



**Featured Symposium
Food & Arrhythmias
October 16th 2015**



**October 16 - 18
14th EDITION 2015**

Can alcohol cause arrhythmias in people with normal heart ?



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NO CONFLICT OF INTEREST
RELATED TO THIS
PRESENTATION TO
DECLARE



- The use of alcohol as a “social lubricant” has been ubiquitous in human societies since ancient times.
- Numerous investigators have noted an association between alcohol and arrhythmias as well as SCD.
- **What is the evidence on the causal relationship of alcohol and arrhythmias in otherwise healthy hearts ?**

Arrhythmias and the "Holiday Heart": Alcohol-associated cardiac rhythm disorders

Philip O. Ettinger, M.D.

Chia F. Wu, M.D.

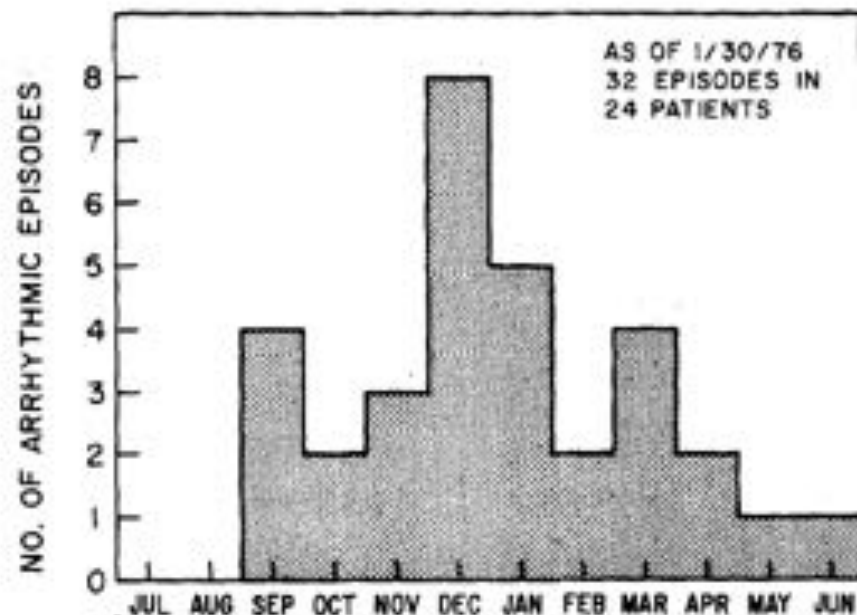
Catalino De La Cruz, Jr., M.D.

Allen B. Weisse, M.D.

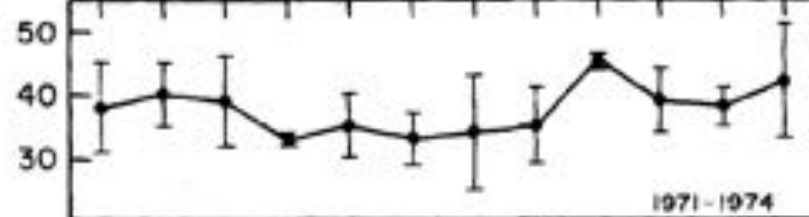
S. Sultan Ahmed, M.D.

Timothy J. Regan, M.D.

Newark, and Englewood, N. J.



MEAN MONTHLY
ADMISSIONS
FOR
TRADITIONAL
ALCOHOL-
ASSOCIATED
ILLNESSES



Am Heart J. 1978 May;95(5):555-62.

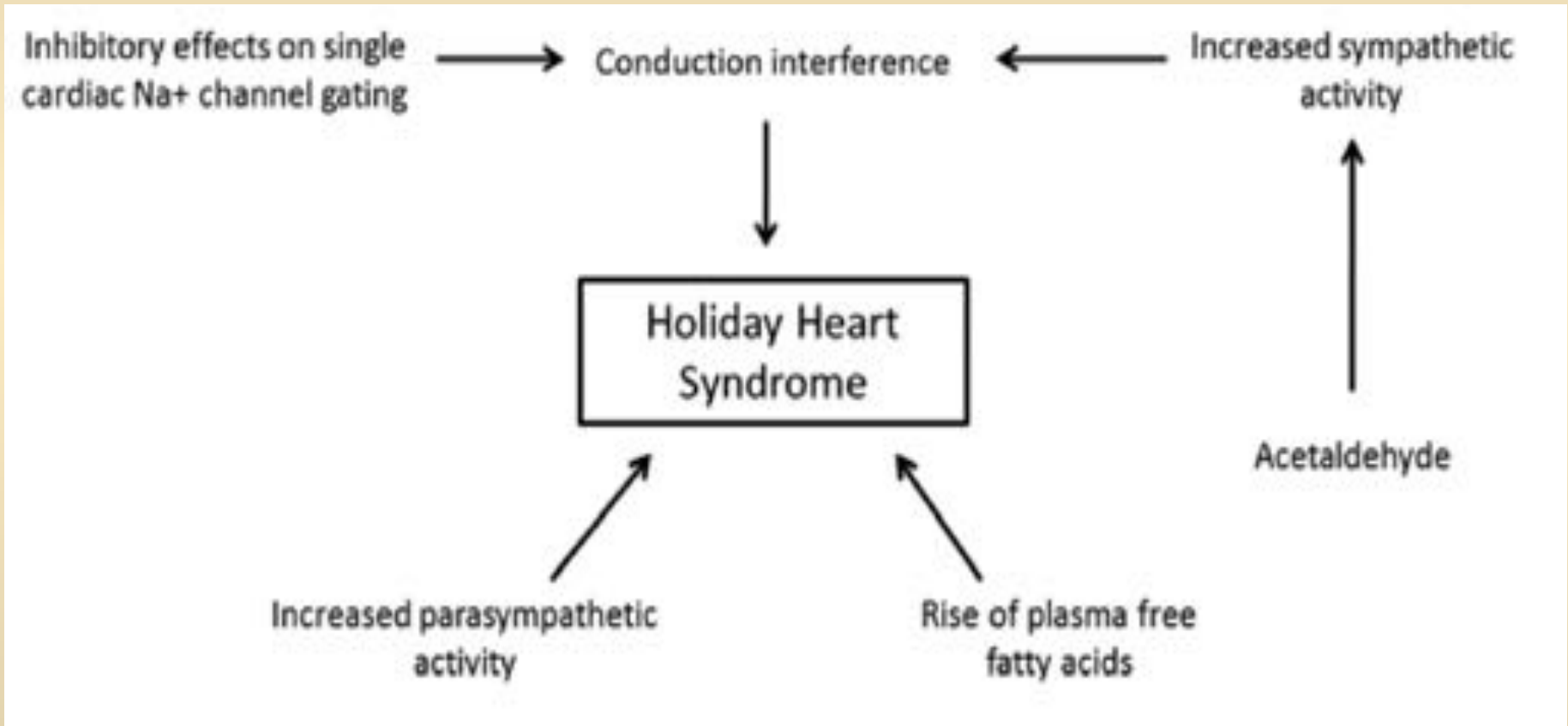
Alcohol-associated arrhythmias in the HHS original report

<i>Rhythm abnormality</i>	<i>No.</i>
Isolated APC's	4
Atrial fibrillation	12
Atrial flutter	6
Paroxysmal atrial tachycardia	3
Junctional tachycardia†	4 (3 in 1 patient)
Isolated PVC's	6
Ventricular tachycardia	1 (after treadmill exercise)

*Several patients had more than one arrhythmia. Of atrial arrhythmias, 6 showed RBBB and 3, LBBB aberration.

†One patient with junctional tachycardia showed atrioventricular dissociation.

Potential mechanisms involved in the onset of cardiac arrhythmias after acute alcohol ingestion (binge drinking)

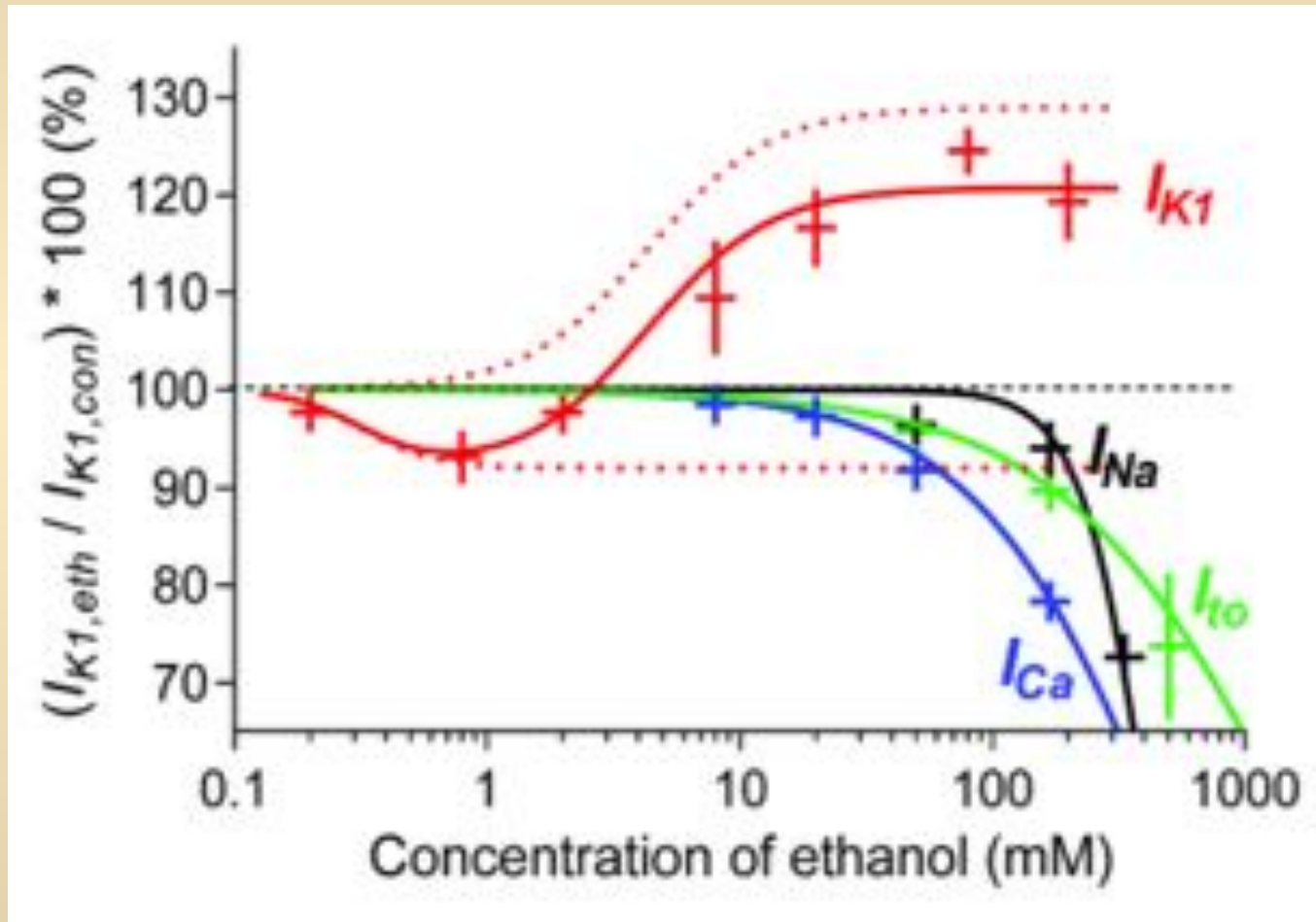


Mechanisms behind the association of alcohol and cardiac arrhythmia

Largely unresolved, several hypotheses, some controversial:

