

ALCOHOLIC DRINKS AND THE RISK OF CANCER

WCRF/AICR GRADING		DECREASES RISK		INCREASES RISK	
		Exposure	Cancer site	Exposure	Cancer site
STRONG EVIDENCE	Convincing			Alcoholic drinks ¹	Mouth, pharynx and larynx 2018 Oesophagus (<i>squamous cell carcinoma</i>) 2016 Liver 2015 ² Colorectum 2017 ³ Breast (postmenopause) 2017 ⁴
	Probable	Alcoholic drinks	Kidney 2015 ⁵	Alcoholic drinks	Stomach 2016 ² Breast (premenopause) 2017 ⁴
LIMITED EVIDENCE	Limited – suggestive			Alcoholic drinks	Lung 2017 Pancreas 2012 ² Skin (<i>basal cell carcinoma</i> and malignant <i>melanoma</i>) 2017
STRONG EVIDENCE	Substantial effect on risk unlikely	None identified			

- 1 Alcoholic drinks include beers, wines, spirits, fermented milks, mead and cider. The consumption of alcoholic drinks is graded by the International Agency for Research on Cancer as carcinogenic to humans (Group 1)[3].
- 2 The conclusions for alcoholic drinks and cancers of the liver, stomach and pancreas were based on evidence for alcohol intakes above approximately 45 grams of ethanol per day (about three drinks a day). No conclusions were possible for these cancers based on intakes below 45 grams of ethanol per day.
- 3 The conclusion for alcoholic drinks and colorectal cancer was based on alcohol intakes above approximately 30 grams of ethanol per day (about two drinks a day). No conclusion was possible based on intakes below 30 grams of ethanol per day.
- 4 No threshold level of alcohol intake was identified in the evidence for alcoholic drinks and breast cancer (pre and postmenopause).
- 5 The conclusion for alcoholic drinks and kidney cancer was based on alcohol intakes up to approximately 30 grams of ethanol per day (about two drinks a day). There was insufficient evidence to draw a conclusion for intakes above 30 grams of ethanol per day.

National per capita consumption of alcohol higher than 12 litres in 2016 [5]

Rank	Country	Alcoholic drinks per day (aged 15 years or older) ¹
1	Lithuania	3.32
2	Belarus	3.00
3	Republic of Moldova	2.90
4	Russian Federation	2.54
5	Romania	2.50
5	Czech Republic	2.50
7	Croatia	2.48
7	Bulgaria	2.48
9	Belgium	2.41
10	Ukraine	2.34
10	Estonia	2.34
12	Slovakia	2.25
12	Poland	2.25
12	Latvia	2.25
12	Hungary	2.25
12	United Kingdom	2.25

¹ © World Cancer Research Fund International dietandcancerreport.org

The number of alcoholic drinks per day was estimated from litres of ethanol consumed per person, per year, where one drink is equivalent to 15 grams of ethanol. The figures are averaged over the whole country and include people who do not drink alcohol.

Summary of CUP dose–response meta-analyses for the risk of cancer, per 10 grams increase in alcohol (as ethanol)¹ consumed per day

Cancer	Total no. of studies	No. of studies in meta-analysis	No. of cases	Risk estimate (95% CI)	I ² (%)	Conclusion ²	Date of CUP cancer report ³
Mouth, pharynx and larynx (oral cavity cancer)	12	6	5,617	1.15 (1.09–1.22)	88	Convincing: Increases risk	2018
Mouth, pharynx and larynx (pharyngeal cancer)	8	4	342	1.13 (1.05–1.21)	61		
Mouth, pharynx and larynx (oral cavity and pharyngeal cancer combined)	10	5	954	1.19 (1.10–1.30)	83		
Mouth, pharynx and larynx (laryngeal cancer)	13	6	781	1.09 (1.05–1.13)	33		
Mouth, pharynx and larynx (head and neck cancer) ⁴	3	–	–	Significant increased risk in 3 studies	–		
Mouth, pharynx and larynx (upper aerodigestive tract cancer)	10	9	1,826	1.18 (1.10–1.26)	95		
Oesophagus (<i>squamous cell carcinoma</i>)	8	6	1,079	1.25 (1.12–1.41)	95	Convincing: Increases risk	2016
Liver ⁵	19	14	5,650	1.04 (1.02–1.06)	64	Convincing: Increases risk	2015
Colorectum ⁶	19	16	15,896	1.07 (1.05–1.08)	28	Convincing: Increases risk	2017
Breast (postmenopause) ⁷	34	22	35,221	1.09 (1.07–1.12)	71	Convincing: Increases risk	2017
Stomach ⁵	30	23	11,926	1.02 (1.00–1.04)	39	Probable: Increases risk	2016
Breast (premenopause) ⁷	16	10	4,227	1.05 (1.02–1.08)	0	Probable: Increases risk	2017
Lung	45	26	21,940	1.03 (1.01–1.05)	67	Limited – suggestive: Increases risk	2017
Pancreas ⁵	10	9	3,096	1.00 (0.99–1.01)	0	Limited – suggestive: Increases risk	2012
Skin (malignant melanoma)	7	6	7,367	1.08 (1.03–1.13)	66	Limited – suggestive: Increases risk	2017
Skin (<i>basal cell carcinoma</i>)	9	9	3,349	1.04 (0.99–1.10)	68	Limited – suggestive: Increases risk	2017
Kidney ⁸	8	7	3,525	0.92 (0.86–0.97)	55	Probable: Decreases risk	2015

