



Is beer consumption responsible for the beer belly ?

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Beer belly – myth or fact?

Does beer intake increase the risk of

- overweight / obesity?
- abdominal fatness?

Does intake level matter?



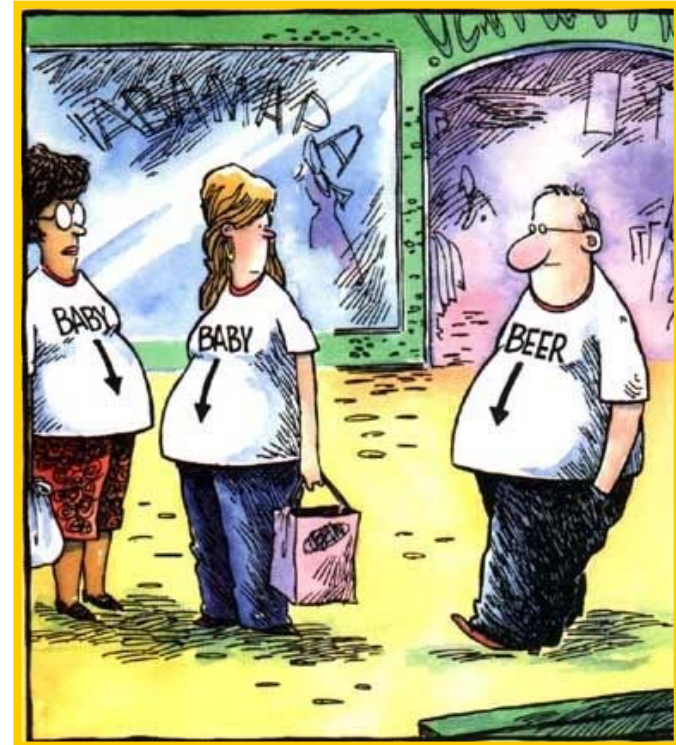
Outline

1. Should beer consumption theoretically promote body fat deposition?
2. What does the available scientific evidence say?
 - Limitations



Why should beer intake promote fatness?

