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Diagnostik und Therapie früher und fortgeschrittener Mammakarzinome

Adjuvante zytostatische und zielgerichtete Therapien



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Adjuvante zytostatische und zielgerichtete Therapien

- **Versionen 2002 – 2021:**
 Albert / Dall / Fehm / Harbeck / Jackisch / Janni / Kümmel / Loibl / Lux /
 von Minckwitz / Möbus / Müller / Nitz / Schmidt / Schneeweiss / Simon /
 Schütz / Solomayer / Stickeler / Thill / Thomssen / Untch

- **Version 2022:**
 Fasching / Rody

Systematic review of published evidence

PUBMED 1999-2021

ASCO 1999-2021

SABCS 1999-2021

ECCO/ESMO 1999-2021

	<h1>Strategien der differenzierten Systemtherapie in der kurativen Situation</h1>	
© AGO e. V. in der DGKG e.V. sowie in der DKG e.V.	Bei Indikation zur Chemotherapie neoadjuvante Applikation bevorzugen; Studienteilnahme empfohlen	
Guidelines Breast Version 2022.1D	„Low absolute risk implies low absolute benefit“	
www.ago-online.de FORSCHEN LEHREN HEILEN	■ HR+ / HER2- mit „niedrigem Risiko“	++
	■ Endokrine Therapie ohne Chemotherapie	++
	■ HR+ / HER2- mit „hohem Risiko“	+
	■ Konventionell dosierte AT-basierte Chemotherapie (q3w)	++
	■ Dosisdichte Chemotherapie (inkl. weekly-Regime)	++
	■ Anschließend endokrine endokrin-basierte Therapie	++
	■ Triple-negativ (TNBC)	+
	■ Konventionell dosierte AT-basierte Chemotherapie (q3w)	++
	■ Dosisdichte sequentielle AT-basierte Chemotherapie (inkl. weekly Schemata)	++
	■ Neoadjuvante Neo- / adjuvante platinhaltige Chemotherapie	+
	■ Neoadjuvante platinhaltige Chemotherapie mit ICPI (Pembrolizumab)	+
	■ HER2 neg, gBRCA1/2^{MUT} (ER-pos. bzw. TNBC¹)	+
	■ Olaparib postneoadjuvant	+
	■ HER2+	++
	■ Trastuzumab (plus Pertuzumab bei N+ oder NACT)	++
	■ Sequentielle AT-basierte Chemoth. mit simultaner Gabe von T + anti HER2-Therapie	+
	■ Anthrazyklin-freie Chemotherapie mit anti HER2-Therapie	++
	¹ Gemäß Zulassung oder Studienpopulation (falls noch nicht zugelassen)	

Systematic review of published evidence

PUBMED 1999-2021

ASCO 1999-2021

SABCS 1999-2021

ECCO/ESMO 1999-2021

Trastuzumab in combination with chemotherapy

1. Gianni L, et al. Neoadjuvant chemotherapy with trastuzumab followed by adjuvant trastuzumab versus neoadjuvant chemotherapy alone, in patients with HER2-positive locally advanced breast cancer (the NOAH trial): a randomised controlled superiority trial with a parallel HER2-negative cohort. Lancet 2010: 375; 377
2. Untch M, et al. Pathologic complete response after neoadjuvant chemotherapy plus trastuzumab predicts favorable survival in human epidermal growth factor receptor 2-overexpressing breast cancer: results from the TECHNO trial of the AGO and GBG study groups. J Clin Oncol 2011: 29; 3351
3. Gianni L, et al. Neoadjuvant and adjuvant trastuzumab in patients with HER2-positive locally advanced breast cancer (NOAH): follow-up of a randomised controlled superiority trial with a parallel HER2-negative cohort. Lancet Oncol 2014: 15; 640
4. Jackisch C, et al. HannaH phase III randomised study: Association of total pathological complete response with event-free survival in HER2-positive early breast cancer treated with neoadjuvant-adjuvant trastuzumab after 2 years of treatment-free follow-up. Eur J Cancer. 2016 Jul;62:62-

3. Nagayama A, et al. Comparative effectiveness of neoadjuvant therapy for HER2-positive breast cancer: a network meta-analysis. J Natl Cancer Inst 2014; 106(9): in print
4. Gianni L et al. Five-year analysis of the phase II NeoSphere trial evaluating four cycles of neoadjuvant docetaxel (D) and/or trastuzumab (T) and/or pertuzumab (P). J Clin Oncol 33, 2015 (suppl; abstr 505)
5. Loibl S, et al. Dual HER2-blockade with pertuzumab and trastuzumab in HER2-positive early breast cancer: a subanalysis of data from the randomized phase III GeparSepto trial. Ann Oncol. 2017;28:497-504
6. Schneeweiss A et al. Long-term efficacy analysis of the randomised, phase II TRYPHAENA cardiac safety study: Evaluating pertuzumab and trastuzumab plus standard neoadjuvant anthracycline-containing and anthracycline-free chemotherapy regimens in patients with HER2-positive early breast cancer. Eur J Cancer 89:27-35, 2017
7. Hurvitz SA, et al. Neoadjuvant trastuzumab, pertuzumab, and chemotherapy versus trastuzumab emtansine plus pertuzumab in patients with HER2-positive breast cancer (KRISTINE): a randomised, open-label, multicentre, phase 3 trial. Lancet Oncol 2017. pii: S1470-2045(17)30716-7 [Epub ahead of print]
8. Swain SM, et al. Pertuzumab, trastuzumab, and standard anthracycline- and taxane-based chemotherapy for the neoadjuvant treatment of patients with HER2-positive localized breast cancer (BERENICE): a phase II, open-label, multicenter, multinational cardiac safety study. Ann Oncol 2017. doi: 10.1093/annonc/mdx773. [Epub ahead of print]
9. Von Minckwitz G, et al. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer. N Engl J Med. 2017 13;377(2):122-131.

Her2+ Antrazyklin-freie Chemotherapie:

1. Ramphorstet MS, van der Voort A, Workhoven ED al. Neoadjuvant chemotherapy with or without anthracyclines in the presence of dual HER2 blockade for HER2-positive breast cancer (TRAIN-2): a multicentre, open-label, randomised, phase 3 trial. Lancet Oncol. 2018 Dec;19(12):1630-1640. doi: 10.1016/S1470-2045(18)30570-9.
2. Anna van der Voort, Mette S. van Ramshorst, Erik D. van Werkhoven et al. J Clin Oncol 38: 2020 (suppl; abstr 501)

TNBC neoadjuvant chemotherapy with ICP

1. Mittendorf EA, Zhang H, Barrios Chet al. Neoadjuvant atezolizumab in combination with sequential nab-paclitaxel and anthracycline-based chemotherapy versus placebo and chemotherapy in patients with early-stage triple-negative breast cancer (IMpassion031): a randomised, double-blind, phase 3 trial. Lancet. 2020 Oct 10;396(10257):1090-1100. doi: 10.1016/S0140-6736(20)31953-X.

2. Schmid P, Cortes J, Pusztai L et al. ; KEYNOTE-522 Investigators. Pembrolizumab for Early Triple-Negative Breast Cancer. N Engl J Med. 2020 Feb 27;382(9):810-821. doi: 10.1056/NEJMoa1910549.
3. Schmid P, Cortes J, Dent R et al. KEYNOTE-522: Phase 3 study of pembrolizumab + chemotherapy vs placebo + chemotherapy as neoadjuvant treatment, followed by pembrolizumab vs placebo as adjuvant treatment for early triple-negative breast cancer (TNBC). ESMO 2021 Abstract #VP7_2021

Abemaciclib:


1. Harbeck N, Rastogi P, Martin M et al. Adjuvant abemaciclib combined with endocrine therapy for high-risk early breast cancer: updated efficacy and Ki-67 analysis from the monarchE study. Ann Oncol. 2021 Dec;32(12):1571-1581. doi: 10.1016/j.annonc.2021.09.015. Epub 2021 Oct 14. PMID: 34656740.

Olaparib

1. Tutt ANJ, Garber JE, Kaufman B et al. Adjuvant Olaparib for Patients with *BRCA1*- or *BRCA2*-Mutated Breast Cancer. N Engl J Med. 2021 Jun 24;384(25):2394-2405. doi: 10.1056/NEJMoa2105215. Epub 2021 Jun 3. PMID: 34081848.

Platin salts:

1. Loibl S, Sikov W, Huober J et al. Event-free survival (EFS), overall survival (OS), and safety of adding veliparib (V) plus carboplatin (Cb) or carboplatin alone to neoadjuvant chemotherapy in triple-negative breast cancer (TNBC) after ≥ 4 years of follow-up: BrighTNess, a randomized phase III trial. ESMO 2021 Abstract #1190. Annals of Oncology (2021) 32 (suppl_5): S407-S446. 10.1016/annonc/annonc687.



