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# Diagnostik und Therapie früher und fortgeschrittener Mammakarzinome

## Operative Therapie des Mammakarzinoms unter onkologischen Aspekten



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- **Versionen 2002–2019:**  
Bauerfeind / Blohmer / Böhme / Brunnert / Costa / Fersis / Gerber / Hanf / Janni / Junkermann / Kaufmann / Kühn / Kümmel / Möbus/ Nitz / Rezai / Simon / Solomayer / Thomssen / Thill / Untch
- **Version 2020:**  
Thomssen / Wöckel

### Screened data bases

Pubmed 1998 – 2019, ASCO 2019, SABCS 2019, ESMO 2019, EBCC 2018, ABC-5 2019, Cochrane data base 1998 - 2019

### Guidelines screened

1. St.Gallen/Vienna 2019: Burstein HJ, Curigliano G, Loibl S et al.; Members of the St. Gallen International Consensus Panel on the Primary Therapy of Early Breast Cancer 2019. Estimating the benefits of therapy for early-stage breast cancer: the St. Gallen International Consensus Guidelines for the primary therapy of early breast cancer 2019. Ann Oncol. 2019 Oct 1;30(10):1541-1557.
2. Balic M, Thomssen C, Würstlein R, Gnant M, Harbeck N. St. Gallen/Vienna 2019: A Brief Summary of the Consensus Discussion on the Optimal Primary Breast Cancer Treatment. Breast Care (Basel). 2019 Apr;14(2):103-110.
3. ABC4: Cardoso F, Senkus E, Costa A et al. 4th ESO-ESMO International Consensus Guidelines for Advanced Breast Cancer (ABC 4)†. Ann Oncol. 2018 Aug 1;29(8):1634-1657.
4. NCCN 2019: NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). Breast Cancer. NCCN Evidence Blocks™. Version 3.2019 – September 6, 2019. [https://www.nccn.org/professionals/physician\\_gls/pdf/breast\\_blocks.pdf](https://www.nccn.org/professionals/physician_gls/pdf/breast_blocks.pdf). Download Jan 19, 2020.

Cochrane library:

- <http://onlinelibrary.wiley.com/cochranelibrary/search>

Pubmed 2008 - 2019, ASCO 2003 – 2019, SABCS 2003 – 2019, Cochrane data base (n.d.)



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# Operative Therapie des Mammakarzinoms unter onkologischen Aspekten

## AGO: ++

**Die operative Therapie ist einer von mehreren Teilschritten bei der Behandlung des Mammakarzinoms. Für jeden Brustoperateur ist eine umfangreiche diagnostische und onkologische Expertise erforderlich.**



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## Prätherapeutische Mamma- und Axilladiagnostik

	Oxford		
	LoE	GR	AGO
■ <b>Klinische Untersuchung</b>	5	D	++
■ <b>Mammographie</b>	2b	B	++
■ + Tomosynthese	2a	B	+
■ + Kontrastmittelmammographie	3a	B	+/-
■ <b>Sonographie (Mamma und Axilla)</b>	2b	B	++
■ <b>MRT*</b>	1b	B	+
■ <b>Minimalinvasive Biopsie Mamma** (CNB, VAB)</b>	1b	A	++
■ Axilla CNB, wenn auffälliger LK-Befund	2b	B	++
■ <b>Mamma-CT</b>	5	D	-

\* Die Möglichkeit der MRT-gestützten Biopsie ist Voraussetzung für die MRT-Untersuchung. MRT erwägen bei hohem familiären Risiko, eingeschränkter Beurteilbarkeit in MG & US (Beurteilbarkeit C/D), invasiv lobulärem Karzinom. Keine Reduktion der Nachresektionsrate.

\*\* Histologische Sicherung von Zusatzbefunden im Fall therapeutischer Relevanz.

### Review on additional imaging

1. Ong E. Preoperative imaging for breast conservation surgery-do we need more than conventional imaging for local disease assessment? Gland Surg. 2018 Dec;7(6):554-559.

### Clinical assessment (inspection, palpation)

=

### Mammography

=

### Combined DM + DBT + US + MRI

1. Mariscotti G, Houssami N, Durando M, et al. Accuracy of mammography, digital breast tomosynthesis, ultrasound and MR imaging in preoperative assessment of breast cancer. *Anticancer Res.* 2014 Mar;34(3):1219-25.
2. Campanino PP, Ruggieri C, Regini E, et al. Accuracy of mammography, digital breast tomosynthesis, ultrasound and MR imaging in preoperative assessment of breast cancer. *Anticancer Res.* 2014 Mar;34(3):1219-25.

### Tomosynthesis

1. Thompson W, Argaez C. Digital Breast Tomosynthesis for the Screening and Diagnosis of Breast Cancer: A Review of the Diagnostic Accuracy, Cost-Effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2019 Oct 28.

### Contrast-enhanced digital mammography (CEM, CEDM), Contrast-enhanced spectral mammography (CESM)

1. Bicchierai G, Tonelli P, Piacenti A et al. Evaluation of contrast-enhanced digital mammography (CEDM) in the preoperative staging of breast cancer: Large-scale single-center experience. *Breast J.* 2020 Jan 30.
2. Amato F, Bicchierai G, Cirone D, et al. Preoperative loco-regional staging of invasive lobular carcinoma with contrast-enhanced digital mammography (CEDM). *Radiol Med.* 2019 Dec;124(12):1229-1237.
3. Ghaderi KF, Phillips J, Perry H et al. Contrast-enhanced Mammography: Current Applications and Future Directions. *Radiographics.* 2019 Nov-Dec;39(7):1907-1920.
4. Jochelson, MS, Dershaw, DD, Sung, JSet al. Bilateral Contrast-enhanced dual-energy digital mammography: Feasibility and comparison with conventional digital mammography and MR imaging in women with known breast carcinoma. *Radiology* 2013; 266:743–751.
5. Fallenberg, EM, Schmitzberger, FF, Amer, Het al. Contrast-enhanced spectral mammography vs. mammography and MRI - clinical performance in a multi-reader evaluation. *Eur Radiol* 2017; 27:2752–2764.

