

Diagnostik und Therapie primärer und metastasierter Mammakarzinome

Onkoplastische und rekonstruktive Mammachirurgie

Plastisch-rekonstruktive Aspekte nach Mastektomie

- **Versionen 2002–2017:**
Audretsch / Bauerfeind / Blohmer /
Brunnert / Dall / Fersis / Gerber /
Hanf / Kümmel / Lux / Nitz / Rezai /
Rody / Scharl / Solbach / Thomssen
- **Version 2018:**
Ditsch / Lux

Pubmed 2003 - 2017

Cochrane data base (z.B. Cochrane Breast Cancer Specialised Register)

Suchbegriffe: breast reconstruction; ... AND random allocation, ... AND cohort study

Einteilung in EBM-Grade nach

Jeremy Howick, et al. "The 2011 Oxford CEBM Evidence Levels of Evidence (Introductory Document)". Oxford Centre for Evidence-Based Medicine.

<http://www.cebm.net/index.aspx?o=5653>

Verwendete Guidelines zu Diagnostik und Therapie des Mammakarzinoms

National Institute of Health (NIH) – National Cancer Institute:

<http://www.cancer.gov/cancertopics/pdq/treatment/breast/HealthProfessional/>

American Association of Clinical Oncology (ASCO) and Technology Assessments:

<http://www.asco.org/portal/site/ASCO/menuitem>. (Practice Guidelines),

Canadian Medical Association (CMA): <http://www.cmaj.ca/cgi/content/full/158/3/DC1>

NCCN 2016

Regeln zur Überarbeitung der AGO Empfehlungsdias_Stand 2018

Definition der onkoplastischen Operation

Einsatz plastischer operativer Techniken zum Zeitpunkt der Tumorentfernung, um sichere Resektionsgrenzen zu erreichen und eine ästhetische Brustform zu ermöglichen.

Fokus auf günstige Narbenplatzierung, adäquate Weichteilformierung, Wahl des geeigneten Wiederaufbauverfahrens (auch unter der Bedingung einer Radiatio) und Rekonstruktion der Gegenseite, um eine Symmetrie zu erreichen.

1. Oncoplastic breast surgery: comprehensive review. Bertozzi N, et al. 2017; 21(11): 2572-2585.
2. Optimizing breast cancer adjuvant radiation and integration of breast and reconstructive surgery. Kuerer H, et al. ASCO Educational Book 2017

Onkoplastische brusterhaltende Operation

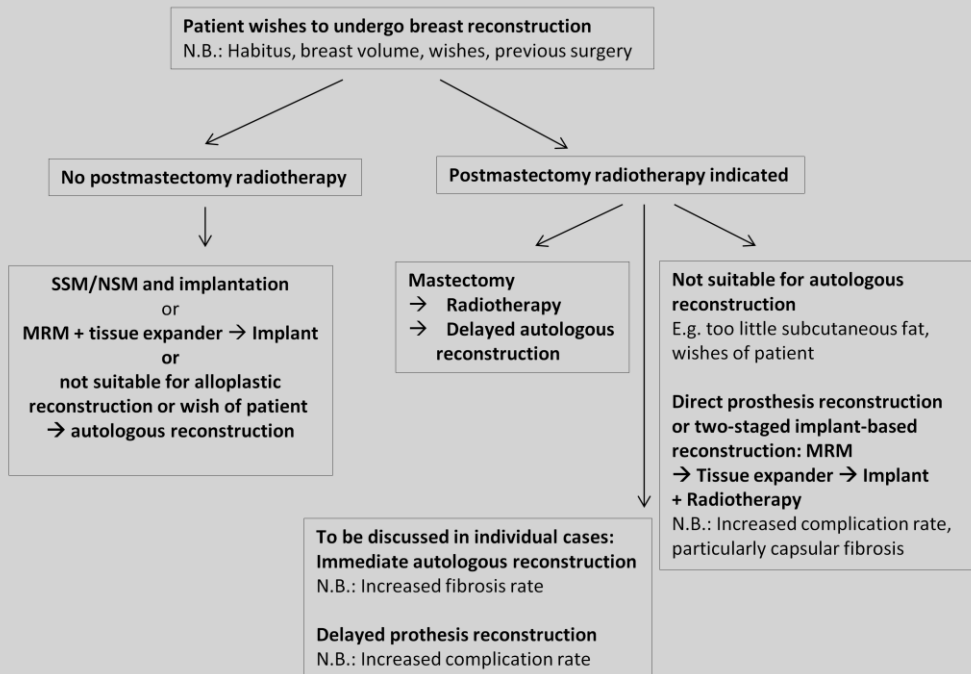
- Tumoradaptierte Reduktionsplastik
- Lokale Lappen-/Verschiebetechniken
- Partielle Mastektomie mit Gewebetransfer
- Onkologische Sicherheit gegeben

