

Clinical Significance of Accurate Lesion Localization:

Surgeon's Perspective and Future Direction

Accurate localization of breast lesions and index nodes is critical for oncologic safety, minimizing re-excisions, and optimizing cosmetic outcomes—particularly as non-palpable tumors and neoadjuvant therapy increase.

Surgeon's priorities

- Ensure negative margins while conserving breast tissue.
- Enable efficient operations and coordinated tumor–axilla procedures.
- Reliably identify residual disease after neoadjuvant chemo therapy.

Relevance of major trials

- MELODY, AXSANA, SENOMAC/SENOMAC Ultra, NAUTILUS, SOUND, INSEMA, TAXIS: all drive axillary de-escalation and depend on precise tumor/node marking for safe patient selection and targeted dissections.

Key techniques

- Wire, radioactive/magnetic/reflector seeds, clips, intraoperative ultrasound, specimen radiography, fluorescence-guided approaches.
- Combining preoperative MRI/US/PET with intraoperative navigation improves accuracy.

Future directions

- Multimodal localization protocols aligned with trial criteria.
- Validation of fluorescence tracers, AR navigation, and AI to reduce margins and support de-escalation.
- Strong multidisciplinary coordination (radiology, surgery, pathology).

Conclusion Robust, standardized localization is essential to safely implement de-escalation strategies from contemporary trials and to improve oncologic and cosmetic outcomes.