

Lung cancer among coal miners, ore miners and quarrymen: smoking-adjusted risk estimates from the synergy pooled analysis of case–control studies

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Table S1. Characteristics of the studies included in the pooled analysis of lung cancer risk among miners and quarrymen, SYNERGY, 1985-2010

Study	Country	Recruitment periods	Job periods	Never worked as miner and quarryman		Ever worked as miners and quarryman		Coal miners		Ore miners		Quarrymen	
				Cases	Controls	Cases	Controls	Cases	Controls	Cases	Controls	Cases	Controls
AUT	Germany	1990–1995	1931–1995	2,372	2,564	287	138	199	111	10	3	28	6
HdA	Germany	1988–1993	1926–1993	798	804	41	34	18	15	5	0	5	7
EAGLE	Italy	2002–2005	1931–2005	1,520	1,609	16	8	5	1	2	3	5	2
TURIN-VENETO	Italy	1990–1994	1922–1994	940	1,233	15	16	6	6	0	0	2	5
ROME	Italy	1993–1996	1926–1996	289	260	5	5	0	1	2	0	2	3
LUCA	France	1989–1992	1926–1992	299	295	5	4	2	1	0	0	1	2
PARIS	France	1988–1992	1923–1992	157	212	4	4	3	0	0	0	0	1
ICARE	France	2001–2007	1937–2007	2,222	2,736	21	13	12	5	3	5	0	0
CAPUA	Spain	2000–2010	1926–2010	628	590	146	122	114	109	9	3	13	3
MORGEN	NL	1993–1997	1945–1997	23	57	1	0	1	0	0	0	0	0
INCO	CZ	1999–2002	1935–2002	203	272	32	21	23	13	3	3	2	5
INCO	Hungary	1998–2001	1931–2001	292	238	19	8	17	8	1	0	1	0
INCO	Poland	1998–2002	1936–2002	542	566	8	7	6	6	0	0	0	0
INCO	Slovakia	1998–2002	1935–2002	256	228	31	8	17	5	6	3	2	0
INCO	Romania	1998–2002	1936–2002	138	151	3	1	0	1	1	0	0	0
INCO	Russia	1998–2001	1931–2001	514	502	6	1	4	1	0	0	0	0

INCO (LLP)	UK	1998–2005	1932–2005	274	562	7	10	7	10	0	0	0	0
LUCAS	Sweden	1985–1990	1923–1990	1,002	2,291	12	16	0	0	1	0	2	0
OCANZ	NZ	2003–2009	1941–2009	206	410	5	7	0	1	0	0	2	4
MONTREAL	Canada	1996–2002	1933–2002	692	883	22	11	8	3	8	3	1	1
TORONTO	Canada	1997–2002	1929–2002	194	368	4	2	0	0	2	1	1	0
Overall		1985–2010	1922–2010	13,561	16,831	690	436	442	297	53	24	67	39

Abbreviations: AUT, Arbeit und Technik; CAPUA, Cancer de Pulmon en Asturias; CZ, Czech Republic; EAGLE, Environment and Genetics in Lung cancer Etiology; HdA, Humanisierung des Arbeitsleben; HONG KONG, Male lung cancer, occupational exposures and smoking – A case-control study in Hong Kong; ICARE, Investigations Cancers Respiratoires et Environnement; INCO, INCO Copernicus; LLP, Liverpool Lung Project; LUCA, Lung cancer in France; LUCAS, Lung cancer in Stockholm; MONTREAL, Montreal case-control study of environmental causes of lung cancer; MORGEN, Monitoring van Risicofactoren en Gezondheid in Nederland; NL, Netherlands; NZ, New Zealand; OCANZ, Occupational Cancer in New Zealand; PARIS, Lung cancer study in Paris; ROME, Rome lung cancer case-control study; TORONTO, Toronto lung cancer (case-control) study; TURIN-VENETO, Population based case-control study of lung cancer in the the city of Turin and in the Eastern part of Veneto Region.

