2.15   Cancer of the prostate

2.15.1   *Cohort studies*

(a)   Special populations (Table 2.75)

Only one of the eight studies of special populations showed an association between alcoholic beverage consumption and cancer of the prostate. In a Danish study of alcohol abusers, higher numbers of prostate cancers were observed compared with those expected from the general population (Tønnesen *et al*., 1994).

(b)   General population (Table 2.76)

Studies of prostate cancer that were conducted more recently generated concern when no attempt was made to distinguish between cases that were detected by screening, with a possibility that many might not have presented clinically during the lifetime of the individual in the absence of screening, and those that presented clinically and were more likely to be progressive. Among the 17 cohort studies, two specifically identified more advanced cases (Platz *et. al*., 2004; Baglietto *et. al*., 2006) but neither suggested any association between alcoholic beverage consumption and such cases of prostate cancer. A few of the other cohort studies that did not make this distinction suggested an increased risk for prostate cancer at elevated levels of alcoholic beverage consumption (Hirayama, 1992; Schuurman *et al*., 1999; Putnam *et al*., 2000; Sesso *et al*., 2001), but there was no consistent dose–response relationship and many other cohort studies showed no association.

2.15.2   *Case–control studies (Table 2.77)*

Five of the 33 case–control studies considered type of disease. Slattery and West (1993) considered 'aggressive' tumours, Hodge *et al*. (2004) studied 'clinically important' disease, Hayes *et al*. (1996) conducted stratified analyses by tumour grade and stage, Chang *et al*. (2005) considered localized and advanced disease and Schoonen *et al*. (2005) classified cases as less and more aggressive cancers. The remainder did not appear to make any distinction, although, in the study of Walker *et al*. (1992), 90% of the cases were advanced at presentation. The majority of the studies showed no association between alcoholic beverage consumption and prostate cancer. Of those that suggested a positive association, one (De Stefani *et al*., 1995) showed a borderline elevation of risk for high levels of consumption of beer, but the risk at high levels of total alcoholic beverage consumption was not significant; one (Hayes *et al*., 1996) showed significant elevations in risk for 'heavy' and 'very heavy' consumers of alcoholic beverages, with higher risks among those with poorly or undifferentiated tumours, or with regional or distant metastases; and another (Sharpe & Siemiatycki, 2001) reported an elevation in risk for those with long duration of drinking, and the greatest elevation in risk for those who started drinking at age <15 years.

Table 2.75 Cohort studies of alcoholic beverage consumption and cancer of the prostate[a] in special populations

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Sundby (1967), Oslo, Norway	1722 men treated for alcoholism in 1925–39; follow-up to 1963; 29 lost to follow-up, 1061 died before the end of study; 632 alive at the end of study	Not reported	Not reported	16	Not reported	Not reported	Expected number based on Oslo urban mortality data
Hakulinen *et al.* (1974), Finland	Male 'chronic alcoholics', >30 years of age, registered in 1967–70 when under custody of alcohol-misuse supervision, or when sent to a labour institute because of the vagrant law; mean annual number in registry=4370	Alcohol misusers registry; Finnish Cancer Registry; Social Welfare Board of Helsinki	Not reported	1	Not reported	Not reported	Two categories of drinkers examined: alcohol misusers and chronic alcoholics; quantity of drinking not reported

Table 2.75 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Adelstein & White (1976), England and Wales, 1953–64, UK Alcoholics Study	629 men discharged from four mental hospitals in 1953–57; 966 men diagnosed with alcoholism and admitted to hospital in 1964; of the total of 1595, 605 had died by July 1974	Patient discharge	Deaths from prostate cancer	3	Not reported	Not reported	
Jensen (1979), Denmark, Danish Brewery Workers	14 313 male Union members employed >6 months in a brewery in 1939–63; follow-up, 1943–73	Not reported	Brewery workers were allowed 2.1 L of free beer/ day (77.7 g pure alcohol/ day)	80	**SIR** 1.0 (0.8–1.2)	Age, sex, area, time trends	Cancer morbidity and mortality compared with those in the general population

Table 2.75 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Schmidt & Popham (1981), Ontario, Canada	9889 men admitted to clinical service for alcoholics in 1951–70; 7719 still alive after 1971	Not reported	Average daily intake of a sample from this group: 25.4 cL pure alcohol	11	**SMR** 1.09 (NS) CI not reported	Not reported	SMR based on age-standardized death rates in Ontario population; compared with US Veterans, SMR for prostate cancer was 1.24 (NS); 96% of a representataive sample of the clinical population drank >15 cL per day; ICD-7 177
Carstensen *et al.* (1990), Sweden, Swedish brewery workers	6230 men employed in the brewery industry in 1960; follow-up by linkage to Swedish Cancer Registry, 1961–79		Workers receive 3 bottles of beer/ day (1 L) free	112	1.06 (0.87–1.27)	Not reported	No information available on when a worker ceased working in the industry; ICD-7 177

Table 2.75 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Adami *et al.* (1992a), Sweden, Cohort of people with a discharge diagnosis of alcoholism	9353 individuals (8340 men) with a discharge diagnosis of alcoholism in 1965–83; mean age at entry, 49.8 years; at diagnosis, 68.1 years; follow-up through to 1984 (maximum, 19 years; mean, 7.7 years); first year of follow-up excluded	Registry based	No data on individual alcohol or tobacco use	68	**SIR** 1.0 (0.8–1.3)		Risk did not vary by length of follow-up
Tønnesen *et al.* (1994), Denmark, Alcoholic men and women	15 214 male alcoholics who entered an outpatient clinic in Copenhagen during 1954–87; average follow-up, 12.9 years	History of alcohol intake obtained by an experienced social worker and psychiatrist	Most subjects consumed about 200 g alcohol daily; consumption in Denmark was 26 g/ day in 1987 (per person >14 years)	91	1.4 (1.2–1.8) $p \leq 0.01$	Not reported	Subjects consumed more alcohol than previous cohort studies examining alcohol intake and prostate cancer; lack of consistency with previous studies may be due to higher intake.

CI, confidence interval; ICD, International Classification of Diseases; NS, not significant; Obs, observed; SIR, standardized incidence ratio; SMR, standardized mortality ratio

[a] Unless otherwise noted in the 'Comments', the ICD code for prostate cancer is 185

Table 2.76 Cohort studies of alcoholic beverage consumption and cancer of the prostate[a] in general populations

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Whittemore *et al.* (1985), USA, Harvard and University of Pennsylvania Alumni Study	33 915 male students who entered Harvard in 1916–50 and 13 356 male and 4076 female students examined at the University of Pennsylvania in 1931–40; followed for cancer mortality through to July 1978	College physical examination, questionnaires	Not reported	243	Not reported	Not reported	Data on collegiate alcohol consumption limited; prostate cancer not associated with collegiate alcohol use; ICD-7 177

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Mills *et al.* (1989), USA, Seventh-day Adventists study	60 000 Seventh-day Adventists in California identified by census questionnaire in 1974, aged >25 years; cancer incidence monitored among 35 000 non-Hispanic white Adventists for up to 6 years; response rate among non-Hispanic whites, 75% (much lower for others)	Lifestyle questionnaire in 1976; annual mailings enquiring about hospitalization, medical records, diagnosis; follow-up 99% complete	*Alcohol intake (any)* No Yes	 142 5	 1.0 0.7 (0.3–1.74)	Age	