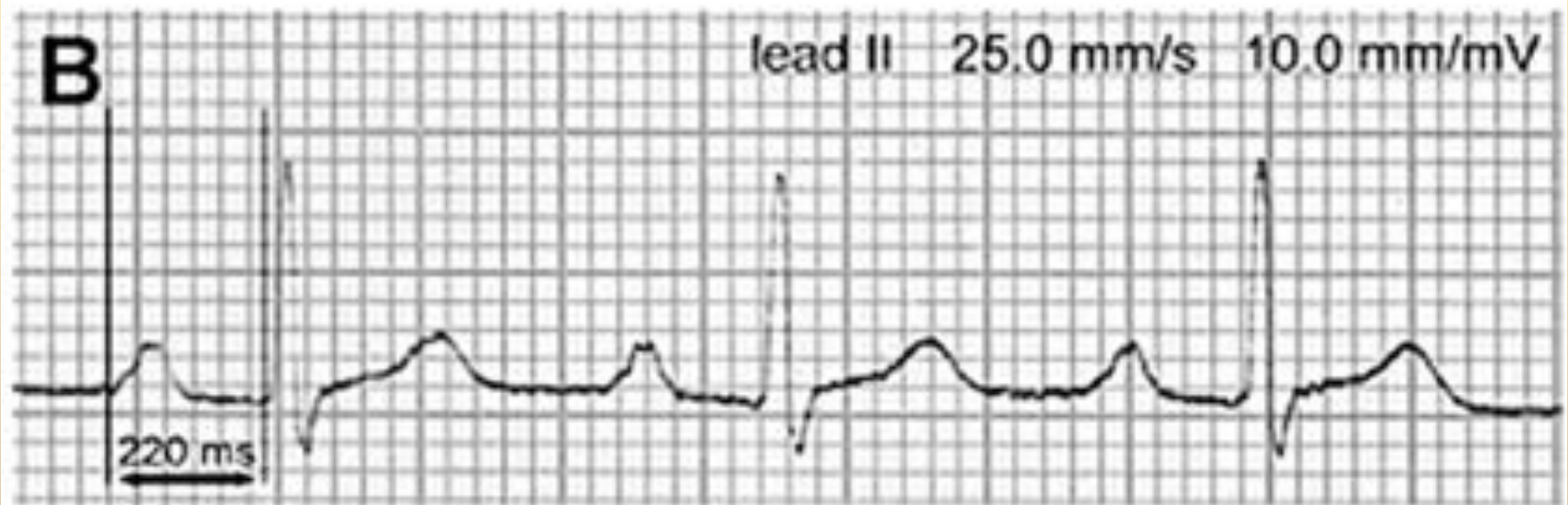
- disturbances of cardiac conduction
 - $\geq 2\text{g/L}$ alcohol - inhibitory effect on cardiac Na channels which can increase Na-Ca-exchanger activity and prolong AP duration
- Shortening of refractory period (experiment only)
- Increased sympathetic activity
- Increased parasympathetic activity
- Rise in plasma free fatty acids
- Acetaldehyde arrhythmogenic effects

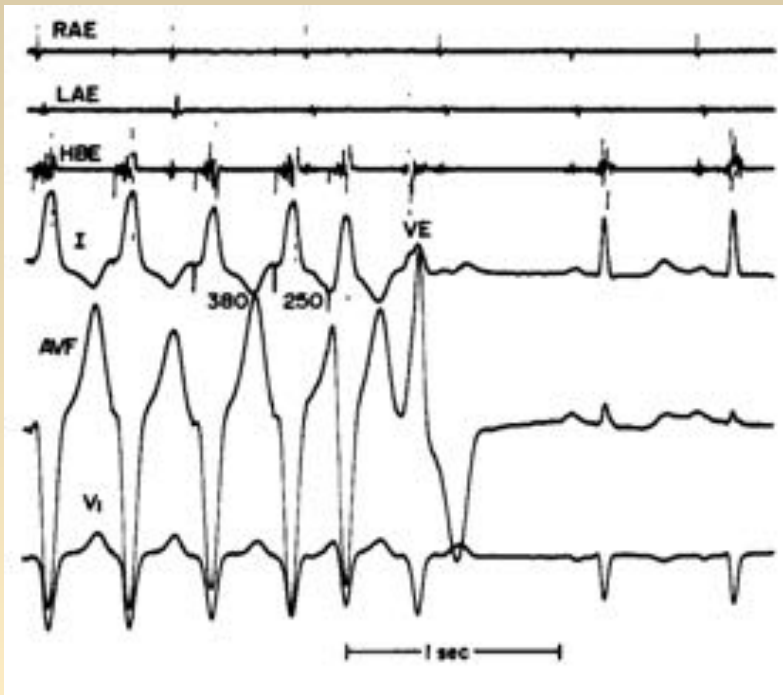
Concentration dependence of the ethanol effect on I_{K1} in comparison with that on several other cardiac ionic currents.



Bébarová M et al., *J Physiol Pharmacol.* 2014 Aug;65(4):497-509.

Adolescent after binge drinking, spontaneous resolution





MEDICAL INTELLIGENCE



**PROVOCATION OF VENTRICULAR
TACHYCARDIA AFTER CONSUMPTION
OF ALCOHOL**

ARNOLD J. GREENSPON, M.D.,
JOHN M. STANG, M.D.,
RICHARD P. LEWIS, M.D.,
AND STEPHEN F. SCHAAL, M.D.

