RadioOnkologie und Strahlentherapie
School of Medicine and Health
Technische Universität München

Graubereiche und Kontroversen der Radiotherapie nach NACT

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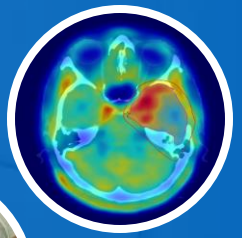

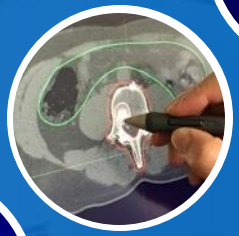

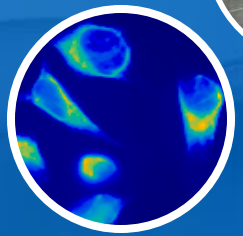

Keine Interessenskonflikte

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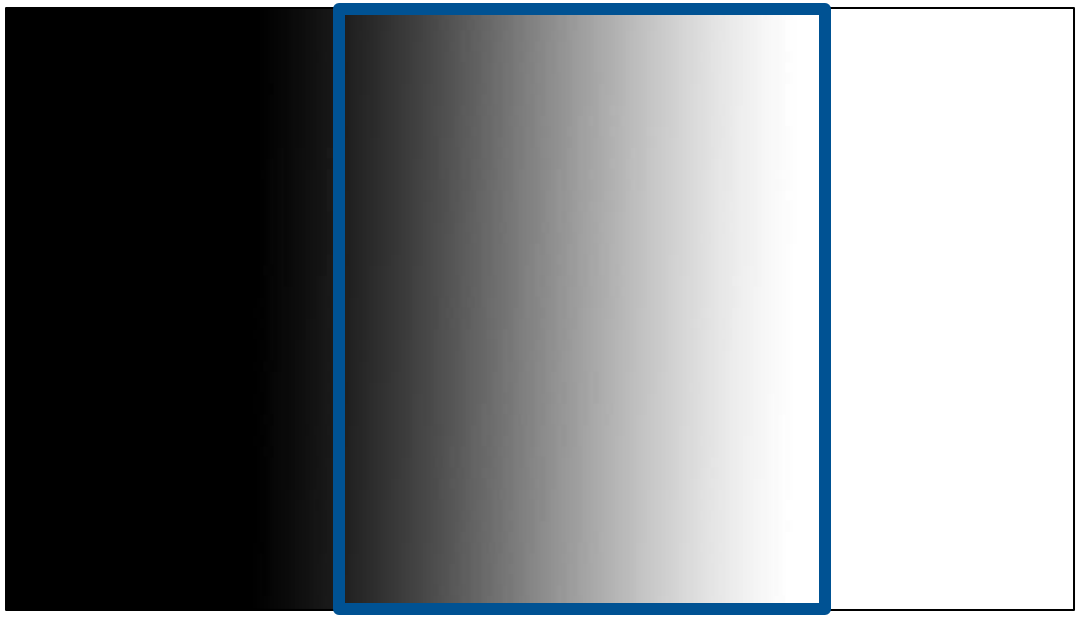

Graubereiche

1) Boostindikation nach NACT

2) Stellenwert der LAW-RTx bei ypN0

3) Optimale Axillatherapie bei ypN+

Graubereiche

1) Boostindikation nach NACT

2) Stellenwert der LAW-RTx bei ypN0

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Boost

LAW-RTx

Axilla

4.98	Evidenzbasierte Empfehlung	geprüft 2025
Empfehlungsgrad **A/B**	Eine lokale Dosisaufsättigung (Boost-Bestrahlung) des Tumorbettes senkt die lokale Rezidivrate in der Brust, ohne dadurch einen signifikanten Überlebensvorteil zu bewirken. Die Boostbestrahlung • soll daher bei allen ≤ 50 Jahre alten Patientinnen und • sollte bei > 50 Jahre alten Patientinnen nur bei erhöhtem lokalen Rückfallrisiko erfolgen (G3, HER2-positiv, tripelnegativ, > T1).	

	LoE	GR	AGO
▪ **Boost-RT des Tumorbettes (verbesserte lokale Kontrolle, kein Überlebensvorteil)**			
▪ **Prämenopausal**	1b	B	++
▪ **Postmenopausal, sofern > T1*, G3, HER2-positiv, tripel-negativ, EIC (mindestens 1 Faktor)**	2b	B	+

?

Boost

LAW-RTx

Axilla

4.98	Evidenzbasierte Empfehlung	geprüft 2025
Empfehlungsgrad **A/B**	Eine lokale Dosisaufsättigung (Boost-Bestrahlung) des Tumorbettes s… lokale Rezidivrate in der Brust, ohne dadurch einen signifikanten… Überlebensvorteil zu bewirken. Die Boostbestrahlung • soll daher bei allen ≤ 50 Jahre alten P… • sollte bei > 50 Jahre alten Patie… erhöhtem lokalen Rückfallrisiko erfolgen (G… ipelnegativ, > T1).	

Keine hinreichende Evidenzgrundlage

- Boost-RT … (verbesserte lokale Kontro… Überl…
  - …nopausal, sofern > T1*, G3, HER2-positiv, tripel-negativ, …indestens 1 Faktor)

GO

++

+

?

Boost

LAW-RTx

Axilla

CLINICAL INVESTIGATION · Volume 108, Issue 4, P1040-1046, November 15, 2020

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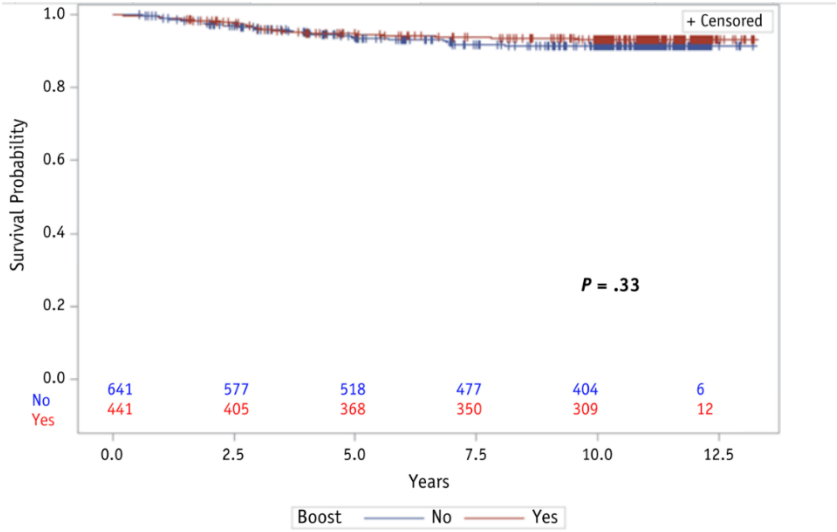
De-intensifying Radiation Therapy in HER-2 Positive Breast Cancer: To Boost or Not to Boost?