### US-Axilla +FNA/CNB

1. Preda T, McGrath R, Bingham J et al. How much does axillary ultrasound contribute in women undergoing breast-conserving surgery with no palpable axillary nodes? ANZ J Surg. 2020 Jan 20.
2. Diepstraten SC, Sever AR, Buckens CFM, et al. Value of preoperative ultrasound guided lymphnode biopsy for preventing completion axillary lymphnode dissection in breast cancer: a systematic review and meta-analysis. Ann Surg Oncol 2014;21:51-59
3. Evans A, Rauchhaus P, Whelehan P, et al. Does shear wave ultrasound independently predict axillary lymph node metastasis in women with invasive breast cancer? Breast Cancer Res Treat. 2013 Dec 4. [Epub ahead of print]
4. Feng Y, Huang R, He Y, et al. Efficacy of physical examination, ultrasound, and ultrasound combined with fine-needle aspiration for axilla staging of primary breast cancer. Breast Cancer Res Treat. 2015 Feb;149(3):761-5. doi: 10.1007/s10549-015-3280-z. Epub 2015 Feb 10.

#### Biopsy

1. Chan KY, Wiseberd Firtell, J, Jois HSR, et al. Localisation techniques for guided surgical excision of non-palpable breast lesions. Cochrane Database of Systematic reviews 2015;vol 12
2. Lourenco AP, Mainiero MB Incorporating imaging into the locoregional management of breast cancer. Semin Radiat Oncol 2016;26(1)
3. Mariscotti G, Houssami N, Durando M, et al. Accuracy of mammography, digital breast tomosynthesis, ultrasound and MR imaging in preoperative assessment of breast cancer. Anticancer Res. 2014 Mar;34(3):1219-25.

#### MRI


1. Mann RM, Loo CE, Wobbles T et al The impact of preoperative MRI on the re-excision rate in invasive lobular carcinoma of the breast. Breast Cancer Res Treat 2010; 119: 415-422
2. Houssami N, Turner R, Morrow M. Preoperative magnetic resonance imaging in breast cancer: meta-analysis of surgical outcomes. Ann Surg. 2013 Feb;257(2):249-55.
3. Debal M, Abramian A, Nemes L, et al. Who may benefit from preoperative MRI? A single-center analysis of 1102 consecutive patients with primary breast cancer. Breast Cancer Res Treat 2015;153(3):531-537

4. Arnaut A, Catley C, Booth CM, et al. Use of preoperative Magnetic Resonance Imaging for breast cancer: A Canadian population-based study. *JAMA Oncol* 2015;1(9):1238-1250
5. Fancellu A, Turner RM, Dixon JM, et al. Metaanalysis of the effect of preoperative MRI on the surgical management of ductal carcinoma in situ. *Brit J Surg* 2015;192(8):883-893
6. Houssami N, Turner R, Macaskill P, et al. An individual person data meta-analysis of preoperative magnetic resonance imaging and breast cancer recurrence. *J Clin Oncol* 2014;32(5):392-401
7. Vos EL, Voogd AC, Verhoef C, et al. Benefits of preoperative MRI in breast cancer surgery studied in a large population-based cancer registry. *Br J Surg* 2015;102(13):1649-1657
8. Lehman CD, Lee JM, DeMartini WS, et al. Screening MRI in women with a personal history of breast cancer. *J Natl Cancer Inst* 2016;108(3)
9. Wang SY, Long JB, Killelea BK, et al. Preoperative breast MRI and contralateral breast cancer occurrence among older women with breast cancer. *J Clin Oncol* 2015;Nov 30, epub ahead of print
10. Riedl CC, Luft N, Clemens B et al. Triple-modality screening trial for familial breast cancer underlines the importance of magnetic resonance imaging and questions the role of mammography and ultrasonography regardless of patient mutation status, age and breast density. *JCO* 2015;33(10):1128-1135
11. El Sharouni M, Postma EL, Menezes GLG et al. High prevalence of MRI-detected contralateral and ipsilateral malignant findings in patients with invasive ductolobular breast cancer: Impact on surgical management. *Clin Breast Cancer*. 2016 Aug;16(4):269-75.
12. Vriens BE, de Vries B, Lobbès MB, van Gastel SM, et al. INTENS Study Group. Ultrasound is at least as good as magnetic resonance imaging in predicting tumour size post-neoadjuvant chemotherapy in breast cancer. *Eur J Cancer*. 2016 Jan;52:67-76.
13. Health Quality Ontario..Magnetic Resonance Imaging as an Adjunct to Mammography for Breast Cancer Screening in Women at Less Than High Risk for Breast Cancer: A Health Technology Assessment. *Ont Health Technol Assess Ser*. 2016; Nov 1;16(20):1-30
14. Lobbès MB, Vriens IJ, van Bommel AC, et al. Breast MRI increases the number of mastectomies for ductal cancers, but decreases them for lobular cancers. *Breast Cancer Res Treat*. 2017;162:353-364.
15. Houssami N, Turner RM, Morrow M. Meta-analysis of pre-operative magnetic resonance imaging (MRI) and surgical treatment for breast cancer. *Breast Cancer Res Treat*. 2017 Sep;165(2):273-283



### Breast-CT (CBCT)

1. Berger N, Marcon M, Frauenfelder T, Boss A. Dedicated Spiral Breast Computed Tomography With a Single Photon-Counting Detector: Initial Results of the First 300 Women. Invest Radiol. 2020 Feb;55(2):68-72.

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	Oxford		
	LoE	GR	AGO
▪ Anamnese und klinische Untersuchung	5	D	++
<b>Nur bei hohem Risiko für Fernmetastasen und / oder Symptomen oder bei geplanter Entscheidung zur (neo-)adjuvanten Chemo-/Antikörpertherapie:</b>			
▪ CT Thorax/Abdomen	2a	B	+
▪ Skelettszintigraphie	2b	B	+
▪ Röntgen-Thorax	5	C	+/-
▪ Leberzonographie	5	D	+/-
▪ Weiterführende Diagnostik je nach Befund (z.B. Leber- MRT/CEUS*/Biopsie etc.)	2a	B	+
▪ FDG-PET oder FDG-PET /CT	3a	C	+/-
▪ Ganzkörper MRT	4	C	+/-
* Contrast enhanced ultrasound			

### Statement: history and physical examination


#### 1. GCP

### Statement: high metastatic potential / symptoms

1. Rutgers, EJ et al: Quality control in the locoregional treatment of breast cancer (2001) EJC 37: 447-453
2. Gerber B, Seitz E, Muller H et al: Perioperative screening for metastatic disease is not indicated in patients with primary breast cancer and no clinical signs of tumor spread. Breast Cancer Res Treat 82:29-37; 2003
3. Schneider C, Fehr MK, Steiner RA et al: Frequency and distribution pattern of distant metastases in breast cancer patients at the time of primary presentation Arch Gynecol Obstet. 2003 Nov;269(1):9-12.
4. Isasi CR, Moadel RM, Blaufox MD. A meta-analysis of FDGPET for the evaluation of breast cancer recurrence and metastases. Breast Cancer Res Treat 2005;90(2):105–12.
5. Schmidt GP, Baur-Melnyk A, Haug A, et al.: Comprehensive imaging of tumor recurrence in breast cancer patients using whole-body MRI at 1.5 and 3 T compared to FDG–PET–CT. European Journal of Radiology 2008; 65, 47–58.
6. Shie P, Cardarelli R, Brandon D et al: Meta-analysis: comparison of F-18 Fluorodeoxyglucose-positron emission tomography and bone scintigraphy in the detection of bone metastases in patients with breast cancer. Clin Nucl Med. 2008 Feb;33(2):97-101.
7. Barrett T, Bowden DJ, Greenberg DC et al.: Radiological staging in breast cancer: which asymptomatic patients to image and how.