1. Beer contains calories
2. Alcohol metabolism & fat oxidation
3. Liquid energy & satiety
4. Alcohol & appetite



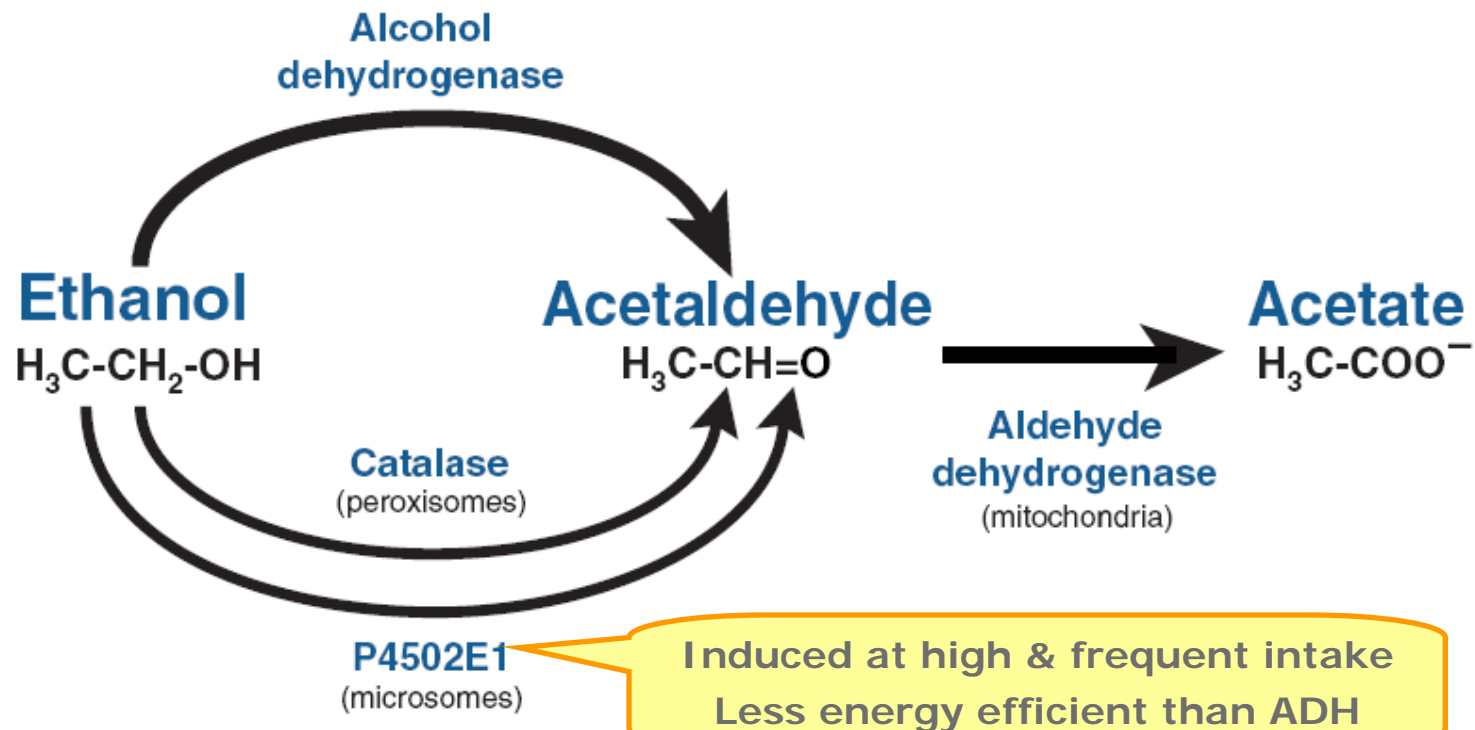
Calories in beer

Per 100 ml

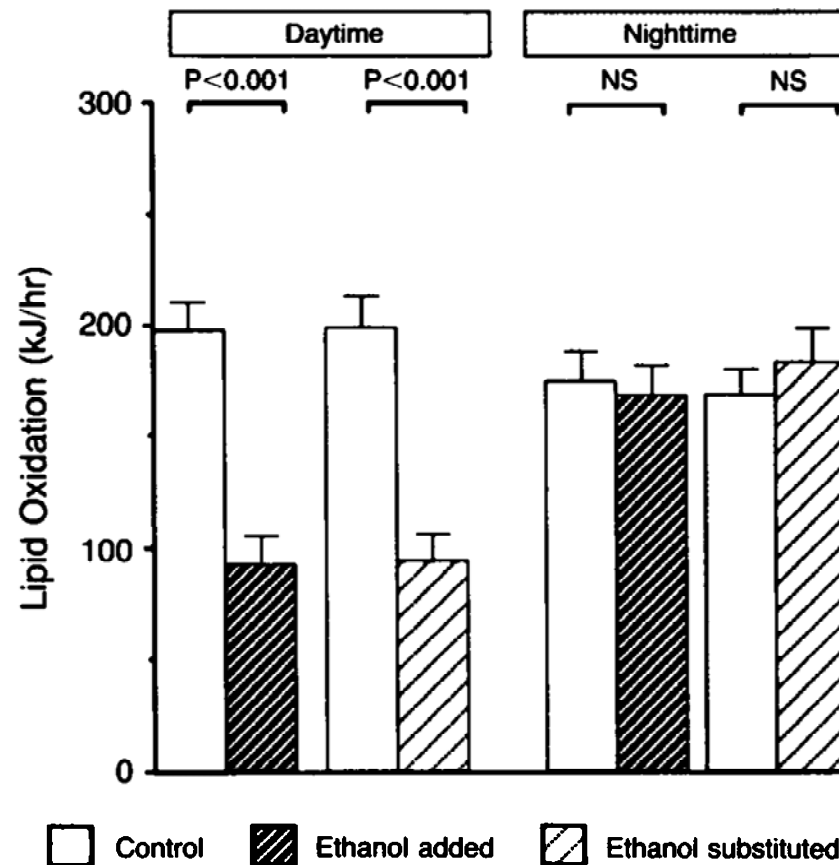
Beer	4.6% alc	41 calories
Wine	12.0% alc	77 calories
Spirits	40% alc	250 calories
Milk	0	64 calories
Orange juice	0	42 calories



