



Bonica's
Management of
Pain
FIFTH EDITION



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**TO THE LASTING MEMORY OF JOHN
BONICA AND HIS ENDURING QUEST TO
END NEEDLESS PAIN.**



John and Emma L. Bonica



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Foreword

This, the fifth edition of Bonica's Management of Pain, continues the tradition that John J. Bonica, MD, started with the publication of the first edition in 1953. That was a herculean endeavor and a monumental achievement, as no one had ever attempted to comprehensively describe all that was known about pain and how to diagnose and treat it. The first edition was almost exclusively the work of Dr. Bonica; only minor sections were contributed by his colleagues. It took him 30 years to bring out the second edition, which was the product of not only Bonica but also of a long list of contributors who in fact wrote more than half of the pages. This edition was characterized by extensive consideration of the anatomy and physiology underlying pain and by the discussion of multidisciplinary pain management and pain clinics.

The field of pain medicine, launched by Bonica's own practice and teaching and by his founding of the International Association for the Study of Pain, had flourished by the time of the second edition, as pain medicine and research were developing rapidly. Bonica knew that another edition of the Bonica's Management of Pain would have to be written to keep his textbook current. Unfortunately, his health limited his ability to undertake this task. Shortly before he died, I promised him that there would be a third edition that I would edit with the help of colleagues at the University of Washington. This was published in 2000, firmly based on the format of the prior editions but expanding the content to keep up with developments in both basic science and clinical pain management.

Another decade passed; the sciences basic to pain and clinical practice continued to rapidly expand. The fourth edition of this great book was

produced by new editors who assembled an all-star group of contributors to continue what Bonica began over 60 years ago. Now, it is time for the fifth edition to be created to set the pace for the coming decade of pain research, teaching, and patient care.

Whereas everyone active in pain research or patient care knew John Bonica in the last 30 years of the 20th century, we now have spawned a generation or two of workers in this field who know him only through his publications or the occasional prophetic story. Although this is an understandable reality, it is unfortunate. John Bonica was a truly great man whose efforts almost single-handedly caused pain to be put on the road maps of both basic science and health care. As I wrote in his obituary published in *Pain*¹:

“He cared about his patients for whom he tirelessly worked. He cared about the research that scientists undertook to understand the mechanisms of pain. He cared about those who suffered in far-away places; he wanted their doctors to learn about pain management. He cared about how governments impacted the delivery of pain management services. He cared about his students, trainees, and colleagues. He really cared about those who attempted to continue what he had started. He cared about his children and his wife, although his career took time away from them.”^(p2)

More than an inscription on his gravestone, the continued life of Bonica’s *Management of Pain* tells us of his accomplishments. It was a privilege to have known him and his family. Working for and with him and carrying on the traditions that he launched has been an honor. JJB, as he was known to all who worked alongside him, would have been thrilled to see the advances that he inspired. His greatness will live on through the publication of this fifth edition.

JOHN D. LOESER, M.D.
June 2018

¹Loeser JD. Obituary: John J Bonica, M.D. and Emma B. Bonica. *Pain* 1994;59:1–3.



Preface to the Fifth Edition (2019)

This book was first introduced 66 years ago, at a time that many believe marks the beginning of the multidisciplinary field of pain management. The idea for a clinical textbook devoted to the management of pain came from John Bonica, and in its first edition, he wrote that the book offers a synthesis of information from disparate disciplines to form a complete discussion on pain and its management. Such a book, he believed, would strengthen the field of medicine by assimilating new insights and growing knowledge from many interested disciplines. Since the first edition in 1953, the purpose of the book has remained the same despite extraordinary growth in the science and practice of pain management and the emergence of pain medicine as its own discipline. The book has remained a key reference for clinicians largely because of the high quality of the original book and its ability to attract world-class experts to engage in his project, even years after Dr. Bonica's death in 1994. It was with trepidation and pride that we, the three chief editors, first accepted the task of shepherding the fourth edition of this essential book to publication. We quickly realized that we were no match for Bonica, who formulated and wrote large parts of the original book himself, and from the start, we solicited help from expert subeditors. As an editorial group, we made several key decisions: that we would keep the book near its original manageable size, that understanding anew the key role played by central mechanisms in pain, that we would shift the book's emphasis from its focus on peripheral (anatomically based) mechanisms to one with a greater focus on neural (global) mechanisms, and that we would include new or updated chapters on issues that impact clinical pain management such as pain training,

regulatory and political issues, and conducting clinical trials.

