

THE MANAGEMENT

OF PAIN

VOLUME

I

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# THE MANAGEMENT OF PAIN

SECOND EDITION

VOLUME

I

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*This volume is dedicated to my wife*

*Emma Louise*

*a magnificent human being whose sympathetic understanding and wonderful virtues as a wife and a mother have been a constant source of wonderment, inspiration, and support, without which this and all other academic activities would have been impossible*



# PREFACE

diagnosis and the therapeutic modalities that can be used.

The book consists of five parts. The chapters in *Part I* contain basic scientific and clinical information. Chapter 1 is a historical overview of pain concepts and treatment, and Chapter 2 contains definitions and the taxonomy of pain published by the International Association for the Study of Pain (IASP). Section B (Chapters 3 through 5) presents an overview of the anatomic, physiologic, and biochemical substrates of pain and a discussion of the psychologic reactions to, and determinants of, pain. Section C is devoted to general considerations of various aspects of pain, including a chapter on applied anatomy especially relevant to the diagnosis and treatment of acute and chronic pain, followed by two chapters that consider the epidemiology, mechanisms, and effects of acute and chronic pain. The last chapter of *Part I* contains a brief discussion of the evolution and current status of multidisciplinary/interdisciplinary pain programs for research, education, training, and patient care. The material in this first part should prove especially useful to family physicians and to students and residents undertaking specialization.

*Part II* consists of 21 chapters on acute painful conditions and chronic pain syndromes that can involve different parts of the body. The information is intended to provide a general discussion that will minimize repetition of certain points regarding causes, pathophysiology, symptoms and signs, diagnosis, and therapy when considering a pain syndrome in a particular region of the body. For example, Section A contains chapters on pain of neuropathic origin such as peripheral nerve disorders, causalgia and other reflex sympathetic dystrophy, and central pain and other disorders, each of which can cause pain in several regions of the body. Thus, when considering neuropathy with neuralgia in the upper limb, chest, abdomen, or lower limb, the reader can refer to the general discussion in this part of the book and then turn to the appropriate chapter in *Part IV*. The last two chapters in *Part II* are devoted to special considerations of pain in infants, children, and the elderly.

The six chapters in *Part III* are devoted to the approaches and methods recommended for the assessment of patients with complex pain problems. Whereas diagnosis of causative factors is usually relatively simple in acute painful conditions such as injuries, burns, and visceral disease and in some chronic painful disorders such as arthritis and cancer, assessment of patients with complex chronic pain problems is necessarily comprehensive and time consuming.

Throughout this part as well as other parts of the book, emphasis is placed on an integrated approach to the evaluation and treatment of patients with pain.

*Part IV* deals with pain in the head, neck and upper limb, chest, abdomen, pelvis, and low back and lower limbs. Each section is introduced by a chapter that pro-

The purpose of this textbook, like that of the first edition published in 1953, is to present a comprehensive discussion of the fundamental aspects of pain, of the various diseases and disorders in which pain is an important problem, and guidelines for managing patients with various acute painful disorders and chronic pain syndromes. Although a number of books and monographs on specific aspects of pain have been published during the past decade or so, none is complete enough to serve clinicians as a guide to the effective management of such a broad, multifaceted, and complex health problem as pain. It is necessary to consult several books in order to obtain information regarding the substrates, causes, pathophysiology, symptoms and signs, diagnosis, and treatment of pain and on the therapeutic modalities in current use and how to apply them appropriately. Unlike other major books on pain, which focus primarily or wholly on chronic pain, this book considers all acute painful disorders as well as virtually every chronic pain syndrome that has been described in the medical literature.

The book is intended to serve both as a textbook and as a complete reference work for practitioners of every field of medicine, because pain is universal and is the primary reason why patients seek the counsel of physicians and other care providers. It has been written for, and should be useful to, four groups of readers: (a) family physicians, dentists, and other caregivers, who are usually the first to see patients with pain; (b) specialists in internal medicine, neurology, neurosurgery, physiatry, psychology, psychiatry, and anesthesiology and others who have had no special training in clinical algology but who frequently encounter complex pain problems; (c) students of medicine, dentistry, nursing, and behavioral sciences and recently graduated physicians who are undertaking postgraduate training for specialization; and (d) clinical algologists. The first and second groups can use it as a reference source in helping to make or to confirm the correct diagnosis of complex pain problems and to deduce what therapy or combination of therapies should be carried out and what treatments should *not* be done. In many cases, therapy can and should be carried out by the patient's primary physician; in others the patient needs to be referred to a specialist with skills in a specific therapy, or more frequently to a multidisciplinary/interdisciplinary facility for diagnosis and therapy of pain. By providing appropriate guidelines, it is hoped that patients will be spared the risk of iatrogenic complications such as the development of chronic pain syndromes, drug toxicity, useless operations, and other ineffective therapies. Students and residents in specialty training will find useful the information on the basic aspects of pain as well as the clinical considerations of conditions encountered in their particular specialty. The clinical algologist will find in-depth discussion of all aspects of complex chronic pain syndromes including guidelines to help in the differential