Oxford		
LoE	GR	AGO
2a	B	+
2a	B	+
3b	B	+/-
2a	B	

1. Determinants for patient satisfaction regarding aesthetic outcome and skin sensitivity after breast-conserving surgery. Dahlbäck C, et al. World J Surg Oncol. 2016; 14(1):303.
2. Oncoplastic surgery combining abdominal advancement flaps with volume displacement techniques to breast-conserving surgery for small- to medium-sized breasts. Ogawa T, et al. Breast Cancer. 2016; 23(6):932-938.
3. The role of oncoplastic breast conserving treatment for locally advanced breast tumors. A matching case-control study. Vieira RA, et al. Ann Med Surg (Lond). 2016; 10:61-8.
4. Complications of Oncoplastic Breast Surgery Involving Soft Tissue Transfer Versus Breast-Conserving Surgery: An Analysis of the NSQIP Database. Cil TD, et al. Ann Surg Oncol. 2016; 23(10):3266-71.
5. Comparative study of oncoplastic versus non-oncoplastic breast conserving surgery in a group of 211 breast cancer patients. Cali Cassi L, et al. Eur Rev Med Pharmacol Sci. 2016; 20(14):2950-4.
6. Operative and Oncologic Outcomes in 9861 Patients with Operable Breast Cancer: Single-Institution Analysis of Breast Conservation with Oncoplastic Reconstruction. Carter SA, et al. Ann Surg Oncol. 2016; 23(10):3190-8.
7. Outcomes After Oncoplastic Breast-Conserving Surgery in Breast Cancer Patients: A Systematic Literature Review. De La Cruz L, et al. Ann Surg Oncol. 2016; 23(10):3247-58.

8. Oncoplastic breast conserving surgery and oncological outcome: Systematic review. Yiannakopoulou EC, et al. 2016; 42(5):625-30.
9. Oncoplastic reduction mammoplasty for breast cancer in women with macromastia: Oncological long-term outcomes. Emiroglu M, et al. Asian J Surg. 2017; 40(1):41-47.

Algorithmus der Brustrekonstruktion



1. Radiation and breast reconstruction: Algorithmic approach and evidence-based outcomes. El-Sabawi B, et al. J Surg Oncol. 2016; 113(8):906-12.
2. Breast Reconstruction Following Cancer Treatment. Gerber B, et al. Dtsch Arztebl Int. 2015; 112(35-36):593-600
3. Optimizing breast cancer adjuvant radiation and integration of breast and reconstructive surgery. Kuerer H, et al. ASCO Educational Book 2017; Memorial Sloan Kettering Cancer Center, Fig. 2 und 3
4. What is the optimum timing of postmastectomy radiotherapy in two-stage prosthetic reconstruction: radiation to the tissue expander or permanent implant? Cordeiro PG, et al. Plast Reconstr Surg. 2015

Brustrekonstruktion

Grundsätze

AGO: ++

- **Planung der Rekonstruktion im interdisziplinären Tumorboard vor einer Mastektomie**
- **Beratung hinsichtlich aller OP-Techniken, sowie deren Vor- und Nachteile**
- **Möglichkeit zum Einholen einer Zweitmeinung**
- **Besprechung einer neoadjuvanten Systemtherapie bei ungünstiger Tumor-Brust-Relation**
- **Berücksichtigung der kontralateralen Brust;**
 - mögliche Angleichung-/Folge-OPs zur Symmetrierherstellung besprechen; i.d.R. sekundär nach Abstand von mindestens 3-6 Monate (Cave: Notwendigkeit Nachresektionen, Effekte der Radiotherapie der betroffenen Seite berücksichtigen)
- **Bevorzugung einer die Patientin wenig belastenden OP-Technik mit langfristig stabilem ästhetischen Ergebnis**
- **Cave: keine Verzögerung in der adjuvanten Therapie durch die Rekonstruktion**

1. AWMF Leitlinien: S3-LL. Brustrekonstruktion mit Eigengewebe. Registernummer 015 – 075, Stand: 01.04.2015 , gültig bis 31.03.2020
2. Oncoplastic breast surgery: comprehensive review. Bertozzi N, et al. Eur Rev Med Pharmacol Sci. 2017; 21(11):2572-2585.
3. Oncologic safety of nipple-sparing mastectomy in women with breast cancer. Smith BL, et al. J Am Coll Surg
4. Nipple-sparing mastectomy and direct to implant breast reconstruction. Colwell AS, et al. Plast Reconstr Surg. 2017; 140(5S Advances in Breast Reconstruction):44S-50S.

Möglichkeiten der Rekonstruktion nach Mastektomie

	Oxford		
	LoE	GR	AGO
▪ Einsatz von mit Silikongel gefüllten Implantaten einzeitig (primär) oder zweizeitig nach Expander	2a	B	+
▪ Sicherheit vergleichbar mit Kochsalzimplantaten	2b	B	
▪ Autologer Gewebettransfer	2a	B	+
▪ Gestielter Gewebettransfer	2a	B	+
▪ Freier Gewebettransfer (mit Gefäßanastomosen)	2a	B	+
▪ Autologer Gewebettransfer kombiniert mit Implantaten	3a	C	+

Cave: BMI >30, Raucher, Diabetes, Strahlentherapie, Alter, bilaterales ME

1. Complications in Postmastectomy Breast Reconstruction: One-year Outcomes of the Mastectomy Reconstruction Outcomes Consortium (MROC) Study. Wilkins EG, et al. Ann Surg. 2016 [Epub ahead of print]
2. Comparison of subcutaneous versus submuscular expander placement in the first stage of immediate breast reconstruction. Zhu L, et al. J Plast Reconstr Aesthet Surg. 2016; 69(4):e77-86.
3. Five-Year Safety Data for More than 55,000 Subjects following Breast Implantation: Comparison of Rare Adverse Event Rates with Silicone Implants versus National Norms and Saline Implants. Singh N, et al. Plast Reconstr Surg. 2017; 140(4):666-679.

