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Diagnosis and Treatment of Patients with early and advanced Breast Cancer

Oncoplastic and Reconstructive Surgery



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Plastic-reconstructive aspects after mastectomy

- **Versions 2002–2018:**
Audretsch / Bauerfeind / Blohmer / Brunnert / Dall / Ditsch / Fersis / Gerber / Hanf / Kümmel / Lux / Nitz / Rezai / Rody / Scharl / Solbach / Thomssen /
- **Version 2019:**
Kümmel / Friedrich

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 01/ 2019



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Definition of oncoplastic surgical procedures

Use of plastic surgical techniques at the time of tumor removal to enable safe resection margins and to preserve aesthetic breast contour.

Focus on favorable scar placement, adequate soft tissue formation, choice of proper reconstruction procedure (including in the context of radiation) and reconstruction of the contralateral side to achieve symmetric results.

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



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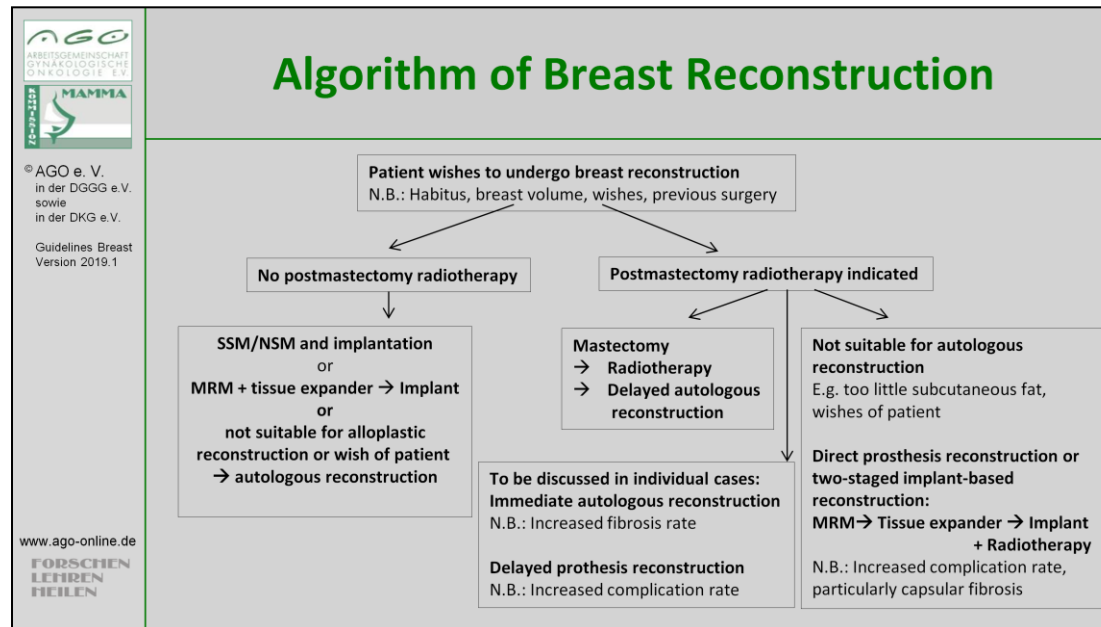
Oncoplastic Breast Conserving Surgery

- **Tumor-adapted reduction mammaplasty**
- **Local flap techniques**
- **Partial mastectomy with tissue transfer**
- **Oncological safety**


	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.



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



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Breast Reconstruction Principles

AGO: ++

- **Planning the reconstructive procedure by an interdisciplinary tumor board before mastectomy**
- **Counseling regarding all surgical techniques, including advantages and disadvantages**
- **Offer of a second opinion**
- **Discussion of neoadjuvant treatment in unfavourable tumor-breast-relation**
- **Consideration of the contralateral breast;**
 - discuss possible alignment / sequencing surgical procedures to produce symmetry; usually after at least 3-6 months (Caveat: need for post-resections, consider effects of radiotherapy on the affected side)
- **Preference for a less stressful surgical technique with long-term stable esthetic result (to prefer BCS over mastectomy)**
- **Caveat: no delay in adjuvant therapy due to reconstruction**


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.
5. Impact of Breast Reconstruction on Time to Definitive Surgical Treatment, Adjuvant Therapy, and Breast Cancer Outcomes. Brice Jabo, Ann C. Lin, Mayada A. Aljehani et al.: [Ann Surg Oncol](#). 2018 Oct;25(10):3096-3105.

