

Session „Onkologische Therapie“ Definition der Resektabilität

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Salzburger Symposium Thoraxchirurgie 2026



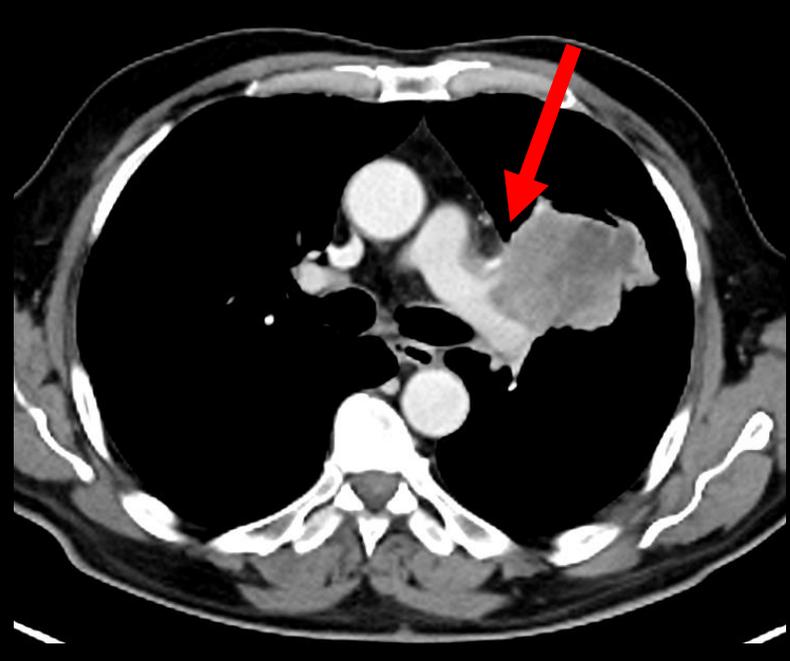
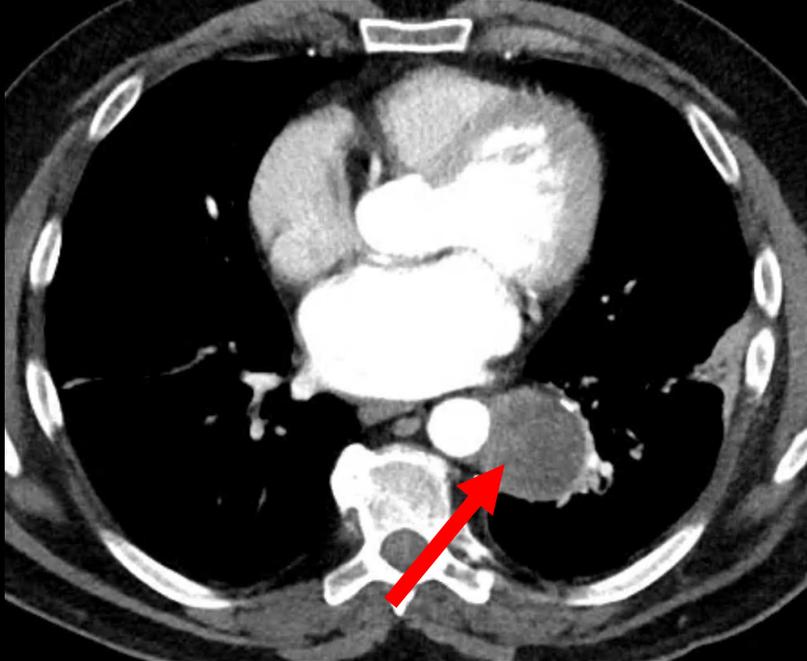
Wiener Gesundheitsverbund
Klinik Floridsdorf



Karl Landsteiner Institut für
klinische und translationale
thoraxchirurgische Forschung

Disclosures

- Speaker Fees, Advisory Boards, Proctoring:
 - MSD, BMS, AstraZeneca, Roche, Johnson&Johnson, Medtronic, Pfizer, Amgen
- All pictures shown are property of the presenter if not otherwise indicated





Chat GPT

Was brachte die Zukunft ???

T1-2, T3
(other than
invasive)
N2 node
positive

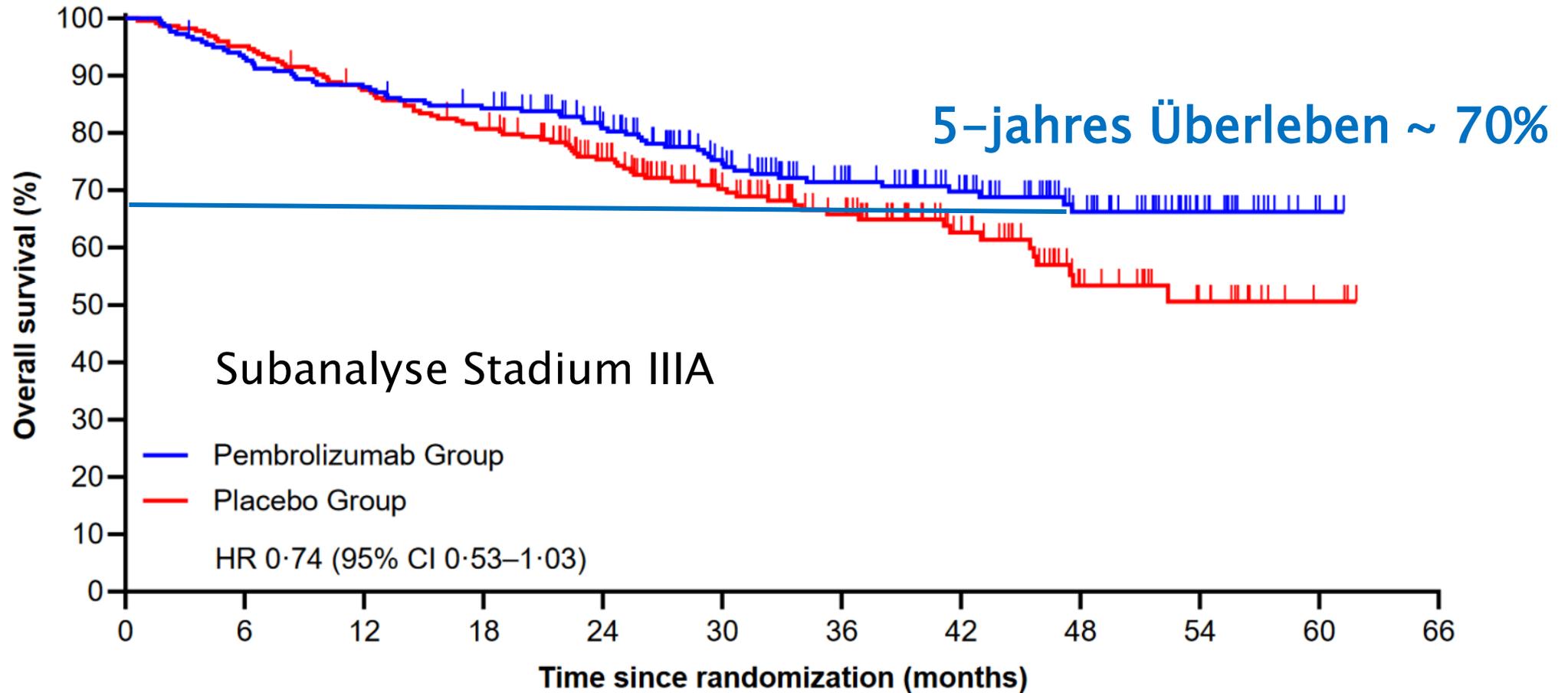


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Überleben im Stadium III HEUTE

Perioperative Chemo/Immuntherapie + Operation



Definition der Resektabilität

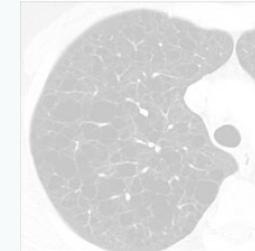
▪ Technische Resektabilität

- Minimalinvasive Zugänge
- Erweiterte Resektionen (z.B. Thoraxwand, Gefäße, extrakorporale Unterstützung)



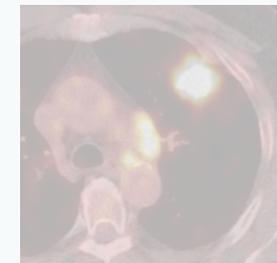
▪ Funktionelle Resektabilität

- Pulmonale und kardiale Reserve, Komorbiditäten



▪ Onkologische Sinnhaftigkeit

- Ausmaß LK Befall



9th Edition TNM Descriptors and Stages

T/M	Categories and Descriptors	N0	N1	N2		N3
				N2a	N2b	
T1	T1a ≤1 cm	IA1	IIA	IIB	IIIA	IIIB
	T1b >1 to ≤2 cm	IA2	IIA	IIB	IIIA	IIIB
	T1c >2 to ≤3 cm	IA3	IIA	IIB	IIIA	IIIB
T2	T2a Visceral pleura / central invasion	IB	IIB	IIIA	IIIB	IIIB
	T2a >3 to ≤4 cm	IB	IIB	IIIA	IIIB	IIIB
	T2b >4 to ≤5 cm	IIA	IIB	IIIA	IIIB	IIIB
T3	T3 >5 to ≤7 cm	IIB	IIIA	IIIA	IIIB	IIIC
	T3 Invasion	IIB	IIIA	IIIA	IIIB	IIIC
	T3 Same lobe separate tumor nodules	IIB	IIIA	IIIA	IIIB	IIIC
T4	T4 >7 cm	IIIA	IIIA	IIIB	IIIB	IIIC
	T4 Invasion	IIIA	IIIA	IIIB	IIIB	IIIC
	T4 Ipsilateral separate tumor nodules	IIIA	IIIA	IIIB	IIIB	IIIC



