

The Benefits of Moderate Beer Consumption



Second Edition: CBMC - The Brewers of Europe 2002



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Introduction

- This booklet summarises the current state of knowledge on the beneficial effects associated with moderate consumption of alcoholic drinks, in particular beer. It has been compiled by The Brewers of Europe to inform the general public of the clear evidence that beer, a wholesome beverage and a staple part of our diets for thousands of years, is not only good to drink but may also be good for health when consumed moderately.
- The information is not intended to encourage people to consume beer, or other drinks, for their health benefits. The intention is to inform and reassure those who enjoy drinking beer that, when consumed moderately, it is not a health risk and there may be a net benefit.
- The first edition of this booklet was inspired by a one-day seminar on the health benefits of moderate alcohol consumption and the healthful properties of beer held in November 1999 which included presentations from many European experts.
- The second edition follows a further symposium held in October 2001 to examine the latest scientific evidence on this subject. Speakers included Professor Antonio Gasbarrini; Catholic University, Rome, Italy; Dr Pilar Cordero Franch, University of Valencia, Spain; Professor Dr Denis de Keukeleire, Ghent University, Belgium; Dr Norbert Frank, German Cancer Research Centre, Heidelberg, Germany; Dr Caroline Walker, Brewing Research International, Nutfield, UK; Dr Jonathan Powell, St Thomas' Hospital, London, UK; Professor Mack Mitchell Jr., Alcoholic Beverage Medical Research Foundation, Baltimore, USA; and Dr Eric Skovenborg, General Practitioner, Denmark. Their presentations are the main reasons for The Brewers of Europe being inspired to revise this edition.
- At the first Beer and Health Symposium the Chairman concluded that beer played a part, along with other alcoholic drinks, in reducing the risk of heart disease and that there was also preliminary evidence of benefits of beer consumption, which may be different from those of other drinks, which warranted more detailed investigation.
- Since then research has progressed and some exciting new results and ideas about the health benefits of beer consumption have now been published. This edition summarises the current state of knowledge.

Moderation and responsibility are the key words



"To drink moderately is to drink within the limits set by your health, the society in which you live and your obligations towards your family and friends"

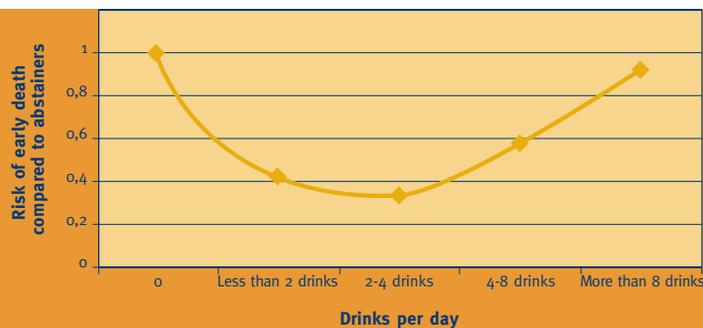
- This booklet concentrates on the effects of responsible consumption of beer. It must be stressed that the beneficial effects reported apply **only** to moderate consumption by adults. Heavy drinking, whether in binges or regularly, can be harmful and is associated with many chronic health problems.
- Dr Skovenborg, speaking at the symposium, defined moderation in the following terms. "To drink moderately is to drink within the limits set by your health, the society in which you live and your obligations towards your family and friends: 1 – 3 drinks a day for most men".
- "Women are more sensitive to alcohol so they are advised to drink less than men: 1 to 2 drinks a day."
- The amount of alcohol in "a drink" of beer can vary considerably depending on the size of the glass and the alcoholic strength and will differ slightly across Europe according to historic traditions and customs*.
- While these are useful guidelines it must be remembered that they only apply to healthy adults and there are some situations where even moderate drinking is too much. Examples of situations where it may not be appropriate to drink at all include during pregnancy, before driving or operating machinery or when taking certain medication.
- The industry is mindful of the dangers of abusive drinking. To this end it has produced numerous educational programmes and campaigns to avoid misuse such as those to prevent drink-driving and underage drinking.

* For the definition above, and all references to glasses of beer / drinks in this booklet, a glass would be 0.25litre (approximately half a pint of beer in the UK or Ireland) with a strength between 4 and 5%abv. This would have an alcohol content of about 10g.

