

# Asbestosis in the Republic of Croatia

IVANČICA TROŠIĆ, PHD, SANJA MILKOVIĆ-KRAUS, PHD

Croatians have been exposed to asbestos in the shipbuilding and asbestos-cement industries since 1945. The first cases of asbestosis were reported in 1961; 317 cases were recorded from 1990 to 2000. The Croatian Cancer Registry recorded 248 malignant pleural mesotheliomas between 1991 and 1997, two thirds of which were attributable to occupational exposures to asbestos. The Croatian Asbestosis Patient Association was founded in 1998 to help victims. Croatian law defines the employer's responsibility for work-related health damage and compensation, but average legal proceedings for asbestosis claims take about seven years. Croatian law does not ban the manufacture and import of asbestos. Croatia as a transitional country is subject to socioeconomic pressures. Future approaches to the asbestos issue will depend on revised regulations, which are expected to conform to recommendations of the European Union by 2005. *Key words:* asbestos; asbestos-related diseases; transitional society.

INT J OCCUP ENVIRON HEALTH 2004; 10:198-201

At the beginning of the twentieth century, asbestosis was a medical curiosity in Croatia. Asbestos production and application were negligible. With the exception of an asbestos-cement plant on the Adriatic coast, there were no plans for its extensive use before World War II. After WWII, asbestos was used by seven shipyards (Pula, Rijeka, Kraljevica, Šibenik, Trogir, Split, and Korčula), an asbestos cement plant was in operation in Vranjic-Split, and asbestos products were processed in an asbestos factory in Ploče. Back then, shipbuilding was one of the leading Croatian industries and was the biggest consumer of asbestos.

Zorica and Šarić reported the first cases of occupational asbestosis, in 1961.<sup>1</sup> The reported four asbestos victims had worked in an asbestos-cement plant for five, 14, seven and 22 years, respectively. Dust concentrations in the plant were found to exceed severalfold the current threshold limit value (TLV) of 200 particles/cm<sup>3</sup> of air.<sup>1</sup> An early asbestos application in the shipyard of Pula, Croatia, dates back to 1962, when asbestos boards were imported from the United Kingdom and used for insulation. As shipbuilding involves a variety of work

operations in the same place at the same time, exposure to various toxicants were inevitable. Although the occupational exposure to asbestos was evident, little effort was made to quantify or control it.<sup>2</sup> Beritić wrote that "asbestos concentrations recorded at working places exceeded the globally accepted TLV many times."<sup>3</sup> When it became clear that asbestos not only caused an occupational disease, but also was a potential health hazard for the general population, the Institute for Medical Research and Occupational Health, in the Croatian capital of Zagreb, introduced regular medical examinations of asbestos-exposed people.<sup>4-7</sup>

The 1980s and early 1990s saw intensified research into the harmful biological potential of asbestos,<sup>8-12</sup> as well as many epidemiologic studies which included extensive workups of shipyard workers.<sup>13-16</sup> Retrospective studies focused on early diagnosis, with particular emphasis on functional parameters and incidence rates of respiratory and gastrointestinal tract tumors.<sup>17-21</sup> The School of Public Health of the University of Zagreb, and particularly the working group of Professor Valić, developed a methodologic approach to the evaluation of the occupational asbestos hazard and to the measurement of airborne asbestos fibers in the workplace.<sup>22</sup> In the 1980s three workshops on asbestosis were held under the auspicious of the Yugoslav Academy of Arts and Sciences, the first in Dubrovnik, Croatia, in 1985; the second in Aranđelovac, Serbia, in 1987, and the third in Zagreb, Croatia, in 1988.

The 1990s saw the birth of social movements against asbestos all over the world. Yet in those years, from 1990 to 1997, the Republic of Croatia was ravaged by war. Since 1997, the country has been going through hard times of restoration and transition to a free-market economy, and again the circumstances have not favored dealing with the asbestos issue, which, of course, the scientific and health care community has been aware of all along.