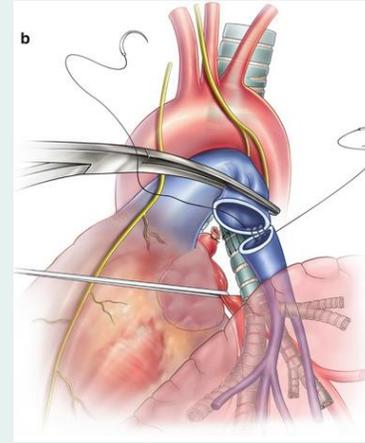
Moderne Chirurgie bei lokal fortgeschrittenem Lungenkarzinom

Minimal-invasiv



VATS
RATS
Parenchymsparend

Maximal-invasiv



Erweiterte Resektionen
Bronchovaskuläre Rekonstruktion
ECMO
Herz-Lungenmaschine

Table 1. Demographic and Disease Characteristics of the Participants at Baseline (Intention-to-Treat Population).*

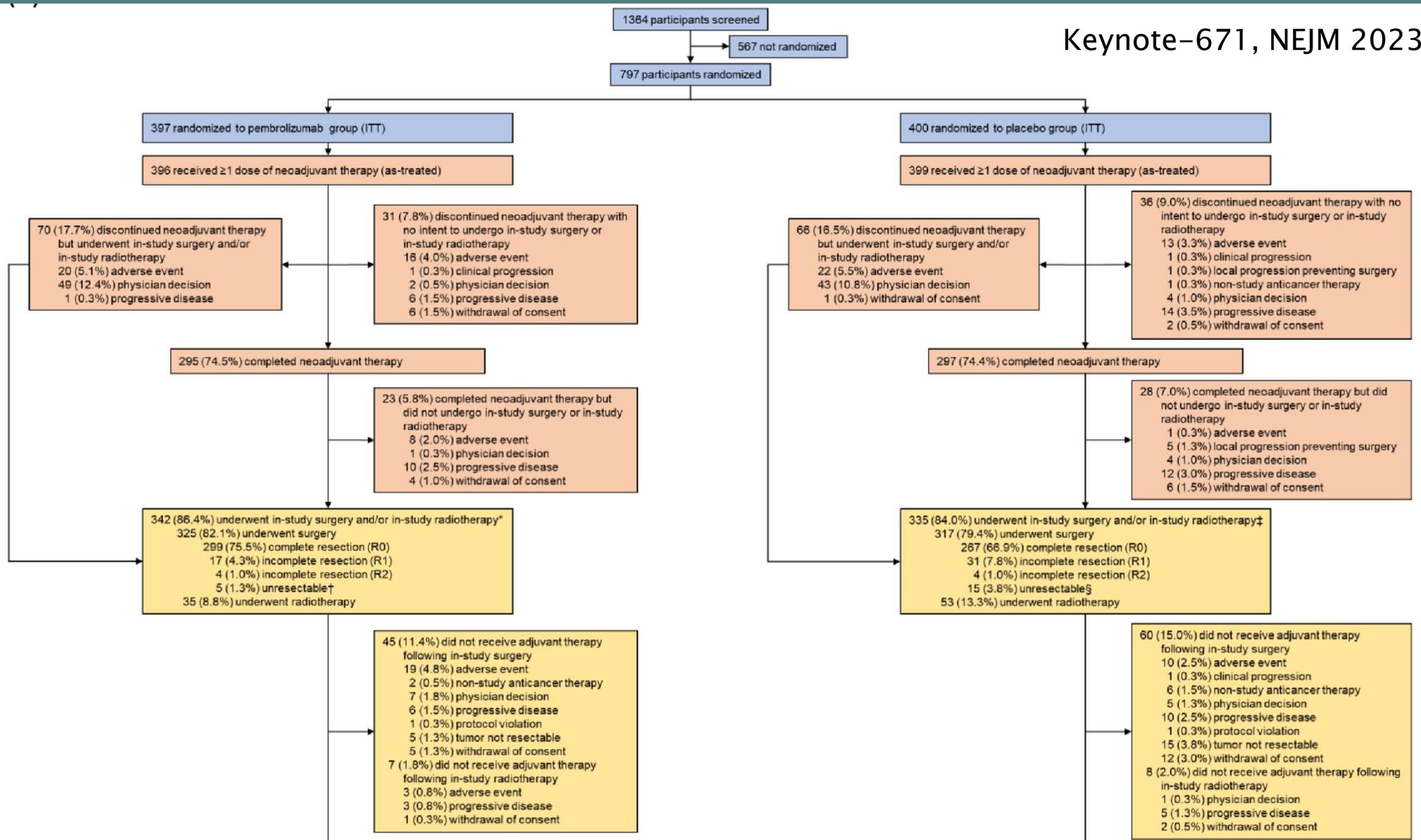
Characteristic	Pembrolizumab Group (N = 397)	Placebo Group (N = 400)
Age		
Median (range) — yr	63 (26–83)	64 (35–81)
≥65 yr — no. (%)	176 (44.3)	186 (46.5)
Male sex — no. (%)		
	279 (70.3)	284 (71.0)
Race or ethnic group — no. (%)†		
American Indian or Alaska Native	1 (0.3)	0
Asian	124 (31.2)	125 (31.2)
Black	6 (1.5)	10 (2.5)
Multiple	3 (0.8)	10 (2.5)
White	250 (63.0)	239 (59.8)
Missing data	13 (3.3)	16 (4.0)
Geographic region — no. (%)		
East Asia	123 (31.0)	121 (30.2)
Other	274 (69.0)	279 (69.8)
ECOG performance-status score — no. (%)‡		
0	253 (63.7)	246 (61.5)
1	144 (36.3)	154 (38.5)
Smoking status — no. (%)		
Current smoker	96 (24.2)	103 (25.8)
Former smoker	247 (62.2)	250 (62.5)
Never smoked	54 (13.6)	47 (11.8)
Pathological stage at baseline — no. (%)		
II	118 (29.7)	121 (30.2)
III	279 (70.3)	279 (69.8)
IIIA	217 (54.7)	225 (56.2)
IIIB	62 (15.6)	54 (13.5)
Tumor stage — no. (%)		
T1	55 (13.9)	61 (15.2)
T2	106 (26.7)	126 (31.5)
T3	121 (30.5)	109 (27.2)
T4	115 (29.0)	104 (26.0)
Node stage — no. (%)		
N0	148 (37.3)	142 (35.5)
N1	81 (20.4)	71 (17.8)
N2	168 (42.3)	187 (46.8)
Histologic features — no. (%)		
Nonsquamous	226 (56.9)	227 (56.8)
Squamous	171 (43.1)	173 (43.2)
PD-L1 tumor proportion score — no. (%)		
≥50%	132 (33.2)	134 (33.5)
<50%	265 (66.8)	266 (66.5)
1–49%	127 (32.0)	115 (28.8)
<1%	138 (34.8)	151 (37.8)
EGFR mutation status — no. (%)		
No	111 (28.0)	127 (31.8)
Yes	14 (3.5)	19 (4.8)
Unknown	272 (68.5)	254 (63.5)
ALK translocation status — no. (%)		
No	104 (26.2)	133 (33.2)
Yes	12 (3.0)	9 (2.2)
Unknown	281 (70.8)	258 (64.5)