Joseph Abi Jaoude, MD * · Majd Kayali, MD * · Evandro de Azambuja, MD, PhD † · ... · Martine Piccart, MD, PhD † · Philip Poortmans, MD, PhD ‖ · Youssef H. Zeidan, MD, PhD * ... Show more

Affiliations & Notes · Article Info



1) Effektivere Systemtherapie reduziert LRR
und damit auch den absoluten Nutzen d. Boosts

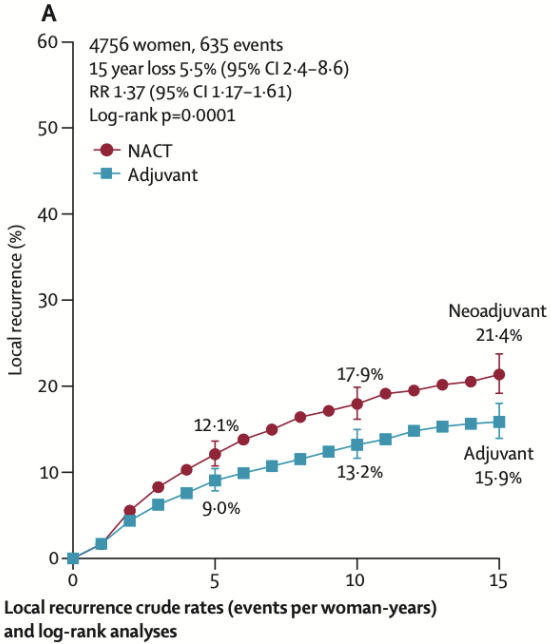
Boost

LAW-RTx

Axilla

Long-term outcomes for neoadjuvant versus adjuvant chemotherapy in early breast cancer: meta-analysis of individual patient data from ten randomised trials

*Early Breast Cancer Trialists' Collaborative Group (EBCTCG)**



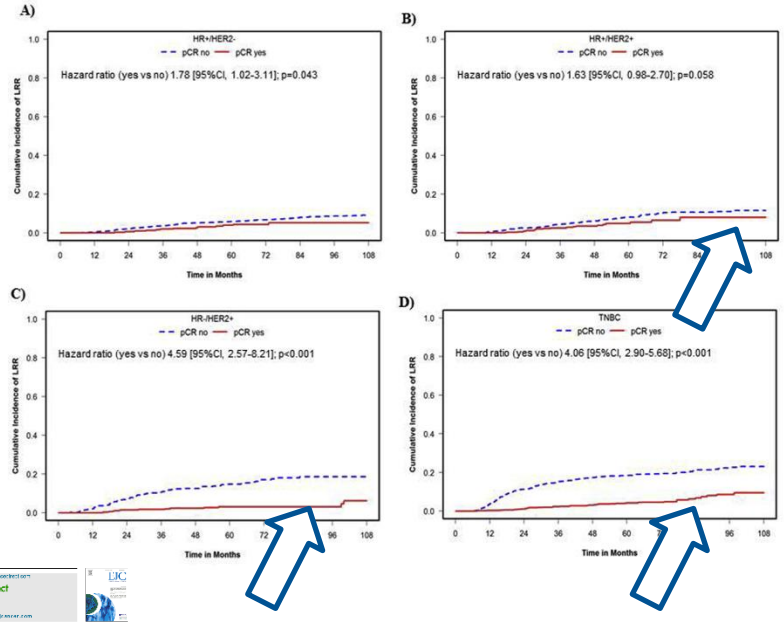
Local recurrence crude rates (events per woman-years) and log-rank analyses

2) Neoadjuvante CTx mit höherer Rate an LRR

Boost

LAW-RTx

Axilla



Original article

Is tumor bed boost necessary in patients who achieved ypCR following neoadjuvant chemotherapy and breast conserving therapy? (KROG 12-05 and 16-16)

Won Kyung Cho [a], Won Park [a, *], Doo Ho Choi [a], Yong Bae Kim [b], Chang-Ok Suh [b], Kyung Hwan Shin [c, q], Eui Kyu Chie [c], Jin Ho Kim [c, **], Seung Do Ahn [d], Su Ssan Kim [d], Kyubo Kim [e], Jin Hee Kim [f], Sung Ja Ahn [g], Sun Young Lee [h], Jeongshim Lee [i], Sang-Won Kim [j, k], Jeanny Kwon [l], Ki Jung Ahn [m], Hyun Soo Shin [n], Hyung Sik Lee [o], Nam Kwon Lee [p]

	5-LRC	p
Tumor bed boost		0.467
No (n = 22)	100%	
Yes (n = 158)	97.4%	

3) non-pCR als RF für Lokalrezidiv

Boost LAW-RTx Axilla

FAZIT:

- Ansprechen auf NACT als zusätzlichen RF berücksichtigen
- genereller Verzicht nach pCR nicht gerechtfertigt
- Boost indiziert bei >6 % LRR nach 10 Jahren*

*Assisi – ThinkTank

Boost

<50y/Prämenopausal
TNBC

pCR/non-CR

72y, HER2 pos.
non pCR

LAW-RTx

Boost

Axilla

72 y, HER2 pos.
pCR

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Boost

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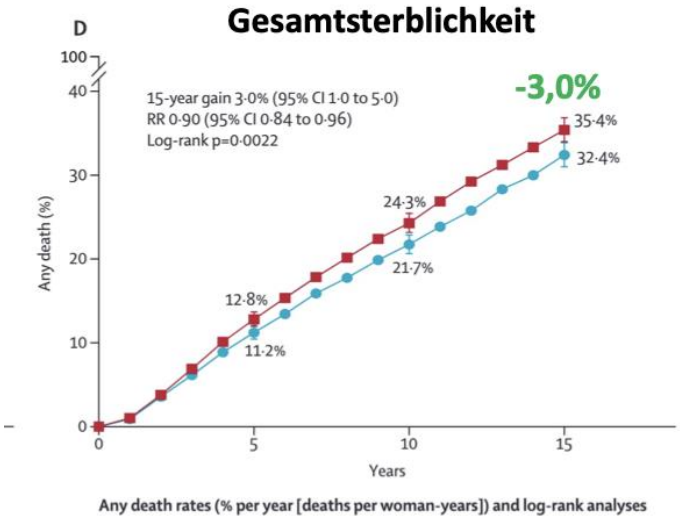


