BASIC SCIENCE
OF NUCLEAR
MEDICINE

The Bare Bone Essentials

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This book is dedicated to my wife Susanna.
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This book is an outgrowth of a set of lecture notes that I prepared for the nuclear medicine student technologists and resident physicians. Over the years in teaching the basic science of nuclear medicine, I found many students lost track of the important points while wading through all the comprehensive texts. My lecture notes were prepared to direct the students' attention to principles I believed were important to understand the science behind nuclear medicine. Accuracy was often sacrificed in the notes to simplify the explanation. Similarly, in this textbook I have generalized many key principles for the sake of understandability instead of dwelling on minute technicalities. If a picture is worth a thousand words, extensive information graphics were called upon to supplement the explanation of abstract physics concepts. I also exercised my amateur photography skill to take pictures of items in my collection of parts discarded by the service engineers to give the readers a physical feel for how theory is translated to technology.

The readers may find many concept descriptions repeated throughout the text. This was done on purpose. One technique I found very effective in teaching difficult concepts was repetition. Many readers may have heard the proverbial saying that the only way to bring a point across to people is: “Tell them what you want to tell them, tell them again, and repeat what you told them.” I took this technique to heart as my style of teaching. Since I never heard comments in my years of teaching that my repetitive lectures sounded like broken records, I extended the redundancy approach to this writing. Because the intent of this text is to give a bare bone minimum introduction to the basic science behind nuclear medicine, some readers may find certain topics missing or lacking in detail. An up-to-date list of references is included at the end of the book for the interested readers to pursue in-depth discussions on topics of their interest.

One bold assumption I made at the onset is that most of my readers have severe allergic reactions to mathematics. I thus strived toward
keeping mathematics to the minimum necessary to show where certain
"must know" equations came from. When I had to subject readers to
heavy-duty equations, I fully explained them step by step with detailed
descriptions and elaborated on the meaning of the final equation.

Converting class notes to an organized textbook required far greater
thought and the help of experts than I initially anticipated. Unlike class
notes, the author is not there to explain if the reader does not under-
stand what is written in the text. I am therefore very grateful to the members
of the Editorial Board of the Society of Nuclear Medicine and Molecular
Imaging who thoroughly reviewed the manuscript and offered numer-
ous suggestions for improving the readability and clarity of the text. I
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