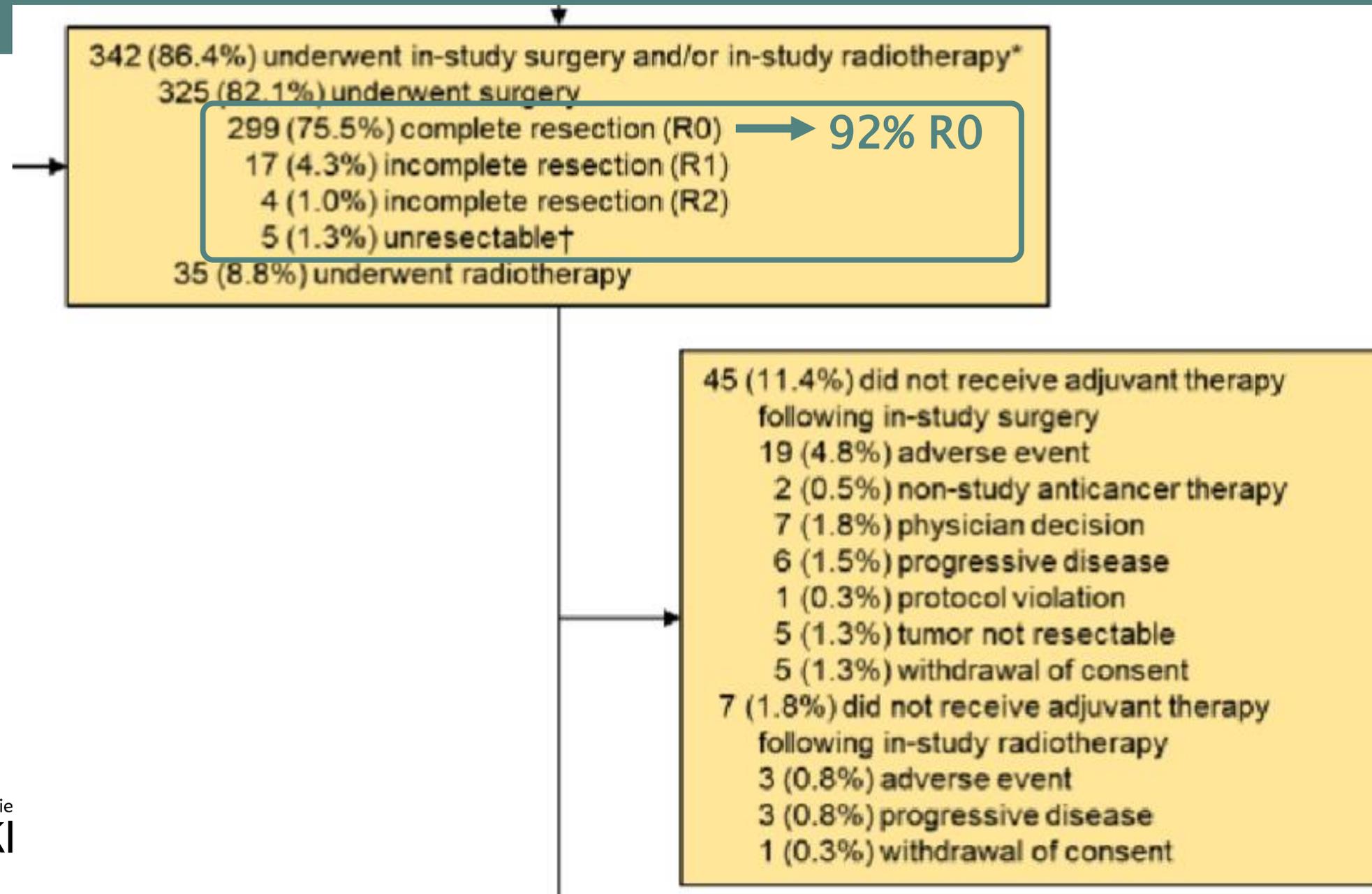
* The intention-to-treat population included all the participants who had undergone randomization. Percentages may not total 100 because of rounding. PD-L1 denotes programmed death ligand 1.

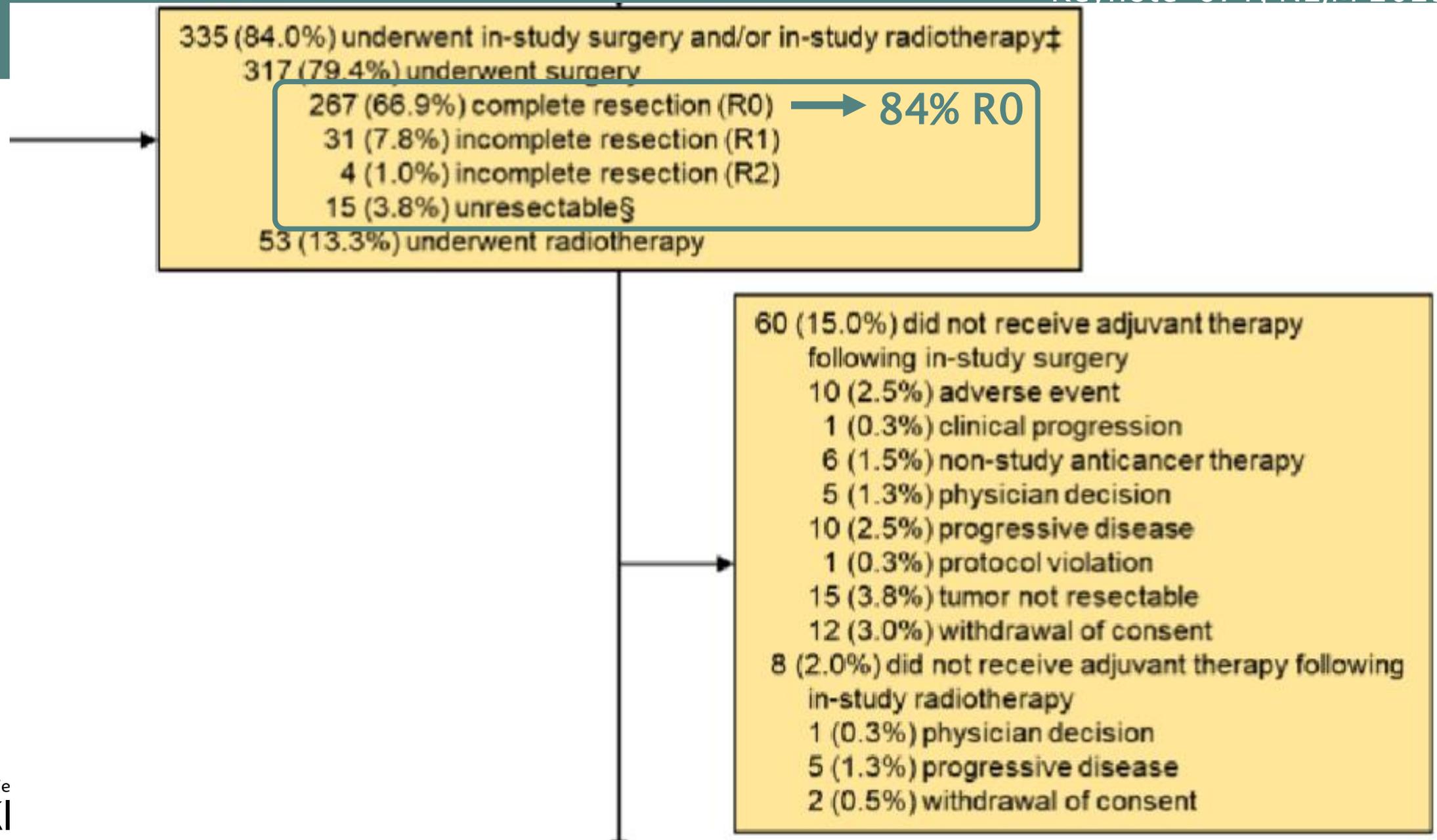
† Race and ethnic group were reported by the participant.

‡ Eastern Cooperative Oncology Group (ECOG) performance-status scores range from 0 to 5, with higher scores indicating greater disability.

Pathological stage at baseline — no. (%)	Pembro	Placebo
II	118 (29.7)	121 (30.2)
III	279 (70.3)	279 (69.8)
IIIA	217 (54.7)	225 (56.2)
IIIB	62 (15.6)	54 (13.5)
Tumor stage — no. (%)		
T1	55 (13.9)	61 (15.2)
T2	106 (26.7)	126 (31.5)
T3	121 (30.5) 60%	109 (27.2) 53%
T4	115 (29.0)	104 (26.0)
Node stage — no. (%)		
N0	148 (37.3)	142 (35.5)
N1	81 (20.4)	71 (17.8)
N2	168 (42.3)	187 (46.8)







Surgical outcomes

Table S4. Summary of Surgical Procedures (Participants Who Underwent In-Study Surgery)

	Pembrolizumab Group (N = 325)	Placebo Group (N = 317)
	<i>no. (%)</i>	
Lobectomy	256 (78.8)*	238 (75.1)†
Bilobectomy	26 (8.0)	26 (8.2)
Pneumonectomy	37 (11.4)	39 (12.3)
Exploratory thoracotomy	4 (1.2)	13 (4.1)
Segmentectomy	1 (0.3)	0
Wedge resection	1 (0.3)	0
Lymph node dissection only	0	1 (0.3)‡

Surgical outcomes

Table S4. Summary of Surgical Procedures (Participants Who Underwent In-Study Surgery)