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Stemmermann *et al.* (1990), Hawaii, USA, Americans of Japanese Ancestry	7572 Japanese men on Oahu island; examination and interview 1965–68; follow-up through to 1988	Questionnaire on diet, alcohol and tobacco use, socioeconomic factors, demographic variables	*Alcohol intake (oz/month)* 0 <5 5–14 15–39 >40	227 total cases; no. of cases by level of intake not reported	**SIR** 1.0 0.9 (0.6–1.3) 0.9 (0.6–1.3) 1.0 (0.7–1.5) 0.9 (0.6–1.5)	Age at exam 1, current smoker status, age started smoking (current smokers), number of cigarettes smoked per day (current smokers), ex-smoker status, maximum number of cigarettes smoked per day (ex-smokers), years of smoking with maximum number per day (ex-smokers)	Mean alcohol intake fell from 14.6 to 11.6 oz/ month for age groups 45–49 years to >65 years, respectively; incidence rates, adjusted for age and smoking, showed no relation with the amount of alcohol consumed; update of Pollack *et al* (1984) and Severson *et al* (1989).

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Hsing *et al.* (1990), USA, Lutheran Brotherhood Cohort Study	17 633 male white policy holders, aged ≥35 years, of the Lutheran Brotherhood Insurance Society	Response to a questionnaire (mailed) in 1966; followed-up until 1986	*Beer* Former drinker Current drinker *Liquor* Former drinker Current drinker	149 total deaths; no. of cases/ deaths by drinking level not reported	1.7 (1.0–2.9) 1.2 (0.8–1.7) 0.7 (0.3–1.5) 1.0 (0.7–1.4)	Smoking	Users defined as those who drank beer or liquor ≥6 times a year; information on dietary habits and alcohol/tobacco use was only obtained once, in 1966.
Hirayama (1992), Japan	265 118 adults (122 261 men), aged ≥40 years, representing 94.8% of the 1965 census population	Interview (1965) on diet, tobacco/ alcohol use, occupation and reproductive history; 17-year follow-up (1966–82)	Non-daily drinker/ nonsmoker Daily drinker/ nonsmoker Non-daily drinker/smoker Daily drinker/ daily smoker [no details reported]	Not reported	1.0 2.65 1.07 2.46 CI not reported	Age, smoking	Update of Hirayama (1989)

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Hiatt *et al.* (1994), California, USA, Health Plan Cohort	43 432 members of a prepaid health plan; received a health check-up in 1979–85	Questionnaire: current and past consumption of alcohol, number of drinks/ day, type of beverage	Non-drinker Former drinker Occasional drinker <1 drink/day 1–2 drinks/day 3–5 drinks/day >6 drinks/day	25 17 37 73 59 22 5	1.0 1.4 (0.7–2.7) 1.4 (0.8–2.3) 1.3 (0.8–2.2) 1.2 (0.7–2.1) 1.1 (0.6–2.0) 1.0 (0.4–2.8)	Age, smoking, race, education	No significant association between alcohol consumption and prostate cancer
Le Marchand *et al.* (1994), Hawaii, USA	Random 2% household surveys of the Hawaiian State Department of Health held since 1968 to collect demographic and health-related data; linked with Hawaiian Tumour Registry; final population, 41 400 persons (20 316 men); participation rate, 95%	Lifestyle questionnaire added to the survey during 1975–80 and addressed to all aged >18 years on height, weight, diet, alcohol use, smoking	*Alcohol intake (g/week)* 0–52 53–104 104–156 *Lifetime intake (g)* 0–1750 1751–3500 3501–5261	198 cases of invasive prostate cancer recorded through to 1989, all >45 years old at interview; no. of cases by alcohol intake not reported	 1.0 1.0 (0.7–1.6) 1.1 (0.7–1.6) *p*-trend=0.77 1.0 1.0 (0.6–1.5) 1.1 (0.7–1.7) *p*-trend=0.72	Age, ethnicity, income	Data recorded on current drinking status, age when drinking started, amount and frequency of intake of beer, wine, saké, and hard liquor.

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Cerhan *et al.* (1997), USA, 1982–93, Iowa 65+ Rural Health Study	3673 residents (1420 men), aged >65 years, from two rural counties in Iowa; 80% of the population (>65 years) were enrolled in 1982; data on prostate cancer obtained from 1050 men (mean age, 73.5 years) without registered cancer during 1972–82 and with no self-reported prior prostate cancer; cancer data obtained by linking with the Iowa State Health Registry	Interview on demographics, health and social characteristics, current alcohol use (beer, wine, liquor); annual follow-up by telephone or in-person interview	*Alcohol consumption* Never Former Current	 22 6 39	 1.0 0.6 (0.3–1.6) 1.0 (0.6–1.8)	Age	Number of prostate cancer cases through to 1993: 71 (histologically confirmed); mean age at diagnosis, 79.2 years

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Breslow *et al.* (1999), USA, NHANES I Epidemiological Follow-up Study	*Cohort I* (1971–75): 5766 men, aged 25–74 years; followed-up through to 1992; median follow-up, 17 years *Cohort II* (1982–84): 3868 men from Cohort I free of prostate cancer in 1982–84; followed-up through to 1992; median follow-up, 9 years; response rate in 1982–84 interview, 88%	Baseline (1972–74): questionnaire to assess 'usual consumption' (over the previous year); follow-up (1982–84): food-frequency questionnaire to assess current and 'distant past' alcohol intake at 25, 35, 45 and 55 years of age	*Alcohol intake (drinks/week)* 0 >0–1 2–7 8–14 15–21 >22 0 >0–1 2–7 8–14 15–21 >22	96 41 65 25 8 17 59 19 29 16 9 2	*Cohort I* 1.0 1.0 (0.7–1.4) 0.9 (0.6–1.2) 1.0 (0.6–1.5) 0.9 (1.4–1.8) 1.4 (0.8–2.4) *Cohort II* 1.0 0.7 (0.4–1.3) 1.1 (0.7–1.8) 1.1 (0.6–1.9) 1.1 (0.6–2.3) 0.2 (0.06–0.95)	Race, design variables (age <65 versus ≥65 years, poverty census enumeration district, family income)	No association between alcohol consumption and prostate found; ICD 185, 233.4.

