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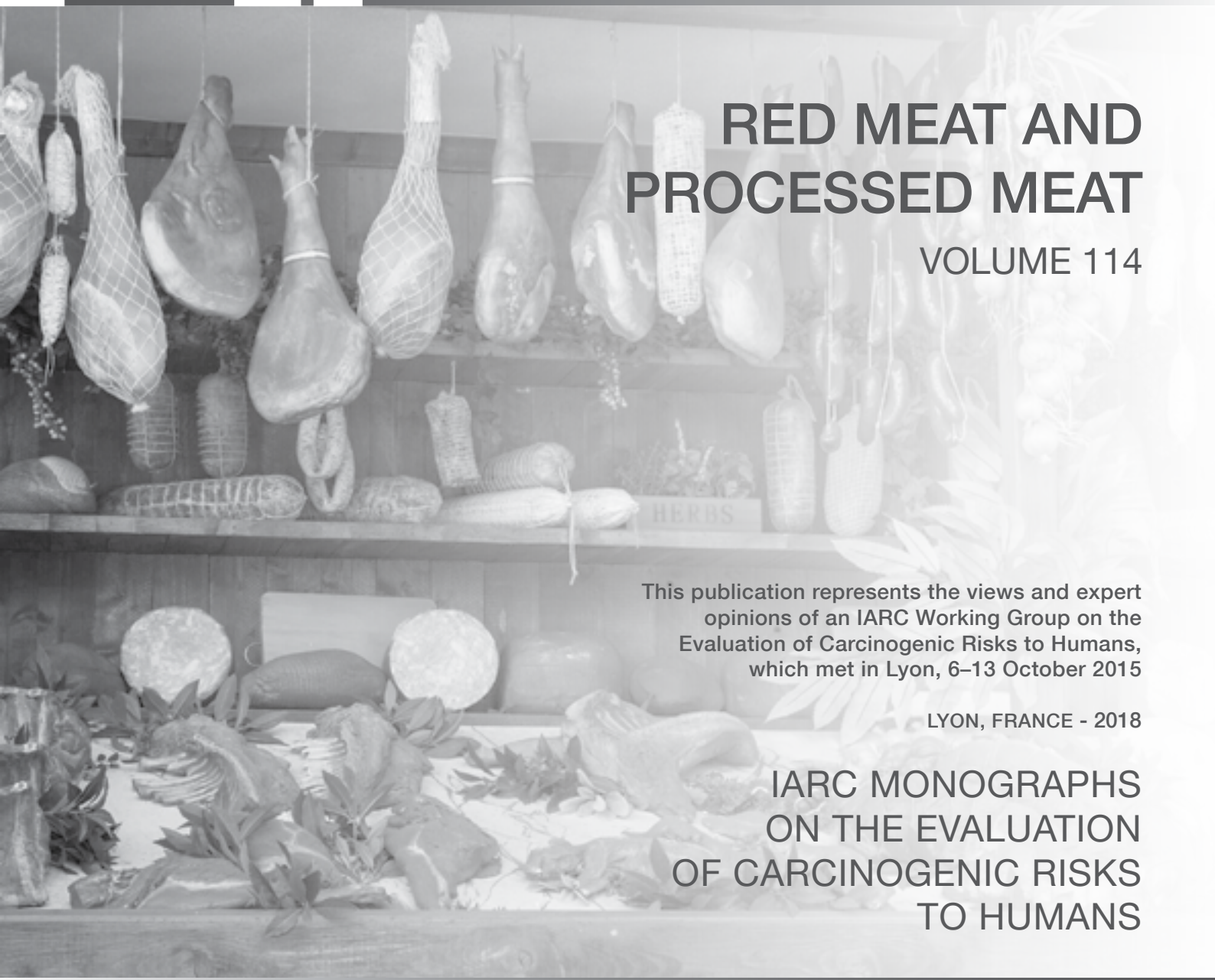

RED MEAT AND PROCESSED MEAT

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International Agency for Research on Cancer

