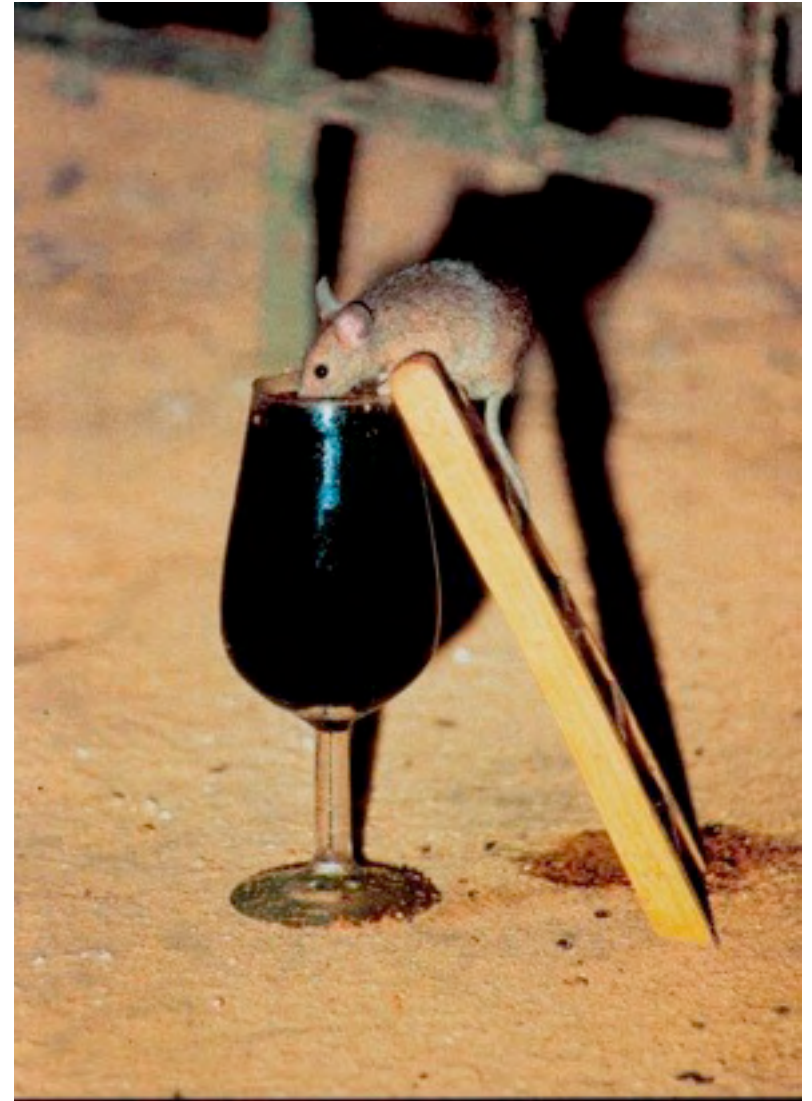


# Alcohol: dietary enhancer, crafty drug

Jonathan Chick

Queen Margaret University  
February 2011



Alcohol is a pervasive, toxic molecule, with  
a toxic breakdown pathway

*Yeasts make it from fruit sugars.*

*Possibly originally evolved by primitive  
yeasts, to deter other micro-organisms  
from pilfering their food source*

# Evolutionary advantages of adaptation to ethanol

Our fruit-eating anthropoid lineage : 40 million years of exposure to low-level dietary ethanol in fermenting fruit

Adaptive primate behaviours

- *smelling ethanol helps to localize fruit crops,*
- *using ethanol as an appetite stimulant to facilitate rapid consumption of transient nutritional resources*

## Slow Loris



**Some animals have adapted to have it as almost their entire food source:**

Fruit flies, some butterflies, some birds (waxwings) some mammals

Fermented palm-tree nectar regularly consumed by some primates, e.g. slow loris)

**And others quite like it :** goats sheep elephants (noted for a tendency sometimes to overdo it)

*\*W.C.McGrew, Corpus Christi College, Cambridge*

*Why would any animal seek to consume a toxic substance? What benefits might there be?*

**Nutrition?** (25ml of vodka = 1 unit,, contains 52 calories; 175ml of 13% wine = 2.3 units contains 134 calories) (cf: 50g packet of potato crisps 300 calories)

**Medicinal?**

**Disinhibition?**

**Sociability?**

# Stimulates appetite?

Yes, and more is eaten ( the extra calories are not compensated for!)

Caton et al *Physiol Behav.* 2004, 81:51-8.



# Aids digestion?

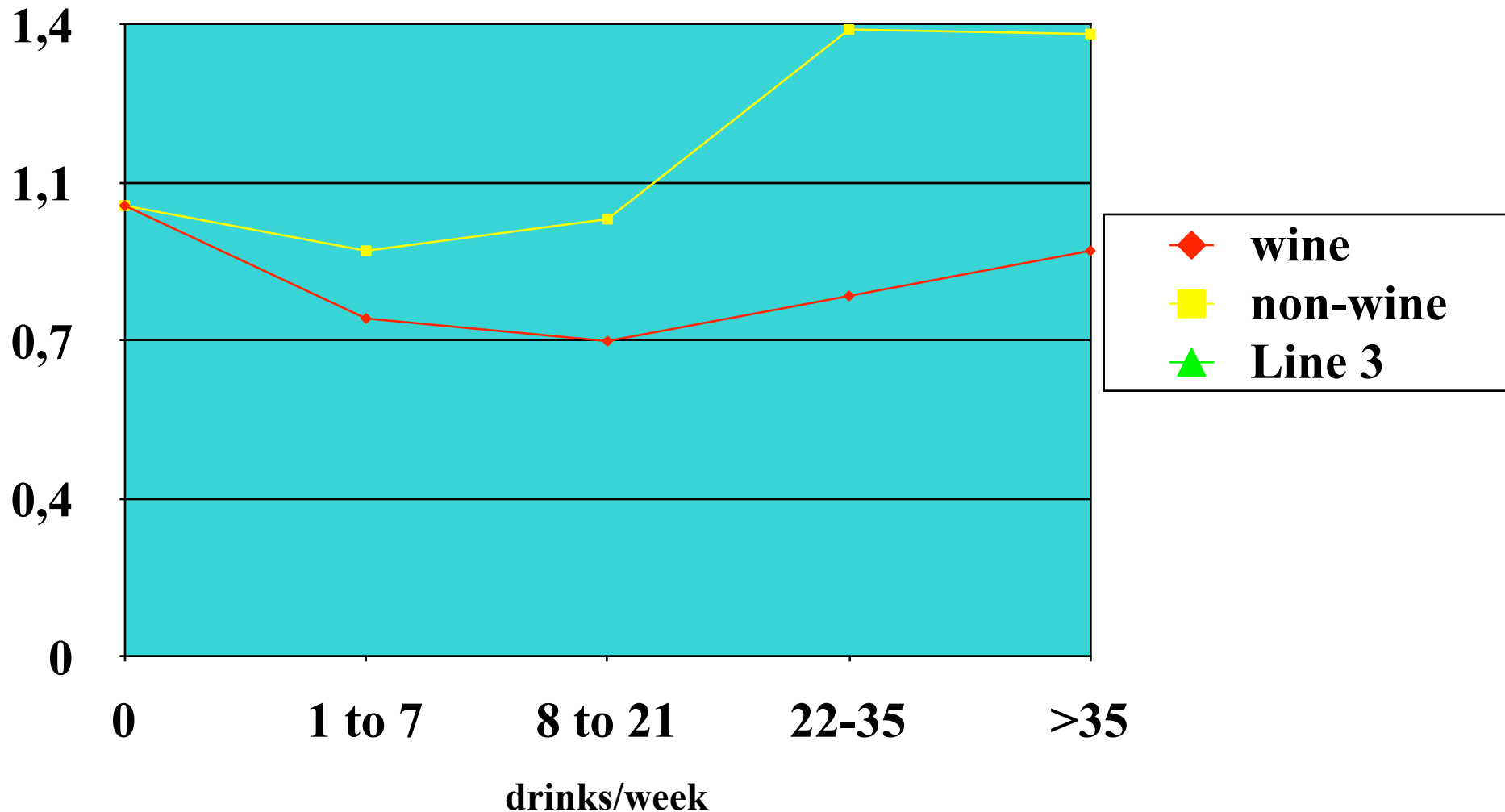
No!

