

# Asbestosis, lung adenocarcinoma with lymphocytic infiltration, and non-Hodgkin lymphoma

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**Summary.** Right lower lobectomy was performed in a 63-year-old man with previous occupational asbestos exposure. Histological examination showed a lung adenocarcinoma with massive stromal lymphocytic infiltration. Thirteen years after lobectomy, non-Hodgkin lymphoma was diagnosed on a liver biopsy. Involvement of lymph nodes and various organs was observed. The patient died two years after diagnosis of the lymphoma. Relevant necropsy findings included lymphoma, renal adenocarcinoma, lung asbestosis. This case suggests a possible relationship between lymphocytic infiltration of the lung tumor and subsequent development of the lymphoma.

**Key words:** lung carcinoma, lymphoma non-Hodgkin, etiology, neoplasms multiple, asbestos

«ASBESTOSI, ADENOCARCINOMA DEL POLMONE CON INFILTRAZIONE LINFOCITARIA E LINFOMA NON-HODGKIN»

**Riassunto.** Un uomo di 63 anni con storia professionale di esposizione all'asbesto viene sottoposto a lobectomia inferiore del polmone destro per adenocarcinoma. La neoplasia è caratterizzata da una massiccia infiltrazione linfoide dello stroma. Tredici anni più tardi viene diagnosticato un linfoma non-Hodgkin su una biopsia epatica. Sono interessati linfonodi e vari organi. Il paziente muore due anni dopo la diagnosi di linfoma. All'autopsia si rilevano il linfoma, un adenocarcinoma renale e asbestosi. Il caso suggerisce una possibile relazione tra infiltrazione linfoide del tumore polmonare ed il successivo sviluppo del linfoma.

**Parole chiave:** carcinoma del polmone, linfoma non-Hodgkin, eziologia, tumori multipli, asbesto

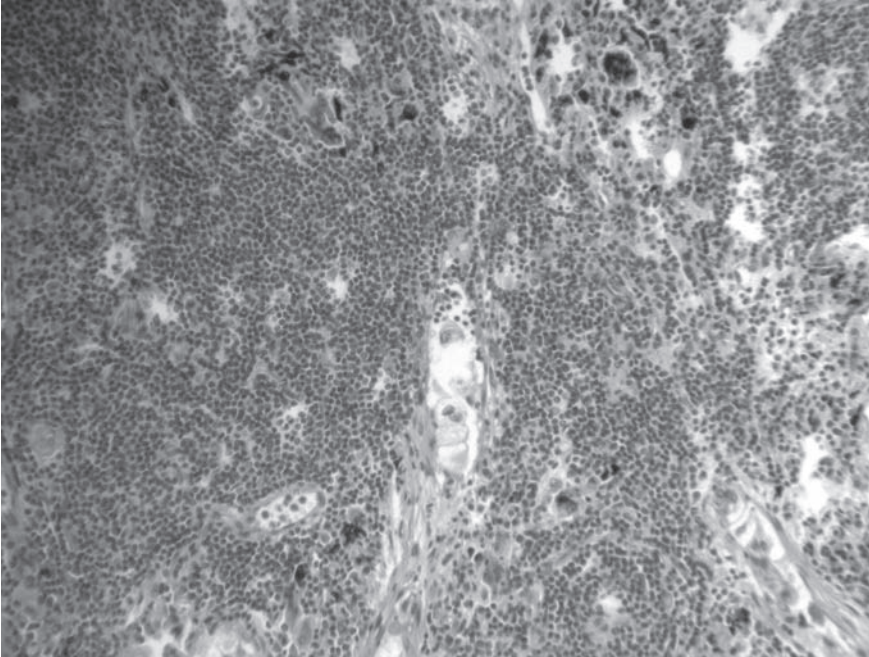
## Introduction

Numerous studies have explored the possible relationship between asbestos exposure and hematologic malignancies (1-18). We describe a case of lung adenocarcinoma with massive lymphocytic infiltration and non-Hodgkin lymphoma in a person heavily exposed to asbestos.