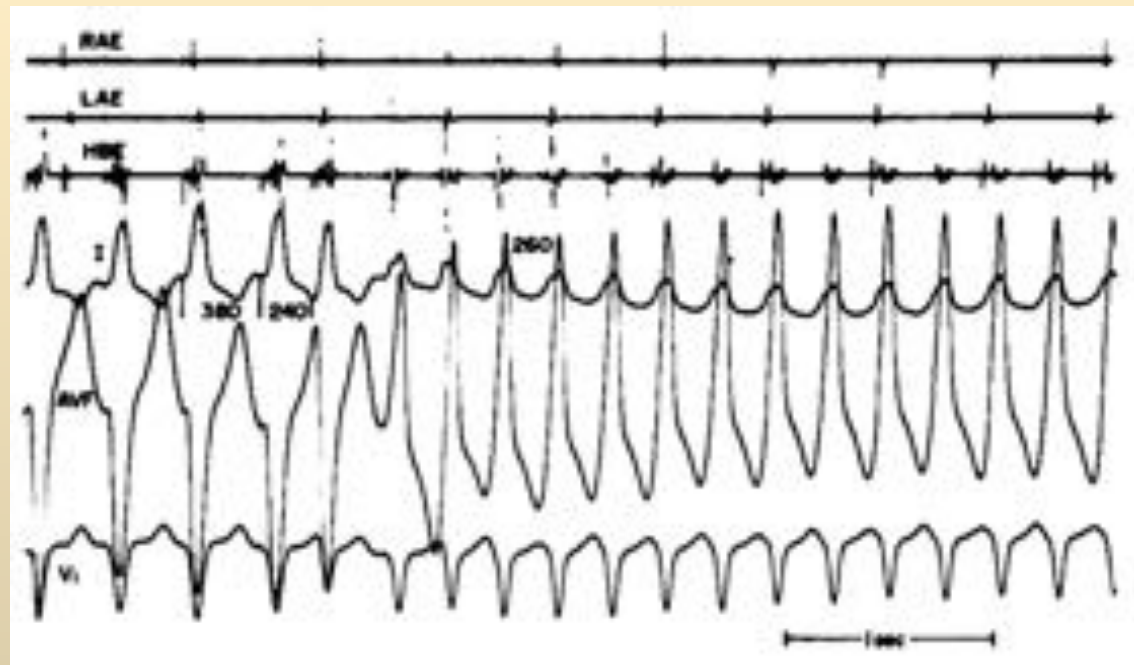
NEJM 1979, 301, 1049

S1 400 / S2 240 ms

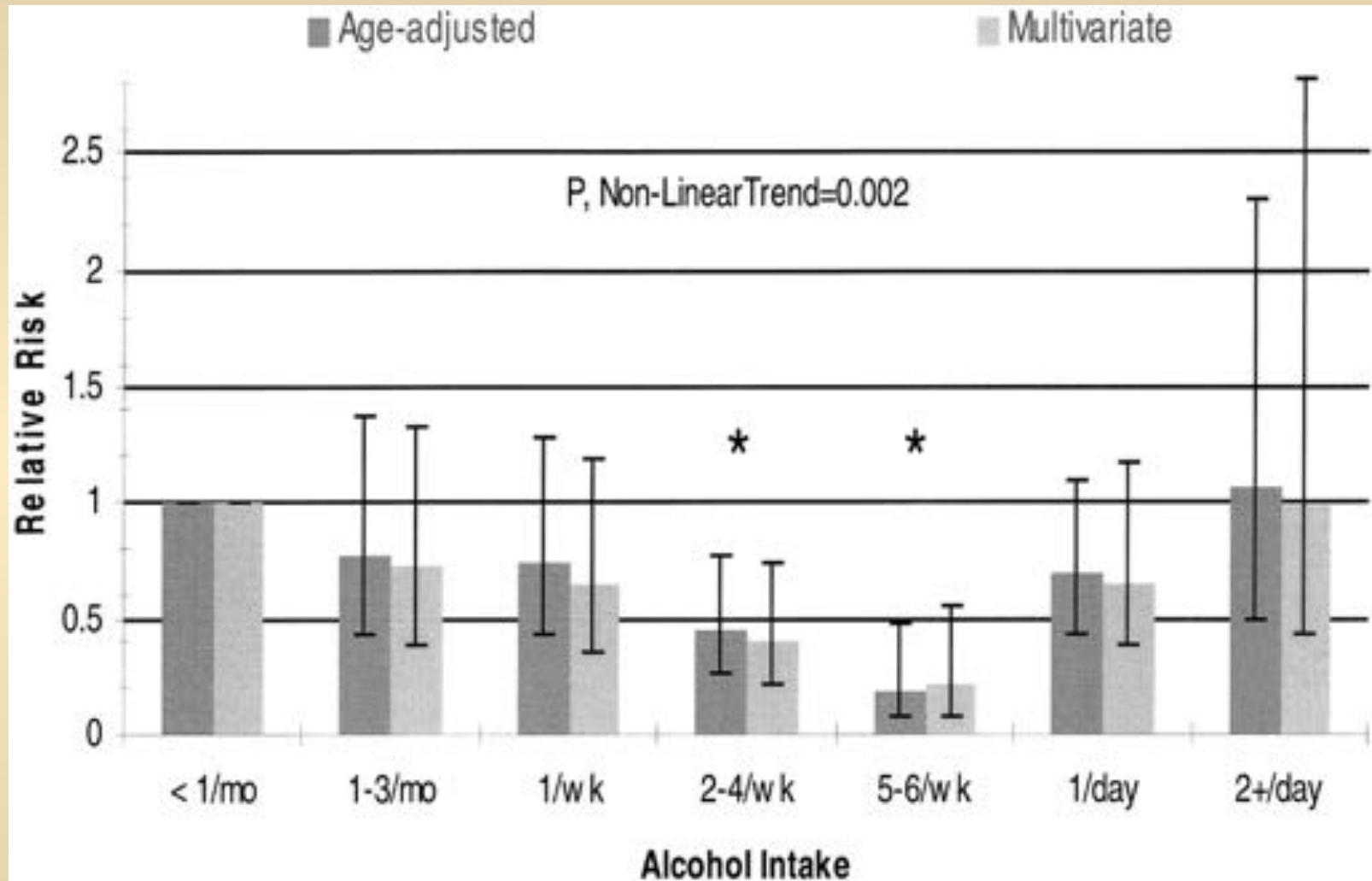


+

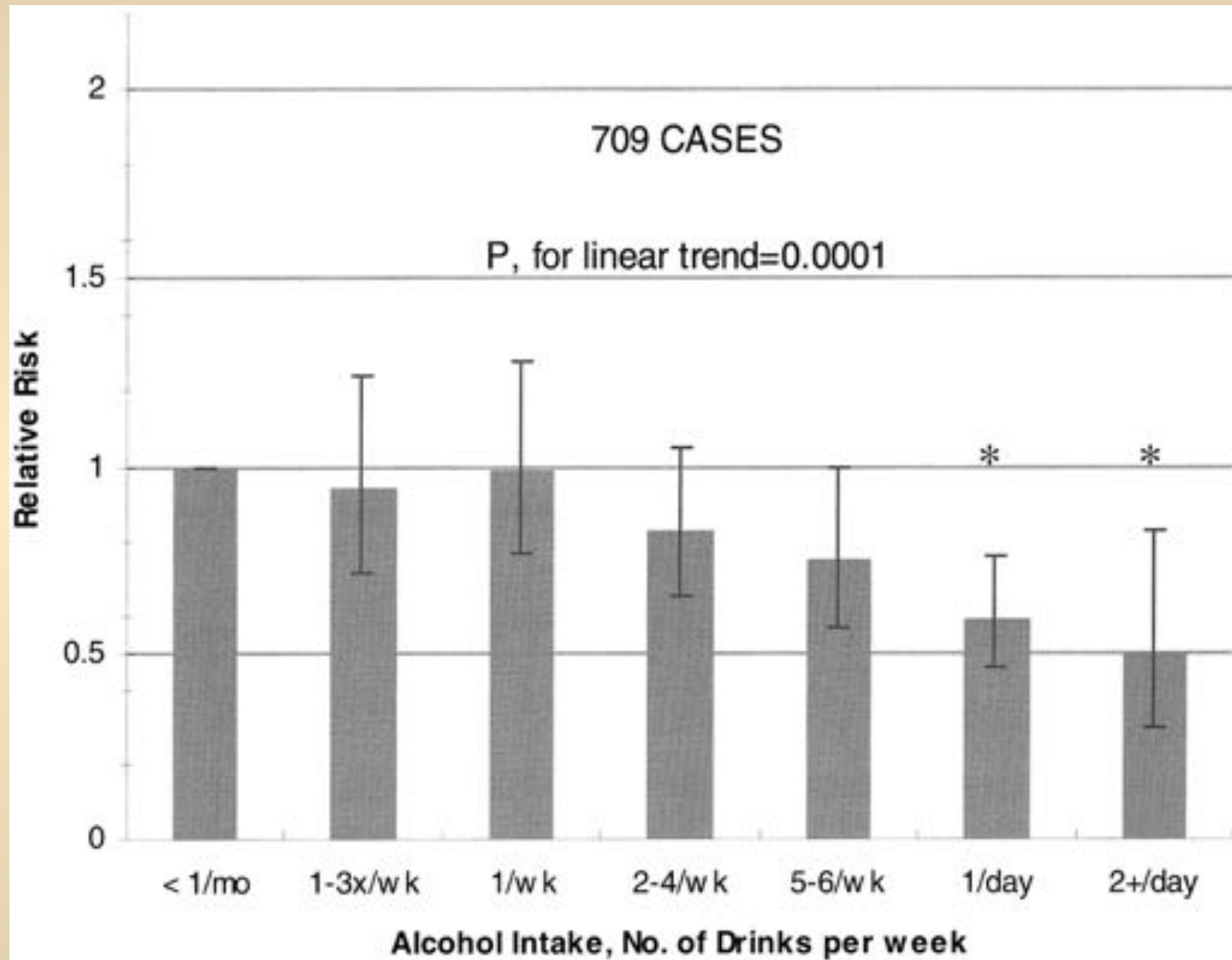
S1 400 / S2 240 ms = VT

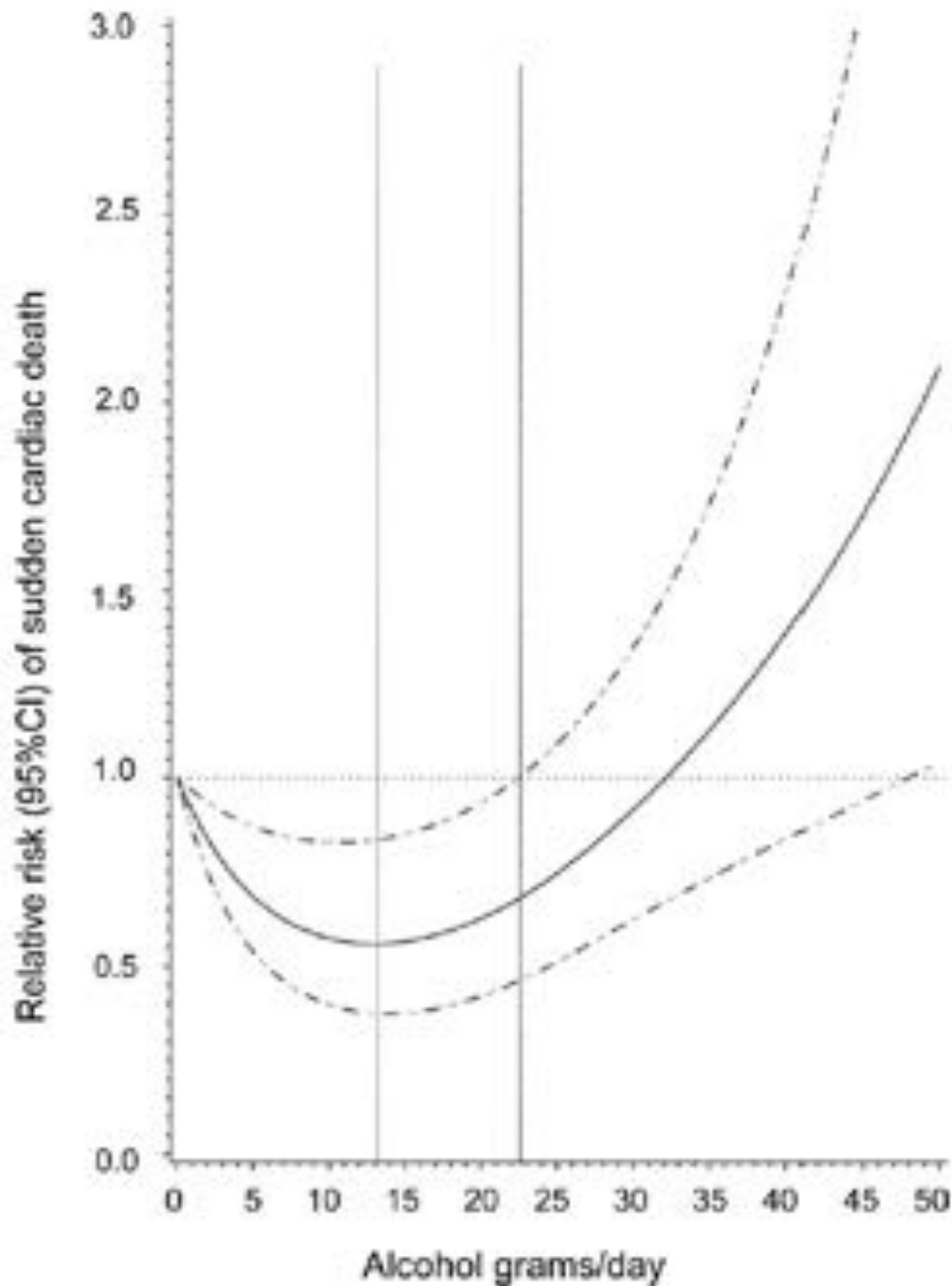


Age-adjusted and multivariate RR of SCD according to level of alcohol intake



Multivariate RR of nonfatal MI according to level of alcohol intake





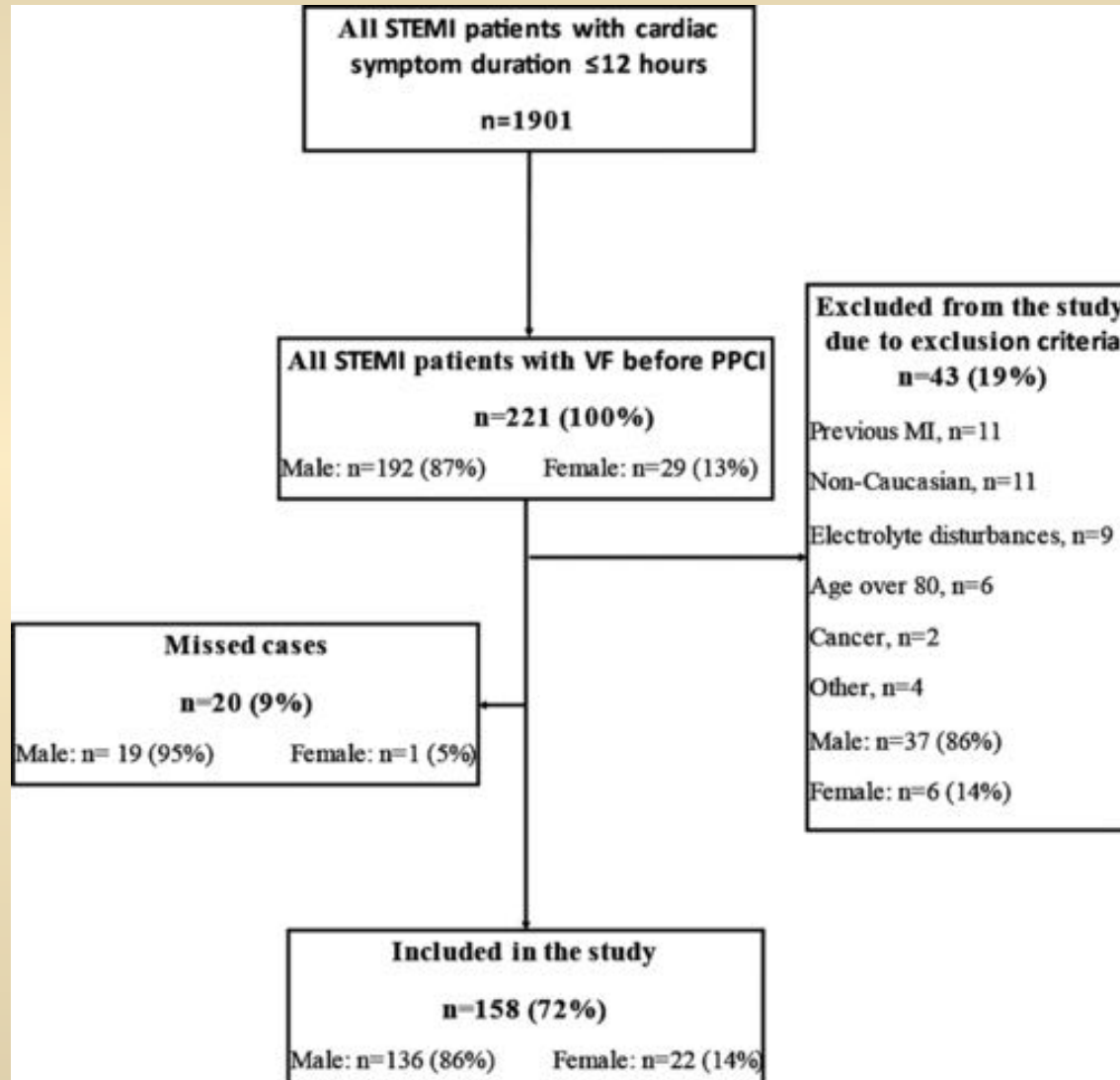
Multivariate relative risk of SCD in women as a function of alcohol intake

(nadir 5-15 g/day)

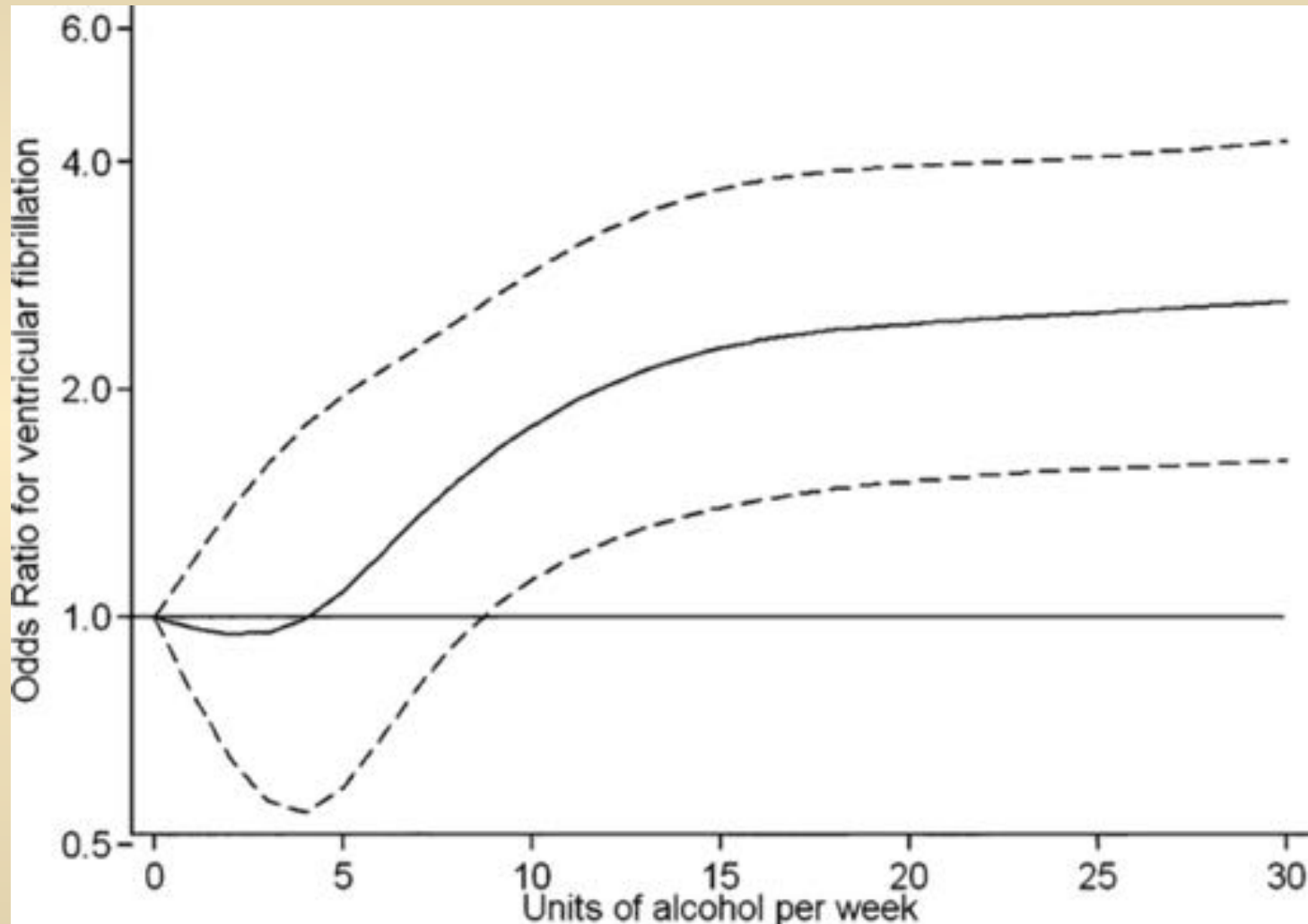
85 067 women from the Nurses Health Study who were free of chronic disease at baseline.

Chiuve SE et al., Heart Rhythm 2010;7:1374–1380

**Screening of STEMI patients for VF at 1 center (1/6/2011 – 31/5/2013):
All STEMI patients presenting to the largest center (Rigshospitalet)
were screened to estimate the incidence of VF prior to PPCI in STEMI**



Multivariate OR of VF before PCI as a function of alcohol intake in units per week



Jabbari R et al. J Am Heart Assoc 2015;4:e001399

The Role of Alcohol in New-Onset Atrial Fibrillation

Steven R. Lowenstein, MD; Patricia A. Gabow, MD; John Cramer, MD; Philip B. Oliva, MD; Karen Ratner, MD

• Forty cases of new-onset atrial fibrillation (AF) were reviewed to establish the frequency of various causes. Alcohol intoxication caused or contributed to 14 cases (35%). Coronary artery disease (22.5%) and pulmonary disease (22.5%) were also common causes of acute AF. Among patients less than 65 years old, alcohol caused or contributed to approximately two thirds (63%) of the cases of AF. Thyrotoxicosis was uncommon (one case in 40); no patient had a diagnosis of mitral stenosis, pulmonary embolism, or pericarditis. There were no complications of AF in alcoholic patients; the majority (88.9%) converted spontaneously to a normal sinus rhythm within 24 hours. Alcohol intoxication should be considered early in the differential diagnosis of new-onset AF in young patients. Many patients may not require admission to an intensive care unit or a costly battery of diagnostic tests.