British Journal of Cancer 2009; 101, 1522 – 1528.

8. Rong J, Wang S, Ding Q, et al. Comparison of 18 FDG PET-CT and bone scintigraphy for detection of bone metastases in breast cancer patients. A meta-analysis. Surg Oncol. 2013 Jun;22(2):86-91
9. Hong S, Li J, Wang S. 18FDG PET-CT for diagnosis of distant metastases in breast cancer patients. A meta-analysis. Surg Oncol. 2013 Jun;22(2):139-43.
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11. Department of Health. Diagnosis, staging and treatment of patients with breast cancer. National Clinical Guideline No. 7. June 2015. ISSN 2009-6259
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13. deSouza NM, Liu Y, Chiti A et al.: Strategies and technical challenges for imaging oligometastatic disease: Recommendations from the European Organisation for Research and Treatment of Cancer imaging group. Eur J Cancer. 2018 Jan 10. [Epub ahead of print].
14. NCCN 2019: NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). Breast Cancer. NCCN Evidence Blocks™. Version 3.2019 – September 6, 2019. [https://www.nccn.org/professionals/physician\\_gls/pdf/breast\\_blocks.pdf](https://www.nccn.org/professionals/physician_gls/pdf/breast_blocks.pdf). Download Jan 19, 2020.
15. Mishima M, Toh U, Iwakuma N, Takenaka M, Furukawa M, Akagi Y. Evaluation of contrast Sonazoid-enhanced ultrasonography for the detection of hepatic metastases in breast cancer. Breast Cancer. 2016 Mar;23(2):231-41
16. Zhang L, Zhang L, Wang H, Chen L, Sui G. Diagnostic performance of contrast-enhanced ultrasound and magnetic resonance imaging for detecting colorectal liver metastases: A systematic review and meta-analysis. Dig Liver Dis. 2019 Sep;51(9):1241-1248.



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## Stellenwert der operativen Optionen

	Oxford	
	LoE	GR
■ Die Überlebensraten nach BET (Tumorektomie + RT) und MRM sind äquivalent	1a	A
■ Die Lokalrezidivraten nach „skin sparing mastectomy“ (SSM) und MRM sind äquivalent	2b	B
■ Die Erhaltung des Mamillen-Areola-Komplexes (MAK) ist bei R0-Resektion onkologisch sicher	2b	C

### Evidence of surgical procedure

#### Statement: lumpectomy – mastectomy

1. Fisher B, Anderson S, Bryant J, et al. Twenty-year follow-up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer (2002) N Engl J Med 347:1233-1241
2. Veronesi U et al.: Twenty-year follow-up of a randomized study comparing breast-conserving surgery with radical mastectomy for early breast cancer. NEJM 2002 Oct 17;347(16):1227-32
3. Christiansen P, Carstensen SL, Ejlersen B, et al. Breast conserving surgery versus mastectomy: overall and relative survival-a population based study by the Danish Breast Cancer Cooperative Group (DBCG). Acta Oncol. 2017 Nov 23:1-7.
4. Hamelinck VC, Bastiaannet E, Pieterse AH, et al. prospective comparison of younger and older patients' preferences for breast-conserving surgery versus mastectomy in early breast cancer. J Geriatr Oncol. 2017 Sep 11. pii: S1879-4068(17)30175-3

#### Statement: skin sparing mastectomy

1. Carlson GW, Bostwick J, Styblo TM et al. Skin-sparing mastectomy. Oncologic and reconstructive considerations. Ann Surg 1997;

225:570-575.

2. Kroll SS, Schusterman MA, Tadjalli HE et al. Risk of recurrence after treatment of early breast cancer with skin- sparing mastectomy. *Ann Surg Oncol* 1997; 4:193-197.
3. Slavin SA, Schnitt SJ, Duda RB et al. Skin-sparing mastectomy and immediate reconstruction: oncologic risks and aesthetic results in patients with early-stage breast cancer. *Plast Reconstr Surg* 1998; 102:49-62.
4. Simmons RM, Fish SK, Gayle L et al. Local and distant recurrence rates in skin-sparing mastectomies compared with non-skin-sparing mastectomies. *Ann Surg Oncol* 1999; 6:676-681.
5. Rivadeneira D, Simmons RM, Fish SK et al. Skin-sparing mastectomy with immediate breast reconstruction: a critical analysis of local recurrence. *Cancer* 2000; 6:331-335.
6. Foster et al. Skin-sparing mastectomy and immediate breast reconstruction: a prospective cohort study for the treatment of advanced stages of breast carcinoma. *Ann Surg Oncol* 2002 Jun;9(5):462-6
7. Greenway RM, Schlossberg L, Dooley WC. Fifteen-year series of skin-sparing mastectomy for stage 0 to 2 breast cancer. *Am J Surg* 2005; 190:918-922.
8. Howard MA, Polo K, Pusic AL et al. Breast cancer local recurrence after mastectomy and TRAM flap reconstruction: incidence and treatment options. *Plast Reconstr Surg* 2006; 117:1381-1386.
9. Patani N, Devalia H, Anderson A et al. Oncological safety and patient satisfaction with skin-sparing mastectomy and immediate breast reconstruction. *Surg Oncol* 2007; 17:97-105.
10. Paepke S, Schmid R, Fleckner S, et al. Subcutaneous mastectomy with conservation of the nipple-areola skin: broadening the indications *Ann Surg.* 2009;250(2):288-92
11. Gerber et al.: Skin-sparing mastectomy with conservation of the nipple-areola complex and autologous reconstruction is an oncologically safe procedure. *Ann Surg* 2009 Mar;249(3):461-8
12. Lanitis S1, Tekkis PP, Sgourakis G, et al.: Comparison of skin-sparing mastectomy versus non-skin-sparing mastectomy for breast cancer: a meta-analysis of observational studies. *Ann Surg.* 2010 Apr;251(4):632-9.

