

Pathology of Asbestos-Associated Diseases

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Pathology of Asbestos-Associated Diseases

Second Edition

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*Dedicated to the memory of
S. Donald Greenberg and Philip C. Pratt
and to the loving memory of
Louis and Anna Roggli*

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Preface

It has been more than a decade since the publication of the first edition of *Pathology of Asbestos-Associated Diseases*. Since that time, some things have changed very little relative to our knowledge of these diseases, whereas in other areas, considerable progress has been made. The purpose of this second edition is to update pathologists, pulmonologists, radiologists, occupational medicine practitioners, industrial hygienists and others with an interest in the field regarding progress in our understanding of these diseases.

A great deal of information has been published in the past decade on methods for diagnosing mesothelioma. This area can be quite intimidating to those who do not deal with this question on a daily basis, and a summary of the more recently published data is therefore deemed to be of some utility. As a result of the explosion of diagnostic techniques, the correct diagnosis of mesothelioma is rarely a problem for the practicing pathologist. Nonetheless, pathologists are being pressed to make the diagnosis on ever-smaller biopsies or on cytologic specimens. A discussion of the latest diagnostic criteria for mesothelioma is presented in Chapter 5, and the limitations of cytologic diagnoses in this regard are emphasized in Chapter 9.

Considerable information has also been published in the medical literature during the past several years regarding the relationship between asbestos exposure and carcinoma of the lung. This information is updated in Chapter 7. This is an area where there is still considerable controversy, and physicians are frequently asked to determine whether asbestos contributed to one or more of the 170,000 lung cancer deaths that occur in the United States annually. Guidelines for making this assessment are provided based on the latest literature on the subject.

The explosion of research in the area of molecular biology has provided us with an abundance of information bearing on the mechanisms by which asbestos causes disease. Studies of cells from both humans and experimental animals have provided further insight in this regard. This information is updated in Chapter 10. We still do not understand all of the steps leading in the transformation, say, of mesothelial cells

into a malignant mesothelioma. Nonetheless, many pieces have been added to the puzzle, and many more are expected in the next decade.

A tremendous amount of information has been accumulated in the past decade regarding the numbers and types of fibers accumulating in the lung and their relation to various asbestos-related diseases and exposures. This information is summarized in Chapter 11. Considerably less information is available concerning fiber burdens in extrapulmonary tissues, and it is expected that advances in this area will occur in the near future. Because the fiber levels in these tissues is expected to be quite low relative to those in the lung, very careful studies utilizing appropriate controls will need to be done if our knowledge of this area is to be advanced significantly.

Since the publication of the first edition of this book, thousands of workers have died of asbestos-related diseases, and more than a dozen manufacturers have filed for bankruptcy. The judicial and legislative branches have refused to provide any relief to the burden these cases impose on civil courts. Hundreds of thousands of cases are still pending. Legal strategies have necessarily changed as a consequence, and the viewpoints of plaintiff and defense attorneys with considerable experience in the field are presented in Chapters 12 and 13, respectively. Although the reduction of workplace exposures will eventually result in the virtual eradication of asbestos-related diseases, it is anticipated that cases will continue to occur during the next two decades or more. Hopefully, this volume will assist those involved with the treatment, care, and diagnosis of these cases.

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Preface to the First Edition

The purpose of *Pathology of Asbestos-Associated Diseases* is to give a detailed description of the pathologic abnormalities associated with exposure to asbestos fibers. The past decade has witnessed substantial advances in our understanding of the pathology of asbestos-associated diseases, as a result of observations using both human and animal tissue samples. A book with this information summarized in a single volume is a valuable resource for pathologists, pulmonologists, radiologists, occupational medicine practitioners, industrial hygienists, and others with an interest in this subject.

Knowledge of asbestos-associated diseases has been derived primarily from three lines of investigation: (1) observations and detailed descriptions of pathologic changes in tissues of individuals exposed through their occupations to airborne asbestos fibers, including quantification of asbestos content; (2) reproduction of these diseases in animals exposed to asbestos fibers under controlled conditions; and (3) epidemiologic observations made of asbestos workers examined as part of either cross-sectional or longitudinal studies. Because these latter two lines of investigation have contributed to knowledge of the pathology of asbestos-associated diseases, they are also summarized in this volume. The chapters dealing with specific diseases include a review of pertinent epidemiologic studies. One entire chapter is devoted to a review of the contributions of experimental animal studies to knowledge of asbestos-associated diseases.

The book is organized into thirteen chapters, each dealing with a specific aspect of asbestos-associated diseases. The first chapter is designed to tell the reader what asbestos is and includes a simplified description of asbestos mineralogy, its sources, and the methods used to detect and identify asbestos fibers. The second chapter describes how individuals are exposed to asbestos, both in the workplace and in the home environment. Chapter 3 gives a detailed description of asbestos bodies, how they are formed, and how they can be distinguished from ferruginous bodies lacking an asbestos core.

The first three chapters give the background for the chapter on asbestosis, a form of pneumoconiosis that has been recognized since

the early decades of this century. This is followed by a chapter dealing with the pathologic features of malignant mesothelioma, a signal neoplasm occurring with alarming regularity in populations exposed to asbestos. An explosion of information regarding the specific features of this neoplasm has greatly increased the reliability of the pathologist's diagnostic armamentarium for distinguishing from other malignancies with which it may be confused. The sixth chapter is devoted to the non-neoplastic alterations in the pleura that may occur in individuals exposed to asbestos.

Chapter 7 is a review of the pathologic and epidemiologic features of carcinoma of the lung related to asbestos exposure. This is a particularly difficult and controversial area, mainly due to the strong and confounding association of the various lung carcinomas with cigarette smoking. Other asbestos-related neoplasms are the topic of the following chapter, an area of investigation that is badly in need of more detailed studies. Chapter 9 reviews the contributions of cytopathology to the diagnosis of asbestos-associated diseases, a source of valuable information often neglected in the past.

A book on the pathology of asbestos-associated diseases would be incomplete without a discussion of the contributions of experimental animal studies. Chapter 10 shows how these models of asbestos-related disease have greatly expanded our understanding of the interactions of asbestos with the respiratory system and the resulting changes that ultimately lead to disease. In addition, they have in a more general sense increased our knowledge of pulmonary pathobiology. With the current rapid progress in molecular biology research, the coming decade should witness even greater progress in understanding the mechanisms at the molecular level, whereby asbestos is able to induce pulmonary fibrosis or effect neoplastic transformation of cells of the lung and pleura.

A great deal of information has also been gained in the past decade with regard to the tissue asbestos levels associated with various asbestos-induced diseases. Although these analytic and quantitative techniques have yet to be standardized, the information provided by different laboratories has been surprisingly consistent. This information is summarized in Chapter 11, including a considerable amount of previously unpublished data from the authors' own laboratories.

The medicolegal repercussions of asbestos-related diseases have affected a large segment of our population through asbestos litigation, and Chapters 12 and 13 deal with the pathologic aspects of asbestos-associated diseases from an attorney's perspective. Both the plaintiff's and the defendant's points of view are presented by prominent attorneys with extensive experience in this litigation.

Each of the chapters also contains a brief historic review to place the discussion in proper perspective. The information in these reviews is largely derived from a few excellent and detailed sources on the historic perspective of asbestos and asbestos-related diseases.

Due to increasing public awareness of asbestos and its effects on health, as well as increasing concern of public health officials on the prevention of future disease, it is important that pathologists have a

working knowledge of the various manifestations of asbestos-related tissue injury. It is hoped that this volume will provide pathologists and other health-care workers with this necessary information.

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