Estimation of Annual Incidence of Lung Cancer Associated with Work Place Exposure to Passive Smoking in France

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Abstract: Estimation of Annual Incidence of Lung Cancer Associated with Work Place Exposure to Passive Smoking in France: Shahryar ALIPOUR, et al. Department of Occupational Health, Faculté de Médecine, France—This study attempted to estimate the number of annual new cases of lung cancer from workplace exposure to Environmental Tobacco Smoke (ETS) in France. The number of new lung cancer cases attributable to workplace ETS exposure in France was estimated with regard to the following factors: excess risk of lung cancer from workplace ETS exposure, incidence of lung cancer in non-exposed non-smokers, and number of French workers exposed to passive smoking. The excess risk of lung cancer from workplace ETS exposure was estimated as from 0.12 to 0.39 by different references. The French workforce, regularly exposed to ETS in their workplace is about 3.2 millions. The incidence of lung cancer in non-smokers without exposure to ETS is between 3.7 to 10 per hundred thousand. If these three factors are combined, it is estimated that exposure to workplace passive smoking causes around 14 to 125 new cases of lung cancer each year in France. New lung cancer cases from workplace exposure to ETS represent a few percent of all occupational lung cancers, and a minuscule number in regards to the whole lung cancer annual incidence (14 to 125 for 23,000 lung cancers in France=0.06% to 0.54%)

Key words: Lung cancer, Environmental Tobacco Smoke, Incidence

Methods

The number of new lung cancer cases from workplace ETS exposure in France was estimated considering three factors.

Excess risk

All studies concerning excess risk of lung cancer from ETS exposure were identified through online literature searches (e.g. Medline and Toxline). We searched meta-analysis and review articles which were published between January 1995 and March 2004. Six meta-analyse and one review article were accepted for our study with regard to international publications11–17. Furthermore, published reports of authoritative organizations, such as the International Agency for Research on Cancer (IARC)18, the Environmental Protection Agency (EPA)19 and the Scientific Committee on Tobacco and Health (SCOTH)20 were also collected.

Lung cancer incidence

Lung cancer incidence in non-smokers who were not exposed to ETS was determined by Medline search and data collection from other studies (e.g. SCOTH report). We have accepted the incidence rate applied by SCOTH20 for the high hypothesis, and the one declared by Boffetta et al.20 for the low hypothesis of our study.

Exposed population

We defined the exposed population, as only non-smoking workers regularly exposed to inhalation of ETS at their workplace (all commercial or industrial branches were concerned). Low frequencies of ETS exposure, for example, two or three times a year were neglected. The information about the active French population exposed to ETS in their workplace was estimated from the latest French publications21, 22.
Methodology calculation

Annual incidence of lung cancer from workplace ETS exposure was estimated with this equation: (Excess risk of lung cancer from ETS exposure in the workplace) × (Risk of lung cancer in non-exposed non-smokers) × (French active population exposed to workplace passive smoking).

Results and Discussion

ETS exposure and lung cancer

A statistically significant increased risk of lung cancer of 12% to 39% in non-smokers exposed to second hand tobacco smoke at the workplace was found\(^2\text{3, 24}\).

Risk of lung cancer in non-exposed non-smokers

This incidence was estimated as being from about 3.7/100,000 to 10/100,000 by other studies\(^9, 20\). The incidence of lung cancer in non-smokers without exposure to ETS is 10 per 100,000. An increased risk of lung cancer from 12 to 39% in exposed non-smokers would give a lung cancer incidence of 11.2 to 13.9 cases per 100,000 per year. In other words we could expect an additional 1.2 to 3.9 lung cancer cases each year per 100,000 non-smokers regularly exposed to ETS in their workplace.

Exposed French population

The number of French persons, regularly exposed to occupational ETS, has not been calculated precisely. Kauppinen \textit{et al.}\(^2\text{5}\) declare that ETS is the most common occupational respiratory carcinogen in European Union countries such as France, in which about 1.2 million of workers are exposed to ETS. The authors of the above-mentioned investigation only considered workers who were exposed to ETS for more than 75% of their working time. This is why the real number of French workers who are exposed to ETS in their workplace must be more than 1,200,000.

For our estimation (data obtained, as occupational practitioner, from a sample of 2,000 workers) we have assumed that about 20% of French non-smoker workers are regularly exposed to occupational ETS. The French non-smoker active population is about 16 millions\(^2\text{6, 27}\) (total French working population is 25 millions). Therefore we estimated that about 3,200,000 of French workers are regularly exposed to occupationally passive smoking.

Lung cancer incidence attributable to workplace ETS exposure

As mentioned previously, according to different investigations, excess risk of lung cancer from ETS exposure in the workplace has been estimated as being between 12% and 39%, and the incidence of lung cancer in non-exposed non-smokers has been determined as being between 3.5/100,000 and 10/10,000, yearly. Considering 3,200,000 French non-smoker workers who are regularly exposed to ETS in their workplace, we estimated that:

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3,200,000 \times (3.5/100,000–10/100,000) \times (12\%–39\%) = 14–125 \text{ new cases of lung cancer are found yearly for the reason of workplace ETS exposure in France (Table 1).}
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It is estimated that approximately 50% of the daily ETS exposure is attributed to workplace exposure\(^2\text{8}\).

The principal limitation of our study is the number of French workers who are exposed to workplace passive smoking. As mentioned above, there is no precise figure for this number. We determined this number using existing data.

The total number of lung cancers due to occupational exposures among men in France is estimated to be about 2,713–6,051 new cases, yearly\(^2\text{9}\). In other words, the estimated number of lung cancer for occupational ETS exposure in France is only a few percent of the total number of occupational lung cancers (0.2% to 4%).

With regard to the fact that ETS is the most common occupational exposure to group 1 respiratory carcinogens in European Union countries (e.g. France), the necessity of approving a more effective and appropriate law seems obvious.

References

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