Alcohol metabolism



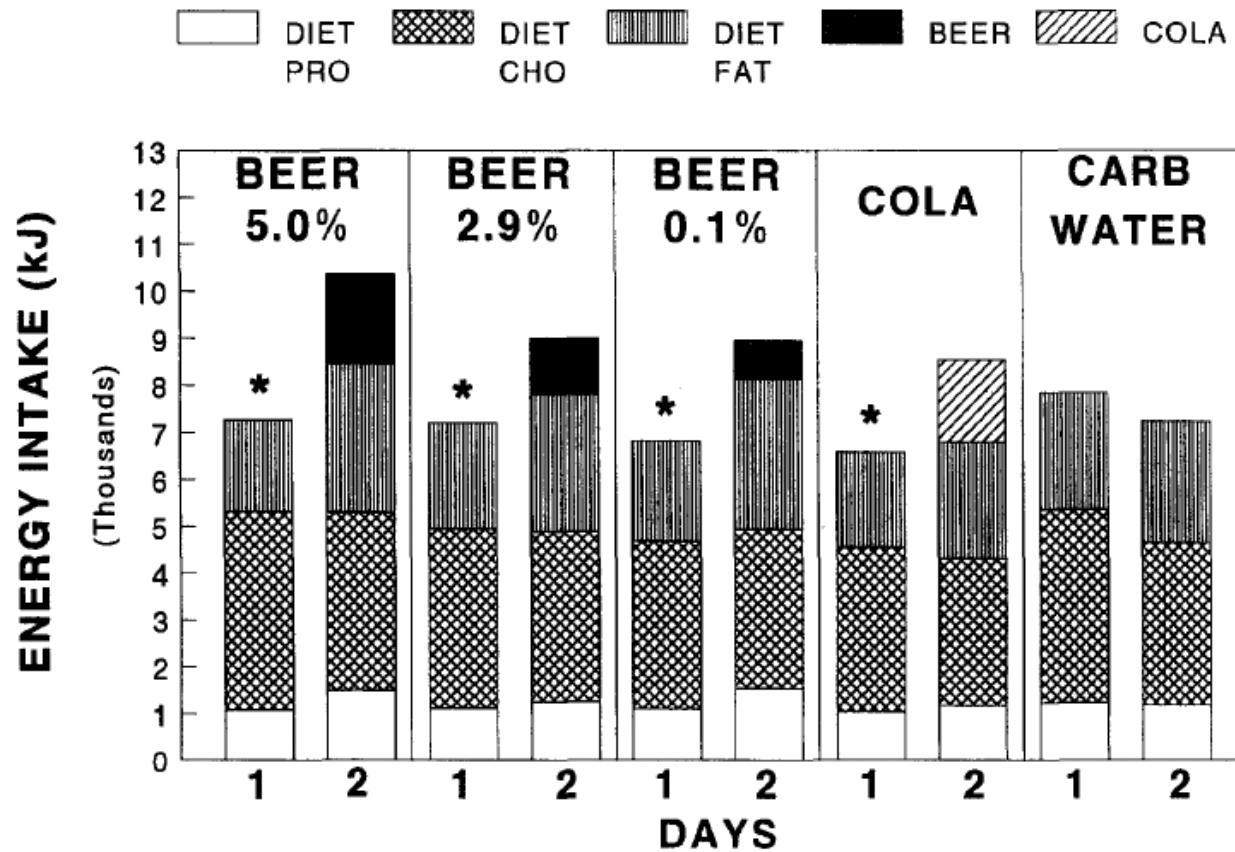
Alcohol intake decreases fat oxidation



Suter et al. NEJM 1992



Are alcohol calories compensated for?