Moderate consumption of alcoholic drinks can be good for your heart

- There is strong evidence that people who are moderate drinkers of beers, wines and spirits have a substantially reduced risk of coronary heart disease, heart attack, when compared to teetotallers and heavy drinkers. This has been shown in many studies throughout the world. There is also evidence that light to moderate drinking may be protective against other cardiovascular diseases including the most common form of stroke¹.
- It is estimated that an intake of approximately 3 alcoholic drinks a day should reduce the risk of coronary heart disease by 24.7%². The benefit applies to a broad range of individuals including those considered to be of higher risk of cardiovascular disease³.
- The "U shaped curve" (shown below) illustrates the effect that this reduction in the risk of coronary heart disease has on the risk of deaths from all causes. At moderate levels of consumption the risk of early death is reduced relative to the risk in abstainers. Heavier drinkers show risk levels equal to or greater than those of abstainers.
- There are several well established explanations for this observed reduction in risk. The one which has been shown to be responsible for the majority of the effect, is that the amount of 'good fat', (HDL cholesterol) in the blood increases when alcohol is consumed, which decreases the risk of cardiovascular disease. Research has shown that one glass of beer a day can increase HDL cholesterol levels by 4%⁵.
- Another explanation is that alcohol has a blood thinning effect and reduces the tendency of blood to form clots².
- Light to moderate alcohol intake has also been shown to be associated with a slight decrease in cardiovascular, and total, mortality in people who have already had a heart attack⁶ or have Diabetes⁷.

Consumption of alcoholic drinks and risk of early death



Source: "The relation of alcohol intake to coronary heart disease and all-cause mortality in a beer drinking population"⁴.

Beer is just as good at protecting the heart as wine

It is the alcohol that is having the protective effect and no individual type of drink can claim the monopoly

- There have been many studies, which have attempted to show that either beer, or wine, or spirits has the most protective effect against cardiovascular disease. But when the evidence is examined, there is no clear "winner" because the major protective agent is alcohol⁸. The American Heart Association has advised that "There is no clear evidence that wine is more beneficial than other forms of alcoholic drink."⁹.
- The same beneficial effect is seen in many different countries with different cultures and drinking habits and this confirms that it is the alcohol that is having the protective effect and no individual type of drink can claim the monopoly¹⁰ in relation to cardiovascular disease.
- For example, in Germany, where beer is the favourite drink, research has confirmed the beneficial effect of alcoholic drinks¹¹. Professor Hoffmeister has calculated that if European beer drinkers stopped drinking there would be an increase in cardiovascular disease, a decrease in life expectancy of about 2 years and a decrease in general happiness!
- Further confirmation that the heart protection comes from the alcohol was provided by some research in the Czech Republic which only analysed beer drinkers and non drinkers¹². The lowest risk of heart attack was found in men who drank 2 – 4 glasses daily. (Between 4 and 9 litres per week).



There is strong evidence that moderate drinkers have a substantially reduced risk of heart attack

The effect of lifestyle

When other factors such as lifestyle are taken into account moderate alcohol consumption alone has been shown to give a 17% reduction in risk of cardiovascular disease

- There are many other factors, apart from what people drink, that influence their health. These factors include such issues as diet, social status, lifestyle, health behaviour and pre-existing disease. It is therefore vital that these factors are taken into account in any research into the effects of alcohol on health. A series of publications from Denmark suggested that wine conferred more health benefits than beer but it is now recognised that lifestyle differences may not have been taken fully into account in this work¹³.
- Lifestyle and other factors which can affect the results are called "confounders" and failure to take proper account of these was a weakness of many studies before their effect was understood. All confounders have to be considered to obtain a measure of the protective effect of alcohol alone. When confounding has been taken into account, moderate alcohol consumption alone has been shown to give a 17% reduction in risk of cardiovascular disease which puts it on a par with the use of aspirin, weight control, antioxidants and exercise as preventive measures.
- Another consideration is not just 'how much' but 'the manner in which' people are drinking. The latest surveys show that people who occasionally 'binge' (drink over 5-6 drinks in a session) do not show the same degree of protection from coronary heart disease even when their consumption over a week is moderate¹⁴. "Plausible explanations for this include several considerations, for instance the opposite effects of a binge compared with regular moderate alcohol consumption on blood clotting and 'good fat', (HDL cholesterol), formation."
- It is also clear that drinking alcoholic drinks with a meal is better than drinking on an empty stomach.



Other beneficial effects from moderate consumption of alcoholic drinks

Research evidence is also building up to show that regular moderate consumption of alcoholic drinks may be protective against many other conditions