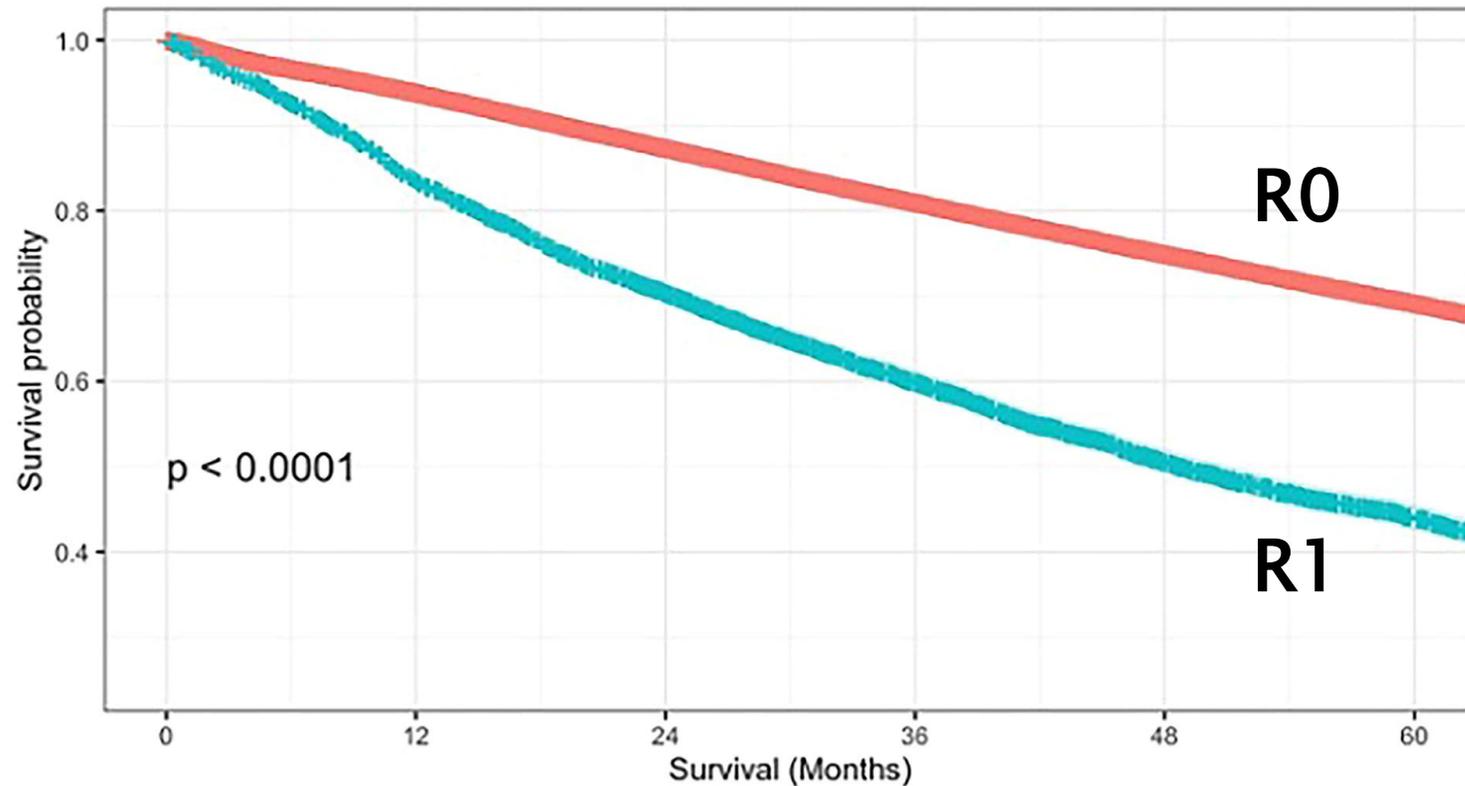
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Pneumonectomy	37 (11.4)	39 (12.3)
Exploratory thoracotomy	4 (1.2)	13 (4.1)
Segmentectomy	1 (0.3)	0
Wedge resection	1 (0.3)	0
Lymph node dissection only	0	1 (0.3)‡

Surgical detail	Durvalumab arm (N=366)	Placebo arm (N=374)
Patients who underwent surgery, n (%)	295 (80.6)	302 (80.7)
Patients who completed surgery, n (%)	284 (77.6)	287 (76.7)
Margins, n (%) [†]		
R0 [†]	269 (94.7)	262 (91.3)
R1 [†]	12 (4.2)	22 (7.7)
R2 [†]	2 (0.7)	2 (0.7)
Missing [†]	1 (0.4)	1 (0.3)
Surgery procedure performed, n (%)		
Lobectomy	238 (65.0)	221 (59.1)
Sleeve resection	7 (1.9)	14 (3.7)
Bilobectomy	13 (3.6)	20 (5.3)
Pneumonectomy	27 (7.4)	29 (7.8)
Sleeve resection (bronchial)	2 (0.5)	2 (0.5)
Sleeve resection (arterial)	0	1 (0.3)
Wedge resection	1 (0.3)	2 (0.5)
Other	7 (1.9)	13 (3.5)
Surgical approach, n (%)		
Open Procedure	145 (39.6)	153 (40.9)
Minimally invasive	145 (39.6)	142 (38.0)
Other	4 (1.1)	6 (1.6)
Missing	1 (0.3)	1 (0.3)



Was passiert bei R1 Resektion ?

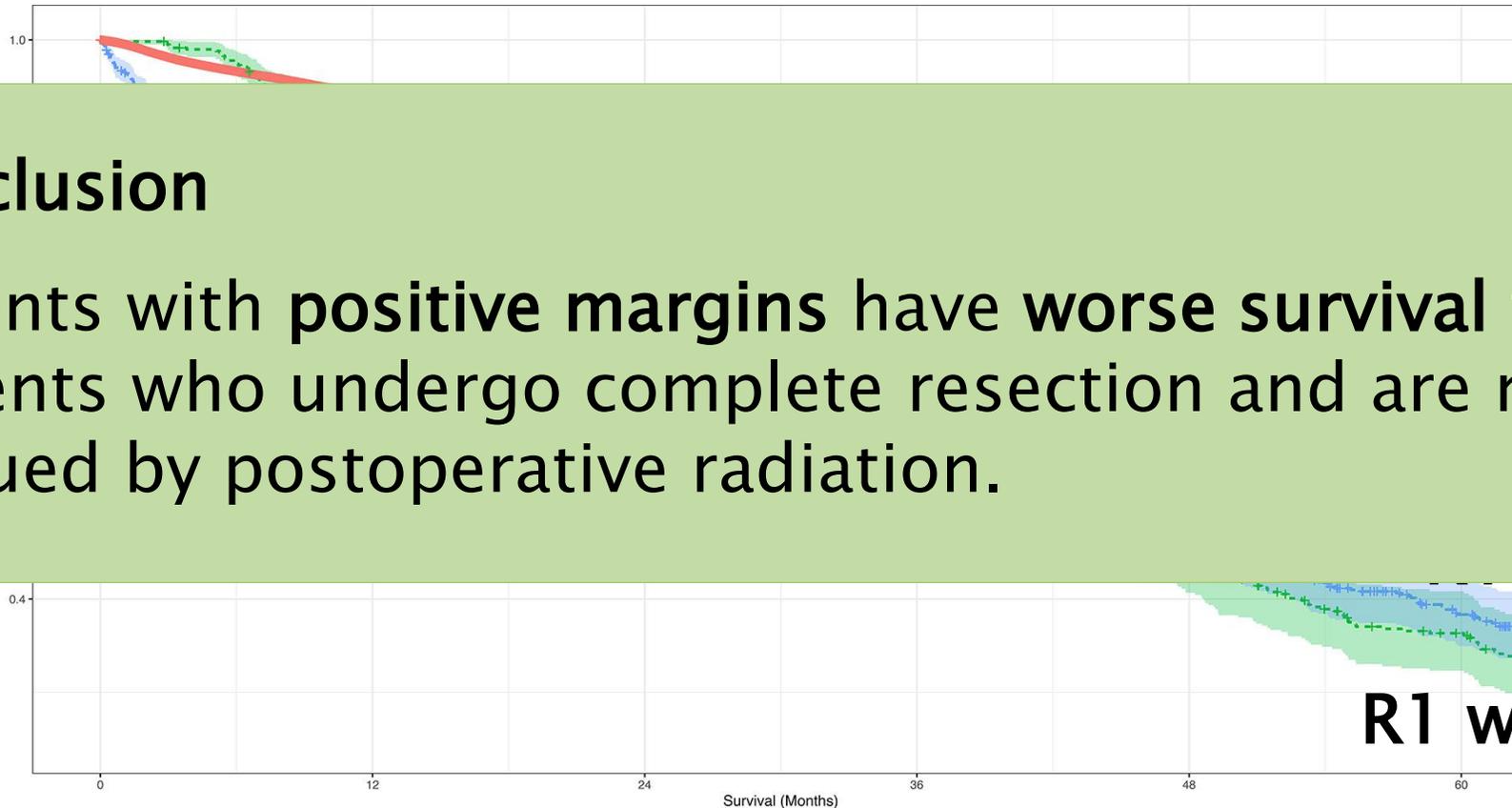
SEER Database, n=181,824



— negative margins — positive margins

Was passiert bei R1 Resektion ?

SEER Database, n=181,824



Conclusion

Patients with **positive margins** have **worse survival** than patients who undergo complete resection and are not rescued by postoperative radiation.