Current legislation does not ban the import and use of asbestos in the Republic of Croatia. From 1995 to 2001, about 4,000 metric tons of asbestos per year were imported for industrial use. The current maximum allowable concentrations in the work environment are 0.1 fiber/cm<sup>3</sup> for tremolite, 0.2 fiber/cm<sup>3</sup> for crocidolite and anthophyllite, 0.5 fibre/cm<sup>3</sup> for amosite, and 2 fiber/cm<sup>3</sup> for actinolite and chrysotile. In addition, the government has issued a warning that all asbestos types are proven human carcinogens.<sup>23</sup>

The annual import of 4,000 metric tons is ten times lower than before the 1990s. For instance, in the mid-

---

Received from the Institute for Medical Research and Occupational Health, Zagreb, Croatia.

Address correspondence and reprint requests to: Ivančica Trošić, PhD, Institute for Medical Research and Occupational Health, Ksaverska cesta 2. POB 291, HR-10001 Zagreb, Croatia; telephone: (+385 1) 4673 188; fax: (+385 1) 4673 303; e-mail: <itrosic@imi.hr>.

1980s, as much as 50,000 tons of asbestos was manufactured in Croatia. However, long-term asbestos use has left its mark on many exposed people who have already developed asbestos-related diseases or are likely to develop them in the near future.

### *The Authors' Involvement and Perspective*

Asbestos was used worldwide in building construction until 1985, including in Croatia. This material is far more common than any other in buildings constructed between 1960 and 1985, and even earlier in Croatia. These buildings contain tons of asbestos and are a potential source of future exposures to airborne asbestos dust, which may be released in the air during the demolition of a building or during the removal of asbestos material.

Future approaches to the asbestos issue in Croatia will depend on revised regulations, which are expected to conform to recommendations of the European Union by 2005. Trade control of all forms of asbestos announced by the United Nations Environmental Program in February 2002 and the continuing hazard from asbestos call for identification of asbestos fibers by type, concentration, and dimension in industrial and biological materials, as well as in air, water, and soil. The Institute for Medical Research and Occupational Health, Zagreb, has participated in the program "Asbestos In Materials Scheme (AIMS)," under the auspices of the Health and Safety Committee on Fiber Measurement at the Health and Safety Laboratory, Sheffield, United Kingdom, as well as the authors of this paper. As various forms of asbestos have distinctive optical properties, polarized light microscopy usually suffices to positively identify the presence and the type of asbestos. This approach has been adapted for routine measurements.<sup>24</sup> This method of asbestos measurement is expected to be required by the upcoming changes in Croatian legislation.

## **ASBESTOS VICTIMS**

Between 1990 and 2000, pneumoconiosis was a factor in 17% of all occupationally related diseases in Croatia. It is curious that no registry of occupational diseases has been established in the country.<sup>25</sup> The Croatian Institute of Public Health recorded a total of 317 cases of asbestos-related occupational disease from 1990 to 2000. Most of these people were not diagnosed as having pulmonary function impairment, but x-rays showed an initial morphologic impairment, with irregular small opacities, which were classified according the ILO International Classification of Radiographs. The Croatian Cancer Registry recorded a total of 248 malignant pleural mesotheliomas between 1991 and 1997. The recorded incidence fluctuated with time, but the trend was clearly increasing over the years. The distribution of tumors was four times

higher in men than in women. Of the total number of recorded cases of pleural mesotheliomas, more than 60% were from the coastal area. Considering the past uses of asbestos in the shipbuilding, asbestos-cement, and asbestos processing industries, this finding is expected. More than two thirds of persons who have had such tumors have been verified as having had occupational exposures to asbestos.<sup>26</sup>

### *Victim's Organizations' Goals and Achievements*

The Croatian Asbestosis Patient Association was founded on July 15, 1998, in Vranjic, near Split, Croatia. The Statute issued on that occasion defines the targets and activities of the Association and makes them public concern. However, although it stipulates certain health care and legal benefits for its members and promotes cooperation with related associations and other relevant institutions, it seems to have failed to fully meet the demands of asbestos victims.

A quick review of filed claims shows that it takes about five years for legal settlement in the municipal courts alone, plus two years in higher courts. The reasons are many; before the court reaches a decision on the settlement amount it has to establish the responsibility of complainant's employer for damage incurred. The employer's responsibility is defined by Article 6 of the Occupational Safety Act,<sup>32</sup> according to which the employer has to compensate the employee for the damage caused by occupational or other work-related injury or disease, unless the damage has been caused by factors that exempt the employer from responsibility, such as force majeure, third-party actions, or employee's error. If the damage inflicted is found to be the consequence of occupational asbestosis, the employer is obligated to compensate the employee. The pecuniary compensation refers to damages for physical pain, fear, mental anguish, and disturbance sustained.

