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Rising mesothelioma incidence on eastern Adriatic coast

Aumento di incidenza del mesotelioma sulla costa orientale del Mar Adriatico

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Summary

Recent studies indicate that mesothelioma incidence remains high or is rising in various areas of the eastern Adriatic coast. Both Italy (Trieste Province) as well as Croatia (Rijeka and Split) are involved. In these areas pleural mesothelioma shows strict similarities, with a large prevalence of shipyard workers. Eur. J. Oncol., 15 (2), 105-109, 2010

Key words: **mesothelioma, pleura, asbestos, shipyards, Adriatic Sea, Italy, Croatia**

Riassunto

Studi recenti mostrano che l'incidenza del mesotelioma rimane alta o è addirittura in aumento in varie aree della costa orientale del Mar Adriatico. Sono interessate dal fenomeno sia l'Italia (Provincia di Trieste) che la Croazia (aree di Fiume e di Spalato). In queste zone il mesotelioma pleurico presenta strette analogie con una forte prevalenza di lavoratori dei cantieri navali. Eur. J. Oncol., 15 (2), 105-109, 2010

Parole chiave: **mesotelioma, pleura, asbesto, cantieri navali, Mare Adriatico, Italia, Croazia**

Introduction

The mesothelioma incidence/mortality shows extreme variations from one country to another (1, 2). Asbestos has been banned in about 50 countries (3). In some of these the ban dates back to some decades. This fact would suggest optimistic predictions about mesothelioma epidemic. At present, available data indicate differences in time trend of the epidemic, being the tumor stable or declining in some countries (4), and increasing in others (5). Recent studies indicate that pleural mesothelioma incidence is rising in various areas of eastern Adriatic coast.

Mesothelioma in Trieste-Monfalcone area

In the Trieste-Monfalcone area mesothelioma has been the object of a long series of studies during the

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last four decades (6, 7). The data furnished by the Cancer Registry of the Friuli Venezia Giulia, at northeastern border of Italy (8), show a worsening of mesothelioma epidemic in two of the four Provinces in the Region, namely the Province of Trieste and the Province of Gorizia (in which Monfalcone area is included); on the contrary the situation seems to be stable in the remaining two Provinces of Udine and Pordenone (fig. 1).

Studies on pleural mesothelioma in Trieste indicate that the features of the tumor in this area are not changed in comparison with those observed in the previous decades. A series of 136 pleural mesotheliomas diagnosed at the Thoracic Surgery Unit of the Trieste University in the period 2001-2007 were reviewed (9, 10). The pathological diagnosis of mesothelioma in these cases was generally based on the examination of material obtained at thoracoscopy or at surgery. In three cases the diagnosis was made through biopsy of the thoracic wall, and in one case through the cytological examination of the pleural fluid. In 54 cases necropsy was performed. The series include 124 men and 12 women, aged between 43 and 89 years (mean 69.2 years, median 69.0 years). The majority of patients had worked in the shipyards (Table 1). One patient had a history of previous thoracic radiation for Hodgkin's disease.

Table 1 - Occupational data in 135 pleural mesotheliomas, Trieste, 2001-2007

Exposure type	No. of cases
Shipbuilding	67
Maritime trades	10
Port	17
Other industries†	15
Various‡	16
Insulation	3
Domestic exposure	7

† Iron industry, petrochemical, etc.; ‡ Cinema projectionist, fire-fighter, lift mechanic, pastry worker, telephone technician, etc

Malignant mesothelioma in Croatia

With reference to the data of the Croatian Cancer Registry, mesothelioma incidence rate was 0.74/100,000 (11) in the period 1991-1997. Incidence rate was higher among males than among females (1.34 and 0.27/100,000 respectively). Age-standardized incidence rates showed a markedly not homogenous geographic distribution. Among males, incidence rates were 2.66/100,000 on the coastal areas, and 0.69 in inland area. A study carried out at the University Hospital of Split

