



Sentinel Lymph Node Dissection in Breast Cancer

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Breast cancer

- Incidence
- Survival
 - Treatment
 - Stage

Current TNM Staging for breast cancer nodal status is based on clinical and histologic evaluations.

Surgical staging of the axilla is the most important predictor of clinical outcome.

Consensus Treatment Guideline

Example

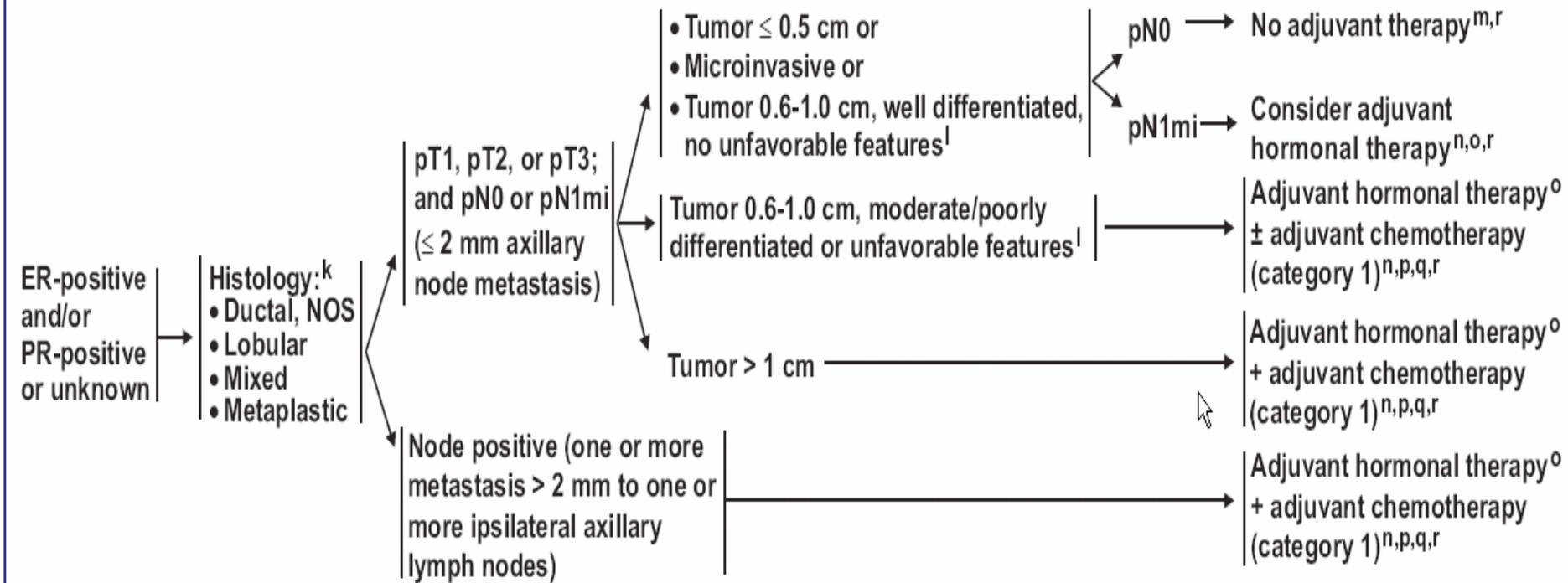
[Guidelines Index](#)
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[Staging, MS, References](#)

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Practice Guidelines
in Oncology – v.2.2006

Invasive Breast Cancer

SYSTEMIC ADJUVANT TREATMENT - HORMONE RESPONSIVE DISEASE - HER-2/NEU NON-OVEREXPRESSED^j



Risk Factors

for Lymph Node Involvement

Risk factors: tumor size and location, histologic grade, and the presence of lymphatic invasion.