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PAPER

The effect of wine or beer versus a carbonated soft drink, served at a meal, on *ad libitum* energy intake

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Questions being addressed

- Does changes in ad libitum food intake compensate or overcompensate for the lower energy and volume in wine compared to an isoalcoholic amount of beer?

Beverages

- Red wine (Valpolicella) 3.00 kJ/ml,
13% alcohol
- Lager beer (Carlsberg Hof) 1.66 kJ/ml,
4.6% alcohol
- Carbonated soft-drink (Sprite Regular)
1.73 kJ/ml

Ad libitum beverage study

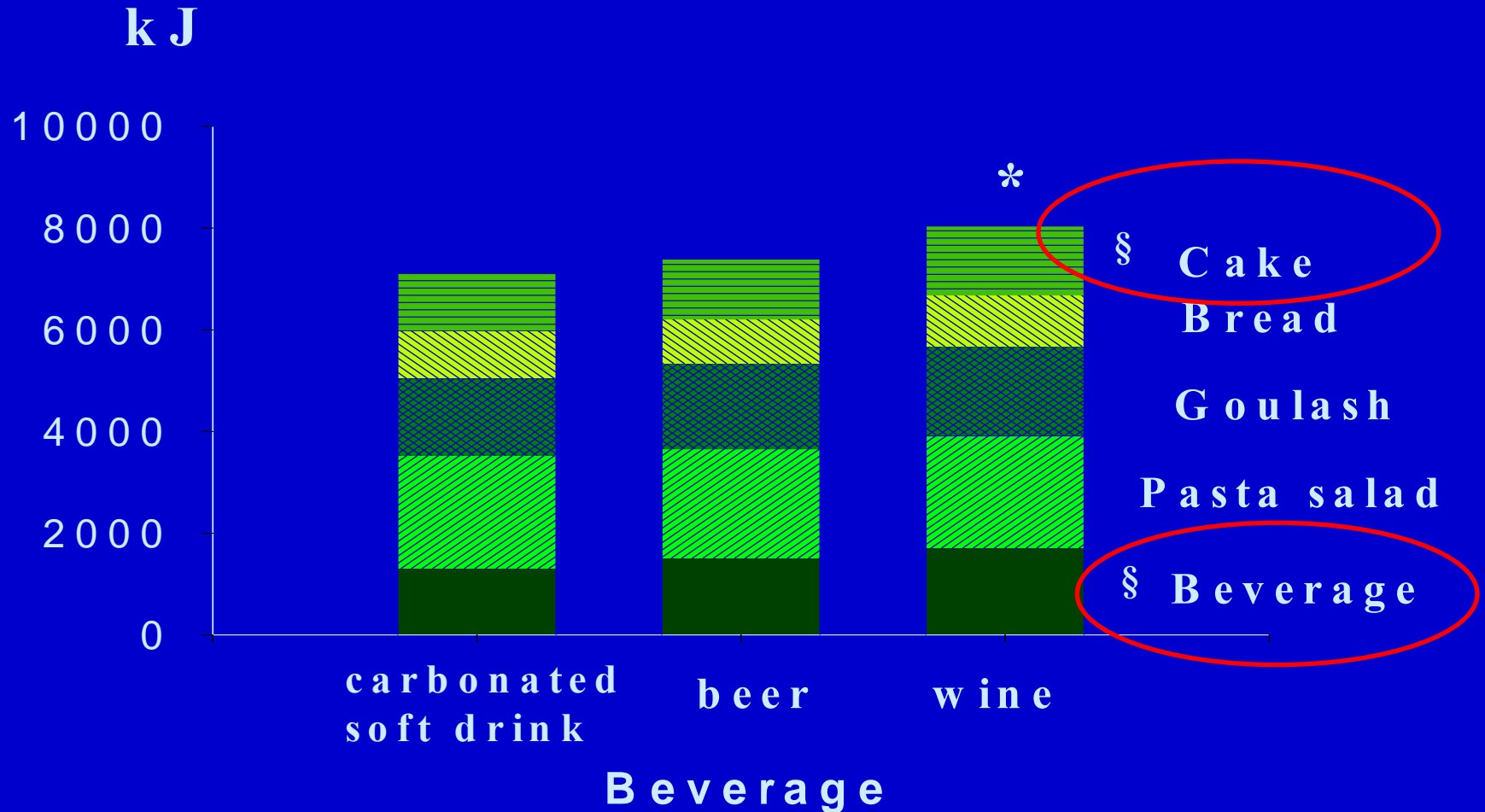
- 22 younger men
- Different beverages given *ad libitum* with a supper meal to subjects in a balanced randomized sequence
- Subjects instructed to eat of the food until they felt comfortable
- A time lag > 4 days between experiments
- Breakfast and lunch were fixed on the experimental days