Statement: Nipple sparing mastectomy

1. Petit JY, Veronesi U, Orecchia R et al. Nipple-sparing mastectomy in association with intra operative radiotherapy (ELIOT): A new type of mastectomy for breast cancer treatment. *Breast Cancer Res Treat* 2006; 96:47-51.
2. Sacchini V, Pinotti JA, Barros AC et al. Nipple-sparing mastectomy for breast cancer and risk reduction: oncologic or technical problem? *J Am Coll Surg* 2006; 203:704-714.
3. Caruso F, Ferrara M, Castiglione G et al. Nipple sparing subcutaneous mastectomy: sixty-six months follow-up. *Eur J Surg Oncol* 2006; 32:937-940.
4. Howard MA, Polo K, Pusic AL et al. Breast cancer local recurrence after mastectomy and TRAM flap reconstruction: incidence and treatment options. *Plast Reconstr Surg* 2006; 117:1381-1386
5. Benediktsson KP, Perbeck L. Survival in breast cancer after nipple-sparing subcutaneous mastectomy and immediate reconstruction with implants: A prospective trial with 13 years median follow-up in 216 patients. *Eur J Surg Oncol* 2008; 34:143-148.
6. Gerber et al.: Skin-sparing mastectomy with conservation of the nipple-areola complex and autologous reconstruction is an oncologically safe procedure. *Ann Surg* 2009 Mar;249(3):461-8
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8. Burdge EC, Yuen J, Hardee M, et al. Nipple skin-sparing mastectomy is feasible for advanced disease. *Ann Surg Oncol*. 2013 Oct;20(10):3294-302.
9. Mellon P, Feron JG, Couturud B et al. The role of nipple sparing mastectomy in breast cancer: a comprehensive review of the literature. *Plast Reconstr. Surg* 2013;131(5):969-84
10. Muller T, Baratte A, Bruant-Rodier C, et al. Oncological safety of nipple-sparing prophylactic mastectomy: A review of the literature on 3716 cases. *Ann Chir Plast Esthet*. 2017 Oct 10 pii: S0294-1260(17)30137-1.

Brusterhaltende Operation (BEO) Vorgehensweise, Technische Aspekte			
	Oxford		
	LoE	GR	AGO
<ul style="list-style-type: none"> <li>■ Nicht palpable Läsionen <ul style="list-style-type: none"> <li>■ Bildgebend gestützte Drahtmarkierung</li> <li>■ Andere Markierungsarten (Radionuklidmarkierung, Radar-Reflexion, Magnetic Seeds, RFID etc.)</li> <li>■ Präparateradiographie oder -sonographie</li> </ul> </li> <li>■ Tumorfremde Resektionsränder (auch bei ungünstiger Biologie ist "no ink on tumor" ausreichend)</li> <li>■ Intraoperative Nachresektion bei randbildendem Tumor in der Präparateradiographie oder -sonographie und/oder intraoperativer pathologischer Untersuchung</li> <li>■ Sekundäre Nachresektion bei invasivem Tumorausläufer bis in den Resektionsrand (Paraffinschnitt)</li> <li>■ Stereotaktische Befundentfernung als alleinige Therapie</li> <li>■ Intraop. Sonographie zur Reduktion der Nachresektionsrate</li> <li>■ Intraop. Schnittrandbeurteilung (mit Margin Probe®)</li> </ul>	2b	B	++
	2a	B	+/-
	2b	B	++
	2a	A	++
	1c	B	++
	3b	C	+
	4	D	--
	1a	A	+/-
	1b	A	+/-



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#### Statement: Wire guided ..

1. Hanna et al.: The use of stereotactic excisional biopsy in the management of invasive breast cancer. World J Surg. 2005 Nov;29(11):1490-4
2. Köhler J, Krause B, Grunwald S, et al. Ultrasound and mammography guided wire marking of non-palpable breast lesions: analysis of 741 cases. Ultraschall Med. 2007 Jun;28(3):283-90.
3. Ahmed M, Douek M. Intra-operative ultrasound versus wire-guided localization in the surgical management of non-palpable breast cancers: systematic review and meta-analysis. Breast Cancer Res Treat. 2013 Aug;140(3):435-46.

#### Statement: Radioguided ..

1. van der Ploeg IM, Hobbelink M, van den Bosch MA: 'Radioguided occult lesion localisation' (ROLL) for non-palpable breast lesions: a review of the relevant literature. Eur J Surg Oncol. 2008 Jan;34(1):1-5.
2. Ahmed M, van Hemelrijck M, Douek M. Systematic review of radioguided versus wire-guided localization in the treatment of non-palpable breast cancers. Breast Cancer Res Treat. 2013 Jul;140(2):241-52

3. Ong JSL, Teh J, Saunders C, Bourke AG, et al: Patient satisfaction with Radioguided Occult Lesion Localisation using iodine-125 seeds ('ROLLIS') versus conventional hookwire localisation. Eur J Surg Oncol. 2017 Dec;43(12):2261-2269.
4. Cheang E, Ha R, Thornton CM, Mango VL. [Innovations in image-guided preoperative breast lesion localization.](#) Br J Radiol. 2018 May;91(1085):20170740.
5. Kapoor MM, Patel MM, Scoggins ME. [The Wire and Beyond: Recent Advances in Breast Imaging Preoperative Needle Localization.](#) Radiographics. 2019 Nov-Dec;39(7):1886-1906
6. Srour MK, Kim S, Amersi F et al. Comparison of wire localization, radioactive seed, and Savi scout® radar for management of surgical breast disease. Breast J. 2019 Aug 25.

Statement: specimen radiography

1. Singletary: Surgical margins in patients with early-stage breast cancer treated with breast conservation therapy. Am J Surg. 2002 Nov;184(5):383-93.
2. Mazouni C, Rouzier R, Balleyguier C. Specimen radiography as predictor of resection margin status in non-palpable breast lesions. Clin Radiol. 2006 Sep;61(9):789-96.
3. Tan KY et al. Breast specimen ultrasound and mammography in the prediction of tumour-free margins. ANZ J Surg. 2006 Dec;76(12):1064-7.
4. Kunos C, Latson L, Overmoyer B Breast conservation surgery achieving  $\geq 2$  mm tumor-free margins results in decreased local-regional recurrence rate, Breast J. 2006 Jan-Feb;12(1):28-36

Statement: tumor free margins ...