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Schuurman *et al.* (1999), Netherlands, Netherlands Cohort Study	58 279 men in 1986 followed up for prostate cancer incidence by computerized record linkage with all nine Dutch cancer registries and with the Dutch national database of pathology reports; follow-up, ≥96% complete; person–years at risk estimated using a random sample (subcohort) of 1688 men	Questionnaire completed in 1986 to assess consumption of food and drinks during the year prior to the start of the study	*Total alcohol (g)* Non-drinkers 0.1–4 5–14 15–29 ≥30 *Alcohol from wine (g)* No wine 0.1–4 5–14 15–29 ≥30 *White wine (g)* 0 0.1–4 5–14 ≥15 *Fortified wines (g)* 0 0.1–4 5–14 ≥15–29	109 143 161 161 101 219 198 90 39 20 359 180 19 8 408 108 26 24	1.0 1.1 (0.8–1.5) 0.9 (0.7–1.3) 1.1 (0.8–1.4) 1.1 (0.8–1.6) *p*-trend=0.74 1.1 (0.8–1.5) 1.1 (0.8–1.4) 0.9 (0.6–1.4) 1.1 (0.7–1.8) 2.3 (1.0–5.3) *p*-trend=0.67 1.1 (0.8–1.4) 1.0 (0.7–1.4) 1.2 (0.6–2.2) 3.3 (1.2–9.2) *p*-trend=0.54 1.1 (0.8–1.5) 0.9 (0.6–1.3) 0.7 (0.4–1.1) 2.3 (1.2–4.7) *p*-trend=0.77	Age; multivariate-adjusted relative risks (age, socioeconomic status, family history of prostate cancer, total alcohol intake) not substantially different	Consumption of beer, red wine, white wine, sherry and other fortified wines, liquor (Dutch gin, brandy, whiskey) and liqueurs evaluated; alcohol content (in g/100 g): beer, 4; wine, 10; fortified wines, 14; liqueurs, 17; liquor, 29; relative risks for alcohol from beer, liquor, red wine and liqueur not different from unity; alcohol intake showed stronger association with localized than with advanced prostate tumours

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Dennis (2000) Meta-analysis	Meta-analysis of six cohort studies of the association between prostate cancer and men	Articles published between January 1976 and July 1978	Ever versus never		1.0 (0.89–1.13)		
Ellison (2000), Canada, Nutrition Canada Survey Cohort	Population survey (1970–72) among 12 795 respondents (47%) and 3295 unsolicited volunteers, aged 50–84 years at interview or entering this age range during the follow-up period through to 1993; data from 3400 men used	Interviews on diet, 24-h food recall and 1-month food frequency	*Total intake (mL/day)* 0 >0–9.9 10.0–24.9 ≥25 Any	38 54 22 25 101	1.0 1.0 (0.6–1.5) 0.9 (0.5–1.5) 0.9 (0.6–1.6) 0.9 (0.6–1.4)	Tea and coffee consumption, serum level of vitamin A, 5-year age group	Alcohol content: beer, 5%; wine, 13.5%; spirits, 40%; consumption of wine (<10 g alcohol per day) versus none: relative risk, 1.5 (95% CI, 1.1–2.1) [no details given]

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Putnam *et al.* (2000), USA, 1986–95, Iowa Cohort	1601 (81%) men of 1989 from controls in a population-based case–control study of six cancer sites conducted 1986–89 in Iowa; data reported for 1572 men (mean age, 68.1 years; 99% white; 24% smokers; 57% drinkers); follow-up through to 1995.	Questionnaire (mailed) and interview by telephone on demographics, education, usual occupation, weight, height, family history of cancer, usual adult diet (55-item food list), usual intake of beer, wine, spirits, use of tobacco	*Any alcohol* No Yes		1.0 1.7 (1.1–2.6) *p*-trend=0.02	Age (40–64, 65–69, 70–74, 75–79, >80 years)	
			Wine (8-oz glasses/week) None <0.2 0.2–0.9 >0.9	30 6 54 11	1.0 1.2 (0.5–3.0) 1.5 (0.9–2.4) 1.9 (0.9–3.7) *p*-trend=0.02		
			Liquor (1-oz shots/week) None <0.5 0.5–2.5 >2.5	30 12 41 18	1.0 1.6 (0.8–3.2) 1.5 (0.9–2.4) 1.7 (0.9–3.0) *p*-trend=0.05		

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Putnam *et al.* (2000) (contd)			*Beer (12-oz cans/week)*			Additional adjustment for body mass index, total energy, linoleic acid, lycopene, carbohydrates, retinal, red meat, history of prostate cancer	
			None	30	1.0		
			<1	22	2.4 (1.4–4.3)		
			1–3	15	1.3 (0.7–2.5)		
			>3	19	1.7 (0.9–3.0) *p*-trend=0.08		
			Total alcohol intake (g/week)				
			None	30	1.0		
			<22	17	1.1 (0.6–2.1)		
			22–92	27	2.6 (1.4–4.6)		
			>92	18	3.1 (1.5–6.3) *p*-trend=0.001		

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Lund Nilsen *et al.* (2000), Norway, 1984–95, Norwegian Cohort Study	77 310 residents (≥20 years of age by 31/12/1983) of the Norwegian county Nord-Trøndelag invited to participate in a health survey: in 1984–86l among these, 22 895 men (≥40 years) with no history of any cancer included; incident cases of prostate cancer identified through linkage with the Norwegian Cancer Registry; response rate, 90.8%	Questionnaire on tobacco and alcohol use, physical activity education level, occupation	*Alcohol consumption the past 2 weeks* None (not teetotaler) 1–4 times >4 times *Teetotaler* No Yes	281 148 40 469 80	1.0 1.2 (0.94–1.41) 0.9 (0.64–1.25) *p*-trend=0.862 1.0 1.22 (0.96–1.55)	Age	

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Sesso *et al.* (2001), USA, Harvard Alumni Health Study	7612 male Harvard alumni (mean age, 66.6 years) followed prospectively during 1988–93	Questionnaire in 1988 on alcohol use, smoking, use of 23 food items, parental cancer history, weight, height; response from 6686 alumni to a questionnaire sent in 1977 also available	**Servings** *Total alcohol* Almost never 1/month–3/ week 3/week–1/day 1–3/day ≥3/day *Liquor* Almost never 1/month–3/ week 3/week–1/day 1–3/day ≥3/day	38 54 76 151 47 93 82 68 108 15	**Multivariate- adjusted** 1.0 1.3 (0.9–2.0) 1.7 (1.1–2.4) 1.9 (1.3–2.6) 1.3 (0.9–2.1) *p*-trend=0.35 1.0 1.2 (0.9–1.6) 1.7 (1.2–2.3) 1.6 (1.2–2.1) 1.1 (0.6–1.9) *p*-trend=0.10	Age, body-mass index, smoking (never/former/current), physical activity, parental history of cancer	Mean total alcohol intake, 123.1 (SD, 136.3) g/ week; 28.6% from wine, 15.8% from beer and 55.6% from liquor (e.g. whiskey); significant increase in relative risk not seen for beer or wine; men who reduced alcohol intake in the period 1977–88 still at elevated risk compared with the 'almost never' group.