### *Access to Medical Treatment and Compensation*

Periodic check-ups of workers in asbestos-related occupations have been performed regularly according to the law. If an employee is suspected to have occupational asbestosis, a general practitioner or a physician specializing in occupational medicine will perform a work-up. Medical documentation regarding asbestosis should include hematologic and radiologic findings, lung function tests, and immunology tests. Asbestos bodies are sought in expectorant, as well as in bronchoalveolar lavage, lung scintiscans, and biopsies of lung or pleural tissue. Positive findings on medical examination and the presence of 0.1 fiber/cm<sup>3</sup> of tremolite, or 0.2 fiber/cm<sup>3</sup> of crocidolite and anthophyllite, or 0.5 fiber/cm<sup>3</sup> of amosite, or 2 fibers/cm<sup>3</sup> of actinolite or chrysotile in the workplace are important in the final diagnosis of asbestosis. Items 36 and 44 of

the Act listing occupational diseases describe the conditions for asbestos-induced diseases.<sup>32</sup>

In the past 50 years, the asbestos used in manufacturing and shipbuilding has been the cause of endemic and occupational asbestosis, as well as of domestic cases of asbestosis in populations living close to the asbestos sources. Some 200 cases of lung and/or pleural asbestosis have been recognized by the social security and pension systems, or by arbitration of competent courts. By 1993, the producer of asbestos cement alone had had 34 cases processed and settled by agreements between the parties. The court proceedings are burdened by a number of irregularities and absurd requirements, which significantly prolong their duration. Therefore, a more regular and rational procedure for establishing occupational asbestosis and evaluating the consequent reduction of general life activity of those suffering from it has been proposed.<sup>27</sup>

According to the law on retirement insurance, in the case of work disability the claimant is entitled to occupational rehabilitation and to a disability pension.<sup>28</sup> Both the law on retirement insurance and the act on medical censoring in retirement insurance stipulate that a claimant's ability to work must be evaluated by the pension insurance medical auditor.<sup>29</sup> The extended insurance regulation is designed to protect employees working in extremely difficult and dangerous conditions.<sup>30</sup> This law defines for the medical auditor the requirements for early retirement. Occupational disease is established according to algorithms accepted by occupational medicine, and the diagnostic procedures include work history, clinical manifestation of functional and/or morphologic impairment, positive diagnostic test findings, and evidence of a harmful material in the workplace.<sup>31</sup>

### *National Asbestos Regulations, National Schemes of Compensation, Treatment*

Should a legal proceeding establish that a worker's asbestosis was caused by occupational asbestos exposure, the employer must compensate the worker for the damage suffered as the consequence of this disease. The employer's responsibility for compensation to a worker is estimated according to the principle of causality based on the Obligatory Relations Act.<sup>34</sup> Courts can establish the presence of an occupational disease in a worker on the basis of the findings and opinions of appointed medical experts. For asbestos-related claims, it is also necessary to establish the worker's long-term occupational exposure to asbestos dust. When the court establishes that a claimant has been affected by occupational asbestosis, and that the cause of the disease was long-term exposure to asbestos dust, the employer must compensate the worker for all damage suffered.

When the court determines the compensation amount it relies on an individual approach to every

claimant. It follows general guidelines for the compensation of the damage, which include the damage assessment, the intended purpose of compensation, and especially the intensity of suffering and fear and their duration. The compensation amount corresponds to the degree of damage caused by the occupational asbestosis.<sup>34</sup>

## **TREATMENT OF VICTIMS: THE ROLES OF GOVERNMENT, TRADE UNIONS, POLITICAL PARTIES, AND HEALTH CARE**

The Symposium on Asbestosis and Other Asbestos-related Diseases, held in Split, Croatia, in September 2001, addressed the needs and rights of people with asbestos-related disease. The objective of this symposium was to review the national experience and the current knowledge about identifying asbestos-related problems, and to propose standardized criteria for the identification and compensation of asbestos-related diseases caused by occupational and environmental exposures. The symposium gathered scientists, health-care professionals, hygienists, asbestos victims, government officials, health and safety practitioners, attorneys, trade unions, and academicians. The participants were informed about the Global Asbestos Congress held in Osasco, Brazil, and about the European Asbestos Seminar held in Brussels in 2001.<sup>35</sup>