In one reported series of 2282 women with invasive breast cancer, the incidence of axillary LN involvement was found to increase with primary tumor size as follows:

- » T1a — 5 percent
- » T1b — 16 percent
- » T1c — 28 percent
- » T2 — 47 percent
- » T3 — 68 percent
- » T4 — 86 percent

Current Surgical Options

for Primary Tumor Management

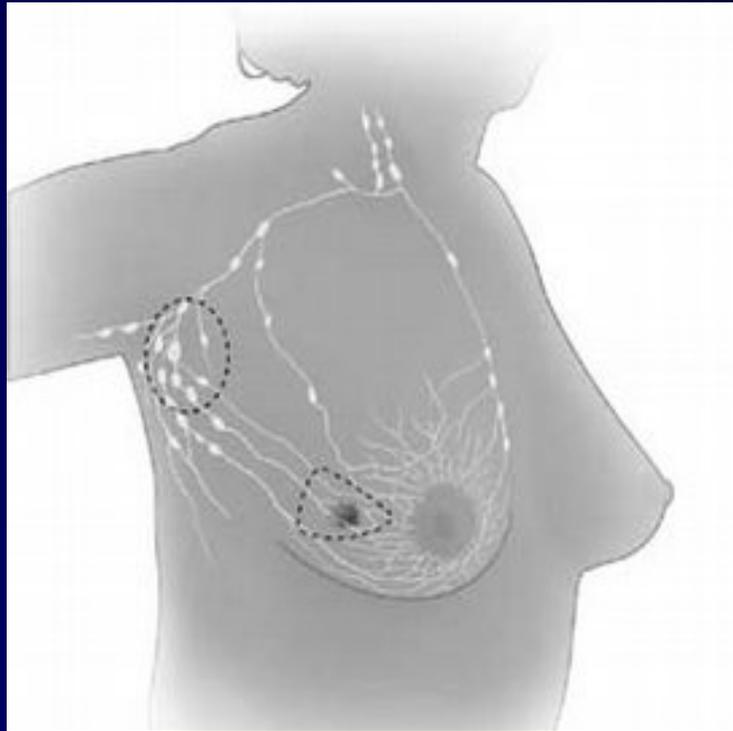
- Mastectomy alone,
- Mastectomy plus reconstruction, and
- Breast-conserving surgery plus radiation therapy.

Selection is based on patient preference and suitability for breast conservation.

Survival is equivalent with any of these options as documented in randomized prospective trials.

Breast - Conserving Surgery

Lumpectomy & Axillary Staging



Current Surgical Approaches for Axillary Staging

Axillary Lymph Node Dissection (ALND)

- Aims to remove Level 1 and 2 lymph nodes.
- Level 3 lymph nodes preserved unless gross disease is present.

Sentinel Lymph Node Dissection (SLND)

- Aims to remove the Sentinel Lymph Node: the first lymph node the cancer is likely to spread to from the tumor.

Axillary Lymph Node Dissection

- Extensive long-term outcomes available.
- Bland et al. analyzed a database of more than 500,000 women treated for breast cancer and observed:
 - A 10-year survival among patients with axillary surgery of 85% compared to 66% among patients for whom this treatment was omitted.

Ref: Krag et al.

Annals of Surgical Oncology 11:208S-210 (2004)

Axillary Lymph Node Dissection

Risks

- Lymphedema
- Injury to or thrombosis of the axillary vein
- Seroma formation
- Impairment of shoulder movements: the incidence rate varies from 12-15% (with RT) and 7-8% (without RT).
- Damage to the brachial plexus with chronic pain and varying degrees of decreased grip strength occurring in up to 15% of patients and lasting for more than a year after surgery.
- Chest wall pain

Axillary Lymph Node Dissection

Lymphedema

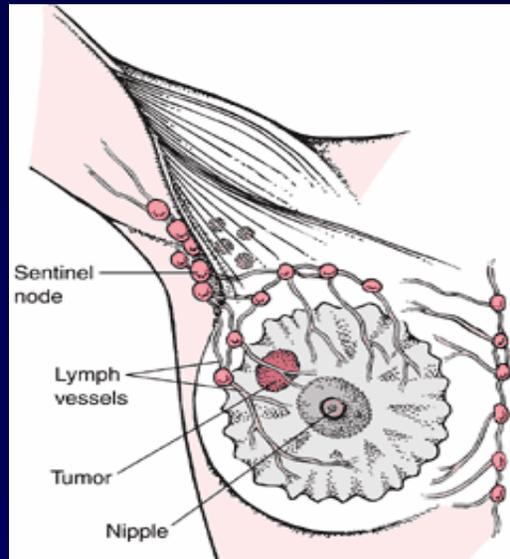
Reported prevalence rate: approximately 11%, range: 5-30%.
Recognized risk factors: extensive surgery, RT, advanced age.
Risk may decrease with time; does not completely disappear.