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Albertsen & Grønbaek (2002), Copenhagen, Denmark, three pooled studies	26 496 men, aged 20–98 years; data from 12 989 men used in the study (1976–94); follow-up time, 4.5–22.9 years (average, 12.3 years); mean participation rate, 80%	Multiple-choice questions on intake of wine, beer, spirits, tobacco, age, education, physical activity, body mass index	**Drinks/week** *Total intake* <1 1–6 7–13 14–20 21–41 >41	42 59 54 36 35 7	1.0 0.9 (0.6–1.3) 0.9 (0.6–1.3) 0.9 (0.6–1.4) 0.9 (0.6–1.5) 0.7 (0.3–1.5) *p*-trend=0.48	Age, education, physical activity body mass index, smoking status, study of origin	Standard drink of wine, beer and spirits in Denmark considered to contain 12 g alcohol; ICD-7 177, ICD-10 DC619
			Beer 0 1–13 >13	53 141 39	1.0 1.0 (0.7–1.5) 1.0 (0.6–1.5) *p*-trend=0.85		
			Wine 0 1–13 >13	106 120 7	1.0 1.2 (0.9–1.6) 0.9 (0.4–2.0) *p*-trend=0.96		
			Spirits 0 1–13 >13	101 122 10	1.0 1.0 (0.7–1.3) 1.0 (0.5–2.0) *p*-trend=0.90		

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Platz et al. (2004), USA, 1986–98, Health Professionals Follow-up Study	51 529 men, aged 40–75 years at enrolment in 1986; excluded: men diagnosed with cancer (except non-melanoma skin cancer) or returned incomplete questionnaire in 1986 (3.1%); 47 843 men, of whom 76.4% in 1986 reported drinking alcohol (2.9% consumed > 50 g/day); verification of cases via medical records and pathology reports; overall follow-up response, 94% at the end of 1998	Questionnaire, mailed and returned every 2 years, on diet, medical history, lifestyle factors; updated via the questionnaires mailed and returned in 1990 and 1994; deaths recorded via the National Death Index	*Intake (g/day)* 0 0.1–4.9 5.0–14.9 15.0–29.9 30.0–49.9 ≥50 0 0.1–4.9 5.0–14.9 15.0–29.9 30.0–49.9	 576 537 694 336 266 70 154 118 175 80 81	**Hazard ratios** *All cases* 1.0 1.0 (0.9–1.1) 1.1 (0.9–1.2) 1.1 (1.0–1.3) 1.1 (1.0–1.3) 1.0 (0.7–1.3) p-trend=0.20 *Advanced cases* 1.0 0.8 (0.7–1.1) 1.0 (0.8–1.3) 1.0 (0.8–1.4) 1.0 (0.7–1.3) p-trend=0.70	Current age, body mass index at 21 years, height, smoking (pack–years in past decade), family history of prostate cancer, major ancestry, vasectomy, high physical activity, diabetes, intake of: total energy, calcium, tomato sauce, fructose, red meat, fish, vitamin E, α-linolenic acid	Consumption over past year of beer, red wine, white wine and liquor (assumed to contain, resp., 12.8, 11.0, 11.0 and 14 g alcohol per serving); analysis of drinking pattern: for men who took ≥105 g alcohol on only 1 or 2 days of the week, hazard ratio was 1.64 (95% CI, 1.13–2.38); this group represented 1% of the cases in the cohort; advanced cases were Stage C or D or fatal.

Table 2.76 (continued)

Reference, location, name of study	Cohort description	Exposure assessment	Exposure categories	No. of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Baglietto *et al.* (2006), Australia, Melbourne Collaborative Cohort Study	528 people (17 049 men), aged 27–75 years, recruited 1990–94 in the Melbourne metropolitan area via electoral rolls, advertisements and community announcements; data from 16 872 men, aged 27–70 years, used; follow-up through to 31 December 2003	Interview to collect data on age, country of birth, education, tobacco use, drinking habits, medical history; cases ascertained through the Victoria Cancer Registry	Lifetime abstainer Former drinker 1–19 g alcohol/ day 20–39 g alcohol/day 40–59 g alcohol/day ≥60 g alcohol/ day	Not reported	**Hazard ratios** *All cases* 1.0 1.2 (0.8–1.6) 1.0 (0.8–1.2) 1.0 (0.8–1.2) 1.0 (0.7–1.3) 0.9 (0.7–1.3) *p*-trend=0.62	Co-variate: country of birth; adjustments for education, body mass index, smoking, total energy intake or medical history did not change risk ratios.	Lifetime abstainers never drank ≥12 drinks/ year; former drinkers did not drink alcohol at start of study; no difference in risk according to the type of alcohol consumed; 'aggressive' cancers defined as Gleason score >7 or advanced stage (T4 or N+ or M+)
			Lifetime abstainer Former drinker 1–19 g alcohol/ day 20–39 g alcohol/day 40–59 g alcohol/day ≥60 g alcohol/ day	Not reported	*Aggressive cases* 1.0 0.7 (0.3–1.7) 0.7 (0.4–1.1) 0.7 (0.4–1.2) 0.7 (0.3–1.3) 0.8 (0.4–1.5) *p*-trend=0.58		

CI, confidence interval; ICD, International Classification of Diseases; NHANES, National Health and Nutrition Examination Survey; SD, standard deviation; SIR, standardized incidence ratio [a] Unless otherwise noted in the comments, the ICD code for prostate cancer is 185

Table 2.77 Case–control studies of alcoholic beverage consumption and cancer of the prostate[a]

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Schwartz *et al.* (1962), France, 1954–58	139 patients	139 age-matched non-cancer patients (accident victims)	Subjects interviewed in the hospital about alcohol drinking	Prostate cancer cases, average consumption of 11.0 cL pure alcohol per day; controls, same average daily alcohol intake	139	NR		Consumption according to age varied from 9.6 to 14.0 cL pure alcohol/ day; ICD 177
Wynder *et al.* (1971), New York, USA, 1965–67	217 patients (167 alcohol drinkers)	200 patients (163 drinkers)	Epidemiological questionnaire	*Alcohol consumed (units per day)* 1–2 3–6 >7 Binge	 106 36 22 3	NR		Unit/day = 1 oz spirits, 4 oz wine, 8 oz beer; a second study included 83 prostate cancer patients and 200 control patients
Williams & Horm (1977), USA, Third National Cancer Survey, 1969–71	465 patients	1323 patients with other cancers, not tobacco-related	Interview to collect data on the amount and the duration of alcohol and tobacco use	<50 oz–years >50 oz–years	62 127	**Odds ratio** 0.78 0.87	Age, race, smoking	Alcohol use expressed as 'oz–years' (units/ week × years drinking)

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Schuman *et al.* (1977), USA, Study period not reported	200 white patients from major hospitals in the Minneapolis-St Paul area	Patients in same hospital with non-genitourinary conditions; matched by age, race, date of admission; age- and race-matched neighbourhood controls (same street of residence)	Personal inter-view on history of residence, jobs, medication, hospitalization, smoking/ drinking habits, drugs, marital history	*Alcohol use* Yes No	39 1	NR		Preliminary report
Niijima & Koiso (1980), Japan, 1963–78	187 patients diagnosed and treated at the Department of Urology, University of Tokyo; mean age, 68.7 years	200 patients without known prostatic disease: 106 cancers of the kidney, ureter, bladder or other organs; 94 diseases other than cancer	Not specified	About 56% of patients and 55% of controls were alcohol drinkers		NR	NR	NR
Jackson *et al.* (1981), USA, 1973–78	231 black patients with prostate carcinoma at Howard University and DC General Hospitals; data from 205 patients used; 100% histologically confirmed	205 age-matched patients free of neoplastic, urological and endocrine conditions	Interview using a pre-tested epidemiological questionnaire			NR	NR	A higher proportion of controls than of patients had a history of heavy alcohol use (beer, wine or liquor) in the 10 years before diagnosis [no data].