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Adjuvante Chemotherapie: TNBC

■ **Indikation zur Chemotherapie bei nodalnegativer Erkrankung**

- > 10 mm
- > 5–10 mm
- ≤ 5 mm

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

1. Gamucci T, Vaccaro A, Ciancola F et. al. Recurrence risk in small, node-negative, early breast cancer: a multicenter retrospective analysis. J Cancer Res Clin Oncol. 2013;139(5):853-60. doi: 10.1007/s00432-013-1388-2. Epub 2013 Feb 15.
2. Kolben T, Harbeck N, Wuerstlein R et al. Endocrine sensitivity is decisive for patient outcome in small node-negative breast cancers (BC) (pT1a,b) - results from the Munich Cancer Registry. Breast. 2015;24(1):24-31. doi: 10.1016/j.breast.2014.10.007. Epub 2014 Nov 8.
3. Nonneville A, Goncalves C, Zemmour M et al. Adjuvant chemotherapy in pT1ab node-negative triple-negative breast carcinomas: Results of a national multi-institutional retrospective study . European J Cancer. 2017; (84):34-43.

Adjuvante Chemotherapie ohne Trastuzumab: Überblick			
	Oxford		
	LoE	GR	AGO
▪ Dosis-dicht Anthrazyklin-/ Taxan-basiert (inkl. weekly)	1a	A	++
▪ Konventionell Anthrazyklin-/ Taxan-basiert (q3w)	1a	A	+
▪ „Tailored“ Anthrazyklin-/ Taxan-basiert	1b	B	+/-
▪ Wenn auf Anthrazykline verzichtet werden soll			
▪ Docetaxel plus Cyclophosphamid	1b	B	+
▪ Paclitaxel mono wöchentlich	1b	B	+/-
▪ CMF	1a	A	+/-
▪ Niedrig-dosierte Erhaltungs-Chemotherapie	1b	B	-

Statement: Dosis-dicht Anthrazyklin-/ Taxan-basiert (inkl. weekly) LoE 1a A AGO ++

1. Moylan EJ, Connell LC, O'Reilly S et al. Are dose-dense and triplet chemotherapy regimens optimal adjuvant therapy in the majority of women with node-positive early breast cancer? J Clin Oncol. 2014;32(6):605-6.
2. Lemos Duarte I, da Silveira Nogueira Lima JP, Passos Lima CS et al. Dose-dense chemotherapy versus conventional chemotherapy for early breast cancer: a systematic review with meta-analysis. Breast. 2012;21(3):343-9.
3. Möbus V, Jackisch C, Lück HJ et al. Ten-year results of intense dose-dense chemotherapy show superior survival compared with a conventional schedule in high-risk primary breast cancer: final results of AGO phase III iddEPC trial. Ann Oncol. 2018 Jan 1;29(1):178-185.
4. Gray R, Bradley R, Braybrooke J et al. Increasing the dose density of adjuvant chemotherapy by shortening intervals between courses or by sequential drug administration significantly reduces both disease recurrence and breast cancer mortality: An EBCTCG meta-analysis of 21,000 women in 16 randomised trials. SABCS 2017, abstr. GS1-01
5. Budd GT, Barlow WE, Moore HC et al. SWOG S0221: A Phase III Trial Comparing Chemotherapy Schedules in High-Risk Early-Stage Breast Cancer. J Clin Oncol. 2015 Jan 1;33(1):58-64.
6. Zhou W, Chen S, Xu Fet al. Survival benefit of pure dose-dense chemotherapy in breast cancer: a meta-analysis of randomized controlled trials. World J Surg Oncol. 2018 Jul 14;16(1):144.
7. Goldvaser H, Majeed H, Ribnikar D et al. Influence of control group therapy on the benefit from dose-dense chemotherapy in early

breast cancer: a systemic review and meta-analysis. Breast Cancer Res Treat. 2018 Jun;169(3):413-425.

8. Matikas A, Foukakis T, Moebus V et al. Dose tailoring of adjuvant chemotherapy for breast cancer based on hematologic toxicities: further results from the prospective PANTHER study with focus on obese patients. Ann Oncol. 2019 Jan 1;30(1):109-114.

Statement: Konventionell Anthrazyklin-/ Taxan-basiert (q3w) LoE 1a A AGO +

1. Budd GT, Barlow WE, Moore HC et al. SWOG S0221: A Phase III Trial Comparing Chemotherapy Schedules in High-Risk Early-Stage Breast Cancer. J Clin Oncol. 2015 Jan 1;33(1):58-64.
2. EBCTCG, Peto R, Davies C, Godwin J et al. Comparisons between different polychemotherapy regimens for early breast cancer: meta-analyses of long term outcome among 100,000 women in 123 randomised trials. Lancet 2012;379(9814):432-44
3. Denduluri N, Chavez-MacGregor M, Telli ML et al. Selection of Optimal Adjuvant Chemotherapy and Targeted Therapy for Early Breast Cancer: ASCO Clinical Practice Guideline Focused Update. J Clin Oncol. 2018 Aug 10;36(23):2433-2443.

Statement Anthrazyklin verzicht

1. Baybrooke J et al. San Antonio Breast Cancer Symposium 2021
2. Hurvitz et al. NPJ Breast Cancer 2021 Oct 8;7(1):134. doi: 10.1038/s41523-021-00342-5.

Statement: „Tailored“ Anthrazyklin-/ Taxan-basiert LoE 1b B AGO +/-

1. Matikas A, Foukakis T, Moebus V, et al. Dose tailoring of adjuvant chemotherapy for breast cancer based on hematologic toxicities: further results from the prospective PANTHER study with focus on obese patients. Ann Oncol. 2019 Jan 1;30(1):109-114.

Statement: If anthracyclines cannot be given - Docetaxel plus cyclophosphamide

1. Jones S, Holmes FA, O'Shaughnessy J et al. Docetaxel With Cyclophosphamide Is Associated With an Overall Survival Benefit Compared With Doxorubicin and Cyclophosphamide: 7-Year Follow-Up of US Oncology Research Trial 9735. Clin Oncol. 2009;27(8):1177-83.

Statement: If anthracyclines cannot be given - Paclitaxel mono weekly

1. Amoroso V, Pedersini R, Sharratt P et al. Should adjuvant weekly Paclitaxel be considered less efficacious than anthracyclines plus cyclophosphamide for lower-risk patients with early-stage breast cancer? J Clin Oncol. 2015 Jan 20;33(3):290.


2. Shulman LN, Berry DA, Cirrincione CT et al. Comparison of doxorubicin and cyclophosphamide versus single-agent paclitaxel as adjuvant therapy for breast cancer in women with 0 to 3 positive axillary nodes: CALGB 40101 (Alliance). J Clin Oncol. 2014 Aug 1;32(22):2311-7.
3. Sparano JA, Wang M, Martino S et al. Weekly Paclitaxel in the Adjuvant Treatment of Breast Cancer. N Engl J Med. 2008 Apr 17;358(16):1663-71

Statement: If anthracyclines cannot be given - CMF

1. Perrone F, Nuzzo F, Di Rella F et al. Weekly docetaxel versus CMF as adjuvant chemotherapy for older women with early breast cancer: final results of the randomized phase III ELDA trial. Ann Oncol. 2015;26(4):675-82.

Statement: Low dose maintenance Chemotherapy

1. Colleoni, Viale G, Goldhirsch A. Low-dose oral cyclophosphamide and methotrexate maintenance for hormone receptor-negative early breast cancer: International Breast Cancer Study Group trial 22-00. J Clin Oncol 2016;34:3400-8



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Gray R et al., Lancet 2019

Early Breast Cancer Trialists' Cooperative Group (EBCTCG)

Increasing the dose-density of adjuvant chemotherapy: an EBCTCG meta-analysis

Same chemotherapy drugs and doses (**n = 10,004**)

Recurrence-free survival: 10-y Gain 4.3% (95%-C.I. 2.2 – 6.5)
(RR = 0.83; 95%-C.I. 0.76 – 0.91; p < 0.0001)

Overall survival: 10-y Gain 2.8% (95%-C.I. 0.8 – 4.8)
(RR = 0.86; 95%-C.I. 0.77 – 0.96; p = 0.0054)

ER negative: **10-y Gain 4.7%** (95%-C.I. 2.3 – 7.1)
ER positive: **10-y Gain 3.1%** (95%-C.I. 1.5 – 4.7)

1. Gray R, Bradley R, Braybrooke J et al. Increasing the dose intensity of chemotherapy by more frequent administration or sequential scheduling: a patient-level meta-analysis of 37 298 women with early breast cancer in 26 randomised trials. Lancet. 2019;393(10179):1440-1452. doi: 10.1016/S0140-6736(18)33137-4. Epub 2019 Feb 8

	Empfohlene dosis-dichte und / oder dosis-eskalierte, sequentielle adjuvante Chemotherapie		
	Oxford		
	LoE	GR	AGO
Dosis-dichte Regime			
▪ A ₆₀ x4 → Pac ₁₇₅ x4 → C ₆₀₀ x4 q2w	1b	A	++
▪ A ₆₀ C q2w x 4 → Pac ₁₇₅ q2w x 4	1b	B	++
▪ E ₉₀ C q2w x 4 → Pac ₁₇₅ q2w x 4	1b	A	++
▪ E ₉₀ C q2w x 4 → Pac ₈₀ q1w x 12	1b	B	++
▪ NabPac ₁₂₅ x 8-12 → E ₉₀ C q2(3)w x 4	1b	B	+
Dosis-dichtes und dosis-eskaliertes Regime (N ≥ 4+)			
▪ E ₁₅₀ → Pac ₂₂₅ → C ₂₀₀₀ q2w	1b	A	++