Sentinel Lymph Node Dissection

&

Lumpectomy



Removal of the first (Sentinel) node in the lymphatic basin is followed by Axillary Lymph Node Dissection if the Sentinel Lymph Node has malignancy on pathologic assessment.

Sentinel Lymph Node Dissection

Generally, studies have restricted the use of SLND to women

- with T1 (≤ 2 cm) and T2 (2-5cm) disease,
- without evidence of multifocal involvement and
- without clinically positive lymph nodes.
- Data suggests that SLND is associated with less morbidity than ALND; outcomes for comparative effects on tumor recurrence or patient survival are pending.

http://www.cancer.gov/cancertopics/pdq/treatment/breast/HealthProfessional/page7#Section_252

Sentinel Lymph Node Dissection

Morbidity

ALMANAC Trial: Randomized controlled trial of 1031 clinically node negative patients randomized to undergo SLND or ALND, followed for 1 year post surgery reported (2006):

- **Quality of life at 1 year** (as assessed by the frequency of patients experiencing a clinically significant deterioration in the Trial Outcome Index of the Functional Assessment of Cancer Therapy-Breast scale) **was superior in the SLND group, 23% vs. 35%**, deteriorating in the SLND vs. ALND dissection groups, respectively; $P = .001$.
- **Arm function, time to return to daily activities were better in the SLND group.**

<http://jncicancerspectrum.oxfordjournals.org/cgi/content/full/jnci;98/9/599#TBL3>

Sentinel Lymph Node Dissection

Disease-Free Survival

NSABP-32: A randomized clinical trial to compare sentinel node resection (SLND) to conventional axillary dissection (ALND) in clinically node-negative breast cancer patients.

Primary aims evaluate if SLND alone is equivalent to SLND followed by ALND as to *overall survival and disease-free survival within 2%*, and if

- SLND alone is equivalent to SLND followed by ALND in the *long-term control of regional disease*,
- *Morbidity* associated with SLND alone is significantly less than that associated with SLND followed by ALND.

Outcomes pending

http://www.annalsurgicaloncology.org/cgi/content/full/11/3_suppl/208S

Sentinel Lymph Node Dissection

Micro-metastases (pN1mi: >0.2 to 2.0mm)

American College of Surgeons Oncology Group Study Z-0010 aims to

- *estimate prevalence and evaluate prognostic significance of sentinel node micro-metastases detected by IHC.*
- *evaluate hazard rate for regional recurrence in women whose sentinel nodes are negative by H&E staining.*
- provide a mechanism for identifying women whose sentinel nodes contain metastases detected H&E.

Outcomes pending

https://www.acosog.org/studies/synopses/Z0010_Synopsis.pdf

Sentinel Lymph Node

Risks of False Results

- False Positive SLN: test (+) when disease absent
- If ALND performed: risks of ALND and risks associated with intra-operative time and anesthesia increased beyond needs for SLND.
- False Negative SLN: test (-) when disease present
- If ALND not performed: risks of unrecognized under-staging, initial under-treatment and associated decrease in survival - unless FN identified, e.g., during histological evaluation.