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Mishina *et al.* (1981), USA	100 prostatic cancer patients	100 matched for age (±1 year) and residence in the same prefecture	Questionnaire and interview on education, job history, income, religion, diet, marriage, sexual activity, physical condition	Rare No alcohol	61 39	1.73 CI not reported		
Talamini *et al.* (1986), northern Italy, 1980–83	166 patients recently diagnosed at the General Hospital of Pordenone (Friuli Venezia-Giulia), aged 48–79 years (median age, 66 years); 100% histologically confirmed; refusal rate, <2%	202 patients in the General Hospital of Pordenone admitted for acute conditions (no malignant, hormonal or urogenital disease) <1 year before interview, aged 50–79 years (median age, 63 years); refusal rate, <2%	Interview with questionnaire on general lifestyle habits, socio-demographic aspects, height, weight, frequency of food intake	Not specified		NR	NR	Risk for prostate cancer not related to wine drinking [data not shown]

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Ross *et al.* (1987), USA, 1977–80	316 black residents of Los Angeles County with prostate cancer (diag-nosed between January 1977 and August 1980), aged 60–75 years; a total of 179 were interviewed, 19 refused to participate; 190 white incident prostate cancer patients of a Los Angeles area retirement community (diagnosed 1972 through 1982), aged, 65–79 years; 142 patients interviewed, 48 refused to participate	142 neighbourhood controls; age-matched (±5 years) with cases 142 controls individually matched to cases on age (±1 year), length of residence in the community (±1 year)	Interview	Any alcohol use Any alcohol use	NR	*Blacks* 0.9 *Whites* 0.9	NR	No confidence intervals reported

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Yu *et al.* (1988), USA, 1969–84	1162 patients (14% blacks) in 20 hospitals across the USA, recently diagnosed and identified in the American Health Foundation registry; mean age, 62.9 years; verified through medical records and pathology reports	3124 patients (54% cancers, excluding cancers at 'alcohol-related' sites; 13% benign neoplasms, 33% non-neoplastic diseases; ~10% blacks) from the same hospitals; mean age, 62.2 years; 3:1 frequency-matched to cases by age at diagnosis (±2 years), race, year of interview, hospital	Interviews at time of admission or diagnosis on race, education, marital status, years of education, height, weight, religion, occupation, smoking, alcohol use	*Intake* 0 1 oz/day 3 oz/day 0 1 oz/day 3 oz/day	 436 321 211 74 46 37	*Whites* 1.0 1.0 (0.6–1.7) 1.2 (0.9–1.5) *Blacks* 1.0 1.4 (0.8–2.3) 1.3 (0.7–2.3)	Age at diagnosis	Consumption of alcohol expressed as whiskey equivalent, (beer amount/8) + (wine amount/4) + whiskey amount in oz/day
Mettlin *et al.* (1989), Roswell Park Memorial Institute, USA, 1957–65	371 patients, 55–85 years of age (mean age, 68.3 years); 2.2% non-white; 100% histologically confirmed	371 patients (4.0% non-white) without diagnosis or history of cancer (12.1% benign prostatic hyperplasia), aged 55–85 years (mean age, 68.1 years)	Questionnaire with 45-item food-frequency check-list; weekly frequency of consumption of beer, wine or liquor			NR		No significant increase or reduction in risk was found for beer, wine or liquor [no details were reported].

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Fincham *et al.* (1990), Canada, 1981–83	382 identified via the Alberta Cancer Registry (April 1981–September 1983), aged ≥45 years	625 age group-matched to cases, chosen from the roster of the Alberta Health Care Insurance Plan	Interview with questionnaire on ethnicity, marital status, job history personal/family medical history, tobacco/alcohol use, puberty age, physical status; diet history over 2-month periods with 6-month interval	NR				Cases consumed somewhat more alcohol (mean, 127 oz/month) than controls (mean, 120 oz/month)
Walker *et al.* (1992), South Africa	166 black hospitalized patients (90% advanced-stage D), residents of Soweto; mean age, 69.2 years (range, 48–84 years); 100% histologically confirmed	166 black age-matched selected from immediate neighbours of patients; mean age, 69.6 years (range, 52–85 years)	Patients questioned as to their diet before they became ill	Non-drinker Occasional drinker Regular drinker	20 35 45	No data		Differences between patients and controls not significant
Nakata *et al.* (1993), Japan	294 patients	294 general population controls chosen from 13 areas in Gunma Prefecture; age-matched (±2 years)	Questionnaire or interview	History of drinking: yes/ no		*Odds ratio* 0.93 (0.62–1.39)	Age	Prostate cancer risk not statistically different between cases and controls

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Slattery & West (1993), Utah, USA, 1983–86	362 white men living in 4 counties in Utah, diagnosed between 1 January 1984 and 15 November 1985 with first-primary prostate cancer, aged 45–74 years; 100% histologically confirmed; completion rate, 77.4%	685 matched to cases by 5-year age group, selected by random-digit dialling (<65 years) or from Social Security records (≥65 years); completion rate, 76.9%	Quantitative food-frequency questionnaire to assess use of alcohol, coffee, tea	*Total alcohol* None Any *Beer* None Any *Wine* None Any *Spirits* None Any	90 89 114 65 130 49 105 74	1.0 1.2 (0.9–1.6) 1.0 1.2 (0.9–1.7) 1.0 0.8 (0.6–1.1) 1.0 1.1 (0.8–1.5)	Crude odds ratio values given; adjustment for dietary intake, body size, age within strata, demographic features did not change the results.	Data are shown for all prostate tumour types, and for cases/controls ≤67 years; results for 'aggressive tumours' or for subjects >67 years did not change the outcome.
van der Gulden *et al.* (1994), Netherlands 1988–90	345 prostate cancer cases from the Comprehensive Cancer Centre IKO diagnosed January 1988 until April 1990; mean age, 72 years; 100% histologically confirmed; response rate, 84%	1346 patients treated in the IKOregion for prostate hyperplasia, but without histological signs of malignancy; mean age, 69 years	Questionnaire (mailed) on smoking/drinking habits, work history, socio-economic status; response rate, 78%	*Alcohol use* Never <1 day/week 1–4 days/week 5–7 days/week All drinkers	21 324 90 176 58	1.0 1.2 (0.7–2.0) 1.4 (0.8–2.3) 1.4 (0.8–2.5) 1.4 (0.8–2.2)	Age	Age at which drinking began or duration of drinking not related to risk for prostate cancer