Statement: Dose-dense regimen

NabPac bei allergischer Reaktion auf Paclitaxel:

1. Michael Untch , Christian Jackisch , Andreas Schneeweiss et al. NAB-Paclitaxel Improves Disease-Free Survival in Early Breast Cancer: GBG 69-GeparSepto. J Clin Oncol. 2019 Sep 1;37(25):2226-2234.doi: 10.1200/JCO.18.01842.
2. Sherko Kuemmel, Oleg Gluz, Matthias Christgen et al. Efficacy of response- and toxicity-guided neoadjuvant chemotherapy in elderly early breast cancer patients: Results of WSG ADAPT elderly sub-trial. AACR; Cancer Res 2020;80(4 Suppl):Abstract nr P2-16-05.
3. Jens-Uwe Blohmer, Theresa Link, Sherko Kümmel et al. Investigating denosumab as an add-on treatment to neoadjuvant chemotherapy and two different nab-paclitaxel schedules in a 2x2 design in primary breast cancer - First results of the GeparX study. AACR; Cancer Res 2020;80(4 Suppl):Abstract nr GS3-01.

Statement: Dose-dense regimen

A60x4 - Pac175x4 - C600x4 q2w / ACPac / AC-Pac q2w

1. Citron ML, Berry DA, Cirincione C et al. Randomized trial of dose-dense versus conventionally scheduled and sequential versus concurrent combination chemotherapy as postoperative adjuvant treatment of node-positive primary breast cancer: first report of Intergroup Trial C9741/Cancer and Leukemia Group B Trial 9741. J Clin Oncol 2003;21:1431-9.

Statement: Dose-dense regimen

AC /EC q2w x 4 Pac q2w x 4

1. Citron ML, Berry DA, Cirincione C et al. Randomized trial of dose-dense versus conventionally scheduled and sequential versus concurrent combination chemotherapy as postoperative adjuvant treatment of node-positive primary breast cancer: first report of Intergroup Trial C9741/Cancer and Leukemia Group B Trial 9741. J Clin Oncol 2003;21:1431-9.
2. Burnell M, Levine MN, Chapman JA et al. Cyclophosphamide, epirubicin, and fluorouracil versus dose-dense epirubicin and cyclophosphamide followed by paclitaxel versus doxorubicin and cyclophosphamide followed by paclitaxel in node-positive or high-risk node-negative breast cancer. J Clin Oncol 28:77-82, 2010.
3. Del Mastro L, De Placido S, Bruzzi P et al. Fluorouracil and dose-dense chemotherapy in adjuvant treatment of patients with early-stage breast cancer: an open-label, 2 × 2 factorial, randomised phase 3 trial. Lancet. 2015;385(9980):1863-72
4. Budd GT, Barlow WE, Moore HC et al. SWOG S0221: a phase III trial comparing chemotherapy schedules in high-risk early-stage breast cancer. J Clin Oncol. 2015 Jan 1;33(1):58-64.
5. Gray R, Bradley R, Braybrooke J et al. Increasing the dose intensity of chemotherapy by more frequent administration or sequential scheduling: a patient-level meta-analysis of 37 298 women with early breast cancer in 26 randomised trials. Lancet. 2019 Apr 6;393(10179):1440-1452. doi: 10.1016/S0140-6736(18)33137-4. Epub 2019 Feb 8

Statement: Dose-dense regimen

EC q2w / Pac q1w

EC q3w / Pac q1w

1. Sparano JA, Zhao, F Martino S et al. Long-Term Follow-Up of the E1199 Phase III Trial Evaluating the Role of Taxane and Schedule in Operable Breast Cancer. J Clin Oncol 2015;33:2353-60.
2. Jones RL, Walsh G, Ashley S et al. A randomized pilot phase II study of doxorubicin and cyclophosphamide (AC) or epirubicin and cyclophosphamide (EC) given 2 weekly with pegfilgrastim (accelerated) vs 3 weekly (standard) for women with early breast cancer. Br J Cancer 2009;100:305-10.
3. Budd GT, Barlow WE, Moore HC et al. SWOG S0221: a phase III trial comparing chemotherapy schedules in high-risk early-stage breast cancer. J Clin Oncol. 2015 Jan 1;33(1):58-64.

EBCTCG Metaanalyse

1. Gray R, Bradley R, Braybrooke J et al. Increasing the dose intensity of chemotherapy by more frequent administration or sequential scheduling: a patient-level meta-analysis of 37 298 women with early breast cancer in 26 randomised trials. *Lancet*. 2019 Apr 6;393(10179):1440-1452. doi: 10.1016/S0140-6736(18)33137-4. Epub 2019 Feb 8

Statement: Dose-dense and dose-escalated regimen ($N \geq 4+$)

E-Pac-C q2w

1. Möbus V, Jackisch C, Lück HJ et al. Intense dose-dense sequential chemotherapy with epirubicin, paclitaxel, and cyclophosphamide compared with conventionally scheduled chemotherapy in high-risk primary breast cancer: mature results of an AGO phase III study. *J Clin Oncol*. 2010 Jun 10;28(17):2874-80.
2. Möbus V, Jackisch C, Lück HJ et al. AGO Breast Study Group (AGO-B) Ten-year Results of Intense Dose-dense chemotherapy show superior survival compared to a conventional schedule in High-risk Primary Breast Cancer: Final results of AGO Phase III iddEPC trial. *Ann Oncol*. 2017 Oct 24. doi: 10.1093/annonc/mdx690. [Epub ahead of print]

Negative Trial

1. Swain SM, Tang G, Geyer CE Jr et al. Definitive results of a phase III adjuvant trial comparing three chemotherapy regimens in women with operable, node-positive breast cancer: the NSABP B-38 trial. *J Clin Oncol*. 2013 Sep 10;31(26):3197-204.
2. Möbus V, von Minckwitz G, Jackisch C et al. German Breast Group (GBG), the AGO Breast Study Group (AGO-B) and NOGGO Study Groups. German Adjuvant Intergroup Node-positive Study (GAIN): a phase III trial comparing two dose-dense regimens (iddEPC versus ddEC-PwX) in high-risk early breast cancer patients. *Ann Oncol*. 2017 Aug 1;28(8):1803-1810.

Empfohlene konventionelle Regime für die adjuvante Chemotherapie			Oxford		
			LoE	GR	AGO
Anthrazyklin-/ Taxan-basierte Regime					
*EC q3w x 4 → Pac q1w x 12			2b	B	++
AC q3w x 4 → Pac q1w x 12			1b	A	++
AC → D q3w	A ₆₀ C q3w x 4 → D ₁₀₀ x 4		1b	A	+
*EC → D q3w	E ₉₀ C q3w x 4 → D ₁₀₀ x 4		1b	B	+
DAC	D ₇₅ A ₅₀ C q3w x 6		1b	A	+ ^a
Anthrazyklin-freie Regime					
6 x DC entspricht EC → D	D ₇₅ C ₆₀₀ x 6		1b	B	+
4 x DC >> 4 x AC	D ₇₅ C ₆₀₀ x 4		1b	B	+
Pac mono	P ₈₀ q1w x 12		1b	B	+/-
CMF			1a	A	+/-
Taxan-freie Schemata (bei pN0)					
FE ₁₀₀ C x 6	F ₅₀₀ E ₁₀₀ C ₃₀₀ x 6		2b ^(a)	B	+
* Extrapoliert von Studien mit Doxorubicin					

Statement: Anthracycline/ taxane based regimen

*EC → Pw E90C q3w x 4 → P80 qw1 x 12

1. Sparano JA, Zhao, F Martino S et al. Long-Term Follow-Up of the E1199 Phase III Trial Evaluating the Role of Taxane and Schedule in Operable Breast Cancer. J Clin Oncol 2015;33:2353-60.

Statement: Anthracycline/ taxane based regimen

AC → Pw A60Cq3w x 4 → P80qw1 x 12

1. Mamounas EP, Bryant J, Lembersky B et al. Paclitaxel After Doxorubicin Plus Cyclophosphamide As Adjuvant Chemotherapy for Node-Positive Breast Cancer: Results From NSABP B-28 J Clin Oncol 2005;23:3686-3696.
2. Sparano JA, Zhao, F Martino S et al. Long-Term Follow-Up of the E1199 Phase III Trial Evaluating the Role of Taxane and Schedule in Operable Breast Cancer. J Clin Oncol 2015;33:2353-60

Statement: Anthracycline/ taxane based regimen

AC → D A60C q3w x 4 → D100 qw3 x 4

EC → D E90C q3w x 4 → D100 qw3 x 4

1. Denduluri N, Chavez-MacGregor M, Telli ML et al. Selection of Optimal Adjuvant Chemotherapy and Targeted Therapy for Early Breast

Cancer: ASCO Clinical Practice Guideline Focused Update. J Clin Oncol. 2018 Aug 10;36(23):2433-2443.