vides a brief overview of the anatomic and physiologic bases of painful conditions in that region, a summary of the most important points in evaluating patients with, for example, pain in the head, and a table summarizing the etiology and differential diagnosis of pain in the specific region. Subsequent chapters in Part IV deal with painful disorders and pain syndromes involving different body systems, such as the nervous system, musculoskeletal system, viscera, and vascular system. This classification of pain syndromes, according to regions and systems, was used in the first edition of this book and was considered to be one of the most important and practical contributions to the clinical management of pain. Moreover, this classification approach was adopted by the IASP as axes I and II of its classification. Many chapters in this part of the book discuss painful disorders not discussed at all in Part II, whereas others present material that complements the information contained in Part II.

Part V is devoted to discussion of all therapies currently used for the relief of pain. Each of the seven sections has chapters that describe specific therapeutic modalities for the symptomatic control of acute and chronic pain. The word symptomatic is intended to convey the fact that most of these therapies are not intended to eliminate the cause of the pain but rather to reduce or eliminate the pain *per se*. (Methods to eliminate the cause of pain, when this is possible, are discussed in various chapters of Part IV dealing with various diseases that cause acute or chronic pain.) The therapeutic modalities are presented in descending order of frequency and practicability of use by health professionals and according to whether they are invasive or noninvasive.

Each section is preceded by a brief historical perspective on the method or techniques, and in some sections, guidelines for their use. Each chapter includes such basic considerations as the pharmacologic, physiologic, psychologic, anatomic, or physical bases for the use of the procedure; its indications; a summary of the results obtained in its application to various painful disorders; and specific comments on side effects, complications, contraindications, and advantages and disadvantages of each procedure. Description of the technique of application varies according to the procedure: some simple techniques and procedures that can be done by family physicians or specialists—such as drug dosage or simple regional blocks, TENS, certain physical therapies, and certain psychologic techniques—are described in sufficient detail to permit either the generalist or the specialist to learn how to do and apply them.

Description of complicated regional anesthesia procedures and neurosurgical operations is brief and is not intended for physicians skilled in their application, nor is it intended to be used as the sole basis for learning and applying them. Rather, the primary objective is to provide readers who do not practice these procedures with information on what the procedure entails and its indications, advantages, disadvantages, and complications. This is in accordance with my long-held conviction that anyone managing patients in pain should be acquainted with all currently available therapeutic procedures, because only with such knowledge and broad perspective can the physician inform and guide the patient as to what therapy (or combination of therapies) is suitable for each particular pain problem.

The last section, composed of a single chapter, deals with multidisciplinary/multimodal therapies in the treatment of patients with complex chronic pain syndromes.

An attempt has been made to present a balanced view of how these modalities might be combined to achieve the best results in the management of patients with pain, particularly those with complex pain syndromes.

The book has been organized to minimize duplication of data and repetition of discussion of all aspects of painful disorders. For example, Chapters 7 and 8, devoted to an overview of epidemiology, mechanisms, and effects of acute and chronic pain, are intended to minimize repetition of these aspects in discussing the various acute and chronic pain disorders in Parts II and IV of the book. Similarly, the general discussions in Part II are intended to minimize repetition in Part IV. On the other hand, there is considerable repetition of some aspects of specific pain syndromes. Moreover, in discussing results obtained with each of the therapeutic modalities in Part V, there is duplication of data presented in various chapters in Parts II and IV. However, the data on results and complications presented in Part V are more comprehensive and include not only those experienced by the author(s) of each chapter, but a summary of data contained in the most important published reports. Repetitions, where they do exist, serve two purposes: to emphasize important issues and to minimize the need for readers to turn pages from one section to the other.

It is widely recognized that multiauthored books are often uneven in format and quality and frequently contain conflicting and contradictory information. These considerations prompted me to write virtually the entire first edition of the book. Subsequent reviewers emphasized its unity and described it as "encyclopedic," "monumental," and "a masterpiece," and it became known worldwide as "the bible of pain." These considerations would have suggested that I undertake the writing of the second edition alone. However, the recent vast advances in basic and clinical aspects of pain, the development of more sophisticated and highly specialized diagnostic and therapeutic modalities, my strong desire to publish the book in a reasonable time, and most importantly, my desire to produce a book that would reflect the multidimensional nature of pain and the multidisciplinary/interdisciplinary approach to its management compelled me to decide to have contributors.

