

Alcohol


- Absorption** Ethanol is absorbed in small intestine and metabolised in liver
- Metabolisation factors** Gender, body fat, liver size, amount of metabolic enzymes
- Metabolism slide**

Beer composition

- Water** Beer is 93% water, which counters dehydration
 - Also helps with uric acid -> kidney stones
 - Helps mineral balance
 - Better water to calories ratio
 - Low alcohol (free) beer is isotonic (have same tension)
- Water numbers** 1 g of alcohol -> 10ml urine excretion
 - Alcohol makes you pee more by suppression of vasopressin, which is hormone that reuptakes water
 - Dehydration -> hangovers
- Net water intake** 330ml beer -> 191 ml
 - 125ml wine -> -11
- Health benefits** Less kidney stones (40% risk reduction)
 - Beer after exercise does not decrease water uptake

Major nutrients

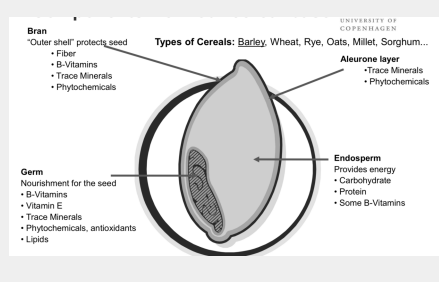
	per 100 ml	per 330 ml
Energy	156kJ / 37kcal	515kJ / 122kcal
Water	93 g	307 g
Alcohol	3,6 g	12 g
Protein	0,3 g	1 g
Carbohydrate	2,7 g	9 g
Fat	0 g	0 g



Calorie counts and exercise

- Beer** 12 oz = 150 kcal, alc free 100 kcal
- Red wine** 125 kcal (anti-inflammatory)
- Pina Colada** 6 oz = 460 kcal
- Margarita** 280 kcal
- 100 kcal is**
 - Casual biking: 23 min
 - Lifting weights: 15 mins
 - Pilates: 24 mins
 - Swimming: 15 mins moderate intensity

Nutrients



Nutrients II

- Major nutrients** readily available carbohydrates: 10 - 60 g/litre as dextrins

Nutrients II (cont)

- little free sugars: < 5 g/litre – typical lager = 1 g/litre
- Fibre: 1 beer contains 3-6% of the daily requirement for fibre
- no fat
- protein as small peptides – 2 - 6 g/litre
- Trace nutrients vitamins, minerals, antioxidants, other hop compounds
- Vitamins Cereals good for B vitamins, malting increases B9 and B6 (spouting), B2 from yeast
 - Beer is more vitamin rich than beer
 - Too high levels of homocysteine = heart disease, increase in level of homocysteine after wine and spirits consumption, but not for beer
 - Lots of potassium and magnesium in beer
 - lots of silicon in beer, which is not readily available anymore in water
 - antioxidants in beer help against free radicals that can start cancers
- Polyphenols positive: beer taste and aging stability, health

Nutrients II (cont)

negatives: haze (together with proteins), astringent bitterness

beer < white wine < red wine, beer has way less

shown to protect LDLs from oxidation

Health

Harmful effects Accidents, brain degeneration, hepatitis, cancer, stroke

Amount pr week 7 for women, 14 for men, stop before 5 on one occasion

Most consumed alcohol Wine, then beer

Habits Beer drinkers were generally more unhealthy compared to wine drinkers

Beer vs wine Higher drinking frequency, shorter education, lower income, more men, more smoking, lower exercise, less healthy diet

Calculation of BAC

Formula $C = A / (p * r)$

C BAC

A Alcohol intake in grams

p body weight in kg

r distribution or reduction factor

Calculation of decrease in BAC

Formula $C_t = C_0 - k * t$

C_t current BAC in promille

C_0 legal BAC in promille

k individual factor, ca 1/400

t time in minutes

rule of thumb bac decreases 0.15 bac/hr

Exercise slides for examples

Exercise 1

Exercise No. 1

Case

Mr. Olsen (75 kg, average constitution) drinks one liter of beer (5% abv.) after a football match in Copenhagen.