Postmastectomy Reconstruction

	Oxford		
	LoE	GR	AGO
■ Use of silicone gel filled breast implants one step or two steps after expander	2a	B	+
■ Safety comparable to saline implants	2b	B	
■ Autologous tissue reconstruction	2a	B	+
■ Pedicled tissue reconstruction	2a	B	+
■ Free tissue reconstruction (including vascular anastomoses)	2a	B	+
■ Autologous tissue procedure plus implants	3a	C	+

Caveat: BMI >30, smoking status, diabetes, radiotherapy, age, bilateral mastectomy

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.
4. Short-term safety outcomes of mastectomy and immediate implant-based breast reconstruction with and without mesh (iBRA): a multicentre, prospective cohort study. Shelley Potter, Elizabeth J Conroy, Ramsey I Cutress, Paula R Williamson et al.: [Lancet Oncol.](#) 2019 Jan 9. pii: S1470-2045(18)30781-2.



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Timing of Reconstruction

	Oxford LoE	GR	AGO
<ul style="list-style-type: none"> ■ Immediate Breast Reconstruction <ul style="list-style-type: none"> ■ Mandatory: SSM/NSM ■ Avoidance of a postmastectomy syndrome 	3b	B	++
<ul style="list-style-type: none"> ■ Delayed Breast Reconstruction <ul style="list-style-type: none"> ■ No interference with adjuvant procedures (CHT, RT) ■ Disadvantage: loss of the skin envelope 	3b	B	++
<ul style="list-style-type: none"> ■ „Delayed-immediate“ Breast Reconstruction 	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.

8. Quality of life and patient satisfaction after one-stage implant-based breast reconstruction with an acellular dermal matrix versus two-stage breast reconstruction (BRIOS): primary outcome of a randomised, controlled trial. Vera Lidwina Negenborn, Danny Aschwin Young-Afat, Rieky Elise Gustina Dikmans et al: [Lancet Oncol.](#) 2018 Sep;19(9):1205-1214.



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Timing of implant Based Reconstruction and Radiotherapy


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

- **Implant Rekonstruktion (IR)**
 - IR without radiotherapy
 - IR prior to radiotherapy
 - IR following radiotherapy
 - IR following secondary mastectomy (after BCS* with radiotherapy)
 - Perioperatively antibiotic prophylaxis (at least 24 hours)

* BCS: Breast Conserving Surgery

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).



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Radiotherapy and Implant-based Reconstruction

Caveat: High complication rate in combination with radiotherapy (capsular contracture, revision surgery, reconstruction failure, reduced cosmetic outcome and patient satisfaction)

Caveat: Lower patient satisfaction with implant-based reconstruction plus radiotherapy compared to autologous reconstruction plus radiotherapy

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).
3. Impact of Postmastectomy Radiation Therapy in Prepectoral Versus Subpectoral Implant-Based Breast Reconstruction. Catherine J. Sinnott, Sarah M. Persing, Mary Pronovost et al.: [Ann Surg Oncol](#). 2018 Oct;25(10):2899-2908.



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Possible Associations between Implants and rare Diseases

- **US FDA Breast Implant Postapproval Studies (LPAS)**
Long-term Outcomes in 99,993 Patients
(Primary Augmentation: N= 71.937 / Primary Reconstruction: N= 9942)
 - 56% of implants were silicone implants
- **Possible Associations:**
 - Sjogren syndrome: (SIR*8.14)
 - scleroderma: (SIR 7.00)
 - rheumatoid arthritis: (SIR5.96)
 - stillbirth: (SIR4.50)
 - melanoma: (SIR3.71)
- **At 7 years, reoperation rate is 11.7% for primary augmentation, and 25% for primary/revision reconstruction.**
- **One case of BI-ALCL**

Associations need to be further analyzed with
patient-level data to provide conclusive evidence !

*Standardized incidence ratio

New Background slide

Statistical Analysis:

LPAS data is expressed relative to normative population rates using standardized incidence ratios (SIRs)

Systemic harm rates in the study population are calculated per 10,000 person-years.

Normative population rates for systemic harms, self-harm, and reproductive outcomes are obtained from the literature; rates reflect LPAS demographics for female sex, age, and race in the United States.

1. US FDA Breast Implant Postapproval Studies: Long-term Outcomes in 99,993 Patients. [Coroneos CJ](#)¹, [Selber JC](#), [Offodile AC 2nd](#) et al.: [Ann Surg.](#) 2019 Jan;269(1):30-36.