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Tavani *et al.* (1994b), northern Italy, 1985–92	Histologically confirmed, incident prostate cancer cases (*n*=281; median age, 67 years; range 25–79 years) diagnosed during the year before interview, admitted to cancer institutes and major hospitals	Patients (*n*=599; median age, 63 years; range 27–79 years) admitted to the same network of hospitals as the cases for acute, non-neoplastic conditions	Interviews with questionnaire on age, education, height, weight, marital status, smoking and drinking habits, intake of several indicator foods	*Total alcohol intake (drinks/ day)* 0 <3 3–<5 5–<8 ≥8 *Wine (drinks/ day)* 0 <5 ≥5 *Beer (drinks/ day)* No Yes *Spirits (drinks/ day)* No Yes *Duration of use/years* 0 >0–<40 ≥40	 22 63 55 63 78 26 152 103 197 84 184 97 22 92 167	 1 1.3 (0.7–2.4) 1.9 (0.5–1.6) 1.2 (0.6–2.3) 1.1 (0.6–2.1) 1 1.2 (0.7–2.0) 0.9 (0.5–1.7) 1 1.1 (0.8–1.6) 1 0.8 (0.5–1.1) 1 1.1 (0.6–2.1) 1.3 (0.7–2.3)	Age, study centre; estimates from multiple logistic regression with age, centre, education, marital status, body mass index and smoking status gave comparable results.	Average number of drinks/day (a drink defined as 150 mL wine, 330 mL beer, or 30 mL spirits, each with 12–15 g ethanol); separate analyses for wine (0,<5, ≥5 per day), beer (no/yes), spirits (no/yes) or duration of use (0, <40, ≥40 years) did not substantially change the results.
Wei *et al.* (1994), China	27 admitted to the hospital of West-China University of Medical Sciences	27 patients with malignant, non-urological tumours, 27 with urological (non-malignant) disease	Questionnaire to assess lifestyle, diet, marital status, history of prostate disease	Not specified		1.0 (0.4–2.5)	Age, sex, race, day of admission	Ten drinkers among cases and 21 drinkers among controls

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
De Stefani et al. (1995), Uruguay, 1988–94	156 adenocarcinoma of the prostate admitted (1988 through 1994) at the Instituto Nacional de Oncologia; 100% histologically confirmed; no refusals recorded	302 patients admitted to the same institute, with diagnoses not related to alcohol, tobacco or diet, aged 40–89 years	Interview by 3 social workers; routine questionnaire given to all patients admitted.	*Beer* Non-drinkers 1–9 mL/day 10–60 mL/day ≥61 mL/day *Wine* Non-drinkers 1–30 mL/day 31–60 mL/day ≥61 mL/day *Liquor* Non-drinkers 1–45 mL/day 46–69 mL/day ≥70 mL/day *Total alcohol* Non-drinkers 1–45 mL/day 46–120 mL/ day ≥121 mL/day	134 5 9 8 67 42 17 30 103 37 29 38 52 37 29 38	**Odds ratios*** 0.7 (0.2–2.1) 1.7 (0.7–4.3) 3.2 (1.0–9.6) p=0.04 1.3 (0.7–2.1) 0.8 (1.4–1.5) 1.4 (0.8–2.6) p=0.35 0.7 (0.3–1.3) 1.1 (0.6–2.1) 1.2 (0.6–2.3) p=0.62 1.4 (0.8–2.4) 0.9 (0.5–1.7) 1.8 (0.9–3.1) p=0.18	Age, residence, level of education, cigarette smoking, dietary items (meat, milk, fruits)	* Odds ratio versus lifelong abstainers; daily alcohol intake expressed as mL pure ethanol, using 60, 120 and 460 mL/L for beer, wine and hard liquor, respectively; odds ratios for beer drinkers versus lifelong abstainers (intake in mL pure ethanol/day): 1–30, 1.2 (0.5–2.8); ≥31, 3.2 (1.2–8.1)
Andersson et al. (1996), Sweden, 1989–91	256 eligible prostate cancer patients (aged <80 years) from Orebro county, January 1989–September 1991; response rate, 74.6%	252 age-matched screened for prostate cancer with negative results; response rate, 76.6%	Interviewer-administered standardized food-frequency questionnaire; clinical data	Non-drinker <24.4 g/week 24.4–48.5 g/ week 48.6–96 g/week >96 g/week	106 18 23 29 31	1.0 0.9 (0.4–1.7) 1.1 (0.6–2.1) 1.4 (0.8–2.6) 1.5 (0.8–2.8) p for trend=0.11	Age	Adjustment for smoking reduced alcohol estimates modestly [data not given]

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Ewings & Bowie, (1996), United Kingdom, 1989–91	159 newly diagnosed prostatic cancer patients in three hospitals; patients interviewed between May 1989 and October 1991; 100% histologically confirmed	2 controls for each case; frequency-matched (5-year age groups), selected from the same hospital: one with benign prostate enlargement, one with non-urological condition (avoiding alcohol- and diet-related disorders)	Questionnaires completed	*Ever use of alcohol*	134	**Odds ratio** 0.6 (0.4–1.2)	NR	
Grönberg *et al.* (1996), Sweden 1959–89	Link between Swedish Twin Registry and Swedish Cancer Registry yielded 406 cases of prostate cancer; mean age at diagnosis, 72.6 years (range, 47–91 years).	1218 3:1 age-matched, unrelated	Questionnaire mailed in 1967 to all same-sex, male twin pairs born in 1886–1925 on food intake and use of beer, wine spirits; 19 (4.7%) cases diagnosed	Non-users Former versus non-user Current versus non-user	64 25 275	**Odds ratio** 1 0.8 (0.5–1.4) 0.9 (0.6–1.3) *p*-trend=0.54	Age	Non-users, former users (did not drink during the last year), current users; beer, wine or spirits: non-users, <1 time/week, 1–2 times per week, almost daily; no increased risk found for total alcohol consumption, nor for beer, wine or spirits

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Hayes *et al.* (1996), USA, 1986–89	479 black, 502 white patients diagnosed 1 August 1986–30 April 1989, aged 40–79 years; 100% pathologically confirmed; response rate, 76%	594 black, 721 white residents of Atlanta, Detroit and 10 counties in New Jersey, covered by three cancer registries; response rate, 71%	In-person inter-views (1986–89) on alcohol intake, duration of use, age when started, age when stopped	*Drinks per week* Never used	94	1	Age, ethnicity, study site	Drinkers: >1 drink per month for at least 6 months; increased risk with higher consumption apparent for beer and liquor, not for wine; elevated risks also reported for those with poorly or undifferentiated tumours
				Any	385	1.2 (1.0– 1.5)		
				≤7	96	1.1 (0.9–1.4)		
				8–21	113	1.1 (0.9–1.4)		
				22–56	119	1.4 (1.0–1.8)		
				≥57	54	1.9 (1.3–2.7)		
						p-trend<0.001		
				Recent drinker Never used	94	1		
				≤7	57	1.1 (0.8–1.5)		
				8–21	64	1.1 (0.8–1.5)		
				22–56	67	1.2 (0.9–1.7)		
				≥57	28	1.7 (1.1–2.6)		
				Former drinker Never used	94	1		
				≤7	36	1.2 (0.8–1.8)		
				8–21	45	1.3 (0.9–1.9)		
				22–56	48	1.6 (1.1–2.4)		
				≥57	24	2.0 (1.2–3.4)		
				Regional/ distant None	56	1		
				≤7	65	1.0 (0.7–1.5)		
				8–21	84	1.1 (0.8–1.7)		
				22–56	63	1.3 (0.9–1.9)		
				≥57	36	2.1 (1.3–3.5)		

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Guess *et al.* (1997), USA, nested case–control study 1964–71	106 incident cases selected from >125 000 members of the Kaiser Permanente Medical Care Program with health examination data and serum samples available (1964–71); diagnosis between September 1970 and November 1987	106 pair-matched to each case on age, date of serum sampling, location of clinic.	Multi-phasic health examination; bioassay	Non-drinker ≤2 drinks/day ≥3 drinks/day	17 46 28	NR		Alcohol consumption was examined as a confounder.

