

Basics of PET Imaging: Physics, Chemistry, and Regulations

G. B. Saha

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Dr. Gopal B. Saha has written a clear and concise primer on PET. This text would be excellent for technologists, residents, or physicians who want to become familiar with the basics of PET and would also be an ideal reference for anyone preparing for accreditation examinations.

Dr. Saha begins his discussion of the fundamentals of PET at the atomic level. He reviews radioactive decay, interaction of charged particles, and several applicable equations. In the next chapter, he compares available PET systems and discusses the characteristics of different detectors, photomultiplier arrays, and hybrid scanners.

Chapter 3 outlines PET and PET/CT data acquisition. Dr. Saha has included several factors that can affect the acquired data, such as photon attenuation, normalization, random coincidences, scatter, and dead time. He also explains the differences between 2-dimensional and 3-dimensional acquisitions. From acquisition, the author moves to reconstruction in Chapter 4. In a detailed presentation, Dr. Saha explains filtered backprojection and iterative algorithms. He discusses the influence of partial-volume effects on reconstruction. This chapter also provides an overview of available software for digital storage and display.

Chapter 5 again compares available scanners but now discusses characteristics such as resolution, sensitivity, and scatter fraction. Dr. Saha explains the effects these characteristics can have on image acquisition and re-

construction. He also outlines system acceptance testing, as well as weekly and daily quality control.

Chapters 6 and 7 describe the production of PET pharmaceuticals, beginning with the operational basics of the medical cyclotron. Dr. Saha provides an easily understood outline of the complicated process of chemical production of PET pharmaceuticals. He explains targets, distillation, filtration, chemical processing, and quality control of common positron emitters.

Chapters 9 and 10 address current regulations governing PET centers and review radiation protection. Common billing and reimbursement procedures are also outlined. The author completes his discussion of PET with a review of current oncology and myocardial protocols.

Dr. Saha has succinctly dedicated each chapter to a particular topic. Several photographs, diagrams, and tables further each discussion. He ends each chapter with a series of review questions, additional references, and suggested reading. The answers to all questions, as well as several useful definitions and terms, are available in appendices at the end of the text. I found this book to be of great value both in content and in price.

Colleen M. Nall, MS, CNMT (N)(PET)
*Henry Ford Hospital
Detroit, Michigan*