Statement: Anthracycline/ taxane based regimen

DAC D75A50C q3w x 6

1. Swain SM, Tang G, Geyer CE Jr et al. Definitive results of a phase III adjuvant trial comparing three chemotherapy regimens in women with operable, node-positive breast cancer: the NSABP B-38 trial. J Clin Oncol. 2013;31(26):3197-204.
2. Blum JL, Flynn PJ, Yothers G et al. Anthracyclines in Early Breast Cancer: The ABC Trials-USOR 06-090, NSABP B-46-I/USOR 07132, and NSABP B-49 (NRG Oncology). J Clin Oncol. 2017;35(23):2647-2655.
3. Braybrooke J, Bradley R, Gray R et al., Taxane with anthracycline versus taxane without anthracycline: An individual patient-level meta-analysis of 16,500 women with early-stage breast cancer in 13 randomised trials, SABCS 2021, GS2-06

Statement: Anthracycline-free regimen

DC → D75 C600 x4 corresponds to EC → D

1. Harbeck N, Gluz O, Wuerstlein R et al. No age-related outcome disparities according to 21-gene recurrence score groups in early breast cancer patients treated by adjuvant chemotherapy in the prospective WSG PlanB trial. SABCS 2017, abstr.P1-06-06

Statement: Anthracycline-free regimen

DC >> 4 x AC

1. Jones S, Holmes FA, O'Shaughnessy J et al. Docetaxel With Cyclophosphamide Is Associated With an Overall Survival Benefit Compared With Doxorubicin and Cyclophosphamide: 7-Year Follow-Up of US Oncology Research Trial 9735. J Clin Oncol. 2009;27(8):1177-83.

Statement: Anthracycline-free regimen

Pac mono 80 mg q1w x 4-6

1. Shulman LN, Burstein HJ, Winer EP et al. Comparison of doxorubicin and cyclophosphamide versus single-agent paclitaxel as adjuvant therapy for breast cancer in women with 0 to 3 positive axillary nodes: CALGB 40101 (Alliance). J Clin Oncol. 2014;32:2311-7.

Statement: Anthracycline-free regimen

CMF 600/40/600 mg q3w x 6

1. Perrone F, Nuzzo F, Di Rella F et al. Weekly docetaxel versus CMF as adjuvant chemotherapy for older women with early breast cancer: final results of the randomized phase III ELDA trial. Ann Oncol. 2014;26:675-82

Statement: Taxan-freie Schemata (bei pN0)

FE100C x 6 q3w

1. Early Breast Cancer Trialists' Collaborative Group (EBCTCG). Effects of chemotherapy and hormonal therapy for early breast cancer on recurrence and 15-year survival: an overview of the randomised trials. Lancet. 2005 May 14-20;365(9472):1687-717.
2. Thomssen C, Vetter M, Kantelhardt EJ et al. on behalf of the NNBC-3 Study Group Adjuvant therapy with FEC and docetaxel in high risk node-negative breast cancer patients identified by tumor-biological (uPA/PAI-1) or clinico-pathological risk assessment. A joint trial of AGO-Breast Study Group, German Breast Group and EORTC Pathology and Biomarker Group (NNBC 3-Europe). Submitted

Adjuvante Chemotherapie: Andere Medikamente			
	Oxford		
	LoE	GR	AGO
<ul style="list-style-type: none"> ■ Capecitabin-haltige Therapie bei TNBC* <ul style="list-style-type: none"> ■ adjuvant / neoadjuvant (zusätzlich zur Standardtherapie) ■ postneoadjuvant bei non-pCR** ■ Platin-Zugabe zu <ul style="list-style-type: none"> ■ Anthrazyklin-freier adjuvanter Therapie bei TNBC (Kombination mit Taxan) ■ Anthrazyklin-haltiger adjuvanter Therapie bei TNBC ■ Hinzunahme von 5-Fluorouracil zu EC / AC-Pac 	<p>1a</p> <p>1a</p> <p>1b</p> <p>5</p> <p>1b</p>	<p>A</p> <p>A</p> <p>B</p> <p>D</p> <p>A</p>	<p>+/-</p> <p>+</p> <p>+</p> <p>+/-</p> <p>--</p>

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* DPYD Genotypisierung zum Ausschluss einer DPD Defizienz erforderlich
** ohne Carboplatinvorbehandlung

Statement: Capecitabine containing regimen in TNBC

1. O'Shaughnessy J, Koeppen H, Xiao Y et al. Patients with Slowly Proliferative Early Breast Cancer Have Low Five-Year Recurrence Rates in a Phase III Adjuvant Trial of Capecitabine. Clin Cancer Res. 2015;21:4305-11
2. Jiang Y, Yin W, Zhou L et al. First efficacy results of capecitabine with anthracycline-and taxane-based adjuvant therapy in high-risk early breast cancer: a meta-analysis. PLoS ONE 2012;7(3): e32474.
3. Joensuu H, Kellokumpu-Lehtinen PL, Huovinen R et al. Adjuvant Capecitabine in Combination With Docetaxel, Epirubicin, and Cyclophosphamide for Early Breast Cancer: The Randomized Clinical FinXX Trial. JAMA Oncol. 2017;3(6):793-800.
4. Martín M, Barrios CH, Torrecillas L et al. Efficacy results from CIBOMA/2004-01_GEICAM/2003-11 study: A randomized phase III trial assessing adjuvant capecitabine after standard chemotherapy for patients with early triple negative breast cancer. San Antonio Breast Cancer Symposium 2018, abstr. GS2-04.
5. Van Mackelenbergh M, Seiter F, Möbus V et al. Effects of capecitabine as part of neo-/adjuvant chemotherapy. A meta-analysis of individual patient data from 12 randomized trials including 15,457 patients. SABCS 2019, abstr. GS1-07

Statement: Capecitabine containing regimen in TNBC in general:

1. Martín M, Barrios CH, Torrecillas L et al. Efficacy results from CIBOMA/2004-01_GEICAM/2003-11 study: A randomized phase III trial assessing adjuvant capecitabine after standard chemotherapy for patients with early triple negative breast cancer. San Antonio Breast

Cancer Symposium 2018, abstr. GS2-04.

1. Li, Y.; Zhou, Y.; Mao, F.; et al. Adjuvant addition of capecitabine to early-stage triple-negative breast cancer patients receiving standard chemotherapy: A meta-analysis. *Breast Cancer Res. Treat.* 2019, 179, 533–542.

Statement: Capecitabine containing regimen in TNBC as postneoadjuvant therapy if non-pCR:

1. Masuda N, Lee SJ, Ohtani S et al. Adjuvant Capecitabine for Breast Cancer after Preoperative Chemotherapy. *N Engl J Med.* 2017 Jun 1;376(22):2147-59.

Statement: 5- Fluorouracil added to EC/AC=>Pac


1. Del Mastro L, De Placido S, Bruzzi P et al. Fluorouracil and dose-dense chemotherapy in adjuvant treatment of patients with early-stage breast cancer: an open-label, 2 × 2 factorial, randomised phase 3 trial. *Lancet.* 2015;385(9980):1863-72.

Statement: Platinum containing regimen in TNBC

1. Joensuu H, Gligorov J. Adjuvant treatments for triple-negative breast cancers. *Ann Oncol.* 2012;23 Suppl 6:vi40-5.
2. Alba E, Chacon JL, Lluch A et al. A randomized phase II trial of platinum salts in basal-like breast cancer patients in the neoadjuvant setting. Results from the GEICAM/2006-03, multicenter study. *Breast Cancer Res Treat* 2012: 136; 487–493.
3. Von Minckwitz G, Schneeweiss A, Loibl S et al. Neoadjuvant carboplatin in patients with triple-negative and HER2-positive early breast cancer (GeparSixto; GBG 66): a randomised phase 2 trial. *Lancet Oncol* 2014: 15; 747-56.
4. Ando M, Yamauchi H, Aogi K et al. Randomized phase II study of weekly paclitaxel with and without carboplatin followed by cyclophosphamide/epirubicin/5-fluorouracil as neoadjuvant chemotherapy for stage II/IIIA breast cancer without HER2 overexpression. *Breast Cancer Res Treat* 2014: 145; 401-09.
5. Petrelli F, Coinu A, Borgonova K et al. The value of platinum agents as neoadjuvant chemotherapy in triple-negative breast cancers: a systematic review and meta-analysis. *Breast Cancer Res Treat* 2014: 144; 223-32.
6. Sikov WM, Berry DA, Perou CM et al. Impact of the Addition of Carboplatin and/or Bevacizumab to Neoadjuvant Once-per-Week Paclitaxel Followed by Dose-Dense Doxorubicin and Cyclophosphamide on Pathologic Complete Response Rates in Stage II to III Triple-Negative Breast Cancer: CALGB 40603 (Alliance). *J Clin Oncol* 2015: 33; 13-21.
7. Loibl S, O'Shaughnessy J, Untch M et al. Addition of the PARP inhibitor veliparib plus carboplatin or carboplatin alone to standard neoadjuvant chemotherapy in triple-negative breast cancer (BrighTNess): a randomised, phase 3 trial. *Lancet Oncol.* 2018

Apr;19(4):497-509.