RT
R1 without RT

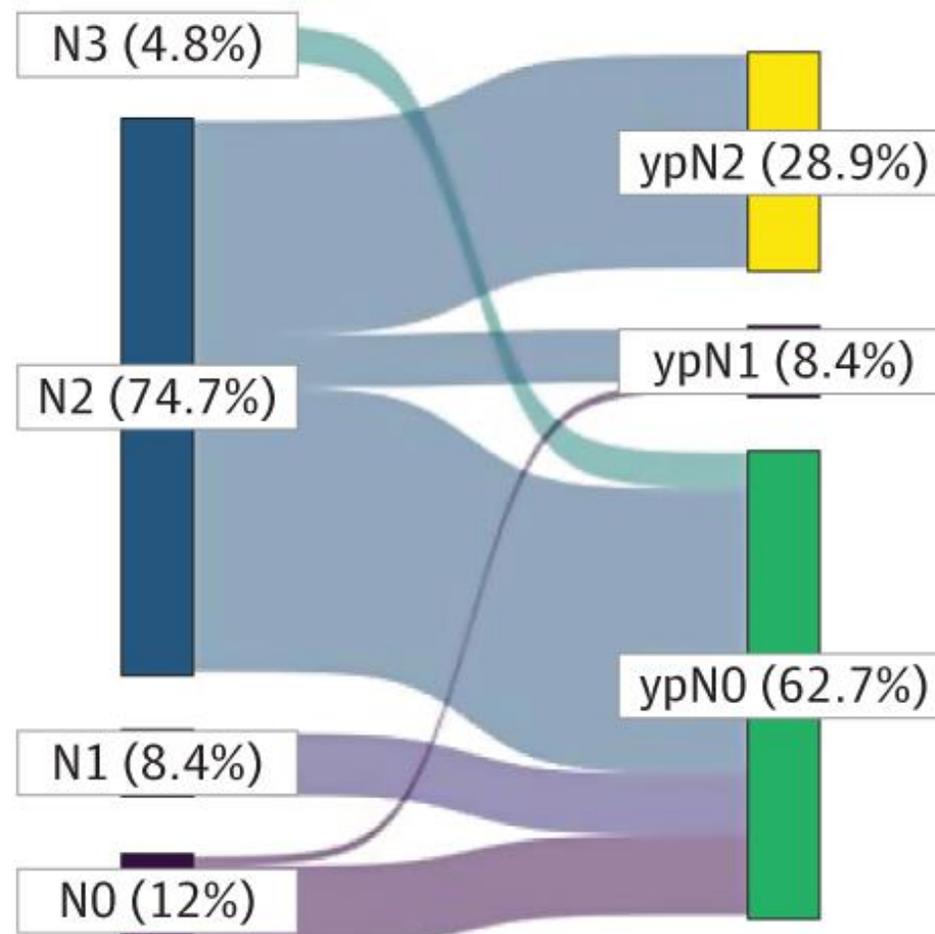
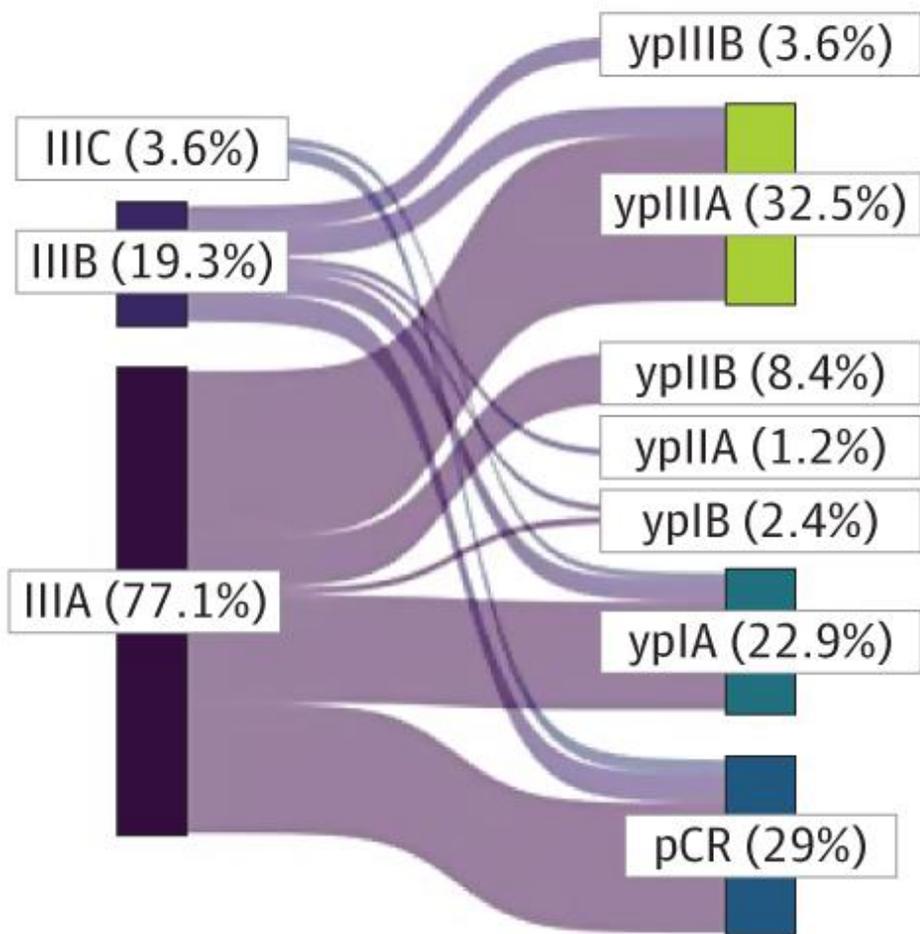
Borderline resectable NSCLC

Ricciuti et al. JAMA Oncology 2025

- Multicenter cohort study 2018 – 2024
- Borderline or unresectable NSCLC
- Stage III T4 and/or N2–N3
- n=112
- 84 (75%) underwent surgery

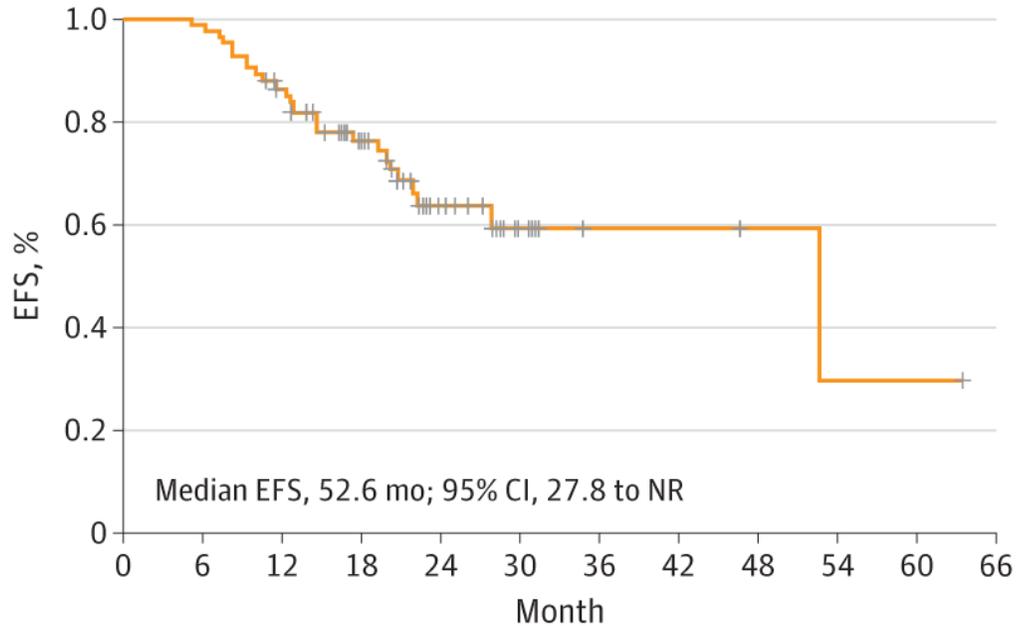
T & N parameter	Total N = 112
cT	
T1	24 (21.4%)
T2	32 (28.6%)
T3	13 (11.6%)
T4	40 (35.7%)
Tx	3 (2.7%)
cN	
N0	14 (12.5%)
N1	9 (8.0%)
N2	78 (69.6%)
N3	11 (9.8%)