1. Cendán JC et al., Accuracy of Intraoperative Frozen-Section Analysis of Breast Cancer Lumpectomy-Bed Margins. J Am Coll Surg 2005;201:194–198.



2. Cabioglu N, Hunt, Sahin et al: Role for Intraoperative Margin Assessment in Patients Undergoing Breast-Conserving Ann Surg Oncol. 2007 Apr;14(4):1458-71.
3. Ciccarelli G, Di Virgilio MR, Menna S. Radiography of the surgical specimen in early stage breast lesions: diagnostic reliability in the analysis of the resection margins. Radiol Med (Torino). 2007 Apr;112(3):366-76.
4. Houssami N, Macaskill P, Marinovich ML, et al. Metaanalysis of the impact of surgical margins on local recurrence in women with early-stage invasive breast cancer treated with breast-conserving therapy. Eur J Cancer. 2010 Dec;46(18):3219-32.
5. Harness JK, Giuliano AE, Pockaj BA, et al: a status report from the Annual Meeting of the American Society of Breast Surgeons. Ann Surg Oncol. 2014 Oct;21(10):3192-7.
6. Houssami N, Macaskill P, Marinovich ML, et al. The association of surgical margins and local recurrence in women with early-stage invasive breast cancer treated with breast-conserving therapy: a meta-analysis. Ann Surg Oncol. 2014 Mar;21(3):717-30
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Statement: tumor free margins in intrinsic subtypes

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2. Jacobs TW, Connolly JL, Schnitt SJ: Nonmalignant lesions in breast core needle biopsies: to excise or not to excise? Am J Surg Pathol. 2002 Sep;26(9):1095-110
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Statement: Margine probe

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	Oxford		
	LoE	GR	AGO
 <p>© AGO e. V. in der DGGG e. V. sowie in der DKG e. V.</p> <p>Guidelines Breast Version 2020.1D</p> <p>www.ago-online.de</p> <p>FORSCHEN LEHREN HEILEN</p>			
<b>Brusterhaltende Operation (BEO) ohne neoadjuvante Therapie</b>			
<ul style="list-style-type: none"> <li>▪ <b>Multizentrität (MF/MZ)</b> (Voraussetzung: R0-Resektion aller Herde)</li> </ul>	2b	B	+
<ul style="list-style-type: none"> <li>▪ <b>Histologisch befallene Resektionsränder trotz wiederholter Nachresektion</b></li> </ul>	2b	B	--
<ul style="list-style-type: none"> <li>▪ <b>Inflammatorisches MaCa</b></li> </ul>	2b	B	--
<b>OP nach neoadjuvanter Chemotherapie siehe Kap. „Neoadjuvante Chemotherapie“</b>			

#### Statement: Multicentricity

1. Wolters R, Wöckel A, Janni W. et al; BRENDA Study Group. Comparing the outcome between multicentric and multifocal breast cancer: what is the impact on survival, and is there a role for guideline-adherent adjuvant therapy? A retrospective multicenter cohort study of 8,935 patients. Breast Cancer Res Treat. 2013 Dec;142(3):579-90.
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1. Coleman CN, Wallner PE, Abrams JS. Inflammatory breast issue. *J Natl Cancer Inst*. 2003 Aug 20;95(16):1182-3.
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#### Statement: general

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Int J Radiat Oncol Biol Phys. 2004 May 1;59(1):146-51.

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Primäre Axilläre Lymphknotendisektion (ALND) I			
	Oxford		
	LoE	GR	AGO
▪ Endpunkt: Überleben (bei adäquater, multimodaler Therapie)	3	D	-
▪ Endpunkt: Staging	3	A	-
▪ Endpunkt: Lokoregionale Tumorkontrolle	2a	A	+/-
▪ pN+ (präoperativ histologisch gesichert) ohne neoadjuvante Systemtherapie	2a	B	+
▪ cN0 pN0 (sn)(i+)	1b	A	--
▪ cN0 pN1 (sn) (mi)	2b	B	--
▪ cN0 pN1 (sn) (cT1/2, <3SN+, BEO + RT + adäquate Systemtherapie)	1b	A	-
▪ cN0 pN1 (sn) und Mastektomie (keine Radiotherapie der Thoraxwand)	1b	B	+
▪ cN0 pN1 (sn) und Mastektomie (T1/2,<3SN+) Strahlentherapie der Thoraxwand	5	D	+/-*
▪ ALND indiziert, aber nicht möglich			
▪ Radiatio analog AMAROS-Studie (evaluiert für cN0 pN1sn)	1b	B	+
* Studienteilnahme empfohlen			

## Statements: Axillary lymph node dissection I

### Statement: Axillary lymph node dissection

1. Kuehn T, Bembenek A, Decker T. A concept for the clinical implementation of sentinel lymph node biopsy in patients with breast carcinoma with special regard to quality assurance. Cancer. 2005 Feb 1;103(3):451-61
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Endpoint: Survival LoE 3D AGO-

-

Endpoint: Staging LoE3A AGO -

-

Endpoint: Locoregional control LoE 2aA AGO+/-

-

pN+ (pre-surgery) without neoadjuvant systemic therapy LoE 2a B AGO +

1. Euhus DM. Management of the clinically positive axilla. Breast J. 2020 Jan;26(1):35-38.



cN0 pN0(sn)(i+)LoE 1b A AGO –

1. Rutgers EJ. Sentinel node biopsy: interpretation and management of patients with immunohistochemistry-positive sentinel nodes and those with micrometastases. J Clin Oncol. 2008 Feb 10;26(5):698-702.

cN0 pN1 (mi) LoE 2b B AGO --

1. Mamtani A, Patil S, Stempel M, et al. Axillary Micrometastases and Isolated Tumor Cells Are Not an Indication for Post-mastectomy Radiotherapy in Stage 1 and 2 Breast Cancer. Ann Surg Oncol. 2017 Aug;24(8):2182-2188.
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cN0 pN 1(sn) ( cT1/2 , < 3 SN +, BCS + tangential radiation field, adequate systemic therapy) LoE 1b A AGO -

1. Giuliano AE, Ballman KV, McCall L, et al. Effect of Axillary Dissection vs No Axillary Dissection on 10-Year Overall Survival Among Women With Invasive Breast Cancer and Sentinel Node Metastasis: The ACOSOG Z0011 (Alliance) Randomized Clinical Trial. JAMA. 2017 Sep 12;318(10):918-926.
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completion axillary node dissection in routine clinical practice. Breast Cancer Res Treat 2018 <https://doi.org/10.1007/s10549-018-5009-2>

