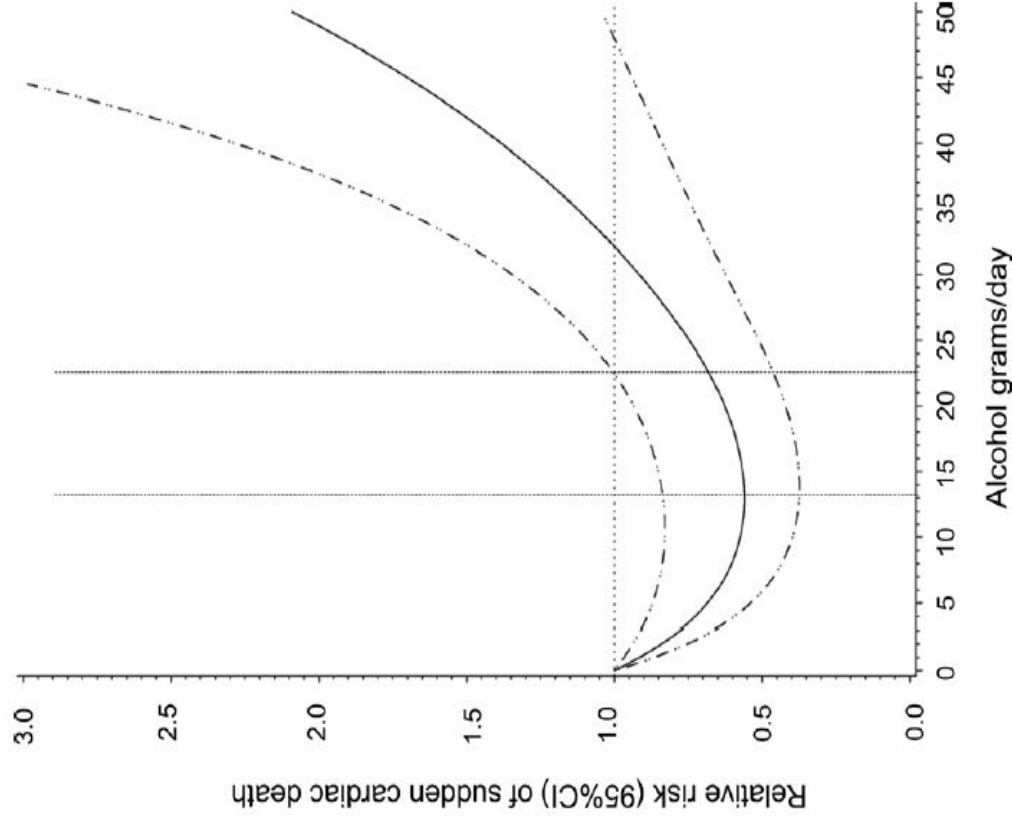
# drinks/week	<1	1-6	≥ 7	P value
cases	127	175	131	
Person-years	62 641	119 963	59 239	
Multivariate RR	1.00	0.82	0.74	0.03
95% CI	(reference)	(0.64–1.05)	(0.57–0.97)	





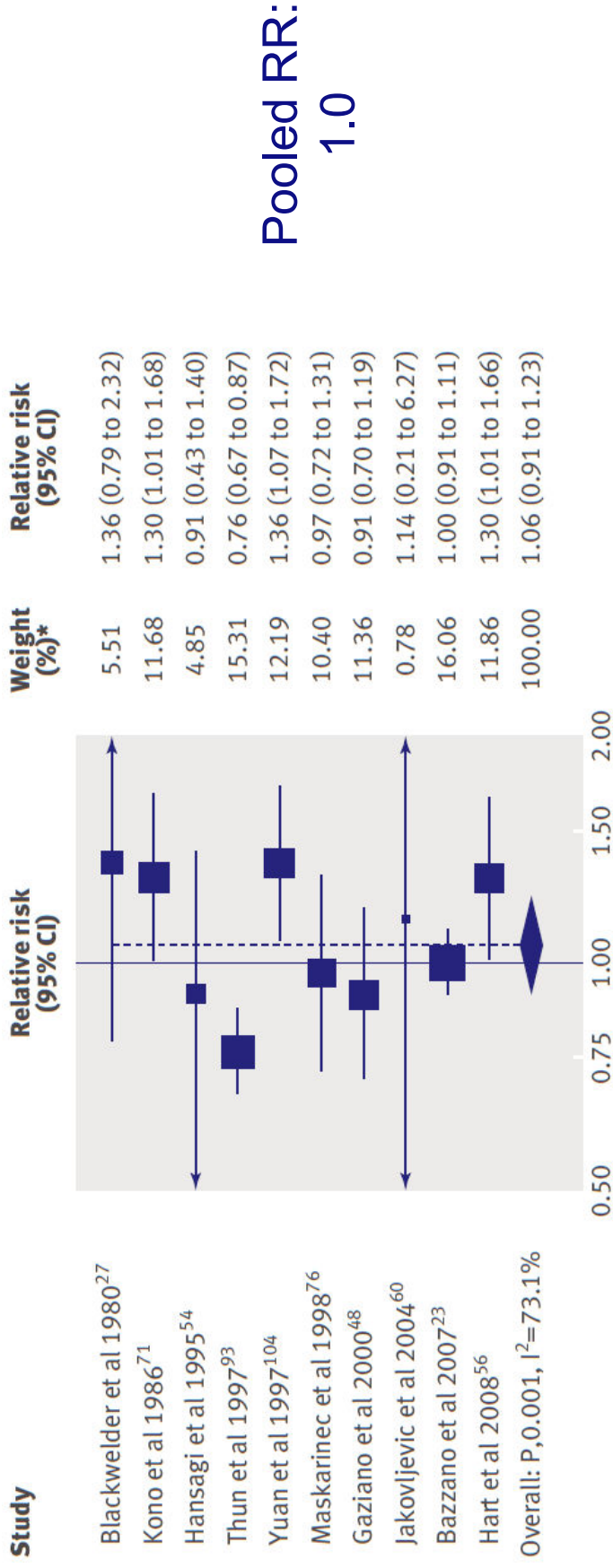
# Multivariate relative risk of *SUDDEN CARDIAC DEATH* as a function of alcohol intake