To minimize the aforementioned disadvantages, I expanded hundreds of hours and exerted significant efforts during the four-year period required for the completion of the book. First, in the planning stage I developed a detailed outline of the book similar to, but larger than, the first edition and also developed uniform formats and outlines for chapters that would be in Parts II, IV, and V of the book. These were subsequently reviewed by my three collaborators: John D. Loeser, who assumed the responsibility of editing chapters dealing with neuropathic pain and neurosurgical operations, and C. Richard Chapman and Wilbert Fordyce, who had the task of reviewing chapters on pain of psychologic origin and the section on psychologic analgesic techniques. The outlines were sent to some four dozen authorities working in the field with the request to make suggestions for improving the organization of the volume. Subsequently I reviewed the responses and had semiweekly meetings with my three collaborators during the developmental stage of the book. In addition to considering the suggestions, they helped me in selecting contributors to the area: they were responsible for. Together with a letter of invitation, each prospective contributor was sent material that included a brief overview of the first edition, details of the objectives of the

second edition, and description of the five parts. Once contributors accepted, they were sent copies of the aforementioned formats that were intended to be conducive to uniformity of chapters in the various parts of the book and were requested to submit a detailed outline of the chapter or chapter section they agreed to write. Once the outlines were received, I studied them carefully and reviewed the most current literature (books, review articles, etc.) on each specific subject to evaluate the proposed outline sent me and to make whatever revision I deemed important. I also enlisted the opinion of my collaborators. The revised outline was then returned to the author with a re-emphasis of the importance of adhering to the format and to the suggested size of the chapter. Each contributor was also requested to submit copies of illustrations to supplement the text. Some months later contributors sent in their initial drafts, which I reviewed and studied carefully. In some instances I enlisted the help of my collaborators in this review process. The chapters were then returned to the contributors, frequently with requests for deletion or addition of material, clarification or amplification of specific points, and revision of the format of both the text and tables. This process was repeated with subsequent drafts; consequently most chapters underwent at least three or four drafts, and some as many as six to eight drafts in order to make them comprehensive, up-to-date, and most important, uniform.

The many illustrations have been included to supplement the detailed description of the text and thus facilitate the task of the reader. Some of these have been taken from the first edition of this book and from other books I have written, many are new, and others are modifications of published figures. Mrs. Domenowske and I spent an immense amount of time and effort, not only to develop the new illustrations, but in modifying published figures

rather than borrowing the original. This was done for the sake of uniformity of artistic style and because the modified illustration emphasizes important points relevant to the subject on hand not found in the original figure. A significant number of illustrations and data on anatomic structures in various chapters of Part IV are repeated in chapters in Part V. This repetition and the fact that the illustrations and the detailed description have been learned by physicians and can be found in textbooks of anatomy, orthopedics, anesthesia, neurosurgery, physical therapy, etc., might be considered by some as superfluous and unnecessary. However, I have included them to refresh the memory of physicians who have not retained the information, for health professionals who have not been taught such information, and most importantly to preclude the need for the reader to consult a number of other textbooks on reading this book. This is pursuant to my long-held philosophy expressed at the beginning of this preface that the comprehensive textbook should provide readers with a catholically thorough exposition of the subject.

Another aspect of the book intended to facilitate the task of a busy reader is that less relevant facts—material that has been included because of its academic importance, or for the sake of completeness, or for consumption by students and those who wish to delve deeper into the problem—are presented in small type. These can be skipped without losing continuity of thought. In this manner, completeness, detail, and thoroughness are not sacrificed and emphasis is laid on the practical aspects of the problem at hand. The references at the end of each chapter consist of the most important books or review articles containing more detailed exposition of subjects or citation of important publications on a particular subject.

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*John. J. Bonica*



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A book of this nature is made possible only by the contributions of many individuals. The information set forth in Chapters 3 and 4 and parts of other chapters represents the fruition of the efforts of many basic and clinical scientists who have spent untold time and efforts to solve the "puzzle of pain." In writing various chapters dealing with basic and clinical issues, I consulted numerous major textbooks on anatomy, neurophysiology, biochemistry, internal medicine, oncology, orthopedics, general surgery, neurosurgery, psychology, and psychiatry. Although these sources are cited in the introduction to each chapter, I wish to acknowledge the invaluable help I received from these books and thank their authors and publishers.

I wish to express my sincere appreciation and thanks to contributors to the two volumes for their cooperation, their patience, and the time spent in revising chapters and complying with my many requests. I am especially indebted to Dr. John D. Loeser, who not only contributed a significant number of chapters, but was extremely helpful in reviewing a number of early drafts of chapters and making editorial suggestions that helped me immensely. Drs. C. Richard Chapman and Wilbert Fordyce also contributed a number of chapters and helped in the editorial review process, particularly of chapters in Section B of Part II and in Part V. Andrew C.N. Chen provided immense help in reviewing the pain literature.

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