Meal

- Pasta salad w/ ham, yoghurt, peas & paprika fruits
- Goullach w/ white bread
- Firm cake

- Foods were presented in excess on the table one by one.
- Subjects were separated by > than 2 m. and were not allowed to communicate.

Ad libitum beverage study



§ $P < 0.05$ vs. carbonated soft drink

* $P < 0.05$ vs. beer and carbonated soft drink

Conclusions

- Total energy intake was greater when wine was given *ad libitum* compared to beer and soft-drink. This was due both to a higher energy intake from food and beverage.

Conclusions

- In males both wine and beer tend to increase caloric intake, but wine is more fattening than beer.
- It remains to be elucidated if the same phenomenon exists in women.
- More research is required to establish a scientific fundament for public health advice regarding the effect of beer and wine on body weight.

Why should beer intake promote abdominal fatness?

Alcohol stimulates production of
cortisol
+
Alcohol decreases lipid oxidation →
Central obesity

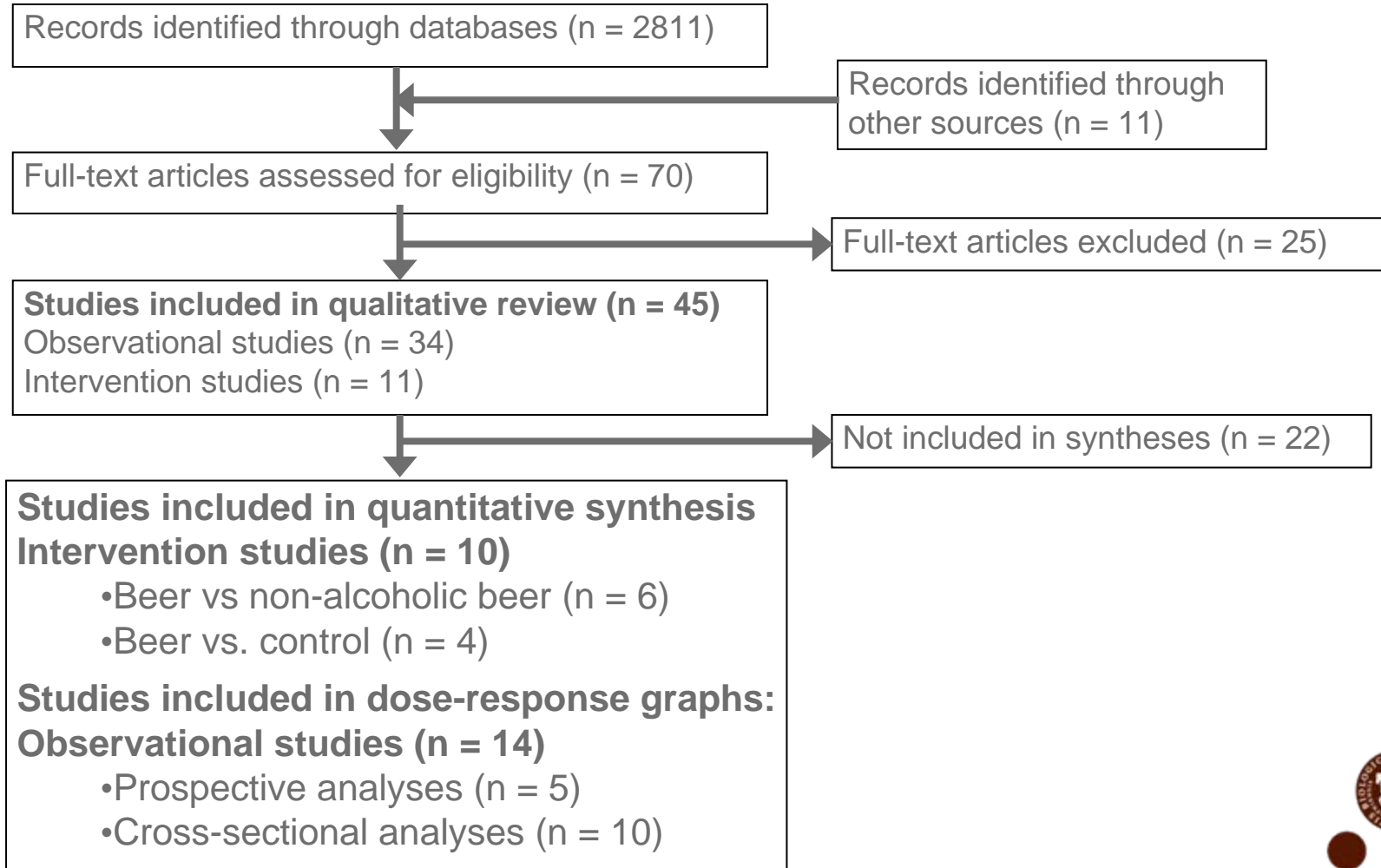
Adinoff et al. Alcoholism:
Clin Exp Res 2005