Chiuve SE, et al (2010) Heart Rhythm; 7:1374-1380



# Forest plot of mortality from STROKE associated with alcohol consumption

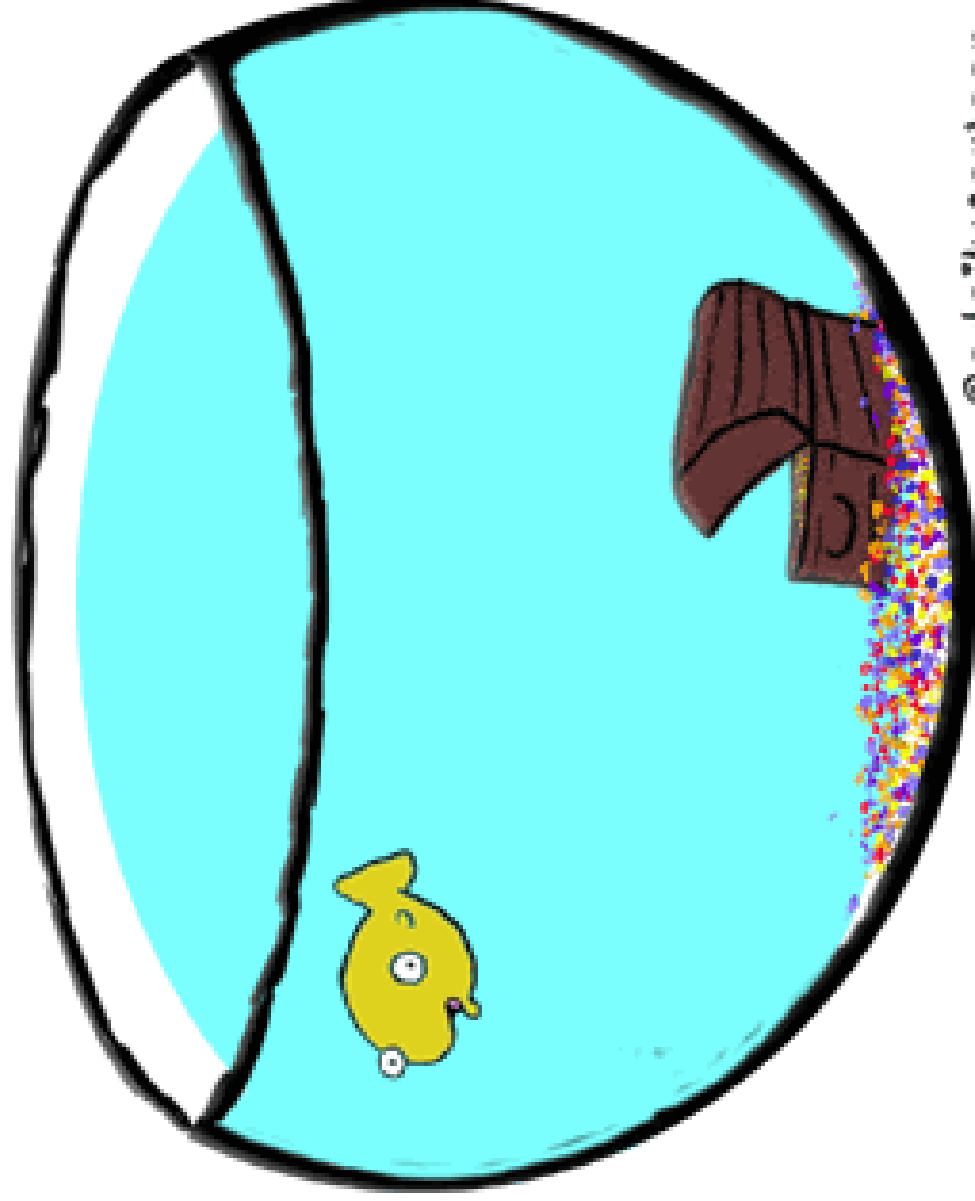
Ronksley PE et al, BMJ (2011) 342:d671



<sup>\*</sup>Weight from random effects analysis



# The Memory of a Goldfish



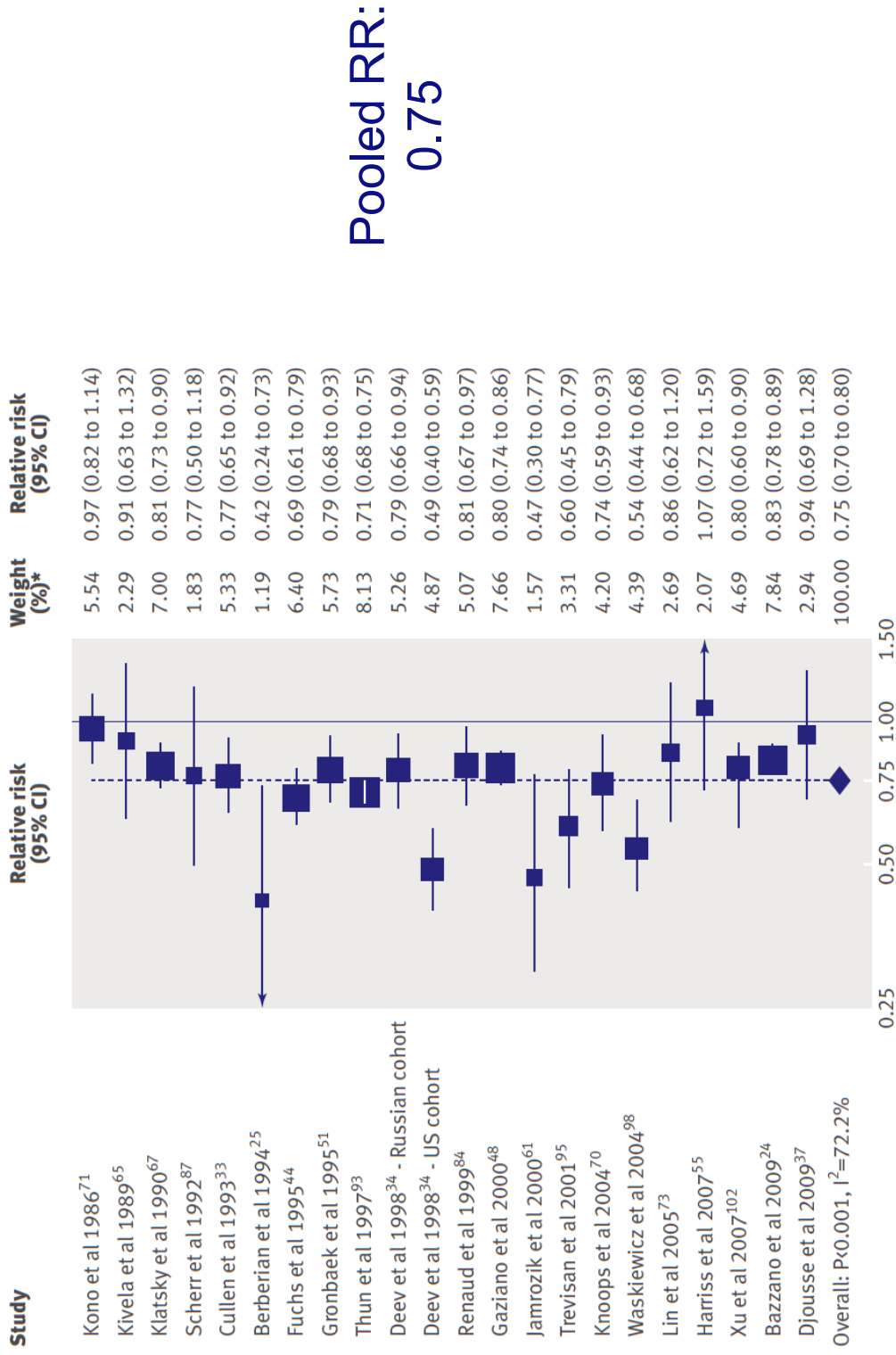
©adailycartoon.com

Brussels, September 20th, 2011