Table S2. Job periods related to mining or quarrying according to the International Standard Classification of Occupations (ISCO) 1968 and the International Standard Industrial Classification (ISIC) Rev. 2 (1968)

Code	Description	N	%
ISCO			
7-1	Miners, quarrymen, well drillers and related workers	1,400	100
7-11.00	Miners and quarrymen	1	0.07
7-11.05	Miners (general)	1,018	72.71
7-11.10	Quarrymen (general)	129	9.21
7-11.20	Cutting-machine operators (mine)	8	0.57
7-11.30	Drilling-machine operators (mine and quarry)	60	4.29
7-11.40	Continuous-machine operators	28	2.00
7-11.50	Shot-firers (mine and quarry)	72	5.14
7-11.60	Underground timbermen	40	2.86
7-11.70	Sampler (mine)	2	0.14
7-11.90	Other miners and quarrymen	42	3.00
ISIC			
2100	Coal mining	960	68.67
2901	Stone quarrying, clay and sand pits	94	6.72
2302	Non-ferrous ore mining	71	5.08
2902	Chemical and fertilizer mineral mining	32	2.29
2301	Iron ore mining	38	2.72
2909	Mining and quarrying not elsewhere classified	13	0.93
...	Others ^a	192	13.71

^a e.g. military services (ISIC A001), construction (ISIC 5000), public administration and defence (ISIC 9100), educational services (ISIC 9310), manufacture of structural clay products (ISIC 3691)

Table S3. Lung cancer risk among miners and quarrymen (as in Table 2 but with all odds ratio of the covariables listed)

	Miners and quarrymen			Coal miners			Ore miners			Quarrymen		
	Control	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)	Controls	Case	OR (95%CI)
Never worked as	16,831	13,561	1.00	16,831	13,561	1.00	16,831	13,561	1.00	16,831	13,561	1.00
Ever worked as	436	690	1.55 (1.34-1.79)	297	442	1.40 (1.18-1.67)	24	53	2.34 (1.36-4.03)	39	67	1.92 (1.21-3.05)
Ln[age]	17,267	14,251	2.53 (2.10-3.04)	17,128	14,003	2.49 (2.07-2.99)	16,855	13,614	2.45 (2.04-2.95)	16,870	13,628	2.49 (2.07-3.05)
Smoking status												
Never	4,735	518	1.00	4,704	508	1.00	4,645	503	1.0	4,652	505	1.00
Current smokers of cigarettes	4,821	8,679	1.32 (1.10-1.59)	4,788	8,529	1.30 (1.08-1.57)	4,709	8,309	1.31 (1.08-1.58)	4,713	8,315	1.31 (1.08-1.58)
Former smokers (years since quitting)												
2-7	1,267	1,831	1.01 (0.83-1.22)	1,255	1,803	1.00 (0.82-1.21)	1,227	1,736	1.00 (0.82-1.22)	1,231	1,739	1.00 (0.82-1.21)
8-15	1,762	1,434	0.63 (0.52-0.76)	1,743	1,406	0.62 (0.52-0.75)	1,716	1,357	0.62 (0.51-0.75)	1,718	1,361	0.62 (0.51-0.75)
16-25	2,208	1,110	0.47 (0.39-0.56)	2,186	1,086	0.47 (0.39-0.56)	2,147	1,060	0.47 (0.39-0.56)	2,146	1,058	0.47 (0.39-0.56)
≥26	2,455	676	0.45 (0.38-0.53)	2,433	668	0.45 (0.38-0.53)	2,393	647	0.44 (0.38-0.52)	2,392	648	0.44 (0.38-0.52)
Other types of tobacco only	19	3	1.17 (0.34-4.00)	19	3	1.18 (0.35-4.04)	18	2	0.83 (0.19-3.60)	18	2	0.82 (0.19-3.59)
Ln[pack-years+1]	17,267	14,251	2.04 (1.96-2.13)	17,128	14,003	2.06 (1.97-2.15)	16,855	13,614	2.05 (1.96-2.14)	16,870	13,628	2.05 (1.96-2.14)
Working in 'List A' occupations except mining and quarrying tasks												
Never	15,679	12,260	1.00	15,568	12,064	1.00	15,328	11,720	1.00	15,340	11,732	1.00
Ever	1,588	1,991	1.39 (1.28-1.51)	1,560	1,939	1.39 (1.28-1.51)	1,527	1,894	1.40 (1.29-1.52)	1,530	1,896	1.40 (1.29-1.52)