Zeitpunkt der Rekonstruktion

	Oxford		
	LoE	GR	AGO
<ul style="list-style-type: none"> ▪ Sofortrekonstruktion <ul style="list-style-type: none"> ▪ Obligat bei SSM/NSM ▪ Vermeiden des Postmastektomie-Syndroms 	3b	B	++
<ul style="list-style-type: none"> ▪ Intervallrekonstruktion <ul style="list-style-type: none"> ▪ Keine Behinderung von adjuvanten Therapien (CHT, RT) ▪ Nachteil: Verlust des Hautmantels 	3b	B	++
<ul style="list-style-type: none"> ▪ Verzögerte Sofortrekonstruktion („Delayed-immediate BR“) 	3b	B	+/-

1. Complications After Mastectomy and Immediate Breast Reconstruction for Breast Cancer: A Claims-Based Analysis. Jaggi R, et al. Ann Surg. 2016; 263(2):219-27.
2. What Is the Optimum Timing of Postmastectomy Radiotherapy in Two-Stage Prosthetic Reconstruction: Radiation to the Tissue Expander or Permanent Implant? Maione L, et al. Plast Reconstr Surg. 2016; 138(1):150e-1e.
3. Comparison of Delayed and Immediate Tissue Expander Breast Reconstruction in the Setting of Postmastectomy Radiation Therapy. Ribuffo D, et al. Ann Plast Surg. 2016; 76(6):743-4.
4. Impact of bilateral versus unilateral mastectomy on short term outcomes and adjuvant therapy, 2003–2010: a report from the National Cancer Data Base. Sharpe SM, et al. Ann Surg Oncol. 2014; 21:2920–7.
5. A Comparison of Surgical Complications Between Immediate Breast Reconstruction and Mastectomy: The Impact on Delivery of Chemotherapy-An Analysis of 391 Procedures. Zhong T, et al. Ann Surg Oncol. 2012; 19(2):560-6.
6. Immediate versus delayed reconstruction following surgery for breast cancer. D'Souza N, et al. Cochrane Database Syst Rev. 2011; (7):CD008674.
7. Direct to implant versus two stage tissue expander/implant reconstruction: 2 year risks and patient reported outcomes from a prospective, multicenter study. Srinivasa DR, et al. Plast Reconstr Surg. 2017; 140(5):869-877.

Zeitpunkt der Rekonstruktion mit Implantaten in Bezug zur Strahlentherapie

■ Implantat-Rekonstruktion (IR)

- IR ohne Strahlentherapie (RT)
- IR vor RT
- IR nach RT
- IR nach sekundärer Mastektomie nach BET
- Perioperativ verlängerte antibiotische Prophylaxe (mind. 24 Stunden)

Oxford		
LoE	GR	AGO
2a	B	+
2a	B	++
2a	B	+
2b	B	+/-
2a	B	+/-
2b	B	+

1. Postmastectomy Radiation Therapy and Two-Stage Implant-Based Breast Reconstruction: Is There a Better Time to Irradiate? Santosa KB, et al. Plast Reconstr Surg. 2016; 138(4):761-9.
2. What Is the Optimum Timing of Postmastectomy Radiotherapy in Two-Stage Prosthetic Reconstruction: Radiation to the Tissue Expander or Permanent Implant? Maione L, et al. Plast Reconstr Surg. 2016; 138(1):150e-1e.
3. Radiation and breast reconstruction: Algorithmic approach and evidence-based outcomes. El-Sabawi B, et al. J Surg Oncol. 2016; 113(8):906-12.
4. Antibiotic Prophylaxis following Implant-Based Breast Reconstruction: What Is the Evidence? Phillips BT, Halvorson EG. Plast Reconstr Surg. 2016; 138(4):751-7.
5. Discussion: Antibiotic Prophylaxis following Implant-Based Breast Reconstruction: What Is the Evidence? Hunter JG. Plast Reconstr Surg. 2016; 138(4):758-9.
6. Are Prophylactic Postoperative Antibiotics Necessary for Immediate Breast Reconstruction? Results of a Prospective Randomized Clinical Trial. Phillips BT, et al. J Am Coll Surg. 2016; 222(6):1116-24.
7. Prosthetic breast reconstruction in previously irradiated breasts: A meta-analysis. Lee KT, Mun GH. J Surg Oncol. 2015; 112(5):468-75.
8. A single pre-operative antibiotic dose is as effective as continued antibiotic prophylaxis in implant-based breast reconstruction: A matched cohort study. Townley WA, et al. J Plast Reconstr Aesthet Surg. 2015; 68(5):673-8.
9. Implant breast reconstruction and radiation: a multicenter analysis of long-term

health-related quality of life and satisfaction. Albornoz CR, et al. *Ann Surg Oncol*. 2014; 21(7):2159-64.