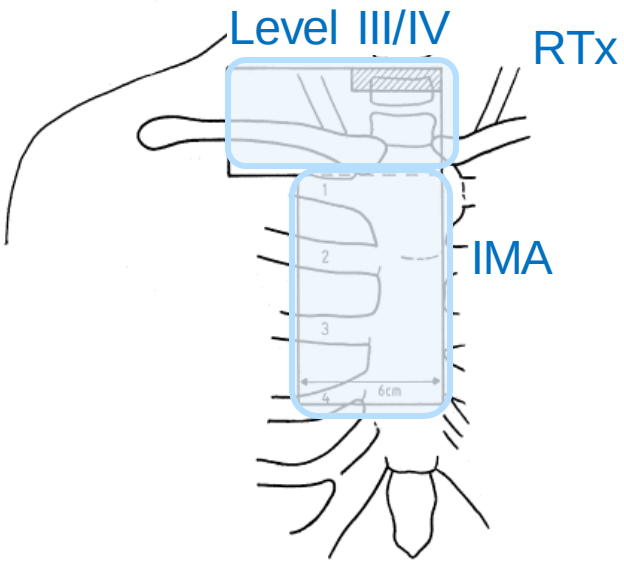
Any death rates (% per year [deaths per woman-years]) and log-rank analyses

Radiotherapy to regional nodes in early breast cancer: an individual patient data meta-analysis of 14 324 women in 16 trials

*Early Breast Cancer Trialists' Collaborative Group (EBCTCG)**

LAW-RTx:

- Level III/IV + IMA
- „Undissected Part" Level I/II



Boost

LAW-RTx

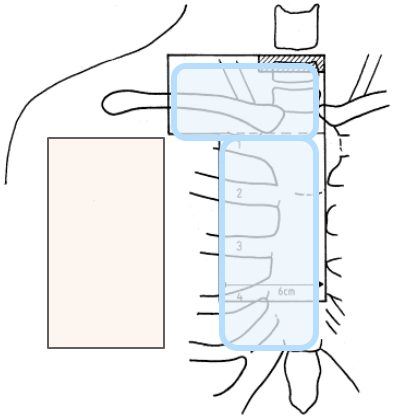
Axilla

Prätherapeutisch	Posttherapeutisch	RT-BET	PMRT	RT-LAW*
		AGO	AGO	AGO
Lokal fortgeschritten	pCR / keine pCR	++	++	++
cT1-3 cN1**	ypT+ ypN0	++	+	+/-[1]
cT1-3 cN1**	ypT0/is ypN0	++	+/-[1]	+/-[1]
cT1-3 cN0 / cN1** (Sonogr. obligat)	ypN+/ypN1mi o. ypT3/4	++	+	+
cT1-3 cN0 (Sonogr. obligat)	ypT0/is ypN0	++	-	-
cT1-3 cN0 (Sonogr. obligat)	ypT1-2 ypN0	++	-	-

Boost

LAW-RTx

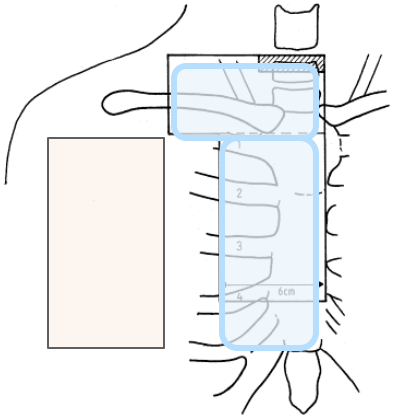
Axilla



1. Primärstaging! (cT1-3, N1)

2. “Risikofaktoren“ – Nutzen der RNI

Boost **LAW-RTx** Axilla



1. Primärstaging! (cT1-3, N1)

2. “Risikofaktoren“ – Nutzen der RNI

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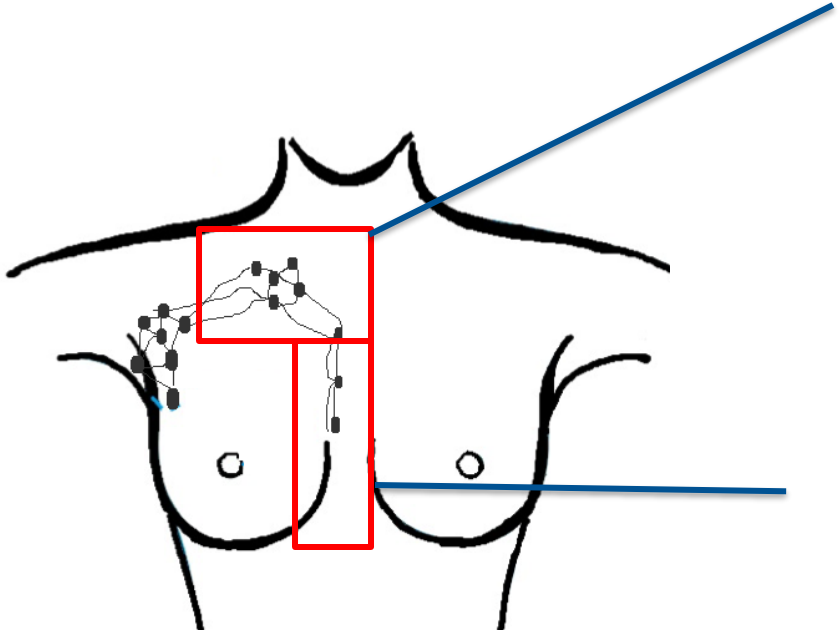
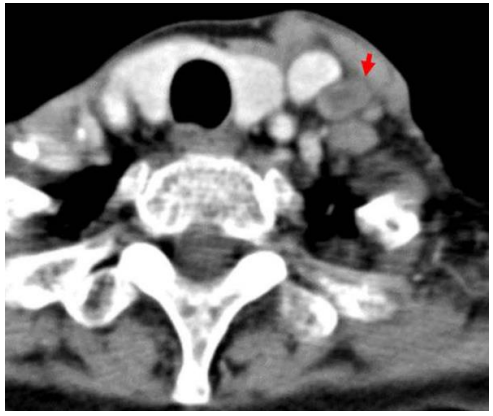
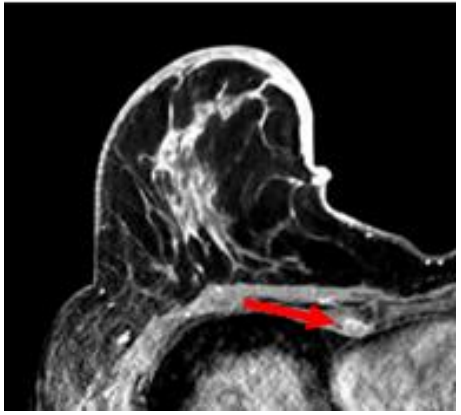
Primärstaging:

cN2/3



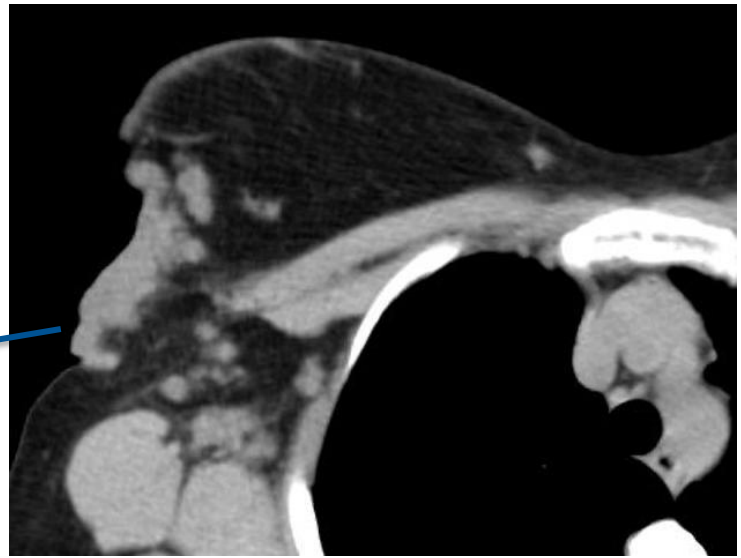




Primärstaging:

cT4

- Inflammatorisch
- Thoraxwandinfiltration
- Exulzeration



Boost **LAW-RTx** Axilla

1. Primärstaging! ✓

2. “Risikofaktoren“ – Nutzen der RNI

Boost

LAW-RTx

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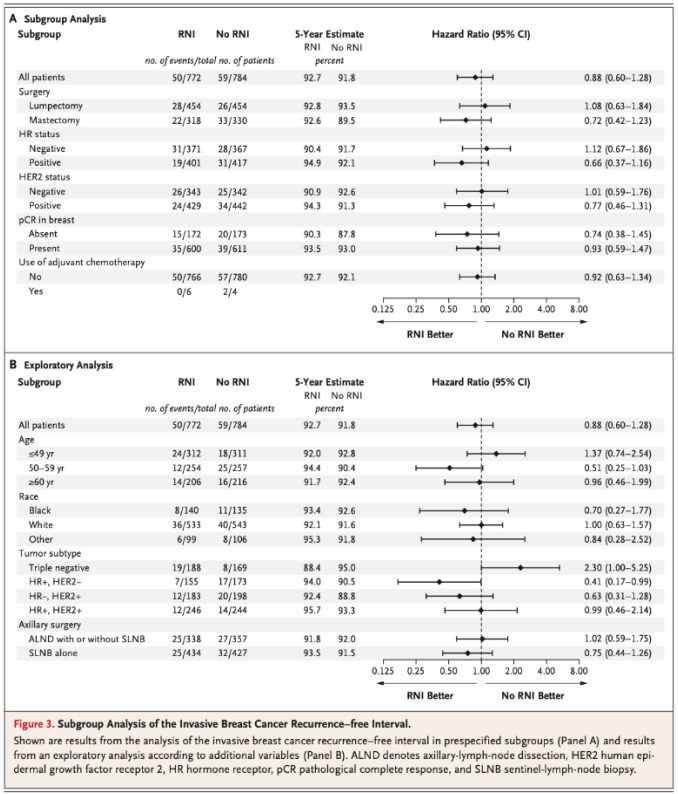


A Subgroup Analysis

Subgroup	RNI	No RNI	5-Year Estimate RNI	5-Year Estimate No RNI	Hazard Ratio (95% CI)
	no. of events/total no. of patients		percent		
All patients	50/772	59/784	92.7	91.8	0.88 (0.60–1.28)
Surgery					
Lumpectomy	28/454	26/454	92.8	93.5	1.08 (0.63–1.84)
Mastectomy	22/318	33/330	92.6	89.5	0.72 (0.42–1.23)
HR status					
Negative	31/371	28/367	90.4	91.7	1.12 (0.67–1.86)
Positive	19/401	31/417	94.9	92.1	0.66 (0.37–1.16)
HER2 status					
Negative	26/343	25/342	90.9	92.6	1.01 (0.59–1.76)
Positive	24/429	34/442	94.3	91.3	0.77 (0.46–1.31)
pCR in breast					
Absent	15/172	20/173	90.3	87.8	0.74 (0.38–1.45)
Present	35/600	39/611	93.5	93.0	0.93 (0.59–1.47)
Use of adjuvant chemotherapy					
No	50/766	57/780	92.7	92.1	0.92 (0.63–1.34)
Yes	0/6	2/4			

0.125 0.25 0.50 1.00 2.00 4.00 8.00

RNI Better — No RNI Better

B Exploratory Analysis

Subgroup	RNI	No RNI	5-Year Estimate RNI	5-Year Estimate No RNI	Hazard Ratio (95% CI)
	no. of events/total no. of patients		percent		
All patients	50/772	59/784	92.7	91.8	0.88 (0.60–1.28)
Age					
≤49 yr	24/312	18/311	92.0	92.8	1.37 (0.74–2.54)
50–59 yr	12/254	25/257	94.4	90.4	0.51 (0.25–1.03)
≥60 yr	14/206	16/216	91.7	92.4	0.96 (0.46–1.99)
Race					
Black	8/140	11/135	93.4	92.6	0.70 (0.27–1.77)
White	36/533	40/543	92.1	91.6	1.00 (0.63–1.57)
Other	6/99	8/106	95.3	91.8	0.84 (0.28–2.52)
Tumor subtype					
Triple negative	19/188	8/169	88.4	95.0	2.30 (1.00–5.25)
HR+, HER2–	7/155	17/173	94.0	90.5	0.41 (0.17–0.99)
HR–, HER2+	12/183	20/198	92.4	88.8	0.63 (0.31–1.28)
HR+, HER2+	12/246	14/244	95.7	93.3	0.99 (0.46–2.14)
Axillary surgery					
ALND with or without SLNB	25/338	27/357	91.8	92.0	1.02 (0.59–1.75)
SLNB alone	25/434	32/427	93.5	91.5	0.75 (0.44–1.26)

0.125 0.25 0.50 1.00 2.00 4.00 8.00

RNI Better — No RNI Better

Figure 3. Subgroup Analysis of the Invasive Breast Cancer Recurrence–free Interval.
Shown are results from the analysis of the invasive breast cancer recurrence–free interval in prespecified subgroups (Panel A) and results from an exploratory analysis according to additional variables (Panel B). ALND denotes axillary-lymph-node dissection, HER2 human epidermal growth factor receptor 2, HR hormone receptor, pCR pathological complete response, and SLNB sentinel-lymph-node biopsy.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Omitting Regional Nodal Irradiation after Response to Neoadjuvant Chemotherapy