- Research evidence is also building up to show that regular light or moderate consumption of alcoholic drinks may be protective against many other conditions.
- Several studies have confirmed the finding of a lower incidence of late onset Diabetes (type 2 Diabetes Mellitus) in moderate drinkers in both men¹⁵ and women¹⁶. The risk has been shown to be 36% lower in men who consumed one or two drinks per day compared to non drinkers¹⁷. While the mechanism remains uncertain, moderate alcohol intake may improve sensitivity to insulin which in turn reduces demand on the pancreas. Lower insulin levels may also be beneficial in reducing risks of cardiovascular disease.
- Several studies have shown an association between moderate alcohol consumption and a decreased risk of developing gallstones¹⁸. This is shown with consumption of all types of alcoholic beverages and the risk is lowest in those who consume frequently. There are several plausible explanations for this finding which include the effect of alcoholic drinks on cholesterol levels and reduced bile concentration.
- Recent research also indicates that moderate consumption of alcoholic drinks has a protective effect on bones which can reduce the risk of osteoporosis (weakening of the bones)¹⁹, may protect against thyroid problems such as goitre²⁰ and can be associated with a lower risk of developing Parkinson's disease²¹. The reasons for these beneficial effects are not yet clearly understood and more research is needed to explain the mechanisms.
- Some recent studies have indicated that moderate consumption may reduce the risk of developing senile dementia²². Although this has been the subject of several papers recently there is no consensus on how alcohol is having this effect²³.
- Positive psychological benefits associated with moderate intake of alcoholic drinks are acknowledged by many experts but are more difficult to demonstrate scientifically. A recent review of the literature confirmed earlier findings that alcohol in moderate amounts is effective in reducing stress and tension and increasing feelings of well being²⁴. The review found that, "to a greater degree than either abstainers or heavy drinkers, moderate drinkers have been found to experience a variety of psychological benefits". More research is needed to explain mechanisms to account for the improved functioning and the part, if any, played by the social setting.
- Research in Spain has confirmed the results of Scandinavian studies which show that people who drink moderately believe they are more healthy²⁵. This results in them feeling better about and having more positive attitudes to their health.

Beer can make a positive contribution to a healthy diet!

- The Brewers of Europe are proud of the range and quality of their beers which include ales, stouts, lagers, wheat beers, fruit beers etc..
- Beer is made from wholesome ingredients, malted barley, hops, yeast and water. All these are natural materials which contribute to a healthy, balanced diet²⁶.
- Beer is 93% water and is a thirst quenching long drink which is relatively low in alcohol.
- Moderate consumption of beer can provide essential vitamins and minerals²⁷. It is high in potassium and low in sodium – the right balance for healthy (low) blood pressure²⁸.
- Like bread, which is also made from cereal, beer is an excellent source of vitamins which are essential for life. Indeed the malting (or sprouting) process actually increases the nutritional value of the cereals used to make beer. In particular beer is rich in the B type vitamins for example niacin, riboflavin (B2), pyridoxine (B6) and folate (B9). (The table on page 13 shows the percentage of the recommended daily intake of certain vitamins and minerals found in a litre of beer).
- It is low in calcium and is rich in magnesium which may help to protect against gall stones and kidney stone formation. This may be one reason why daily consumption of a glass of beer has been shown to reduce the risk of kidney stones by 40%²⁹.
- People who drink beer moderately are protected from the bacterium *Helicobacter pylori*³⁰ which is known to cause the majority of stomach ulcers and may be a risk factor for stomach cancer.
- Beer is also a source of soluble fibre which is derived from the cell walls of barley³¹. Half a litre of beer contains an average of 10% of the recommended daily intake of soluble fibre and some beers can provide up to 30%. Other than keeping you regular, this has a further benefit by slowing down the digestion and absorption of food and reducing cholesterol levels which may help to reduce the risk of heart disease³².

Beer can provide essential vitamins and minerals and can contribute to a healthy balanced diet



Some vitamins and minerals in beer

Vitamin	% of recommended daily intake per litre of beer*	Average contents per litre of beer*
B12	>100	1.7 micrograms
B2 Riboflavin	17	0.3 mg
B6 Pyridoxine	17	0.3 mg
Biotin	17	5.0 micrograms
Niacin	13	3.0 mg
B9 Folate	10 - 45	40 - 120 micrograms
Pantothenic Acid	8	1.0 mg

* Amount in an average (typical) beer

Mineral	% daily intake per litre of beer*	Average contents per litre of beer*
Magnesium	25	100mg
Potassium	25	400mg

Source: "The composition of Foods"³³.



Potential benefit from the natural ingredients in beer

Vitamins and antioxidants could also be protective

- Scientists who have studied the reduced risk of coronary heart disease in beer drinkers report that the reduction in risk is greater than would be expected from the alcohol alone and speculate that other factors in beer such as vitamins and antioxidants could also be protective³⁴.
- Research is also being conducted into the properties of alcohol-free beer. The results so far indicate that the potential beneficial effects from the natural ingredients are likely to apply equally to this type of beer³⁵.

• Antioxidants

Beer contains natural antioxidants which may have a positive health effect

- Natural antioxidants are found in fruits, vegetables and cereals. They are present in beer, where they come from both the malt (barley) and hops as ingredients³⁶. The total amount of antioxidants in beer will depend on the style of beer and therefore the raw materials and the brewing process used.
- Per drink (of equivalent alcohol content), beer contains more than twice as many antioxidants as white wine, although only half the amount in red wine³⁷. However, many of the antioxidants in red wine are large molecules and may be less readily absorbed by the body than the smaller molecules found in beer. Research has shown that the antioxidant content of blood is raised following beer consumption suggesting that the antioxidants in beer are readily absorbed³⁸ and perhaps more readily than that from solid foods³⁹.
- The health significance of antioxidants is that they may play a role in the protection against cancer through their action against free radicals⁴⁰. They are also thought to reduce the risk of heart attacks by inhibiting blood clotting⁴¹. Thus the anti-oxidants in beer may have a positive health effect on the consumer.