OR adjusted for ln(age), study center, ln(packyears+1), time-since-quitting smoking cigarettes (current smokers, other types of tobacco only, stopped smoking 2-7, 8-15, 15-26, 26 + years before interview/diagnosis, never smokers), and ever working in a 'List A' job except mining and quarrying.

Table S4. Lung cancer risk among miners and quarrymen with stepwise exclusion of studies

	Miners and quarrymen			Coal miners			Ore miners			Quarrymen		
	Controls	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)
ALL												
Never worked as	16,831	13,561	1.00	16,831	13,561	1.00	16,831	13,561	1.00	16,831	13,561	1.00
Ever worked as	436	690	1.55 (1.34-1.81)	297	442	1.40 (1.18-1.67)	24	53	2.34 (1.36-4.04)	39	67	1.92 (1.21-3.03)
Without CAPUA												
Never worked as	16,241	12,933	1.00	16,241	12,933	1.00	16,241	12,933	1.00	16,241	12,933	1.00
Ever worked as	314	544	1.65 (1.40-1.95)	188	328	1.51 (1.23-1.86)	21	44	2.34 (1.31-4.16)	36	54	1.84 (1.12-3.03)
Without AUT												
Never worked as	14,267	11,189	1.00	14,267	11,189	1.00	14,267	11,189	1.00	14,267	11,189	1.00
Ever worked as	298	403	1.41 (1.18-1.68)	186	243	1.34 (1.07-1.69)	21	43	1.94 (1.08-3.47)	33	39	1.25 (0.73-2.14)
Without HdA												
Never worked as	16,027	12,763	1.00	16,027	12,763	1.00	16,027	12,763	1.00	16,027	12,763	1.00
Ever worked as	402	649	1.58 (1.36-1.84)	282	424	1.43 (1.19-1.71)	24	48	2.06 (1.18-3.64)	32	62	2.28 (1.38-3.77)
Without LUCAS												
Never worked as	14,540	12,559	1.00	14,540	12,559	1.00	14,540	12,559	1.00	14,540	12,559	1.00
Ever worked as	420	678	1.55 (1.33-1.81)	297	442	1.40 (1.17-1.67)	24	52	2.31 (1.33-4.03)	39	65	1.79 (1.12-2.86)
Without INCO-Czech Republic												
Never worked as	16,559	13,358	1.00	16,559	13,358	1.00	16,559	13,358	1.00	16,559	13,358	1.00
Ever worked as	415	658	1.55 (1.34-1.81)	284	419	1.39 (1.16-1.66)	21	50	2.50 (1.42-4.43)	34	65	2.06 (1.28-3.33)
Without INCO-Hungary												
Never worked as	16,593	13,269	1.00	16,593	13,269	1.00	16,593	13,269	1.00	16,593	13,269	1.00
Ever worked as	428	671	1.52 (1.32-1.76)	289	425	1.37 (1.15-1.64)	24	52	2.32 (1.35-4.01)	39	66	1.84 (1.16-2.94)
Without INCO-Poland												
Never worked as	16,265	13,019	1.00	16,265	13,019	1.00	16,265	13,019	1.00	16,265	13,019	1.00
Ever worked as	429	682	1.56 (1.35-1.81)	291	436	1.41 (1.19-1.69)	24	53	2.34 (1.36-4.04)	39	67	1.92 (1.21-3.03)
Without INCO-Romania												
Never worked as	16,680	13,423	1.00	16,680	13,423	1.00	16,680	13,423	1.00	16,680	13,423	1.00
Ever worked as	435	687	1.54 (1.33-1.80)	296	442	1.41 (1.18-1.67)	24	52	2.31 (1.34-4.03)	39	67	1.92 (1.21-3.03)