8. Gluz O Nitz U, Liedtke C et al. Comparison of Neoadjuvant Nab-Paclitaxel+Carboplatin vs Nab-Paclitaxel+Gemcitabine in Triple-Negative Breast Cancer: Randomized WSG-ADAPT-TN Trial Results. J Natl Cancer Inst. 2018 Jun 1;110(6):628-637.
9. Van Ramshorst MS, van der Voort A, van Werkhoven ED et al. Neoadjuvant chemotherapy with or without anthracyclines in the presence of dual Her2 blockade for Her2-positive breast cancer (TRAIIn-2): a multicentre, open-label, randomised, phase 3 trial. Lancet Oncol. Dec;19(12):1630-1640; doi:10.1016/S1470-2045(18)30570-9.



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Van Mackelenbergh M et al., SABCS 2019, abstr. GS1-07

Effects of capecitabine as part of neo- / adjuvant chemotherapy

Meta-analysis of individual patient data from 12 randomized trials (n = 15,457)

HR for DFS overall	0.952 (95%-C.I. 0.895-1.012, p = 0.115)
X add.	0.888 (95%-C.I. 0.817-0.965, p = 0.005)
X instead	1.035 (95%-C.I. 0.945-1.134, p = 0.455)
HR for OS overall	0.892 (95%-C.I. 0.824-0.965, p = 0.005)
X add.	0.837 (95%-C.I. 0.751-0.933, p = 0.001)
X instead	0.957 (95%-C.I. 0.853-1.073, p = 0.450)
Significance only for TNBC overall	
DFS	0.886 (95%-C.I. 0.789-0.994, p = 0.040)
OS	0.828 (95%-C.I. 0.720-0.952, p = 0.008)
X add.: DFS	0.818 (95%-C.I. 0.713-0.938, p = 0.004)
OS	0.778 (95%-C.I. 0.657-0.921, p = 0.004)

1. Van Mackelenbergh M Seiter F, Möbus V et al. Effects of capecitabine as part of neo-/adjuvant chemotherapy. A meta-analysis of individual patient data from 12 randomized trials including 15,457 patients. SABCS 2019, abstr. GS1-07

Adjuvante Therapie mit Trastuzumab +/- Pertuzumab			
	Oxford		
	LoE	GR	AGO
<ul style="list-style-type: none"> Trastuzumab + Pertuzumab <ul style="list-style-type: none"> pN+ pN- 	1b ^a	B	+
	1b ^a	B	+/-
<ul style="list-style-type: none"> Trastuzumab bei nodal-negativer Erkrankung (wenn Chemotherapie als indiziert angesehen wird) <ul style="list-style-type: none"> > 10 mm > 5–10 mm ≤ 5 mm 	1a	A	++
	2b	B	+
	2b	B	+/-



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Statement Trastuzumab + Pertuzumab (pN+/-)

1. von Minckwitz G, Procter M, de Azambuja E et al; APHINITY Steering Committee and Investigators. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer. N Engl J Med. 2017;377(2):122-131.
2. Piccart M, Procter M, Fumagalli D et al. Interim overall survival analysis of APHINITY (BIG 4-11): A randomized multicenter, double-blind, placebo-controlled trial comparing chemotherapy plus trastuzumab plus pertuzumab versus chemotherapy plus trastuzumab plus placebo as adjuvant therapy in patients with operable HER2-positive early breast cancer. SABCS 2019; abstr. GS 01-04
3. Yu L, Fu F, Li J, Huang M, Zeng B, Lin Y, Mei Q, Lv J, Wang C. Dual HER2 Blockade versus a Single Agent in Trastuzumab-Containing Regimens for HER2-Positive Early Breast Cancer: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Oncol 2020 <https://doi.org/10.1155/2020/5169278> (accessed 12302020)

Statements: Trastuzumab in node-negative disease (if chemotherapy is indicated)

1. Piccart-Gebhart MJ, Procter M, Leyland-Jones B et al.; Herceptin Adjuvant (HERA) Trial Study Team. Trastuzumab after adjuvant chemotherapy in HER2-positive breast cancer. N Engl J Med. 2005;353(16):1659-72.
2. Smith I, Procter M, Gelber RD et al.; HERA study team. 2-year follow-up of trastuzumab after adjuvant chemotherapy in HER2-positive breast cancer: a randomised controlled trial. Lancet. 2007;369(9555):29-36.
3. Goldhirsch A, Gelber RD, Piccart-Gebhart, MJ et al.; Herceptin Adjuvant (HERA) Trial Study Team. 2 years versus 1 year of adjuvant

- trastuzumab for HER2-positive breast cancer (HERA): an open-label, randomised controlled trial. *Lancet*. 2013;382(9897):1021-8.
4. Cameron D, Piccart-Gebhart MJ, Gelber RD, et al.; Herceptin Adjuvant (HERA) Trial Study Team. 11 years' follow-up of trastuzumab after adjuvant chemotherapy in HER2-positive early breast cancer: final analysis of the HERceptin Adjuvant (HERA) trial. *Lancet*. 2017;389(10075):1195-1205.
 5. Perez EA, Romond EH, Suman VJ et al. Trastuzumab plus adjuvant chemotherapy for human epidermal growth factor receptor 2-positive breast cancer: planned joint analysis of overall survival from NSABP B-31 and NCCTG N9831. *J Clin Oncol*. 2014;32(33):3744-52.
 6. Jackisch C, Hegg R, Stroyakovskiy D et al. HannaH phase III randomised study: Association of total pathological complete response with event-free survival in HER2-positive early breast cancer treated with neoadjuvant-adjuvant trastuzumab after 2 years of treatment-free follow-up. *Eur J Cancer*. 2016;62:62-75.

Statements: >10 mm/> 5-10 mm/ <= 5mm

1. Denduluri N, Somerfield MR, Eisen A et al. Selection of optimal adjuvant chemotherapy regimens for human epidermal growth factor receptor (Her2)- negative and adjuvant targeted therapy for Her2-positive breast cancers: an American Society of Clinical Oncology Guideline adaptation of the Cancer Care Ontario Clinical Practice Guideline. *J Clin Oncol* 2016;34(20):2416-27.
2. O'Sullivan CC, Bradbury I, Campbell C et al. Efficacy of Adjuvant Trastuzumab for Patients With Human Epidermal Growth Factor Receptor 2-Positive Early Breast Cancer and Tumors ≤ 2 cm: A Meta-Analysis of the Randomized Trastuzumab. *J Clin Oncol*. 2015;33(24):2600-8.
3. de Nonneville A, Gonçalves A, Zemmour C, et al. Benefit of adjuvant chemotherapy with or without trastuzumab in pT1ab node-negative human epidermal growth factor receptor 2-positive breast carcinomas: results of a national multi-institutional study. *Breast Cancer Res Treat*. 2017;162(2):307-316.

Adjuvante Therapie mit Trastuzumab / Pertuzumab			
	Oxford		
	LoE	GR	AGO
Beginn der Therapie			
▪ Simultan mit Taxanen	1a	A	++
▪ Sequentiell bis zu 3 Monaten nach Chemotherapie	1b	B	+
▪ s.c. = i.v.	1a	A	++
Dauer			
▪ Für 1 Jahr	1a	A	++
▪ Für 0,5 Jahre (Trastuzumab)	1a	A	+
▪ Für 2 Jahre	1b	A	-

Statement: Start of treatment simultaneously with taxanes

1. Smith I, Procter M, Gelber RD et al.; HERA study team. 2-year follow-up of trastuzumab after adjuvant chemotherapy in HER2-positive breast cancer: a randomised controlled trial. Lancet. 2007;369(9555):29-36.
2. Goldhirsch A, Gelber RD, Piccart-Gebhart, MJ et al.; Herceptin Adjuvant (HERA) Trial Study Team. 2 years versus 1 year of adjuvant trastuzumab for HER2-positive breast cancer (HERA): an open-label, randomised controlled trial. Lancet. 2013;382(9897):1021-8.
3. Cameron D, Piccart-Gebhart MJ, Gelber RD, et al.; Herceptin Adjuvant (HERA) Trial Study Team. 11 years' follow-up of trastuzumab after adjuvant chemotherapy in HER2-positive early breast cancer: final analysis of the HERceptin Adjuvant (HERA) trial. Lancet. 2017;389(10075):1195-1205.
4. Perez EA, Romond EH, Suman VJ et al. Trastuzumab plus adjuvant chemotherapy for human epidermal growth factor receptor 2-positive breast cancer: planned joint analysis of overall survival from NSABP B-31 and NCCTG N9831. J Clin Oncol. 2014;32(33):3744-52.
5. Joensuu H, Bono P, Kataja V et al. Fluorouracil, epirubicin, and cyclophosphamide with either docetaxel or vinorelbine, with or without trastuzumab, as adjuvant treatments of breast cancer: final results of the FinHer Trial. J Clin Oncol. 2009;27(34):5685-92.
6. Yin W, Jiang Y, Shen Z et al. Trastuzumab in the adjuvant treatment of HER2-positive early breast cancer patients: a meta-analysis of published randomized controlled trials. PLoS One. 2011;6(6):e21030.
7. Perez EA, Suman VJ, Davidson NE et al. Sequential Versus Concurrent Trastuzumab in Adjuvant Chemotherapy for Breast Cancer. J Clin

Oncol 2011;29:4491-4497

8. Slamon D, Eiermann W, Robert N et al.; Breast Cancer International Research Group. Adjuvant trastuzumab in HER2-positive breast cancer. N Engl J Med. 2011;365(14):1273-83.