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7. Barrio AV, Downs-Canner S, Edelweiss M et al. Microscopic Extracapsular Extension in Sentinel Lymph Nodes Does Not Mandate Axillary Dissection in Z0011-Eligible Patients. Ann Surg Oncol. 2019 Dec 9.

cN0 pN1 (sn) and mastectomy (no chestwall radiotherapy) LoE 1b B AGO +\*

1. Cody HS 3rd. Extending ACOSOG Z0011 to Encompass Mastectomy: What Happens Without RT? Ann Surg Oncol. 2017 Mar;24(3):621-623.

cN0 pN1(sn) and mastectomy (T1/2, <3SN+) (chestwall radiotherapy) LoE 5 D AGO +/-\*


-

ALND indicated, but not feasible – Radiotherapy according to AMAROS-trial (validated for cN0 pN1sn) LoE 1b B AGO +

1. Donker M, van Tienhoven G, Straver ME, et al. Radiotherapy or surgery of the axilla after a positive sentinel node in breast cancer

(EORTC 10981-22023 AMAROS): a randomised, multicentre, open-label, phase 3 non-inferiority trial. Lancet Oncol. 2014 Nov;15(12):1303-10.

2. Euhus DM. Management of the clinically positive axilla. Breast J. 2020 Jan;26(1):35-38.

 © AGO e. V. in der DGCG e.V. sowie in der DKG e.V. Guidelines Breast Version 2020.1D  www.ago-online.de FORSCHEN LEHREN HEILEN						
Axilläre Interventionen bei NACT				Oxford		AGO
SLNE nach NACT				LoE	GR	
SLNE vor NACT				2b	B	++
				2b	B	+/-
cN-Status (vor NACT)	pN-Status (vor NACT)	N-Status (nach NACT)	Axilläre Intervention (nach NACT)			
cN0	pN0(sn)	ycN0	Keine weitere ax. Interv.	1a	A	+
cN0	pN+(sn) analog ACOSOG Z0011	ycN0	Keine weitere ax. Interv.	1b	B	+
cN0	pN+(sn) nicht analog ACOSOG Z0011	ycN0	ALND oder Axilla-RT	2b	B	+
cN0	Nicht erhoben (keine SLNE)	ypN0 (sn)	SLNE alleine	2b	B	++
		ypN1 <sub>mic</sub> (sn)	ALND Axilla RT	2b 5	C D	+ +/-
		ypN1 (sn)	ALND Axilla RT	2b 5	C D	++ +/-
cN+	pN <sup>+</sup> <sub>CNB</sub>	ycN0	SLNE alleine*	2b	B	+/-
			TAD (TLNE + SLNE)*	2b	B	+
			ALND*	2b	B	+
cN+	pN <sup>+</sup> <sub>CNB</sub>	ycN+	ALND Axilla RT	2b 5	B D	++ -

NACT=Neoadjuvante Chemotherapie; ALND=Axilläre Lymph Node Dissection; SLNE=Sentinel Lymph Node Excision;  
 TAD=Targeted Axillary Dissection; TLNE=Targeted Lymph Node Excision; RT=Radiotherapie – \*Studienbeteiligung empfohlen

Complete Axillary lymph node dissection after positive sentinel lymph node may be omitted in certain cases due to lack of benefit in prospectively randomized studies

1. Reimer T, Gerber B. Quality-of-life considerations in the treatment of early-stage breast cancer in the elderly. *Drugs Aging*. 2010 Oct 1;27(10):791-800.
2. Tuttle TM, Shamliyan T, Virnig BA, et al. The impact of sentinel lymph node biopsy and magnetic resonance imaging on important outcomes among patients with ductal carcinoma in situ. *J Natl Cancer Inst Monogr*. 2010;2010(41):117-20. Review.
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Women With Invasive Breast Cancer and Sentinel Node Metastasis: The ACOSOG Z0011 (Alliance) Randomized Clinical Trial. JAMA. 2017 Sep 12;318(10):918-926.

Statement surgical intervention in the axilla before or after neoadjuvant chemotherapy

1. Kuehn T, Bauerfeind I, Fehm T, et al.: Sentinel-lymph-node biopsy with breast cancer before and after neoadjuvant chemotherapy (SENTINA): a prospective multi-center cohort study. Lancet Oncol 2013;14(7):609-18.
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12. Sentinel lymph node biopsy without axillary lymphadenectomy after neoadjuvant chemotherapy is accurate and safe for selected patients: the GANEA 2 study. Classe JM, Loaec C, Gimbergues P et al. Breast Cancer Res Treat 2018; doi.org/10.1007/s10549-5004-7

#### Axillary intervention after PST

1. Tee SR, Devane LA, Evoy D et al. Meta-analysis of sentinel lymph node biopsy after neoadjuvant chemotherapy in patients with initial biopsy-proven node-positive breast cancer. Br J Surg. 2018 Nov;105(12):1541-1552.
2. Balic M, Thomssen C, Würstlein R, Gnant M, Harbeck N. St. Gallen/Vienna 2019: A Brief Summary of the Consensus Discussion on the Optimal Primary Breast Cancer Treatment. Breast Care (Basel). 2019 Apr;14(2):103-110.
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#### TAD (+SLNE) after PST, if pN1 (CNB prior to PST and ycN0


1. Allweis TM, Menes T, Rotbart N et al. Ultrasound guided tattooing of axillary lymph nodes in breast cancer patients prior to neoadjuvant therapy, and identification of tattooed nodes at the time of surgery. Eur J Surg Oncol. 2019 Nov 16. pii: S0748-7983(19)31445-3.

2. Balasubramian R, Morgan C, Shaari E et al. Wire guided localisation for targeted axillary node dissection is accurate in axillary staging in node positive breast cancer following neoadjuvant chemotherapy. *Eur J Surg Oncol*. 2019 Dec 11. pii: S0748-7983(19)31500-8.
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11. Natsiopoulou I, Intzes S, Liappis T et al. Axillary Lymph Node Tattooing and Targeted Axillary Dissection in Breast Cancer Patients Who Presented as cN+ Before Neoadjuvant Chemotherapy and Became cN0 After Treatment. *Clin Breast Cancer*. 2019 Jun;19(3):208-215.
12. Simons JM, van Nijnatten TJA, van der Pol CC et al. Diagnostic Accuracy of Different Surgical Procedures for Axillary Staging After Neoadjuvant Systemic Therapy in Node-positive Breast Cancer: A Systematic Review and Meta-analysis. *Ann Surg*. 2019

Mar;269(3):432-442.