Without INCO-Russia

Never worked as	16,329	13,047	1.00	16,329	13,047	1.00	16,329	13,047	1.00	16,329	13,047	1.00
Ever worked as	435	684	1.54 (1.33-	296	438	1.39 (1.16-1.65)	24	53	2.34 (1.36-	39	67	1.92 (1.21-

Without INCO-Slovakia

Never worked as	16,603	13,305	1.00	16,603	13,305	1.00	16,603	13,305	1.00	16,603	13,305	1.00
Ever worked as	428	659	1.53 (1.32-	292	425	1.39 (1.16-1.66)	21	47	2.48 (1.39-	39	65	1.88 (1.18-

Without INCO-UK

Never worked as	16,269	13,287	1.00	16,269	13,287	1.00	16,269	13,287	1.00	16,269	13,287	1.00
Ever worked as	426	683	1.58 (1.37-	287	435	1.44 (1.20-1.71)	24	53	2.34 (1.36-	39	67	1.92 (1.21-

Without LUCA

Never worked as	16,536	13,262	1.00	16,536	13,262	1.00	16,536	13,262	1.00	16,536	13,262	1.00
Ever worked as	432	685	1.56 (1.34-	296	440	1.40 (1.18-1.67)	24	53	2.34 (1.36-	37	66	2.08 (1.30-

Without TURIN-VENETO

Never worked as	15,598	12,621	1.00	15,598	12,621	1.00	15,598	12,621	1.00	15,598	12,621	1.00
Ever worked as	420	675	1.57 (1.36-	291	436	1.40 (1.17-1.67)	24	53	2.34 (1.36-	34	65	2.21 (1.36-

Without ROME

Never worked as	16,571	13,272	1.00	16,571	13,272	1.00	16,571	13,272	1.00	16,571	13,272	1.00
Ever worked as	431	685	1.56 (1.35-	296	442	1.41 (1.18-1.68)	24	51	2.21 (1.28-	36	65	2.03 (1.26-

Without MONTREAL

Never worked as	15,948	12,869	1.00	15,948	12,869	1.00	15,948	12,869	1.00	15,948	12,869	1.00
Ever worked as	425	668	1.53 (1.32-	294	434	1.38 (1.16-1.64)	21	45	2.17 (1.20-	38	66	1.94 (1.22-

Without EAGLE

Never worked as	15,222	12,041	1.00	15,222	12,041	1.00	15,222	12,041	1.00	15,222	12,041	1.00
Ever worked as	428	674	1.55 (1.34-	296	437	1.39 (1.17-1.65)	21	51	2.75 (1.55-	37	62	1.86 (1.16-

Without PARIS

Never worked as	16,619	13,404	1.00	16,619	13,404	1.00	16,619	13,404	1.00	16,619	13,404	1.00
Ever worked as	432	686	1.55 (1.34-	297	439	1.39 (1.17-1.65)	24	53	2.34 (1.36-	38	67	1.96 (1.23-

Without MORGEN

Never worked as	16,774	13,538	1.00	16,774	13,538	1.00	16,774	13,538	1.00	16,774	13,538	1.00
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Ever worked as	436	689	1.54 (1.34-	297	441	1.39 (1.17-1.66)	24	53	2.34 (1.36-	39	67	1.92 (1.21-
Without ICARE												
Never worked as	14,095	11,339	1.00	16,774	13,538	1.00	16,774	13,538	1.00	16,774	13,538	1.00
Ever worked as	423	669	1.55 (1.34-	292	430	1.39 (1.17-1.65)	19	50	2.76 (1.53-	39	67	1.92 (1.22-
Without TORONTO												
Never worked as	16,421	13,355	1.00	16,463	13,367	1.00	16,463	13,367	1.00	16,463	13,367	1.00
Ever worked as	429	685	1.55 (1.34-	296	442	1.40 (1.18-1.67)	24	53	2.33 (1.36-	35	65	1.99 (1.24-