Borderline resectable NSCLC



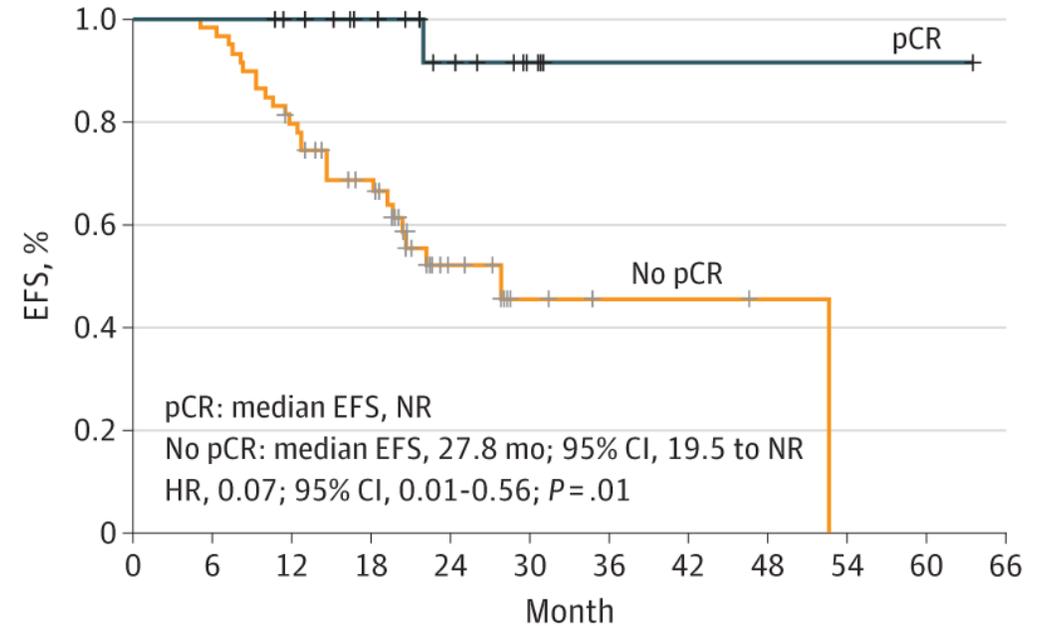
Borderline resectable NSCLC

B EFS to neoadjuvant chemoimmunotherapy



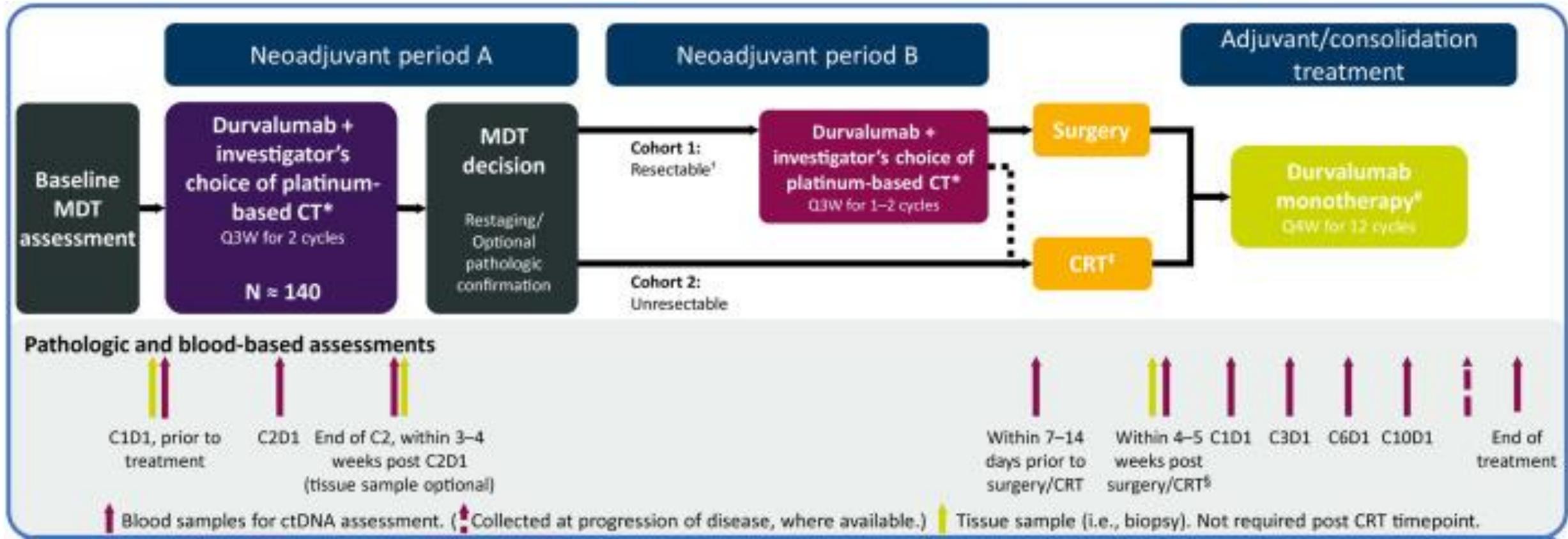
No. at risk	84	83	69	48	19	8	3	3	2	1	1	0
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C EFS by pCR

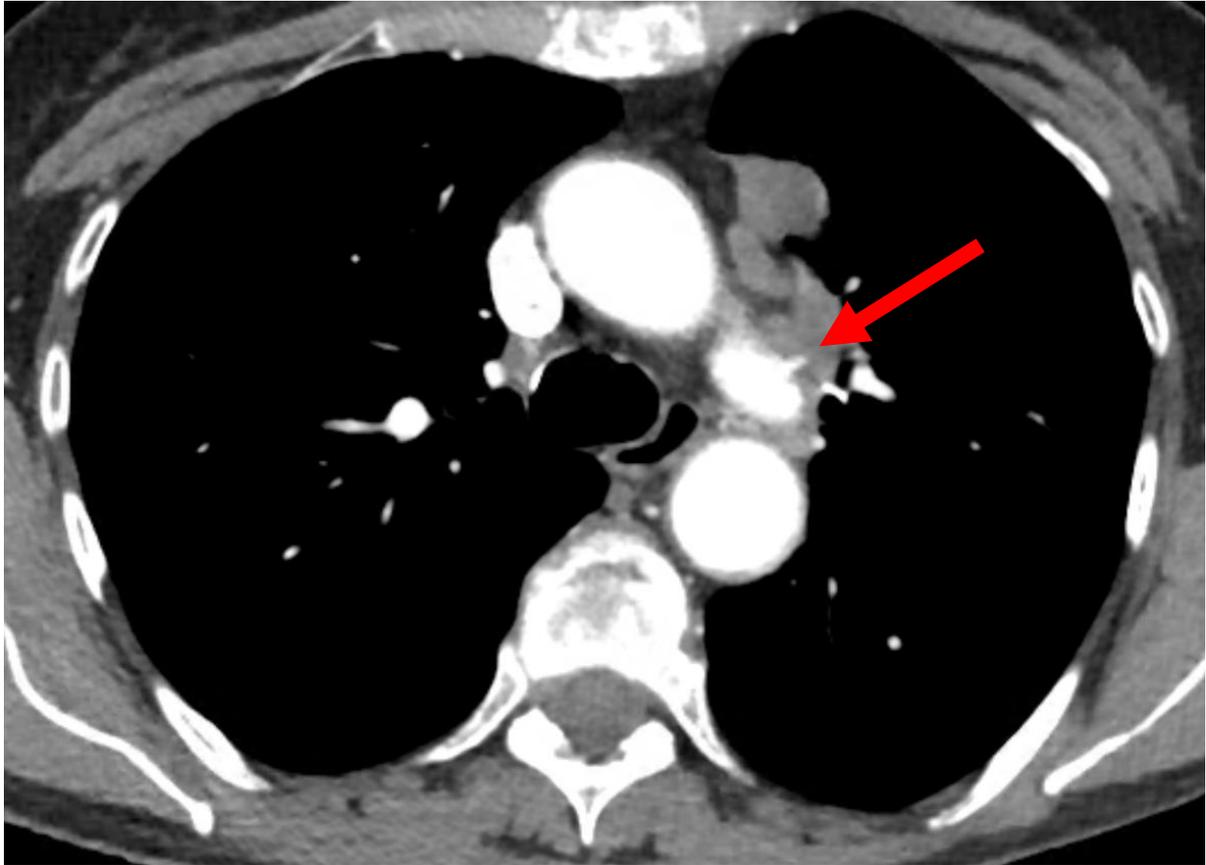
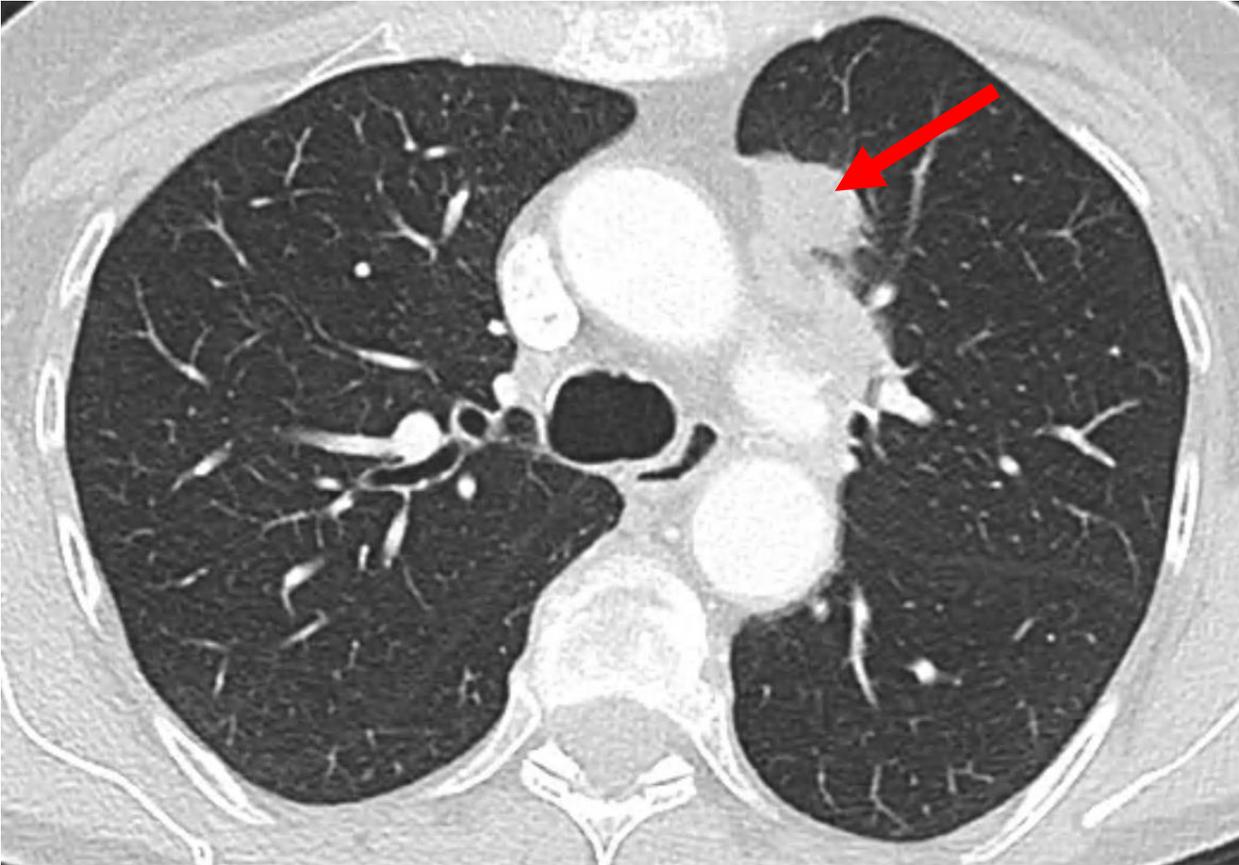


