# OCCUPATIONAL HEALTH

## Recognizing and Preventing Work-Related Disease

*Edited by*
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# Foreword

The medicine and the science of occupational health are universal. A discovery made in a distant part of the world will be valid here. Basic knowledge enhanced by other branches of medical science will help explain occupational disease. The pathology, physiology, chemistry, physics, and toxicology that help to form the scientific base for occupational medicine are not unique to occupational medicine.

However, unlike other medical specialties that deal with a single organ or system or have a special diagnostic or therapeutic approach, occupational medicine is a part of preventive medicine. It is distinguished by its focus on environmental determinants of diseases and methods of disease prevention.

Occupational medicine is finally attracting the interest and attention it deserves. This field has the potential to contribute more to human welfare than any other health specialty. Occupational hazards are the most preventable cause of disease, disability, and death. Unlike many other public health problems, we often know who is exposed to what. When the effect of an exposure can be measured, it is often possible to construct an exposure-effect curve. Thus, good epidemiology can describe causal relationships. And because the exposures are in the workplace, they are by definition preventable.

Although the science of occupational medicine is universal, the economic, political, and social environments determine whether and how we make progress and prevent occupational disease. *Occupational Health* is unusual because it consciously places the science of occupational medicine in the current United States economic, political, and social context. It will provide the reader with far more than basic science. It presents information on how to succeed with the prime task: protecting the health of workers.

To be an effective occupational health professional, one must understand five basic points con-

cerning occupational health in the United States today:

1. The occupational health laws are strong.
2. The ethics of the field need strengthening.
3. Prevention must be the underlying objective of all activities.
4. Control technology and substitution are the critical strategies for prevention.
5. To prevent disease effectively, we must rely on laboratory tests for the data on which to base public health policy rather than waiting for epidemiology to count human bodies.

These five points need to be expanded.

1. We have very strong occupational safety and health statutes. The Coal Mine Safety and Health Act of 1969, the Occupational Safety and Health Act of 1970, and the Federal Mine Safety and Health Act of 1977 require the employer to provide every worker with a safe and healthful workplace. With the burden placed squarely on the employer, the laws give strong enforcement powers to the government. Complaints from workers may trigger inspections. This powerful rule means that worker knowledge of occupational safety and health is important, and that worker education efforts are especially effective ways to prevent disease and injury. The enforcement agency has a right of entry to any workplace to carry out inspections. Criminal penalties are provided for willful violations and violations that lead to a worker's death. The strength of the statutes should not mislead one to believe that the laws work effectively or that the federal government has always wanted them to work. Under a government not committed to protecting workers, only the language is strong.

2. There is an ethical tradition in American medicine that physicians' and other health professionals' first responsibility is to their patients. There is a cloud over this great tradition in the field of occupational health. Physicians, industrial hygienists, and others have failed at times to serve their patients, choosing instead to serve their employers (often the employer of their patients). Examples exist where health professionals informed the employer of hazards in the factory that were causing disease in workers without telling the workers, or, worse, while reassuring workers of the safety of the workplace. This dilemma does not arise with every patient or every encounter, but there is frequently a conflict between the interests of the worker or patient and that of the health professional's employer. If occupational medicine and industrial hygiene are ever to gain the respect of other medical and public health professionals, it is clear that a consistent policy must resolve these conflicts in favor of the patient.

3. As it is important for occupational health professionals to serve the workers whom they see as patients, the same professionals must be able to assure that occupational disease is prevented. In the United States system, that means that they must be able to influence the behavior of the employer. They must convince management to correct the problems. They must teach workers. Or, they must call in enforcement agencies.

Occupational medicine can benefit only a relatively few patients as a purely clinical specialty. Many problems are chronic and progressive, and most can be remedied only by avoiding exposure. Thus, the effectiveness of occupational physicians hinges almost entirely on their ability to prevent disease. Occupational health research must also lead to prevention, with the understanding that basic science advances may have to precede preventive programs. Eventually, both clinical practice and research in occupational medicine will be judged by their ability to prevent disease.

4. At one time, it may have been sufficient to diagnose an occupational disease and describe the exposure that caused it. With a new emphasis on prevention, all occupational health professionals must have an understanding of the approaches to prevention, especially engineering controls or control technology, and substitution. Since the health professional's role is to assure that workers are protected, to assist in the promulgation of new

standards, and to convince management to act to protect workers, it is not sufficient to link the disease to the exposure. It has become critical that we demonstrate that engineering controls are possible or that safer materials can be used. For example, studies of aluminum reduction have centered on coal tar pitch volatiles released in pot-room operations. Precision in describing the carcinogenic effects will be edifying, but either enclosing the pot-room or isolating the worker holds the key to prevention. Substitution is an accepted approach in manufacturing process. When one raw material is too expensive, another is substituted, often requiring modification in the process. Similar attention is now required to substitute safer for more hazardous materials or chemicals. The dye industry, for example, is being asked to find substitutes for benzidine and related dyes that have been found to cause cancer. Thus, effectiveness in occupational health requires an awareness of production technology.

