Alcohol and cancer: a position statement from Cancer Council Australia

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ABSTRACT

- The Cancer Council Australia (CCA) Alcohol Working Group has prepared a position statement on alcohol use and cancer. The statement has been reviewed by external experts and endorsed by the CCA Board.
- Alcohol use is a cause of cancer. Any level of alcohol consumption increases the risk of developing an alcohol-related cancer; the level of risk increases in line with the level of consumption.
- It is estimated that 5070 cases of cancer (or 5% of all cancers) are attributable to long-term chronic use of alcohol each year in Australia.
- Together, smoking and alcohol have a synergistic effect on cancer risk, meaning the combined effects of use are significantly greater than the sum of individual risks.
- Alcohol use may contribute to weight (fat) gain, and greater body fatness is a convincing cause of cancers of the oesophagus, pancreas, bowel, endometrium, kidney and breast (in postmenopausal women).
- The existing evidence does not justify the promotion of alcohol use to prevent coronary heart disease, as the previously reported role of alcohol in reducing heart disease risk in light-to-moderate drinkers appears to have been overestimated.
- CCA recommends that to reduce their risk of cancer, people limit their consumption of alcohol, or better still avoid alcohol altogether.
- For individuals who choose to drink alcohol, CCA recommends that they drink only within the National Health and Medical Research Council guidelines for alcohol consumption.

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Alcohol use is widespread in Australia and has had a dominant role in defining Australian culture for more than 200 years.[1,2] However, it is also an important cause of illness, injury and death, whether resulting from short-term episodes of intoxication or from long-term, chronic use.[3]

Addressing the health and social damage resulting from risky drinking is one of the three key priority areas identified by the Australian National Preventative Health Taskforce.[4] Levels of harm from alcohol use are increasing, and a range of policy measures have been proposed to address the current drinking "culture" in Australia.[4]

In this article, we provide a brief overview of the evidence concerning alcohol use and cancer, and outline the current Cancer Council Australia (CCA) recommendations on alcohol consumption. The consensus process for developing this position statement is described in Box 1, and a summary of the key evidence-based points is provided in Box 2.

Evidence linking alcohol use and cancer

It has been known for more than 20 years that long-term chronic use of alcohol can cause cancer. In 1988, the International Agency for Research on Cancer stated that the "occurrence of malignant tumours of the oral cavity, pharynx, larynx, oesophagus and liver is causally related to the consumption of alcoholic beverages" and classified alcoholic beverages as Group 1 carcinogens — known to cause cancer in humans.[5] Ethanol, the chemical present in all alcoholic beverages that induces the altered physical and mental responses experienced with alcohol use, has also been listed as a Group 1 carcinogen.[6]

The most recent comprehensive review of the scientific evidence by the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR) concluded that there is convincing evidence that alcohol is a cause of cancer of the mouth, pharynx, larynx, oesophagus, bowel (in men) and breast (in women), and probable evidence that alcohol increases the risk of bowel cancer (in women) and liver cancer.[7] Convincing and probable are the two highest levels of evidence set by the WCRF and AICR, which identify a causal relationship between a particular aspect of food, nutrition, physical activity or body composition, and cancer.[7] Scientific research is continuing to identify other cancers that could be associated with alcohol use. For example, there is some evidence that heavy alcohol consumption may be associated with a higher risk of prostate cancer.[8,9]

There is a dose–response relationship between alcohol and cancer risk for men and women, with studies showing that the risk of cancer increases with increasing consumption of alcohol on a regular basis.[7,10-12]

There are a number of biological mechanisms that may explain alcohol's contribution to cancer development. Ethanol may cause cancer through the formation of acetaldehyde, its most toxic metabolite. Acetaldehyde has mutagenic and carcinogenic properties, and bonds with DNA to increase the risk of DNA mutations and impaired cell replication.[13,14] Ethanol may also cause direct tissue damage by irritating the epithelium and increasing the

1 Consensus process used to develop the Cancer Council Australia (CCA) position statement

The position statement was developed by a writing group established under the CCA Public Health Committee. The writing group prepared an initial evidence-based draft statement that was circulated for comment to the Alcohol Working Group, Nutrition and Physical Activity Committee, and Public Health Committee. Based on feedback, the statement was revised and sent for peer review before being endorsed by the Public Health Committee and, finally, the CCA Board. The position statement is available in full at http://www.cancer.org.au/Healthprofessionals/PositionStatements/alcohol.htm. ◆