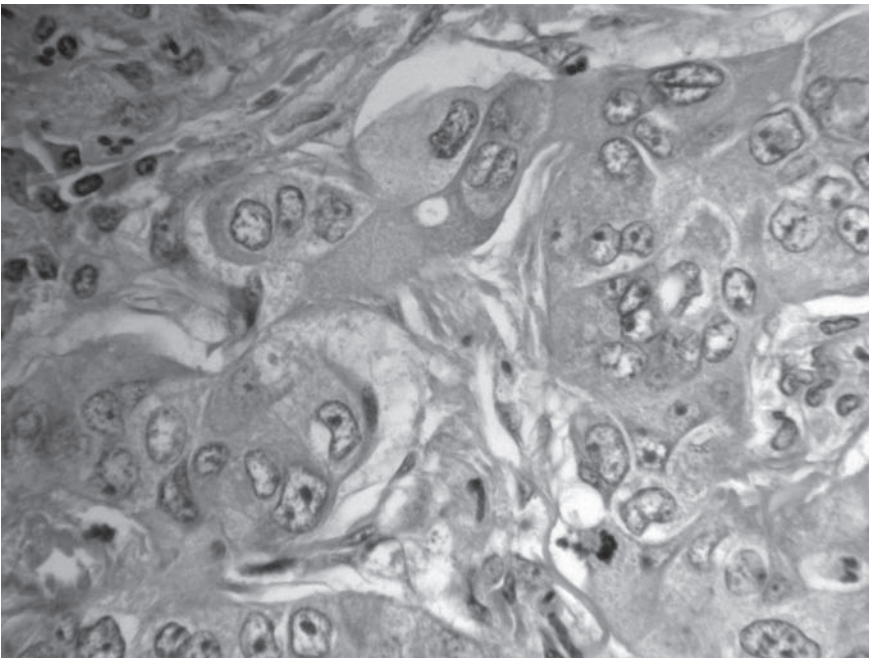
## Case report

The patient was a 63-year-old man with a history of occupational exposure to asbestos. He had

worked at the Monfalcone shipyards for 35 years (1943-46, 1947-79). In 1990 X-ray of the thorax revealed a nodule in the right lung. The size of the nodule remained unchanged in the following two years. In December 1995 the nodule reached a diameter of 3.5 cm. A needle biopsy showed a malignancy and a lower right lobectomy was performed in February 1996. The histologic examination (Figs. 1-4) showed an adenocarcinoma well differentiated in some areas and scarcely differentiated in others. The stroma of the tumor was characterized by a massive lymphocytic infiltration. Many asbestos bodies were visible in the tumor. No signs of recurrence were observed in the



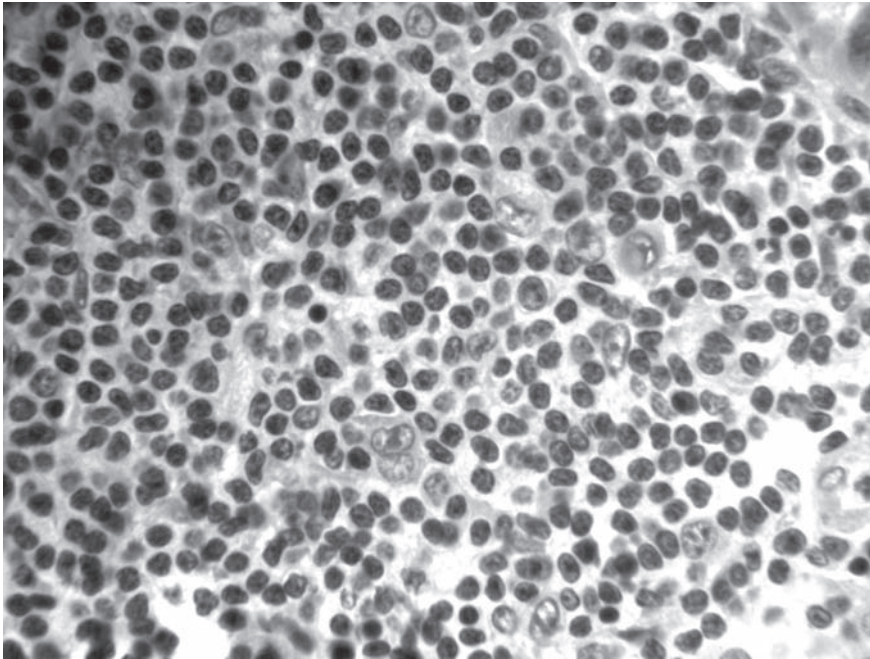
**Figure 1.** Histological aspect of the lung, infiltrated by adenocarcinoma. Prominent lymphocytic infiltration involves the stroma. H&E x 100.