E.P. Marnounas,[1] H. Bandos,[2,3] J.R. White,[4] T.B. Julian,[5] A.J. Khan,[6] S.F. Shaitelman,[7] M.A. Torres,[8] F.A. Vicini,[9] P.A. Ganz,[10,11] S.A. McCloskey,[12] P.C. Lucas,[13-16] N. Gupta,[17] X.A. Li,[18] B. McCormick,[6] B. Smith,[7] R.D. Tendulkar,[19,20] V.S. Kavadi,[21] K. Matsumoto,[22] S.A. Seaward,[23] W.J. Irvin, Jr.,[24] J.Y. Lin,[8] R.W. Mutter,[25] T.M. Muanza,[26] J. Stromberg,[27] R. Jagsi,[4] A.C. Weiss,[28] W.J. Curran, Jr.,[29] and N. Wolmark[14,15,30]

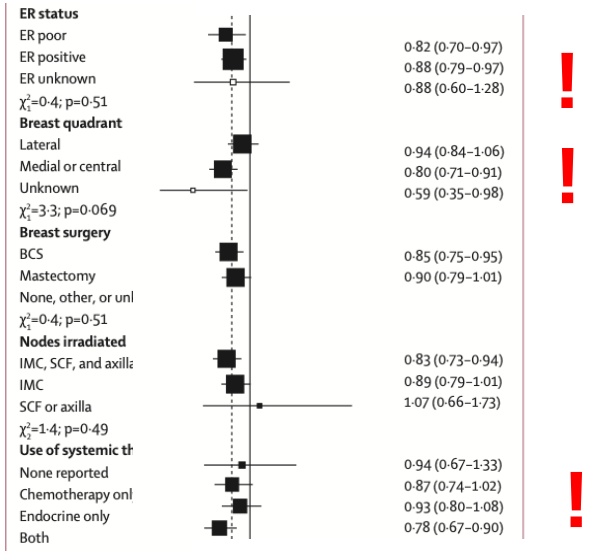
Boost

LAW-RTx

Axilla

Radiotherapy to regional nodes in early breast cancer: an individual patient data meta-analysis of 14 324 women in 16 trials

*Early Breast Cancer Trialists' Collaborative Group (EBCTCG)**



!

!

!

!	Regional radiotherapy	No regional radiotherapy	Gain from regional radiotherapy
Any recurrence			
pN0	19·0%	21·3%	2·3%
pN1–3	25·6%	28·5%	2·9%
pN4+	46·8%	51·1%	4·3%
Breast cancer mortality			
pN0	10·9%	12·5%	1·6%
pN1–3	20·3%	23·0%	2·7%
pN4+	40·5%	45·0%	4·5%

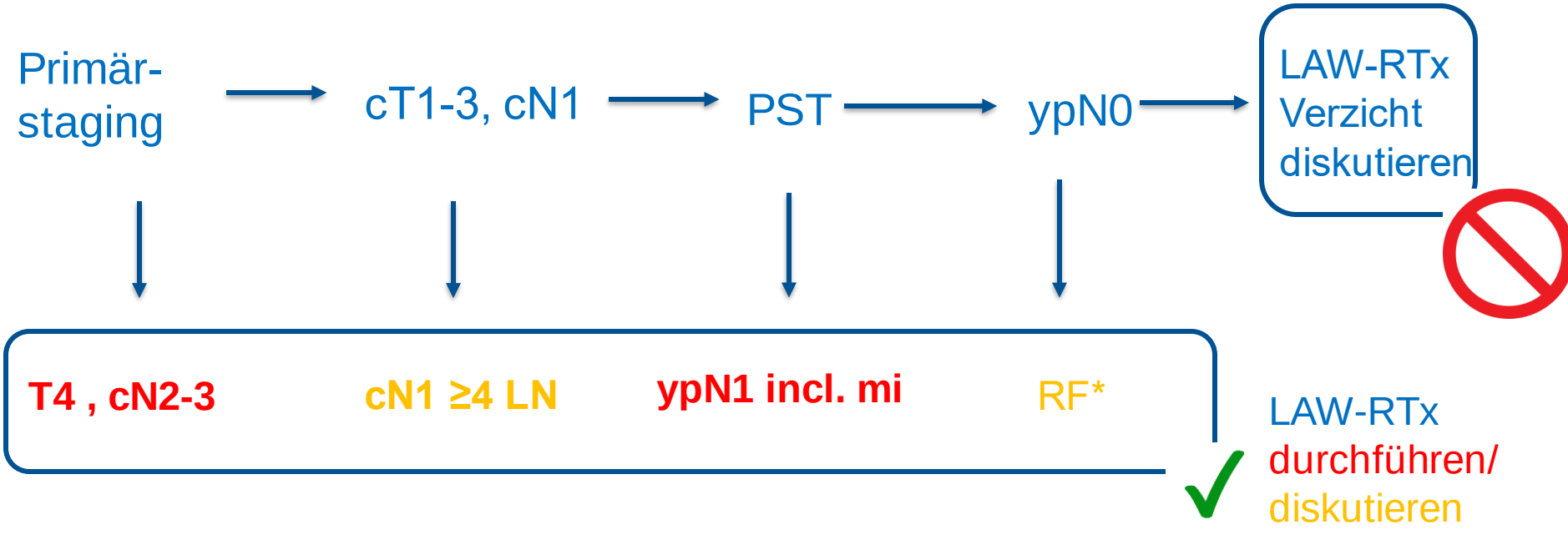
Größter Nutzen bei

- ≥4 LN
- ER neg.
- Medial/Zentraler Tumor
- CTx

Boost

LAW-RTx

Axilla



*Kriterien für hohes Rezidivrisiko bzw. Benefit der lokoregionären Radiotherapie: Zentraler Tumorsitz, HR-negativ, prämenopausal, non-pCR in der Brust, cT3

Graubereiche

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Boost

LAW-RTx

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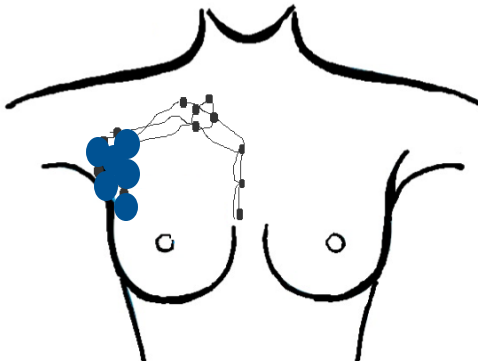
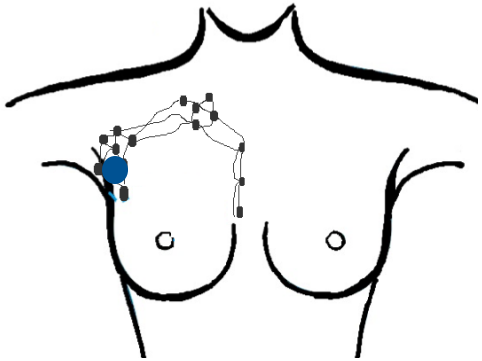
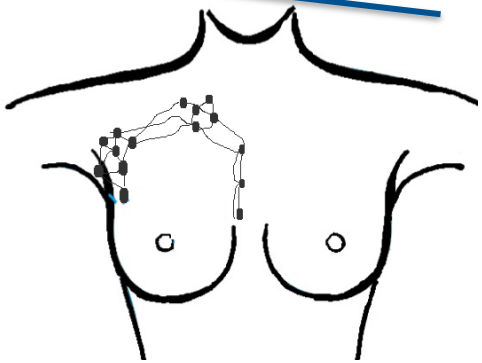


