

Table 2.13. Cohort studies of consumption of alcoholic beverages and cancer of the colorectum

Reference, location, name of study	Cohort description (No. in analysis)	ICD Code	Exposure assessment	Exposure categories	No. of cases	Relative risk (95% CI)	Adjustment factors	Comments
Akhter <i>et al.</i> (2007), Japan, Miyagi Cohort Study [data also included in the pooled analysis, Mizoue <i>et al.</i> (2008)]	Analytical cohort of 21 199 men living in the Miyagi region recruited in 1990; followed-up until 2001; 307 cases (179 colon, 131 rectum, 3 both) cases identified through cancer registry	Colorectal; Colon (C18.2–18.9); Proximal colon (C18.2–18.5) Distal colon (C18.6, 18,7); Rectosigmoid junction and rectum (C19.0–20.9)	Self-administered questionnaire	<i>Alcohol intake (g/d)</i>		<i>Colorectum</i>	Age, family history, education, body mass index, walking time, smoking, intake of meat, green-yellow vegetables and fruits	Increased risk for all subsites, but strongest association seen for distal colon, and no significant association for proximal colon; joint associations evaluated with alcohol intake and age, education, body mass index, walking time and smoking; compared with never-drinkers, heavy drinking was associated with an increased risk among older men
				Never	36	1.0		
				< 22.8	57	1.24 (0.81–1.88)		
				22.8–45.5	54	1.34 (0.88–2.05)		
				≥ 45.6	138	1.91 (1.32–2.78)		
				p for trend		0.0001		
						<i>Colon</i>		
				Never	20	1.0		
				< 22.8	29	1.15 (0.65–2.03)		
				22.8–45.5	36	1.61 (0.93–2.80)		
				≥ 45.6	79	2.03 (1.23–3.33)		
				p for trend		0.0008		
						<i>Proximal Colon</i>		
				Never	12	1.0		
< 22.8	13	0.82 (0.37–1.80)						
22.8–45.5	12	0.89 (0.40–1.99)						
≥ 45.6	33	1.40 (0.72–2.75)						
p for trend		0.16						
		<i>Distal Colon</i>						
Never	5	1.0						
< 22.8	10	1.68 (0.57–4.92)						
22.8–45.5	18	3.30 (1.22–8.91)						
≥ 45.6	40	4.17 (1.63–10.66)						
p for trend		0.0002						
		<i>Rectum</i>						
Never	16	1.0						
< 22.8	29	1.40 (0.76–2.59)						
22.8–45.5	18	1.00 (0.51–1.96)						
≥ 45.6	61	1.84 (1.05–3.31)						
p for trend		0.04						

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Ferrari <i>et al.</i> (2007), Europe, European Prospective Investigation into Cancer and Nutrition	Analytical cohort of 478 732 men and women in 10 European countries; age range mostly 35–70 years; recruited 1992–2000; followed-up until 2001 or 2002 depending on recruitment centre; 1 833 cases (769 men; 1 064 women) identified through cancer registry or active follow-up depending on centre	Colorectal (C18-C20); Colon (C18.0–18.9); Proximal colon (C18.0–18.5); Distal colon (C18.6–18.7); Rectum (C19, C20)	Self-administered questionnaire	<i>Baseline alcohol intake (g/d)</i>			Centre, age, sex, physical activity, smoking, education, weight, height, energy intake from non-alcohol sources	No significant difference between colon and rectum (although slightly higher estimates for rectum); similar association for average lifetime alcohol intake; similar association for men and women; no significant difference by beverage type; no significant association for time since quitting drinking and duration of drinking; no significant interaction with smoking status (RR per 15 g/d: 1.15 (1.03–1.28) in never-smokers, 1.11 (0.97–1.28) in former smokers, and 1.23 (1.12–1.36) in current smokers; interaction with tertiles of folate intake (RR per 15 g/d: 1.13 (1.06–1.20) in lowest, 1.09 (1.03–1.15) in medium, and 1.03 (0.98–1.09) in highest tertile (P _{interaction} = 0.06)
				<i>Colorectum</i>	224	0.99 (0.84–1.17)		
					518	1.0 (ref.)		
					482	1.05 (0.92–1.19)		
					275	1.03 (0.88–1.20)		
					233	1.26 (1.06–1.49)		
					101	1.64 (1.29–2.08)		
						< 0.001		
						1.09 (1.05–1.13)		
					<i>Colon</i>			
					152	0.97 (0.79–1.18)		
					348	1.0 (ref)		
					309	1.03 (0.88–1.21)		
					183	1.08 (0.89–1.31)		
					139	1.21 (0.98–1.50)		
					53	1.43 (1.04–1.97)		
		0.20						
		1.07 (1.02–1.12)						
	<i>Proximal colon</i>							
	52	0.81 (0.58–1.13)						
	142	1.0 (ref)						
	135	1.11 (0.87–1.61)						
	79	1.20 (0.89–1.61)						
	54	1.21 (0.86–1.70)						
	14	0.92 (0.51–1.66)						
	65	0.32						
	29	1.03 (0.95–1.12)						