- ‘Gastric emptying was faster when cheese fondue was consumed with black tea or water than with wine or schnapps’

Heinrich et al, *BMJ*, 2010. 341:c6731



**The J-shaped curve:** mortality, all causes, relative to abstainers. Copenhagen n=24,523 (adjusted for age,sex,smoking,educational level, physical activity,BMI)  
(Grønbæck et al Ann Int Med 2000;133:411-9)





# ‘Uncontrollable confounding’

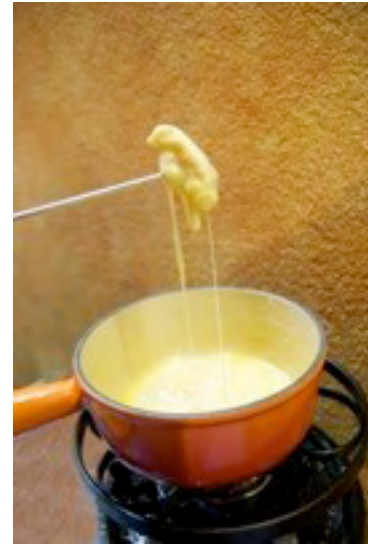
- Sociability means better health ( ...even get jobs because they meet people!)
- Diet
- Unknown!

***Cautionary tale of hormone replacement and coronary heart disease*** An association may not be revealed to be an artefact until there is a randomized controlled trial.

(Jackson et al., Lancet, 2005)

# **Mechanisms whereby alcohol could reduce risk of thrombotic strokes and coronary artery disease**

- Reduce platelet stickiness
- Reduce post-prandial circulating fibrinogen
- Increase 'good' (HDL) lipoproteins
- Reduce risk of mid life diabetes



# Heart disease rates higher in Northern Ireland than France

Ruidavets et al, BMJ 2010, 341:c6077

Over 50g (= 6 units) - in a session once a week: doubles the risk heart disease

The French tended to drink wine (regularly in smaller doses);

The Irish drank their beer and spirits in more concentrated sessions

(Glasgow: Monday is the commonest day to die of a heart attack!)

***(Diet may confound!)***

# Other than its usual dose-pattern, does Wine contain protective ingredients?

Gill J, Tsang C, Black H, Chick J.  
*Alcohol Alcohol.* 2010, 45:398-400



Red wine

White wine

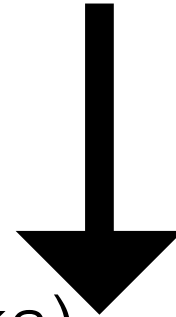
Beer

lager

Whisky/ (*Kassipu* – Sri Lanka)

Rice distillate (Laos)

White cider/vodka



*anti-oxidant*

*content*

# Alcohol and the cardiovascular system - Summary

Over 50yrs old, regular light to moderate drinking slightly reduces risk of coronary artery disease and occlusive strokes:

Diet, weight, exercise are more important.

Heavy session drinking can cause heart attacks and strokes

Regular heavy drinking increases risk haemorrhagic stroke

“Talking about alcoholism without talking about the positive aspects of alcohol is like trying to understand the car by looking at road accidents” Selden Bacon, 1943

*Practice point: If you recognise the benefits that patients perceive from their drinking, you find that they then attend to the harms!*

# Crafty drug: dose!

We now have *ad libitum* access to a molecule previously scarce

# Εὐβούλιος 400b.c.

For sensible men I prepare only 3 kraters:

the 1st is for health, the 2nd for love and pleasure, and the 3rd for sleep.

After the 3rd is drained, wise men go home.