(Arch Intern Med 1983;143:1882-1885)

Relative Risks of AFIB According to Alcohol Consumption in the Framingham Study

Alcohol (g/d)	Men and Women	
	Cases/Controls	RR (95% CI)
0	163/692	1.0
0.1–12.0	493/2,291	0.97 (0.78–1.22)
12.1–24.0	162/738	1.06 (0.80–1.38)
24.1–36.0	82/386	1.12 (0.80–1.55)
>36.0	155/565	1.34 (1.01–1.78)
p for trend [‡]		0.006

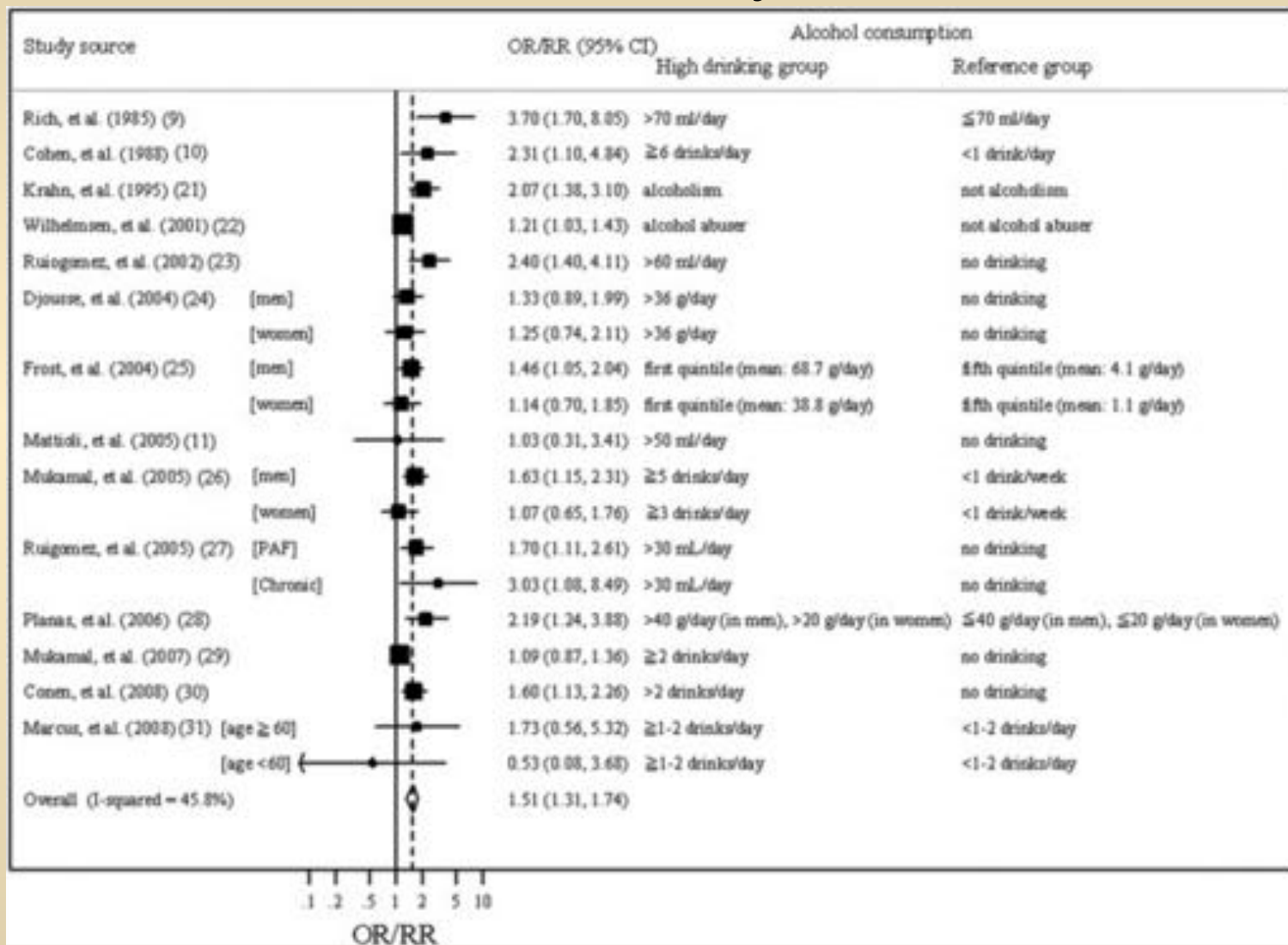
Alcohol Consumption and Risk of Atrial Fibrillation in Men and Women

The Copenhagen City Heart Study

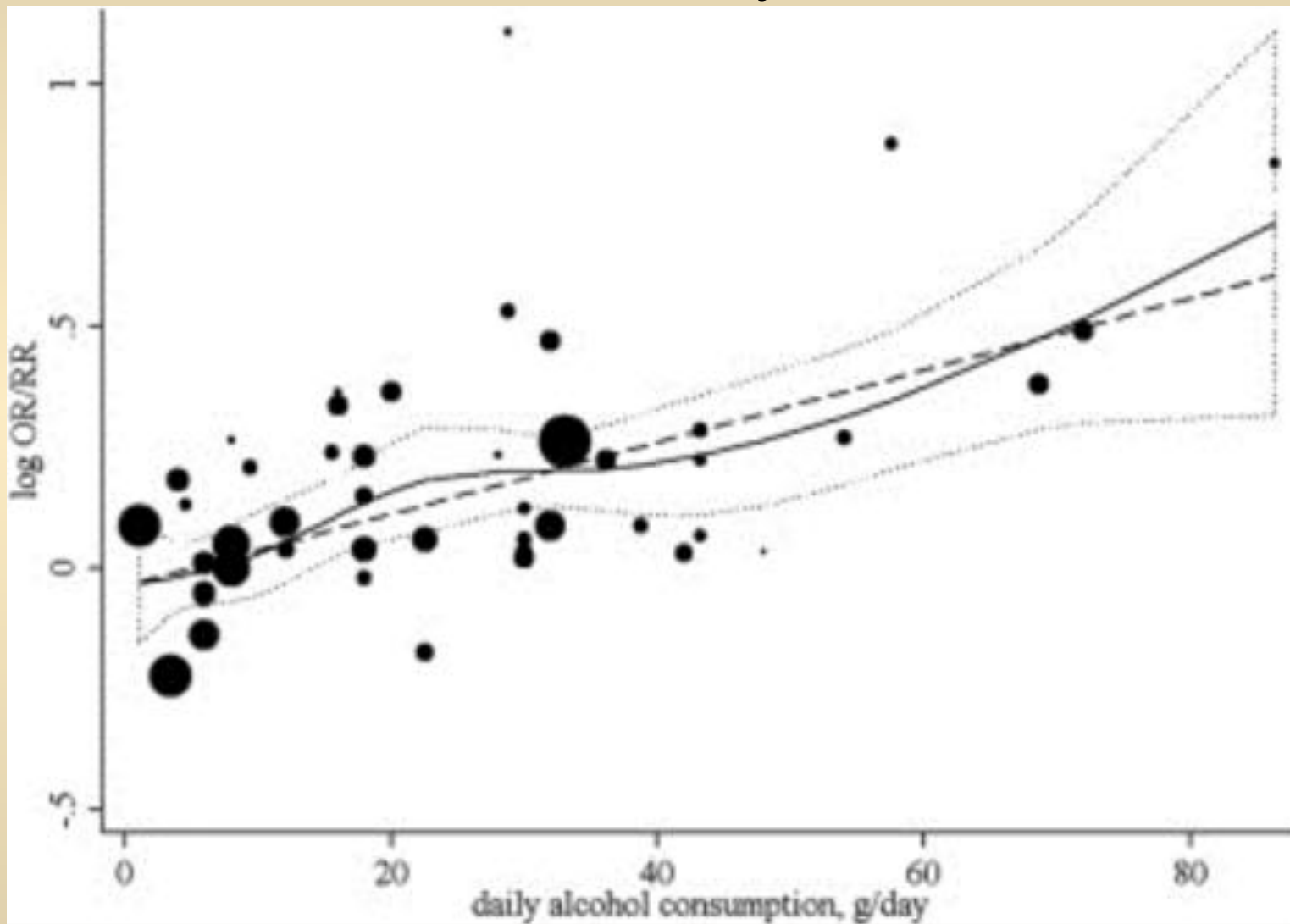
Kenneth J. Mukamal, MD, MPH, MA; Janne S. Tolstrup, MS; Jens Friberg, MD; Gorm Jensen, MD, DMSc; Morten Grønbaek, MD, PhD, DMSc

- Incident AFIB among 16 415 women and men, total of 1071 cases occurred during F-U
- consumption of >35 drinks / week among men was associated with a **hazard ratio of 1.45** (95% CI 1.02 to 2.04); few women consumed this amount of alcohol
- **Approximately 5% of cases of AFIB among men were attributable to heavy alcohol use.**