# Overview of mortality from *CARDIOVASCULAR DISEASE* associated with alcohol consumption

Ronksley PE et al, BMJ (2011) 342:d671



Pooled RR:  
0.75



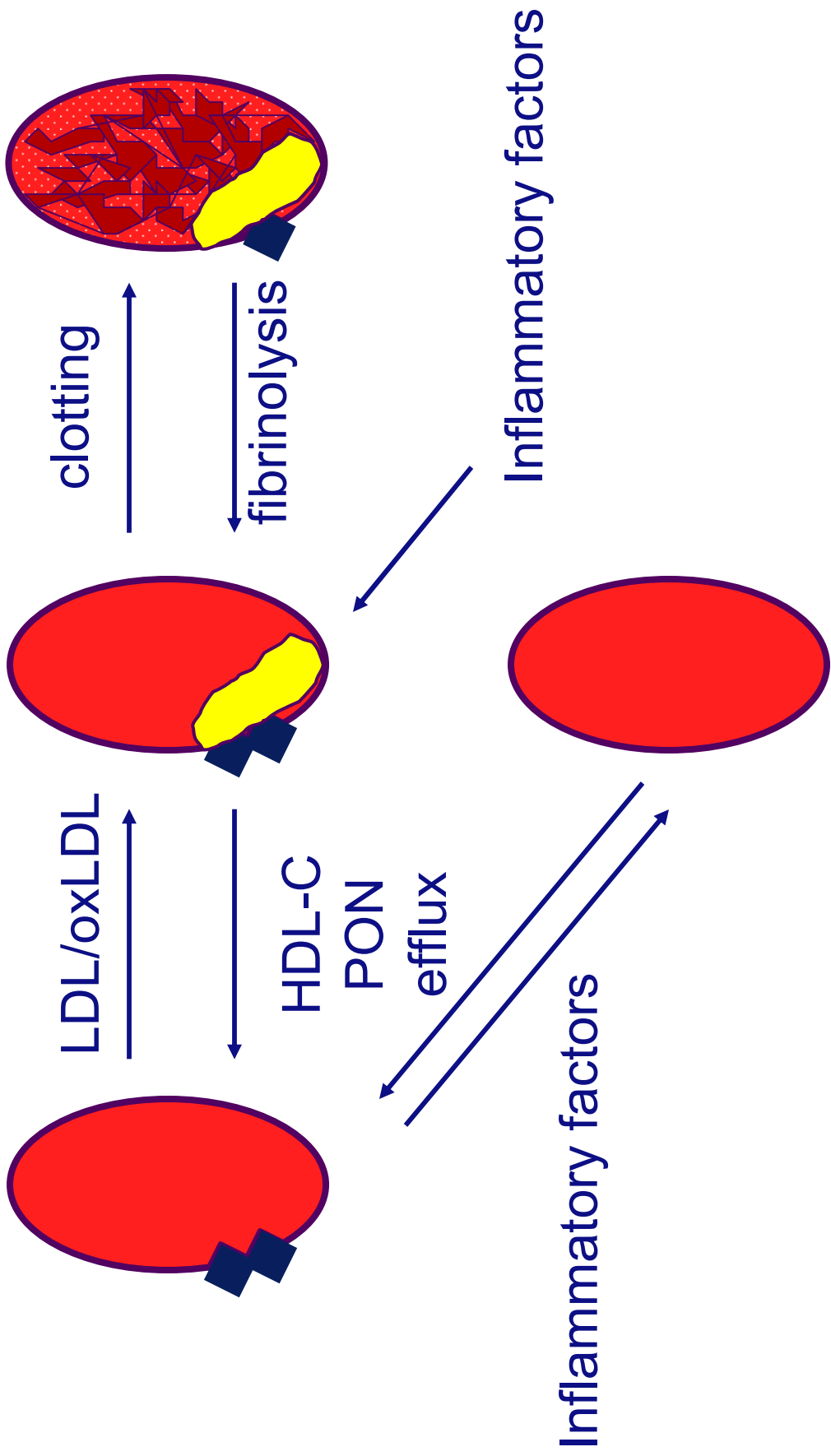
# Content

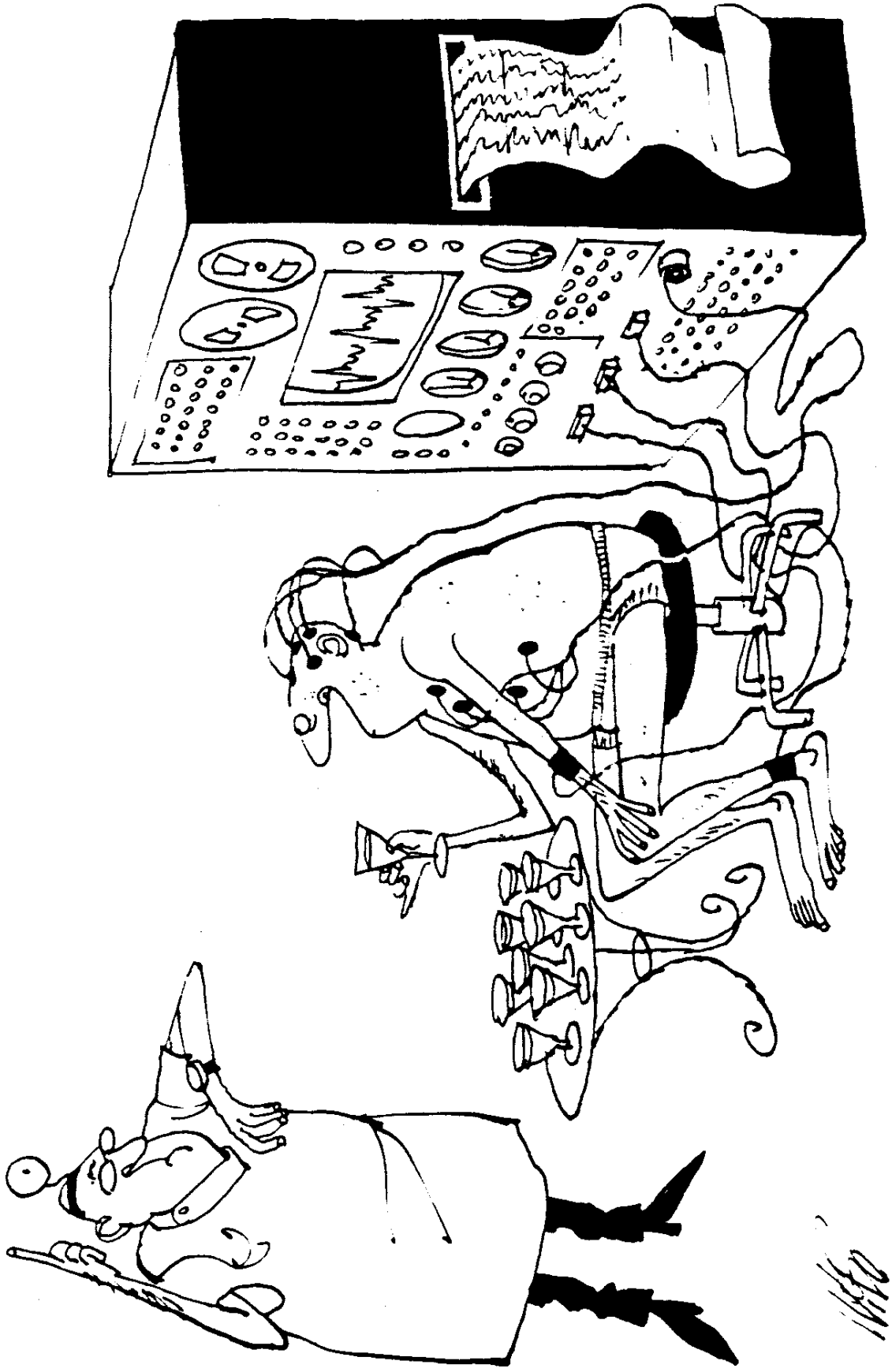
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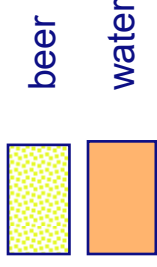
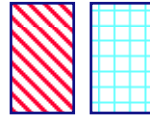
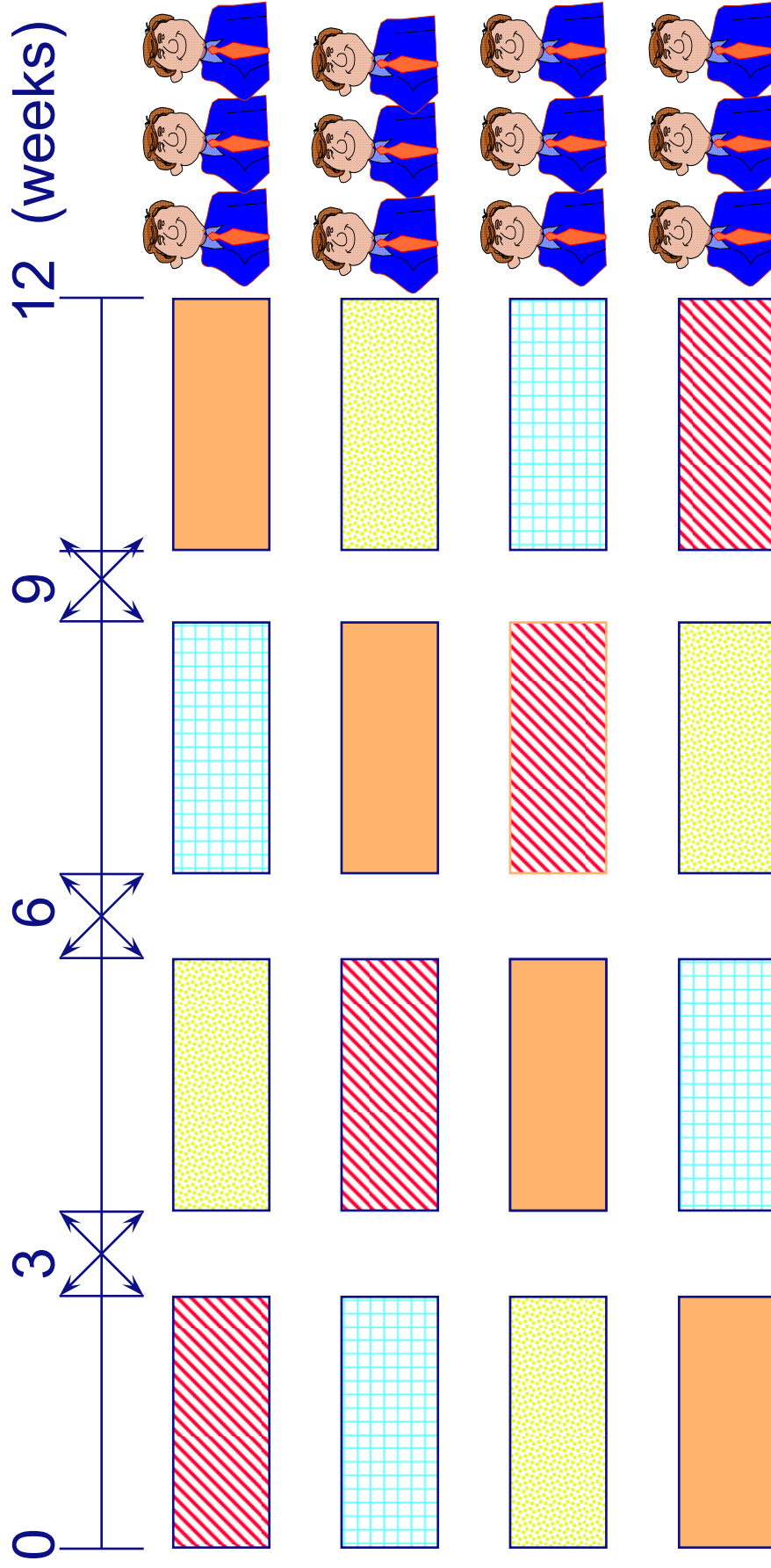