*The 4th krater is not mine anymore – it belongs to bad behaviour;*

*the 5th is for shouting;*

*the 6th is for rudeness and insults;*

*the 7th is for fights;*

*the 8<sup>th</sup> is for breaking the furniture;*

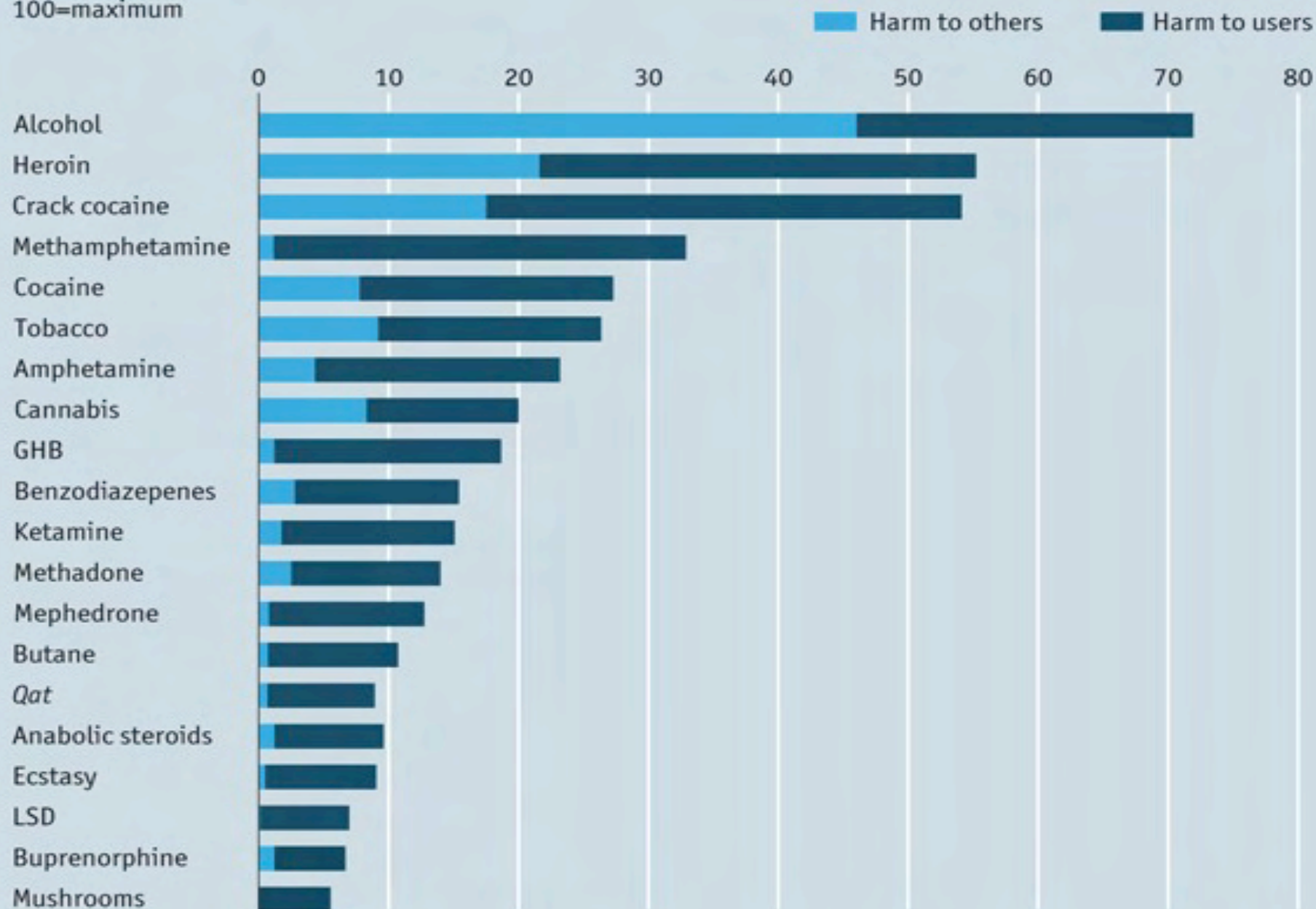
*the 9<sup>th</sup> is for depression,*

*the 10<sup>th</sup> is for madness and unconsciousness*



## Harm caused by drugs

100=maximum



Source: "Drug harms in the UK", by David Nutt et al. *The Lancet*

# Leading causes of death (England & Wales), women age

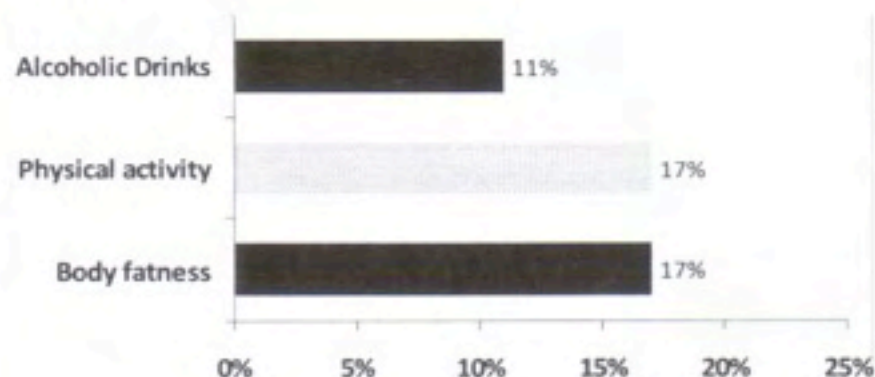
Number of deaths

Breast cancer	1,925
Liver disease	879
Ischaemic heart disease	762

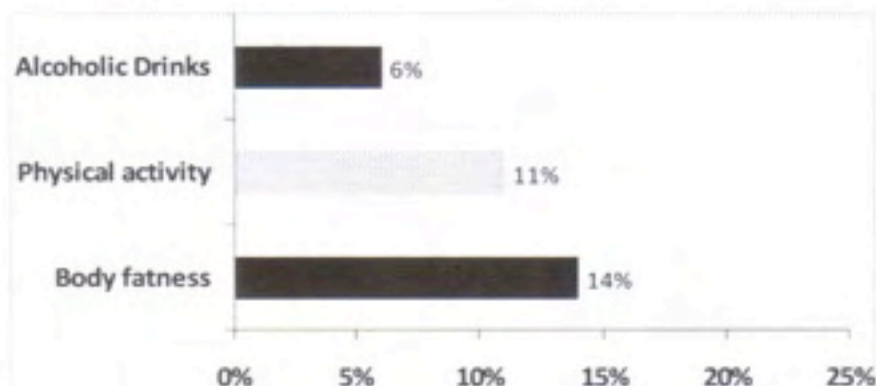
ONS data for 2003

# Preventability estimates of breast cancer for specific risk factors across countries

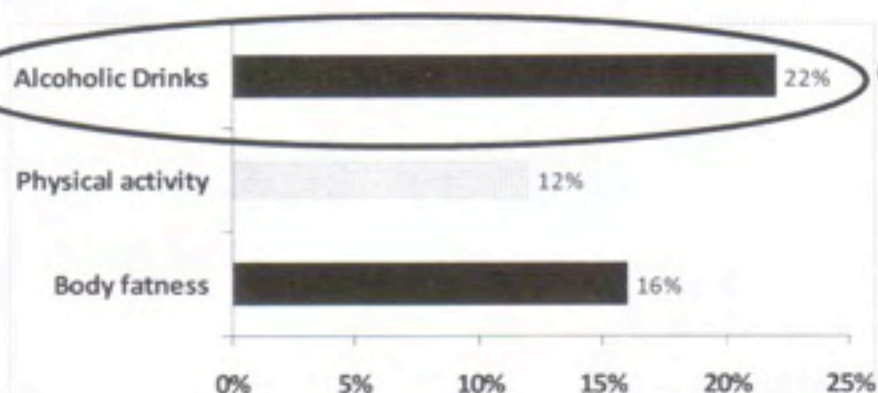
## USA



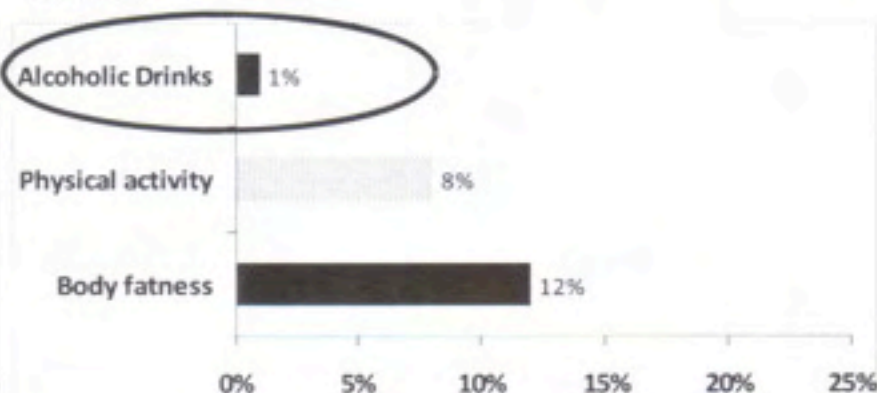
## Brazil



## UK



## China



## *Dose: guidelines since 1970's!*

Current UK government guidelines =  
'Sensible drinking' (1995)

“Adult men should not regularly drink more than 3-4 units of alcohol a day and adult women should not regularly drink more than 2-3 units a day”

# ‘Education’ and labelling

There is no evidence that having read labels on bottles is associated with lower consumption

*MacKinnon and Nohre, 2006 ‘Alcohol and tobacco warnings’*

# Labelling and 'knowledge'



*We don't know how many units we're drinking:*

O'May and Gill asked 300 employees to pour 'a drink': on average, drinks contained 2.05 units. Only 27% of respondents estimated the unit content of their drink within 10% of the true value. *Alc Alcohol*, 2007.42: 436-441

(Women students: 14% said guidelines influenced their drinking)

# *Advice can help those who are seeking help*

*In hospital and General Practice 'brief intervention' helps those who are seeking medical help at that point for a possibly related matter (e.g. [Chick](#), et al, BMJ, 1985)*

*c.f. Some reduction in consumption, in Leeds Univ. And QMU students who took part in an internet education exercise*