Summary

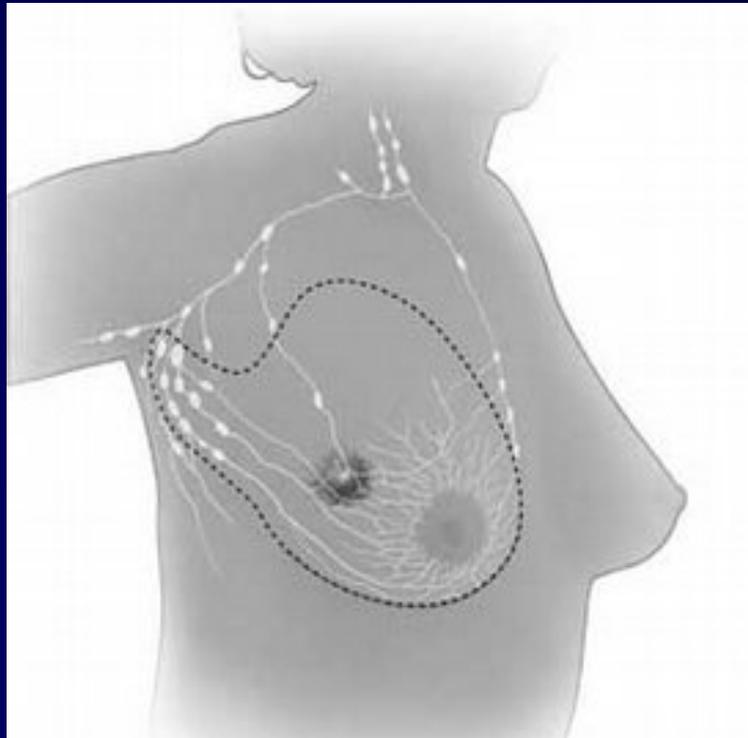
- Advances in breast cancer care aim to minimize patient risks and optimize benefit.
- Current TNM Staging of lymph nodes is based on clinical exam and tissue pathology.
- Studies are underway to
 - compare SLND and ALND associated survival at just under a 2% survival difference between the groups.
 - determine prognostic effect of micrometases.
- Unrecognized false results risk preventable compromise of patient care.
- Multi-modality evaluation can minimize false results.