# Etiology of cardiovascular diseases



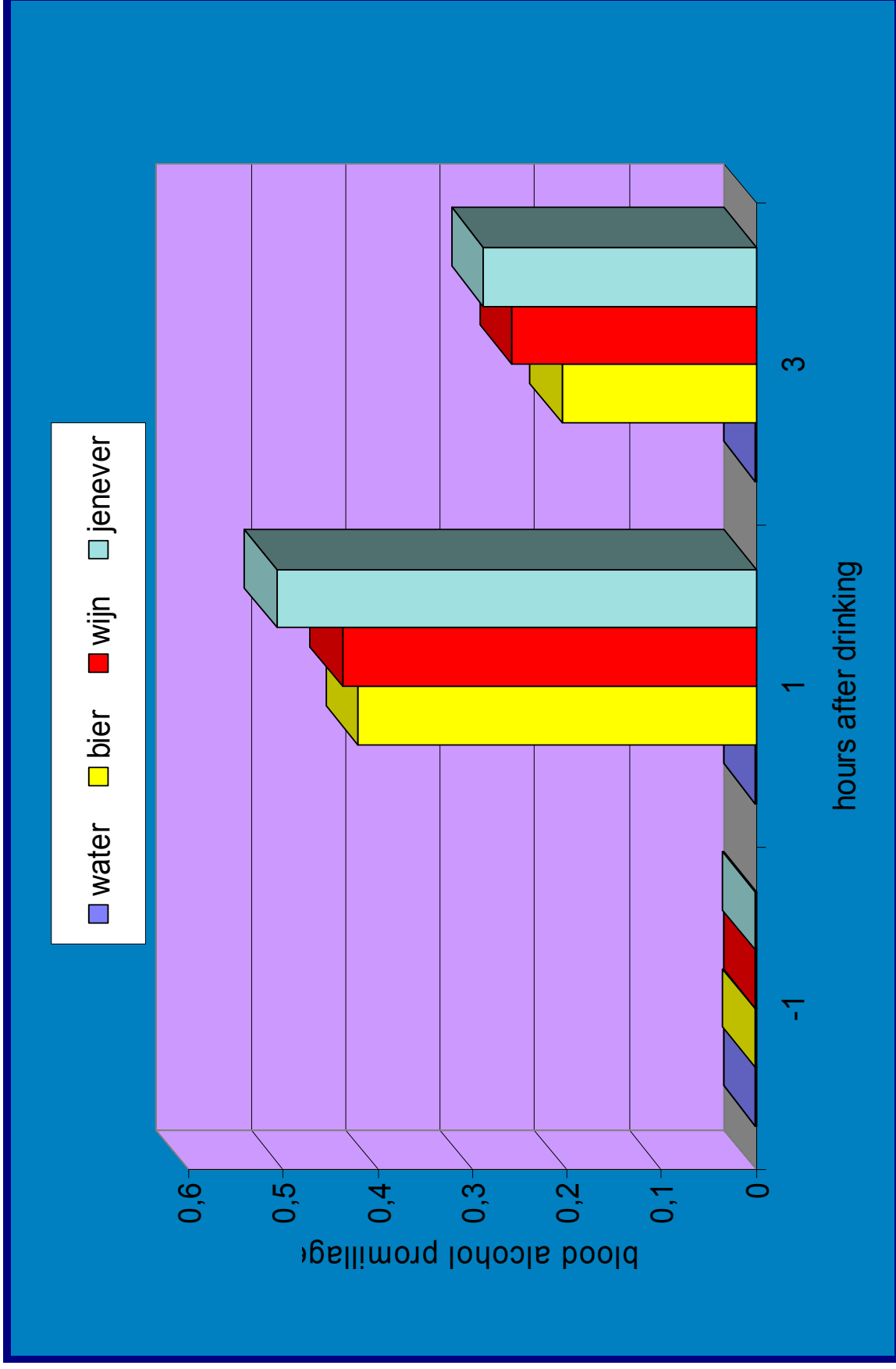


# Study example

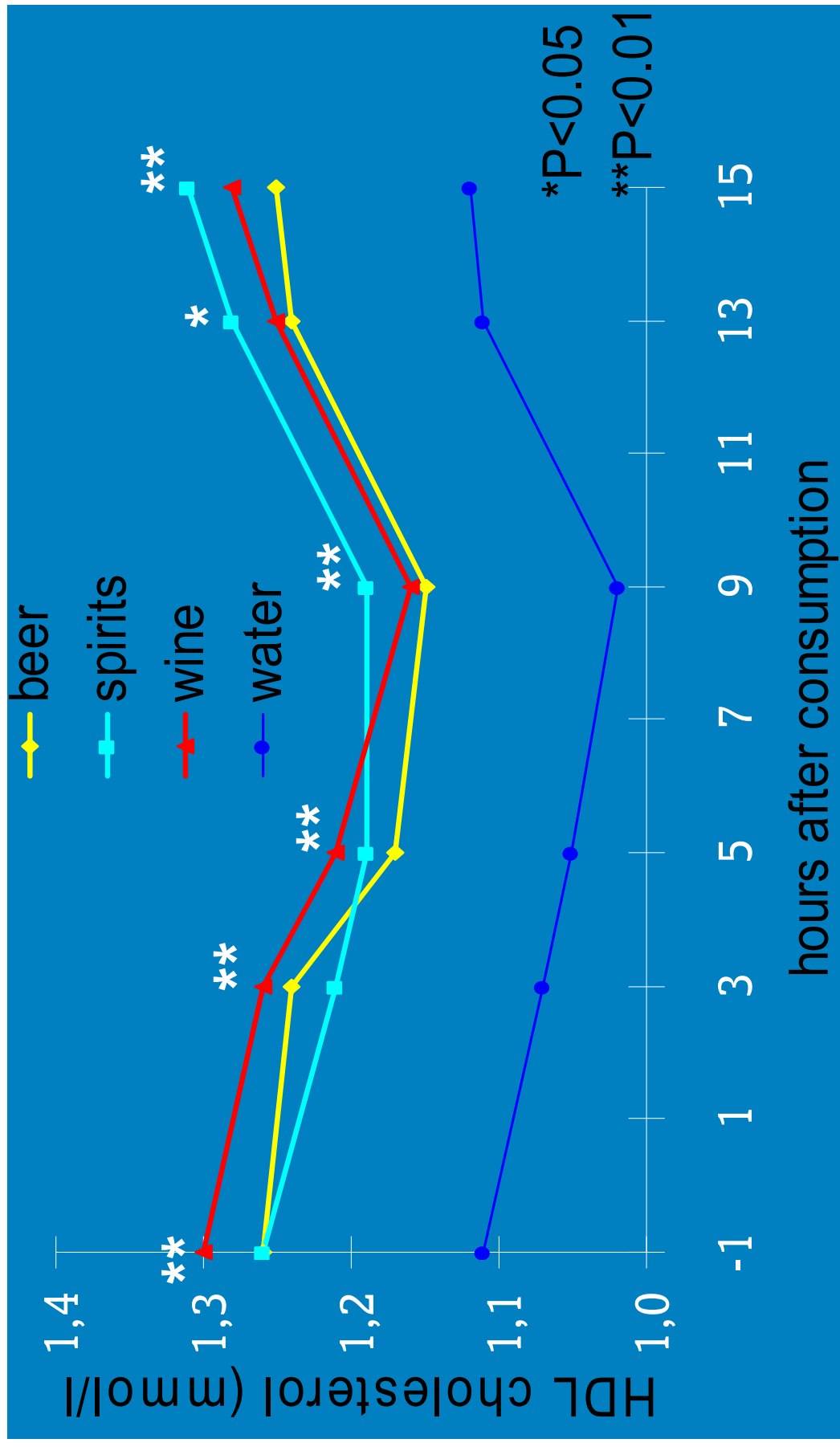


# BAC before and after drinking with a meal

van der Gaag et al, Atherosclerosis 1999;147:405-10



# HDL cholesterol before and after drinking with a meal





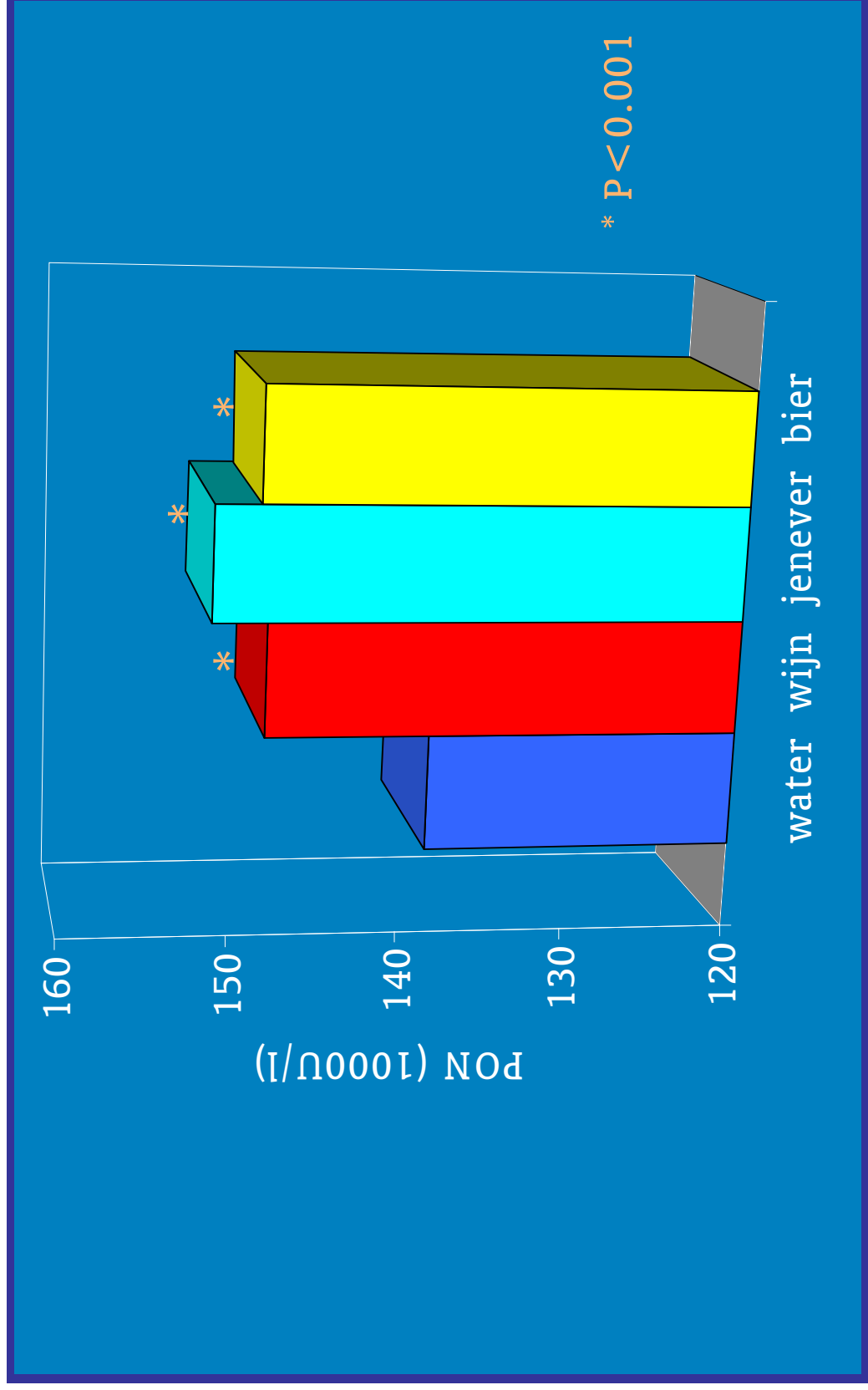
# HDL functions

- Prevent LDL oxidation using the enzyme paraoxonase



# Paraoxonase activity increase by moderate alcohol consumption

Van der Gaag et al, Atherosclerosis 1999;147:405-10