- Alcoholic drinks include beers, wines, spirits, fermented milks, mead and cider. The consumption of alcoholic drinks is graded by the International Agency for Research on Cancer as carcinogenic to humans (Group 1) [3].
- See Definitions of WCRF/AICR grading criteria (**Section 1:** Alcoholic drinks and the risk of cancer: a summary matrix) for explanations of what WCRF means by ‘convincing’, ‘probable’ and ‘limited – suggestive’.
- Throughout this Third Expert Report, the year given for each cancer site is the year the CUP cancer report was published, apart from for nasopharynx, cervix and skin, where the year given is the year the SLR was last reviewed. Updated CUP cancer reports for nasopharynx and skin will be published in the future.
- A dose–response meta-analysis of cohort studies could not be conducted in the CUP. All three studies (two highest versus lowest meta-analyses and one dose–response meta-analysis) identified on alcoholic drinks and head and neck cancers reported a statistically significant increased risk.
- The conclusions for alcoholic drinks and cancers of the liver, stomach and pancreas were based on evidence for alcohol intakes above approximately 45 grams of ethanol per day (about three drinks a day). No conclusions were possible for these cancers based on intakes below 45 grams of ethanol per day.
- The conclusion for alcoholic drinks and colorectal cancer was based on alcohol intakes above approximately 30 grams of ethanol per day (about two drinks a day). No conclusion was possible based on intakes below 30 grams of ethanol per day.
- No threshold level of alcohol intake was identified in the evidence for alcoholic drinks and breast cancer (pre and postmenopause).
- The conclusion for alcoholic drinks and kidney cancer was based on alcohol intakes up to approximately 30 grams of ethanol per day (about two drinks a day). There was insufficient evidence to draw a conclusion for intakes above 30 grams of ethanol per day.

Summary of published pooled analyses of alcohol intake and the risk of oral cavity cancer

Publication	Contrast	Sex	RR (95% CI)	P trend	No. studies (case-control)	No. cases
Lubin, 2011 [70]	5 to 10 drinks/day vs 0.01 to 0.9 drinks/day	Men	1.75 (1.1–2.8)	< 0.01	15	1,333
		Women	2.37 (0.8–7.5)	< 0.01		456

Summary of published pooled analyses of alcohol (as ethanol) intake and the risk of pharyngeal cancer

Publication	Contrast	Cancer	Sex	RR (95% CI)	P trend	No. studies (case-control)	No. cases
Lubin, 2011 [70]	5 to 10 drinks/day vs 0.01 to 0.9 drinks/day	Oropharyngeal	Men	2.82 (1.8–4.3)	< 0.01	15	1,528
			Women	7.63 (2.8–21.0)	< 0.01		404
		Hypopharyngeal	Men	7.03 (2.6–19.0)	< 0.01		395
			Women	19.60 (1.8–217.0)	< 0.01		77

Summary of published pooled analyses of alcohol intake and the risk of laryngeal cancer

Publication	Contrast	Sex	RR (95% CI)	P trend	No. studies (case-control)	No. cases
Lubin, 2011 [70]	5 to 10 drinks/day vs 0.01 to 0.9 drinks/day	Men	1.89 (1.10–3.10)	< 0.01	15	1,361
		Women	0.52 (0.10–2.70)	0.88		

Summary of published cohort studies of alcohol intake and the risk of head and neck cancer

Publication	Increment/contrast	Sex	RR (95% CI)	No. cases
Maasland, 2014 [8]	Per 10 g/day ethanol	Men	1.19 (1.12–1.27)	314
		Women	1.40 (1.18–1.65)	81
Hashibe, 2013 [82]	≥ 4 drinks/day vs none	Men and women	2.24 (1.37–3.65)	177
Freedman, 2007 [81]	> 3 drinks/day vs < 1 drink/day	Men	1.48 (1.15–1.90)	611
		Women	2.52 (1.46–4.35)	183

CUP dose–response meta-analyses for the risk of subtypes of cancer of the mouth, pharynx and larynx, per 10 grams increase in the specific type of alcohol consumed per day

Analysis	Cancer type	RR (95% CI)	I ² (%)	No. studies
Beer	Oral cavity	1.14 (0.96–1.36)	74	2
	Pharyngeal	1.12 (1.02–1.24)	0	2
	Laryngeal	1.05 (0.98–1.13)	0	2
	Head and neck	1.09 (1.01–1.18)	49	2
Wine	Oral cavity	0.90 (0.77–1.06)	18	2
	Pharyngeal	0.99 (0.83–1.17)	0	2
	Laryngeal	0.93 (0.80–1.07)	0	3
	Head and neck	0.92 (0.83–1.02)	0	2
Spirits	Oral cavity	1.11 (1.02–1.21)	0	2
	Pharyngeal	1.08 (0.89–1.31)	55	2
	Laryngeal	1.04 (0.96–1.13)	0	2
	Head and neck	1.09 (1.02–1.15)	15	2