10. Acellular dermal matrices and radiotherapy in breast reconstruction: a systematic review and meta-analysis of the literature. Valdatta L, et al. *Plast Surg Int*. 2014; 472604.
11. A systematic review of morbidity associated with autologous breast reconstruction before and after exposure to radiotherapy: are current practices ideal? Kelley BP, et al. *Ann Surg Oncol*. 2014; 21(5):1732-8.
12. Reconstruction: before or after postmastectomy radiotherapy? A systematic review of the literature. Berbers J, et al. *Eur J Cancer*. 2014; 50(16):2752-62.
13. Radiotherapy in implant-based immediate breast reconstruction: risk factors, surgical outcomes, and patient-reported outcome measures in a large Swedish multicenter cohort. Eriksson M, et al. *Breast Cancer Res Treat*. 2013; 142(3):591-601.
14. Delayed autologous breast reconstruction after postmastectomy radiation therapy: is there an optimal time? Momoh AO, et al. *Ann Plast Surg*. 2012; 69(1):14-8.
15. Extended trimethoprim/sulfamethoxazole prophylaxis for implant reconstruction in the previously irradiated chest wall. Mirzabeigi MN, et al. *Plast Reconstr Surg*. 2012; 129(1):1e-7e.
16. Radiotherapy and breast reconstruction: a meta-analysis. Barry M, Kell MR. *Breast Cancer Res Treat*. 2011; 127(1):15-22.
17. Determining the outcomes of post-mastectomy radiation therapy delivered to the definitive implant in patients undergoing one- and two-stage implant-based breast reconstruction: A systematic review and meta-analysis. Magill LJ, et al. *J Plast Reconstr Aesthet Surg*. 2017; 70(10):1329-1335.
18. Impact of Radiotherapy on Complications and Patient-Reported Outcomes After Breast Reconstruction. Jagsi R, et al. *J Natl Cancer Inst*. 2018; 110(2).

Radiotherapie und Implantatrekonstruktion

Cave: Hohe Komplikationsrate in Kombination mit Radiotherapie (Kapselkontraktur, Revisionsoperationen, Versagen der Rekonstruktion, reduzierte Kosmetik und Patientenzufriedenheit)

Cave: Niedrigere Patientenzufriedenheit bei Implantatrekonstruktion plus Radiotherapie im Vergleich zur autologen Rekonstruktion plus Radiotherapie

LoE 2b B

1. Determining the outcomes of post-mastectomy radiation therapy delivered to the definitive implant in patients undergoing one- and two-stage implant-based breast reconstruction: A systematic review and meta-analysis. Magill LJ, et al. J Plast Reconstr Aesthet Surg. 2017; 70(10):1329-1335.
2. Impact of Radiotherapy on Complications and Patient-Reported Outcomes After Breast Reconstruction. Jagsi R, et al. J Natl Cancer Inst. 2018; 110(2).

Techniken / Netze im Rahmen der Rekonstruktion

	Oxford		
	LoE	GR	AGO
▪ Eigengewebe (z.B. deepithelialisierter Corium-Fett-Lappen, TDAP [§] , LDF*)	3b	C	+
▪ Azelluläre Dermis (ADM)	2a	B	+ [#]
▪ Synthetische Netze	2b	B	+ [#]

§ Thorakodorsaler Arterien Perforator-Lappen
 * Latissimus dorsi Lappen
 # Teilnahme an Registerstudien empfohlen

1. Mesh versus acellular dermal matrix in immediate implant-based breast reconstruction - A prospective randomized trial. Gschwantler-Kaulich D, et al. Eur J Surg Oncol. 2016; 42(5):665-71.
2. Single-stage breast reconstruction using Strattice™: A retrospective study. Dikmans RE, et al. J Plast Reconstr Aesthet Surg. 2016; 69(2):227-33.
3. Subcutaneous Implant-based Breast Reconstruction with Acellular Dermal Matrix/Mesh: A Systematic Review. Salibian AA, et al. Plast Reconstr Surg Glob Open. 2016; 4(11):e1139.
4. Clinical outcome and patient satisfaction with the use of bovine-derived acellular dermal matrix (SurgiMend™) in implant based immediate reconstruction following skin sparing mastectomy: A prospective observational study in a single centre. Headon H, et al. Surg Oncol. 2016; 25(2):104-10.
5. Biological and synthetic mesh use in breast reconstructive surgery: a literature review. Logan Ellis H, et al. World J Surg Oncol. 2016; 14:121.
6. Subcutaneous Tissue Expander Placement with Synthetic Titanium-Coated Mesh in Breast Reconstruction: Long-term Results. Casella D, et al. Plast Reconstr Surg Glob Open. 2016; 3(12):e577.
7. Risk-reducing, conservative mastectomy-analysis of surgical outcome and quality of life in 272 implant-based reconstructions using TiLoop(®) Bra versus autologous corial flaps. Rezai M, et al. Gland Surg. 2016; 5(1):1-8.
8. Focus on technique: one-stage implant-based breast reconstruction. Salzberg CA. Plast

Reconstr Surg. 2012; 130(5 Suppl 2):95S-103S.

9. Long-term outcomes following fat grafting in prosthetic breast reconstruction: a comparative analysis. Seth AK, et al. Plast Reconstr Surg. 2012; 130(5):984-90.
10. The scarless latissimus dorsi flap for full muscle coverage in device-based immediate breast reconstruction: an autologous alternative to acellular dermal matrix. Elliott LF, et al. Plast Reconstr Surg. 2011; 128(1):71-9.
11. Acellular Dermal Matrix in Immediate Expander/Implant Breast Reconstruction: A Multicenter Assessment of Risks and Benefits. Sorkin M, et al. Plast Reconstr Surg. 2017; 140(6):1091-1100.
12. A Meta-analysis of Studies Comparing Outcomes of Diverse Acellular Dermal Matrices for Implant-Based Breast Reconstruction. Lee KT, Mun GH. Ann Plast Surg. 2017; 79(1):115-123.
13. Thoracodorsal artery perforator flap as an autologous alternative to acellular dermal matrix. Hashem T, Farahat A. World J Surg Oncol. 2017; 15(1):185.