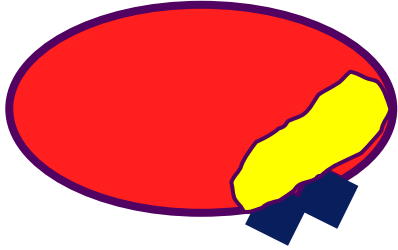
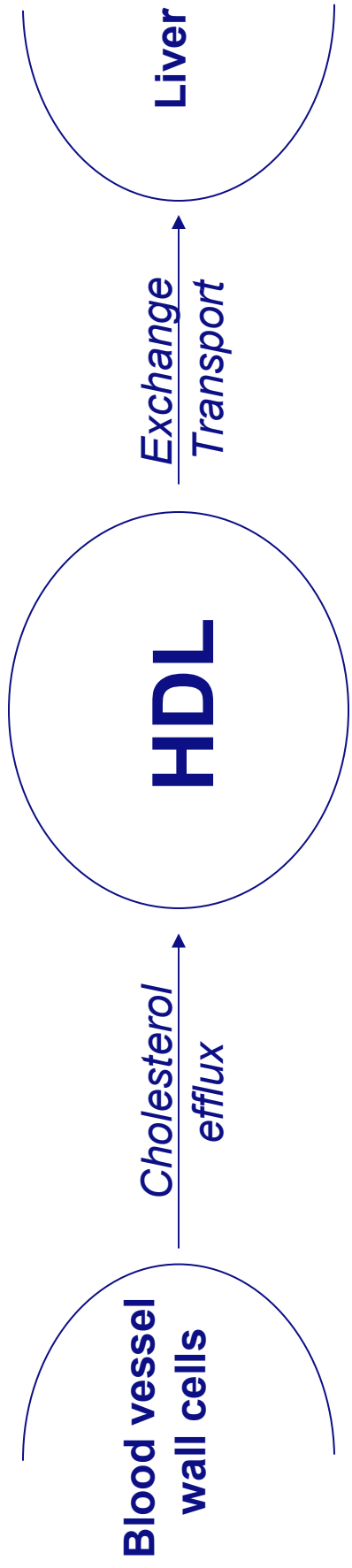


## HDL functions

- Prevent LDL oxidation using the enzyme paraoxonase
- Remove cholesterol from blood vessels through the process 'reverse cholesterol transport'



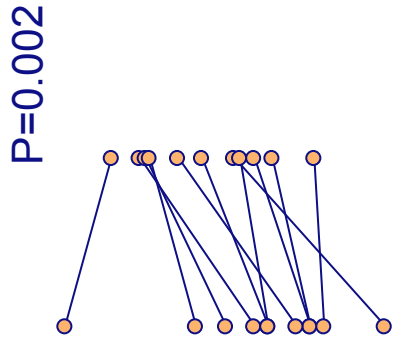
# Reverse cholesterol transport



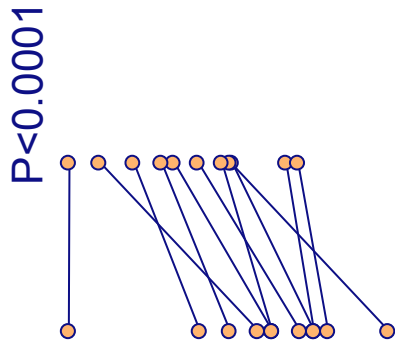
# Cholesterol efflux wine, beer and gin

Van der Gaag et al, J Lipid Res. 2001;42:2077-83

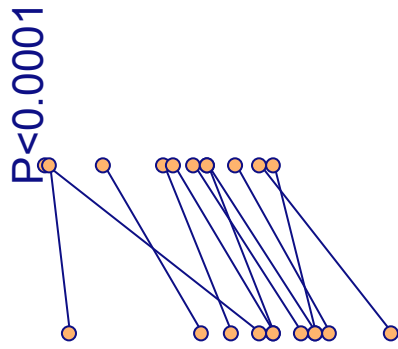
Serum cholesterol efflux (%)