Possible Associations between Implants and rare Diseases							
Rare Systemic Harms Compared With the General Population:							
	Manufacturer _{xy}	Study Events	Study Event Rate (Per 10,000 Person Yr)	General Population Event Rate (Per 10,000 Person Yr)	SIR	SIR 95% CI	P Value
Fibromyalgia	Allergan	9	1.8	112.8	0.02	0.01–0.03	<0.001
	Mentor	307	28.4	112.8	0.25	0.22–0.28	<0.001
Rheumatoid arthritis	Allergan	4	0.8	5.4	0.15	0.04–0.38	<0.001
	Mentor	349	32.2	5.4	5.96	5.35–6.62	<0.001
Scleroderma	Mentor	46	4.2	0.6	7.00	5.12–9.34	<0.001
Sjogren syndrome	Mentor	62	5.7	0.7	8.14	6.24–10.44	<0.001
Systemic lupus erythematosus	Allergan	3	0.6	5.4	0.11	0.02–0.32	<0.001
	Mentor	66	6.0	5.4	1.11	0.86–1.41	0.398
Cancer	Allergan	80	16.0	41.3	0.39	0.31–0.48	<0.001
	Mentor	532	63.8	41.3	1.54	1.42–1.68	<0.001
Breast cancer	Mentor	116	13.9	12.5	1.11	0.92–1.33	0.26
Lung cancer	Mentor	5	0.6	5.2	0.12	0.04–0.27	<0.001
Brain cancer	Mentor	3	0.4	0.6	0.67	0.14–1.95	0.639
Melanoma	Mentor	65	7.8	2.1	3.71	2.87–4.73	<0.001
Neurological disorder	Allergan	18	3.6	22.5	0.16	0.09–0.25	<0.001
	Mentor	394	35.8	22.5	1.59	1.44–1.76	<0.001
Multiple sclerosis	Mentor	47	4.3	2.5	1.72	1.26–2.29	0.001
Myositis	Mentor	17	1.5	0.8	1.88	1.09–3.00	0.018
Allergan follow-up 2 years							
Mentor follow-up 7 years							

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New Background slide

1. US FDA Breast Implant Postapproval Studies: Long-term Outcomes in 99,993 Patients. [Coroneos CJ](#), [Selber JC](#), [Offodile AC 2nd et al.](#): [Ann Surg.](#) 2019 Jan;269(1):30-36.



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Tissue Replacement Techniques and Meshes

	Oxford LoE	GR	AGO
■ Autologous tissue (e.g. autoderma graft, TDAP [§] , LDF [*])	3b	C	+
■ Acellular dermal matrix (ADM)	2a	B	+ [#]
■ Synthetic meshes	2b	B	+ [#]


§ Thoracodorsal Arteries Perforator flap

* Latissimus dorsi flap

Participation in registry studies recommended

1. 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
2. Long-term outcomes following fat grafting in prosthetic breast reconstruction: a comparative analysis. Seth AK, et al. Plast Reconstr Surg. 2012; 130(5):984-9.
3. Focus on technique: one-stage implant-based breast reconstruction. Salzberg CA. Plast Reconstr Surg. 2012; 130(5 Suppl 2):95S-103S.
4. 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.
5. Single-stage breast reconstruction using Strattice™: A retrospective study. Dikmans RE, et al. J Plast Reconstr Aesthet Surg. 2016; 69(2):227-33.
6. 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.
7. 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.
8. Biological and synthetic mesh use in breast reconstructive surgery: a literature review. Logan Ellis H, et al. World J Surg Oncol. 2016; 14:121.
 9. 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.
 10. 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.
 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.
 14. Is single-stage implant-based breast reconstruction (SSBR) with an acellular matrix safe?: Strattice™ or Meso Biomatrix® in SSBR. Hillberg NS, Ferdinandus PI1, Dikmans REG et al.: Eur J Plast Surg. 2018;41(4):429-438. doi: 10.1007/s00238-018-1415-2. Epub 2018 Apr 24.



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Lipotransfer

	Oxford		
	LoE	GR	AGO
▪ Lipotransfer following mastectomy and reconstruction	2a	B	+
▪ Lipotransfer after BCS*	2a	B	+
▪ Autologous adipose derived stem cells (ASCs)-enriched fat grafting	4	C	-

*BCS: Breast Conserving Surgery

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):385-93.
 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. Indications and Controversies in Lipofilling for Partial Breast Reconstruction. Delay E, Guerid S, Meruta AC. *Clin Plast Surg*. 2018 Jan;45(1):101-110. doi: 10.1016/j.cps.2017.08.008. Epub 2017 Sep 18.
 14. 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.
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Postmastectomy Pedicled Reconstruction


Breast reconstruction (BR) with autologous tissue

- TRAM, Latissimus-dorsi-flap (both can be performed as a muscle-sparing technique)
- Delayed TRAM in risk patients
- Ipsilateral pedicled TRAM
- Radiotherapy:
 - BR following radiotherapy
 - BR prior to radiotherapy
 (higher rates of fibrosis, wound healing problems, liponecrosis and reduced aesthetic outcome)

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

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Free flaps for reconstruction

	Oxford		
	LoE	GR	AGO
Kind of free flap			
▪ DIEP	2a	B	+
▪ Free TRAM	2a	B	+
▪ SIEA	3a	C	+/-
▪ Glutealis flaps (SGAP- / IGAP, FCI)	4	C	+/-
▪ Free gracilis flap (TMG)	4	C	+/-
Advantages			
▪ DIEP and free TRAM are potentially muscle-sparing procedures. The DIEP has a lower rate of abdominal hernias.			
Disadvantages			
▪ Time- and personnel consuming microsurgical procedure			
▪ Intensified postoperative monitoring			
▪ Higher reoperation rate			
▪ Pre-reconstruction radiotherapy increases rate of vascular complications			

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Stalked versus free tissue transfer

- Muscle-sparing techniques and accuracy of abdominal wall closure will lead to low rates of late donor site complications whatever method used
- Autologous abdominal-based reconstructions have the highest satisfaction in all patient groups without any difference
- Donor site morbidity (e.g. impaired muscle function) has to be taken into consideration in all flap techniques.