Statement s.c.

1. Gligorov J, Ataseven B, Verrill M et al.; SafeHer Study Group. Safety and tolerability of subcutaneous trastuzumab for the adjuvant treatment of human epidermal growth factor receptor 2-positive early breast cancer: SafeHer phase III study's primary analysis of 2573 patients. Eur J Cancer. 2017;82:237-246.
2. Pivot X, Verma S, Fallowfield L et al.; PrefHer Study Group. Efficacy and safety of subcutaneous trastuzumab and intravenous trastuzumab as part of adjuvant therapy for HER2-positive early breast cancer: Final analysis of the randomised, two-cohort PrefHer study. Eur J Cancer. 2017;86:82-90.
3. Jackisch C, Stroyakovskiy D, Pivot X et al. Subcutaneous vs Intravenous Trastuzumab for Patients With ERBB2-Positive Early Breast Cancer: Final Analysis of the HannaH Phase 3 Randomized Clinical Trial. JAMA Oncol. 2019;5(5):e190339. doi: 10.1001/jamaoncol.2019.0339.
4. Federica Tan AR, et al. SABCS 2019 (Abstract PD4-07),
5. Phrancesca O'Shaughnessy J et al. ESMO 2020, Abstract-Nr. 165MO

Statement: Duration

Duration Trastuzumab 1 year

Duration Trastuzumab 2 year

Duration Trastuzumab 0.5 years

1. Goldhirsch A, Gelber RD, Piccart-Gebhart, MJ et al.; Herceptin Adjuvant (HERA) Trial Study Team. 2 years versus 1 year of adjuvant trastuzumab for HER2-positive breast cancer (HERA): an open-label, randomised controlled trial. Lancet. 2013;382(9897):1021-8.
2. Cameron D, Piccart-Gebhart MJ, Gelber RD, et al.; Herceptin Adjuvant (HERA) Trial Study Team. 11 years' follow-up of trastuzumab after adjuvant chemotherapy in HER2-positive early breast cancer: final analysis of the HERceptin Adjuvant (HERA) trial. Lancet. 2017;389(10075):1195-1205.
3. Joensuu H, Fraser J, Wildiers H et al. Effect of Adjuvant Trastuzumab for a Duration of 9 Weeks vs 1 Year With Concomitant

Chemotherapy for Early Human Epidermal Growth Factor Receptor 2-Positive Breast Cancer: The SOLD Randomized Clinical Trial. JAMA Oncol. 2018;4(9):1199–1206.

4. Conte P, Frassoldati A, Bisagni G et al. Nine weeks versus 1 year adjuvant trastuzumab in combination with chemotherapy: final results of the phase III randomized Short-HER study. Ann Oncol. 2018;29(12):2328-2333.
5. Pivot X, Romieu G, Debled Met al. 6 months versus 12 months of adjuvant trastuzumab in early breast cancer (PHARE): final analysis of a multicentre, open-label, phase 3 randomised trial. Lancet. 2019;393(10191):2591-2598. doi: 10.1016/S0140-6736(19)30653-1.
6. Earl HM, Hiller L, Vallier AL et al. 6 versus 12 months of adjuvant trastuzumab for HER2-positive early breast cancer (PERSEPHONE): 4-year disease-free survival results of a randomised phase 3 non-inferiority trial. Lancet. 2019;393(10191):2599-2612. doi: 10.1016/S0140-6736(19)30650-6.

Metaanalyses analyzing optimal duration:

1. Chen L, Zhou W, Hu X et al. Short-duration versus 1-year adjuvant trastuzumab in early HER2 positive breast cancer: A meta-analysis of randomized controlled trials. Cancer Treat Rev. 2019;75:12-19. doi: 10.1016/j.ctrv.2019.02.003.
2. Inno A, Barni S, Ghidini A et al. One year versus a shorter duration of adjuvant trastuzumab for HER2-positive early breast cancer: a systematic review and meta-analysis. Breast Cancer Res Treat. 2019;173(2):247-254. doi: 10.1007/s10549-018-5001-x.
3. Niraula S, Gyawali B. Optimal duration of adjuvant trastuzumab in treatment of early breast cancer: a meta-analysis of randomized controlled trials. Breast Cancer Res Treat. 2019;173(1):103-109. doi: 10.1007/s10549-018-4967-8.
4. Goldvaser H, Korzets Y, Shepshelovich D et al. Deescalating Adjuvant Trastuzumab in HER2-Positive Early-Stage Breast Cancer: A Systemic Review and Meta-Analysis. JNCI Cancer Spectr. 2019;3(2):pkz033. doi: 10.1093/jncics/pkz033.

Adjuvante Therapie mit Trastuzumab +/- Pertuzumab: Chemotherapieregime			
	Oxford		
	LoE	GR	AGO
Trastuzumab simultan mit			
▪ Paclitaxel / Docetaxel nach AC / EC	1a	A	++
▪ P q1w 12 x bei pT < 2 cm, pN0	2b	B	+
▪ Docetaxel und Carboplatin	1b	A	+
Trastuzumab + Pertuzumab simultan mit			
▪ Mit Paclitaxel q1w (oder Docetaxel q3w) nach EC / AC	1b	B	++
▪ Mit Docetaxel + Carboplatin	1b	B	+
▪ Mit Taxan dosis-dicht	2b	B	+
Radiotherapie simultan zu Trastuzumab / Pertuzumab	2b	B	+

Statement: with paclitaxel/docetaxel after AC/EC

1. Perez EA, Suman VJ, Davidson NE et al. Sequential Versus Concurrent Trastuzumab in Adjuvant Chemotherapy for Breast Cancer. J Clin Oncol 2011;29:4491-4497
2. Cameron D, Piccart-Gebhart MJ, Gelber RD, et al.; Herceptin Adjuvant (HERA) Trial Study Team. 11 years' follow-up of trastuzumab after adjuvant chemotherapy in HER2-positive early breast cancer: final analysis of the HERceptin Adjuvant (HERA) trial. Lancet. 2017;389(10075):1195-1205.
3. Papakonstantinou A, Matikas A, Bengtsson NO et al. Efficacy and Safety of Tailored and Dose-Dense Adjuvant Chemotherapy and Trastuzumab for Resected HER2-Positive Breast Cancer: Results From the Phase 3 PANTHER Trial. Cancer 2019 doi: 10.1002/cncr.32653. [Epub ahead of print]

Statement: P q1w12 in pT < 2 cm pN0

1. Tolaney SM, Barry WT, Dang CT et al. Adjuvant paclitaxel and trastuzumab for node-negative, HER2-positive breast cancer. N Engl J Med. 2015;372(2):134-41.
2. Tolaney SM, Guo H, Pernas S et al. Seven-Year Follow-Up Analysis of Adjuvant Paclitaxel and Trastuzumab Trial for Node-Negative, Human Epidermal Growth Factor Receptor 2-Positive Breast Cancer. J Clin Oncol. 2019;37(22):1868-1875. doi: 10.1200/JCO.19.00066.

Statement: with docetaxel and carboplatin

1. Valero V, Forbes J, Pegram MD et al. Multicenter phase III randomized trial comparing docetaxel and trastuzumab with docetaxel, carboplatin, and trastuzumab as first-line chemotherapy for patients with HER2-gene-amplified metastatic breast cancer (BCIRG 007 study): two highly active therapeutic regimens. J Clin Oncol. 2011;29(2):149-56.
2. Burstein HJ, Piccart-Gebhart MJ, Perez EA et al. Choosing the Best Trastuzumab-Based Adjuvant Chemotherapy Regimen: Should We Abandon Anthracyclines? Journal of Clinical Oncology 2012;18(30):2179-2182

Statement: Trastuzumab + Pertuzumab simultaneously with Paclitaxel q1w or Docetaxel q3w (after EC or AC)

1. von Minckwitz G, Procter M, de Azambuja E et al; APHINITY Steering Committee and Investigators. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer. N Engl J Med. 2017;377(2):122-131.

Statement: Trastuzumab + Pertuzumab simultaneously with Docetaxel and Carboplatin q3w


1. von Minckwitz G, Procter M, de Azambuja E et al; APHINITY Steering Committee and Investigators. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer. N Engl J Med. 2017;377(2):122-131.
2. Schneeweiss A, Chia S, Hickish T et al. Long-term efficacy analysis of the randomised, phase II TRYPHAENA cardiac safety study: Evaluating pertuzumab and trastuzumab plus standard neoadjuvant anthracycline-containing and anthracycline-free chemotherapy regimens in patients with HER2-positive early breast cancer. Eur J Cancer 89:27-35, 2017

Statement: Trastuzumab + Pertuzumab simultaneously with taxanes dose-dense

1. von Minckwitz G, Procter M, de Azambuja E et al; APHINITY Steering Committee and Investigators. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer. N Engl J Med. 2017;377(2):122-131.