Extra Slides



Modified Radical Mastectomy

Mastectomy & Axillary Lymph Node Dissection



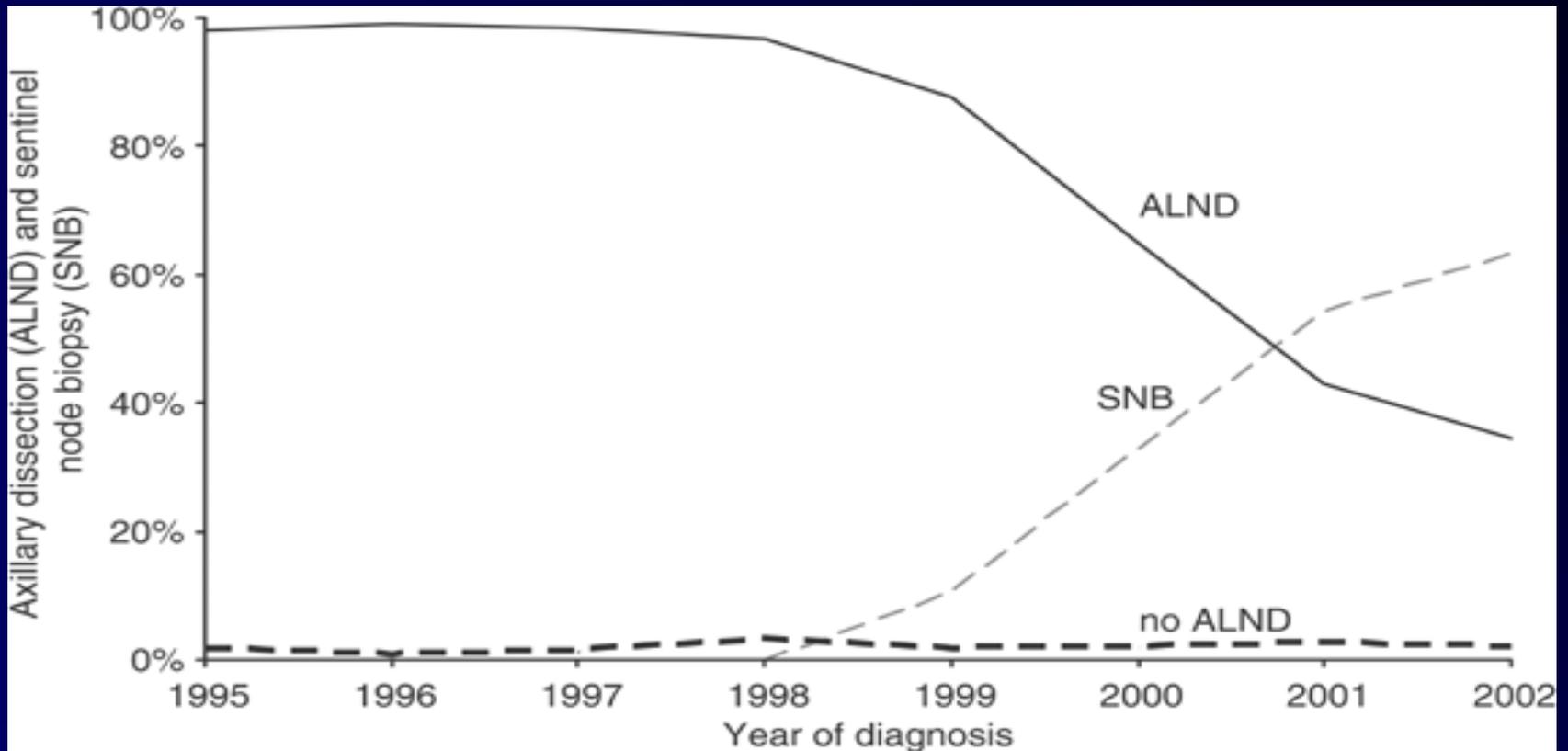
Breast - Conserving Surgery

Lumpectomy (Segmental Mastectomy)
& Axillary Lymph Node Dissection (ALND)

Lumpectomy (Segmental Mastectomy)
& *Sentinel Lymph Node Dissection (SLND)*,
& *possible ALND at a follow-up surgery.*

Time Trend

ALND / SLND (SNB)



Time trend for ALND / SLND breast cancer in the Comprehensive Cancer Center North region 1995-2002. www.nature.com/.../v93/n5/fig_tab/6602747f4.html

Sentinel Lymph Node Dissection

Feasibility comparisons to ALND

Medscape®

www.medscape.com

Study and reference	Study size (number of patients)	Technique	SLN identification (%)	Accuracy (%)	False-negative rate (%)
Giuliano <i>et al.</i> (1996) ³⁸	174	Dye	65	96	12
Veronesi <i>et al.</i> (1999) ⁵³	376	Radioactive colloid	99	96	7
Krag <i>et al.</i> (1998) ³³	443	Radioactive colloid	93	97	11
Quan <i>et al.</i> (2002) ⁵⁴	152	Radioactive colloid	93	100	0
Tafra <i>et al.</i> (2001) ⁵⁵	535	Both	87	96	13
Bergkvist <i>et al.</i> (2001) ⁵⁶	498	Both	90	N/A	11
McMasters <i>et al.</i> (2001) ⁵⁷	2,206	Both	93	97	8

Both; use of radioisotope and vital blue dye labeling; SLN, sentinel lymph node

Source: Nat Clin Pract Oncol © 2005 Nature Publishing Group

Average FNR = 8.8%. (ref: www.nci.gov)

Sentinel Lymph Node Dissection

American College of Surgeons Oncology Group

Report on Z0010: a prospective study of sentinel node and bone marrow micro-metastases in women with clinical T1 or T2 N0 M0 breast cancer, n = 5212, states that:

Using a standard skill requirement, surgeons from a variety of institutions achieved an acceptably low SLND failure rate of (1.3%, n=71), validating the incorporation of SLND into clinical practice.

Surgeon accrual of fewer than 50 patients was associated with increased SLND failure.

Participants used blue dye + radiocolloid in 79.4% of cases, blue dye alone in 14.8%, and radiocolloid alone in 5.7%.

Ref: Posther et al, Ann Surg. 2005 October; 242(4): 593–602.

Sentinel Lymph Node Dissection

American Society of Clinical Oncology Guideline

Important measures for assessing SNB include the following:

- Percentage of patients for whom lymphatic mapping is successful. When lymphatic mapping is not successful (failed sampling), full ALND is generally necessary to assess the status of the nodes.
- False-negative rate: the proportion of patients with negative findings on SNB who are subsequently found to have disease in the axillary lymph nodes on ALND.
- Negative predictive value: the proportion of individuals with negative findings of SNB in whom no involvement of the axillary lymph nodes is found on ALND.
- Accuracy: the proportion of all patients (positive or negative findings of SNB) for whom the SNB correctly predicts the results of ALND.