

## RADIOGUIDED SURGERY

### TO THE EDITOR:

Within the framework of a valuable initiative, the supplement to the December issue of *The Journal of Nuclear Medicine* highlights some of the major contributions that Nuclear Medicine and Molecular Imaging has made to patient care over 60 years of publication. An additional area that deserves mention is radioguided surgery – which starts with the Nuclear Medicine procedure of tagging with a radioactive label (administered either systemically or locoregionally) a certain tissue/lesion to ease its identification by preoperative imaging and its subsequent resection by using intraoperatively a counting probe. There have been several thousands citations to articles published in the *Journal* regarding radioguided sentinel lymph node (SLN) biopsy, contributing to recognize this procedure as the standard-of-care for some cancers. After Cabañas introduced in the 1970's the SLN concept as an anatomical notion, in 1992 Morton renewed interest in the SLN approach using visual guidance with a blue dye to visualize lymphatic drainage from tumors, recognizing its variability from patient to patient. Nonetheless, it was the introduction of radioguidance in the mid-1990's that led to the current array of clinical applications of SLN surgery – as witnessed by the number of publications in this field that has increased by more than 10-fold every 5 years between 1996 and 2005 versus 1991–1995.

As a fundamental aid for primary staging of solid epithelial cancers, radioguided SLN biopsy constitutes one of the best examples of how Nuclear Medicine interacts with and has a crucial impact on other medical specialties. In fact, this procedure constitutes the undisputed standard-of-care for initial treatment of cutaneous melanoma and breast cancer, while it is increasingly being recognized as the standard-of-care also for penile cancer, head & neck cancers, and some gynecologic cancers. Radioguided surgery, including robot-assisted procedures, is undergoing clinical validation in other malignancies, not only for SLN biopsy, but also for radiotagged tumor resection.

Ranking of articles published in the *Journal* according to the number of citations in the international literature identifies the top 5 articles as milestone contributions to establish radioguided SLN biopsy as the standard-of-care particularly for breast cancer and cutaneous melanoma (1-5). The next most cited 5 articles (6-10) deal with important components of radioguided SLN surgery that ensure optimal performance of the procedure, as well as technological advances based on fruitful interactions of Nuclear Medicine with other medical specialties. In particular, they emphasize the crucial role of preoperative imaging within the whole procedure of radioguided surgery and the possibility for hybrid imaging with SPECT/CT to provide

a roadmap for easier “navigation” during the surgical procedure, guided both by the gamma-probe and by preoperative lymphatic mapping – especially in anatomically complex regions such as the head & neck region or the abdomen. Other crucial factors driving further developments are the possibility to tag lesions with radioactive seeds and the availability of dual-signature imaging agents for lymphatic mapping and/or tumor-seeking procedures using both radioguidance (by preoperative SPECT/CT or PET/CT imaging and intraoperative gamma-probe counting) and intraoperative fluorescence-based guidance with probes to be used also in close surgical environments, e.g. during laparoscopy with robot-assisted surgery.

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