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BOOK BRIEFLY NOTED

Advances in Nuclear Oncology: Diagnosis and Therapy

E. Bombardieri, J. Buscombe, G. Lucignani, and O. Schober, eds. London: Informa Healthcare; 2007, 544 pages, 100 illustrations, $374.95.

Advances in Nuclear Oncology: Diagnosis and Therapy brings together a number of eminent authors in the field of nuclear oncology. The book is divided into 32 chapters dealing with both basic and clinical sciences as they relate to nuclear oncology. These chapters cover cell biology, chemistry, pharmacology, physics, computer sciences, instrumentation, radiopharmaceuticals, and numerous clinical topics applied to the imaging and therapy of cancer. The chapters are well illustrated with more than 100 figures (mainly multitechnique scans) and numerous tables and illustrations dedicated to the study of these techniques in various tumor types.

In this era of genomics and proteonomics, the book is particularly useful to the neuroradiologist interested in understanding the pathophysiology of cancer at a molecular level and how radiopharmaceuticals developed specifically to target malignant tumors can be useful as biomarkers for diagnostic and therapeutic purposes. Aberrations of gene-expression profiles are being rapidly discovered, and these discoveries are enhancing our understanding of the molecular pathology of cancer markers. A number of distinct clinical molecular imaging targets and therapeutic targets have been validated or are in the developmental stages. Specific chapters dedicated to various targeted molecular markers that can be imaged with scintigraphic approaches, such as positron-emission tomography (PET) and single-photon emission tomography (SPECT) combined with anatomic imaging systems such as CT or MR imaging, are extremely informative.

Chapters dedicated specifically to primary brain tumors and head and neck cancers are particularly useful to the neuroradiologist in understanding the efficacy of SPECT and PET/CT in these tumors. The authors discuss the various applications of these techniques, such as delineating tumors from non-neoplastic tissue, their utility in grading and prognosis, choosing the optimal biopsy site to obtain viable tissue, differentiating tumor from necrosis or opportunistic infections, assessing tumors of neuroendocrine origin, and evaluating the response of tumors to therapy and malignant progression.

Most of the remaining chapters, though less interesting to neuroradiologists, provide important insights into the role that nuclear imaging techniques play compared with conventional imaging in cancers of the lung, esophagus, colorectum, prostate, ovaries, breast, thyroid, the neuroendocrine system; hematologic malignancies such as lymphomas; and other dermatologic, bone, and soft-tissue tumors.

Radiopharmaceuticals for therapy of various specific malignancies appear extremely promising though currently limited in their application. A specific chapter on the therapy of brain tumors not only discusses the conventional surgical, radiotherapeutic, and chemotherapeutic treatments but introduces the reader to the application of new concepts using either systemically guided radioimmunotherapy or catheter-guided locoregional delivery systems. These applications may be of particular interest to interventional neuroradiologists and can complement the traditional therapeutic techniques or can be used as salvage therapy.

The pretargeted antibody-guided radioimmunotherapy technique (PAGRIT), used systemically or logoregionally in high-grade gliomas, has been demonstrated by the European Institute of Oncology to be highly effective, with no major adverse events. Furthermore, with a multimodal approach, locoregional PAGRIT in association with chemotherapy (temozolamide) showed efficacy and safety, with a significant increase in survival compared with surgery and external radiation therapy.

In the chapter, "Future Perspectives," the authors discuss the role of PET/CT in treatment planning in various cancers, including brain and head and neck malignancies. Radionuclide molecular imaging markers allow one to individualize treatments, depending on the biologic properties of tissue, and also to predict the response to these treatments and provide information on the prognosis and efficacy of a particular treatment plan. These results can be achieved by using radiolabeled markers, which not only measure tissue metabolism with [^{18}F] fluorodeoxyglucose–PET but also scan with radiolabeled amino acids such as ^{11}C-methionine to visualize protein synthesis and amino acid transport phenomena, which are accelerated in tumors. The application of new biomarkers to measure tissue hypoxia, tumor proliferation, and clonogenic cell attenuation (by using radiolabeled nucleotides, deoxyuridine, or amino acids) appear very promising.

Multitechnique imaging with image fusion allowing combined molecular/anatomic imaging is one of the great innovations being applied to oncology and radiation therapy, allowing more accurate diagnoses and treatment planning, especially in tumors of the central nervous system (CNS) and of the head and neck. Multitechnique imaging using various molecular markers will become even more important for the establishment of imaging-guided treatment strategies in the future.

Although the book is not specifically intended for the neuroradiologist, it can serve as a useful reference source for those interested in using molecular imaging techniques in CNS tumors or head and neck cancers.

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