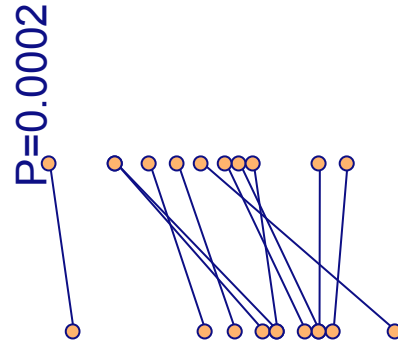
**Water Wine**



**Water Alcohol**



**Water Gin**

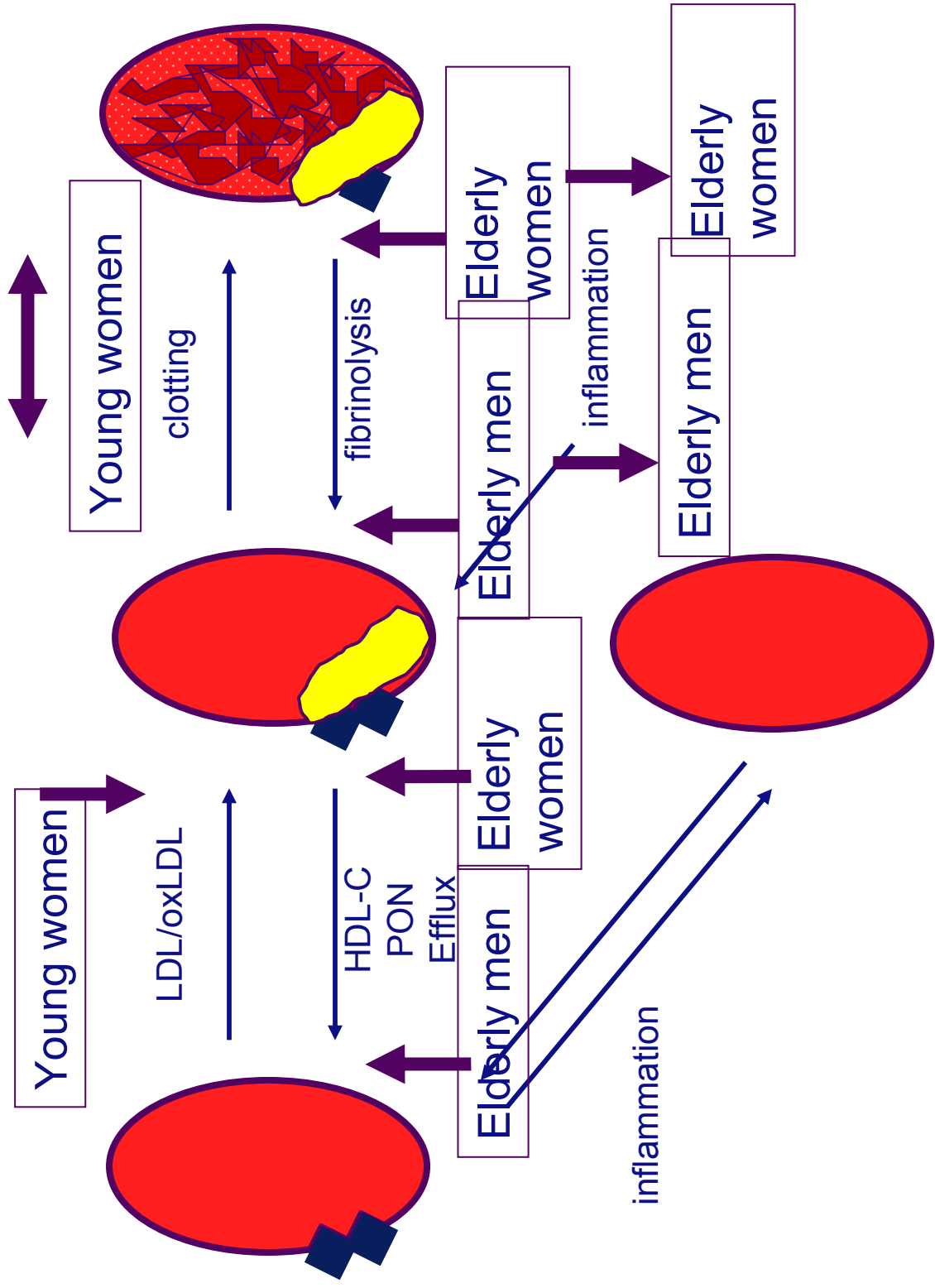


**Water Beer**



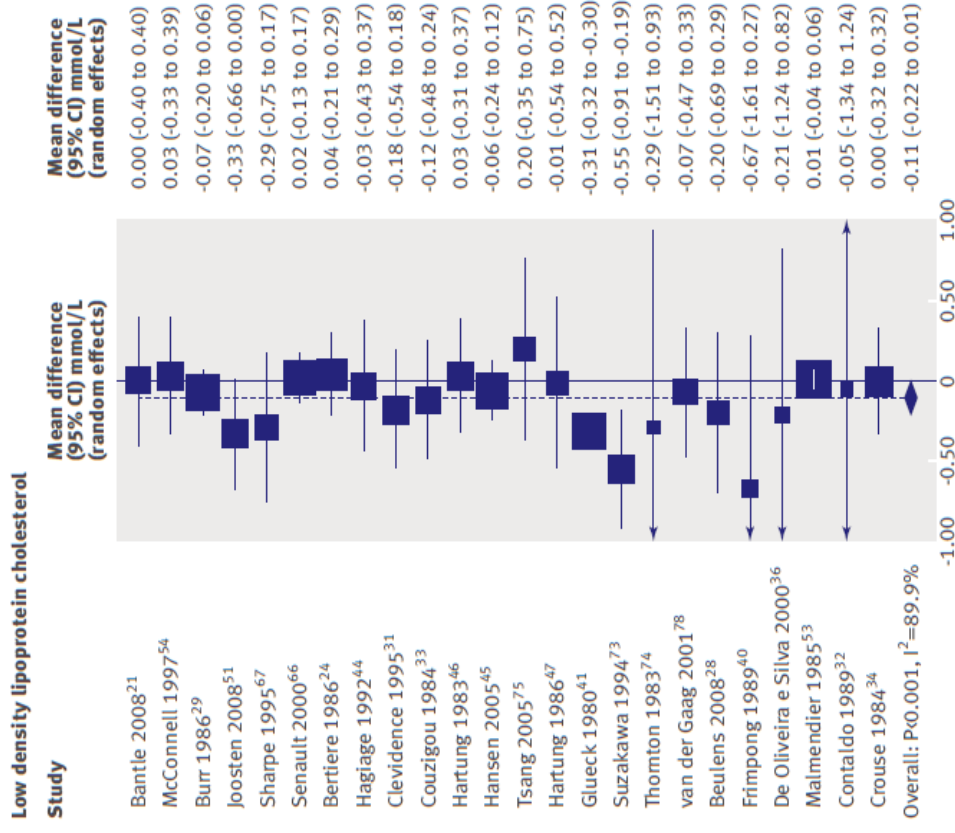
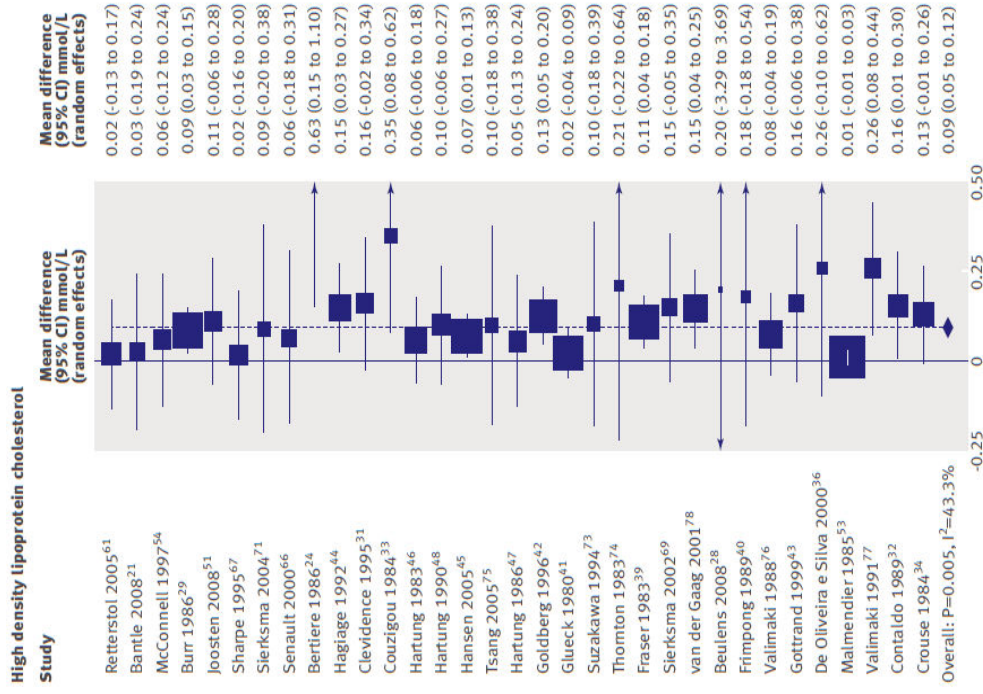


# How does coronary heart disease develop



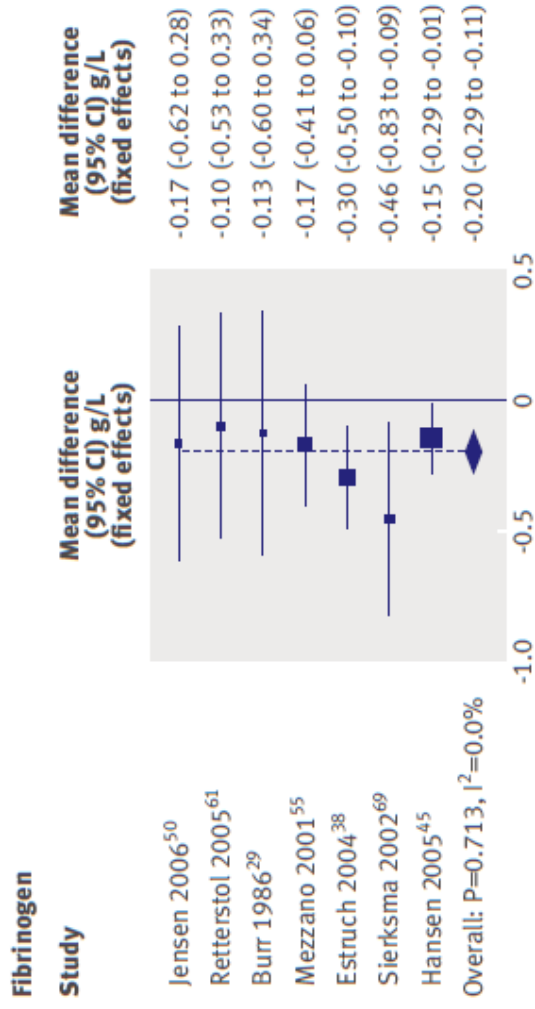
# Forest plot of alcohol consumption on high and low density lipoprotein cholesterol