• Vitamins and minerals

Beer provides a rich source of dietary folate and silicon



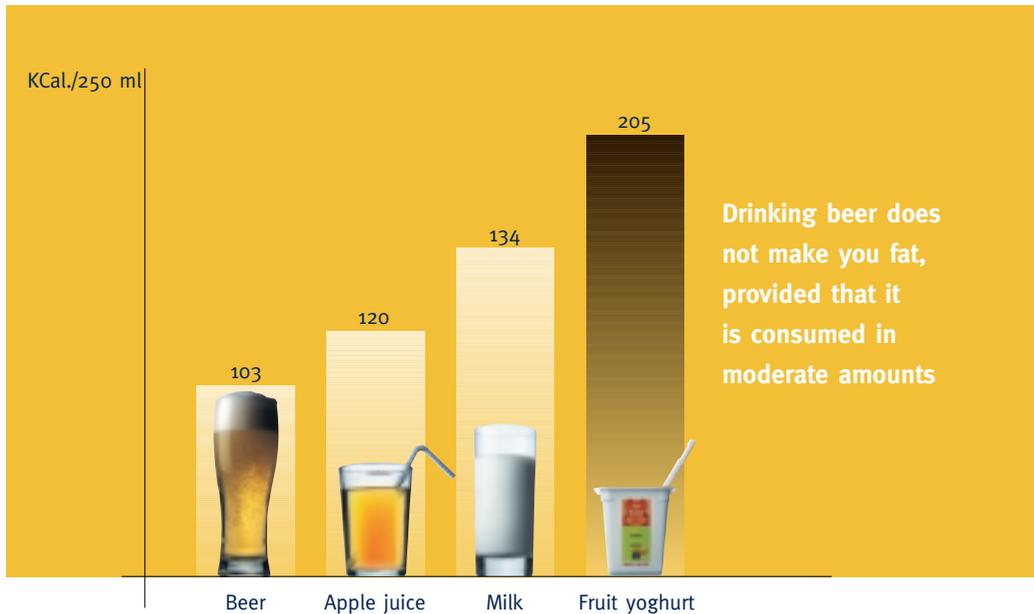
- As well as adding to a healthy diet, the vitamins and minerals in beer may confer additional health benefits.
- Recent research suggests that the B vitamins (B6 and B9) may give beer drinkers additional protection against cardiovascular disease compared to drinkers of wine or spirits⁴²⁻⁴³. For example vitamin B9 may help to reduce the levels of homocysteine in the blood. High homocysteine levels, like "bad cholesterol" (LDL), are associated with a higher risk of heart attacks. Research in a predominantly beer drinking population in Wales concluded that drinking beer, in contrast to other alcoholic drinks, may moderate homocysteine levels as a result of its high folate content⁴⁴. Another study in the beer drinking population of the Czech Republic found that consumption of one litre of beer a day was associated with lower blood homocysteine levels⁴⁵. Clinical research is underway to examine whether the folate in beer can reduce homocysteine levels.
- It has been suggested that adequate dietary folate (B9) could protect against some cancers by protecting the DNA from the type of damage that can cause cancer⁴⁶.
- Beer is also an excellent source of dietary silicon which is readily absorbed by the body. This silicon comes from the barley and is released during the brewing process⁴⁷. Silicon is associated with healthy bones and has been shown in laboratory (animal) experiments to increase bone mineral density when taken orally⁴⁸. Research is underway which will investigate whether the dietary silicon provided by moderate beer consumption actually protects against osteoporosis. This may explain in part the protective effect on bones reported for alcoholic drinks in general (see page 11 above).

• Hops

Possible health benefits - unique to beer

- Small quantities of the flowers from hops are used to preserve and flavour beer.
- Hops are not used in other alcoholic drinks so any potential health benefits they have are unique to beer.
- Many studies have shown that the flavonoids in hops, have the potential to protect against some diseases and help fight some types of cancer⁴⁹. Most of this research has been done in the laboratory but additional research is planned to investigate the potential effects in animals and people.
- Hop flavonoids can be shown to be present in beer⁵⁰ but as yet their effect on human health is not fully understood.