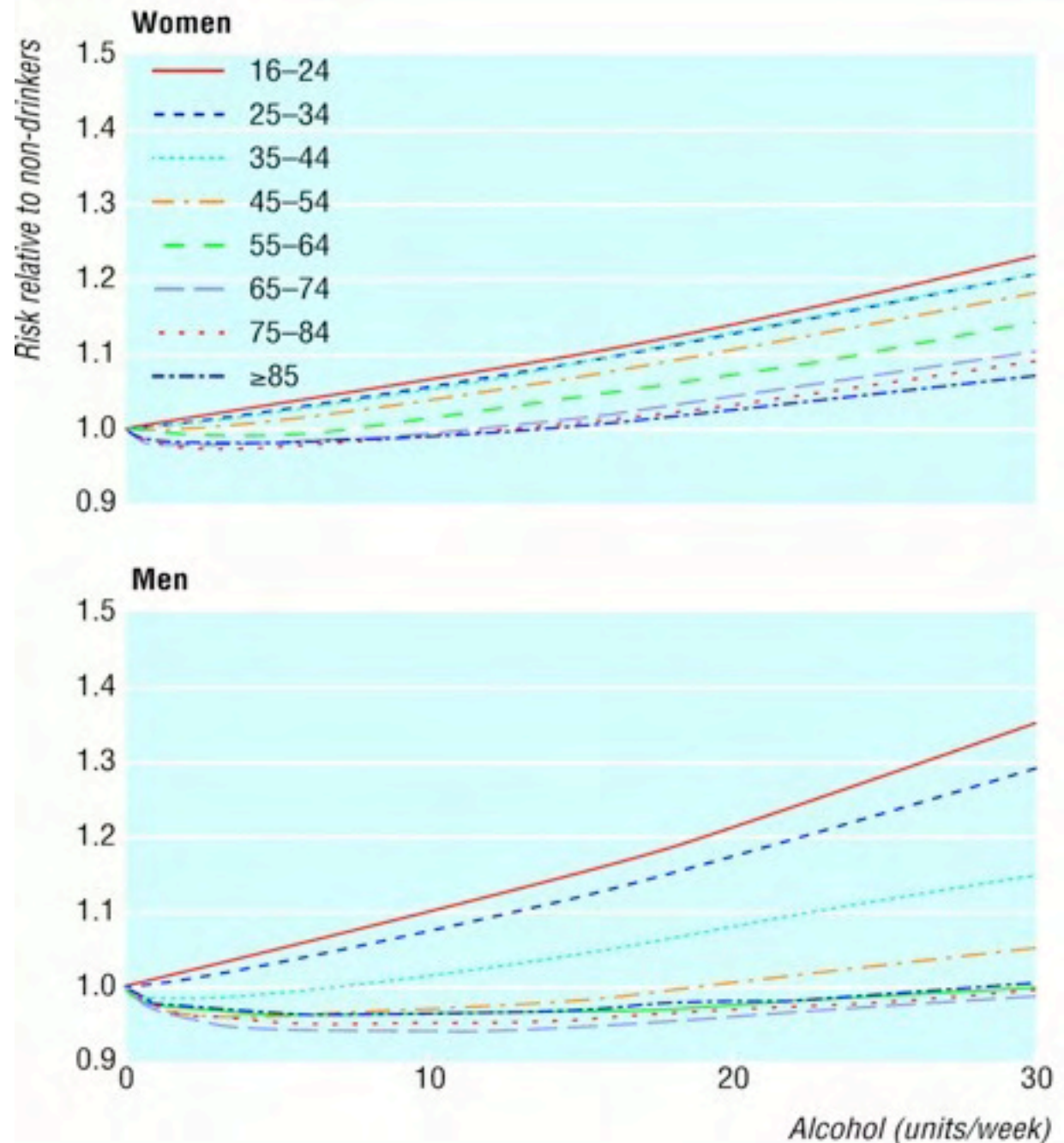
[Bewick BM](#), [Gill J](#), [O'May F](#), et al *J Med Internet Res.* 2010; 2 :e59



***Where is the  
J-shape  
curve in this  
UK data?***

**Risk of all cause  
mortality (relative to  
non-drinkers) by  
level of alcohol  
consumption**

*White et al. BMJ  
2002;325:191*



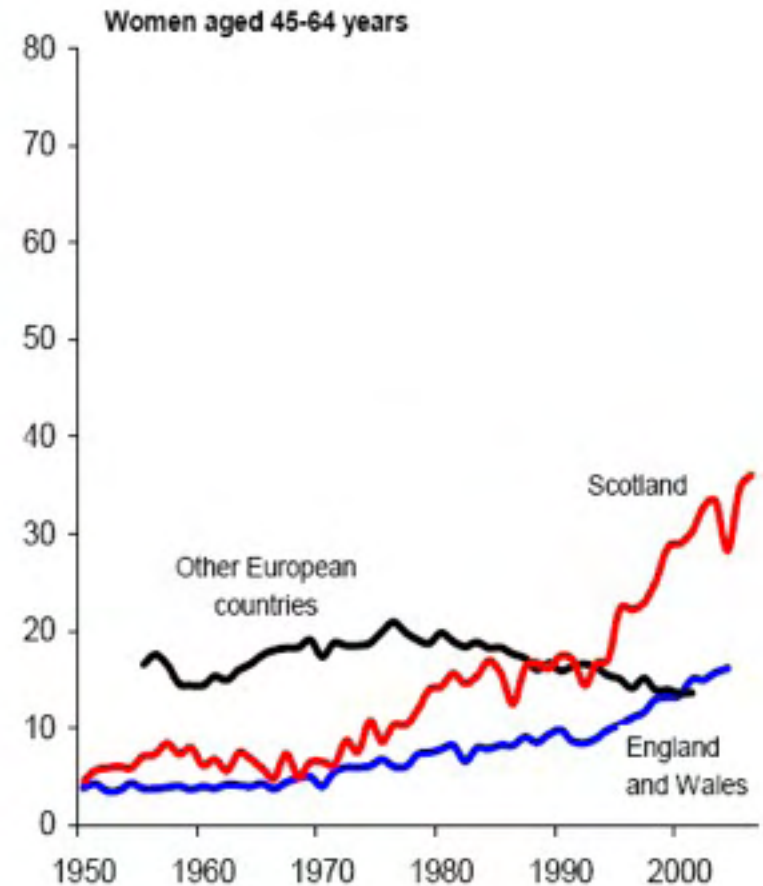
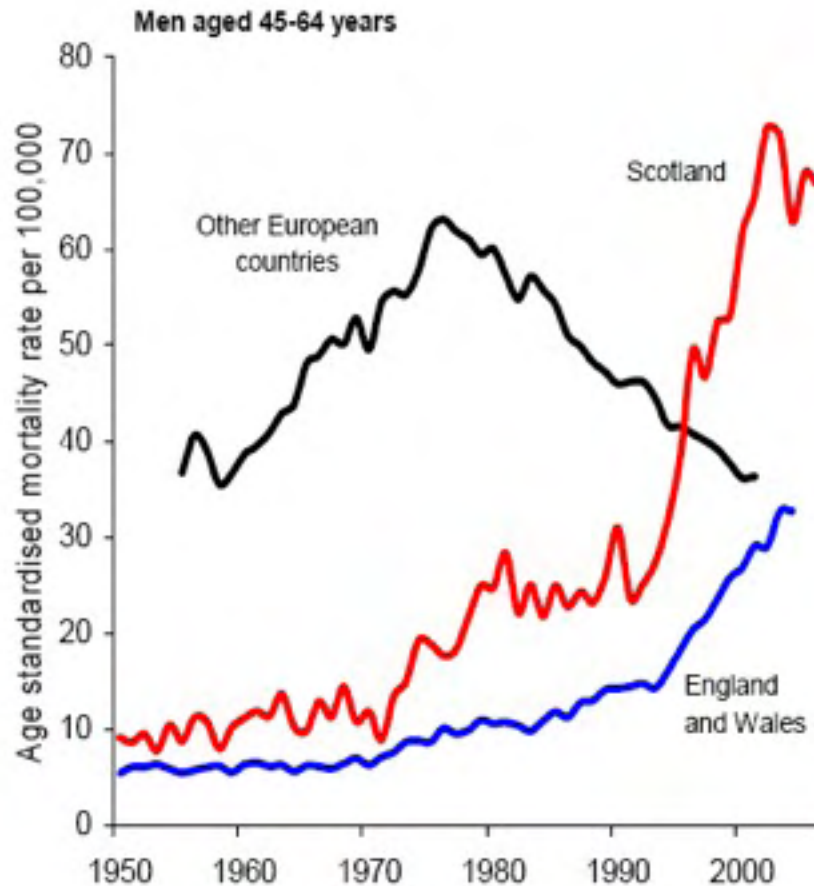


# Health Survey for England, 2009

Adults who drank in the last week

- More than twice the limit on at least one day:  
men 35%; women 27%

# Liver Cirrhosis Death Rates 1950 - 2006



*Lancet 2006; 367: 52-56*

*David A Leon, Jim McCambridge*

A transplanted liver for alcoholic liver disease is expensive, but life

NB: Out of 100, 1 in 5 resumed harmful drinking (highest risk in those who continued to smoke i.e. Feeding addictive circuits of the brain)

Kelly, Chick, et al, (2006) *Alcohol & Alcoholism* 41: 278-283,

Can we replace the northern  
European drinking style with the

The grape *versus* grain and potatoes  
Scandinavia and elsewhere:

**new customs are added to, rather  
than replace, the old**

# Availability: taxation

Significant reductions in mortality related to chronic heavy alcohol consumption follow increases in alcohol taxes

e.g.