Brien SE, et al (2011) BMJ 342:d636



# Forest plot of alcohol consumption on fibrinogen

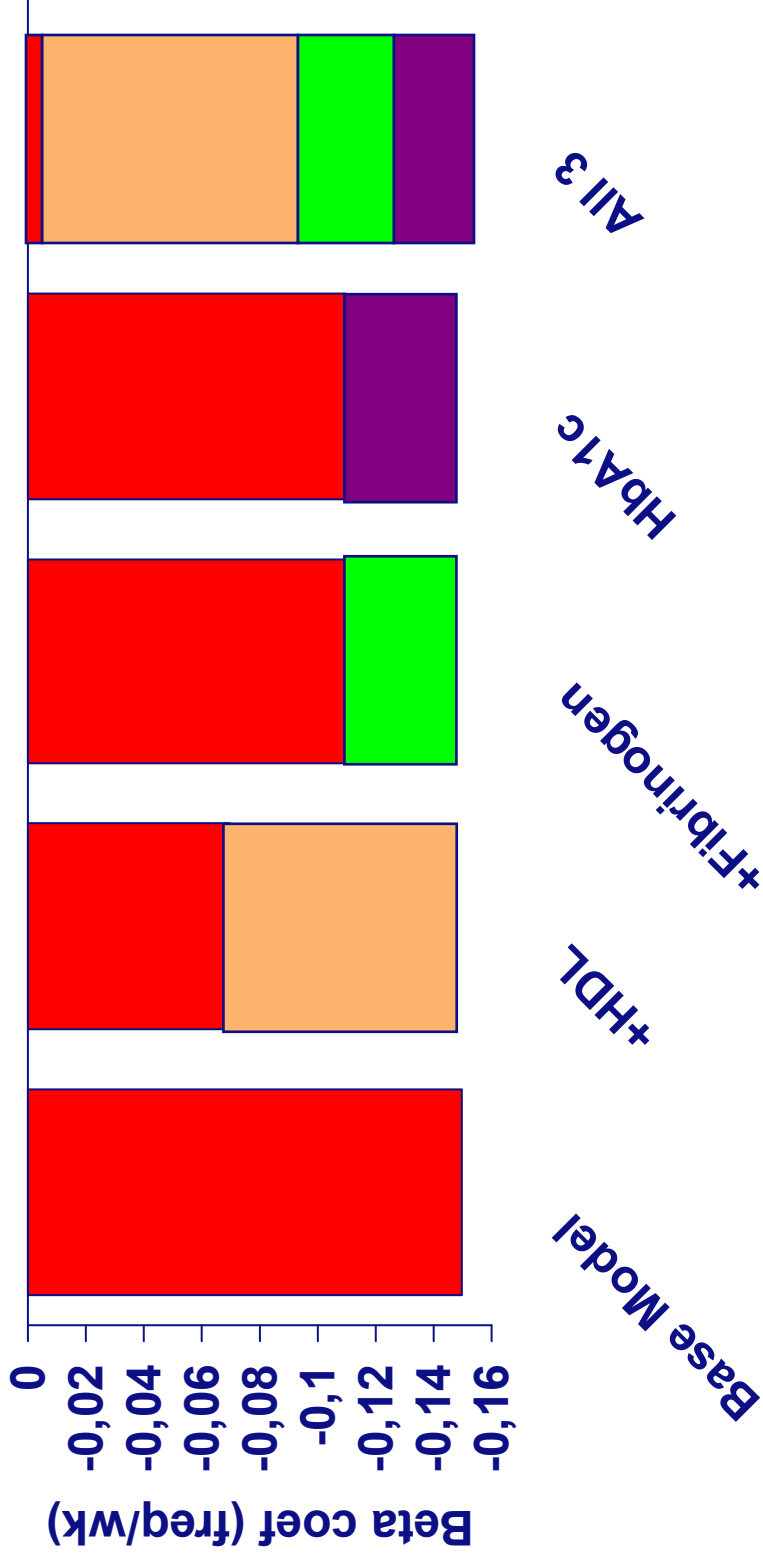
Brien SE, et al (2011) BMJ 342:d636



# Moderate alcohol consumption and heart attacks

## the active components

Mukamal KJ et al (2005) 112:1406-1413



## Alcohol consumption and blood pressure

- Alcohol abuse increases blood pressure
- Over 30 grammes of alcohol per day, every additional 10 grammes of alcohol per day:
  - Increases systolic blood pressure by 1 - 2 mmHg
  - Increases diastolic blood pressure by 1 mmHg



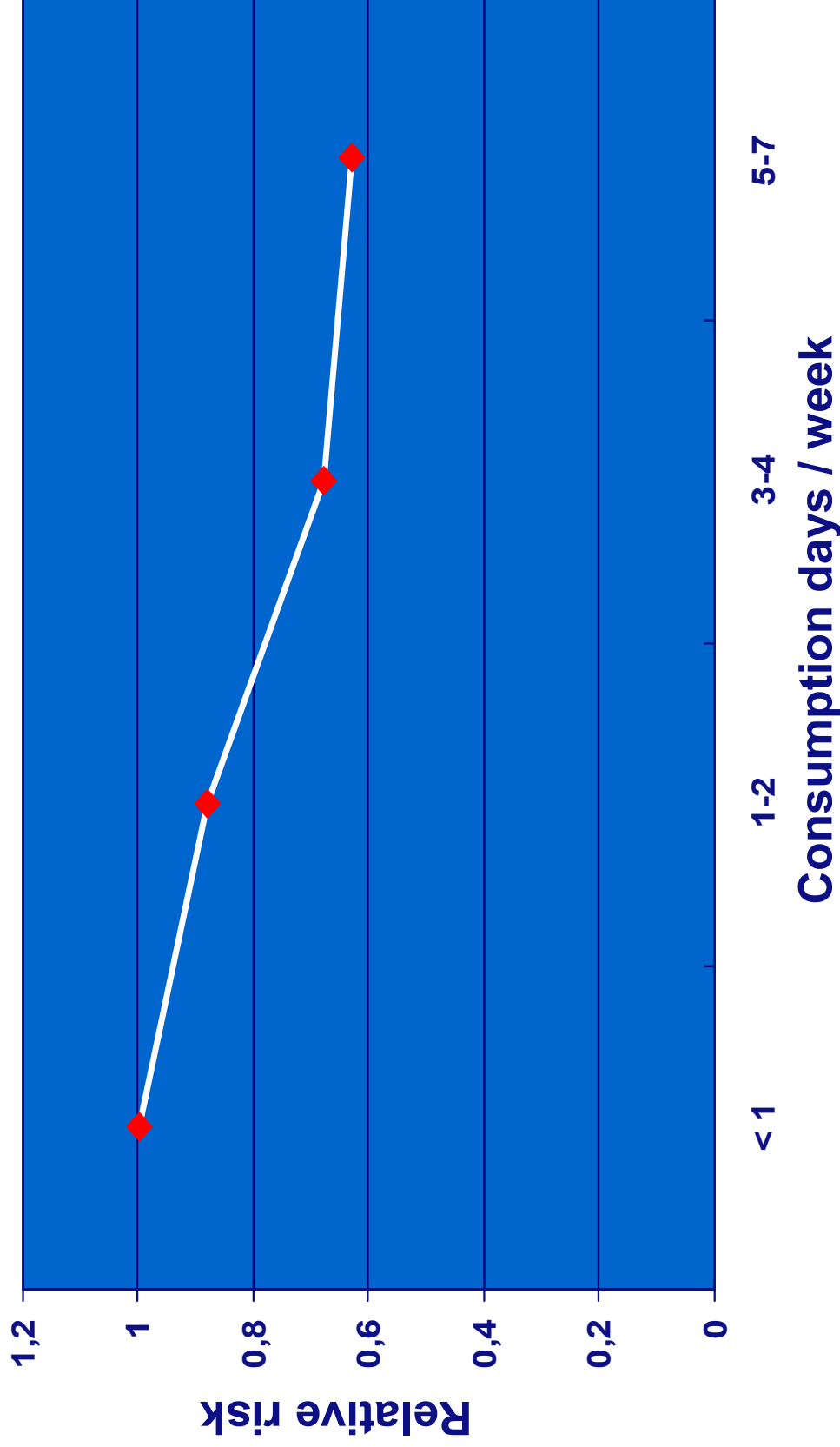
# Content

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# Moderate alcohol consumption and myocardial infarction risk