13. Simons JM, van Pelt MLMA, Marinelli AWKS et al. Excision of both pretreatment marked positive nodes and sentinel nodes improves axillary staging after neoadjuvant systemic therapy in breast cancer. *Br J Surg.* 2019 Nov;106(12):1632-1639.
14. Tee SR, Devane LA, Evoy D et al. Meta-analysis of sentinel lymph node biopsy after neoadjuvant chemotherapy in patients with initial biopsy-proven node-positive breast cancer. *Br J Surg.* 2018 Nov;105(12):1541-1552





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## Verbesserung der Falsch-Negativ-Rate des operativen Stagings bei pN<sub>CNB</sub> vor NACT und ycN0 nach NACT

	Oxford		
	LoE	GR	AGO
▪ Entfernung von > 2 SLNs (SLNE, kein ungezieltes axilläres Sampling!)	2a	B	+
▪ Kombinierte Tracermethode	2a	B	+/-
▪ IHC zur Detektion von ITC oder Mikrometastasen	2b	B	+
▪ Markierung von positiven LK vor NACT (Clip / Coil / Tattoo)	2b	B	+*
▪ Targeted Axillary Dissection (TAD = TLNE + SLNE)**	2b	B	+*
▪ Alleinige TLNE	2b	B	+/-*


\* Teilnahme an Studien empfohlen;  
\*\*TAD =Targeted axillary dissection; TLNE = Targeted lymph node excision; SLNE = Sentinel lymph node excision

1. TAD (+SLNE) after PST, if pN1 (CNB prior to PST and ycN0
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## Verminderung der individuellen Versagerrate für die SLNB bei pN1 ypN0

- **Prädiktive Faktoren für eine Konversion von pN1 (vor NACT) nach ypN0<sub>sn/TAD</sub> (nach NACT)**
  - Junges Alter
  - Intrinsischer Subtyp (ER neg, HER 2 pos)
  - Grade 3
  - N1 (vs N2)
  - pCR (Brust)

Kantor et al. Ann Surg Oncol 2018

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Sentinel-Lymphknoten-Exzision (SLNE)			
Indikationen I			
	Oxford		
	LoE	GR	AGO
<ul style="list-style-type: none"> <li>Klinisch / sonographisch neg. Axilla (cN0) <ul style="list-style-type: none"> <li>Zusätzliche CNB bei cN1 um eine SLNE zu ermöglichen</li> </ul> </li> <li>cT 1–2</li> <li>cT 3–4c</li> <li>Multifokales / multizentrisches MaCa</li> <li>DCIS <ul style="list-style-type: none"> <li>Mastektomie</li> <li>BET</li> <li>DCIS beim Mann</li> </ul> </li> <li>MaCa des Mannes</li> <li>Bei der älteren Patientin</li> </ul>	1b	A	++
	2a	B	+
	2b	A	++
	3b	B	+
	2b	B	+
	3b	B	+
	3b	B	-
	5	D	+/-
	2b	B	+
	3b	B	+

### Statement: SLNE

1. Schwartz GF, Giuliano AE, Veronesi U; Consensus Conference Committee. Proceedings of the consensus conference on the role of sentinel lymph node biopsy in carcinoma of the breast, April 19-22, 2001, Philadelphia, Pennsylvania. Cancer 2002;94:2542-51.
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Results of Ganglion Sentinelle et Chimiotherapie Neoadjuvante, a French Prospective Multicentric Study. *J Clin Oncol*. 2008 Dec 29. [Epub ahead of print]

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Statement: preoperative FNA / CNB (core needle biopsy) of suspicious lymph nodes

1. Houssami N, Ciatto S, Turner RM, et al. Preoperative ultrasound-guided needle biopsy of axillary nodes in invasive breast cancer – a metaanalysis. *Ann Surg Oncol* 2011;254:243-251
2. Diepstraten SC, Sever AR, Buckens CF, et al. Value of preoperative ultrasound-guided axillary lymph node biopsy for preventing completion axillary lymph node dissection in breast cancer: a systematic review and meta-analysis. *Ann Surg Oncol*. 2014;21(1):51-9.
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Statement: Multifocal / multicentric MaCa

1. Ferrari A, Dionigi P, Rovera F. Multifocality and multicentricity are not contraindications for sentinel lymph node biopsy in breast

cancer surgery. World J Surg Oncol. 2006 Nov 20;4:79.

#### Statement: DCIS

1. Tuttle TM, Shamliyan T, Virnig BA, et al. The impact of sentinel lymph node biopsy and magnetic resonance imaging on important outcomes among patients with ductal carcinoma in situ. J Natl Cancer Inst Monogr. 2010;2010(41):117-20.
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#### Statement: Male

1. Boughey JC et al. Comparative analysis of sentinel lymph node operation in male and female breast cancer patients. J Am Coll Surg 2006 Oct;203(4):475-80.
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#### Statement: Elderly

1. Reimer T, Gerber B. Quality-of-life considerations in the treatment of early-stage breast cancer in the elderly. Drugs Aging. 2010 Oct 1;27(10):791-800.
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#### Statement: Lymphedema



1. Miller CL, Specht MC, Skolny MN, et al. Sentinel lymph node biopsy at the time of mastectomy does not increase the risk of lymphedema: implications for prophylactic surgery. *Breast Cancer Res Treat.* 2012 Oct;135(3):781-9.

Sentinel-Lymphknoten-Exzision (SLNE)			
Indikationen II			
	Oxford		
	LoE	GR	AGO
<div>  <p>© AGO e. V. in der DGGG e.V. sowie in der DKG e.V.</p> <p>Guidelines Breast Version 2020.1D</p> <p>www.ago-online.de</p> <p>FORSCHEN LEHREN HEILEN</p> </div>			
▪ Während Schwangerschaft oder Stillzeit (nur <sup>99m</sup> Tc-Kolloid, keine Markierung mit Patentblau)	3	C	++
▪ Nach vorausgegangener Tumorektomie	2b	B	+
▪ Nach vorausgegangener „großer“ Brust-Operation (z.B. Reduktionsplastik)	3b	C	+/-
▪ Ipsilaterales intramammäres Rezidiv nach vorheriger BET und SNLE	4	D	-
▪ SLNE entlang der A. mammaria interna	2b	B	-
▪ Nach Axilla-Voroperation	3b	B	+/-
▪ Prophylaktische bilaterale / kontralaterale Mastektomie	3b	B	--
▪ Inflammatorisches MaCa	3b	C	-

#### Statement: pregnancy

1. Khera SY, Kiluk JV, Hasson DM Pregnancy-associated breast cancer patients can safely undergo lymphatic mapping. Breast J. 2008 May-Jun;14(3):250-4
2. Bergkvist L. Resolving the controversies surrounding lymphatic mapping in breast cancer. Future Oncol. 2008 Oct;4(5):681-8.
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#### Statement: internal mammarian

1. Avisar E, Molina MA, Scarlata M: Internal mammary sentinel node biopsy for breast cancer. Am J Surg. 2008 Oct;196(4):490-4.
2. Chen RC, Lin NU, Golshn M: Internal mammary nodes in breast cancer: diagnosis and implications for patient management -- a

systematic review. J Clin Oncol. 2008 Oct 20;26(30):4981-9.