Statement: radiotherapy concurrent with trastuzumab

1. M. Y. Halyard, T. M. Pisansky, L. J. Solin et al. Trastuzumab can be administered concurrent to adjuvant radiotherapy of the breast or thoracic wall. Adjuvant radiotherapy (RT) and trastuzumab in stage I-IIA breast cancer: Toxicity data from North Central Cancer Treatment Group Phase III trial N9831 J Clin Oncol. 2009;27(16):2638-44

Adjuvante Therapie mit weiteren zielgerichteten Substanzen			
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		LoE	GR AGO
	■ Lapatinib	1b ^a	B -
	■ (verzögerte adjuvante Therapie)	1b	B -
	■ Lapatinib + Trastuzumab	1b ^a	B -
	■ Neratinib* 1 Jahr nach 1 Jahr Trastuzumab (HR-positiv)	1b	B +
	■ Bevacizumab	1b	B --
	* kombiniert mit endokriner Standardtherapie		

Statement: Lapatinib

Delayed adjuvant treatment

1. Moreno-Aspitia A, Dueck AC, Ghanem-Cañete I et al. RC0639: phase II study of paclitaxel, trastuzumab, and lapatinib as adjuvant therapy for early stage HER2-positive breast cancer. Breast Cancer Res Treat. 2013;138(2):427-35.
2. Goss PE, Smith IE, O'Shaughnessy J.; TEACH investigators. Adjuvant lapatinib for women with early-stage HER2-positive breast cancer: a randomised, controlled, phase 3 trial. Lancet Oncol. 2013;14(1):88-96.
3. Perez EA, Holmes E, De Azambuja E et al. Disease-free survival (DFS) in the lapatinib alone arm and expanded results of the phase III ALTTO trial (BIG 2-06; NCCTG [Alliance] N063D) in the adjuvant treatment of HER2-positive early breast cancer (EBC). Ann Oncol 2014;25(5):1-41

Statement: Lapatinib + Trastuzumab


1. Piccart-Gebhart M, Holmes E, Baselga J et al. Adjuvant Lapatinib and Trastuzumab for Early Human Epidermal Growth Factor Receptor 2-Positive Breast Cancer: Results From the Randomized Phase III Adjuvant Lapatinib and/or Trastuzumab Treatment Optimization Trial. J Clin Oncol. 2016 1;34(10):1034-42.

Statement: Neratinib

1. Martin M, Holmes FA, Ejlersen B et al.; ExteNET Study Group. Neratinib after trastuzumab-based adjuvant therapy in HER2-positive breast cancer (ExteNET): 5-year analysis of a randomised, double-blind, placebo-controlled, phase 3 trial. Lancet Oncol. 2017;18(12):1688-1700

Statement: Bevacizumab

1. Cameron D, Brown J, Dent R et al. Adjuvant bevacizumab-containing therapy in triple-negative breast cancer (BEATRICE): primary results of a randomised, phase 3 trial. Lancet Oncol. 2013;14(10):933-42.
2. Slamon D et al.. BETH: A Randomized Phase III Study Evaluating Adjuvant Bevacizumab Added to Trastuzumab/Chemotherapy for Treatment of HER2+ Early Breast Cancer. SABCS 2013
3. Miller KD, O'Neill A, Gradishar W et al. Double-Blind Phase III Trial of Adjuvant Chemotherapy With and Without Bevacizumab in Patients With Lymph Node-Positive and High-Risk Lymph Node-Negative Breast Cancer (E5103). J Clin Oncol. 2018;36(25):2621-2629.



Postneoadjuvante Therapie HR+ / HER2-

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HR positiv (pCR und non-pCR)

	Oxford		
	LoE	GR	AGO
▪ Endokrine Therapie nach Menopausenstatus (s. Kap. 10)	1a	A	++
▪ Abemaciclib für 2 Jahre + endokrine Therapie bei hohem Rezidivrisiko ¹	1b	B	+
▪ Palbociclib für 1-2 Jahre + endokrine Therapie	1b	B	-
▪ Olaparib für 1 Jahr + endokrine Therapie (gBRCA1/2 ^{MUT} , bei non-pCR und CPS-EG Score ≥ 3) ²	1b	B	+
▪ Capecitabin (bei non-pCR)	3b	C	+/-

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¹ entsprechend Einschlusskriterien der monarchE-Studie
² entsprechend Einschlusskriterien der OlympiA-Studie

Statement ER and/or PgR positiv (pCR und non-pCR) Endokrine Therapie nach Menopausenstatus (s. Kap. 10)

1. Early Breast Cancer Trialists' Collaborative Group (EBCTCG). Effects of chemotherapy and hormonal therapy for early breast cancer on recurrence and 15-year survival: an overview of the randomised trials. Lancet. 2005 May 14-20;365(9472):1687-717.
2. Early Breast Cancer Trialists' Collaborative Group (EBCTCG). Aromatase inhibitors versus tamoxifen in early breast cancer: patient-level meta-analysis of the randomised trials. Lancet. 2015 Oct 3;386(10001):1341-1352.

Statement CDK4/6 inhibitors

1. Harbeck N, Rastogi P, Martin M, et al.; monarchE Committee Members. Adjuvant abemaciclib combined with endocrine therapy for high-risk early breast cancer: updated efficacy and Ki-67 analysis from the monarchE study. Ann Oncol. 2021 Dec;32(12):1571-1581.
2. Martin M, Hegg R, Sung-Bae K, et al., Abemaciclib combined with adjuvant endocrine therapy in patients with high risk early breast cancer who received neoadjuvant chemotherapy (NAC). J Clin Oncol 2021;39(15 suppl): abstract 517
3. Gnant M, Dueck AC, Frantal S, et al.; PALLAS groups and investigators. Adjuvant Palbociclib for Early Breast Cancer: The PALLAS Trial Results (ABCSG-42/AFT-05/BIG-14-03). J Clin Oncol. 2021 Dec 7;JCO2102554.
4. Mayer EL, Dueck AC, Martin M, et al. Palbociclib with adjuvant endocrine therapy in early breast cancer (PALLAS): interim analysis of a multicentre, open-label, randomised, phase 3 study. Lancet Oncol. 2021 Feb;22(2):212-222.
5. Loibl S, Marmé F, Martin M, et al. Palbociclib for Residual High-Risk Invasive HR-Positive and HER2-Negative Early Breast Cancer-

The Penelope-B Trial. J Clin Oncol. 2021 May 10;39(14):1518-1530.

6. O'Shaughnessy JA, Johnston S, Harbeck N et al. Primary outcome analysis of invasive disease-free survival for monarchE: abemaciclib combined with adjuvant endocrine therapy for high risk early breast cancer. SABCS 2020:GS1-01.
7. Johnston SRD, Harbeck N, Hegg R et al.; monarchE Committee Members and Investigators Abemaciclib Combined With Endocrine Therapy for the Adjuvant Treatment of HR+, HER2-, Node-Positive, High-Risk, Early Breast Cancer (monarchE). J Clin Oncol. 2020 Dec 1;38(34):3987-3998.

Statement Olaparib gBRCAmt

1. Tutt ANJ, Garber JE, Kaufman B, et al.; OlympiA Clinical Trial Steering Committee and Investigators. Adjuvant Olaparib for Patients with BRCA1- or BRCA2-Mutated Breast Cancer. N Engl J Med. 2021 Jun 24;384(25):2394-2405.

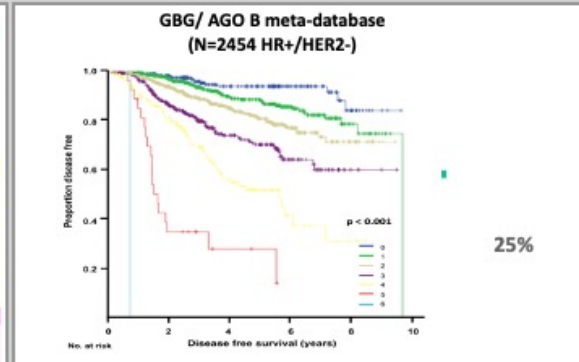
Statement Capecitabine (bei non-pCR; 8 Kurse)

1. Joensuu H, Kellokumpu-Lehtinen PL, Huovinen R et al. Adjuvant Capecitabine for Early Breast Cancer: 15-Year Overall Survival Results From a Randomized Trial. J Clin Oncol. 2022 Jan 12;JCO2102054.
2. Lluch A et al. Phase III Trial of adjuvant capecitabine after standard neo-/adjuvant chemotherapy in patients with early triple-negative breast cancer (GEICAM/2003-11_CIBOMA/2004-01). J Clin Oncol. 2020 Jan 20;38(3):203-213.
3. Masuda N, Lee SJ, Ohtani S, et al. Adjuvant Capecitabine for Breast Cancer after Preoperative Chemotherapy. N Engl J Med. 2017 Jun 1;376(22):2147-2159.

