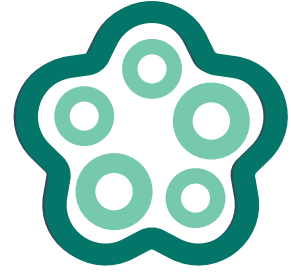


DRINKING AND CANCER



IARD Health Reviews offer a referenced overview of recent peer-reviewed, published research on the relationship between alcohol consumption and health outcomes. They are not necessarily intended to be exhaustive representations of all scientific research on a given subject and, as research is constantly evolving, they may not include the most recent findings. These materials do not necessarily reflect the views of IARD or its member companies. The reviews report the findings of the referenced studies and are not intended to advise individuals about their drinking. People with specific questions about their drinking are encouraged to consult a health-care professional; together, they can determine what is best based on individual risk factors, including family history, genetics, and lifestyle. For some people, the better choice may be to not drink at all. IARD Health Reviews should be read in their entirety and not misrepresented or taken out of context.

This Health Review focuses on cancer sites associated with alcohol consumption as identified by the World Cancer Research Fund and the International Agency for Research on Cancer. Due to the limited availability of national cancer statistics in many countries, U.S. data – which is publicly available and annually updated – is sometimes used to illustrate cancer risk in this review.

There is a glossary of key cancer terms used in this chapter on page 5.

Last Reviewed: July 2019



Background

In 2019, cancer was the second-leading cause of death globally after cardiovascular disease among all non-communicable diseases (NCDs) and other causes of death. Cancer accounted for 17.8% of all deaths, according to the Global Burden of Disease Study (GBD) [1].

Cancer incidence (new cases diagnosed within a given year) and mortality rates vary across the globe, with approximately two-times higher incidence rates in high-income countries than in lower-income countries. Although mortality rates have been declining in high-income and middle-income countries, these rates have remained nearly unchanged in low-income countries since the 1990s [1].

Table 1: Top ten cancer sites worldwide in 2020, by number of new cases

Cancer	Number of new cases	Age-standardized incidence rate (per 100,000)
All cancers	19,292,789	201.0
Breast	2,261,419	47.8
Lung	2,206,771	22.4
Colorectum	1,931,590	19.5
Prostate	1,414,259	30.7
Stomach	1,089,103	11.1
Liver	905,677	9.5
Cervix uteri	604,127	13.3
Oesophagus	604,100	6.3
Thyroid	586,202	6.6
Bladder	573,278	5.6

Source: *Global Cancer Observatory* [2].

The incidence of being diagnosed with cancer varies by cancer site (see Table 1). In 2020, the cancer sites with the highest incidence rates for both men and women combined were: breast, lung, colorectum, and prostate (see Appendix Table 1A for the Global Cancer Observatory's complete list of new cancer cases in 2018). Cancer incidence can further vary by sex [2].



Cancer risk factors

Some established risk factors for cancer include health-related behaviors, existing health conditions, family history, and genetics. These are categorized into modifiable and non-modifiable risk factors (see Table 2).

According to Macmillan Cancer Support, “Everyone has a certain risk of developing cancer. A combination of genes, lifestyle and environment can affect this risk. Doctors do not know the exact causes of cancer. But there are risk factors that can increase your chance of developing it. Having one or more risk factors does not mean you will get cancer. Also, having no risk factors does not mean you will not develop cancer. Around 1 in 3 cases of the most common cancers (about 33%) could be prevented by eating a healthy diet, keeping to a healthy weight and being more active. There are some things you can do to lower your risk of developing cancer. But you cannot reduce your risk completely through your lifestyle.” [3]

The following organizations, among others, provide more information on risk factors associated with cancer: [American Cancer Society](#), [National Cancer Institute \(NCI\)](#), [Cancer Research UK](#), [Macmillan Cancer Support](#), [Mayo Clinic](#), and the [World Cancer Research Fund \(WCRF\)](#).

Table 2: Modifiable risk and non-modifiable risk factors for cancer*

Modifiable risk factors	Non-modifiable risk
<ul style="list-style-type: none"> • Alcohol consumption • Body mass index (BMI) • Dietary fiber intake • Fruit and vegetable intake • Length and frequency of physical activity • Radiation and sun exposure • Smoking • Viruses and infections 	<ul style="list-style-type: none"> • Age • Ethnicity • Family History • Race • Sex (certain cancers, for example, breast, prostate and thyroid cancer)

Sources: *American Cancer Society* [4] and *National Cancer Institute* [5].