Croatia is going through a transitional period, which brings great expectations along with uncertainties and anxieties to most citizens. The sense of safety is gone; the rate of unemployment is over 20%; the trend of uneven opportunities, and the economic crisis are in full swing. In addition, global trends are not favorable, including terrorism, the growing disparity between poor and rich countries, as well as unfair demands of international financial institutions. Croatian people are undergoing rash and radical adaptations of the economic and social system in response to global standards. Asbestos victims are part of the dissatisfied majority of citizens; their future is questionable, since nearly all the companies in which they worked have been shut down.

One can only hope that current reforms in welfare, health care, and education will improve living conditions in the Republic of Croatia. These changes will hopefully affect all social partners, from trade unions and political parties to health-care institutions.

### *References*

1. Zorica M, Šarić M. Asbestosis in the manufacture of asbestos-cement products. *Arh Hig Rada Toksikol.* 1961; 12:97-117.
2. Kovač S, Petrak A, Car Z, Beritić T. Azbestoza u brodogradilišnih radnika [Asbestosis in shipyard workers]. Abstracts of the First Workshop on Asbestosis in Yugoslavia. Dubrovnik, 1985; 27. [In Croatian]
3. Beritić T. U eskalaciji azbestoze tri su naše temeljne obaveze: otkriti, suzbiti i spriječiti [Three basic tasks occupational medi-

