International Agency for Research on Cancer
Centre International de Recherche sur le Cancer

Pooled Analyses on Diesel Motor Exhaust and Lung Cancer in Europe and Canada

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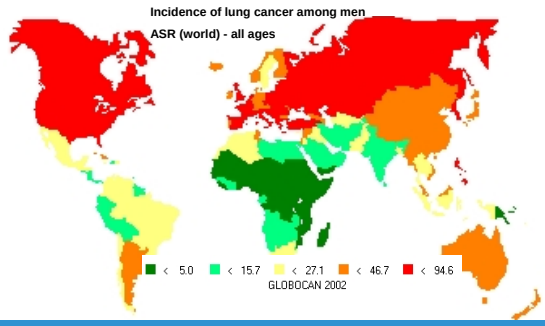
BACKGROUND

Lung cancer is the most common cancer in the world and one of the most fatal cancer types. The areas with the highest incidence and mortality rates are Europe (especially Eastern Europe) and North America [1].

Diesel motor exhaust (DME) is a mixture of substances in either gas or particle form, and was classified as probably carcinogenic to humans (group 2A) by the International Agency for Research on Cancer (IARC) in 1989 [2].

Our objective is to investigate the risk of lung cancer following occupational exposure to DME, while controlling for smoking and other occupational exposures.



METHODS

The results are based on data from the **SYNERGY project** – ***Pooled Analyses of Case-control Studies on the Joint Effects of Occupational Carcinogens in the Development of Lung Cancer*** – which started in 2007.

The SYNERGY project currently holds pooled data from 10 population or hospital based case-control studies conducted between 1985 – 2005 in eleven European countries and Canada. All original studies carry lifetime occupational- and detailed smoking history.

The Institute for Risk Assessment Sciences at Utrecht University developed a job exposure matrix based on ISCO codes to determine level of exposure to occupational DME. Out of 1840 ISCO codes, 202 were assigned low level of DME (=1) e.g. drivers, and 27 codes were assigned high levels of DME exposure (=2) e.g. miners.

Odds ratios for lung cancer and 95% confidence intervals (CI) were estimated by unconditional logistic regression, adjusted for age, sex, geographical area, smoking status, and ever employment in a "Group A job"[3]. Cumulative exposure was defined as: Σ(level² * duration).

References:

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RESULTS

STUDIES INCLUDED IN THE SYNERGY PROJECT IN JANUARY 2009

STUDY	COUNTRY	CASES	CONTROLS	TOTAL
AUT	Germany	3180	3249	6429
HdA	Germany	1004	1004	2008
EAGLE	Italy	1946	2116	4062
TURIN	Italy	1132	1553	2685
ROME	Italy	347	365	712
LUCAS	Sweden	1042	2364	3406
PARIS	France	173	234	407
LUCA	France	310	302	612
INCO	Central & Eastern Europe, UK	3075	3620	6695
MONTREAL	Canada	1203	1513	2716
Total		**13412 (45.1%)**	**16320 (54.9%)**	**29732 (100%)**

LUNG CANCER RISK FOLLOWING OCCUPATIONAL EXPOSURE TO DIESEL MOTOR EXHAUST

	ALL			MEN			WOMEN	
	OR	95% CI	cases / controls	OR	95% CI	cases / controls	OR	95% CI
Level of DME exposure								
Never	1	Ref.	5536 / 7458	1	Ref.	2115 / 2704	1	Ref.
Low	1.09	1.02 – 1.15	3992 / 4466	1.08	0.98 – 1.12	306 / 411	0.93	0.77 – 1.12
High	1.36	1.24 – 1.49	1323 / 1095	1.33	1.21 – 1.46	41 / 29	2.00	1.16 – 3.43
Test for trend		*<.0001*			*<.0001*			*0.46*
Duration								
< 10 years	1.06	0.98 – 1.14	1844 / 2041	1.06	0.98 – 1.15	204 / 262	0.85	0.68 – 1.06
10.5 - 20 years	1.11	1.01 – 1.23	1007 / 1101	1.07	0.97 – 1.19	79 / 82	1.44	1.01 – 2.06
20.5 - 30 years	1.14	1.02 – 1.26	836 / 852	1.12	1.01 – 1.26	30 / 44	0.86	0.51 – 1.44
30.5 - 40 years	1.23	1.11 – 1.27	943 / 914	1.22	1.10 – 1.36	18 / 30	1.16	0.61 – 2.22
> 40 years	1.32	1.17 – 1.50	679 / 645	1.31	1.16 – 1.49	16 / 21	1.73	0.86 – 3.49
Test for trend		*<.0001*			*<.0001*			*0.28*
Index of cumulative DME exposure								
< 6	0.99	0.91 – 1.09	1128 / 1323	1.01	0.92 – 1.11	145 / 197	0.74	0.58 – 0.96
6 - 17.3	1.09	1.00 – 1.19	1215 / 1382	1.05	0.96 – 1.15	116 / 127	1.27	0.95 – 1.70
17.3 - 34.5	1.13	1.03 – 1.23	1394 / 1439	1.11	1.02 – 1.21	51 / 70	0.99	0.66 – 1.49
> 34.5	1.35	1.24 – 1.47	1572 / 1409	1.33	1.22 – 1.46	35 / 45	1.71	1.05 – 2.79
Test for trend		*<.0001*			*<.0001*			*0.15*

CONCLUSION

Our preliminary results show an association between lung cancer risk and occupational DME exposure; for low exposure to DME, OR=1.09 (95% CI 1.02-1.15); and for ever high exposure to DME, OR=1.36 (95% CI 1.24-1.49). The effect is similar in men and women. Analysis by increased duration and by increased cumulative exposure revealed significant trends (p-value <.0001).

Further analyses are planned. Within the scope of the SYNERGY project the interaction with other occupational carcinogens will be explored in more detail.

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