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Ferrari <i>et al.</i> (2007) (contd)								
					<i>Distal colon</i>			
					None	79	1.08 (0.81–1.45)	
					0.1–4.9	155	1.0 (ref)	
					5–14.9	133	0.98 (0.77–1.24)	
					15–29.9	67	0.86 (0.63–1.16)	
					30–59.9		1.22 (0.89–1.67)	
					≥ 60		1.68 (1.08–2.62)	
					p for trend		0.07	
					Per 15 g/d		1.08 (1.01–1.16)	
					<i>Rectum</i>			
					None	72	1.04 (0.78–1.38)	
					0.1–4.9	170	1.0 (ref)	
					5–14.9	173	1.07 (0.86–1.33)	
					15–29.9	92	0.94 (0.72–1.23)	
					30–59.9	94	1.34 (1.01–1.77)	
					≥ 60	48	1.93 (1.35–2.78)	
					p for trend		0.003	
					Per 15 g/d		1.11 (1.05–1.17)	
Ishihara <i>et al.</i> (2007), Japan, Public Health Center-based Prospective Study [data also included in the pooled analysis, Mizoue <i>et al.</i> (2008)]	Analytical cohort of 81 189 (38 107 men; 43 077 women); recruited 1995–99; age range 45–74 years; followed-up until 2002; 526 colorectal cases identified through cancer registry (335 men; 191 women)	ICD-O 3 rd ed. Colon (C180-C189); Rectum (C199, C209)	Self-administered questionnaire	<i>Alcohol intake (g/week)</i>		<i>Low folate intake</i>	Age, smoking, supplement use, body mass index, physical activity, calcium, vitamin D, meat intake, study area	Results presented stratified by folate intake; no significant interaction between alcohol and folate intake; no interaction also with intake of vitamin B6, B12 or methionine intake
					0–149	25	1.0	
					≥ 150	50	1.74 (1.00–3.03)	
					0–149	48	0.93 (0.56–1.54)	
					≥ 150	51	2.45 (1.36–4.42)	

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Ozasa (2007), Japan, Japan Collaborative Cohort Study [data also included in the pooled analysis, Mizoue <i>et al.</i> (2008)]	Cohort of 109 778 (46 178 men, 63 600 women) resident of 45 areas across Japan; recruited 1988–90; age range 40–79 years; numbers; followed-up until 2003; 692 deaths identified (383 men, 309 women)	Colon (C18) Rectum (C19-C20)	Self-administered questionnaire	<i>Alcohol intake (mL/day)</i>		<i>Men: Colon</i>	Age, area	No significant association with frequency of intake (i.e. almost every day or < 3–4 times/week versus rare/non-drinkers); no association with duration of drinking or age started drinking; positive association with time since cessation of drinking for men who stopped < 5 years ago versus rare/non-drinkers (RR: 2.36 for colon and 3.46 for rectum) and no association with longer time since stopping, although based on small numbers; very few women drinkers
				Rare/none	36	1.0		
				< 54	66	1.32 (0.85–2.04)		
				54–80	36	1.26 (0.76–2.07)		
				≥ 81	20	1.75 (0.97–3.14)		
				<i>Men: Rectum</i>				
				Rare/none	25	1.0		
				< 54	43	1.07 (0.64–1.78)		
				54–80	26	1.08 (0.61–1.92)		
				≥ 81	21	2.25 (1.22–4.14)		