Maldonado-Molina, Wagenaar **(2010) Effects of alcohol taxes on alcohol-related mortality in Florida: time-series analyses from 1969 to 2004.** *AlcClin Exp Res* 34:1915-21

# Availability: pricing

Price lowering

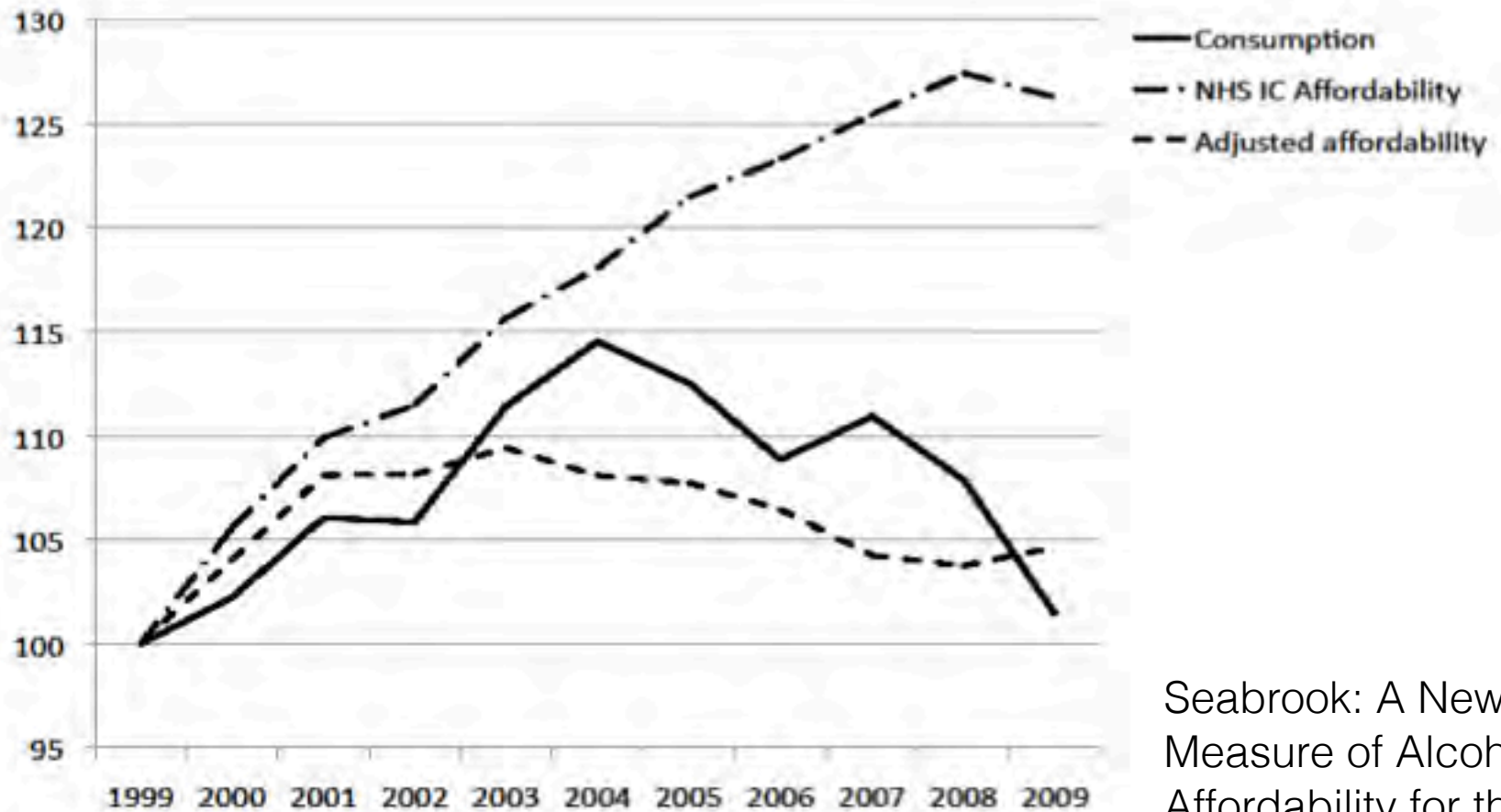
- use by supermarkets as loss-leader
- reclaiming VAT on ‘promotional deals’

3 litres of 5% cider at Tesco for £2.79.

“That’s less than the price of a pint of beer in many pubs.”

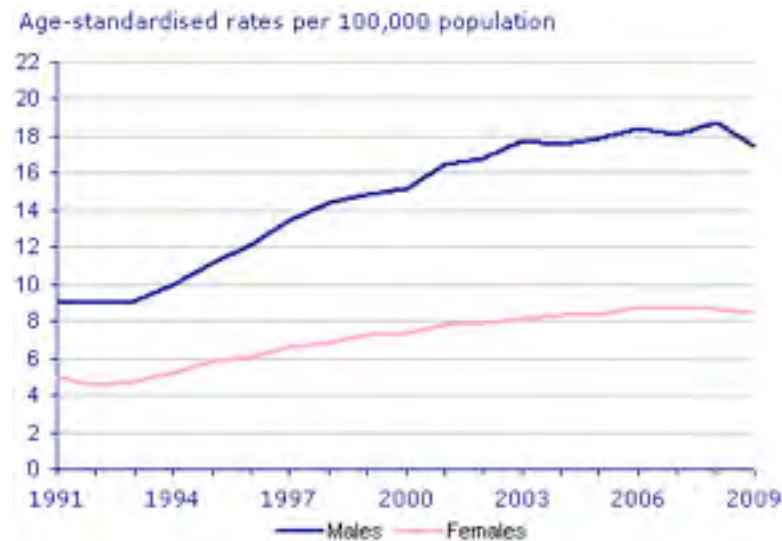
**The relative price of alcohol has fallen by 70% since 1980 and consumption has tripled.**

# Availability: Affordability



Seabrook: A New Measure of Alcohol Affordability for the UK *Alcohol and Alcoholism* , 45 581–585, 2010