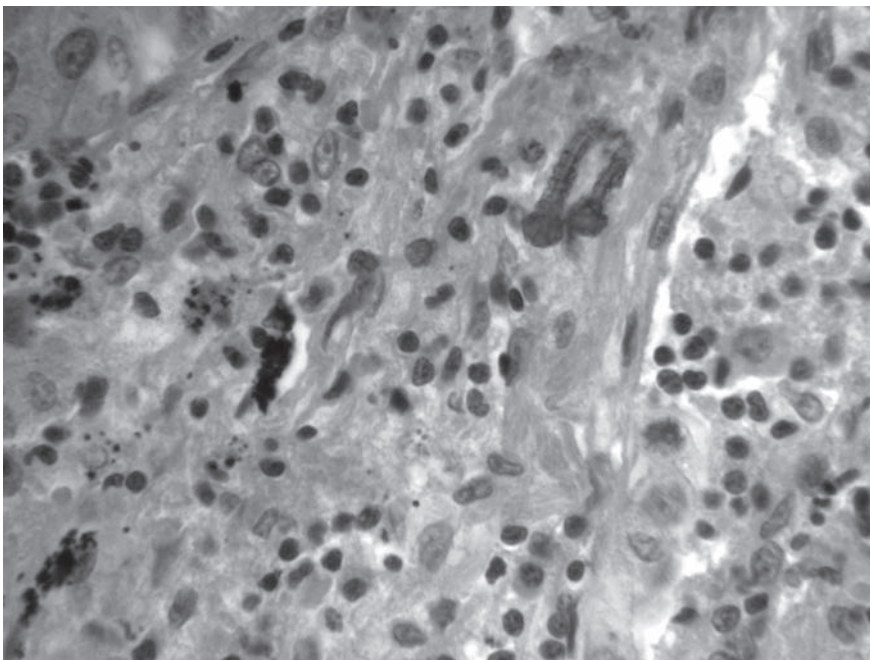
**Figure 2.** Lung adenocarcinoma showing marked atypia of the neoplastic cells. H&E x 400.

following years. In 2002 an aortocoronary bypass was performed. In March 2009 abdomen CT showed nodules in the liver, spleen, left adrenal, right kidney, and enlargement of the periaortic lymphnodes. A biopsy of the liver revealed a B large cell non-Hodgkin lym-

phoma (CD30+, BerH<sub>2</sub>+). The patient was treated by chemotherapy. After a period without relevant symptoms, abdominal CT carried out in July 2011 showed masses located at the left adrenal, right kidney and enlarged lymphnodes (periaortic, periliac and inguinal).



**Figure 3.** Lymphoid cells, generally small, sometimes very large, infiltrate the lung tissue. H&E x 400.

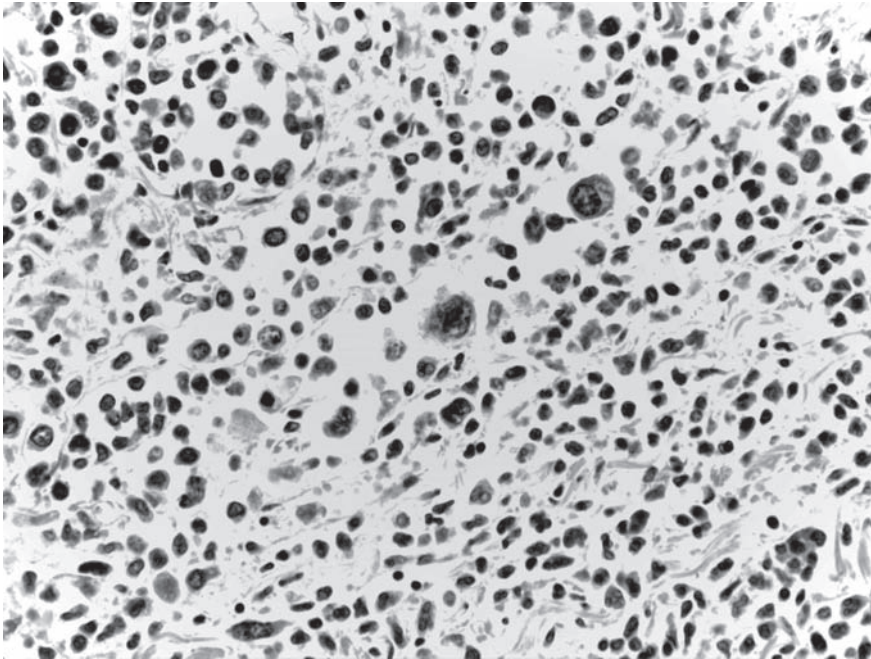


**Figure 4.** Lung adenocarcinoma. Some asbestos bodies are visible in a nest of neoplastic cells. Lymphoid infiltration is prominent. H&E x 400.