Wie berechnet man den CPS+EG Score ?

Point assignment for CPS+EG score

Clinical Stage		
I	0	T1N0, T0N1m, T1N1m
IIA	0	T0N1, T1N1, T2N0
IIB	1	T2N1, T3N0
IIIA	1	T0-2N2
IIB	2	T4N0-2
IIIC	2	Any T N3
Pathologic Stage		
0	0	T0/iN0
I	0	T1N0, T0N1m, T1N1m
IIA	1	T0N1, T1N1, T2N0
IIB	1	T2N1, T3N0
IIIA	1	T0-2 N2
IIB	1	T4 N0-N2
IIIC	2	Any T N3
Tumor Biologic Factors		
ER negative	1	
Nuclear grade 3	1	



Mittendorf EA, J Clin Oncol 2011;
Marmé F, et al. Eur J Cancer 2016

Adjuvant / Post-Neoadjuvant Treatment with CDK4/6i			
	monarchE	PALLAS	PENELOPE ^B
N	5,637	5,600	1,250
CDK4/6i	Abemaciclib	Palbociclib	Palbociclib
% of pts. with NACT	37%	n.r.	100%
Duration of CDK4/6i treatment	24 mths	24 mths	12 mths
Follow-up	27.1 mths	24 mths	43 mths
Discontinuation rate	28%	42%	20%
Discontinuation rate due to AE _{CDKi}	17%	27%	5%
IDFS-HR (95%-CI)	0.70 (0.59-0.82) p < 0.0001	0.96 (0.81-1.14) p = 0.65	0.93 (0.74-1.16) p = 0.525
2-yrs IDFS	92.7% vs. 90.0%	n.r.	88% vs. 78%
3-yrs IDFS	88.8% vs. 83.4%	88% vs. 89%	81% vs. 78%
4-yrs IDFS	n.r.	84.2% vs. 84.5%	73% vs. 72%

IDFS: Invasive disease-free survival

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1. Mayer EL, Gnant MI, DeMichele A et al. PALLAS: A randomized phase III trial of adjuvant palbociclib with endocrine therapy versus endocrine therapy alone for HR+/HER2- early breast cancer. Ann Oncol (2020) 31 (suppl_4): S1142-S1215. 10.1016/annonc/annonc325
2. Loibl S, Marmé F, Martin M, et al. Palbociclib for Residual High-Risk Invasive HR-Positive and HER2-Negative Early Breast Cancer- The Penelope-B Trial. J Clin Oncol. 2021 May 10;39(14):1518-1530. doi: 10.1200/JCO.20.03639. Epub 2021 Apr 1.PMID: 33793299
3. Harbeck N, Rastogi P, Martin M, et al.; monarchE Committee Members. Adjuvant abemaciclib combined with endocrine therapy for high-risk early breast cancer: updated efficacy and Ki-67 analysis from the monarchE study. Ann Oncol. 2021 Dec;32(12):1571-1581. doi: 10.1016/j.annonc.2021.09.015. Epub 2021 Oct 14.PMID: 34656740
4. Gnant M, Dueck AC, Frantal S, et al.; PALLAS groups and investigators. Adjuvant Palbociclib for Early Breast Cancer: The PALLAS Trial Results (ABCSG-42/AFT-05/BIG-14-03). J Clin Oncol. 2021 Dec 7;JCO2102554. doi: 10.1200/JCO.21.02554. Online ahead of print.PMID: 34874182

Postneoadjuvante Therapie triple-negativ			
	Oxford		
	LoE	GR	AGO
pCR			
▪ Fortführung Pembrolizumab, wenn neoadj. begonnen (q3w für 9 Kurse)	1b	B	+
Non-pCR			
▪ Capecitabin (q3w bis zu 8 Kurse)*	1a	A	+
▪ Olaparib (gBRCA ^{MUT}) ¹	1b	B	+
▪ Fortführung Pembrolizumab, wenn neoadj. begonnen (q3w für 9 Kurse)	1b	B	++

¹ entsprechend Einschlusskriterien der OlympiA-Studie
 * Studienlage ohne platinbasierte Vorthherapie

Statement Tripelnegativ (TNBC) (bei non-pCR): Capecitabine (8 Kurse)

1. Joensuu H, Kellokumpu-Lehtinen PL, Huovinen R et al. Adjuvant Capecitabine for Early Breast Cancer: 15-Year Overall Survival Results From a Randomized Trial. J Clin Oncol. 2022 Jan 12;JCO2102054.
2. Lluch A et al. Phase III Trial of adjuvant capecitabine after standard neo-/adjuvant chemotherapy in patients with early triple-negative breast cancer (GEICAM/2003-11_CIBOMA/2004-01). J Clin Oncol. 2020 Jan 20;38(3):203-213.
3. Masuda N, Lee SJ, Ohtani S, et al. Adjuvant Capecitabine for Breast Cancer after Preoperative Chemotherapy. N Engl J Med. 2017 Jun 1;376(22):2147-2159.
4. Van Mackelenbergh M Seiter F, Möbus V et al. Effects of capecitabine as part of neo-/adjuvant chemotherapy. A meta-analysis of individual patient data from 12 randomized trials including 15,457 patients. SABCS 2019, abstr. GS1-07

Pembrolizumab in combination with chemotherapy

1. Schmid P, Cortes J, Pusztai L et al. ; KEYNOTE-522 Investigators. Pembrolizumab for Early Triple-Negative Breast Cancer. N Engl J Med. 2020 Feb 27;382(9):810-821.
2. Schmid P, Cortes J, Dent R, et al. KEYNOTE-522: Phase III study of neoadjuvant pembrolizumab + chemotherapy vs. placebo + chemotherapy, followed by adjuvant pembrolizumab vs. placebo for early-stage TNBC. <https://doi.org/10.1016/j.annonc.2021.06.014>

Postneoadjuvante Therapie HER2-positiv			
	Oxford		
	LoE	GR	AGO
pCR			
▪ Low risk: Trastuzumab (bis 12 Mon. komplett)	2a	C	++
▪ High risk (cN+): Trastuzumab + Pertuzumab (bis 12 Mon. komplett)	2b	C	+
▪ Neratinib nach 1 Jahr* Trastuzumab (HR-positiv)*	2b	B	-
non-pCR			
▪ T-DM1	1b	B	+
▪ Trastuzumab + Pertuzumab (bis 12 Mon. komplett)	2b	C	+/-
▪ Zusätzlich nach 1 Jahr (erweiterte adj. Therapie)			
▪ Neratinib nach Trastuzumab (HR-positiv)*	2b	B	+
▪ Neratinib nach anderer anti-HER2-Therapie (HR-positiv)*	5	D	+/-
* kombiniert mit Standard endokriner Therapie			

Statement HER2 positiv (pCR):

1. Piccart M et al.; APHINITY Steering Committee and Investigators. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer in the APHINITY Trial: 6 Years' Follow-Up. J Clin Oncol. 2021 May 1;39(13):1448-1457.
2. Chan A, Moy B, Mansi J et al.: ExteNET Study Group. Final Efficacy Results of Neratinib in HER2-positive Hormone Receptor-positive Early-stage Breast Cancer From the Phase III ExteNET Trial. Clin Breast Cancer. 2020 Oct 6:S1526-8209(20)30258-5. doi: 10.1016/j.clbc.2020.09.014.
3. Martin M et al.; ExteNET Study Group. Neratinib after trastuzumab-based adjuvant therapy in HER2-positive breast cancer (ExteNET): 5-year analysis of a randomised, double-blind, placebo-controlled, phase 3 trial. Lancet Oncol. 2017;18(12):1688-1700
4. von Minckwitz G, Procter M, de Azambuja E, et al. APHINITY Steering Committee and Investigators. Adjuvant Pertuzumab and Trastuzumab in Early HER2-Positive Breast Cancer. N Engl J Med. 2017 Jul 13;377(2):122-131.
5. Goldhirsch A et al.; Herceptin Adjuvant (HERA) Trial Study Team. 2 years versus 1 year of adjuvant trastuzumab for HER2-positive breast cancer (HERA): an open-label, randomised controlled trial. Lancet. 2013;382(9897):1021-8.

Statement HER2 positiv (non-pCR) :

1. Chan A, Moy B, Mansi J, et al.; ExteNET Study Group. Final Efficacy Results of Neratinib in HER2-positive Hormone Receptor-positive Early-stage Breast Cancer From the Phase III ExteNET Trial. Clin Breast Cancer. 2021 Feb;21(1):80-91.e7.

2. von Minckwitz G, Huang CS, Mano MS et al. Trastuzumab Emtansine for Residual Invasive HER2-Positive Breast Cancer. *N Engl J Med*. 2018 Dec 5. doi: 10.1056/NEJMoa1814017.
3. Martin M et al.; ExteNET Study Group. Neratinib after trastuzumab-based adjuvant therapy in HER2-positive breast cancer (ExteNET): 5-year analysis of a randomised, double-blind, placebo-controlled, phase 3 trial. *Lancet Oncol*. 2017;18(12):1688-1700