ALND

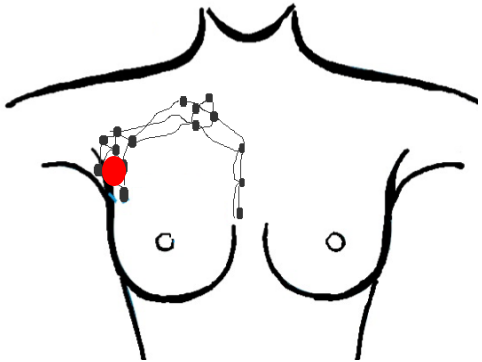


SLNB

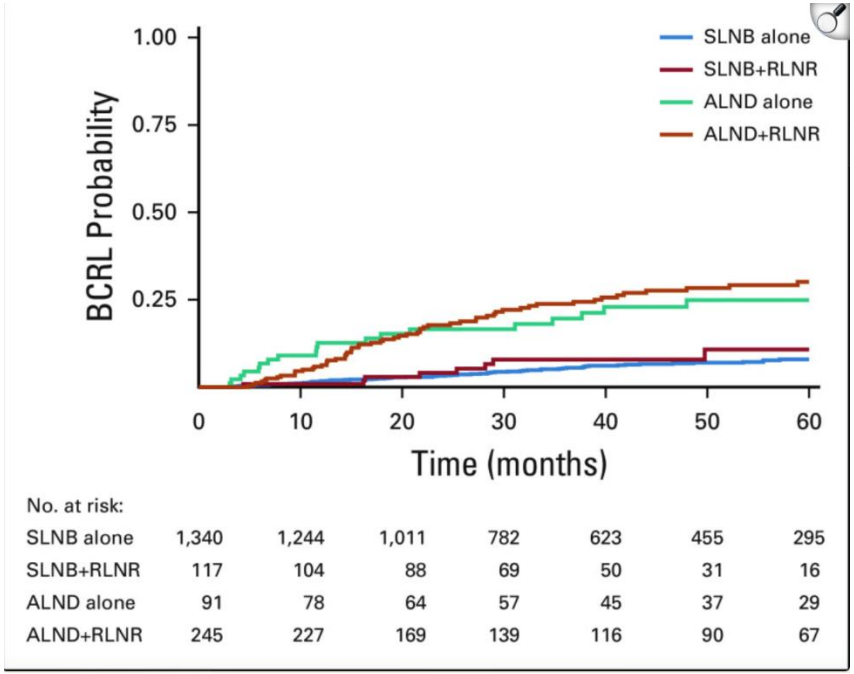


Boost LAW-RTx

Axilla



Evidenzbasierte Empfehlung	modifiziert 2025
Bei Patientinnen mit pT1-pT3/cN0-Tumoren, die eine brusterhaltende Operation mit anschließender perkutaner Ganzbrustbestrahlung erhalten und einen oder zwei positive Sentinel-Lymphknoten aufweisen, sollte auf eine Axilladissektion verzichtet werden.	

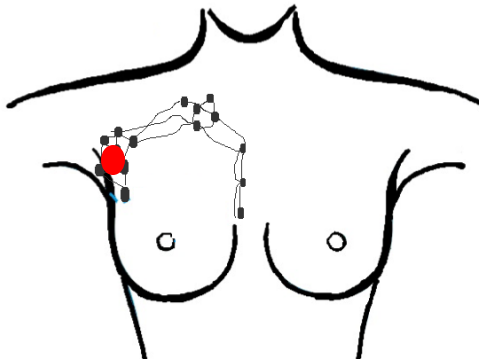


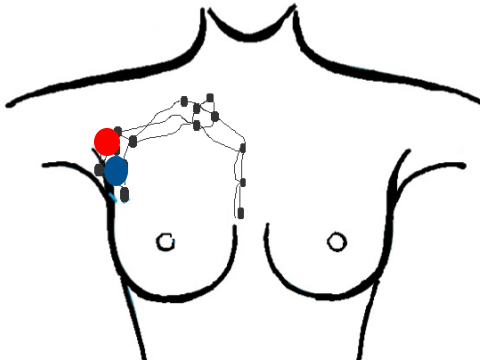
Boost

LAW-RTx

Axilla

NACT





cN+

Targeted Lymph Node Dissection:
Markierter cN+ LN & SLNB

Boost

LAW-RTx

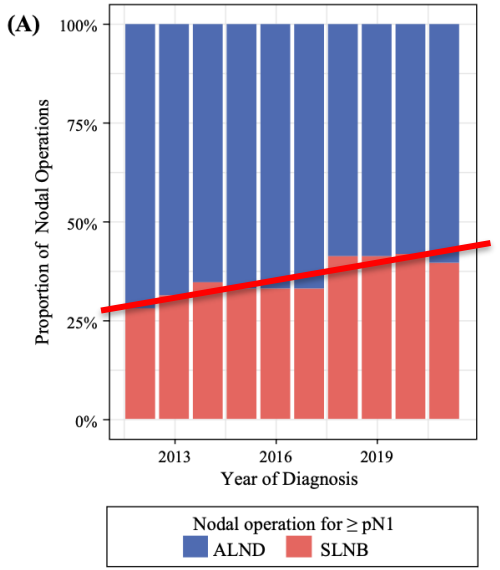
Axilla

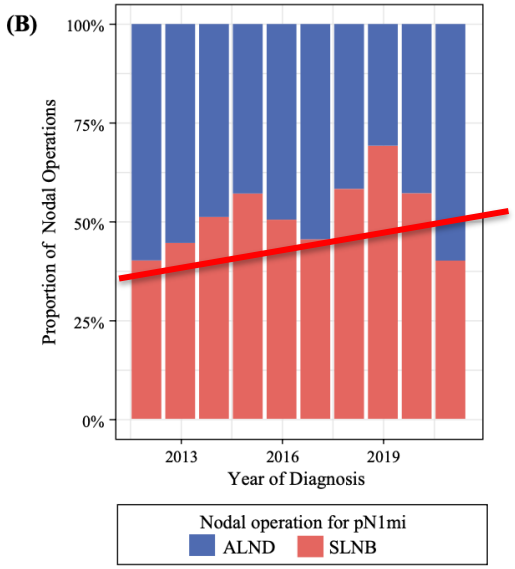
ypN+

Omission of Axillary Lymph Node Dissection in Patients with Residual Nodal Disease After Neoadjuvant Chemotherapy