Alcohol Consumption and Risk of AFIB: Meta-Analysis

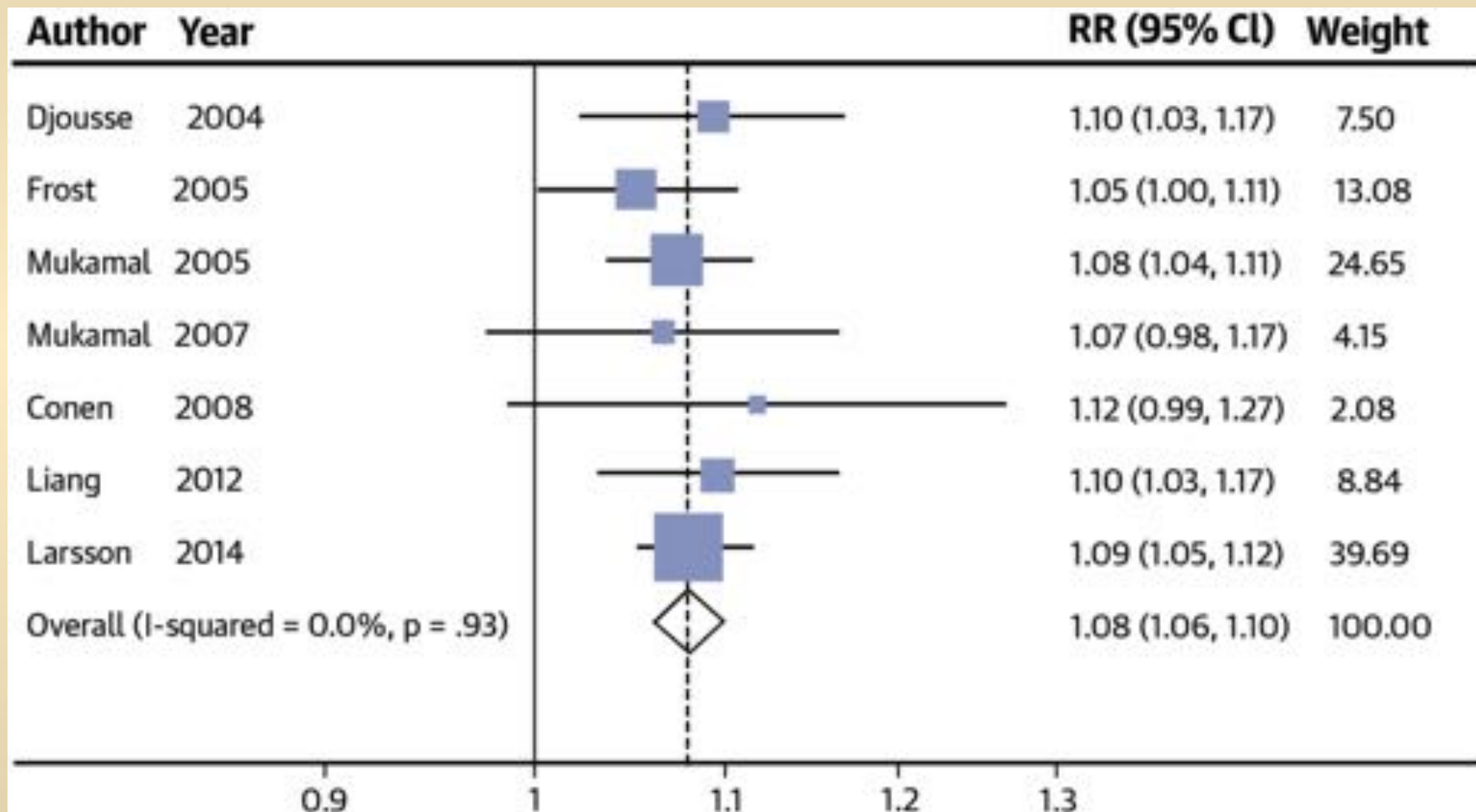


Alcohol Consumption and Risk of AFIB: A Meta-Analysis

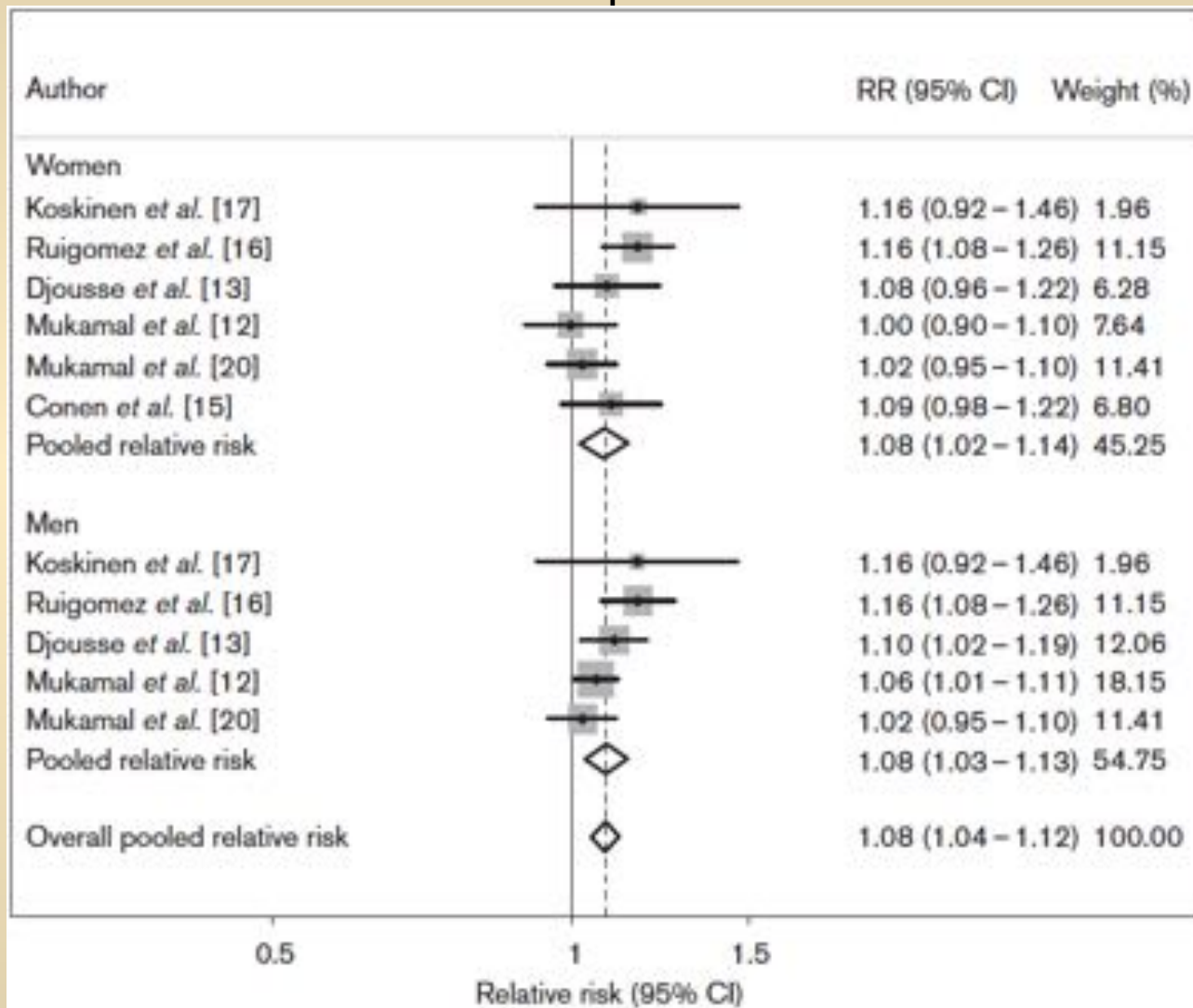


Alcohol Consumption and Risk of Atrial Fibrillation

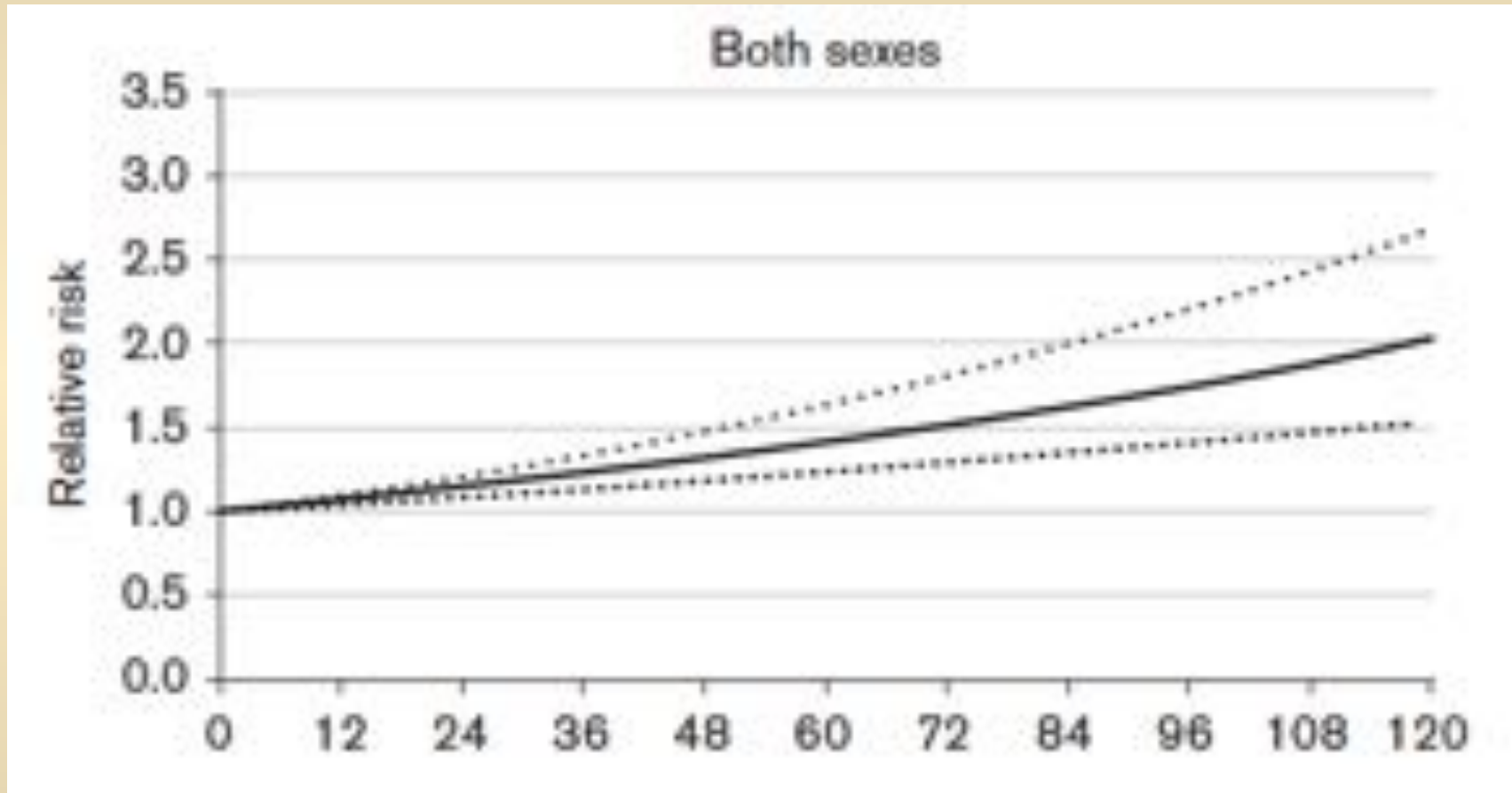
Relative Risks of AFIB Per 1 Drink / Day Increment in Alcohol Consumption



Epidemiological criteria for causality were met to conclude a causal impact of alcohol consumption on the onset of AF with a monotonic dose–response



Dose–response relationship between alcohol consumption and risk of atrial fibrillation



Relative risk of arrhythmias by alcohol consumption

Exposure category	RR	P value	95% CI
Both sexes			
>0–2 drinks/day ^a	1.00	0.989	0.92–1.09
>2–3 drinks/day ^a	1.11	0.097	0.98–1.25
>3–4 drinks/day ^a	1.22	0.028	1.02–1.46
More than 4 drinks/day ^a	1.50	0.000	1.22–1.85
Women			
>0–2 drinks/day ^a	0.99	0.775	0.91–1.07
>2–3 drinks/day ^a	1.17	0.032	1.01–1.36
>3–4 drinks/day ^a	1.17	0.353	0.84–1.65
More than 4 drinks/day ^a	2.18	0.001	1.38–3.43
Men			
>0–2 drinks/day ^a	1.02	0.718	0.90–1.16
>2–3 drinks/day ^a	1.09	0.275	0.94–1.26
>3–4 drinks/day ^a	1.25	0.045	1.01–1.55
More than 4 drinks/day ^a	1.53	0.000	1.23–1.91

1 drink = 12 g. CI, confidence interval; RR, relative risk. ^aReference group is nondrinkers.