- cine related to the escalation of asbestosis: identification, treatment and prevention]. Abstracts of the First Workshop on Asbestosis in Yugoslavia. Dubrovnik, 1985; 26-8. [In Croatian]
4. Dimov D, Beritić T. Asbestos bodies in the lung in an urban population. *Lij Vjes.* 1969; 91:1003-6.
  5. Beritić T, Dimov D, Bunarević A, Sondić M, Širec A. Asbestos and ferruginous bodies. *Arh Hig Rada Toksikol.* 1971; 22:317-23.
  6. Kovač-Stojković S. Exposure to asbestos and pleural mesothelioma. *Arh Hig Rada Toksikol.* 1979; 30:227-312.
  7. Beritić T, Kovač S, Kurajica L, Sokol I. Diagnostic criteria of asbestosis. *Arh Hig Rada Toksikol.* 1984; 35:363-81.
  8. Trošić I, Horvat Đ, Račić J. The effect of asbestos on cells in culture. *Period Biol.* 1986; 88:269-75.
  9. Trošić I, Štilinović L. Haemolysis of human erythrocytes with chrysotile-asbestos fibers of different sizes. *Yugoslav Physiol Pharmacol Acta.* 1985; 21, 359-61.
  10. Trošić I, Štilinović L. Direct haemolysis of erythrocytes produced by chrysotile asbestos fibers and soluble constituents of chrysotile asbestos in vitro. *Yugoslav Physiol Pharmacol Acta.* 1987; 23:189-97.
  11. Trošić I, Horvat Đ. Incorporation of <sup>3</sup>H-uridine and <sup>14</sup>C-phenylalanine into V-79 cells treated with asbestos. *Period Biol.* 1989; 9:397-9.
  12. Trošić I, Horvat Đ, Štilinović L, Pišl Z. Cytotoxic, haemolytic and mutagenic issue caused by chrysotile-asbestos in vitro. Effects of mineral dusts on cells. *NATO ASI Series, Series H: Cell Biology* 1989; 3:423-37.
  13. Trošić I. Occupational exposure to asbestos, general immunological characteristics and asbestosis. PhD thesis, University of Zagreb, Zagreb, Yugoslavia, 1989.
  14. Trošić I, Šarić M, Pišl Z. Influence of long-lasting asbestos exposure on immunological status of asbestos exposed shipyard workers. Mechanisms in fibre carcinogenesis. *NATO ASI Series A: Life Sciences.* 199; 223:39-42.
  15. Trošić I, Štilinović L, Šarić M. Evidence of harmful health effects of asbestos exposure. *ILSI Monographs. Toxic and Carcinogenic Effects of Solid Particles in the Respiratory Tract* 1994; 4:587-90.
  16. Trošić I, Šarić M, Štilinović L. The significance of asbestos bodies and occurrence of macrophages in the sputum of asbestos-exposed workers. *Environ Hyg.* 1992; 3:170-4.
  17. Duić J, Tocilj J, Boschi S, Šarić M, Eterović D. Biphasic lung diffusing capacity: detection of early asbestos induced changes in lung function. *Br J Ind Med.* 1992; 49:260-7.
  18. Dujčić Ž, Tocilj J, Šarić M. Early detection of interstitial lung disease in asbestos exposed non-smoking workers by mid-expiratory flow rate and high resolution computed tomography. *Br J Ind Med.* 1991; 48:663-4.
  19. Šarić M, Vujović M. Malignant tumors in an area with an asbestos processing plant. *Public Health Rev.* 1994; 22:293-303.
  20. Ćurin K, Šarić M. Cancer of the lung, pleura, larynx and pharynx in an area with an asbestos-cement plant. *Arh Hig Rada Toksikol.* 1995; 46:289-300.
  21. Šarić M, Ćurin K. Malignant tumors of the gastrointestinal tract in an area with an asbestos-cement plant. *Cancer Lett.* 1996; 103:191-9.
  22. Valić F, Skurić Z. Evaluation of occupational hazards of airborne asbestos fibres. *Arh Hig Rada Toksikol.* 1988; 39:169-81.
  23. Pravilnik o maksimalno dopustivim koncentracijama štetnih tvari u atmosferi radnih prostorija i prostora i o biološkim graničnim vrijednostima [Regulations on maximal allowable concentrations for noxious agents in the work environment and biological limit value]. *Narodne novine*, No 92,1993. [In Croatian]
  24. Trošić I. Use of reference samples in the detection and identification of asbestos in materials. *Proceedings of 3rd Central European Conference on Reference Materials and Measurements. Rogaska Slatina, Slovenia, 2002; 12.*
  25. Dečković-Vukres V, Hemen M. Azbestoza kao profesionalna bolest u Republici Hrvatskoj [Asbestosis as an occupational disease in Republic of Croatia]. *Proceedings of Symposia on Asbestosis and Other Asbestos Related Diseases. Split, Croatia, 2001; 15-9.* [In Croatian]
  26. Ćurin K, Šarić M, Strnad M. Incidence of malignant pleural mesothelioma in coastal and continental Croatia. *Croat Med J.* 2002; 4:498-502.
  27. Muše-Danielov M, Kurajica L. Establishing occupational asbestosis and reduction of life activity. *Work and Safety.* 2001; 1-2:89-96.
  28. Zakon o mirovinskom osiguranju [Law on retirement insurance]. *Narodne novine*, No 102,1998. [In Croatian]
  29. Uredba o medicinskom vještačenju u mirovinskom osiguranju [Act on medical censoring in retirement insurance]. *Narodne novine*, No 52, 1999. [In Croatian]
  30. Zakon o stažu s povećanim trajanjem [Insurance validity with extended insurance act]. *Narodne novine*, No 71/99. [In Croatian]
  31. Zavaić M, Bogadi-Šare A. Kriterij za priznavanje profesionalne azbestoze plućnog parenhima i pleure [Criteria for acknowledgement of occupational asbestosis of the lung parenchyma and pleura]. *Arh Hig Rada Toksikol.* 1995; 46:433-44.
  32. Zakon o listi profesionalnih bolesti [Act on list of occupational disease]. *Narodne novine*, No 162, 1998. [In Croatian]
  33. Zakon o zaštiti na radu [Occupational safety act]. *Narodne novine*, No. 19,1983; 17, 1986; 47,1989; 46,1992; 26,1993. [In Croatian]
  34. Zakon o obveznim odnosima [Obligatory relations act]. *Narodne novine*, No. 53, 1991; 73, 1991; 3, 1984; 7, 1996; 112, 1999. [In Croatian]
  35. Trošić I. Fate of the miraculous mineral—ban asbestos worldwide campaign. *Coll Antropol.* 200; 2:713-8.