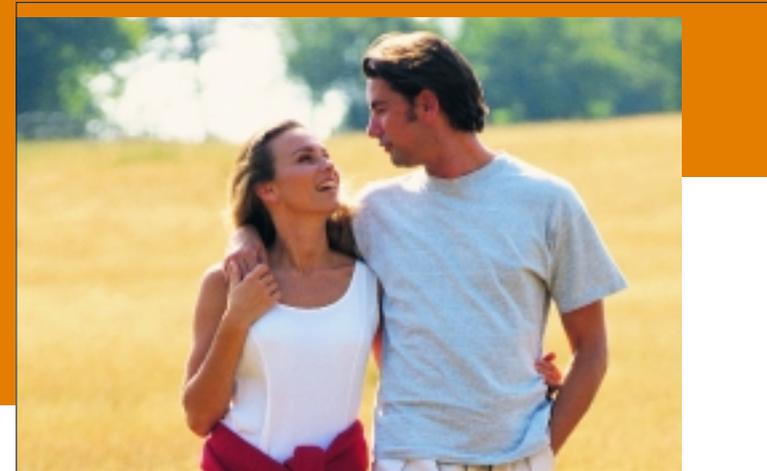
Drinking beer in moderation does not make you fat



- Beer does not contain fat or cholesterol and is low in free sugars. The calories in beer come largely from the alcohol content.
- The term "beer belly" is associated with obesity in beer drinkers in several parts of Europe. This may not be due to the beer but to a confounder. In other words, some beer drinkers may have a less healthy lifestyle.
- It has been shown that generally teetotallers have a tendency to be fatter than people who drink alcoholic drinks⁵¹.
- Several studies have observed that when moderate drinkers are compared to non-drinkers females have a lower average weight and males similar average weight. This is found despite the fact that their calorie intake is greater (calories from diet and alcoholic drink). Why this should be the case is still a matter of debate⁵².
- Research also points to less efficient utilisation of the energy contained in alcoholic drinks⁵³.
- Beer provides calories in similar quantities to soft drinks⁵⁴.
- Drinking beer does not make you fat, provided that is part of a balanced diet and consumed in moderation with meals⁵⁵.

And finally...

The information given is not meant to encourage consumption of beer or other drinks as a means of promoting health or longer life



- The research described in this leaflet sums up the current state of knowledge on this subject. More studies are underway to examine whether some of the potentially beneficial components of foods and beverages such as beer, can be used by the body for the prevention of disease.
- The information is not meant to encourage consumption of beer or other drinks as a means of promoting health or longer life. Beer is consumed for refreshment, enjoyment and convivial company. However, it should be comforting to those who do consume beer regularly that, providing consumption is moderate and part of a balanced diet, it is not a health risk and there may be a net benefit.
- The medical profession is reluctant to advocate moderate drinking to gain the associated health benefits because of an understandable fear that this might lead to over indulgence or be interpreted as an excuse for some people to drink too much. On an individual basis general practitioners will be able to assess their patients risk more precisely.
- More public information about what Government's and the medical profession consider as moderate (healthy) consumption levels would be welcomed by the industry.