Lipotransfer

- **Lipotransfer nach ME und Rekonstruktion**
- **Lipotransfer nach brusterhaltender Therapie**
- **Mit Stammzellen (ACS) angereicherte, autologe Fettgewebstransplantation**

Oxford		
LoE	GR	AGO
2a	B	+
2a	B	+
4	C	-

1. AWMF-Leitlinie „Autologe Fetttransplantation“, Klasse: S2k Registernummer: 009/017, 11/2015
2. Autologous fat transplantation for breast reconstruction: A literature review. Simonacci F, et al. Ann Med Surg (Lond). 2016; 12:94-100.
3. Systematic review: The oncological safety of adipose fat transfer after breast cancer surgery. Waked K, et al. Breast. 2016; 31:128-136.
4. Breast cancer and fat grafting: efficacy, safety and complications-a systematic review. De Decker M, et al. Eur J Obstet Gynecol Reprod Biol. 2016; 207:100-108.
5. Lipofilling of the Breast Does Not Increase the Risk of Recurrence of Breast Cancer: A Matched Controlled Study. Petit JY, Maisonneuve P. Plast Reconstr Surg. 2016; 138(5):937e-938e.
6. Oncological Safety of Lipofilling in Patients with Breast Cancer: A Meta-analysis and Update on Clinical Practice. Wazir U, et al. Anticancer Res. 2016; 36(9):4521-8.
7. Lipofilling of the Breast Does Not Increase the Risk of Recurrence of Breast Cancer: A Matched Controlled Study. Batista BN, et al. Plast Reconstr Surg. 2016; 138(6):1068e-1069e.
8. Oncological outcomes of lipofilling breast reconstruction: 195 consecutive cases and literature review. Silva-Vergara C, et al. J Plast Reconstr Aesthet Surg. 2016; 69(4):475-81.
9. Lipofilling of the Breast Does Not Increase the Risk of Recurrence of Breast Cancer: A Matched Controlled Study. Kronowitz SJ, et al. Plast Reconstr Surg. 2016; 137(2):385-

10. Efficacy and Safety of Cell-Assisted Lipotransfer: A Systematic Review and Meta-Analysis. Zhou Y, et al. *Plast Reconstr Surg*. 2016; 137(1):44e-57e.
11. The Safety, Effectiveness, and Efficiency of Autologous Fat Grafting in Breast Surgery. Spear SL, et al. *Plast Reconstr Surg Glob Open*. 2016; 4(8):e827.
12. Autologous fat grafting in onco-plastic breast reconstruction: A systematic review on oncological and radiological safety, complications, volume retention and patient/surgeon satisfaction. Groen JW, et al. *J Plast Reconstr Aesthet Surg*. 2016; 69(6):742-64.
13. Adipose-Derived Stem Cells in Novel Approaches to Breast Reconstruction: Their Suitability for Tissue Engineering and Oncological Safety. O'Halloran N, et al. *Breast Cancer (Auckl)*. 2017; 11:1178223417726777.
14. Lipofilling effects after breast cancer surgery in post-radiation patients: an analysis of results and algorithm proposal. Debal M, et al. *Eur J Plast Surg*. 2017; 40(5):447-454.
15. Determining the Oncologic Safety of Autologous Fat Grafting as a Reconstructive Modality: An Institutional Review of Breast Cancer Recurrence Rates and Surgical Outcomes. Cohen O, et al. *Plast Reconstr Surg*. 2017; 140(3):382e-392e.
16. Impact of Human Adipose Tissue-Derived Stem Cells on Malignant Melanoma Cells in An In Vitro Co-culture Model. Preisner F, et al. *Stem Cell Rev*. 2017; doi: 10.1007/s12015-017-9772-y. [Epub ahead of print]

Gestielte Lappen zur Rekonstruktion

Brustrekonstruktion (BR) mit autologem Gewebe

- **TRAM, Latissimus-dorsi-Lappen (können muskelsparend präpariert werden)**
- **Delayed-TRAM bei Risikopatientinnen**
- **Ipsilateral gestielter TRAM**
- **Radiotherapie:**
 - BR nach RT
 - BR vor RT

(erhöhte Rate an Fibrosen, Wundheilungsstörungen, Liponekrosen, reduziertes ästhetisches Outcome)