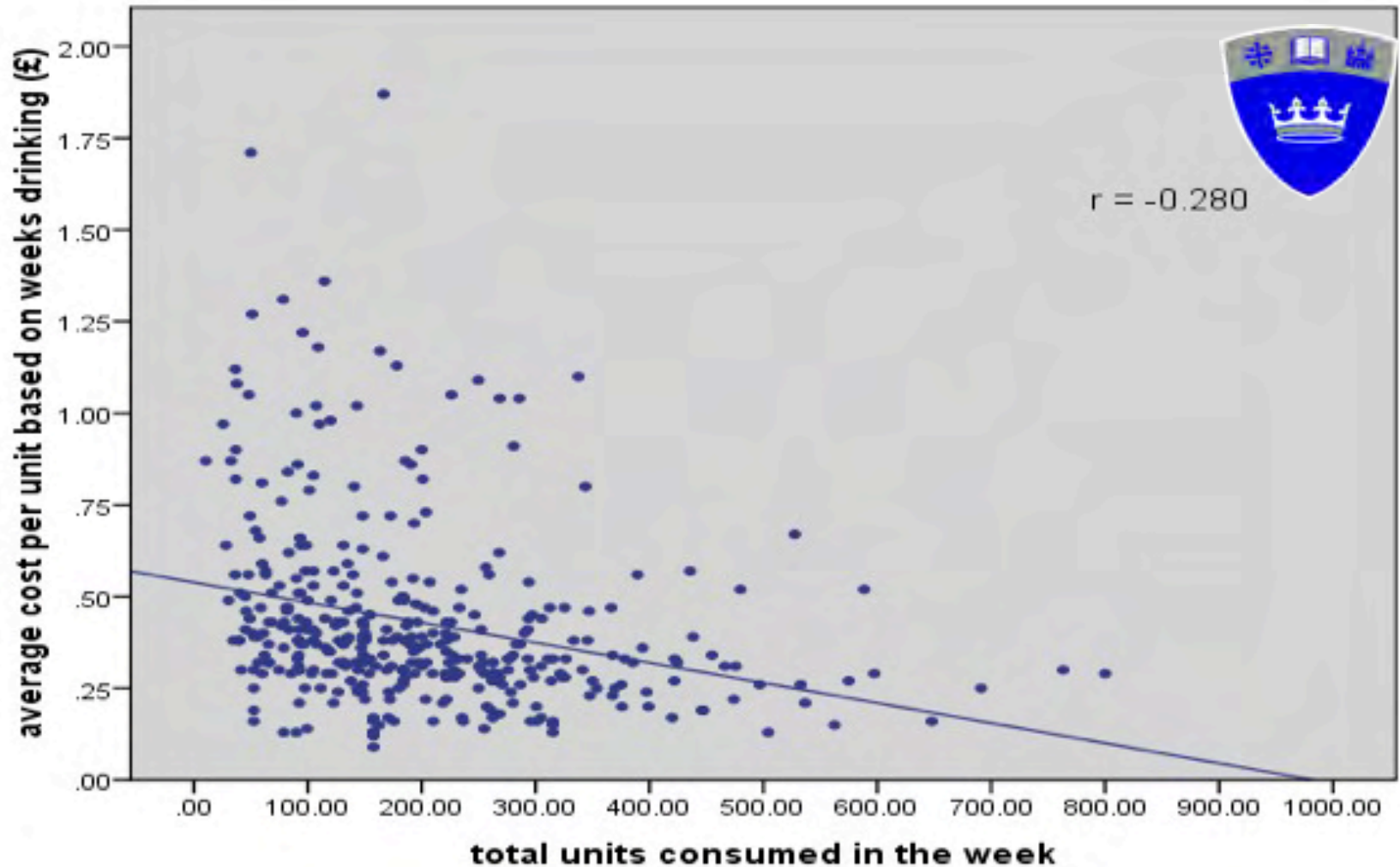
# Alcohol-related death rates by sex, United Kingdom, 1991-2009 (ONS,





# Beverage type and price paid by drinkers ill due to excess alcohol, compared to purchasing by wider population

(“The price of a drink” Black et al. *Addiction* 2011)



# Drinkers made ill due to alcohol: compared to wider Scottish population

(“The price of a drink”, Black et al, *Addiction*, 2011),



- 93% of patients' alcohol is purchased off-licence (wider population: 69%)
- Favourites: cheap vodka and 'white cider'
  - White cider as low as £0.09 per unit
  - White cider is 16.0% of their consumption (only 0.009% of the wider population's )

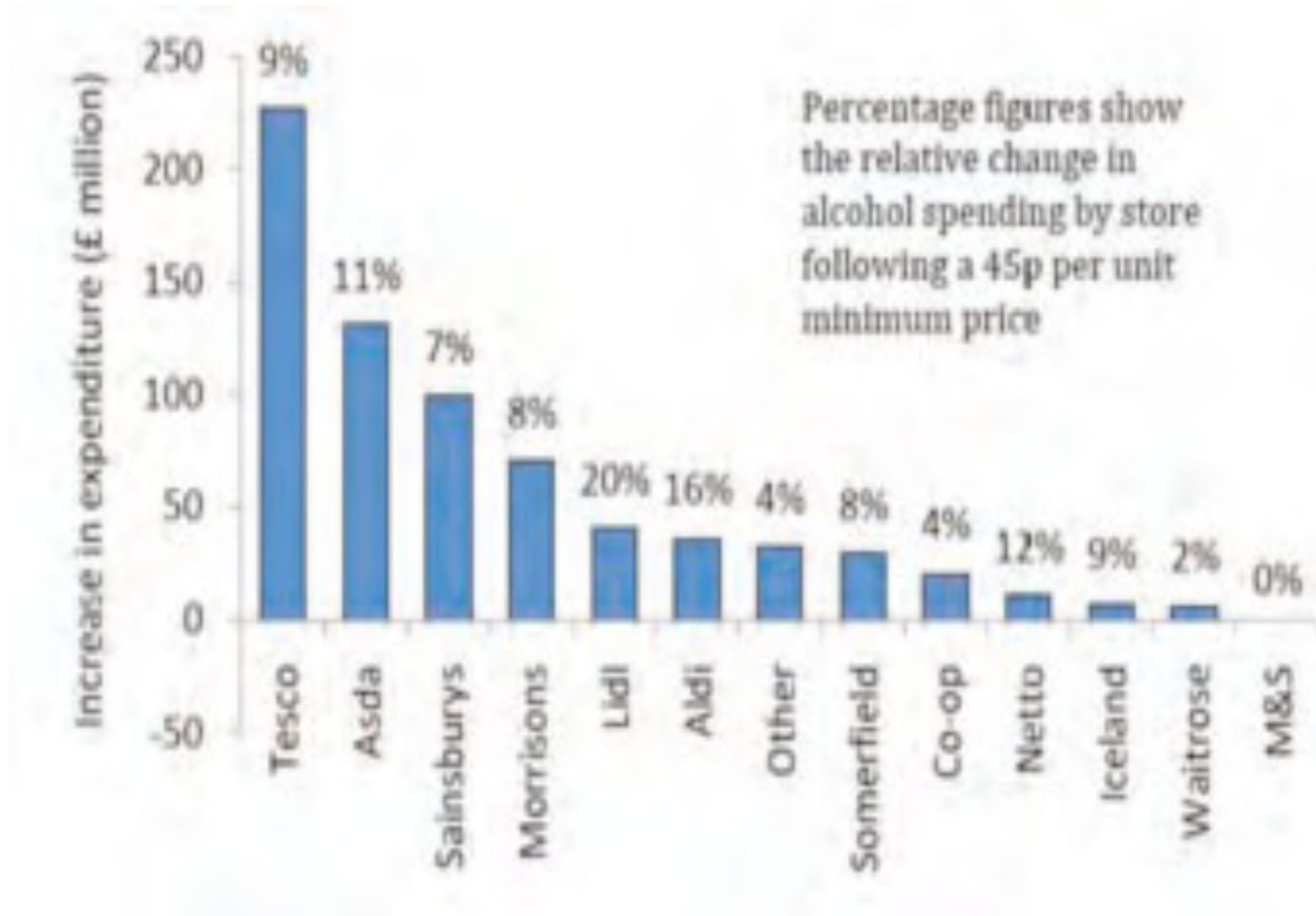
**“Killing the alcohol bill will cost lives – and Labour votes”**

*Iain Macwhirter, The Herald, 14 Nov 2010*

“Labour’s arguments echoed those of John Reid, the former UK health minister, against the smoking ban in 2005. Smoking was one of the “few pleasures left for the working man”, he said.

“Jack McConnell, then First Minister, had the wit to reject Reid’s numpty populism. He ..... scored the first major legislative victory for himself and arguably for devolution.”

Minimum pricing: The largest cash beneficiaries would be stores which sell the most cheap alcohol (Institute of Fiscal Studies, 2010, and The Globe)





# Other stakeholders

- .....who operate at the highest level

Dose is crucial- the drug tricks us into allowing the dose to

- The feel-good effect quickly requires a larger dose

Availability  = casualties 

Alcohol tricks us into thinking it's the answer to our anxieties and low self-confidence (aided by advertising!)

Genetic, social and emotional predisposing factors –

- BUT, the bigger the dose flowing in society, of an addictive substance, the more casualties there will be.....and the greater cost to all of us.