References

- ¹ Fagrell B, De Faire U, Bondy S et al. (1999). "The effects of light to moderate drinking on cardiovascular diseases". *Journal of Internal Medicine*, 246:331-340.
- ² Rimm EB, Williams P, Fosher K et al. (1999). "Moderate alcohol intake and lower risk of coronary heart disease: meta-analysis of effects on lipids and haemostatic factors. *British Medical Journal*, 319:1523-1528.
- ³ Hendriks HF, van Haaren MRT, Leenen R et al. (2001). "Moderate alcohol consumption and postprandial plasma lipids in men with different risks for coronary heart disease". *Alcoholism: Clinical and Experimental Research*, 25:563-570.
- ⁴ Keil U, Chambless LE, Döring A et al. (1997). "The relation of alcohol intake to coronary heart disease and all-cause mortality in a beer drinking population". *Epidemiology*, 8(2):150-156.
- ⁵ McConnell MV, Vavouranakis I, Wu LL et al. (1997). "Effects of a single daily alcoholic beverage on lipid and haemostatic markers of cardiovascular risk." *American Journal of Cardiology*, 80(9):1226-1228.
- ⁶ Muntwyler J, Hennekens CH, Buring JE et al. (1998). "Mortality and light to moderate alcohol consumption after myocardial infarction". *Lancet*, 352:1882-1885.
- ⁷ Tanasescu M, Hu FB, Willett WC et al. (2001) "Alcohol consumption and risk of coronary heart disease among men with type 2 Diabetes Mellitus". *Journal of the American College of Cardiology*, 38(7):1836-1842.
- ⁸ Rimm EB, Klatsky A, Grobbee D et al. (1996). "Review of moderate alcohol consumption and reduced risk of coronary heart disease: Is the effect due to beer, wine or spirits?" *British Medical Journal*, 31:731-736.
- ⁹ Goldberg IJ, Mosca L, Piano MR et al. (2001). "Wine and your heart: a science advisory for healthcare professionals from the Nutrition Committee, Council on epidemiology and prevention, and Council on cardiovascular nursing of the American Heart Association". *Circulation*, 103(3):472-475.
- ¹⁰ Doll R (1997). "One for the Heart". *British Medical Journal*, 315:1664-1668.
- ¹¹ Hoffmeister H, Schelp F-P, Mensink GBM et al. (1999). "The relationship between alcohol consumption, health indicators and mortality in the German population". *International Journal of Epidemiology*, 28(6):1066-1072.
- ¹² Bobak M, Skodova Z and Marmot M (2000). "Effect of beer drinking on risk of myocardial infarction: population based case control study". *British Medical Journal*, 320:1378-1379.
- ¹³ Mortensen EL, Jensen HH, Sanders SA et al. (2001). "Better psychological functioning and higher social status may largely explain the apparent health benefits of wine". *Archives of Internal Medicine*, 161:1844-1848.
- ¹⁴ McElduff P, Dobson AJ (1997). "How much alcohol and how often? Population based case control study of alcohol consumption and risk of a major coronary event." *British Medical Journal*, 314:1159-1164.
- ¹⁵ Ajani UA, Hennekens CH, Spelsberg A et al. (2000). "Alcohol consumption and risk of type 2 diabetes mellitus among US male physicians". *Archives of Internal Medicine*, 160(7):1025-1030.
- ¹⁶ Stampfer MJ, Colditz GA, Willett WC et al. (1988). "A Prospective study of moderate alcohol drinking and risk of diabetes in women". *American Journal of Epidemiology*, 128(3):549-558.
- ¹⁷ Conigrave KM, Hu BF, Carmargo Jr. CA et al. (2001). "A prospective study of drinking patterns in relation to risk of Type 2 Diabetes among men". *Diabetes*, 50:2390-2395.
- ¹⁸ Leitzmann MF, Giovannucci EL, Stampfer MJ et al. (1999). "Prospective study of alcohol consumption patterns in relation to symptomatic gallstone disease in men". *Alcoholism: Clinical and Experimental Research*, 23(5):835-841.
- ¹⁹ Holbrook TL, Barrett-Connor E (1993). "A prospective study of alcohol consumption and bone mineral density. *British Medical Journal*, 306:1506-1509.
- ²⁰ Knudsen N, Bülow I, Laurberg P et al. (2001). "Alcohol consumption is associated with reduced prevalence of goitre and solitary thyroid nodules". *Clinical Endocrinology*, 55:41-46.
- ²¹ Paganini-Hill A (2001). "Risk factors for Parkinson's disease: the Leisure World Cohort Study". *Neuro-epidemiology*, 20:118-124.
- ²² Zuccalà G, Onder G, Pedone C et al. (2001). "Dose-related impact of alcohol consumption on cognitive function in advanced age: results of a multicenter survey". *Alcoholism: Clinical and Experimental Research*, 25(12):1743-1748.
- ²³ Ruitenberg A, van Swieten JC, Witteman JCM et al. (2002). "Alcohol consumption and risk of dementia: the Rotterdam study". *Lancet*, 359:281-286.
- ²⁴ Peele S and Brodsky A (2000). "Exploring psychological benefits associated with moderate alcohol use: a necessary corrective to assessments of drinking outcomes?". *Drug and Alcohol Dependence*, 60:221-247.
- ²⁵ Guallar-Castillón P, Rodríguez-Artalejo F, Díez Gañán L et al. (2001). "Consumption of alcoholic beverages and subjective health in Spain". *Journal of Epidemiology and Community Health*, 55:648-652.
- ²⁶ Baxter, D (2000) "Healthy Ingredients in Beer" *Ferment*, Feb/Mar: 20-24.