2 Key evidence-based points on alcohol use and cancer

- Alcohol use is a cause of cancer in humans (Group 1 carcinogen, highest level of evidence, classified by the International Agency for Research on Cancer [IARC]).[5]
- Ethanol, the chemical present in all alcoholic beverages, is also a cause of cancer in humans (IARC Group 1 carcinogen).[6]
- There is **convincing** evidence that alcohol use increases the risk of cancers of the mouth, pharynx, larynx, oesophagus, bowel (in men) and breast (in women).[7] Convincing evidence, as classified by the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR), is the strongest level of evidence and denotes a causal relationship.[5]
- Alcohol use **probably** increases the risk of bowel cancer (in women) and liver cancer. A probable relationship, as classified by the WCRF and the AICR, is the second highest level of evidence and denotes that the relationship is probably causal in nature.[5]
- Alcohol use may contribute to weight (fat) gain and may therefore contribute indirectly to cancers associated with overweight and obesity.
- Greater body fatness is a **convincing** cause of cancers of the oesophagus, pancreas, bowel, endometrium, kidney and breast (in postmenopausal women).[7] ◆

absorption of carcinogens through its effects as a solvent.[7] In addition, alcohol can increase the level of hormones such as oestrogen, thereby increasing breast cancer risk,[7] and increase the risk of liver cancer by causing cirrhosis of the liver, increased oxidative stress, altered methylation and reduced levels of retinoic acid.[13] Lifestyle factors such as smoking, poor oral hygiene, and certain nutrient deficiencies (folate, vitamin B6, methyl donors) or excesses (vitamin A/β-carotene) owing to poor diet or self-medication may also increase the risk for alcohol-associated tumours.[13]

Combined effects of drinking and smoking

For some cancers, the combined effects of drinking alcohol and smoking tobacco greatly exceed the risk from either factor alone. Smoking and alcohol together have a synergistic effect on upper gastrointestinal and aerodigestive tract cancer risk.[15] Compared with non-smoking non-drinkers, the approximate relative risks for developing mouth and throat cancers are up to seven times greater for people who smoke tobacco, up to six times greater for those who drink alcohol, but more than 35 times greater for those who are regular heavy users of both substances (consuming more than four alcoholic drinks and smoking 40 or more cigarettes daily).[16] The synergistic effect of alcohol and smoking has been estimated to be responsible for more than 75% of cancers of the upper aerodigestive tract in developed countries.[16]

Alcohol use and weight gain

The relationship between alcohol consumption and body weight and fat is complex and appears to vary with sex and drinking pattern.[17] From a nutritional viewpoint, alcoholic drinks represent "empty kilojoules" — that is, alcoholic drinks are high in kilojoules but low in nutritional value, especially when added to sugary mixer drinks. Alcohol itself has a comparatively high energy content (29 kJ/g) compared with other macronutrients.[18]

If people drink alcohol in addition to their normal dietary intake — that is, without a compensatory reduction in energy intake — they are liable to gain weight. Alcohol provides extra kilojoules, and slows fat and carbohydrate oxidation. On the other hand, if drinking replaces healthy eating patterns, it can lead to nutritional deficiencies and serious illness.[17,19]

Therefore, as well as being a direct cause of several cancers, alcohol might also contribute indirectly to those cancers associated with excess body fatness. There is convincing evidence that body fatness increases the risk of cancers of the oesophagus, pancreas, bowel, breast (in postmenopausal women), endometrium and kidney, and probable evidence that body fatness increases the risk of gallbladder cancer.[7]

Alcohol use and heart disease

Earlier research reporting that low-to-moderate levels of alcohol consumption might reduce the incidence of coronary heart disease may be flawed.[20] For example, misclassification error may be a factor in studies in which the category of non-drinkers includes former drinkers who might have stopped drinking for reasons such as ill health or becoming older.[21] It might reasonably be assumed that this population would be more likely to have coronary heart disease.[21] Other reviews have suggested that unmeasured confounding in epidemiological studies of alcohol and heart disease is likely to be widespread, and that it is almost impossible to account for this confounding without randomised controlled trials.[22-24]

The putative benefits of moderate alcohol consumption on heart disease appear to be confined to middle-aged and older people.[25] However, the ongoing debate over the potential impact of uncontrolled confounders on estimates of the size of the cardioprotective

3 Estimated cancer incidence caused by alcohol use in Australia, applying population attributable fractions (PAFs) for the United Kingdom to Australian cancer incidence data for 2005

		Australian incidence†	
Cancer site	UK PAF*	Overall	Attributable to alcohol use
Convincing evidence that alcohol use increases risk*			
Mouth, pharynx, larynx	41%	3161	1296
Oesophagus	51%	1165	594
Bowel (men)	7%	7181	503
Breast (women)	22%	12 170	2677
Subtotal			5070
Proportion of all cancers			5.0%
Probable evidence that alcohol use increases risk*			
Bowel (women)	7%	5895	413
Liver	17%	1060	180
Subtotal			593
Proportion of all cancers			0.6%
Total			**5663**
Total proportion of all cancers			**5.6%**