Oxford		
LoE	GR	AGO
3b	C	+
3a	B	+
3b	A	+
2a	B	+
2a	B	+/-

- Comparison of Outcomes following Autologous Breast Reconstruction Using the DIEP and Pedicled TRAM Flaps: A 12-Year Clinical Retrospective Study and Literature Review. Knox AD, et al. Plast Reconstr Surg. 2016; 138(1):16-28.
- Free Versus Pedicled TRAM Flaps: Cost Utilization and Complications. Golpanian S, et al. Aesthetic Plast Surg. 2016; 40(6):869-876.
- Quality of Life and Patient-Reported Outcomes in Breast Cancer Survivors: A Multicenter Comparison of Four Abdominally Based Autologous Reconstruction Methods. Macadam SA, et al. Plast Reconstr Surg. 2016; 137(3):758-71.
- The Effect of Progressive-Tension Closure on Donor Site Seroma Formation in Delayed Latissimus Dorsi Flaps for Breast Reconstruction. Landis LV, et al. Ann Plast Surg. 2016; 76(2):170-3.
- Latissimus dorsi flap versus pedicled transverse rectus abdominis myocutaneous breast reconstruction: outcomes. Teisch LF, et al. J Surg Res. 2015; 199(1):274-9.
- Donor-Site Hernia Repair in Abdominal Flap Breast Reconstruction: A Population-Based Cohort Study of 7929 Patients. Mennie JC, et al. Plast Reconstr Surg. 2015; 136(1):1-9.
- Latissimus Dorsi Flap for Total Autologous Immediate Breast Reconstruction without Implants. Jia Y, et al. Plast Reconstr Surg. 2015; 136(2):267e-268e.
- Long-term evaluation of postmastectomy breast reconstruction with the pedicled transverse rectus abdominis musculocutaneous flap. Christensen BO, et al. J Plast Surg Hand Surg. 2013; 47(5):374-8.

9. Angiographic delay: a viable alternative to surgical delay. Aboutanos SZ, et al. Ann Plast Surg. 2012; 68(6):562-7.
10. Prevention of postoperative seroma-related morbidity by quilting of latissimus dorsi flap donor site: a systematic review. Sajid MS, et al. Clin Breast Cancer. 2011; 11(6):357-63.
11. Preoperative Angio-CT Preliminary study of the TRAM flap after selective vascular delay. Ribuffo D, et al. Ann Plast Surg 2007; 59(6):611-616.
12. The pedicled TRAM flap in breast reconstruction. Jones G. Clin Plast Surg. 2007; 34(1):83-104.
13. Breast Cancer Version 2.2015. Gradishar WJ, et al. J Natl Compr Canc Netw. 2015

Freie Lappen zur Rekonstruktion

Freier Gewebettransfer

- DIEP
- Freier TRAM
- SIEA
- Gluteallappen (SGAP- / IGAP, FCI)
- Free gracilis flap (TMG)

Oxford		
LoE	GR	AGO
2a	B	+
2a	B	+
3a	C	+/-
4	C	+/-
4	C	+/-

Vorteil

- Freier TRAM und DIEP sind potenziell muskelsparend. DIEP hat niedrige Rate an Hernien.

Nachteile

- Zeit- und personalintensive mikrochirurgische Techniken
- Aufwendige postoperative Überwachung
- Höhere Rate an Reoperationen
- RT vor Rekonstruktion erhöht Rate vaskulärer Komplikationen

1. Effects of Obesity on Postoperative Complications After Breast Reconstruction Using Free Muscle-Sparing Transverse Rectus Abdominis Myocutaneous, Deep Inferior Epigastric Perforator, and Superficial Inferior Epigastric Artery Flap: A Systematic Review and Meta-analysis. Lee KT, Mun GH. Ann Plast Surg. 2016; 76(5):576-84.
2. Risk Factors Leading to Free Flap Failure: Analysis From the National Surgical Quality Improvement Program Database. Sanati-Mehrizy P, et al. J Craniofac Surg. 2016; 27(8):1956-1964.
3. Assessing Surgical and Medical Complications in Bilateral Abdomen-Based Free Flap Breast Reconstructions Compared With Unilateral Free Flap Breast Reconstructions. Lin IC, et al. Ann Plast Surg. 2016; 77(1):61-6.
4. The free fasciocutaneous infragluteal (FCI) flap: Outcome and patient satisfaction after 142 breast reconstructions. Struckmann V, et al. J Plast Reconstr Aesthet Surg. 2016; 69(4):461-9.
5. Impact of Time Interval between Radiation and Free Autologous Breast Reconstruction. Mull AB, et al. J Reconstr Microsurg. 2016; [Epub ahead of print]
6. Tamoxifen may increase the risk of microvascular flap complications. Surgeons should consider temporarily stopping the drug 28 days before microsurgical breast reconstruction. Kelley BP, et al. J Plast Reconstr Surg. 2012; 129(2):305-14.
7. Perfusion-related complications are similar for DIEP and muscle-sparing free TRAM flaps harvested on medial or lateral deep inferior epigastric Artery branch perforators for breast reconstruction. Garvey PB, et al. Plast Reconstr Surg. 2011; 128(6):581e-9e.

8. Analysis of Complications and Patient Satisfaction in Pedicled Transverse Rectus Abdominis Myocutaneous and Deep Inferior Epigastric Perforator Flap Breast Reconstruction. Momoh AO, et al. Ann Plast Surg. 2011; [Epub ahead of print]
9. Survival Differences in Women with and without Autologous Breast Reconstruction after Mastectomy for Breast Cancer. Semple JL, et al. Plast Reconstr Surg Glob Open. 2017; 5(4):e1281.