Abbreviations: AUT, Arbeit und Technik; CAPUA, Cancer de Pulmon en Asturias; CZ, Czech Republic; EAGLE, Environment and Genetics in Lung cancer Etiology; HdA, Humanisierung des Arbeitsleben; ICARE, Investigations Cancers Respiratoires et Environnement; INCO, INCO Copernicus; LLP, Liverpool Lung Project; LUCA, Lung cancer in France; LUCAS, Lung cancer in Stockholm; MONTREAL, Montreal case-control study of environmental causes of lung cancer; MORGEN, Monitoring van Risicofactoren en Gezondheid in Nederland; NL, Netherlands; NZ, New Zealand; OCANZ, Occupational Cancer in New Zealand; PARIS, Lung cancer study in Paris; ROME, Rome lung cancer case-control study; TORONTO, Toronto lung cancer (case-control) study; TURIN-VENETO, Population based case-control study of lung cancer in the city of Turin and in the Eastern part of Veneto Region.

Figure S1. Study-specific and meta-analysis odds ratios (ORs) with 95% confidence intervals (CIs) for miners and quarrymen. OR is adjusted for ln(age), study center, ln(packyears+1), smoking status (current smokers, other types of tobacco only, stopped smoking 2-7, 8-15, 16-25, 26+ years before interview/diagnosis, never smokers), and ever working in a 'List A' job except mining and quarrying

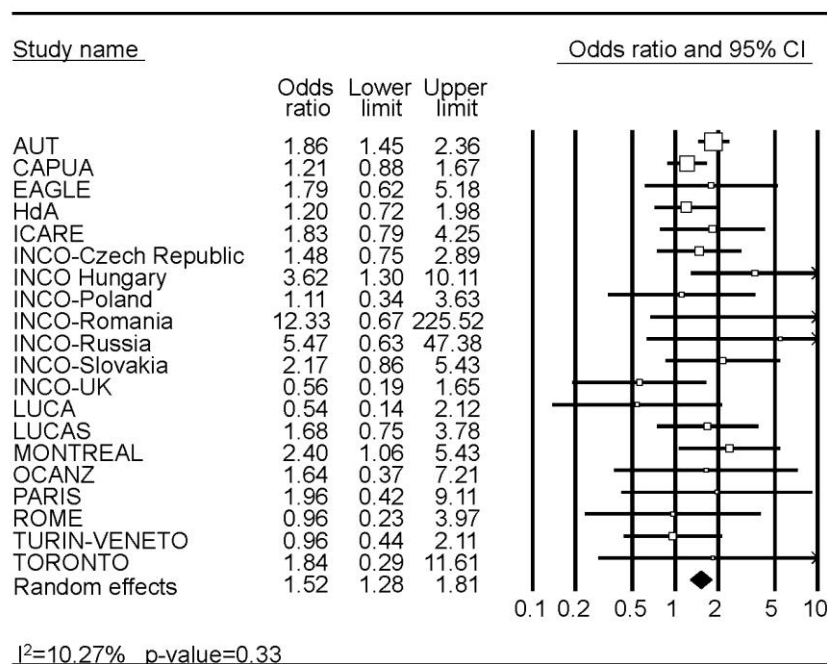


Figure S2. Study-specific and meta-analysis odds ratios (ORs) with 95% confidence intervals (CIs) for coal miners. OR is adjusted for ln(age), study center, ln(packyears+1), smoking status (current smokers, ever other types of tobacco only, stopped smoking 2-7, 8-15, 16-25, 26 + years before interview/diagnosis, never smokers), and ever working in a 'List A' job except mining and quarrying