World Health Organization

Table 2.7.1 Cohort studies: Red meat and cancer of the lung (web-only)

Reference, location enrolment/follow-up period, study design	Population size, description, exposure assessment method	Organ site	Exposure category or level	Exposed cases/deaths	Risk estimate (95% CI)	Covariates controlled
Breslow et al. (2000) US Initial interview in 1987 and matched to mortality data through to 31 December 1995	20 195 individuals; Households eligible for the National Health Interview Survey in 1987 **Exposure assessment method:** Questionnaire	Lung	Red meat (servings/week)			Age, gender, smoking duration (years), packs per day smoked
			0–2.3	39	1	
			2.3–4.2	29	0.7 (0.4–1.2)	
			4.2–6.6	44	1.5 (0.9–2.4)	
			> 6.6	46	1.6 (1–2.6)	
			Trend-test p-value: 0.014			
Tasevska et al. (2009) US 1995–2003	278 380 men and 189 596 women; NIH-AARP Diet and Health Study: men and women aged 50–71 y from 8 US states **Exposure assessment method:** Questionnaire; Self-administered semiquantitative 124-item FFQ. Meat-cooking module in a second FFQ 6 months after baseline	Lung	Red meat (g/1000 kcal) Men:			BMI, smoking, race, education, physical activity, intake of alcohol, energy-adjusted vegetable and fruit servings, saturated fat
			Q1: ≤ 19.2	NR	1	
			Q2: > 19.2 ≤ 30.0	NR	1.1 (0.98–1.23)	
			Q3: > 30.0 ≤ 40.6	NR	1.18 (1.05–1.31)	
			Q4: > 40.6 ≤ 54.7	NR	1.13 (1–1.26)	
			Q5: > 54.7	NR	1.22 (1.09–1.38)	
			Trend-test p-value: 0.005			
		Lung	Red meat (g/1000 kcal) Women:			Same as above
			Q1: ≤ 13.3	NR	1	
			Q2: 13.3 ≤ 22.1	NR	1.05 (0.91–1.21)	
			Q3: > 22.1 ≤ 31.2	NR	0.93 (0.8–1.08)	
			Q4: > 31.2 ≤ 43.8	NR	1.05 (0.91–1.22)	
			Q5: > 43.8	NR	1.13 (0.97–1.32)	
			Trend-test p-value: 0.05			

Table 2.7.1 Cohort studies: Red meat and cancer of the lung (web-only)

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		Lung	Red meat (g/1000 kcal) Men:			Same as above
			Never smokers: 90th percentile compared to 10th percentile	137	1.19 (0.69–2.06)	
			Trend-test p-value: 0.52			
		Lung	Red meat (g/1000 kcal) Women:			Same as above
			Never smokers: 90th percentile compared to 10th percentile	166	1.21 (0.76–1.94)	
			Trend-test p-value: 0.44			
		Lung	Well/very-well done (g/1000 kcal) Men:			Same as above
			T1: ≤ 2.7	NR	1	
			T2: > 2.7 ≤ 9.7	NR	1.07 (0.96–1.19)	
			T3: > 9.7	NR	1.2 (1.07–1.35)	
			Trend-test p-value: 0.002			
		Lung	Well/very-well done (g/1000 kcal) Women:			Same as above
			T1: ≤ 2.5	NR	1	
			T2: > 2.5 ≤□9.4	NR	0.92 (0.8–1.05)	
			T3: > 9.4	NR	0.93 (0.8–1.08)	
			Trend-test p-value: 0.43			