Mukamal et al, N Engl J Med 2003;34:109-18



# Mortality and lifestyle factors

Knoops et al JAMA (2004) 292: 1433-1439

## Mediterranean Diet, Lifestyle Factors, and 10-Year Mortality in Elderly European Men and Women The HALE Project

Effect of four lifestyle factors on mortality risk

1. Mediterranean diet
2. Moderate alcohol consumption
3. Physical activity
4. Non smoking

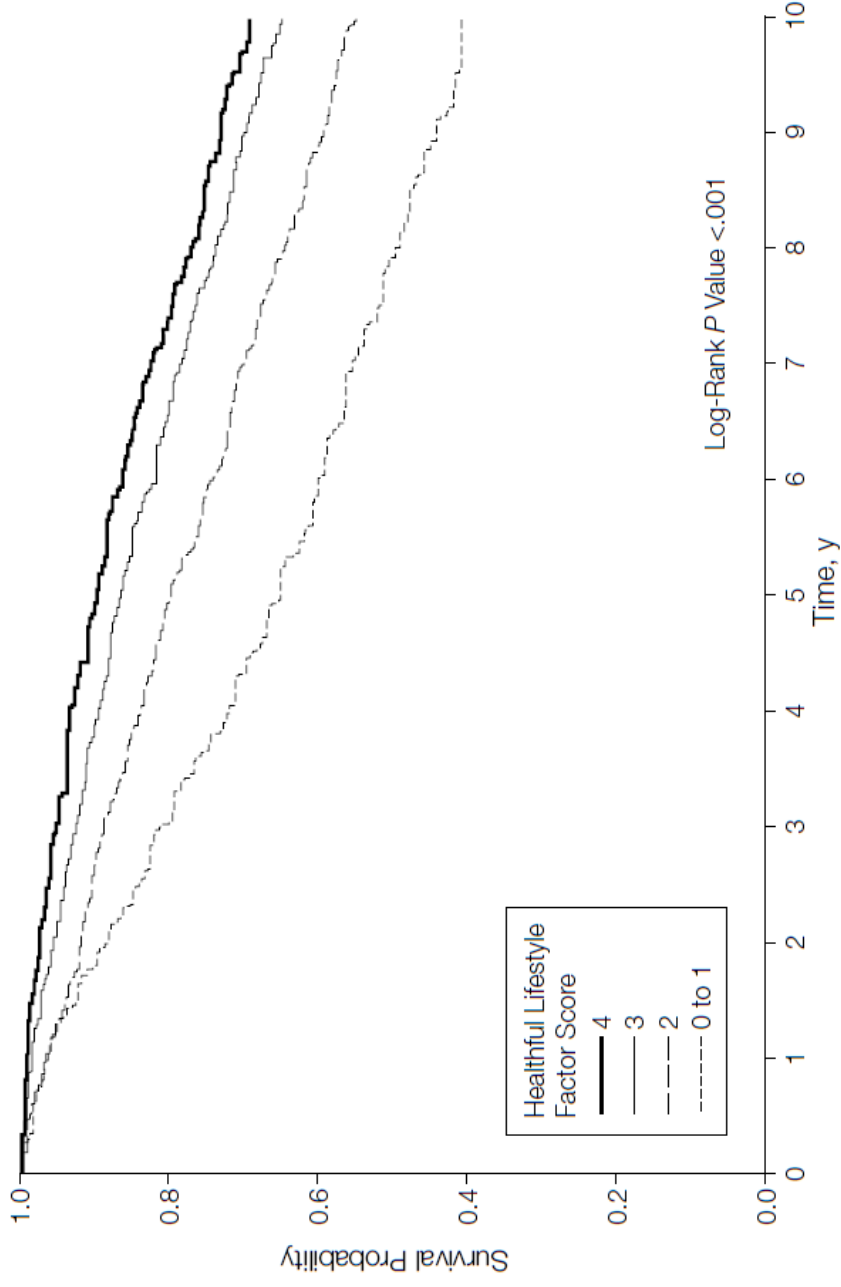




# Mortality and lifestyle factors

Knoops et al JAMA (2004) 292: 1433-1439

**Figure.** Kaplan-Meier Curves for Number of Healthful Lifestyle Factors



# Incidence of MYOCARDIAL INFARCTION according to healthy lifestyle behaviors and alcohol intake

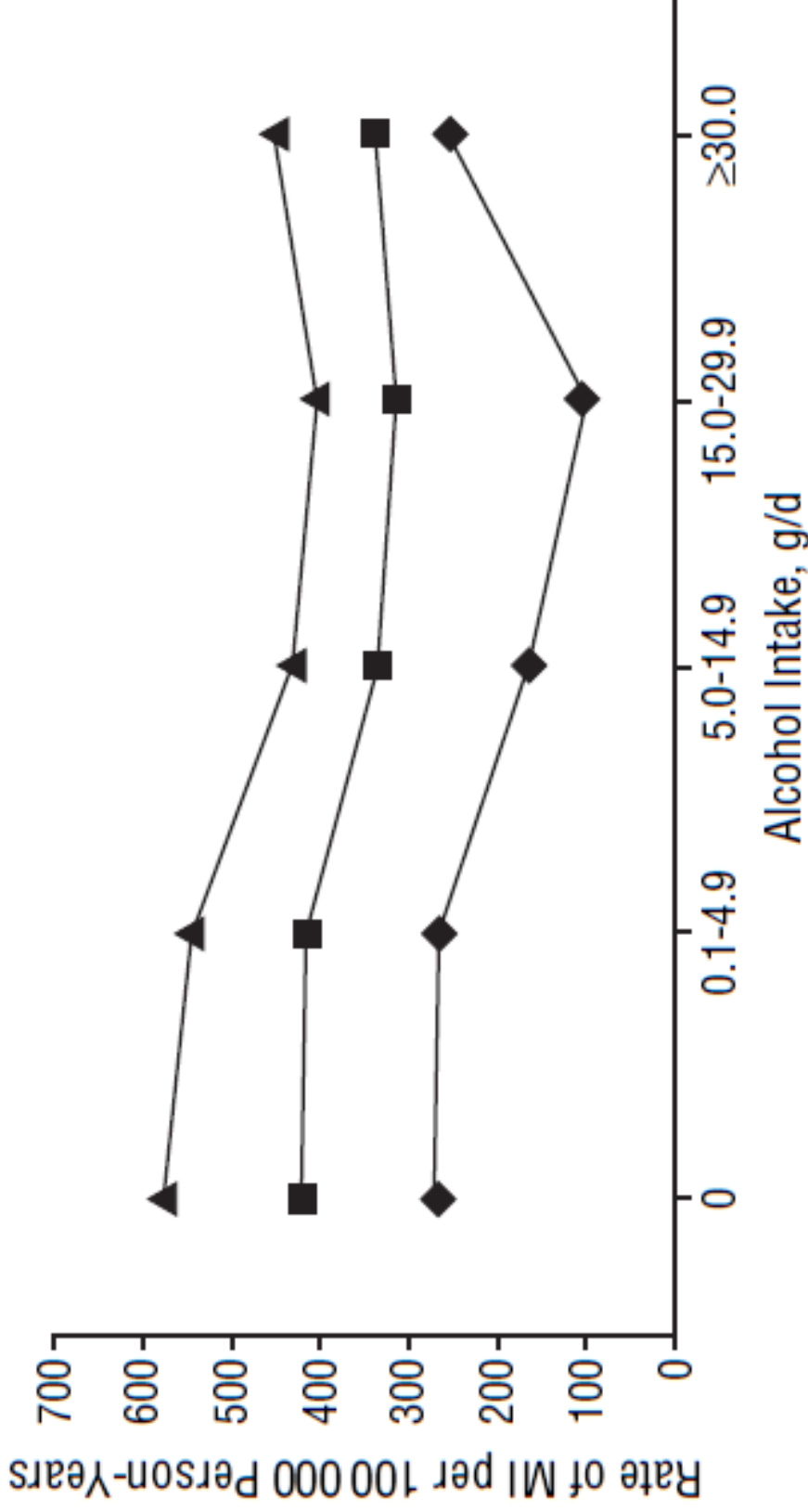
Mukamal KJ et al (2006) Arch Intern Med 166:2145-2150

Behavior	Alcohol Intake, g/d					Other Lifestyle Behavior
	0	0.1-4.9	5.0-14.9	15.0-29.9	≥30.0	
Optimal weight, activity, and smoking (n = 13 342)						
No. of cases	44	45	45	17	13	Optimal diet 106
Person-years	15 269	18 488	23 825	10 924	6568	
Multivariate adjusted*	1.00	0.80 (0.50-1.27)	0.62 (0.40-0.97)	0.45 (0.24-0.83)	0.69 (0.35-1.34)	0.72 (0.51-1.02)
Optimal weight, activity, and diet (n = 9125)						Nonsmoking 106
No. of cases	29	37	30	8	10	
Person-years	10 567	13 041	16 960	7 644	4 215	
Multivariate adjusted*	1.00	0.99 (0.56-1.73)	0.63 (0.35-1.12)	0.37 (0.16-0.87)	0.92 (0.40-2.14)	0.26 (0.10-0.72)
Optimal weight, smoking, and diet (n = 13 730)						Optimal activity 106
No. of cases	98	96	83	38	31	
Person-years	29 193	31 087	36 472	16 482	9 747	
Multivariate adjusted*	1.00	1.04 (0.78-1.40)	0.77 (0.56-1.05)	0.74 (0.49-1.10)	0.86 (0.56-1.31)	0.73 (0.57-0.93)
Optimal activity, smoking, and diet (n = 15 118)						Optimal weight 106
No. of cases	66	81	67	29	18	
Person-years	18 499	23 194	29 517	14 372	8 002	
Multivariate adjusted*	1.00	1.04 (0.74-1.48)	0.62 (0.43-0.90)	0.54 (0.34-0.86)	0.57 (0.33-0.99)	0.54 (0.42-0.71)



# MYOCARDIAL INFARCTION according to healthy lifestyle features and alcohol intake

Mukamal KJ et al (2006) Arch Intern Med 166:2145-2150



Corresponding to men with 4 (◇), 2 or 3 (■) and 0 or 1 (▲) life-style factor



# Conclusions

- Moderate beer (alcohol) consumption is associated with an improved cardiovascular health. This beneficial association is observed for the most common cardiovascular diseases.
- The beneficial effects of moderate beer (alcohol) consumption are mediated by improvements in lipid (cholesterol) metabolism, blood clotting and glucose metabolism.
- Risk reduction is additive to other healthy life style factors like non-smoking, physical activity and a healthy diet.
- The studies combined provide strong evidence for a cardioprotective effect of moderate beer (alcohol) consumption.





# Acknowledgements

- Sponsors:  
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- PhD students:  
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Aafje Sierksma en  
Martijn van der Gaag
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Eric Rimm and Ken Mukamal, Harvard School of Public Health  
and many others