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Jain *et al.* (1998), Canada	*Ontario*: 187 patients listed in Ontario Cancer Registry between April 1990 and April 1992 and living in or around Toronto; refusal rate for interview, 20.2% *Quebec*: 229 patients admitted to five Montreal hospitals between 1989 and 1993; refusal rate, 15.5% *British Columbia*: 201 patients (random sample from 6183) in the British Columbia Cancer Registry, in the years 1989–1991; refusal rate, 7%; all histologically confirmed prostate adenocarcinoma	*Ontario*: 207 chosen at random from lists of the Ministry of Finance; matched with cases by geographic area, 5-year age group; refusal rate, 37% *Quebec*: 230 chosen via a modified random-digit dialling method, with the same first three phone digits as the cases *British Columbia*: 199 selected at random from Medical Services Plan rosters; refusal rate, 15%	Questionnaires:, weight, physical activity, personal and medical history (e.g, rectal examinations), smoking habits, frequency of use of medical system and demographic data, amount and frequency of food intake in the year before the diagnosis (cases) or before the date of the interview (controls)	*Total alcohol intake* 0 >0–<10 g/day 10–<20 g/day 20–<30 g/day ≥30 g/day *Beer* 0 >0–9 g/day ≥10 g/day *Wine* 0 >0–9 g/day ≥10 g/day *Liquor* 0 >0–15 g/day ≥16 g/day	175 168 82 57 135 333 189 95 323 193 101 331 190 96	**Odds ratio** 1.0 0.8 (0.6–1.1) 0.8 (0.6–1.2) 0.8 (0.5–1.1) 0.9 (0.6–1.3) p for trend=0.51 1.0 0.8 (0.6–1.1) 0.7 (0.5–0.9) p for trend=0.01 1 0.8 (0.6–1.0) 1.12 (0.8–1.55) p for trend=0.8 1 0.9 (0.7–1.2) 0.9 (0.6–1.2)	Age (continuous), total energy intake	Percentage alcohol in beer, 3.6%; wines and sherry, 11.5%; liquor/ spirits, 37.9%; amount of alcohol in 350mL beer, 12.6 g; in 120mL wine, 13.8 g; in 45mL whiskey, 17.1 g; odds ratios for combined data for all 3 centres; odds ratios for individual centres and for different types of beverage not significantly different from unity; additional adjustment for smoking (ever versus never), educational level, family history of prostate cancer, history of benign prostate hypertrophy, Quetelet index, energy intake and retinol intake had little impact on the results.

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Lumey *et al.* (1998), USA, 1977–91	699 identified in computerized registry of the American Health Foundation (1977–1991) in 20 US hospitals; mean age, 62.6 years; 100% histologically confirmed; response rate, 94%	2041 hospital patients without tobacco- or alcohol-related disease and without benign prostatic hypertrophy; mean age, 61.1 years; 3:1 matched with cases by age at diagnosis (within 5 years), year of diagnosis, hospital, race; response rate, 94%	Interview at the time of admission to the hospital, with a structured questionnaire on demographic, socioeconomic and behavioural aspects, smoking, drinking	*Drinks/week* Never Any ≤7 8–21 22–56 ≥57	106 593 235 160 123 62	**Odds ratios** 1.0 1.2 (0.9–1.5) 1.2 (0.9–1.6) 1.1 (0.8–1.5) 1.3 (1.0–1.8) 1.1 (0.7–1.5)	Age at diagnosis, study site	Odds ratios for current and former drinkers similar; adjustment for marital status, occupation, religion, education, smoking habits did not change the results; separate analyses for beer, wine and liquor, or for different age groups (≤64 or ≥65 years) did not influence the results; one drink defined as a glass of whisky, a glass of wine or a glass of beer.
Hsieh *et al.* (1999), Greece, 1994–97	320 patients (95% aged >60 years) with prostate carcinoma from six hospitals in the Greater Athens area between 1994 and 1997; 100% histologically confirmed	246 (90% aged >60 years) non-cancer patients in the same hospitals as the cases	Interviews from February 1994 to January 1997 at the hospital, with questions about demographic, socioeconomic, reproductive, biomedical, dietary variables	*Alcohol drinking (glasses/day)* None <1 1–<2 2–<3 3–<4 ≥4	 101 43 38 32 29 61	NR	Age, body mass index, height, years of schooling	

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Dennis (2000)	Meta-analysis of 27 case–control studies examining the association between alcohol use and prostate cancer		Articles published between January 1976 and July 1978	Ever versus never		1.1 (0.98–1.13)		
Sharpe & Siemiatycki (2001), Montreal, Canada, 1979–85	Interview data obtained from 449 of 557 (80.6%) eligible incident cases, histologically confirmed, in Montreal; reliable alcohol consumption data obtained from 399 cases	541 chosen from electoral lists 1979–82 and 1984–85, 199 by random digit dialling; 533 responded (rate, 72%), of whom 512 were interviewed; data from 476 were used	Interviews on use of beer, wine and spirits, frequency of use, time when drinking started; data expressed as 'drink–years'	Never drank daily	69	1.0	Age, ethnicity, respondent status, family income, body mass index, cigarette smoking	A drink of beer, wine or spirits was estimated to contain 13.6 g alcohol; the study was primarily designed to study occupational causes of cancer;
				Drank weekly, never daily	133	1.6 (1.1–2.4)		
				Drank daily				
				Age at starting daily drinking (years)				
				<15	17	3.8 (1.6–9.3)		
				15–19	51	1.4 (0.8–2.4)		
				20–24	49	1.6 (0.9–2.7)		
				≥25	68	1.2 (0.8–2.0) *p*-trend=0.009		
				Duration of drinking (years)				
				<20	32	1.3 (0.7–2.4)		
				20–39	64	1.1 (0.7–1.8)		
				>39	88	2.0 (1.2–3.1) *p*-trend=0.01		

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Sharpe & Siemiatycki (2001) (contd)				*Cumulative consumption (daily drinkers)*				647 cancer controls selected from other, not alcohol-related cancer cases (response rates, 78–85%) also included; findings similar when using cancer controls
				<58 drink–years	54	1.4 (0.9–2.3)		
				58–125 drink–years	44	1.1 (0.7–1.9)		
				>125 drink–years	99	2.1 (1.3–3.3)		
						p-trend=0.003		
				Combined use				
				Beer only	57	1.6 (0.9–2.5)		
				Wine only	16	1.4 (0.7–2.9)		
				Spirits only	12	1.9 (0.4–1.9)		
				Beer and wine	17	1.2 (0.6–2.4)		
				Beer and spirits	78	1.9 (1.2–3.1)		
				Wine and spirits	20	1.1 (0.6–2.2)		
				Beer, wine and spirits	130	1.8 (1.2–2.7)		