In his first edition, John Bonica tells us that he was called to write his book out of the “. . . deep feeling for those who are afflicted with intractable pain, and by an intense desire to contribute something toward the alleviation of their suffering.” This commitment originated from his experiences in treating wounded soldiers with intractable pain during the Second World War. It is sad and ironic that this fourth edition was published in 2009 at a time when inadequate treatment of pain had come to be more widely recognized than ever and, in part, informed by wounded soldiers returning from the wars in Iraq and Afghanistan. In the year just prior to publishing the fourth edition, the US Congress passed, and the President of the United States signed into law, two bills that aimed to improve pain care for active military personnel and veterans, respectively. More than 50 years after Bonica began to raise awareness about the plight of those in pain, our society was coming to increasingly value safe and effective control of pain, and the trend echoed Bonica’s vision of a world free of suffering from treatable pain. Over the past 9 years, since the publication of the fourth edition of the textbook, there has been widespread recognition of a devastating crisis in opioid abuse and deaths as well as excessive prescribing of opioids. Much controversy has arisen regarding the use of opioids, particularly opioids for chronic pain. This controversy plays out in the pages of this the fifth edition, and you will find opposing and at times mutually exclusive opinions expressed. We, the editors, did not try to align the opinions of all of the experts expressed in the text. We allow readers to consider the disparate opinions on their own while we await the science we need to point us toward the best practices.

The fourth edition of the textbook remained faithful to Bonica’s original intent that his book should provide a comprehensive reference for practicing clinicians across all disciplines. In 1953, Bonica was one of few experts in a nascent new field that would become pain medicine, and he almost single-handedly undertook the task of producing the first clinical textbook. Now, there are many experts with a remarkable depth of knowledge. It is a testament to Bonica that the many leading authorities contributing to the fourth and now this fifth edition as authors and section editors feel sincerely indebted to him, and they have willingly given of

their time to maintain his legacy. Through its second and third editions, the book maintained a structure and organization similar to the first edition. In the fourth edition, every chapter was revised, substantially rewritten, or represented a completely new chapter and or topic. With a text of such broad scope, some degree of overlap was inevitable; indeed, we have often allowed significant overlap, so that each chapter would stand on its own during independent perusal or study.

Like the fourth edition, this fifth edition of the book is divided into six parts: (1) Basic Considerations; (2) Economic, Political, Legal, and Ethical Considerations; (3) Evaluation of the Pain Patient; (4) Pain Conditions; (5) Methods for Symptomatic Control; and (6) Provision of Pain Treatment. Basic Considerations offers an orientation to the history of pain management and the concepts and paradigms fundamental to this field, including taxonomy, basic science, anatomy, physiology, psychology, and social science. Economic, Political, Legal, and Ethical Considerations represents new content for this textbook, reflecting the emerging social impact of pain and pain management. Evaluation of the Pain Patient covers physical and psychological assessment and use of imaging and other technology-based testing as well as special assessment for function, disability, addiction, and multidisciplinary care. Pain Conditions is the largest single part of the text, comprising 9 sections and 53 chapters. These sections include neuropathic pain syndromes; psychological contributions to pain; vascular, cutaneous, and musculoskeletal pains; pain due to cancer; acute pain; pain in special populations; visceral pain; regional pain; and neck and low back pain. The section on pain in special populations addresses populations such as children, older persons, and those with pain and addiction. The regional pain section is a holdover from past editions and covers pain disorders that are associated with discrete parts of the body such as facial pain, cranial neuralgias, and pain syndromes associated with upper or lower extremities. Methods of Symptomatic Control is another large part of the text which is partitioned into the following six sections: pharmacologic therapies, psychological techniques, physical and other noninterventional therapeutic modalities, implanted electrical stimulators, interventional pain management, and surgical approaches. Provision of Pain Treatment is the final part of this text, addressing