*Items are listed alphabetically and not according to importance or magnitude of risk.

This Health Review focuses on the role of alcohol consumption as a risk factor for cancer, specifically the cancer sites associated with alcohol consumption as identified by the World Cancer Research Fund (WCRF) and the International Agency for Research on Cancer (IARC).

ALCOHOL AND CANCER RISK

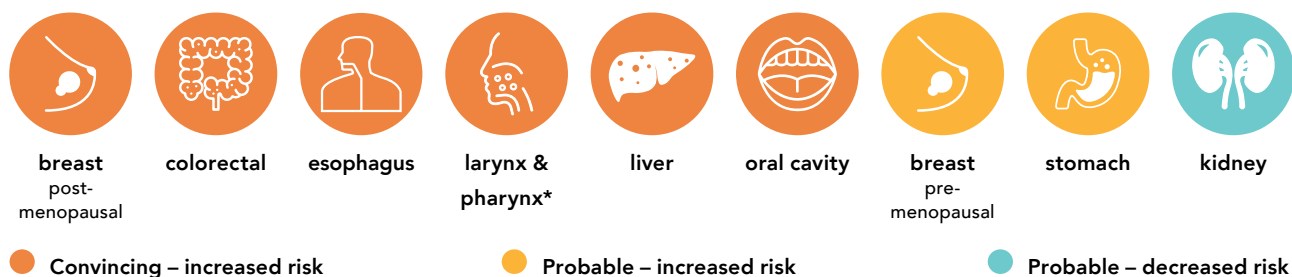
IARC first described alcohol beverages as a Group 1 *carcinogen* in 1988 [6]. IARC gives this classification to agents or exposures if there is sufficient evidence that they are carcinogenic to humans [6]. Group classifications are based on the strength of the evidence, not the level of risk [6, 7]. (See Glossary on page 5 for a description of IARC's classification of sufficient evidence.)

Both IARC and WCRF report that alcohol consumption is associated with a risk of being diagnosed with certain cancers [8, 9]. According to WCRF:

- ▶ “For some cancers, there is an increased risk with any amount of alcohol consumed, whereas for other cancers the risk becomes apparent from a higher level of consumption, of about two or three drinks a day (30 or 45 grams of alcohol per day)” [9].

The 2012 IARC Monograph report lists seven cancer sites that are associated with alcohol consumption [8]. WCRF's *Third Expert Report 2018* lists nine cancer sites where there is convincing or probable evidence related to alcohol consumption: eight sites associated with an increased cancer risk and one site with a decreased risk (see Figure 1) [9]. (See Appendix Table 1B for a list of all cancer sites or subtypes reviewed in the *Third Expert Report 2018*.)

Figure 1: WCRF 2018 grading of risk associated with alcohol consumption by cancer site with strong evidence



Source: *The World Cancer Research Fund / American Institute for Cancer Research's Third Expert's Report 2018* [9].

*Pharynx includes nasopharynx, oropharynx, and hypopharynx cancer.

This review focuses on the cancer sites listed by WCRF's 2018 report as having strong evidence of an increase or decrease in risk associated with alcohol consumption as the WCRF's Continuous Update Project (CUP) is more recent and comprehensive than IARC's most recent (2012) review. "Strong evidence", as defined by WCRF, includes sites with "convincing" and "probable" evidence of an increase or decrease in risk associated with alcohol. (See Appendix Figure 1A for descriptions of WCRF classifications and grading of alcohol associated cancers.)



Glossary

- ▶ **Carcinogen** is any agent or substance that can cause cancer.
- ▶ **IARC's classification of sufficient evidence** is described as "a causal relationship has been established between exposure to the agent and human cancer. That is, a positive relationship has been observed between exposure to the agent and cancer in studies in which chance, bias, and confounding could be ruled out with reasonable confidence" [6].