Alcohol as RF for AFIB

Women consuming 24, 60 and 120 g of alcohol/day had relative risks of (vs. nondrinkers)

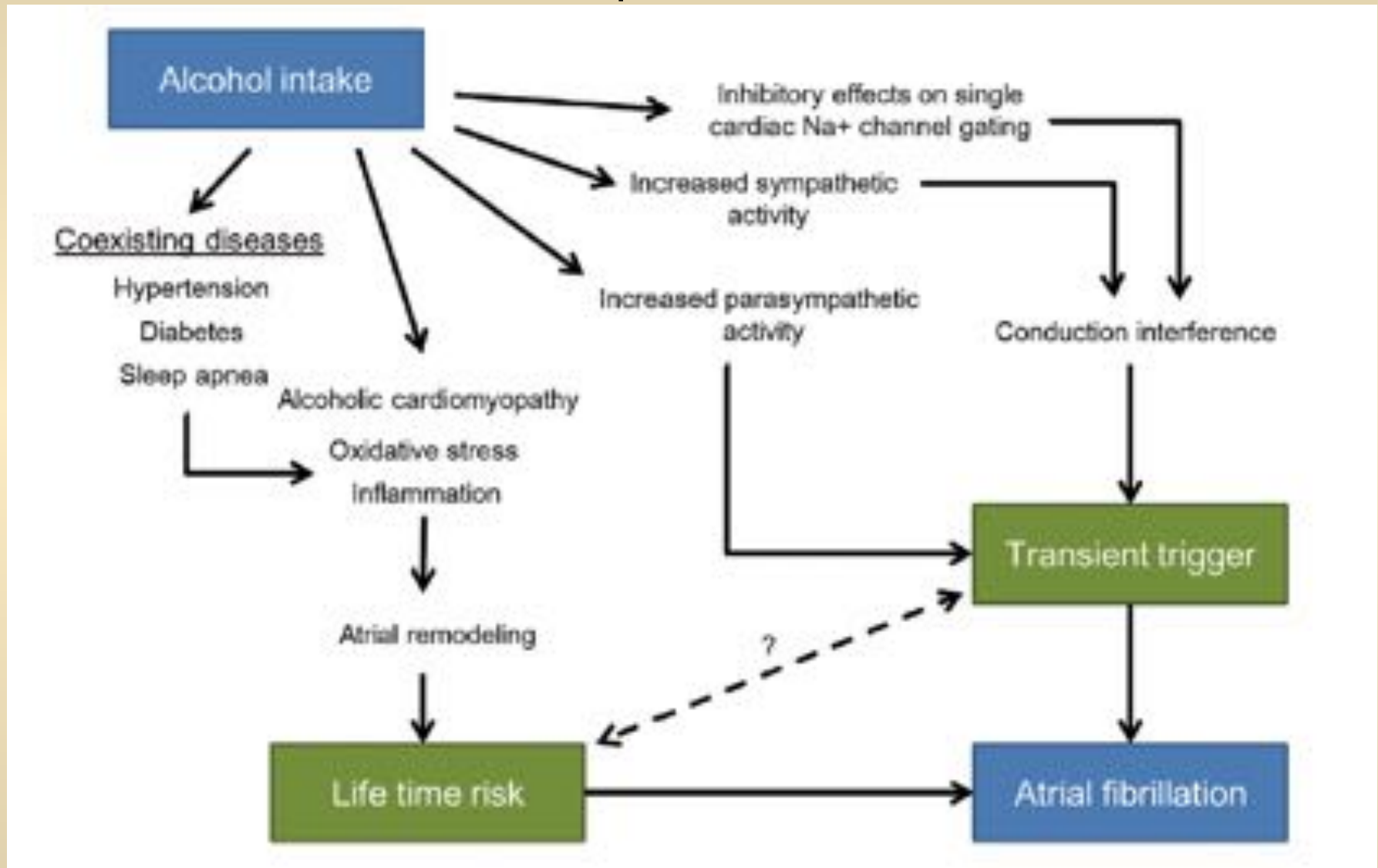
- **1.07** [95%confidence interval (CI): 1.04–1.10]
- **1.42** (95% CI: 1.23–1.64)
- **2.02** (95% CI: 1.60–2.97) Among

Corresponding risks for men:

- **1.08** (95% CI: 1.04–1.11)
- **1.44** (95% CI: 1.23–1.69)
- **2.09** (95% CI: 1.52–2.86)

Possible threshold of 3 and 2 drinks/day for men and women, resp.

Potential mechanisms of the relationship between alcohol intake and development of atrial fibrillation

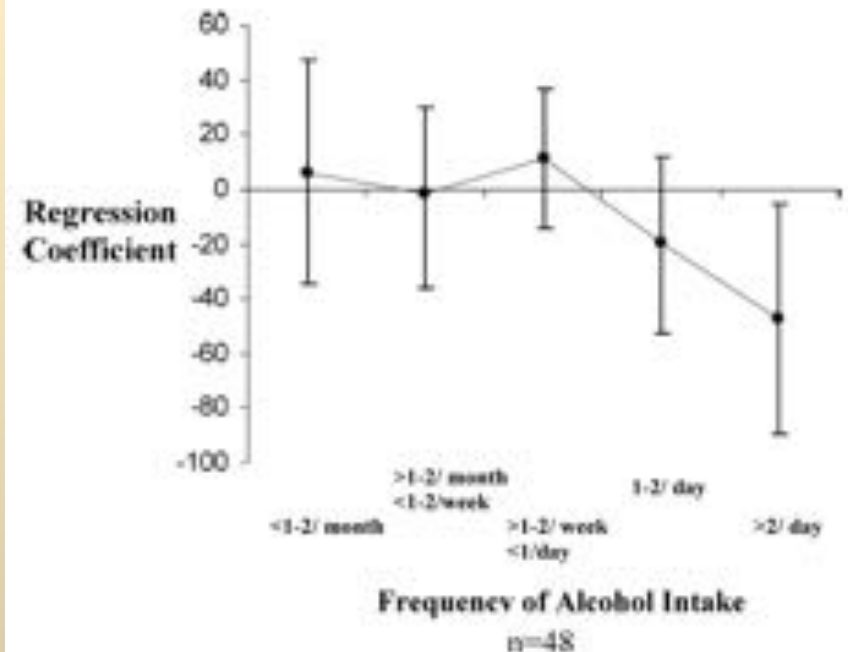


Alcohol Frequency (Drinks)	Odds Ratio	95% Confidence Interval	P Value for Each Level Compared to No Alcohol
<1-2/month	4.1	0.66-24.9	0.130
>1-2/month	15.7	1.8-134.8	0.012
<1-2/week			
>1-2/week	5.0	0.77-32.6	0.089
<1-2/day			
1-2/day	11.4	1.4-89.6	0.021
>2/day	52.4	0.89-3073.8	0.057

Odds Ratios for the Presence of AFL in Those ≤60 Years of Age for Progressive Alcohol Intake Compared to No Alcohol Intake