systems for delivery of care and means for training pain specialists. Special areas of medicine in which pain has a prominent role are addressed, including primary care, end-of-life care, intensive care, and emergency care. The text concludes with a brief view toward the future of pain management.

This book would not be possible without the extensive contributions of the section editors and particularly the efforts of the chapter authors; the success of this work is directly attributable to these individuals. The editors are indebted to Brian Brown and Keith Donnellan of Wolters Kluwer who served critical roles in shepherding this project into existence and managed its development with skill and diplomacy.

As the field of pain medicine has evolved, so has this text. Despite much that is new or revised, the text remains incomplete, a reflection of an emerging field that awaits profound discoveries and development. Through the many chapters and pages of this new fifth edition of his classic text, we hope that John Bonica's passion for an integrated, coherent, and compassionate field will live on. Like Bonica, our central purpose is to assist students and practitioners across all medical disciplines, advance their knowledge of pain medicine, and relieve suffering.



Preface to the First Edition (1953)

The purpose of this book is to present within one volume a concise but complete discussion of the fundamental aspects of pain, the various diseases and disorders in which pain constitutes a major problem, and the methods employed in its management, with special emphasis on the use of analgesic block as an aid in the diagnosis, prognosis, and therapy.

Although several books dealing with certain phases of this problem are available, none is complete from the standpoint of the practitioner; for it is necessary for him to consult several texts in order to obtain information regarding the cause, characteristics, mechanisms, effects, diagnosis, and therapy of pain and management of its intractable variety with analgesic block and certain adjuvant methods. The present volume is the product of the author's desire to facilitate the task of the busy practitioner and to supply him easily accessible information with the conviction that this will induce more clinicians to employ these methods of diagnosis and therapy.

One need not elaborate on the reasons for writing on the management of pain, for reflection emphasized that this age-old problem is still one of the most difficult and often vexing phases of medical practice—a fact well appreciated by most physicians. This fact, as well as other reasons, are presented in the introduction and are emphasized throughout the book, particularly in [Chapter 5](#).

I have been motivated to write this volume by a deep feeling for those who are afflicted with intractable pain, and by an intense desire to contribute something toward the alleviation of their suffering. The plan for its writing was germinated almost a decade ago during the Second World War, while I was Chief of the Anesthesia Section of a large Army hospital,

where I was afforded the opportunity to observe and manage an unusually large number of patients with severe intractable pain. The gratifying results obtained with analgesic block in some instances impressed me with the efficacy of this method in selected cases. In addition, the fact that these procedures effected relief which frequently was not only dramatic, but outlasted by hours and days the transient physiochemical interruption of nerve impulses, fascinated me and aroused my interest. Perusal of the literature revealed a paucity of material on this subject—a situation which has not changed much since then and which clearly indicated an obvious need for a practical source of information about this perplexing phenomenon and the application of analgesic block to its management.

This book is composed of three parts. The first part includes a discussion of the fundamental aspects of pain. While some of the material, on superficial thought, might be considered too detailed or entirely unnecessary, it has been included because of my conviction that in order to manage pain properly its anatomical, physiological and psychological bases must be understood. As is true in all fields of endeavor, a thorough knowledge of fundamental principles is an essential prerequisite without which optimal results are precluded. In order to diagnose and treat it properly, the physician must know the course of pain from its place of origin to the apperception centers in the brain and must be well versed in all the essentials and components of which pain consists; he must know its causes, mechanisms, characteristics, varieties, its localizations and significance, and the mental and physical effects it produces.