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Tsong <i>et al.</i> (2007), Singapore, Singapore Chinese Health Study	Analytical cohort of 63 257 men and women living in Singapore recruited 1993–98; aged 45–74 years; followed-up until 2004; 845 cases (516 colon, 329 rectosigmoid/rectum) identified through cancer registry; 97% histologically confirmed	Colorectal (ICD codes not stated)	Interview-administered questionnaire	<i>Alcohol intake (drinks/week)</i>				Age, sex, dialect group, year of recruitment, education, body mass index, diabetes, family history, smoking, physical activity	No significant difference by subsite; no significant interaction with smoking, although stronger association in ever-smokers versus never-smokers; no significant difference by beverage type, although there was a significant association with beer intake (RR: 1.12, 95% CI: 1.03–1.23 per drink/day), which was the most common beverage consumed.
				None	658	1.0	<i>Colorectum</i>		
				< 7	117	0.96 (0.72–1.25)			
				≥ 7	70	1.84 (1.31–2.58)			
				p for trend		0.0004			
				None	416	1.0	<i>Colon</i>		
				< 7	60	0.96 (0.72–1.25)			
				≥ 7	40	1.84 (1.31–2.35)			
				p for trend		0.01			
							<i>Rectosigmoid/Rectum</i>		
				None	242	1.0			
				< 7	57	1.22 (1.07–2.35)			
≥ 7	30	1.59 (1.07–2.35)							
p for trend		0.01							

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Bongaerts <i>et al.</i> (2008), Netherlands, the Netherlands Cohort Study	Analytical cohort of 4 118 men and women recruited 1986 throughout the Netherlands; follow-up for 13.3 years; 2 323 cases identified through cancer registry	Colorectal (C18–20); Colon (C18.0–18.9); Proximal colon (C18.0–18.4); Distal colon (C18.5–18.7) Rectosigmoid (C19); Rectum (C20)	Self-administered questionnaire	<i>Alcohol intake (g/d)</i>		<i>Colorectum</i>		Age, sex, family history, body mass index, physical activity, energy intake, fat intake, fibre intake, calcium intake	Slightly stronger associations found when analysis restricted to individuals who reported the same alcohol intake at baseline and at five years before baseline (strongest association for rectosigmoid, RR for 30+ g/d versus non-drinkers: 2.07) and rectum (RR = 1.69 for 30+ g/d versus non-drinkers); increased risk seen for overall colorectal cancer observed in both men and women; no significant association seen with beverage type
				Non-drinkers	487	1.0			
				0–4.9	652	1.06 (0.91–1.23)			
				5–14.9	507	0.97 (0.82–1.14)			
				15–29.9	383	1.00 (0.82–1.20)			
				≥ 30	294	1.32 (1.06–1.65)			
				<i>Colon</i>		<i>Proximal Colon</i>			
				Non-drinkers	351	1.0			
				0–4.9	455	1.03 (0.87–1.22)			
				5–14.9	341	0.93 (0.78–1.13)			
				15–29.9	242	0.93 (0.75–1.14)			
				≥ 30	184	1.24 (0.96–1.59)			
				Non-drinkers	178	1.0			
0–4.9	247	1.14 (0.91–1.41)							
5–14.9	150	0.87 (0.68–1.11)							
15–29.9	113	0.94 (0.71–1.23)							
≥ 30	72	1.05 (0.75–1.46)							

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Bongaerts <i>et al.</i> (2008) (contd)						<i>Distal Colon</i>			
						Non-drinkers	161	1.0	
						0–4.9	198	0.95 (0.75–1.19)	
						5–14.9	177	0.98 (0.77–1.26)	
						15–29.9	117	0.90 (0.67–1.19)	
						≥ 30	97	1.32 (0.95–1.83)	
						<i>Rectosigmoid</i>			
						Non-drinkers	36	1.0	
						0–4.9	56	1.19 (0.77–1.85)	
						5–14.9	49	1.19 (0.76–1.87)	
						15–29.9	49	1.56 (0.98–2.48)	
						≥ 30	28	1.56 (0.87–2.79)	
						<i>Rectum</i>			
						Non-drinkers	100	1.0	
						0–4.9	141	1.10 (0.83–1.45)	
						5–14.9	117	1.00 (0.74–1.3)	
						15–29.9	92	1.04 (0.75–1.44)	
						≥ 30	82	1.50 (1.05–2.16)	