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Crispo *et al.* (2004), Italy 1991–2002	1294 patients with prostate carcinoma; median age, 66 years (range, 46–74 years); 100% histologically confirmed;. refusal rate, <5%; 1369 patients with benign prostatic hyperplasia; median age, 65 years (range, 46–74 years); refusal rate, <5%	1451 patients admitted to the same hospitals for non-neoplastic disorders; median age, 63 years (range, 46–74 years); refusal rate, <5%	Personal inter-views with questionnaire on alcohol drinking: number of days per week, number of drinks per week, duration (up to 1 year prior to diagnosis or admission)	*Prostate cancer patients* *Abstainer* *Former drinker* *Current drinkers* <3 drinks/ week 3–4 drinks/ week 5–6 drinks/ week 7–8 drinks/ week ≥9 drinks/ week	71 93 1130 496 355 177 107 88	1.0 0.8 (0.5–1.3) 0.9 (0.6–1.3) 0.9 (0.6–1.3) 0.9 (0.6–1.3) 1.1 (0.7–1.7) 1.0 (0.6–1.5) 0.9 (0.5–1.4)	Age, study centre, education, body mass index, physical activity, history of prostate cancer in first-degree relatives	Abstainers never consumed alcohol; former drinkers had abstained ≥1 year; one drink: 125 mL wine, 330 mL beer, 30 mL hard liquor (12–15 g alcohol); analysis by different types of beverage (beer, wine, spirits) did not show any significant association with risk for prostate cancer; some evidence for an inverse relationship with the risk for benign prostatic hyperplasia.
Hodge *et al.* (2004), Melbourne, Perth, Sidney, Australia, 1994–97	858 patients diagnosed 1994–97 with 'clinically important' prostate cancer (Gleason score ≥5), aged <70 years; registered to vote; 100% histologically confirmed; response rate, 65%	905 randomly selected from State Electoral Rolls; age-matched; response rate, 50%	Personal inter-views, dietary habit questions and a 121-item food frequency questionnaire; men with energy intake from food >3 SD above the mean not included; alcohol intakes from beer, wine, spirits and total use recorded	*Total alcohol intake (g/day)* <20 20–39 40–59 ≥60	NR	1.0 1.0 (0.8–1.3) 1.0 (0.7–1.3) 1.0 (0.7–1.4)	State, age group, year, country of birth, socio-economic group, family history of prostate cancer	Analysis by different types of beverage (beer, wine, spirits) did not show any association with prostate cancer risk.

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Chang *et al.* (2005), Sweden, 2001–02	1499 incident prostate cancers identified from Swedish regional cancer registries; mean age, 66.4 years; histologically confirmed as adenocarcinoma; response rate, 79%	1130 identified from the Swedish Population Registry database; mean age, 67.3 years; response rate, 67%	Self-administered questionnaire to assess known and potential risk factors for prostate cancer	Non-drinker Former drinker Current drinker *Ethanol (g/ week)* 0.0 0.1–45 45.1–90.0 90.1–135.0 >135.1 *Localised disease* 0.0 0.1–45 45.1–90.0 90.1–135.0 >135.1 *Advanced disease* 0.0 0.1–45 45.1–90.0 90.1–135.0 >135.1	122 112 1259 218 379 311 202 359 NR NR	1.0 2.1 (1.4–3.3) 1.6 (1.2–2.1) 1.0 1.1 (0.8–1.4) 1.2 (0.9–1.5) 1.3 (0.9–1.7) 1.3 (1.0–1.7) *p*-trend=0.06 1.0 1.5 (1.1–2.1) 1.4 (1.0–2.0) 1.4 (1.0–2.1) 1.4 (1.0–2.0) *p*-trend=0.27 1.0 0.8 (0.6–1.0) 0.9 (0.7–1.2) 1.1 (0.8–1.5) 0.9 (0.7–1.2) *p*-trend=0.50	Age (5-year categories), smoking history (ever, never), current body mass index, family history of prostate cancer, intake of other alcohol types, dairy products, red meat, fruit, vegetables	Light, medium and strong beers (33 cL) contain 6, 9.1 and 14.6 g ethanol; light and strong wines (15 cL) contain 14.2 and 20.7 g ethanol; a shot of liquor (4 cL) contains 12.6 g ethanol; light beers were not counted in number of drinks per week; non-drinkers included consumers of only light beer; former drinkers were those who stopped ≥18 months before; current drinkers included those who stopped <18 months before.

Table 2.77 (continued)

Reference, study location, period	Characteristics of cases	Characteristics of controls	Exposure assessment	Exposure categories	No of cases/ deaths	Relative risk (95% CI)	Adjustment factors	Comments
Schoonen *et al.* (2005), USA, 1993–96	753 Caucasian and African-American men living in King County (Washington State, USA), newly diagnosed with prostate cancer in 1993–96, aged, 40–64 years; 100% histologically confirmed; participation rate, 82.1%; participant refusal, 12.5%	941 identified using random-digit dialling; frequency-matched to cases by 5-year age group; 703 interviewed; participation rate, 75%; participant refusal, 24%.	Histological and clinical details on case subjects from the Seattle-SEER cancer registry; interview with food-frequency questionnaire and data on medical history, prostate-cancer screening history, family history of cancer, demographics, height, weight, lifetime alcohol use, smoking habits, marital and sexual history, lifestyle and occupational factors	Ever use *Lifetime alcohol (g)* 0 >0–6000 >6000–12 000 >12 000–24 000 >24 000 *Drinks per week* None or <1 1–7 8–14 ≥15 *Red wine (drinks/week)* Non-drinker 1–3 4–7 ≥8	681 72 186 122 138 235 126 266 166 195 134 121 66 27	**Odds ratio** 1.1 (0.7–1.5) 1.0 1.1 (0.8–1.7) 0.9 (0.6–1.4) 1.0 (1.6–1.5) 1.3 (0.8–2.0) *p*-trend=0.33 1.0 0.9 (0.7–1.3) 1.0 (0.7–1.5) 1.1 (0.7–1.6) *p*-trend=0.32 1.0 0.8 (0.5–1.3) 0.5 (0.3–0.9) 0.5 (0.2–0.9) *p*-trend=0.02	Age, use of prostate screening, lifetime number of female sexual partners, smoking status Odds ratio values for red wine also adjusted for intake of other types of alcohol	One bottle of beer (12 oz), one glass of wine (4 oz), one shot of liquor (1.5 oz) contain 13, 11 and 14 g ethanol, respectively; analyses by age at first alcohol use, lifetime duration of use, or by heavy drinking period (yes/ no) did not affect the outcome; associations were similar for less and more aggressive cancers; subjects consuming <1 drink/ week were included in the reference group; non-drinkers had ≤12 drinks during life.

CI, confidence interval; ICD, International Classification of Diseases; NR, not reported; SD, standard deviation; SEER, Surveillance, Epidemiology, and End Result
ᵃ Unless otherwise noted in the comments, the ICD code for prostate cancer is 185

2.15.3 *Meta-analysis*

A meta-analysis that included six cohort and 27 case–control studies that were reported before July 1998 resulted in an estimate of 1.05 (95% CI, 0.98–1.11) for ever consumption of alcoholic beverages (Dennis, 2000). There was a suggestion of a weak dose–response relationship for increasing levels of alcoholic beverage consumption (relative risk, 1.21; 95% CI, 1.05–1.39 for four drinks/day) when data from 15 of the studies were used. [Results for the six cohort studies and the 27 case–control studies are presented in Tables 2.76 and 2.77, respectively.]