Suter et al. NEJM 1992

Purnell et al. AJP 2009



Systematic review: What is the evidence for a fattening effect of beer?



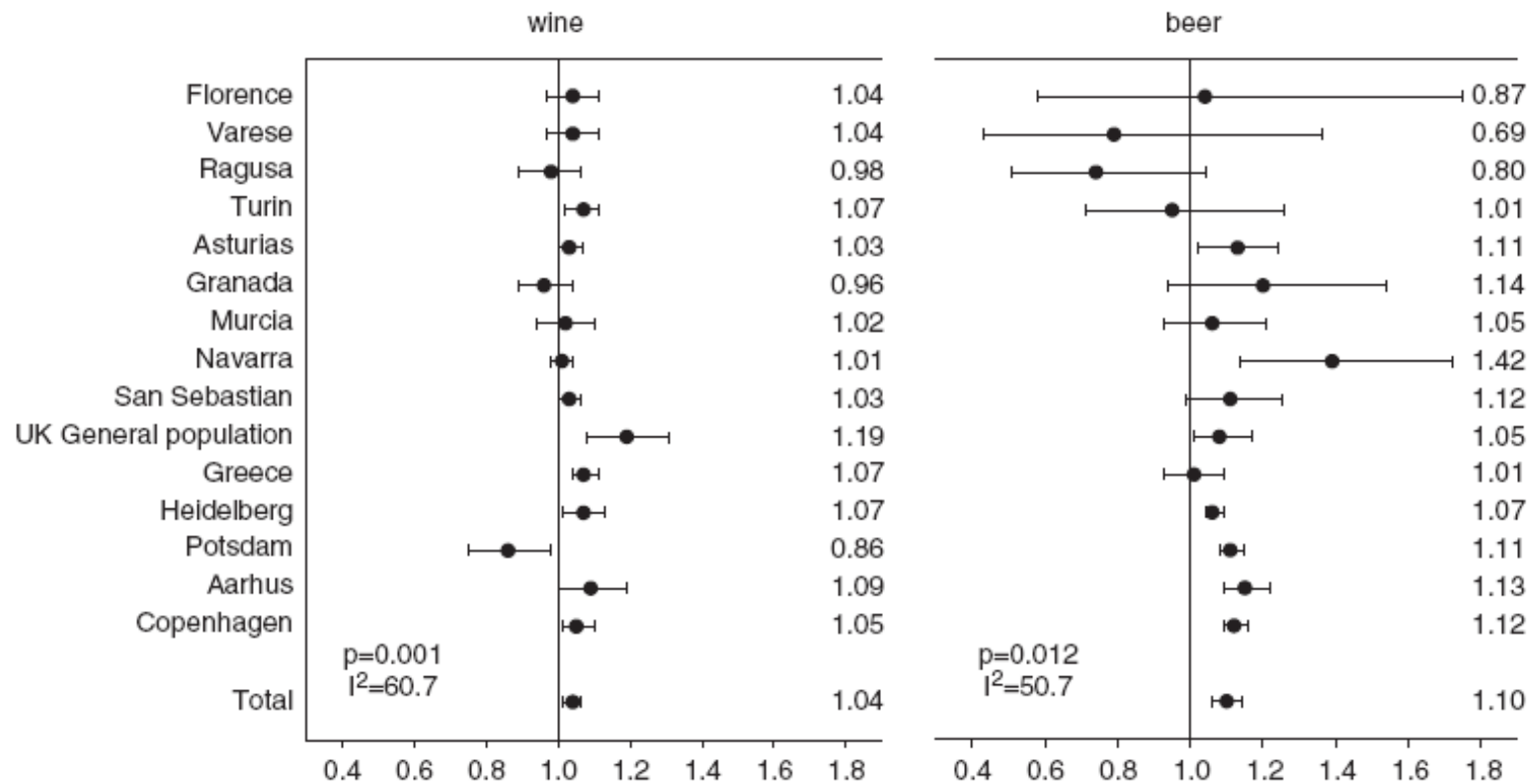
Observational studies: Association between beer intake and fatness

