

# Preface

The fields of nuclear medicine, surgery, and general oncology have changed dramatically in the past two decades. Surgical oncologists are being asked to resect smaller and often radiographically occult tumors. The accurate staging of many malignancies is now performed with identification and resection of sentinel lymph nodes, almost always with the aid of nuclear medicine. *Radioguided Surgery: A Comprehensive Team Approach* presents an interdisciplinary approach to performing radioguided surgical resection. Experienced surgeons, nuclear medicine physicians, physicists and radiopharmacists describe how to effectively apply these techniques.

The book is divided into three sections. The first discusses the chemistry and physics of radiopharmaceuticals, intraoperative probes, site-directed biopsy, radiation safety, and training requirements. This section will be extremely helpful to any group wishing to initiate or improve their own radioguided surgical approach to malignancies.

Part two describes sentinel lymph node surgery, the field that has benefited extensively by and revitalized the comprehensive team approach. Tumor cells express a large number of growth factors, including many members of the vascular endothelial growth factor (VEGF) family. Expression of VEGFs by a neoplasm is associated with the growth of lymphatics in the region of tumors. In addition to entering these new lymphatic vessels, tumor cells can enter existing host lymphatics by secreting metalloproteinases and collagenases to dissolve the basement membrane, allowing the tumor cells to enter the lumen. Once in the lumen, the tumor cells are carried to the regional lymph nodes. The sentinel node is the first lymph node along this path. Sentinel lymph node (SLN) biopsy and lymphatic mapping were initially developed in patients with penile cancer, and further refined in patients with melanoma, under the assumption that examining the first regional lymph node that drains the lesion would predict the status of the remainder of the nodes in that region. If no tumor cells are seen in the sentinel node, the morbidity associated with an extensive lymph node dissection could be avoided. This hypothesis was confirmed in multiple clinical trials in patients with breast cancer, melanoma as well as penile and vulvar cancer. As a result, sentinel node evaluation has become an integral component of treatment planning in patients with these tumors. In this book, leading world experts present both the state-of-the art and the latest advances in radioguided SLN biopsy in a variety of solid tumors, discussing in general the anatomy and physiology of lymph nodes and lymph node staging, and then SLN biopsy for specific malignancies. The histopathology of sentinel nodes and histopathologic examination intraoperatively and postoperatively is discussed. In addition, the technique and role of molecular assessment of sentinel nodes in the basic science laboratory is described.

The third section describes a particularly vexing problem for the clinical surgeon—the detection and removal of lesions which were not detected by

traditional imaging. In this section the origins of radioguided surgery from radio-immunoimaging is described. The localization and resection of occult lesions in the breast, parathyroid, lung, and other organ systems are described.

The authors hope that this text will serve both as a reference for those who encounter the occasional patient with these problems and as a guide for those immersed in the field. Clinical judgments and opinions of experts in each chapter should be of great aid to the management of patients with malignancy.

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