* Source: World Cancer Research Fund and the American Institute for Cancer Research. [7,31] † Source: Australian Institute of Health and Welfare.[30] ◆

effect, and whether or not moderate alcohol consumption should be recommended for protection against heart disease, is difficult to resolve in the absence of randomised controlled trials. Acknowledging these issues, the World Health Organization stated in 2007 that "from both the public health and clinical viewpoints, there is no merit in promoting alcohol consumption as a preventive strategy".[20] In Australia, the National Heart Foundation explicitly advises against the consumption of red wine and other types of alcoholic drinks for the prevention or treatment of heart disease.[26]

Estimates of cancer incidence attributable to alcohol use in Australia

Several estimates of the numbers of cases of cancer attributable to alcohol use in Australia have been calculated using different methods.[4,27-29] However, these calculations predate the confirmation of alcohol use as a convincing cause of bowel cancer in men. Because the incidence of bowel cancer in Australia is high,[30] calculations which exclude bowel cancer are likely to lead to a substantial underestimate of the true burden of alcohol-caused cancer in Australia.

In order to estimate cancer incidence attributable to alcohol use in Australia, a set of attributable fractions developed by the WCRF and AICR for cancers (including bowel cancer) associated with alcohol for the United Kingdom[31] was applied to Australian cancer incidence data for 2005[28] (Box 3). Of the four preventability estimates calculated (United States, UK, Brazil and China), exposure data for Australia (39%) most closely matched the UK estimates (24%). The other countries had a substantially higher proportion of the population who did not drink alcohol (US, 63%; Brazil, 79%; China, 91%).[31,32]

Using this method, it is estimated that 5070 cases of cancer (or 5% of all cancers) are attributable to long-term chronic use of alcohol each year in Australia. This figure includes cancers for which there is convincing evidence that alcohol use increases the risk of disease. When cancers for which the risk is probably increased by alcohol use are included, the tally rises to 5663 (or 5.6% of all cancers).

CCA recommendations on alcohol use

Alcoholic drinks and ethanol are carcinogenic to humans.[5,6] There is no evidence that there is a safe threshold of alcohol consumption for avoiding cancer, or that cancer risk varies between the type of alcoholic beverage consumed.[7]

CCA recommends that to reduce their risk of cancer, people limit their consumption of alcohol, or better still avoid alcohol altogether. For individuals who choose to drink alcohol, consumption should occur within the National Health and Medical Research Council guidelines.[33] CCA's key recommendations are outlined in Box 4.

CCA is a strong advocate for evidence-based action to reshape social attitudes concerning drinking, and to reduce the burden of morbidity and mortality caused by alcohol use. These issues are addressed in policy statements adopted by CCA, available from http://www.cancer.org.au/Healthprofessionals/PositionStatements/alcohol.htm.

4 Key recommendations on alcohol use

Cancer Council Australia (CCA) recommends that to reduce their risk of cancer, people limit their consumption of alcohol, or better still avoid alcohol altogether.

CCA bases its recommendations regarding alcohol use on the weight of scientific evidence that has accumulated on the relationship between alcohol consumption and cancer.

For individuals who choose to drink alcohol, CCA supports drinking only within the National Health and Medical Research Council (NHMRC) guidelines to reduce health risks from drinking alcohol.*[33] The guidelines are summarised below; full text is available at http://www.nhmrc.gov.au/publications/synopses/ds10syn.htm.

Guideline 1: Reducing the risk of alcohol-related harm over a lifetime

The lifetime risk of harm from drinking alcohol increases with the amount consumed. For healthy men and women, drinking no more than two standard drinks† on any day reduces the lifetime risk of harm from alcohol-related disease or injury.

Guideline 2: Reducing the risk of injury on a single occasion of drinking

On a single occasion of drinking, the risk of alcohol-related injury increases with the amount consumed. For healthy men and women, drinking no more than four standard drinks on a single occasion reduces the risk of alcohol-related injury arising from that occasion.

Guideline 3: Children and young people under 18 years of age

For children and young people under 18 years of age, not drinking alcohol is the safest option.

Guideline 4: Pregnancy and breastfeeding

Maternal alcohol consumption can harm the developing fetus or breastfeeding baby:

- for women who are pregnant or planning a pregnancy, not drinking is the safest option
- for women who are breastfeeding, not drinking is the safest option.

* The NHMRC states that, "the advice in the guidelines cannot be ascribed levels of evidence ratings as occurs with other NHMRC guidelines, due to the analytic approach taken in their development". Guidelines 1 and 4, however, are underpinned by evidence equivalent to NHMRC level III-1. † The Australian standard drink contains 10 g of alcohol (equivalent to 12.5 mL of pure alcohol). In Australia, a standard drink is a 100 mL glass of wine (13.5% alcohol), a 285 mL glass of beer (about 5% alcohol) or a 30 mL nip of spirits (about 40% alcohol). ◆

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Competing interests

None identified.

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An electronic photograph should accompany the obituary, preferably 300 dpi, jpeg or tiff file. The obituary may be published in print and online, or online only. The article may be truncated in the print version.

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