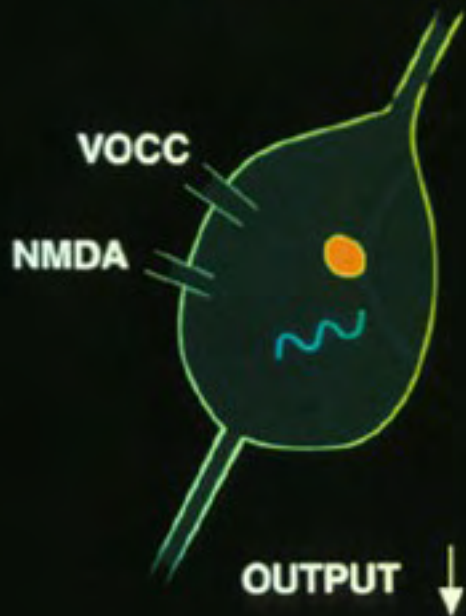
# Alcohol hijacks fundamental brain pathways



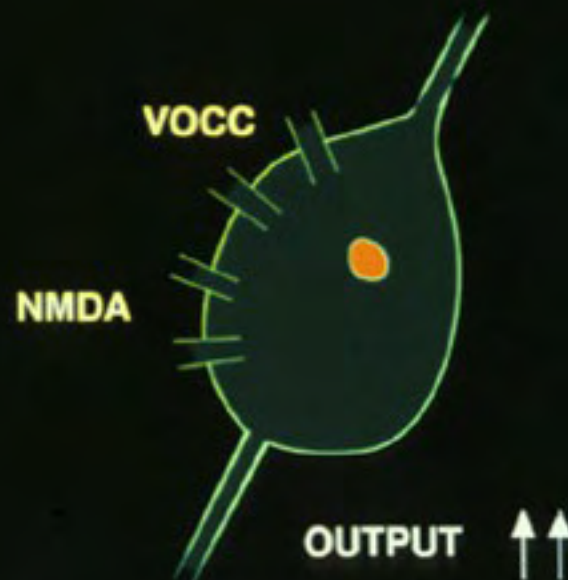
# A meso-limbic nerve cell

(after Littleton/Samson)