Jessica N. Limberg, MD[1], Tyler Jones, MS[2,3], Samantha M. Thomas, MS[2,3], Koumani W. Ntowe, BS[1], Juliet C. Dalton, MS[1], Astrid Botty van den Bruele, MD[1,2], Ton Wang, MD, MS[1], Jennifer K. Plichta, MD, MS[1,2], Laura H. Rosenberger, MD, MS[1,2], Maggie L. DiNome, MD[1,2], and Akiko Chiba, MD[1,2]

[1]Department of Surgery, Duke University Medical Center, Durham, NC; [2]Duke Cancer Institute, Durham, NC; [3]Biostatistics and Bioinformatics, Duke University, Durham, NC

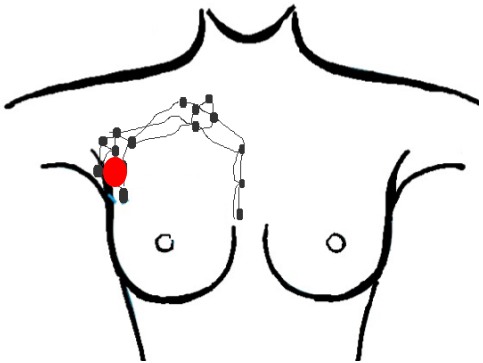




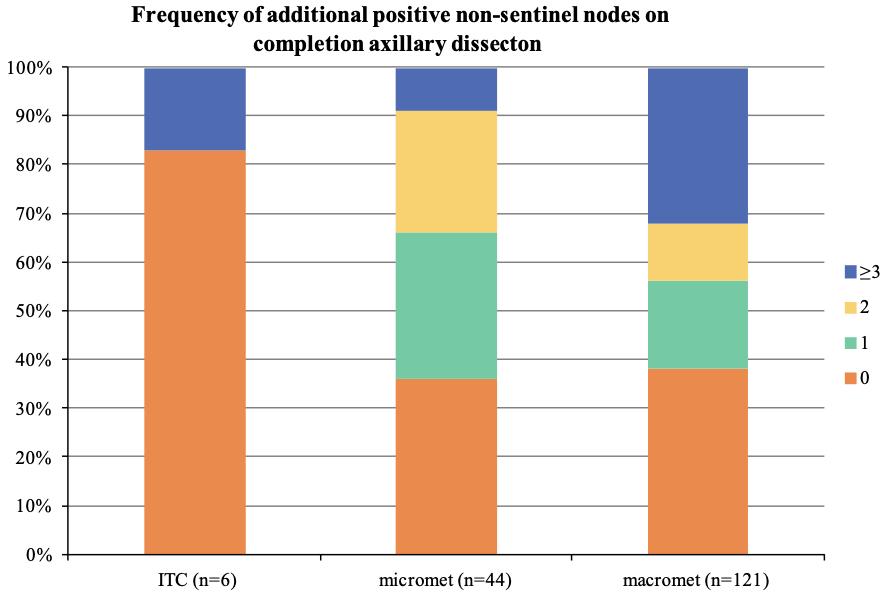
Boost

LAW-RTx

Axilla



ypN+ ≠ pN+



Ann Surg Oncol (2018) 25:1488–1494
https://doi.org/10.1245/s10434-018-429-2

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CrossMark

ORIGINAL ARTICLE – BREAST ONCOLOGY

Is Low-Volume Disease in the Sentinel Node After Neoadjuvant Chemotherapy an Indication for Axillary Dissection?

Tracy-Ann Moo, MD[1], Marcia Edelweiss, MD[2], Sabina Hajiyeva, MD[2], Michelle Stempel, MPH[1], Monica Raiss, BA[1], Emily C. Zabor, MS[3], Andrea Barrio, MD[1], and Monica Morrow, MD[1]

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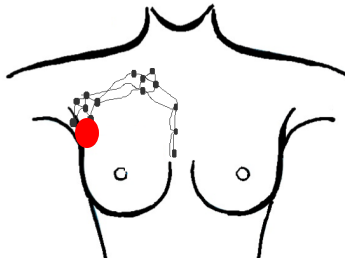
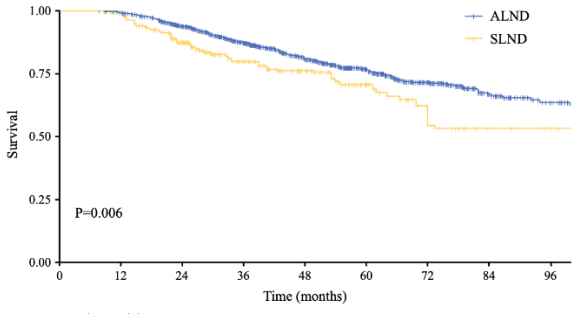
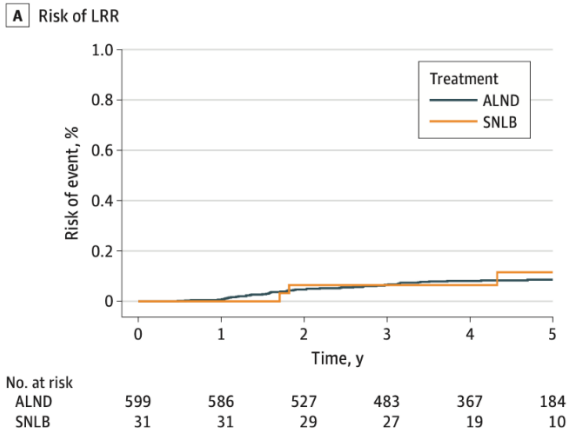
Boost



LAW-RTx



Axilla



Ann Surg Oncol (2021) 28:930–940
https://doi.org/10.1245/s10434-020-08928-2

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ORIGINAL ARTICLE – BREAST ONCOLOGY

Omission of Axillary Lymph Node Dissection is Associated with Inferior Survival in Breast Cancer Patients with Residual N1 Nodal Disease Following Neoadjuvant Chemotherapy

Muayad F. Almahariq, MD, PhD[1], Ronald Levitin, MD[1], Thomas J. Quinn, MD[1], Peter Y. Chen, MD[1], Nayana Dekhne, MD[2], Sayee Kiran, MD[2], Amita Desai, MD[2], Pamela Benitez, MD[2], Maha S. Jawad, MD[1], Gregory S. Gustafson, MD[1], and Joshua T. Dilworth, MD, PhD[1]