Oxford		
LoE	GR	AGO

3a	A	++
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Flap-implant combination

	Oxford		
	LoE	GR	AGO
LDF* + Implant			
▪ IR following RT	2b	C	+
▪ IR prior to RT	3b	C	+
Additional flap techniques + implant	5	D	-
	5	C	+/-

Advantages:


- TRAM:staged procedure preferable
- Improved implant coverage
- Suitable for irradiated tissue

Disadvantage:

- muscle contraction (LDF)

* LDF = Latissimus dorsi flap

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Skin-/nipple-sparing Mastectomy (SSM/NSM) and Reconstruction


	Oxford LoE	GR	AGO
<ul style="list-style-type: none"> ■ Skin-/nipple-sparing Mastectomy (SSM/NSM) <ul style="list-style-type: none"> ■ Safe (same recurrence rate as MX) ■ Higher QoL for patients ■ NAC can be preserved under special conditions <ul style="list-style-type: none"> ■ Feasible after mastopexy / reduction mammoplasty ■ Use of ICG* to predict necroses of the skin ■ Skin incisions - different possibilities: <ul style="list-style-type: none"> ■ Periareolar ■ Hemi-periareolar with/without medial/ lateral extension ■ Reduction pattern: „inverted-T“ or vertical ■ Inferior lateral approach, inframammary fold <ul style="list-style-type: none"> ■ Lowest incidence of complications 	<div>2b</div> <div>2b</div> <div>2b</div> <div>4</div> <div>3b</div> <div> </div> <div> </div> <div> </div> <div> </div> <div>2b</div>	<div>B</div> <div>B</div> <div>B</div> <div>C</div> <div>C</div> <div> </div> <div> </div> <div> </div> <div>B</div>	<div>++</div> <div>++</div> <div>++</div> <div>++</div> <div>+/-</div> <div> </div> <div> </div> <div> </div> <div>+</div>

* ICG = Indocyanine Green

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Risk-reducing bilateral mastectomy for healthy women (RRBM)

	Oxford		
	LoE	GR	AGO
■ RRBM reduces breast cancer incidence	1b	A	++
■ RRBM in deleterious BRCA1/2 mutation	2a	B	+*
■ RRBM in high risk situation without BRCA 1/2 mutation (individual decision depending on personal- family history and mutational status – e.g. high and moderate risk genes, Hodgkin lymphoma)	4	D	+/-*
■ High risk and no BRCA counselling in specialized centre*	5	D	--
■ Non-directive counselling prior to RRBm	2b	B	++*
■ RRBM should be considered with other risk-reducing surgical options incl. bilateral salpingoophorectomy (BSO) and pre-existing diseases	2a	A	++*
■ Further need for education of physicians regarding possibilities and advantages of RRBm	1b	A	++
* Counselling, risk prediction and follow-up in specialized centres recommended			

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Surgical Prevention for Healthy Female *BRCA1/2* Mutation Carriers


	Oxford LoE	GR	AGO
■ Risk-reducing bilateral salpingo-oophorectomy (RRSO)	2c	B	*
■ Reduces BrCa incidence and mortality			+/-*
■ Reduces OvCa incidence and mortality			++*
■ Reduces overall mortality			++*
■ Risk-reducing bilateral mastectomy (RRM)	2a	B	+*
■ Reduces BrCa incidence and mortality			

RR-BSO is recommended after completion of family planning
RR-BM revealed a high incidence of premalignant lesions

* study participation recommended

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Forms of risk-reducing (bilateral) mastectomy (RRBM)

	Oxford LoE	GR	AGO
RRBM reduces breast cancer incidence;**			
bc-spec mortality also likely reduced			
▪ Simple mastectomy	2b	B	+
▪ RRBM by SSM*	2b	C	+
▪ RRBM by NSM* (NAC# sparing)	2b	C	+
▪ Contralateral prophylactic mastectomy	4	C	+/-

* SSM / NSM: Skin-/Nipple-Sparing Mastectomy
 # MAK: nipple-areola complex
 ** depending on previous illnesses, e. g. pre-existing ovarian cancer 1-2% (stage III-IV)

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