Ethanol reduces entry  
of calcium ions



Ethanol dependence



VOCC = voltage operated calcium channels

NMDA = N-methyl-D-aspartate receptor control

~~~~~ = C-fos gene expression

# *addictare*

- to sentence to servitude

Addictive drinking (alcohol dependence) ..... a “brain disease”?

- ‘getting beyond my control’
- But society not ready to see it as a disease.....

*...especially if it seems that they do not want to get better.....*



.....*unless a causal biological basis  
can be identified*

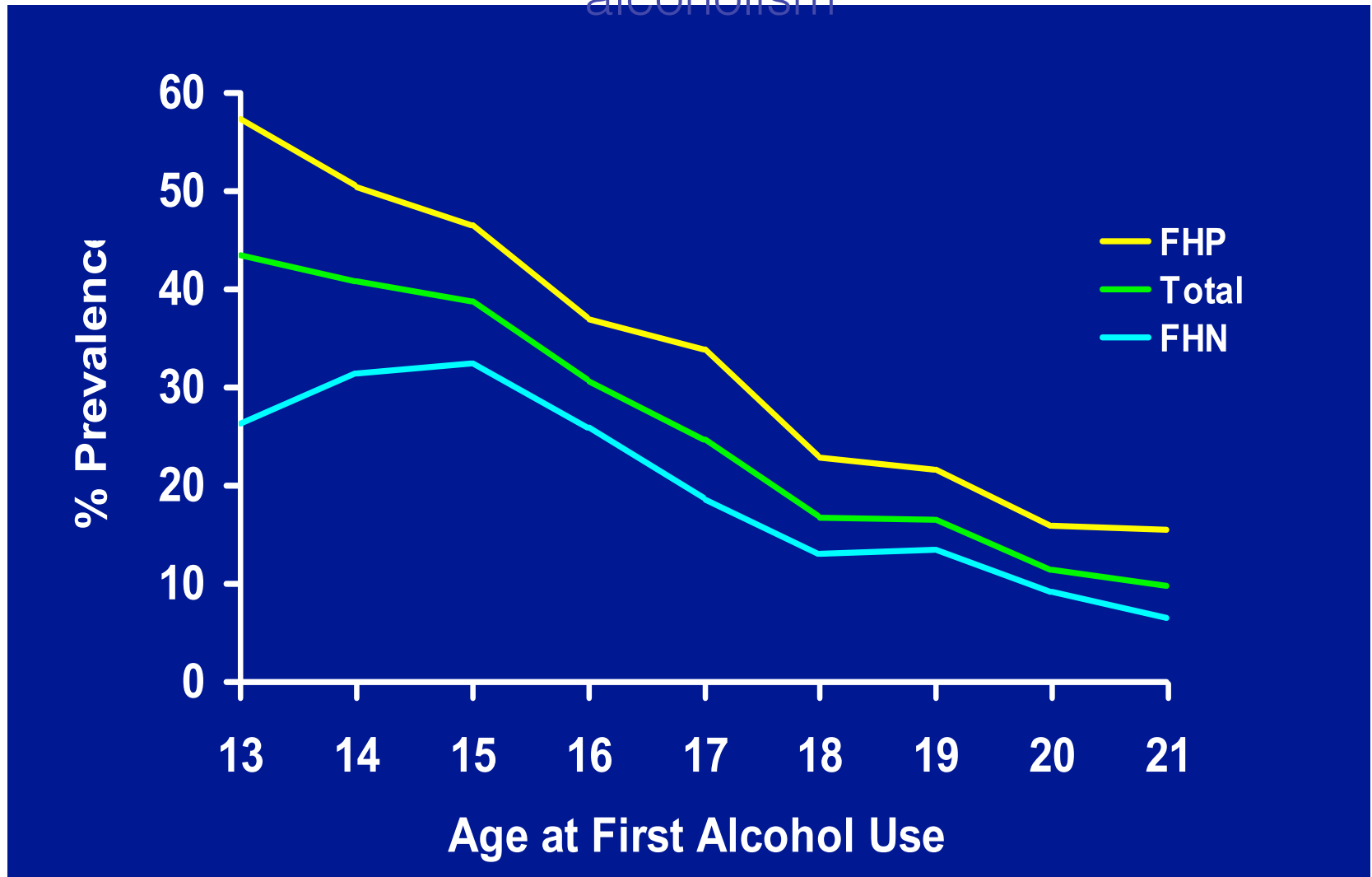
Several genetic predisposing factors  
liking for stimulation  
liking for relaxation  
dependence  
anxiety



**Zebrafish of the AB strain display significantly increased preference for the compartment where they received ethanol during a single 20-min exposure.**

[Mathur P](#), et al Brain Res. 2010 Oct 23.

Prevalence of lifetime **alcohol dependence** according to age of first alcohol use and **family history** of alcoholism



Attempts to make crafty drugs  
to control the addiction



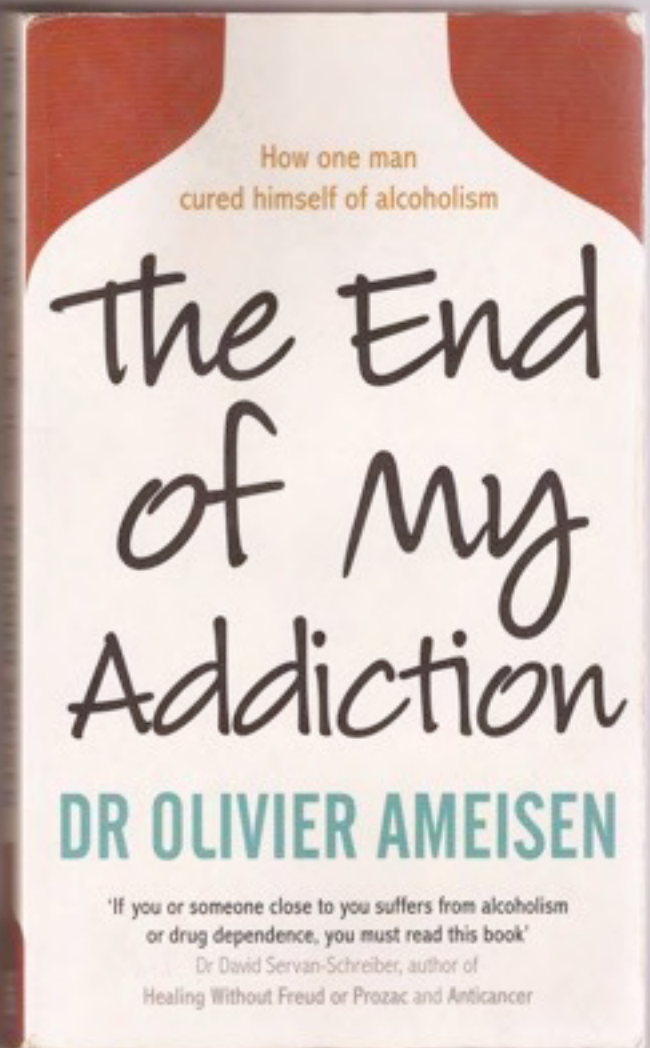
# Self treatment

- (doctors who self-prescribe!)

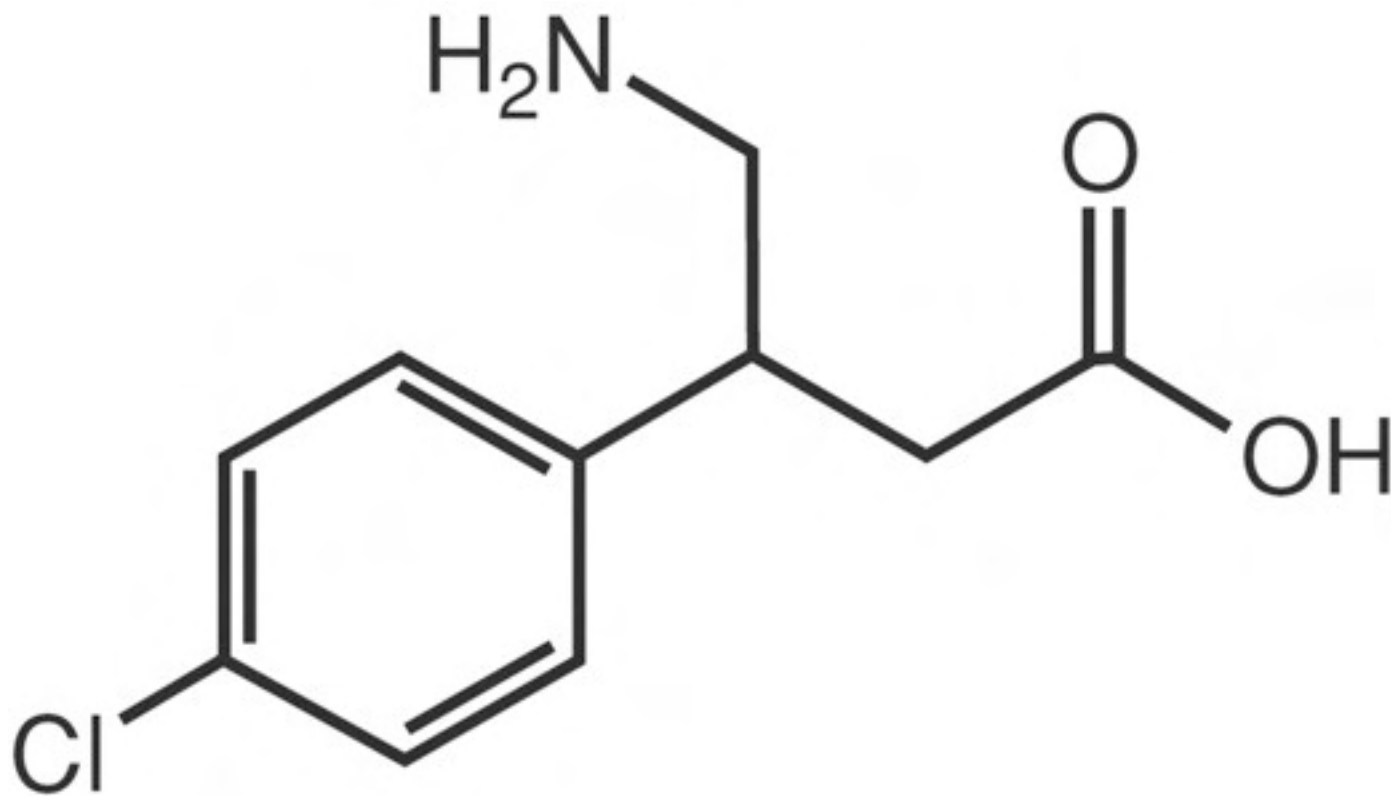
Used alcohol for anxiety  
since a youth

Steeped in AA, but still  
drinking in destructive  
bouts

Self-treatment with baclofen



The figure shows the chemical structure of baclofen [4-amino-3-(4-chlorophenyl)butanoic acid]



Leggio, L. Alcohol Alcohol. 2009 44:341-352; doi:10.1093/alcalc/agp026

# The endorphin –dopamine hypothesis

- Drugs to reduce the ‘loss of control’ by reducing alcohol’s action endorphin receptors

Not so crafty: medications that can lead to MORE drinking

- **SSRIs (e.g. Prozac, etc)**

***Can help depressed , 'late onset' alcoholism but worsen early ( <25 yrs) onset alcoholism***

Kranzler et al *Am J Psychiat*, 1995; 152: 391-7

Chick et al *Drug Alc Depend* 2004; 74: 61-70

# Alcohol addiction damages the soul

- Dishonesty
- Selfishness
- Egocentricity/arrogance
- Preoccupation
- Isolation
- Life narrows
- Blames others/ Does not take responsibility

All to PROTECT the supply of alcohol



*Loss, despair, suicide*

**“We are on the case and in control”**

Alcohol addicts keep believing they have the problem under control

.....so they refuse help

Alcoholics Anonymous membership has  
increased in secular Britain

Survey 1986 : 2176 groups, ?18,000  
members

Survey 2005 : 3630 groups, about 34,000  
members

Estimate 2008: 4000 groups, about 40,000  
members.

# *Health Technology Board of Scotland*

## **Cost-effectiveness study**

Slattery *et al* **Prevention of Relapse in Alcohol Dependence**

[www.docs.scottishmedicines.org/  
docs/pdf/Alcohol%20Report.pdf](http://www.docs.scottishmedicines.org/docs/pdf/Alcohol%20Report.pdf)

**‘Patients should be encouraged to attend AA,  
particularly those who live or work in  
environments where there is a lot of drinking  
and little support for abstinence’**

**Cost – Nil; Effectiveness/cost =  $\infty$**



# **Alcoholics Anonymous teaches that:**

- Alcohol is a powerful drug
- Being 'in control' is a delusion
- The facts must be faced, honestly
- If you blame others, your problem persists
- Compassion is owed to those who remain enslaved
- Recovery is collaborative

# **We are an alcoholised society- the**

- Denial of the facts
  - David Nutt's summary dismissal
- Blaming others
  - “It's the industry”
  - Or, “It's just a few weaked-willed who misuse it”
- Delusion of control
  - “We have it under control: the industry will put guidelines on bottles and beer mats; it will check that young people are not shown on its



# Health Select Committee, Jan 2011

“It is time the Government listened more to the Chief Medical Officer and the College of Physicians and less to the drinks and retail industry.

“If everyone drank responsibly, the alcohol industry might lose about 40% of its sales.....The Government must be more sceptical about the industry's claims that it is in favour of responsible drinking.”

# Onwards to the past

## ***RDAN (Responsibility Deal - Alcohol***

**Network)** *Pledges could include ceasing using VAT loophole for cut-price promotions!*

[The Guardian](#), 17 February 2011

**“Alcohol policy in tatters as health experts revolt”**

“Coalition's concessions to drinks industry puts collaborative approach on

What risk/benefit ratio for our society? We have chosen cheap, available alcohol

