Pathology of Bone and Joint Disorders
With Clinical and Radiographic Correlation

Second Edition

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To our mentors: Howard Dorfman and Frank Sim
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Preface: boundary crossings

This book is an introduction to orthopedic pathology co-written by a bone pathologist and an orthopedic surgeon. It is based on our day-to-day collaboration at The Johns Hopkins Hospital. Not only do we work together in clinical medicine, we also teach together, and, in composing this book, we draw from both our daily practice and our in-service course in bone pathology. We instruct residents in pathology and orthopedic surgery, and it is for these students this book is primarily intended. In addition, however, we believe it provides practicing physicians with a useful survey of bone and joint disease. Although we keep our discussions at an introductory level, we supply appropriate references for those readers who want to inquire further. In our view, the information in this volume represents the minimum that residents in pathology and orthopedic surgery should know by the completion of their training.

Our underlying assumption throughout is that bone and joint diseases are best viewed from multiple angles. Diagnosing skeletal disorders requires the close interaction of pathologists, orthopedists, and radiologists. Therefore, we emphasize the correlation of pathologic features with clinical history and radiographic images. We believe this multidisciplinary approach should inform students’ learning from the beginning. That is, when pathologists begin to learn about bone diseases, they should, at the same time, learn to read radiographs. The radiographs represent the gross pathology of bone and joint disease, and they provide the context for interpreting the histologic features. Conversely, orthopedists and radiologists must learn to look at pathology slides. Seeing tissues under the microscope will help them better understand what a disease is doing to the patient.

In sum, working with bones requires physicians to cross boundaries between specialties. When pathologists cross into the realm of images and learn to converse with radiologists, they return home with a better understanding of their own discipline. And when orthopedists speak with pathologists, they see their patients in a new light. These boundary crossings may be likened to the enriched comprehension of English which results from studying French. This multidisciplinary approach is what we practice and teach, and it is what we encourage in this book.

We organize this volume into 18 chapters, and they are best read in order, from first to last. We begin, in Chapter 1, with an overview of skeletal diseases and the principles of their diagnosis. In Chapter 2, we leave this general picture to begin building the foundational vocabulary needed to study bone disorders. That is, we summarize the anatomy and physiology of normal bone, subjects required to understand abnormal bone. In subsequent chapters we explore each of the major bone disease categories we outline in Chapter 1: genetic, metabolic, traumatic, infectious, circulatory, and neoplastic. In addition to bone disease, we also discuss joint diseases and the pathology of failed total joint arthroplasty, including metal-on-metal hip prostheses. To this second edition, we have added discussions of molecular genetics of many orthopedic diseases and new imaging modalities such as PET scan.

In most chapters, we provide historical background of the diseases we describe, detailing archeological evidence of skeletal disorders and honoring individuals whose work has led to our current knowledge. This is to remind us that, in the words of Sir Isaac Newton, “We stand on the shoulders of giants.” It also helps us remember that humans have suffered from these diseases for thousands of years.