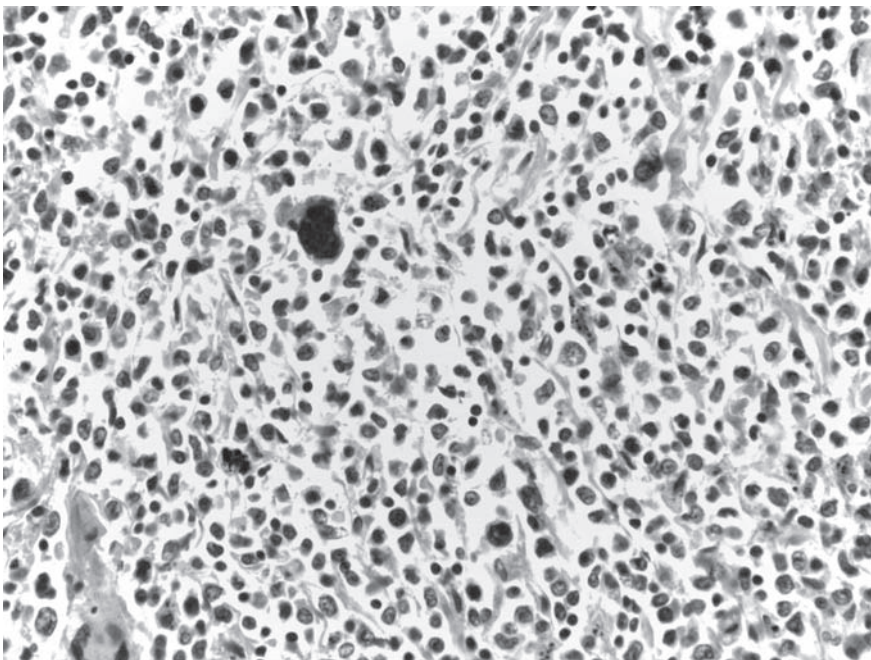
Progressive deterioration of the general conditions occurred in the following months and the patient died in December 2011. Necropsy showed large and small cell non-Hodgkin lymphoma (Figs. 5-6) involving lungs, liver, numerous lymphnodes, pelvic tissue, and bone. Renal adenocarcinoma involving adrenal and periad-

renal tissues co-existed. Pleura showed medium size hyaline plaques. Severe fibrosis and many asbestos bodies were seen in the lung. Large amounts of asbestos bodies were found after chemical digestion of the lung tissue following the Smith-Naylor method (64,000 bodies per gram of dried tissue) (19).





**Figure 5.** Histological appearance of small and large cell lymphoma. H&E x 400.



**Figure 6.** Non-Hodgkin lymphoma infiltrating lung tissue. H&E x 400.

## Discussion

The patient showed markers of heavy exposure to asbestos (asbestosis and high burden of lung asbestos bodies). The high number of asbestos bodies (64,000

bodies per gram of dried tissue) found after chemical digestion of the lung tissue only partly reflects the intensity of the exposure the patient had. A long time period (32 years) elapsed between the end of the exposure and death. In such a period clearance plausibly

reduced the asbestos content of the lungs substantially (20). On the basis of the Helsinki criteria (21), lung adenocarcinoma in this case may be attributed to asbestos. A prominent characteristic of the lung tumor was the massive lymphocytic infiltration of the stroma. This feature seems to be infrequent, and has been associated with a favorable prognosis (22). This is in agreement with the course of the lung tumor in the present case (low growth and absence of recurrence).

A non-Hodgkin lymphoma appeared 21 years after the early radiologic detection of the lung tumor. The question arises if a relationship exists between the marked lymphocytic hyperplasia visible in the lung tumor and the later development of lymphoma. Prolonged immune stimulation may favor lymphomas (23). The problem is complicated by the fact that asbestos itself may induce major changes in the immune system (24-26).

The relationship asbestos-lymphoma has been the object of research and debate. Non-concordant data have been furnished by epidemiology (4, 13-16). On the other hand, some elements in the natural history of asbestos-related diseases suggest that asbestos plays a role in the etiology of lymphoma. Not uncommonly mesothelioma and lymphoma develop in the same person (1, 17, 18). Moreover, in people exposed to asbestos many cases have been reported, in which lymphoma has developed at extra-nodal sites (1). It is well known that such occurrence is observed particularly in a background of immune impairment (26).