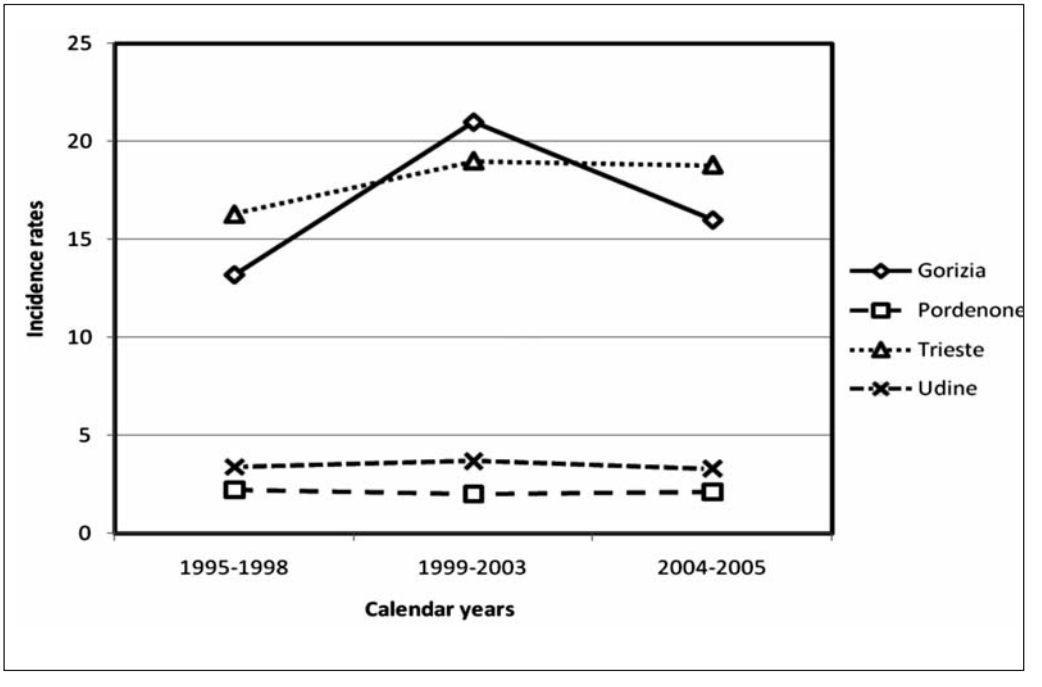

Fig. 1. Malignant mesothelioma in Friuli Venezia Giulia, men, 1995-2005. Crude incidence rates per 100,000

showed that out of 55 pleural mesotheliomas (51 men and four women), observed in the period 1995-2000, the majority of patients (56.8%) had histories of asbestos exposure in the shipyards or in the asbestos-cement industry.

A marked worsening of the mesothelioma epidemic has been observed on the Croatian coastal areas in recent years. A study recently published regards pleural mesotheliomas in Split-Dalmatian County (population about 464,000 inhabitants) in the period 2000-2007 (12). In these years, 137 cases of pleural mesothelioma have been diagnosed at the University Hospital of Split. Incidence rate in such period was 3.55/100,000, frankly increased in comparison with that observed in the period 1992-1995 (1.7/100,000). Men accounted for 85.4% of the cases. The majority of patients (85.4%) had occupational histories of exposure to asbestos, 8.8% had environmental exposure, and 5.8% a domestic exposure.

Pleural mesothelioma has been recently investigated also in the Primorsko-Goranska County, whose center is the city of Rijeka. The total population of the County is about 400,000 inhabitants. Pleural mesotheliomas diagnosed at the University Hospital of Rijeka in the period 2003-2008 were reviewed (13). The series included 41 men and two women, aged between 52 and 82 years. A majority of patients (58.1%) had worked in the shipyards. A variety of occupations were reported in the remaining cases.

Some common features of mesothelioma in the above areas

The incidence of pleural mesothelioma is high in some areas of eastern Adriatic coast (fig. 2). On the basis of occupational data, such phenomenon may be mainly attributed to the activity of shipyards. The relationship between shipbuilding and mesothelioma is one of the most typical features in mesothelioma epidemiology (14). In the Trieste-Monfalcone area the relationship mesothelioma-shipyards has extensively been investigated (6, 7, 15).

The shipyards located in Croatia showed an increase in activity in the 1950s. At that time, and until 1991, Croatia was one of the republics forming Yugoslavia. All Yugoslavian shipyards were placed on the Croatian coast, with major yards being located in Pula, Rijeka, Kraljevica, Trogir, and Split. In the 1980s Yugoslavia became one of the major shipbuilders in the world (Table 2).

In Italy, restrictions in asbestos use started in the late 1970s; total ban was adopted in 1992. In Croatia, crocidolite and amosite were banned in 1993; in

Fig. 2. Map of the Adriatic Sea showing some cities of the Eastern coast

Table 2 - Shipbuilding in Yugoslavia. Ship orders 1985-1990 (tons)*

Year	N. of tons	World rank
1985	1,000,000	(7°)
1986	1,300,000	(5°)
1987	1,200,000	(3°)
1988	1,270,000	(3°)
1989	1,440,000	(3°)
1990	1,560,000	(5°)

* Based on the data reported by Encyclopedia Britannica, Book of the Year, 1986-1991

2006 the ban was extended to all varieties of asbestos with some exceptions (manufacture of asbestos containing products for export) (3).

Despite the difference between Italy and Croatia with regard to asbestos policy, the data recently reported show very strict similarities between the Province of Trieste and the Split area. The above-mentioned review of malignant pleural mesotheliomas, diagnosed at the Thoracic Surgery Unit of the Trieste University in the period 2001-2007 gave figures very close to those obtained at the University Hospital in Split in the period 2000-2007 (Table 3).

The large prevalence of shipyard workers in the two series is the principal element. The features of asbestos exposure, occurred in the past in the shipyards are well known: the mineral was used in large amounts, amphiboles represented important percentages of asbestos used, the work was carried out in confined spaces, asbestos was frequently applied by spraying. As a consequence of these features, shipbuilding has represented in the past one of the principal causes of mesothelioma (14). The findings recently reported from the eastern Adriatic coast indicate that the effects of working in shipyards are far from being exhausted.

Table 3 - Malignant pleural mesothelioma in the Trieste Province and in the Split area

Area	Province of Trieste	Split area
Population	240,000	464,000
Period	2001-2007	2000-2007
No. Cases	136	137
% of men	90%	85%
% of people aged 60-79 years	75%	58.4%
Occupation		
No. of shipyard workers	67	77
Other major categories (No.)	27 sailors and dock workers	26 asbestos-cement workers

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