5. Epidemiology is the basic science of all public health, but we are confronted with problems that defy the epidemiologist. How can we prevent diseases that have a long latent period between exposure and manifestation if we must wait for the epidemiologist to warn us? With many new chemicals introduced into the workplace each year, occupational health today must rely on laboratory tests to help set public health policy. Both animal studies and in vitro tests for toxicity, mutagenicity, teratogenicity, and carcinogenicity will have to suffice for many major decisions about what exposures are likely to be dangerous and therefore must be avoided. Similar results will have to guide decisions about the safety of industrial processes and the desirability of substitution and other preventive measures. A clear understanding of the uses and limitations of toxicology and laboratory medicine is now essential to practice occupational medicine. With more experience, scientists will no longer be concerned that predictive tests are misunderstood or misused in public health decisions. We will realize that the certainty required to take a protective and conservative public health action is generally less than that required to prove a basic research hypothesis.

In conclusion, occupational health is the application of biology, medicine, epidemiology, engineering, economics, education, politics, the law, and other disciplines to protect workers from diseases of the workplace. With this diversity of disciplines, the challenge will always be exciting and intellectually stimulating.

*Anthony Robbins*

# Preface

Although work-related disease is common and preventable, health professional schools in the United States seldom provide instruction in its recognition and prevention. Because one reason for this oversight is the absence of adequate curricular and resource materials in occupational health, we developed this textbook. Although we planned *Occupational Health* for medical students, we also designed it to be useful to practicing physicians and students or practitioners in other health disciplines.

We believe that the most important distinguishing feature of occupational diseases and injuries is that, in principle, they are preventable. We therefore emphasize throughout this book the crucial role that health professionals can play both in recognizing work-related medical conditions and in taking appropriate measures to prevent them. Too often, health professionals have believed that work-related medical problems are part of progress and advanced industrial development, that therefore they will always be with us, and that whatever we do will make little difference. Our text is intended to facilitate a shift in this belief. Work-related medical problems, in fact, can be substantially decreased or eliminated, and health professionals have vital roles to play. But to do so health professionals must change their orientation about occupational disorders from after-the-fact treatment to early recognition and prevention. While participating in the prevention and control of work-related disorders, health professionals must recognize that occupational health deals with a body of scientific information in a complex political, social, and economic arena. This arena is filled with often-conflicting interests, perspectives, assumptions, and approaches to recognizing, defining, treating, and preventing problems. For example, in the United States, the occurrence of occupational diseases or injuries often implies that some individual or group has been at fault and therefore legally responsible for damages. We therefore also deal with a wide range of non-

medical subjects that are relevant to occupational health.

Part I focuses on general concepts and data concerning occupational health in the United States and aspects of work in America. Part II is devoted to various approaches to recognizing and preventing occupational disease. Part III addresses hazardous workplace exposures and their effects. In contrast, Part IV describes occupational disorders by organ system. Part V deals with special problems and opportunities in the field, ranging from problems faced by women and minority workers to workers' compensation and disability evaluation. Finally, three appendixes provide detailed information on workplace toxins, training and career opportunities in occupational health, and other sources of information in this field.

The variety of perspectives is also reflected by the diversity in contributors. Their backgrounds, viewpoints, and current activities vary widely. They include primary care and specialty physicians who work or have worked in academia, industry, labor, and government. And they also importantly include professionals in industrial hygiene, safety and ergonomics, psychology, labor, economics, law, and sociology. In developing and editing this text, we did not attempt to present a single point of view because in occupational health there is no such thing.

There is also diversity in format of presentation of material in the text, which reflects the diversity and excitement in this field. We have used case studies, tables, photographs, drawings, boxes, and other materials to make the book not only informational but also explanatory, interesting, and readable. Bibliographies in each chapter, appendixes to some chapters, and the appendixes at the end of the text are designed to lead the reader with interest in a particular subject to further sources of information. This book is designed to be used primarily as a textbook, not a reference book; therefore, references are kept to a minimum, many of the tables are not comprehensive but rather illustrative, and technical detail on diagnosis, treatment, and prevention is not included.

A comment on the use of the term "health professional" is in order. Although the physician or nurse has traditionally been the provider of health care for work-related disorders, we often refer to the "health professional." This is in recognition of the increasing roles and responsibilities in this field of nurse practitioners, physician's assistants, industrial hygienists, and occupational safety and ergonomics specialists.

In sum, our primary intent is to present basic information that we believe is valuable to all health professionals. Ultimately, the recognition, treatment, control, prevention, and compensation of occupational diseases and injuries must be made as objectively and compassionately as possible. It should necessarily be based on good science and medicine and the recognition of the health rights of workers, including the right to a safe and healthy workplace. *Occupational Health* is intended to contribute to this end.

*Worcester and Boston, Massachusetts* *B.S.L.*
*D.H.W.*

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