	Women		Men	
	Overall fatness (BMI/weight)	Abdominal fatness (WC/WHR)	Overall fatness (BMI/weight)	Abdominal fatness (WC/WHR)
↑ positive association				
Cross-sectional studies				
Prospective studies				
↔ no association				
Cross-sectional studies				
Prospective studies				
↓ negative association				
Cross-sectional studies				
Prospective studies				



OR of having a larger WC than expected from BMI
for increase of one more alcoholic drink/d

99,381 men in the EPIC study

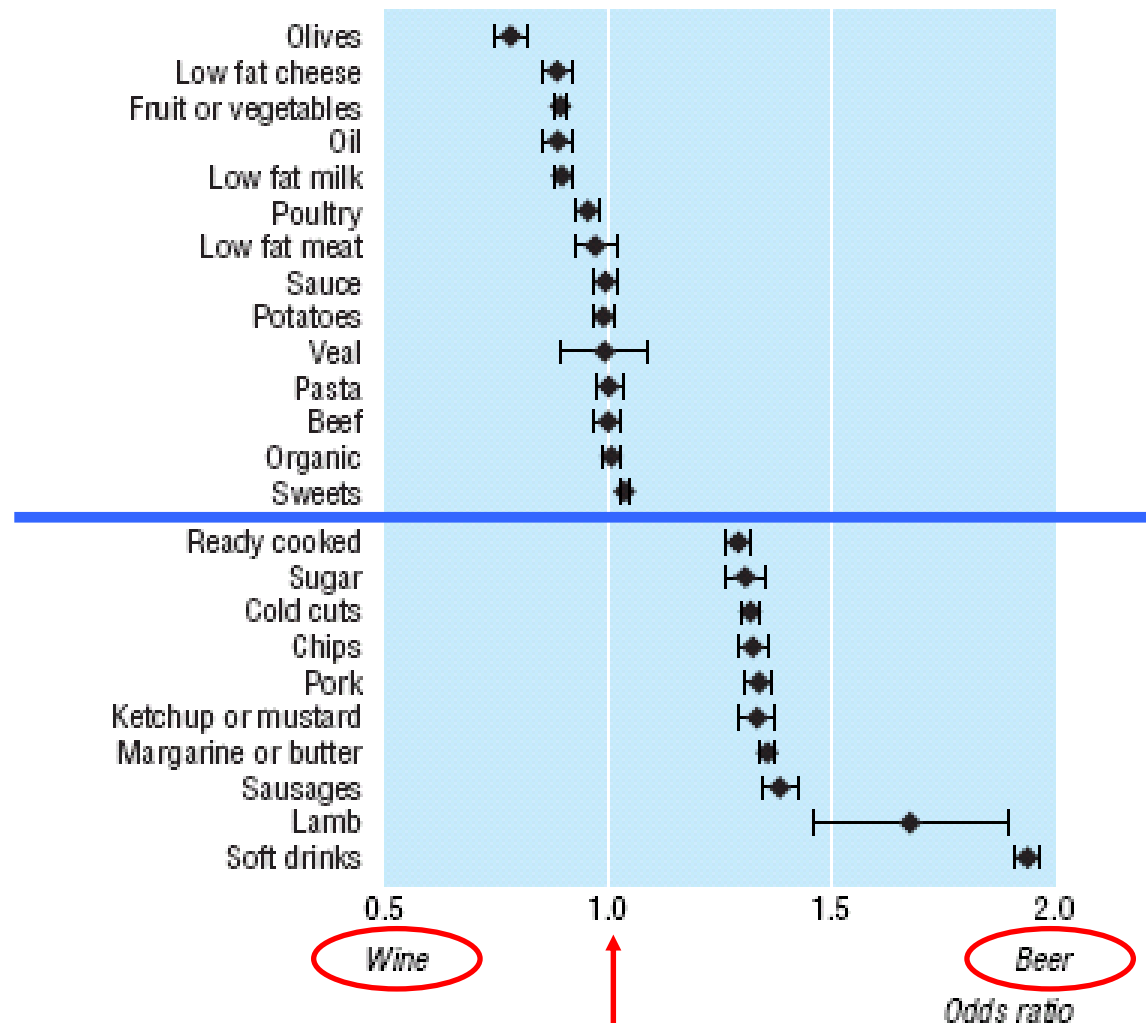


Limitations & confounding: Possible explanations for inconsistent findings

- Underreporting of beer intake
- Are excessive drinkers included in research studies?
- Drinking pattern
- Lifestyle
 - Physical activity
 - Diet
 - Smoking
 - Education



Beer-drinking and lifestyle I



Johansen et al.
BMJ 2006

Fig 2 Likelihood of beer and wine buyers buying items of food. Items with an odds ratio lower than 1 are bought more often by wine buyers and items with an odds ratio higher than 1 are bought more often by beer buyers



Beer-drinking and lifestyle II

Germany 7876 men	No beer	1–<250 'very light'	250–<500 'light'	500–<1000 'moderate'	1000+ 'heavy'
n (%)	535 (7)	3603 (46)	1125 (14)	1421 (18)	1192 (15)
WC gain ^b	61	56	54	57	59
Smokers (%)	35	19	20	25	33
Ex-smoker (%)	36	41	48	48	47