- ²⁷ Fuller RK, Littell AS, Witschi JC et al. (1971). "Calorie and nutrient contribution of alcoholic beverages to the usual diets of 155 adults". *American Journal Clinical Nutrition*, 24(9):1042-1052.
- ²⁸ Bamforth CW (2002). "Nutritional aspects of beer – a review". *Nutrition Research*, 22:227-237.
- ²⁹ Hirvonen T, Pietinen P, Virtanen M et al. (1999). "Nutrient intake and use of beverages and the risk of kidney stones among male smokers". *American Journal of Epidemiology*, 150(2):187-194.
- ³⁰ Brenner H, Rothenbacher D, Bode G et al. (1997). "Relation of smoking and alcohol and coffee consumption to active helicobacter pylori infection: Cross sectional study". *British Medical Journal*, 315:1489-1492.
- ³¹ Gromes R, Zeuch M, Piendl A. (2000). "Further investigations into the dietary fibre in beers". *Brauwelt International*, 1:24-28.
- ³² Bell S, Goldman VM, Bistrrian BR et al. (1999). "Effect of β-Glucan from oats and yeast on serum lipids". *Critical Reviews in Food Science and Nutrition*. 39(2):189-202.
- ³³ McCance, Widdowson (1978) "The composition of Foods Fourth Edition". HMSO, London.
- ³⁴ Brenner H, Rothenbacher D, Bode G et al. (2001). "Coronary heart disease risk reduction in a predominantly beer-drinking population". *Epidemiology*, 12(4): 390-395.
- ³⁵ Martínez Álvarez JR, Villarino Marín AL and Cobo Sanz JM (2001). "Cerveza sin alcohol. Sus propiedades". *Sociedad Española de Dietética y Ciencias de la Alimentación (SEDCA)*. Published by Centro de Información Cerveza y Salud.
- ³⁶ Shahidi F, Naczk M (1995). "Food Phenolics; sources, chemistry, effects, applications". *Technomic Publishing Co, Lancaster Basel*. Chapter 5:128.
- ³⁷ Suter PM (2001). "Alcohol and mortality: if you drink, do not forget fruits and vegetables". *Nutrition Reviews*, 59(9):293-297.
- ³⁸ Ghiselli A, Natella F, Guidi A et al. (2000). "Beer increases plasma antioxidant capacity in humans". *Journal of Nutrition and Biochemistry*, 11:76-80.
- ³⁹ Bourne L, Paganga G, Baxter D et al. (2000). "Absorption of ferulic acid from low alcohol beer". *Free Radical Research*, 32:273-280.
- ⁴⁰ Tagashira M, Watanabe M, Uematsu N (1995). "Antioxidative activity of hop bitter acids and their analogues". *Bioscience, Biotechnology, Biochemistry*. 59:740.
- ⁴¹ Pignatelli P, Pulcinelli FM, Celestini A et al. (2000). "The flavonoids quercetin and catechin synergistically inhibit platelet function by antagonizing the intracellular production of hydrogen peroxide". *American Journal of Clinical Nutrition*, 72:1150-1155.
- ⁴² Van der Gaag MS, Ubbink JB, Sillanaukee P et al. (2000). "Effect of consumption of red wine, spirits and beer on serum homocysteine". *Lancet*, 355:1522.
- ⁴³ Jaques PF, Bostom AG, Wilson PWF et al. (2001). "Determinants of plasma total homocysteine concentration in the Framingham Offspring cohort". *American Journal of Clinical Nutrition*, 73:613-621.
- ⁴⁴ Ubbink JB, Fehily AM, Pickering J et al. (1998). Homocysteine and ischaemic heart disease in the Caerphilly cohort". *Atherosclerosis*, 140(2):349-356.
- ⁴⁵ Mayer Jr. O, Simon J, Rosolová H (2001). "A population study of the influence of beer consumption on folate and homocysteine concentrations". *European Journal of Clinical Nutrition*, 55(7):605-609.
- ⁴⁶ Zhang S, Hunter DJ, Hankinson SE et al. (1999). "A prospective study of folate intake and the risk of breast cancer". *Journal of the American Medical Association*, 281:1632-1637.
- ⁴⁷ Bellia JP, Birchall JD and Roberts NB (1994). "Beer: a dietary source of silicon". *Lancet*, 343:235.
- ⁴⁸ Rico H, Gallego-Lago JL, Hernández ER et al. (2000). "Effect of Silicon supplement on osteopenia induced by ovariectomy in rats". *Calcified Tissue International*, 66(1):53-55.
- ⁴⁹ Arimoto-Kobayashi S, Sugiyama C, Harada N et al. (1999). "Inhibitory effects of beer and other alcoholic beverages on mutagenesis and DNA adduct formation induced by several carcinogens". *Journal of Agricultural and Food Chemistry*, 47(1):221-230.
- ⁵⁰ Stevens JF, Taylor AW and Deinzer ML (1999). "Quantitative analysis of xanthohumol and related prenylflavonoids in hops and beer by liquid chromatography – tandem mass spectrometry". *Journal of Chromatography A*, 832:97-107.
- ⁵¹ Männistö S, Uusitalo K, Roos E et al. (1997). "Alcohol beverage drinking, diet and body mass index in a cross sectional survey". *European Journal of Clinical Nutrition*, 51(5):236-332.
- ⁵² McCarty MF (2000). "The insulin-sensitising activity of moderate alcohol consumption may promote leanness in women". *Medical Hypotheses*, 54:749-797.
- ⁵³ Suter PM (1994). "Effect of ethanol on energy expenditure". *American Journal of Physiology*, 226:R1204 – R1212.
- ⁵⁴ Janssens J, Shapira N, Debeuf P et al. (1999). "Effects of soft drink and table beer consumption on insulin response in teenagers". *European Journal of Cancer Prevention*, 8:289-295.
- ⁵⁵ Borys JM, Bagrel A, Pelletier X et al. (1994). "Bière et poids: la fin des idées reçues?" *Expansion Scientifique Française*.