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		Lung	MelQx (ng/1000 kcal) Men:			Same as above
			Q1: ≤ 1.7	NR	1	
			Q3: > 4.2 ≤ 8.3	NR	1.15 (1–1.32)	
			Q5: > 16.5	NR	1.2 (1.04–1.38)	
			Trend-test p-value: 0.04			
		Lung	MelQx (ng/1000 kcal) Women:			Same as above
			Q1: ≤ 1.1	NR	1	
			Q3: > 3.0 ≤ 6.2	NR	0.97 (0.81–1.15)	
			Q5: > 12.7	NR	0.95 (0.8–1.13)	
			Trend-test p-value: 0.66			
		Lung	Heme iron (µg/1000 kcal) Men:			Same as above
			Q1: ≤ 90.2	NR	1	
			Q3: > 143.8 ≤ 201.0	NR	1.22 (1.06–1.41)	
			Q5: > 285.2	NR	1.25 (1.07–1.45)	
			Trend-test p-value: 0.02			
		Lung	Heme iron (µg/1000 kcal) Women:			Same as above
			Q1: ≤ 63.2	NR	1	
			Q3: > 104.0 ≤ 149.4	NR	0.9 (0.74–1.08)	
			Q5: > 217.2	NR	1.18 (0.99–1.42)	
			Trend-test p-value: 0.002			

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Linseisen et al. (2011) Europe enrollment early 1900s	142 602 men and 335 825 women; EPIC: men and women age 25–70 in 10 European countries **Exposure assessment method:** Questionnaire; Self-administered FFQ, 300–350 items. 24-hour recalls or 7-day diaries in subcohorts	Lung: ICD-O C34	Continuous model per 50 g: red meat	NR	1.06 (0.89–1.27)	Age, sex, centre, smoking, body weight, height, energy intake, alcohol, fruits and vegetables, physical activity, education
Tasevska et al. (2011) USA enrollment 1993–2001; follow-up until 2006 (5.5 years median)	48 229 men and 51 350 women; PLCO Cancer Screening Trial – healthy volunteers aged 55–74 years **Exposure assessment method:** Questionnaire; self-administered semiquantitative food frequency questionnaire (FFQ) with 124 food items	Lung: 34.0–34.9	Red meat, g/1000 kcal Men: Q (quintiles) 2 vs Q1	NR	1.02 (0.75–1.41)	Age, detailed smoking history, race, education, total energy intake, fruits and vegetables, fats, alcohol
			Q3 vs Q1	NR	1 (0.72–1.38)	
			Q4 vs Q1	NR	1.06 (0.76–1.47)	
			Q5 vs Q1	NR	1.11 (0.79–1.56)	
			Women: Q2 vs Q1	NR	1.33 (0.91–1.94)	
			Q3 vs Q1	NR	1.6 (1.1–2.33)	
			Q4 vs Q1	NR	1.24 (0.84–1.85)	
			Q5 vs Q1	NR	1.3 (0.87–1.95)	

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Butler et al. (2013) Singapore Enrollment 1993–98	27 293 men and 34 028 women; Singapore Chinese Health Study; men & women aged 45–74 **Exposure assessment method:** Questionnaire; 165-item quantitative food frequency questionnaire	Lung: all cancers	Total fried meat (times/year)			Age, ethnicity, sex, education, BMI, energy intake, smoking, cryptoxanthin, interview year
			T1, < 115	357	1	
			T2, 115–189	399	1.13 (0.98–1.31)	
			T3, ≥ 190	374	1.09 (0.94–1.27)	
			Trend-test p-value: 0.2			
		Lung: adenocarcinomas	Total fried meat (times/year)			Same as above
			T1, < 115	115	1	
			T2, 115–189	150	1.31 (1.03–1.68)	
			T3, ≥ 190	154	1.36 (1.06–1.74)	
			Trend-test p-value: 0.02			
Gnagnarella et al. (2013) Italy Enrollment 2004–2005	5203; Volunteer smokers or quit smoking for < 10 years and had smoked at least 20 pack-years **Exposure assessment method:** Questionnaire; FFQ from Italian component of EPIC	Lung	All red meats. tertile of average monthly intake			Baseline risk probability, total energy (using the nutrient-density method), fruits and vegetables, fish, red meat, olive oil, tea and wine intake
			Q1	35	1	
			Q2	39	0.95 (0.6–1.5)	
			Q3	49	0.91 (0.57–1.44)	
			Q4	55	1.73 (1.15–2.61)	
			Trend-test p-value: 0.003			

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