Appendix

Table A1: Estimated number of new cases in 2020, worldwide, both sexes, all ages, regardless of drinking status

Cancer	Number of new cases	Crude Rate per 100,000	ASR (World) per 100,000
All cancers	19,292,789	247.5	201.0
Breast	2,261,419	58.5	47.8
Lung	2,206,771	28.3	22.4
Colorectum	1,931,590	24.8	19.5
Prostate	1,414,259	36.0	30.7
Stomach	1,089,103	14.0	11.1
Liver	905,677	11.6	9.5
Cervix uteri	604,127	15.6	13.3
Oesophagus	604,100	7.8	6.3
Thyroid	586,202	7.5	6.6
Bladder	573,278	7.4	5.6
Non-Hodgkin lymphoma	544,352	7.0	5.8
Pancreas	495,773	6.4	4.9
Leukaemia	474,519	6.1	5.4
Kidney	431,288	5.5	4.6
Corpus uteri	417,367	10.8	8.7
Lip, oral cavity	377,713	4.8	4.1
Melanoma of skin	324,635	4.2	3.4
Ovary	313,959	8.1	6.6
Brain, central nervous system	308,102	4.0	3.5
Larynx	184,615	2.4	2.0
Multiple myeloma	176,404	2.3	1.8
Nasopharynx	133,354	1.7	1.5
Gallbladder	115,949	1.5	1.2
Oropharynx	98,412	1.3	1.1
Hypopharynx	84,254	1.1	0.91
Hodgkin lymphoma	83,087	1	0.98
Testis	74,458	1.9	1.8
Salivary glands	53,583	0.69	0.57
Vulva	45,240	1.2	0.85

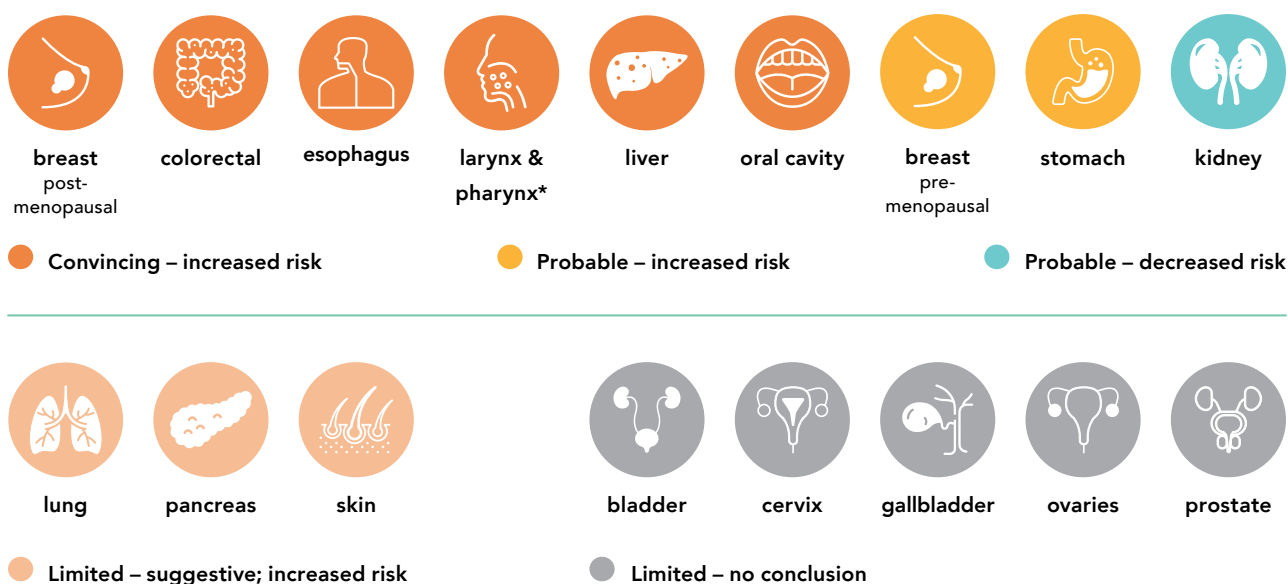
Penis	36,068	0.92	0.88
Kaposi sarcoma	34,270	0.44	0.39
Mesothelioma	30,870	0.4	0.3
Vagina	17,908	0.46	0.36

Source: *Global Cancer Observatory* [2]

ASR = age-standardized rates

Figure 1A: WCRF 2018 classification of evidence and risk associated with alcohol consumption by cancer site

WCRF summarizes the results of its Third Expert Report according to strength of evidence and direction of effect by cancer site and sub-site or sub-type, when relevant, in Section 5, of *Alcohol drinks and the risk of cancer 2018* [10] as follows:



Source: *The World Cancer Research Fund / American Institute for Cancer Research's Third Expert's Report 2018* [9].