CUP non-linear dose–response estimates of alcohol (as ethanol) intake and the risk of oesophageal cancer (squamous cell carcinoma), including the six studies shown in Figure 5.6 and studies from Asia on oesophageal cancer

Alcohol (as ethanol) intake (g/day)	RR (95% CI)
0	1.00
10	1.41 (1.31–1.52)
22	1.97 (1.79–2.17)
40	2.64 (2.24–3.11)
59.5	3.12 (1.90–5.12)
99.5	4.16 (1.17–14.77)

Summary of published pooled analyses of alcohol intake and the risk of oesophageal cancer (squamous cell carcinoma)

Publication	Contrast	RR (95% CI)	p trend	No. studies	No. cases
BEACON Consortium [100]	≥ 7 drinks/day vs none	9.62 (4.26–21.71)	< 0.0001	5 case-control, 2 cohort	1,016

CUP non-linear dose–response estimates of alcohol (as ethanol) intake and the risk of liver cancer

Alcohol (as ethanol) intake (g/day)	RR (95% CI)
0	1.00
12.5	0.99 (0.94–1.05)
20	0.99 (0.92–1.07)
45	1.06 (1.01–1.11)
55	1.11 (1.06–1.15)
75	1.23 (1.07–1.41)

Summary of published pooled analyses of alcohol (as ethanol) intake and the risk of liver cancer

Publication	Increment	Sex	RR (95% CI)	No. studies (cohort)	No. cases
Pooled analysis of Japanese cohort studies [116]	10 g/day	Men	1.02 (1.004–1.04)	4	605
		Women	1.11 (0.96–1.29)	4	199

CUP non-linear dose–response estimates of alcohol (as ethanol) intake and the risk of colorectal cancer

Alcohol (as ethanol) intake (g/day)	RR (95% CI)
0	1.00
10	1.02 (0.98–1.07)
20	1.07 (1.00–1.16)
30	1.15 (1.06–1.26)
40	1.25 (1.14–1.36)
50	1.41 (1.31–1.52)
60	1.60 (1.51–1.69)

Summary of published pooled analyses of alcohol (as ethanol) intake and the risk of colorectal cancer

Publication	Increment	Sex	RR (95% CI)	No. studies (cohort)	No. cases
UK Dietary Cohort Consortium [130]	≥ 45 g ethanol/day vs 0 g ethanol/day	Men	1.24 (0.69–2.22)	7	266
		Women	1.52 (0.56–4.10)		313

Summary of published pooled analyses of alcohol (as ethanol) intake and the risk of postmenopausal breast cancer

Publication	Increment/ contrast	Life events	RR (95% CI)	No. cohort studies	No. cases
Pooling Project of Prospective Studies on Diet and Cancer [155]¹	10 g/day		1.09 (1.07–1.11)	20	24,511
UK Dietary Cohort Consortium [156]	10 g/day		1.09 (1.01–1.18)	4	656
National Cancer Institute studies [157]	≥ 7 drinks/ week vs none	Nulliparous women, postmenopausal	1.30 (1.11–1.52)	4	1,501
		Parous women aged < 25 years at first birth	1.22 (1.11–1.35)		4,719
		Parous women aged ≥ 25 years at first birth	1.33 (1.19–1.50)		2,856

¹ Published after the CUP 2017 SLR search.

CUP non-linear dose–response estimates of alcohol (as ethanol) intakes and the risk of stomach cancer

Alcohol (as ethanol) intake (g/day)	RR (95% CI)
0	1.00
10	1.00 (0.98–1.03)
22	1.01 (0.97–1.06)
32	1.03 (0.98–1.08)
45	1.06 (1.01–1.11)
53	1.08 (1.03–1.13)
58	1.09 (1.04–1.14)
71	1.13 (1.05–1.21)
80	1.15 (1.06–1.26)
90	1.19 (1.07–1.32)
106	1.24 (1.08–1.42)
120	1.28 (1.08–1.52)

Summary of published pooled analyses of alcohol (as ethanol) intake and the risk of premenopausal breast cancer

Publication	Increment	RR (95% CI)	No. studies	No. cases
Pooling Project of Prospective Studies on Diet and Cancer¹ [155]	10 g/day	1.03 (0.99–1.08)	15	3,730

¹ Published after the CUP SLR 2017 search.

Summary of pooled analyses of alcohol consumption and the risk of kidney cancer

Analysis	Increment/ contract	RR (95% CI)	No. studies	No. cases
Pooling Project of Prospective Studies on Diet and Cancer [183]	≥ 15 g/day vs no alcohol	0.72 (0.60–0.86)	12	1,430
	10 g/day ¹	0.81 (0.74–0.90)		

¹ Participants with intake > 30 grams per day were excluded.