3. Wouters MW, van Geel AN, Menke-Pluijmers M: Should internal mammary chain (IMC) sentinel node biopsy be performed? Outcome in 90 consecutive non-biopsied patients with a positive IMC scintigraphy. Breast. 2008 Apr;17(2):152-8.

#### Statement: prophylactic mastectomy

1. Dupont et al. The role of sentinel lymph node biopsy in women undergoing prophylactic mastectomy. Am J Surg 2000 Oct;180(4):274-7
2. Soran A et al.: Is routine sentinel lymph node biopsy indicated in women undergoing contralateral prophylactic mastectomy? Magee-Womens Hospital experience. Ann Surg Oncol 2007 Feb;14(2):646-51.
3. Boughey JC et al.: Decision analysis to assess the efficacy of routine sentinel lymphadenectomy in patients undergoing prophylactic mastectomy. Cancer 2007 Dec 1;110(11):2542-50

#### Statement: After previous tumor excision

1. Celebioglu et al.: Sentinel node biopsy in non-palpable breast cancer and in patients with a previous diagnostic excision. Eur J Surg Oncol 2007 Apr;33(3):276-80.

#### Statement: previous major breast surgery

1. Intra et al. Sentinel lymph node biopsy is feasible even after total mastectomy. J Surg Oncol 2007 Feb 1;95(2):175-9
2. Kaminski A, Amr D, Kimbrell ML: Lymphatic mapping in patients with breast cancer and previous augmentation mammoplasty. Am Surg. 2007 Oct;73(10):981-3
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Statement: Ipsilateral breast recurrence after prior BCS and prior SLNB


1. Mattia Intra M, Triro G, Viale G: Second Biopsy of Axillary Sentinel Lymph Node for Reappearing Breast Cancer After Previous Sentinel Lymph Node Biopsy. *Ann Surg Oncol*. 2005;12(11):895-9
2. Intra et al. Second axillary sentinel node biopsy for ipsilateral breast tumour recurrence. *Br J Surg* 2007 Oct;94(10):1216-9
3. Schrenk P et al. Lymphatic mapping in patients with primary or recurrent breast cancer following previous axillary surgery. *Eur J Surg Oncol*. 2008 Aug;34(8):851-6.
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Statement: inflammatory breast cancer

1. Fayanju OM, Ren Y, Greenup RA, et al. Extent of axillary surgery in inflammatory breast cancer: a survival analysis of 3500 patients [published online ahead of print, 2020 Jan 20]. *Breast Cancer Res Treat*. 2020;10.1007/s10549-020-05529-1.
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#### Statement: Others

1. Schwartz GF, Giuliano AE, Veronesi U; Consensus Conference Committee. Proceedings of the consensus conference on the role of sentinel lymph node biopsy in carcinoma of the breast, April 19-22, 2001, Philadelphia, Pennsylvania. *Cancer* 2002;94:2542-51
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## Sentinel-Lymphknoten-Exzision (SLNE)

### Markierung

Oxford		
LoE	GR	AGO
1a	A	++
1b	A	+
1a	A	+/-
4	D	-
2a	B	+/-
2a	B	+/-

- <sup>99m</sup>Tc Kolloid
- Präoperative Lymphszintigraphie (diagnostischer Zugewinn limitiert, aber gesetzlich vorgeschrieben)\*
- Patentblau
- Methylenblau
- Indocyaningrün (ICG)
- SPIO<sup>#</sup>

\* Qualitätssicherung Nuklearmedizin  
<sup>#</sup> SPIO: Superparamagnetic Iron Oxide;

### Statement radiotracer/blue dye

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4. Rodier JF, Velten M, Wilt M, et al. Prospective multicentric randomized study comparing periareolar and peritumoral injection of radiotracer and blue dye for the detection of sentinel lymph node in breast sparing procedures: FRANSENODE trial. *J Clin Oncol*. 2007 Aug 20;25(24):3664–
5. Bines S, Kopkash K, Ali A, Fogg L, et al. The use of radioisotope combined with isosulfan Blue dye is not superior to radioisotope alone for the identification of sentinel lymph nodes in patients with breast cancer. *Surgery*. 2008 Oct;144(4):606-9; discussion 609-10.

6. Straver ME, Meijnen P, van Tienhoven G, et al. Sentinel node identification rate and nodal involvement in the EORTC 10981-22023 AMAROS trial. *Ann Surg Oncol*. 2010 Jul;17(7):1854-61.
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## Operatives Vorgehen nach Neoadjuvanter Therapie

	Oxford		
	LoE	GR	AGO
▪ <b>Frühzeitige Clip-Markierung des Tumors mit exakter topographischer Dokumentation</b>	5	D	++
▪ <b>Operative Entfernung des Tumors / Tumorbettes</b>	2b	C	++
▪ <b>Freie Resektionsränder</b>	2	B	++
▪ <b>Exzision in neuen Tumorgrenzen</b>	2	C	+

**OP nach neoadjuvanter Chemotherapie  
siehe Kap. „Neoadjuvante Chemotherapie“**

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# Beginn adjuvanter Therapiemaßnahmen nach primärer Operation

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	Oxford		
	LoE	GR	AGO
▪ Zeitnaher Anschluss systemischer Therapie und adjuvanter Radiotherapie (RT) nach OP	1b	A	++
▪ Beginn der Chemo- ± AK-Therapie nach OP baldmöglichst, vor Radiotherapie	1b	A	++
▪ Wenn keine Chemo- ± Antikörpertherapie:			
▪ Beginn der adjuvanten RT innerhalb von 6–8 Wochen nach OP	2b	B	++
▪ Beginn der endokrinen Therapie nach OP baldmöglichst	5	D	++
▪ Endokrine Therapie gleichzeitig mit Radiotherapie	3b	C	+

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