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Kabat <i>et al.</i> (2008), Canada, Canadian National Breast Screening Study	Analytical cohort of 49 654 women aged 40–59 years enrolled in a randomized controlled trial of screening for breast cancer and who completed a dietary questionnaire, recruited 1980–85; follow-up for an average of 16 years; 617 cases identified through cancer databases	Colorectal (ICD codes not stated)	Self-administered questionnaire	<i>Alcohol intake (g/d)</i>		1.0	Age, body mass index, smoking, education, menopausal status, use of oral contraceptives, use of hormone replacement therapy, energy intake	No evidence of an interaction of alcohol intake with intake of folate or B vitamins
				None	Not given	0.92 (0.73–1.14)		
				< 5		0.93 (0.71–1.22)		
				5–9		1.04 (0.79–1.36)		
				10–19		1.13 (0.77–1.64)		
				20–29		1.02 (0.72–1.44)		
≥ 30		0.48						
			p for trend					
Lim & Park (2008), Korea (Republic of), Elderly Pharmacoe- pidemiologic cohort	Analytical cohort of 14 304 (4 834 men, 9 470 women) residents of the Busan region who were beneficiaries of Medial Insurance Corporation; aged ≥ 65 years; recruited 1993–98; followed-up for an average of 4.8 years; 112 cases identified	Colorectal (C18-C21)	Self-administered questionnaire	<i>Alcohol status</i>			Age, sex	No significant associations with type of beverage; no association with frequency of intake
				Never	68	1.0		
				Former	18	1.13 (0.63–2.03)		
				Current	26	0.64 (0.39–1.05)		
				<i>Intake (g/d)</i>				
				Never	74	1.0		
				> 0–24	14	0.62 (0.35–1.12)		
				25–48	8	1.13 (0.52–2.45)		
				49–72	2	1.07 (0.26–4.48)		
				≥ 73	8	1.15 (0.28–4.72)		

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Thygesen <i>et al.</i> (2008), USA, Health Professionals Follow-up Study	Analytical cohort of 47 432 men, aged 40–75 years; recruited in 1986; followed-up until 2002; 868 self-reported cases verified through medical records (89%), and from telephoning the participants	Colorectal (ICD codes not stated)	Self-administered questionnaire at baseline (1986), and also in 1990, 1994 and 1998	<i>Alcohol intake (g/d)</i>		<i>Colorectum (n = 868)</i>				
				Non-drinkers		1.0	Intake of folate, methionine, vitamin D, calcium, energy intake, multivitamin use, intake of processed and red meat, aspirin use, smoking, physical activity, body mass index, colonoscopy, sigmoidoscopy, family history	Similar associations found for most recent intake (using data updated during follow-up), and average cumulative intake, as for baseline intake; risk slightly lower with longer latency time (RR: 1.04, 95% CI, 0.98–1.10 per 10 g/d for 8–12 years from recruitment to diagnosis); no significant association for beverage type, although positive association found for beer and spirits, but not for wine intake (small numbers); more frequent intake (5–7 days/week) associated with an increased risk for intake > 15 g/d versus non-drinkers, but no association with frequency of intake among low alcohol intakes (< 15 g/d)		
				0.1–5	67	1.05 (0.79–1.40)				
				5.1–10	167	1.30 (0.96–1.76)				
				10.1–20	120	1.38 (1.04–1.83)				
				20.1–30	192	1.43 (0.99–2.07)				
				30.1–45	52	1.44 (1.04–2.00)				
				> 45	86	1.75 (1.21–2.52)				
				p for trend	59	0.0006				
				Per 10 g/d		1.07 (1.02–1.11)				
						<i>Distal colon (n = 272)</i>				
				Non-drinkers	not stated	1.0				
				0.1–5		1.35 (0.75–2.42)				
				5.1–10		1.55 (0.84–2.87)				
				10.1–3		1.75 (0.98–3.12)				
				> 30 g/d		2.17 (1.17–4.02)				
				p for trend		0.007				
						<i>Proximal colon (n = 288)</i>				
Non-drinkers	not stated	1.0								
0.1–5		0.84 (0.52–1.37)								
5.1–10		1.03 (0.61–1.73)								
10.1–3		0.91 (0.56–1.49)								
> 30		1.36 (0.80–2.33)								
p for trend		0.062								
		<i>Rectum (n = 175)</i>								
Non-drinkers	not stated	1.0								
0.1–5		0.76 (0.42–1.39)								
5.1–10		0.88 (0.46–1.67)								
10.1–3		0.90 (0.50–1.64)								
> 30		1.09 (0.56–2.13)								
p for trend		0.21								