Gestielter vs. freier Gewebetransfer

	Oxford		
	LoE	GR	AGO
<ul style="list-style-type: none"> ▪ Muskelsparende Techniken und sorgfältiger Verschluss der Bauchdecke führen zu niedrigen Komplikationsraten unabhängig von der verwendeten Methode ▪ Autologer Gewebetransfer von der Bauchdecke hat die höchste Zufriedenheitsrate in allen Patientengruppen ▪ Morbidität der Spenderregion (z.B. reduzierte Muskelfunktion) kann bei allen Lappentechniken auftreten 	3a	A	++

1. AWMF Leitlinien: S3-LL. Brustrekonstruktion mit Eigengewebe. Registernummer 015 – 075, Stand: 01.04.2015 , gültig bis 31.03.2020
2. NSQIP Analysis: Increased Immediate Reconstruction in the Treatment of Breast Cancer. Sabino J, et al. Am Surg. 2016; 82(6):540-5.
3. National trends in immediate and delayed post-mastectomy reconstruction procedures in England: A seven-year population-based cohort study. Mennie JC, et al. Eur J Surg Oncol. 2017; 43(1):52-61.
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5. Comparison of Outcomes following Autologous Breast Reconstruction Using the DIEP and Pedicled TRAM Flaps: A 12-Year Clinical Retrospective Study and Literature Review. Knox AD, et al. Plast Reconstr Surg. 2016; 138(1):16-28.
6. Free Versus Pedicled TRAM Flaps: Cost Utilization and Complications. Golpanian S, et al. Aesthetic Plast Surg. 2016; 40(6):869-876.
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Lappen-Implantat-Kombination

LDF* + Implantat

- Nach RT
- Vor RT

Weitere Lappentechniken + Implantat

Vorteile:

- TRAM: bevorzugt Implantateinlage nach Intervall
- Verbesserte Abdeckung des Implantates
- Geeignet zur Rekonstruktion bestrahlten Gewebes

Nachteil:

- Muskelkontraktion (LDF)

* LDF = Latissimus dorsi flap

Oxford		
LoE	GR	AGO
2b	C	+
3b	C	+
5	D	-
5	C	+/-

1. A Systematic Meta-analysis of Prosthetic-Based Breast Reconstruction in Irradiated Fields With or Without Autologous Muscle Flap Coverage. Fischer JP, et al. Ann Plast Surg. 2016; 77(1):129-34.
2. Temporal Trends in Postmastectomy Radiation Therapy and Breast Reconstruction Associated With Changes in National Comprehensive Cancer Network Guidelines. Frasier LL, et al. JAMA Oncol. 2016; 2(1):95-101. Erratum in: JAMA Oncol. 2016; 2(1):146.
3. Complications After Mastectomy and Immediate Breast Reconstruction for Breast Cancer: A Claims-Based Analysis. Jagsi R, et al. Ann Surg. 2016; 263(2):219-27.
4. Outcome of 122 delayed breast reconstruction following post-mastectomy radiotherapy: The scarless latissimus dorsi flap with tissue expansion technique. de Runz A, et al. Ann Chir Plast Esthet. 2016.

Haut / Nipple-sparende Mastektomie (SSM/NSM) und Rekonstruktion

	Oxford		
	LoE	GR	AGO
■ Hautsparende Mastektomie (SSM/NSM)			
■ Sicher (gleiche Rezidivrate wie bei MX bei geeigneter Pat.auswahl)	2b	B	++
■ Höhere Lebensqualität für Patientin	2b	B	++
■ Erhalt des Mamillen-Areola-Komplex (NAC) unter bestimmten Bedingungen	2b	B	++
■ Möglich nach Mastopexie / Reduktionsplastik	4	C	++
■ Nutzung von ICG* zur Vorhersage von Nekrosen	3b	C	+/-
■ Hautschnitte → verschiedene Möglichkeiten:			
■ Periareolär			
■ Hemi-Periareolär mit/ ohne medialer/ lateraler Erweiterung			
■ Reduktionsschnittbild: „inverses T“ oder vertikal			
■ Inferior-lateraler Zugang / Inframammärfalte			
■ Niedrigste Inzidenz von Komplikationen	2b	B	+

* ICG = Indocyanine Green

1. Nipple sparing mastectomy: Surgical and oncological outcomes from a national multicentric registry with 913 patients (1006 cases) over a six year period. Orzalesi L, et al. Breast. 2016; 25:75-81.
2. The Oncological Safety of Nipple-Sparing Mastectomy: A Systematic Review of the Literature with a Pooled Analysis of 12,358 Procedures. Headon HL, et al. Arch Plast Surg. 2016; 43(4):328-38.
3. Local breast cancer recurrence after mastectomy and immediate breast reconstruction for invasive cancer: A meta-analysis. Gieni M, et al. Breast. 2012; [Epub ahead of print]
4. The Impact of Skin-Sparing Mastectomy with Immediate Reconstruction in Patients with Stage III Breast Cancer Treated with Neoadjuvant Chemotherapy and Postmastectomy Radiation. Prabhu R, et al. Plast Reconstr Surg. 2012; 129(1):37e-45e.
5. 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. Benediktsson KP, Perbeck L. Eur J Surg Oncol. 2008; 34(2):143-8.
6. Nipple-sparing mastectomy using a hemi-periareolar incision with or without minimal medial-lateral extensions; clinical outcome and patient satisfaction: A single centre prospective observational study. El Hage Chehade H, et al. Am J Surg. 2017; 213(6):1116-1124.
7. Prediction of Skin Necrosis after Mastectomy for Breast Cancer Using Indocyanine Green Angiography Imaging. Gorai K, et al. Plast Reconstr Surg Glob Open. 2017;

5(4):e1321.