## References

- Bianchi C, Bianchi T, Ramani L. Malignant mesothelioma of the pleura and other malignancies in the same patient. *Tumori* 2007; 93: 19-22.
- Lieben J. Malignancies in asbestos workers. *Arch Environ Health* 1966; 13: 619-21.
- Gerber MA. Asbestosis and neoplastic disorders of the hematopoietic system. *Am J Clin Path* 1970; 53: 204-8.
- Ross R, Dworsky R, Nichols P, *et al.* Asbestos exposure and lymphomas of the gastrointestinal tract and oral cavity. *Lancet* 1982; 2: 1118-20.
- Perry MC, Solinger A, Farhangi M, *et al.* Plasmacytomas and mesothelioma. *Med Ped Oncol* 1978; 5: 205-12.
- Kagan E, Jacobson RJ. Lymphoid and plasma cell malignancies: asbestos-related disorders of long latency. *Am J Clin Pathol* 1983; 80: 14-20.
- Longo MS, Giordano D, Papa D, *et al.* Su di un caso di associazione mesotelioma IgG-mieloma. *Rivista Ospedale Sampierdarena* 1983; 21: 29-38.
- Bianchi C, Brollo A, Bittesini L. Esposizione all'asbesto e linfomi non-Hodgkin nel territorio di Monfalcone. In: Furbetta D, Abbritti G, editors. 47° Congresso della Società Italiana di Medicina del Lavoro e Igiene Industriale. Bologna: Monduzzi Editore; 1984; 1077-80.
- Efremidis AP, Waxman JS, Chahinian AP. Association of lymphocytic neoplasia and mesothelioma. *Cancer* 1985; 55: 1056-9.
- Hayashi Y, Mizuo K, Hayashi K. An autopsy case of double cancer of multiple myeloma and malignant mesothelioma (in Japanese). *J Jpn Soc Intern Med* 1989; 78, 1611-2.
- Oksa P, Pukkala E, Karjalainen A, *et al.* Cancer incidence and mortality among Finnish asbestos sprayers and in asbestosis and silicosis patients. *Am J Ind Med* 1997; 31: 693-8.
- Bianchi C, Di Bonito L, Brollo A, *et al.* Primary lymphoma of the brain and asbestosis (abstract). *Acta Neurologica* 1983; 5: 308.
- Becker N, Berger J, Bolm-Audorff U. Asbestos exposure and malignant lymphomas – a review of the epidemiological literature. *Int Arch Occup Environ Health* 2001; 74: 459-69.
- Mester B, Nieters A, Deeg E, *et al.* Occupation and malignant lymphoma: a population-based case-control study in Germany. *Occup Environ Med* 2006; 63: 17-26.
- Seidler A, Becker N, Nieters A, *et al.* Asbestos exposure and malignant lymphoma: a multicenter case-control study in Germany and Italy. *Int Arch Occup Environ Health* 2010; 83: 563-70.
- Weisenburger DD, Chiu BC. Does asbestos exposure cause non-Hodgkin's lymphoma or related hematolymphoid cancer? A review of the epidemiologic literature. *Clin Lymphoma* 2002; 3: 36-40.
- Bianchi C, Bianchi T, Bucconi S. Non-Hodgkin lymphoma of the testis and malignant mesothelioma of the pleura in the same patient. *Eur J Oncol* 2010; 15: 167-71.
- Li X, Brownlee NA, Sporn TA, *et al.* Malignant (diffuse) mesothelioma in patients with hematologic malignancies: a clinicopathologic study of 45 cases. *Arch Pathol Lab Med* 2015; 139(9): 1129-36.
- Smith NJ, Naylor B. A method for extracting ferruginous bodies from sputum and pulmonary tissue. *Am J Clin Pathol* 1972; 58: 250-4.
- Barone-Adesi F, Ferrante D, Bertolotti M, *et al.* Long-term mortality from pleural and peritoneal cancer after exposure to asbestos: Possible role of asbestos clearance. *Int J Cancer* 2008; 123: 912-6.
- Consensus report. Asbestos, asbestosis and cancer: the Helsinki criteria for diagnosis and attribution. *Scand J Work Environ Health* 1997; 23: 311-16.
- Minami Y, Iijima T, Onizuka M, *et al.* Pulmonary adenocarcinoma with massive lymphocyte infiltration: report of three cases. *Lung Cancer* 2003; 42: 63-8.
- Pukkala E, Martinsen JI, Lynge E, *et al.* Occupation and

- cancer - follow up of 15 million people in five Nordic countries. *Acta Oncol* 2009; 48: 646-790.
24. Froom P, Lahat N, Kristal-Boneh E, *et al.* Circulating natural killer cells in retired asbestos cement workers. *J Occup Environ Med* 2000; 42: 19-24.
  25. Nishimura Y, Miura Y, Maeda M, *et al.* Impairment in cytotoxicity and expression of NK cell-activating receptors on human NK cells following exposure to asbestos fibers. *Int J Immunopathol Pharmacol* 2009; 22: 579-90.
  26. Bianchi C, Bianchi T. Susceptibility and resistance in the genesis of asbestos-related mesothelioma. *Indian J Occup Environ Med* 2008; 12: 57-60.

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