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Toriola <i>et al.</i> (2008), Finland, Findrink Study	Analytical cohort of 2 627 men living in Eastern Finland; recruited between 1984–89; aged 42–60 years; followed-up until 2005; 59 cases identified through cancer registry	Colorectal (ICD codes not stated)	Self-administered questionnaire	<i>Alcohol intake (g/d)</i>			Age, date of recruitment, intake of vegetables, fibre intake, family history, smoking, socioeconomic status, physical activity	Alcohol from spirits contributes to > 50% of total alcohol consumption; includes men with very high alcohol intake	
				< 3.3	5	1.0			
				3.3–17.2	13	2.4 (0.9–6.8)			
				17.3–48.8	13	2.5 (0.9–7.2)			
				48.9–115.3	11	2.2 (0.8–6.4)			
> 115.3	17	3.5 (1.2–9.8)							
Allen <i>et al.</i> (2009), United Kingdom, Million Women Study	Analytical cohort of 1 280 296 women recruited 1996–2001; aged 50–64 years; follow-up until 2006; 4 169 colon cases and 2 129 rectal cases identified through cancer registries	Colon (C18) Rectum (C19-C20)	Self-administered questionnaire at baseline and 3 years later	<i>Usual intake (drinks/week)</i>		<i>RR (95% floated CI)</i>	Age, region, socioeconomic status, body mass index, smoking, physical activity, oral contraceptive use, hormone replacement therapy use	Alcohol intake of < 2 drinks/week taken to be the reference group; no difference by beverage type (wine versus other alcoholic drinks)	
				None	1 047				1.00 (0.94–1.07)
				< 2	1 235				1.00 (0.95–1.06)
				3–6	927				0.99 (0.93–1.06)
				7–24	753				1.02 (0.95–1.09)
				≥ 15	207				1.00 (0.87–1.15)
				Per 10 g/d					1.01 (0.95–1.06)
				p for trend					0.8
									<i>Rectum</i>
				None	496				0.94 (0.86–1.03)
				< 2	621				1.00 (0.92–1.08)
				3–6	479				1.01 (0.92–1.11)
				7–24	402				1.07 (0.97–1.18)
≥ 15	131	1.25 (1.06–1.49)							
Per 10 g/d		1.10 (1.02–1.18)							
p for trend		0.02							

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Engeset <i>et al.</i> (2009), Norwegian European Prospective Investigation into Cancer and Nutrition; data also included in Ferrari <i>et al.</i> (2007)	Analytical cohort of 34 471 women recruited in 1998; age range not stated (mean:48 years); followed-up until 2005; 133 cases (93 colon, 40 rectum) identified through cancer registry	Colorectal (C19) Colon (C18) Rectum (C20)	Self-administered questionnaire	<i>Alcohol dietary pattern</i>	133	<i>Colorectum</i> 1.0 1.04 (0.54–2.01) <i>Colon</i> 1.0 0.78 (0.34–1.80) <i>Rectum</i> 1.0 1.73 (0.59–5.06)	Age, smoking, energy, education, fish intake, fruit intake, and for rectal cancer, vegetables and physical activity	85% of women included in the ‘alcohol’ dietary pattern cluster had an alcohol intake ≥ 27 g/d; no information provided on other dietary characteristics within this dietary cluster; no significant difference by menopausal status
				No				
				Yes				
				No				
				Yes	93			
				Yes	40			