Clinical PET-CT in Radiology
It has been nearly a decade since the first PET-CT scanners became commercially available. At the time of the initial launch of clinical PET-CT scanners it was thought at most 30% of the PET scanner market would be in the form of PET-CT scanners. Within only a few years (by 2006), however, PET-CT scanners replaced stand-alone PET scanners completely in commercial offerings, and today over 5,000 PET-CT scanners have been delivered worldwide. The remarkably rapid adoption of PET-CT is not entirely surprising, as the overwhelming clinical application of PET-CT has been body oncology imaging, and the merging of the anatomic and metabolic information provided by CT and FDG PET scans was a natural and already ongoing practice for body oncology imaging.

The original intent of PET-CT was to provide clinical CT and clinical PET in one scan procedure with the images sets inherently registered and aligned to facilitate interpretation of both modalities. The notion of merging the anatomic information of CT with the metabolic information of PET was suggested by a cancer surgeon in the early 1990s, but in fact the practice of integrating the interpretation of complimentary imaging modalities for clinical diagnosis has been ongoing in disease-based or organ system-based medical imaging subspecialties. This trend has accelerated recently with the widespread application of PACs and teleradiology as well as continued refinements in image registration and image fusion software. The acceptance of PET-CT hybrid scanners has more recently led to commercial SPECT-CT hybrid scanners and to the tentative development of PET-MRI scanners; the concept of hybrid imaging and multimodality imaging diagnosis is a broad and pervasive process occurring in medical imaging.

Since the introduction of commercial PET-CT scanners, published textbooks have approached the subject mainly from a nuclear medicine perspective, including applications to neurologic and cardiac imaging, and discussion of PET radiotracers other than FDG. The true necessity of the hybrid scanner applies to body imaging and in particular the vast majority of applications of clinical PET-CT today remain in body oncology imaging. In this textbook we bring together all aspects of PET-CT relevant to clinical body oncology imaging using clinical CT and clinical FDG PET. The intent is to provide practicing imaging physicians with both a comprehensive and practical text, which treats PET-CT as an integrated anatomic-metabolic medical imaging procedure applied to cancer imaging that it currently is, and was always intended to be. Ample coverage of the relevant physics and clinical oncology is included for reference. The physics and instrumentation chapters are oriented to provide an overview of the available technology and some of the physical concepts without entering into excessive detail. The clinical chapters are structured to provide concise and structured background regarding the clinical management of each cancer and the role of PET-CT imaging in all phases of patient management. It is assumed the reader has some background in both PET and CT interpretation. The intent of each clinical chapter is to help the imaging physician more completely understand the relationship and role of the integrated modality imaging with respect to the overall treatment of the cancer patient. We hope that this text will be a valuable companion for the imaging physician and further establish PET-CT in the mainstream of cancer imaging.

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