MEMBER ASSOCIATIONS

AUSTRIA

Verband der Brauereien
Österreichs
Zaunergasse 1-3
A - 1030 Wien
Tel. : 43-1 713 15 05
Fax : 43-1 713 39 46
getraenke@lebensmittel.wk.or.at
<http://www.bierserver.at>

BELGIUM

Belgian Brewers
Maison des Brasseurs
Grand'Place 10
B - 1000 Bruxelles
Tel. : 32-2 511 49 87
Fax : 32-2 511 32 59
belgian.brewers@beerparadise.be
<http://www.beerparadise.be>

DENMARK

Bryggeriforeningen
Frederiksberggade 11
DK - 1459 Copenhagen V
Tel. : 45-33 12 62 41
Fax : 45-33 14 25 13
info@bryggeriforeningen.dk
<http://www.bryggeriforeningen.dk>

FINLAND

Panimoliitto
Finnish Federation of the
Brewing Industry
Pasilankatu 2 - P.O. Box 115
FIN - 00241 Helsinki
Tel. : 358-9 148 871
Fax : 358-9 1488 7201
info@panimoliitto.fi
<http://www.panimoliitto.fi>

FRANCE

Brasseurs de France
Bd Malesherbes 25
F - 75008 Paris
Tel. : 33-1 42 66 29 27
Fax : 33-1 42 66 52 79
contact@brasseurs-
de-france.com
[http://www.brasseurs-
de-france.com](http://www.brasseurs-
de-france.com)

GERMANY

Deutscher Brauer-Bund e.V.
Annaberger Strasse 28
D - 53175 Bonn
Tel. : 49-228 95 906 0
Fax : 49-228 95 906 16
info@brauer-bund.de
<http://www.brauer-bund.de>

GREECE

Greek Brewers' Association
102 Kifissou Ave
GR - 122 41 Egaleo
Tel. : 30-1 538 49 11
Fax : 30-1 545 08 48
amstgdd@otenet.gr

IRELAND

The Irish Brewers' Association
Confederation House
84/86 Lower Baggot Street
IRL - Dublin 2
Tel. : 353-1 660 10 11
Fax : 353-1 660 17 17
paddy.jordan@ibec.ie

ITALY

Assobirra
Viale di Val Fiorita 90
I - 00144 Roma
Tel. : 39-06 54 39 32
Fax : 39-06 59 12 910
birra.viva@assobirra.it
<http://www.assobirra.it>

LUXEMBOURG

Fédération des Brasseurs
Luxembourgeois
Bld Konrad Adenauer 31
L - Luxembourg - Kirchberg
B.P. 1304 L - 1013 Luxembourg
Tel. : 352-43 53 66 1
Fax : 352-43 23 28
fed.brassieurs@fedil.lu

PORTUGAL

Associação da Indústria
Cervejeira
Portuguesa
Av. Almirante Reis 115-3º
P - 1150-014 Lisboa
Tel. : 351-21 330 49 68
Fax : 351-21 330 49 69
asscerv@mail.telepac.pt

SPAIN

Cervecedores de España
Almagro 24 - 2º Izda.
E - 28010 Madrid
Tel. : 34-91 308 67 70
Fax : 34-91 308 66 61
info@cervecedores.org
<http://www.cervecedores-es.com>

SWEDEN

Svenska Bryggareföreningen
Polhemsgatan 29
Box 8104
S - 10420 Stockholm
Tel. : 46-8 566 213 00
Fax : 46-8 566 213 10
reception@swedbrewers.se
<http://www.swedbrewers.se>

THE NETHERLANDS

Centraal Brouwerij Kantoor
Herengracht 282
NL - 1016 BX Amsterdam
PB 3462 NL-1001 AG Amsterdam
Tel. : 31-20 625 22 51
Fax : 31-20 622 60 74
info@cbk.nl
<http://www.cbk.nl>

UNITED KINGDOM

British Beer and Pub
Association
Market Towers
1 Nine Elms Lane
GB - London SW8 5NQ
Tel. : 44-207 627 91 91
Fax : 44-207 627 91 23
enquiries@beerandpub.com
<http://www.beerandpub.com>

ASSOCIATE MEMBERS

NORWAY

Bryggeri- og
mineralvannforeningen
Essendropsgt. 6
P.O.Box 7087 Homansbyen
N - 0306 OSLO
Tel. : 47-23 08 86 90
Fax : 47-22 60 30 04
info@brom.no
<http://www.brom.no>

SWITZERLAND

Schweizerischer Bierbrauerverein
Bahnhofplatz 9
CH - 8023 Zürich
Tel. : 41-1 221 26 28
Fax : 41-1 211 62 06
info@bier.ch
<http://www.bier.ch>