The second part deals with methods and techniques of managing pain. It was originally planned to include only the method which is the central theme of the book—analgesic block. However, it was soon realized that while this important phase is, to be sure, here treated in a comprehensive manner, it does not present the complete story of the management of pain; because frequently other adjuvant methods are employed in conjunction with nerve blocking. To illustrate the point, trigeminal neuralgia is frequently treated with neurolytic blocks, but sometimes this does not afford sufficiently long relief, and neurotomy is resorted to. The pain associated with malignancy is managed with alcohol nerve block, but roentgen therapy is frequently employed as an adjuvant. Moreover

physical and/or psychiatric therapy constitute integral phases of the management of pain without which optimal results cannot be hoped for. After careful consideration, it was decided to include another section in Part II in which are presented methods that are frequently employed in conjunction with analgesic block. It is hoped that such inclusion will give the book a wider scope and greater usefulness.

In the third part are presented various diseases or disorders with painful syndromes which have been and can be managed with analgesic block with or without the aid of other methods. The arrangement of this part is explained in detail on page 671. It is suggested that the reader refer to that page before proceeding further to read any on the pain syndromes. Though the material in this part mainly represents my observations, clinical impressions, and opinions, obtained or developed from experience with, and statistical analysis of, many thousands of cases, it also includes unpublished data of several outstanding authorities who have kindly placed them at my disposal. Moreover, it includes the published views and clinical experiences of others, with credit given where it is due.

In writing this comprehensive treatise, which has involved no small amount of time and effort, the one principle which has always been kept in mind and adhered to has been to present the fundamental considerations and principles of the problem before the practical aspects are discussed.

I have endeavored to make this book as complete as possible, and to this end have thoroughly searched the literature, both English and foreign, and have taken from it all that I thought might be valuable to the reader. In order to comply with the aim of completeness and still keep the book concise and within reasonable size, the material has been selected with care and discretion. In a field so vast and complex as pain, it is unavoidable that what might be thought sufficiently important to deserve detailed discussion is presented in an abbreviated manner or entirely omitted. In other instances, mere mention or omission represents a reluctant compliance with the requirements dictated by the size of the volume. Nonetheless, I believe thoroughness and important detail have not been sacrificed. The bibliography represents the most important references, and many excellent articles on each subject were also reluctantly omitted for that reason.

The book is intended for practitioners of every field of medicine, because pain is universal and provides the main reason why patients seek the aid of the doctor. It is hoped that it will prove useful, not only to the anesthesiologist, neurologist, neurosurgeon, orthopedist, and physiatrist to whom especially is relegated the task of caring for patients with intractable pain, but also to the general practitioner, surgeon, internist, psychiatrist, and any other physician who may be confronted with this problem. It is especially intended for general practitioners, particularly those practicing in smaller communities where the services of a specialist in analgesic blocking are not available. With this aim in mind the techniques of analgesic block are presented in such a manner that most of them may be effectively accomplished by any physician, even though he may be a novice with regional analgesia. In order to facilitate the task of the busy reader, less relevant facts—material which has been included because of its academic importance, 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 omitted without losing continuity of thought. In this manner, while completeness, detail, and thoroughness are not sacrificed, emphasis is laid on the practical aspects of the problem at hand.

The unusually large number of illustrations, many of which are original and composed from dissected material or clinical cases, have been included with the conviction that these frequently tell the story much better than words.

A book of this nature is made possible only by the contribution of many individuals. The information set forth in the first part of the volume represents the fruition of the joint effort of anatomists, physiologists, pharmacologists, neurologists, neurosurgeons, anesthesiologists, psychiatrists, and many other laboratory and clinical investigators who have spent untold time, labor, and effort to discover the mystery of pain. I am grateful for their elucidating knowledge. To clinicians who have reported their experiences, and to others who have placed at my disposal unpublished data, observations, and opinions, my sincere thanks. I am particularly obliged to General Maxwell Keeler, and Col. Clinton S. Lyter, of Madigan Army Hospital for their continuous cooperation in obtaining

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