- Calculate his blood alcohol concentration (BAC) (‰)
- Is Mr. Olsen able to drive his Fiat home?
- How long time will Olsen have to wait before being able to drive his car again?

Exercise 1 answers

Answer to Exercise No. 1

- 5.0 ABV% x 1000 ml beer = 50 ml alcohol
50 ml alcohol x 0.789 g/ml = 39.5 g alcohol
39.5 g alcohol / (75 kg x 0.7 factor) = 0.75 (‰)
BAC = 0.75
- Olsen can't drive home as legal limit is 0.5 in Denmark
- Calculation of time to $C_t = 0.5$ ‰
 $t = (C_0 - C_t) * 400 = (0.75 - 0.5) * 400 = 100 \text{ minutes}$
Rule of thumb: the blood alcohol conc. falls about 0.15 ‰ / hour

Exercise 2.1

Exercise No. 2

Compare the energy content (kJ) in:

Beer - Red wine - White wine - and Whisky

- per 100 ml
- per drink (12 g alcohol)
- Carbohydrate + protein pr. 100 ml is 3.0 g for beer, 1.7 g for red wine, 2.6 g for white wine and 0 g for whisky

Note: energy from alcohol = 29 Kilo Joule / g alcohol

Exercise 2.1 answers

Calculation

Find amount of alcohol in 100 ml:
(4.6 / 100) ml/ml x 100 ml x 0.789 g/ml = 3.63 g alcohol

Find energy from alcohol in 100 ml:
3.63 g alcohol x 29 kJ/g = 105 kJ

Find energy from other macro nutrients:
2.7 g carbohydrate x 17 kJ = 46 kJ

0.3 g protein x 17 kJ = 5.1 kJ

Total energy content in 100 ml beer: 156 kJ

Exercise 2.2

Energy content in alcoholic beverages
Note: Alcohol density = 0.789 g/ml. Energy from alcohol = 29 kJ/g

	Beer 4.6% vol. (330 ml)	Red wine 12% vol. (125 ml)	White wine 12.5% vol. (125 ml)	Whisky 46% vol. (33 ml)
Energy content per 100 ml				
Energy content per drink				

Effects of alcohol consumption

2-4 drinks (men) 1-2 (women) mortality protection of 18%

Jshaped curve Risk goes down with moderation, goes up with excessive use

HDL and LDL High density lipoprotein up with alcohol (good cholesterol)

LDL down with alcohol (bad cholesterol)

diabetes in moderate drinkers 30% reduced risk of diabetes

alcohol is anti-inflammatory

Effects of alcohol consumption (cont)

enhanced insulin sensitivity with lower plasma insulin concentrations (risk factor for diabetes)

partly due to lower average weight of drinkers (obesity is a risk factor for diabetes)

Cognitive function

Alcohol decreases arteriosclerosis in brain vessels, Protective antioxidative effects of polyphenols on cerebral cells (both good)

“regular consumers of alcohol had a significantly lower risk of Alzheimer’s compared to non-drinkers”, protection was 50% for moderate drinkers

1-6 drinks/week associated with lower risk of dementia in ≥ 65year adults, 20% reduction in dementia risk for moderates

Effects of alcohol consumption (cont)

Alcohol triggers release of dopamine, a hormone, which plays a major role in reward-motivated behavior

Osteoporosis

“a positive association between alcohol intake and bone mineral density in older women has been reported in the original Framingham Osteoporosis Study”

Suppression of gradual bone loss that increases with age, called resorption, Positive effect of silicon on bone formation

Moderate consumption of alcohol may be beneficial to bone mineral density in men and postmenopausal women. The tendency toward stronger associations between BMD and beer or wine, relative to liquor, suggests that constituents other than ethanol may contribute to bone health.

Exercise 2.2 answers

Energy content in alcoholic beverages

	Beer 4,6% vol. (330 ml)	Red wine 12% vol. (125 ml)	White wine 12,5% vol. (125 ml)	Whisky 46% vol. (33 ml)
Energy content per 100 ml	156 kJ	303 kJ	330 kJ	1053 kJ
Energy content per drink	515 kJ	379 kJ	413 kJ	347 kJ



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Published 8th August, 2019.

Last updated 8th August, 2019.

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