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Research Letter FREE

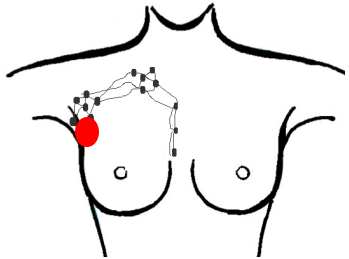
Axillary Surgery for Chemoresidual (ypN-Positive) Nodal Disease

Eric D. Brooks, MD, MHS[1,2]; Adeline M. Deladisma, MD, MPH[3]; Christopher G. Morris, MS[1,2]; et al

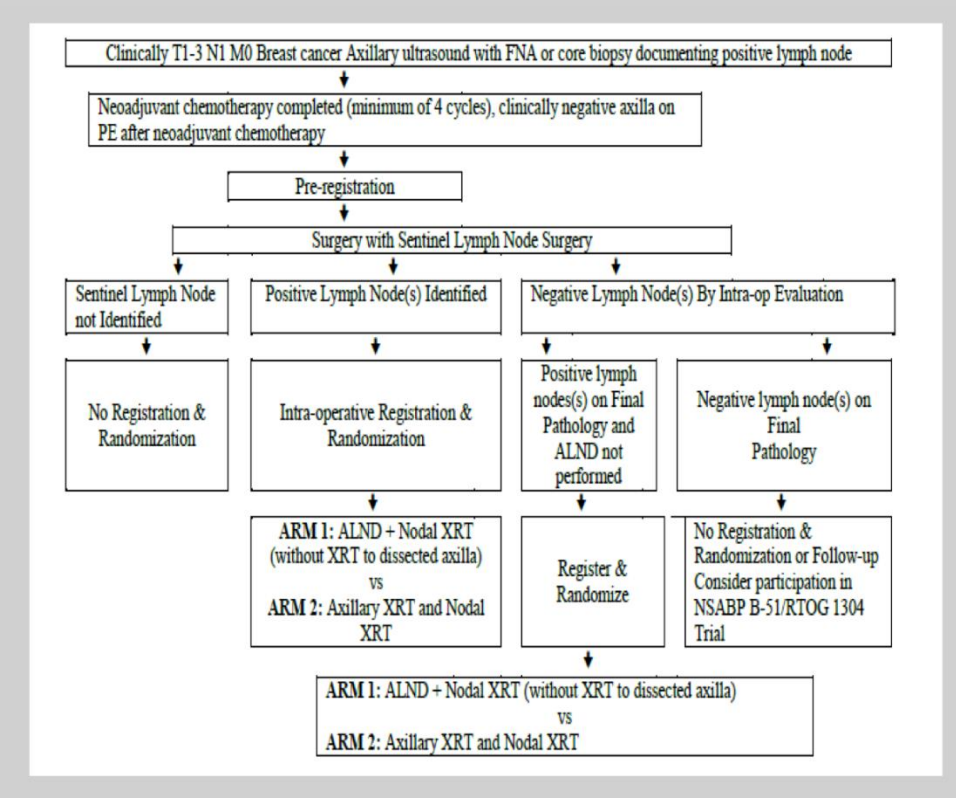
Boost

LAW-RTx

Axilla



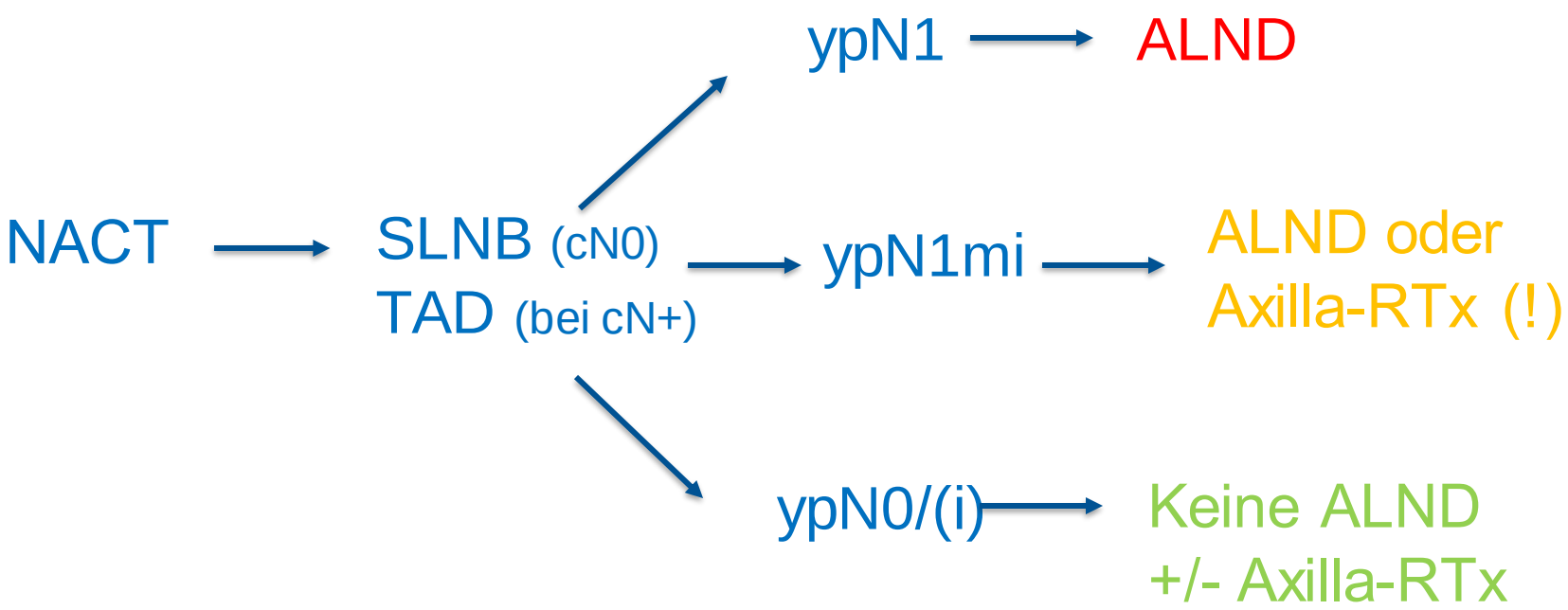
ALLIANCE
FOR CLINICAL TRIALS IN ONCOLOGY



Fazit

- Residuelle Makro- oder Mikrometastasen nach NACT sind RF
- Daten aus der Primärsituation sind nicht übertragbar
- Studien werden optimale Axillatherapie klären

Boost LAW-RTx **Axilla**



Vielen Dank für Ihre Aufmerksamkeit

AG Mammakarzinom
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