Total EI (kJ/d)	10 323 (3356)	9891 (2778)	10076 (2597)	10 537 (2641)	11 360 (2846)
Non-beer EI (kJ/d)	10 323 (3356)	9711 (2775)	9460 (2597)	9578 (2639)	9160 (2701)
PA (h/week)	17.4 (13.0)	14.9 (10.5)	14.2 (10.2)	14.4 (10.6)	14.8 (11.1)
University education (%)	26	40	38	37	27



Conclusions

- Few studies have been conducted with the specific objective to assess whether beer intake is associated with body fatness
- Results are inconsistently presented across studies
- Most studies are of low quality
- There is inconsistent scientific evidence to support that beer intake is responsible for the beer belly
- Higher beer intakes (>4 L or 16 gl/wk) may be associated with a higher degree of fatness
- There is a need for controlled intervention studies designed to answer the question of whether beer consumption promotes body fat deposition



What causes abdominal obesity = Beer belly ?

- Weight gain in males and postmenopausal women
- There is a robust positive association between **smoking** and abdominal fatness, and smoking cessation reduces the waist line.
- Mental stress
- Impaired or too little sleep
- Lack of physical activity
- Medications (i.e. sleeping and anxiety medications, steroids)
- Industrially produced trans fat



**Thank you for your
attention.**

Questions?

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