Risiko-reduzierende bilaterale Mastektomie für nicht erkrankte Frauen (RRBM)

	Oxford		
	LoE	GR	AGO
■ RRBM verringert die Brustkrebsinzidenz	1b	A	++
■ RRBM bei BRCA1/2 Mutationsträgerinnen	2a	B	++*
■ RRBM bei hohem Mammakarzinomrisiko (individuelle Entscheidung in Abhängigkeit von Mutationsstatus und familiärer Belastung – z.B. high-risk/moderate Gene/Hodgkin-Lymphom)	4	D	+/-*
■ Hohes Risiko und keine Beratung in spezialisierten Zentren*	5	D	--
■ Nicht direktive Beratung vor RRBM	2b	B	++*
■ RRBM sollte im Zusammenhang mit anderen prophylakt. Op. wie BSO und vorbestehenden Erkrankungen gesehen werden	2a	A	++*
■ Weitere Notwendigkeit der Fortbildung von Ärztinnen und Ärzten in Bezug auf Möglichkeiten und Vorteile der RRBM	1b	A	++

* Beratung, Risikoberechnung und Nachsorge in spezialisierten Zentren empfohlen

1. Society of Surgical Oncology Breast Disease Working Group Statement on Prophylactic (Risk-Reducing) Mastectomy. Hunt KK, et al. Ann Surg Oncol. 2017; 24(2):375-397.
2. Quality of life among patients after bilateral prophylactic mastectomy: a systematic review of patient-reported outcomes. Razdan SN, et al. Qual Life Res. 2016; 25(6):1409-21.
3. Risk reduction and survival benefit of prophylactic surgery in BRCA mutation carriers, a systematic review. Ludwig KK, et al. Am J Surg. 2016; 212(4):660-669.
4. Is Sentinel Lymph Node Biopsy Necessary in Patients Undergoing Prophylactic Mastectomy? A Systematic Review and Meta-Analysis. Nagaraja V, et al. Breast J. 2016; 22(2):158-65.
5. Effectiveness of Prophylactic Surgeries in BRCA1 or BRCA2 Mutation Carriers: A Meta-analysis and Systematic Review. Li X, et al. Clin Cancer Res. 2016; 22(15):3971-81.
6. Improved overall survival after contralateral risk-reducing mastectomy in BRCA1/2 mutation carriers with a history of unilateral breast cancer: a prospective analysis. Heemskerk-Gerritsen BA, et al. Int J Cancer. 2015; 136(3):668-77.
7. ASCO/SSO review of current role of risk-reducing surgery in common hereditary cancer syndromes. Guillem JG, et al. J Clin Oncol. 2006; 24(28):4642-60.

Formen der Risiko-reduzierenden (bilateralen) Mastektomie (RRBM)

**RRBM reduziert die Inzidenz von MaCa und
wahrscheinlich auch MaCa-bedingte Mortalität****

	Oxford		
	LoE	GR	AGO
▪ Einfache Mastektomie	2b	B	+
▪ RRBM mittels SSM*	2b	C	+
▪ RRBM mittels NSM* (MAK# erhaltend)	2b	C	+
▪ Kontralaterale prophylaktische Mastektomie	4	C	+/-

* SSM / NSM: Skin-/Nipple-Sparing Mastectomy

MAK: Mamillen-Areola-Komplex

** in Abhängigkeit von Vorerkrankungen, z.B. bei vorbestehendem Ovarialkarzinom 1-2%

1. Patient Satisfaction and Nipple-Areola Sensitivity After Bilateral Prophylactic Mastectomy and Immediate Implant Breast Reconstruction in a High Breast Cancer Risk Population: Nipple-Sparing Mastectomy Versus Skin-Sparing Mastectomy. van Verschuer VM, et al. Ann Plast Surg. 2016; 77(2):145-52.
2. Nipple sparing versus skin sparing mastectomy: a systematic review protocol. Agha RA, et al. BMJ Open. 2016; 6(5):e010151.
3. Conservative mastectomies for breast cancer and risk-reducing surgery: the Memorial Sloan Kettering Cancer Center experience. Manning AT, et al. Gland Surg. 2016; 5(1):55-62.
4. Oncologic safety of conservative mastectomy in the therapeutic setting. Benson JR, et al. Gland Surg. 2016; 5(1):37-46.
5. Patient satisfaction with nipple-sparing mastectomy: A prospective study of patient reported outcomes using the BREAST-Q. Howard MA, et al. J Surg Oncol. 2016; 114(4):416-22.
6. Contralateral Prophylactic Mastectomy (CPM) Consensus Statement from the American Society of Breast Surgeons: Data on CPM Outcomes and Risks. Boughey JC, et al. Ann Surg Oncol. 2016; 23(10):3100-5.
7. Contralateral Prophylactic Mastectomy Consensus Statement from the American Society of Breast Surgeons: Additional Considerations and a Framework for Shared Decision Making. Boughey JC, et al. Ann Surg Oncol. 2016; 23(10):3106-11.
8. Nipple-sparing mastectomy in BRCA1/2 mutation carriers: an interim analysis and

review of the literature. Yao K, et al. Ann Surg Oncol.; 2015; 22(2):370-6.

9. ASCO/SSO review of current role of risk-reducing surgery in common hereditary cancer syndromes. Guillem JG, et al. J Clin Oncol. 2006; 24(28):4642-60.