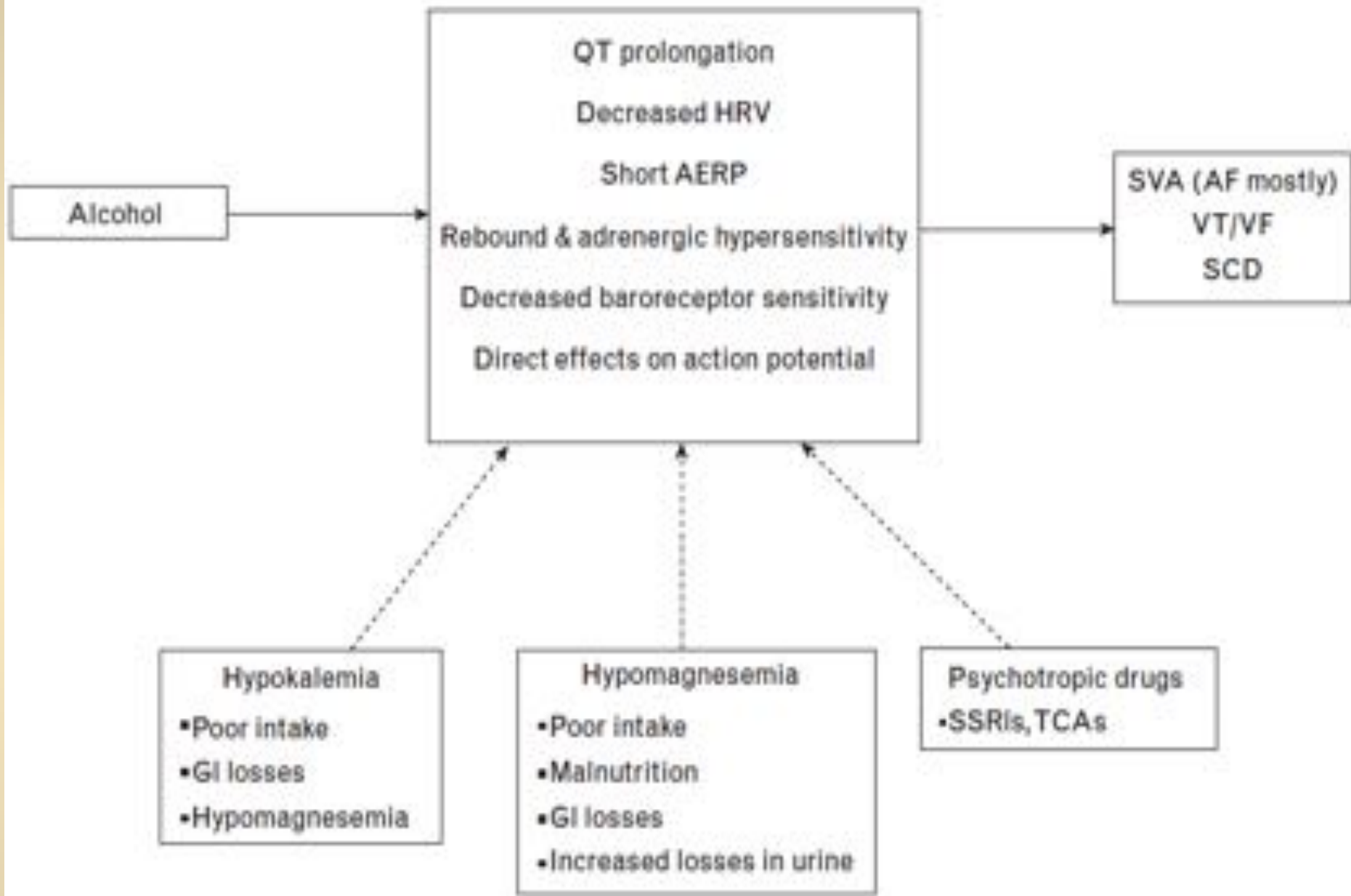
Atrial flutter and alcohol consumption

Increasing intake of alcohol is associated with shorter HRA ERPs



Alcohol and AFIB

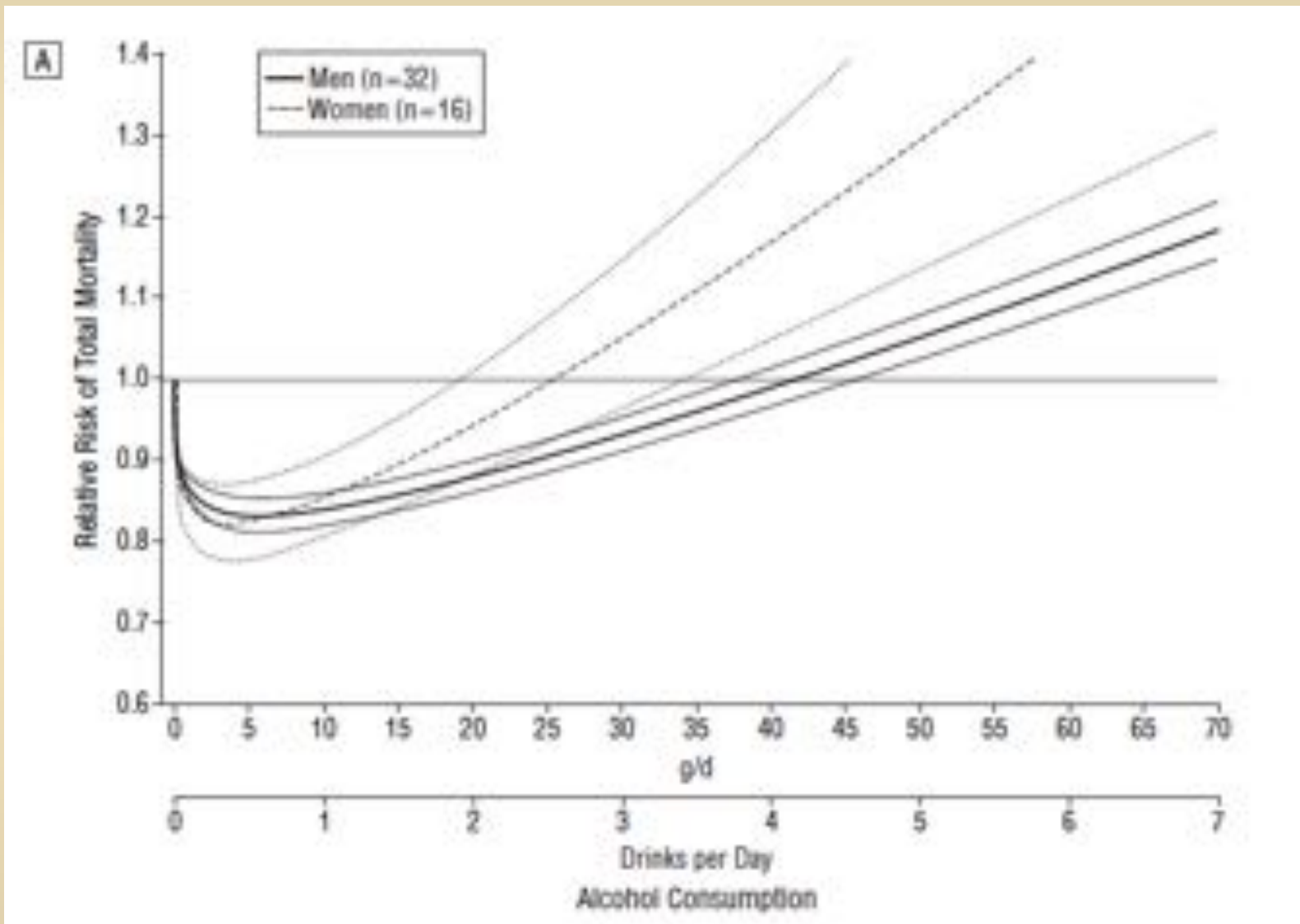
- The relationship between alcohol use and the development of AF is dose dependent, with higher amounts of alcohol associated with increased risk of AF and probably some increase in AF even at low doses of alcohol



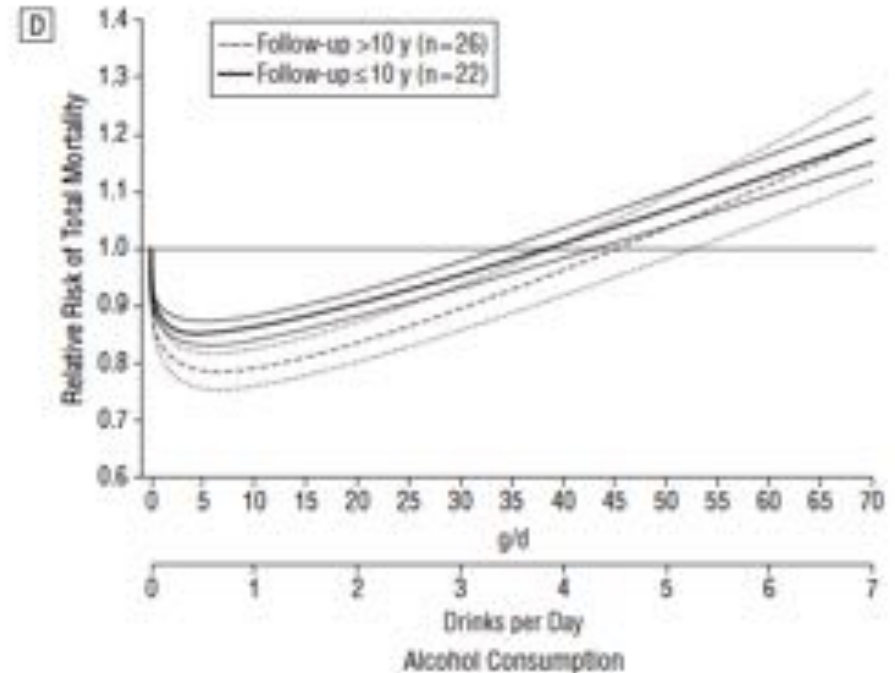
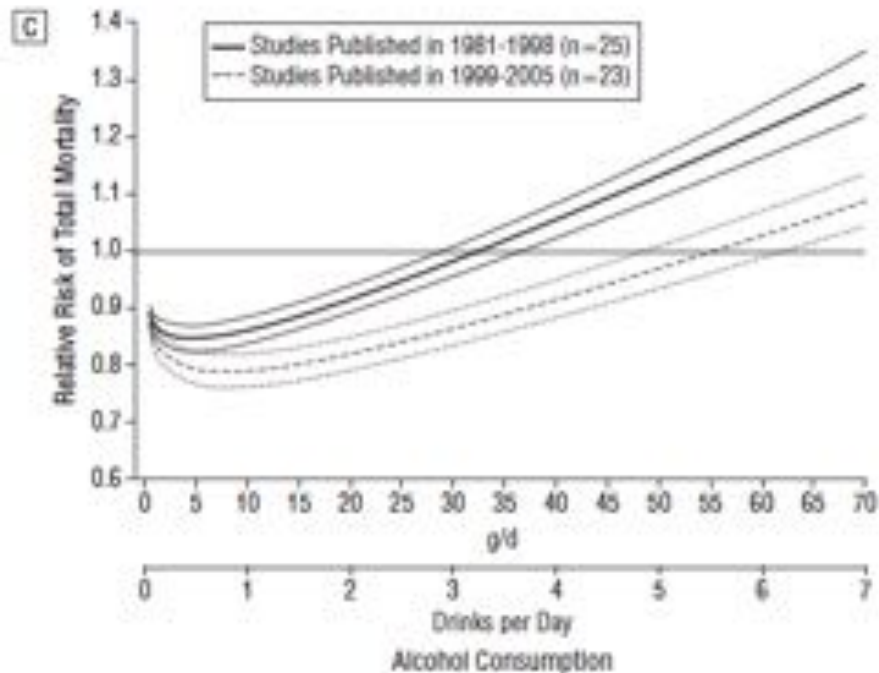
Potential mediators of alcohol-induced cardiac arrhythmias

Georg and Figueredo, J Cardiovasc Med 11:221–228

Relative risk of total mortality and alcohol intake in men and women



Relative risk of total and alcohol intake stratified according year of publication (C) and F-U duration (D)



What is the threshold for alcohol consumption related to arrhythmia ?

- In order to target lifestyle guidance, the “threshold” risk for alcohol is of crucial importance
- Threshold might be different according to the patient’s profile
- Defining individual threshold – a task for “precision” medicine

Alcohol and arrhythmias

- The relation of alcohol to arrhythmias has strong evidence, based on epidemiological studies, basic science investigations and animal models
- **Binge drinking is the model situation for acute ethanol effects on healthy hearts – clinically relevant atrial and ventricular arrhythmias were described**
- The exact relationship between alcohol and arrhythmias continues to be controversial (RCT addressing these issues improbable ...).

Alcohol, arrhythmias and the heart

- With moderate alcohol consumption (≈ 1 drink per day) the protective effect might outweigh the questionable proarrhythmic effect, except in patients with preexisting arrhythmia and / or SHD.
- High alcohol consumption is definitely proarrhythmogenic both in acute and chronic settings