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## Original Research

# Design and validation of a self-administered questionnaire as an aid to detection of occupational exposure to lung carcinogens



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## ABSTRACT

**Objective:** Ten to thirty percent of lung cancer is thought to be of occupational origin. Lung cancer is under-declared as an occupational disease in Europe, and most declarations of occupational disease concern asbestos. The purpose of this study was to design and validate a short, sensitive self-administered questionnaire, as an aid for physicians in detecting occupational exposure to asbestos and other lung carcinogens in order to remedy occupational lung cancer under-declaration.

**Study design:** Cross-sectional study.

**Methods:** A short (30-question) self-administered questionnaire was drawn up by oncologist-pneumologists and occupational physicians, covering situations of exposure to proven and probable lung carcinogens. Understanding and acceptability were assessed on 15 lung cancer patients. Validity and reliability were assessed on 70 lung cancer patients by comparison against a semi-directive questionnaire considered as gold standard. Sensitivity and specificity were assessed by comparing responses to items on the two questionnaires. Reliability was assessed by analysing the kappa concordance coefficient for items on the two questionnaires.

**Results:** Sensitivity was 0.85 and specificity 0.875. Concordance between responses on the two questionnaires was 85.7%, with a kappa coefficient of 0.695 [0.52–0.87]. Mean self-administration time was 3.1 min (versus 8.12 min to administer the gold-standard questionnaire). In 16 patients, the self-administered questionnaire detected lung carcinogen exposure meeting the criteria for occupational disease.

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*Conclusion:* The present short, easy-to-use self-administered questionnaire should facilitate detection of occupational exposure to lung carcinogens. It could be used in occupational lung cancer screening and increase the presently low rate of application for recognition of lung cancer as an occupational disease.

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## Introduction

Lung cancer is the leading cause of death by cancer in the world.<sup>1</sup> In 2012, 1.8 million new cases were diagnosed, amounting to 13% of all cancer diagnoses, with 1.6 million deaths from lung cancer.<sup>2</sup> North America and Europe are strongly affected. In 2012, there were 239,781 new cases and 187,712 deaths of lung cancer in Northern America and there were 448,618 new cases and 388,203 deaths of lung cancer in Europe.<sup>3,4</sup> In 2015, there were 221,200 new cases in the USA, and 158,040 deaths. Five-year survival is lower for small-cell (6%) than non-small-cell lung cancer (21%).<sup>5</sup> The greatest risk factor for lung cancer is smoking. However, in 2000, it was estimated that 10% of lung cancer deaths in males (88,000 deaths) and 5% in females (14,300 deaths) worldwide could be attributable to exposure to occupational lung carcinogens as identified the IARC (International Agency for Research on Cancer): asbestos, arsenic, beryllium, cadmium, chromium, nickel and silica.<sup>6,7</sup> Imbernon reported that in 1999, 13–20% of lung cancers (between 2,433 and 5,427 cases) in males in France were due to occupational exposure.<sup>8</sup>

Occupational lung cancer is under-declared in France as in other European countries, notably due to the difficulty of detecting occupational aetiology, and physicians' lack of awareness of occupational respiratory carcinogens, and of the importance of occupational disease (OD) status for patients and their beneficiaries in terms of national health insurance cover.<sup>9–11</sup> Compensation for ODs in France is based on an insurance system: the employer who created the risk bears the financial burden of compensation and must reimburse the national health insurance funds for the costs.<sup>12–14</sup> Failure to screen for exposure to lung carcinogens represents a loss of opportunity for the patients, who will not have the coverage to which occupational diseases should give title.

In France, classification as OD is based on occupational disease tables specifying carcinogen exposure. The principle of presumption of origin means that the OD tables do not take account of exposure to individual risk factors, such as smoking, if all of the conditions for occupational exposure specified in the table (type of disease, exposure characteristics, task-list) are met. The application is made by the patient or his/her beneficiaries, whom the physician provides with an initial medical certificate for occupational disease after assessment of potential exposure to a lung carcinogen featuring in the occupational disease table. Recognition as occupational disease follows an administrative investigation to check occupational exposure criteria (time-limit for compensation claims and exposure duration) and the type of work done by the patient.

In France in 2011, more than half of cancers recognized as ODs were asbestos-related lung cancers, and 95% of the 1058 lung cancers recognized as ODs were asbestos related.<sup>9</sup> There are, however, 11 lung carcinogens listed in the French OD tables.<sup>11</sup>

In this context, the main objective of the present study was to design and validate a short, easy-to-use and sensitive self-administered questionnaire to facilitate identification of occupational exposure to asbestos and other lung carcinogens. The secondary objective was to facilitate applications for recognition of OD status in lung cancer so as to reduce under-declaration.

## Methods

*Study design:* This is a cross-sectional study.

### Population

The target population comprised lung cancer patients treated in two French health-care centres: the Saint-Etienne University Hospital Center and the Lucien Neuwirth Cancer Institute.

A sample of 85 volunteer patients was taken from the target population.

#### *Inclusion criteria comprised patients:*

- with primary lung cancer;
- with insurance cover by the general and/or agricultural French national health insurance schemes;
- able to understand French.

#### *Exclusion criteria comprised patients*

- with lung cancer already recognized as occupational;
- receiving invalidity benefit for lung cancer under the French national health insurance scheme;
- without insurance cover by the general and/or agricultural French national health insurance schemes.

Eligible patients were provided with clearly understandable information on the study procedure and objectives. Written informed consent was obtained before inclusion.

The number of refusals to participate was noted and reasons collected.

Socio-occupational and medical data were collected from eligible patients: marital status, educational level, last occupation and disease stage.

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