No. at risk												
No pCR	59	58	46	30	10	4	2	2	1	0	0	0
pCR	24	24	22	17	9	4	1	1	1	1	1	0

MTD bridge Studie - „Borderline resectable“ Stadien IIB - IIIB

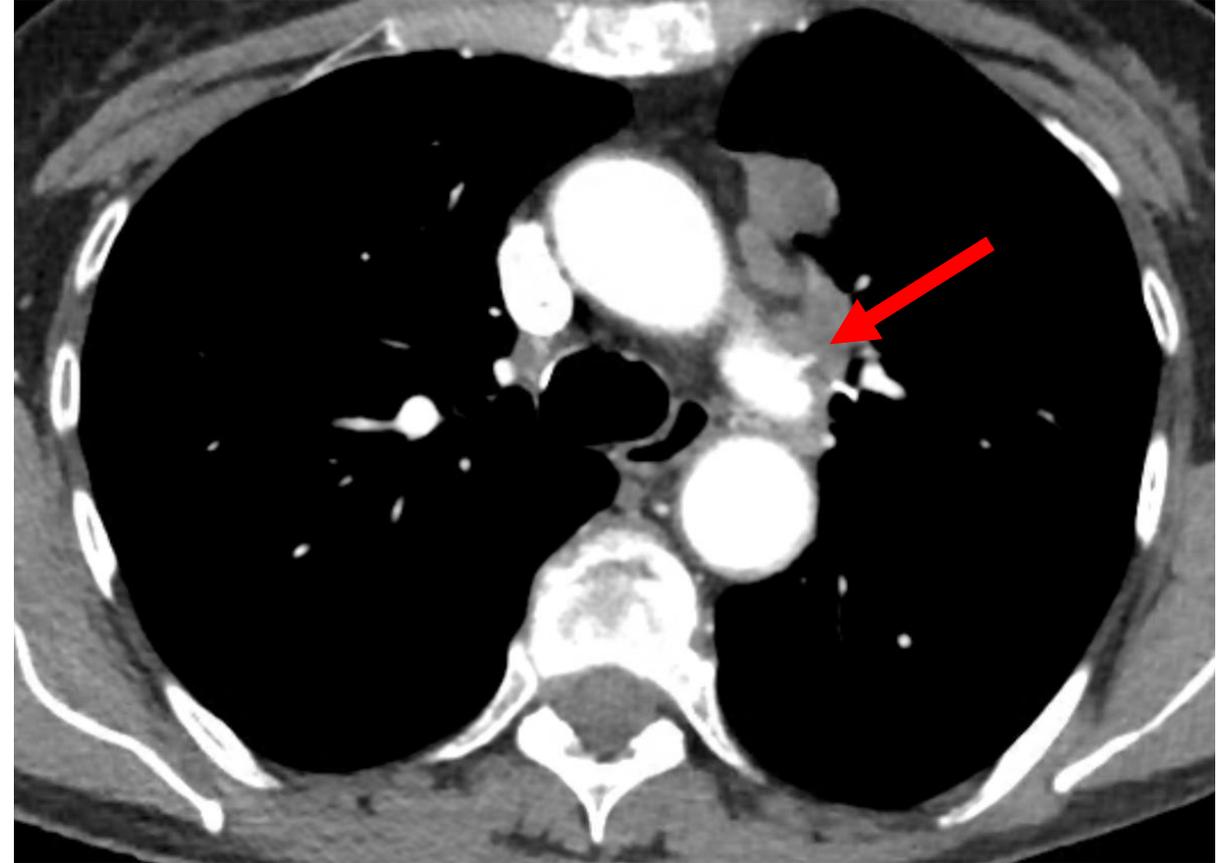


Zentraler Tumor linker Oberlappen



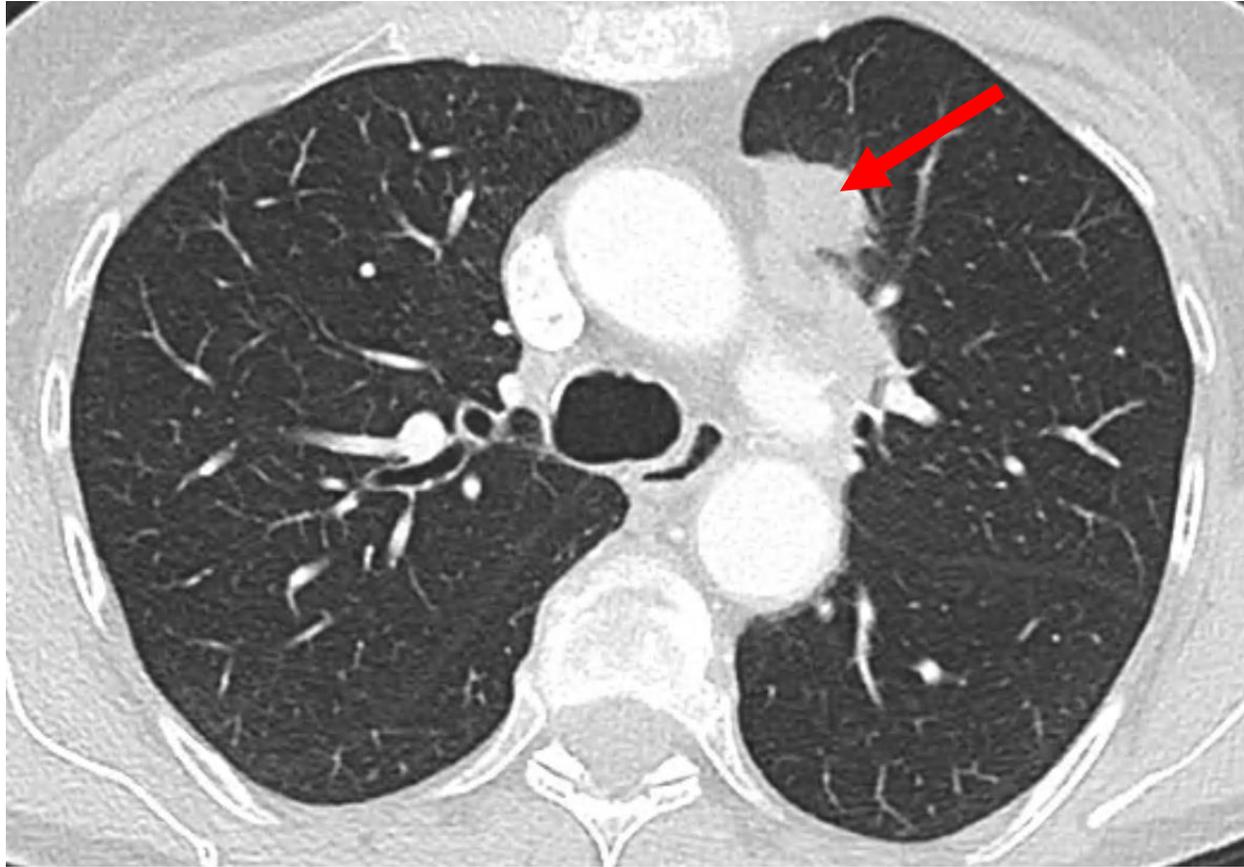
Zentraler Tumor linker Oberlappen

- **Adenokarzinom LOL**
 - MET Exon 14 Skipping Mutation
- **Klinisches Staging**
 - cT4 (Mediastinalinfiltration)
 - cN2a (LK Region 5)
 - cM0
 - Stadium IIIB (TNM-9)
- **Einleitung Therapie mittels TKI**