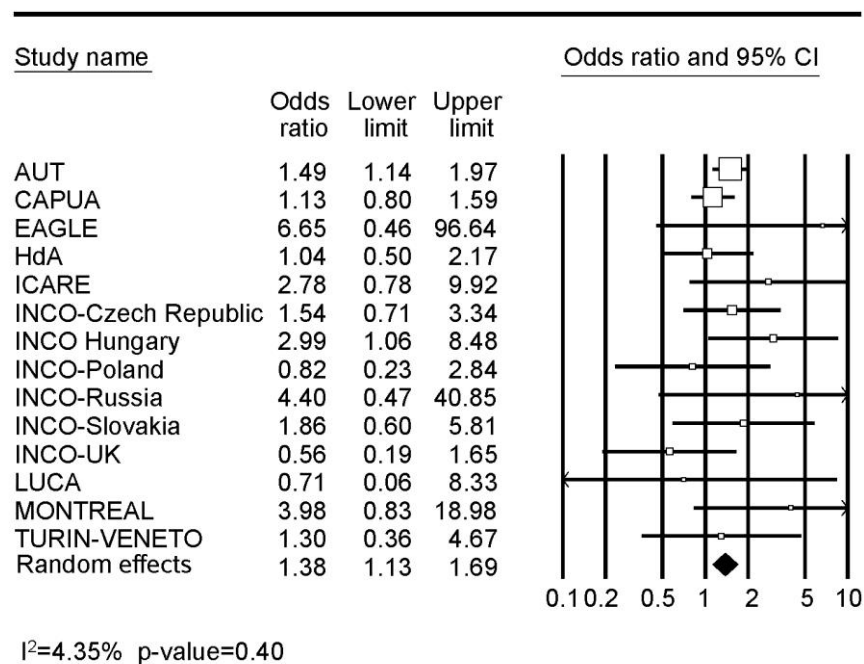


Figure S3. Study-specific and meta-analysis odds ratios (ORs) with 95% confidence intervals (CIs) for ore miners. OR is adjusted for ln(age), study center, ln(packyears+1), smoking status (current smokers, ever other types of tobacco only, stopped smoking 2-7, 8-15, 16-25, 26 + years before interview/diagnosis, never smokers), and ever working in a 'List A' job except mining and quarrying

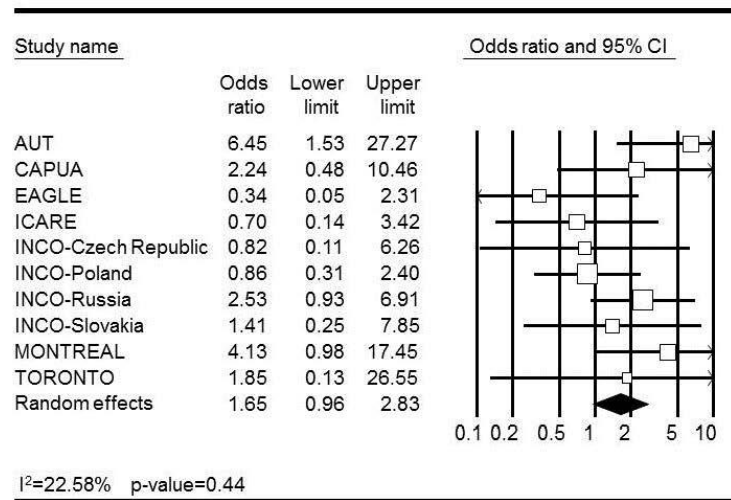


Figure S4. Study-specific and meta-analysis odds ratios (ORs) with 95% confidence intervals (CIs) for quarrymen. OR is adjusted for ln(age), study center, ln(packyears+1), smoking status (current smokers, ever other types of tobacco only, stopped smoking 2-7, 8-15, 16-25, 26+ years before interview/diagnosis, never smokers), and for ever working in a 'List A' job except mining and quarrying