*Pharynx includes nasopharynx, oropharynx, and hypopharynx cancer.

The WCRF definitions of their grading criteria as convincing, probable, limited, and unlikely [9] are reproduced here:

Strong evidence: "Evidence is strong enough to support a judgement of a convincing or probable causal (or protective) relationship and generally justifies making public health recommendations."

- ▶ **Convincing:** “Evidence is strong enough to support a judgement of a convincing causal (or protective) relationship, which justifies making recommendations designed to reduce the risk of cancer. The evidence is robust enough to be unlikely to be modified in the foreseeable future as new evidence accumulates.”
- ▶ **Probable:** “Evidence is strong enough to support a judgement of a probable causal (or protective) relationship, which generally justifies making recommendations designed to reduce the risk of cancer.”

Limited evidence: “Evidence is inadequate to support a probable or convincing causal (or protective) relationship. The evidence may be limited in amount or by methodological flaws, or there may be too much inconsistency in the direction of effect (or a combination), to justify making specific public health recommendations.”

- ▶ **Limited - suggestive:** “Evidence is inadequate to permit a judgement of a probable or convincing causal (or protective) relationship, but is suggestive of a direction or effect. The evidence may be limited in amount or by methodological flaws, but shows a generally consistent direction of effect. This judgement generally does not justify making recommendations.”
- ▶ **Limited - no conclusion:** “There is enough evidence to warrant Panel consideration, but it is so limited that no conclusion can be made. The evidence may be limited in amount, by inconsistency in the direction of effect, by methodological flaws, or any combination of these. Evidence that was judged to be ‘limited – no conclusion’ is mentioned in Evidence and judgements” [Section 5, Page 24].

Substantial effect on risk unlikely: “Evidence is strong enough to support a judgement that a particular lifestyle factor relating to diet, nutrition, body fatness or physical activity is unlikely to have substantial causal (or protective) relation to a cancer outcome.”

References

1. Institute for Health Metrics and Evaluation (IHME). *Global Burden of Disease Study (GBD): Compare Visualization Hub*. Retrieved 01 November 2020, from <http://vizhub.healthdata.org/gbd-compare>
2. Ferlay, J., Ervik, M., Lam, F., Colombet, M., Mery, L., Pineros, M., et al. (2018). *Global Cancer Observatory: Cancer today*. Retrieved 17 December, 2020 from <https://gco.iarc.fr/today/home>
3. Macmillan Cancer Support. (2018). *Cancer information and support: Causes and risk factors*. Retrieved on 03 November 2020 from <https://www.macmillan.org.uk/cancer-information-and-support/worried-about-cancer/causes-and-risk-factors> from <https://www.macmillan.org.uk/cancer-information-and-support/worried-about-cancer/causes-and-risk-factors>
4. American Cancer Society. *What Causes Cancer*. Retrieved 01 May, 2020, from <https://www.cancer.org/cancer/cancer-causes.html>
5. National Cancer Institute. (2015). *Risk factors for cancer*. Retrieved 5 February, 2018, from <https://www.cancer.gov/about-cancer/causes-prevention/risk>
6. World Health Organisation (WHO), & International Agency for Research on Cancer (IARC). (1988). *Alcohol drinking*. IARC Working Group, Lyon, 13-20 October 1987. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, 44, 1-378.
7. International Agency for Research on Cancer (IARC). (2019). *Preamble (Amended)*. Retrieved from <https://monographs.iarc.fr/wp-content/uploads/2019/07/Preamble-2019.pdf>
8. International Agency for Research on Cancer (IARC). (2012). *Volume 100E: Personal habits and indoor combustions* (IARC Monographs on the evaluation of carcinogenic risks to humans).
9. World Cancer Research Fund / American Institute for Cancer Research. (2018). *Diet, nutrition, physical activity and cancer: A global perspective* (Continuous update project expert report 2018). Retrieved from <https://www.wcrf.org/dietandcancer>
10. World Cancer Research Fund (WCRF), & American Institute for Cancer Research (AICR). (2018). *Continuous Update Project Expert Report 2018. Alcoholic drinks and the risk of cancer*. Retrieved from <https://www.wcrf.org/sites/default/files/Alcoholic-Drinks.pdf>