Re-Staging

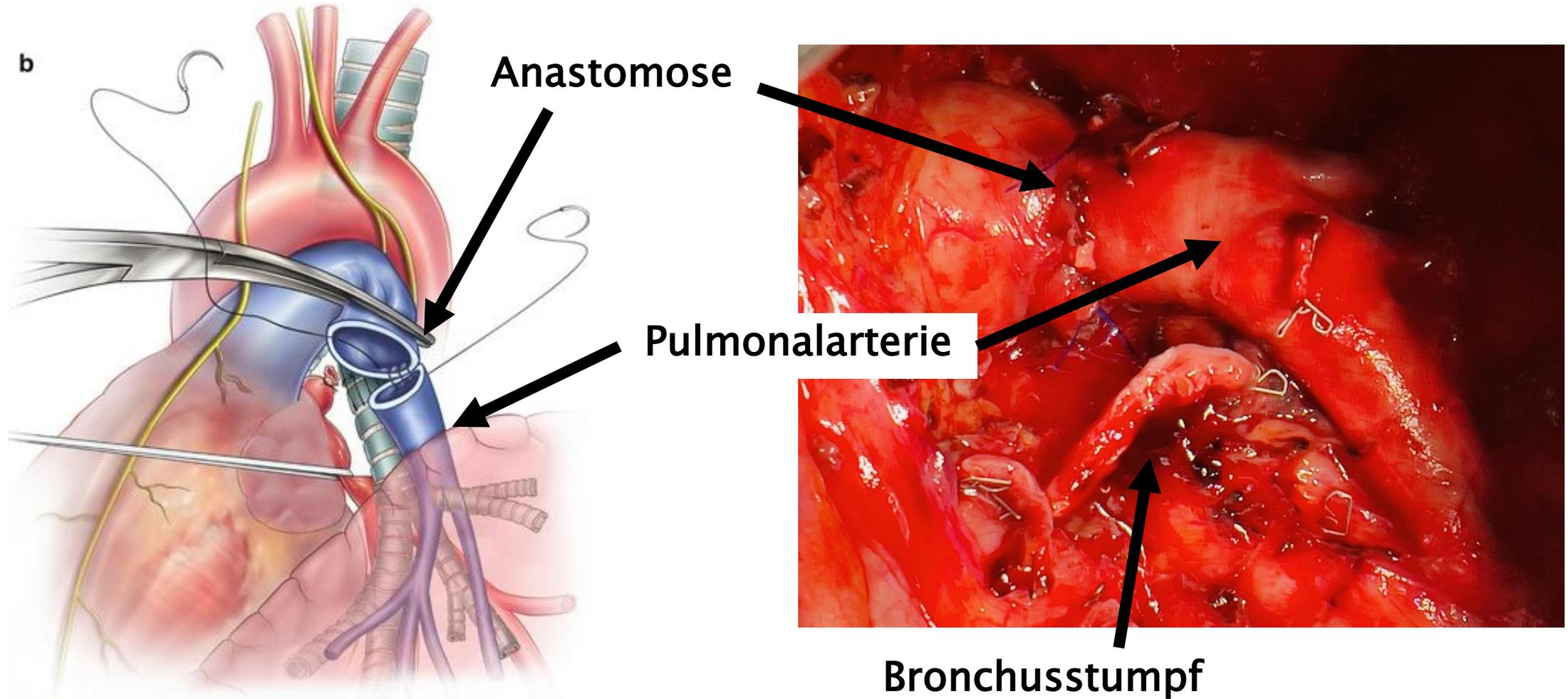
VOR TKI Therapie



NACH TKI Therapie

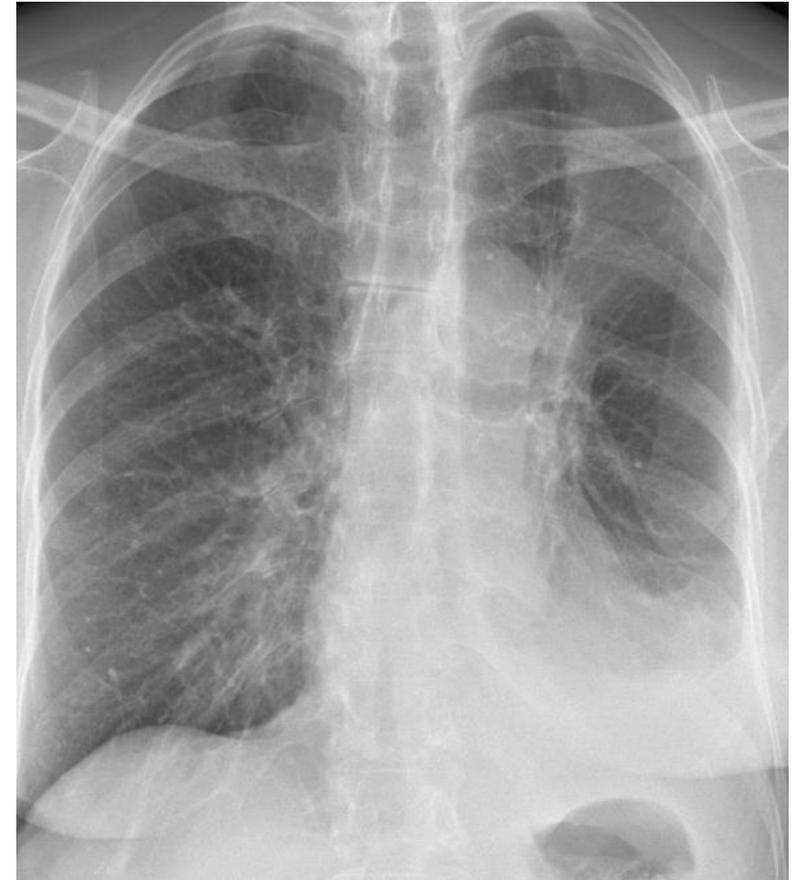


Lobektomie mit vaskulärem Sleeve

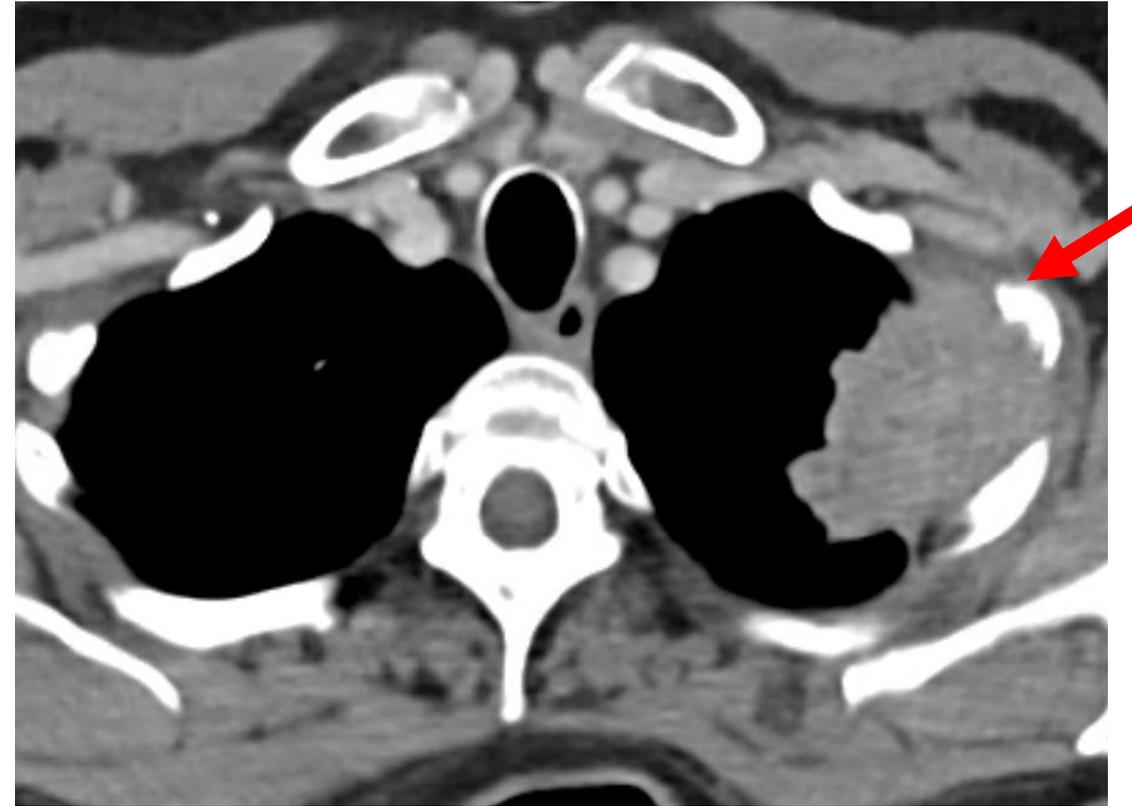


Outcome

- Entlassung POD 4
- Pathologie
 - ypT2a pN2 (Region 5 kapselüberschreitend),
70% vitale TU Zellen, R0
- Adjuvante RT
- TKI weiter

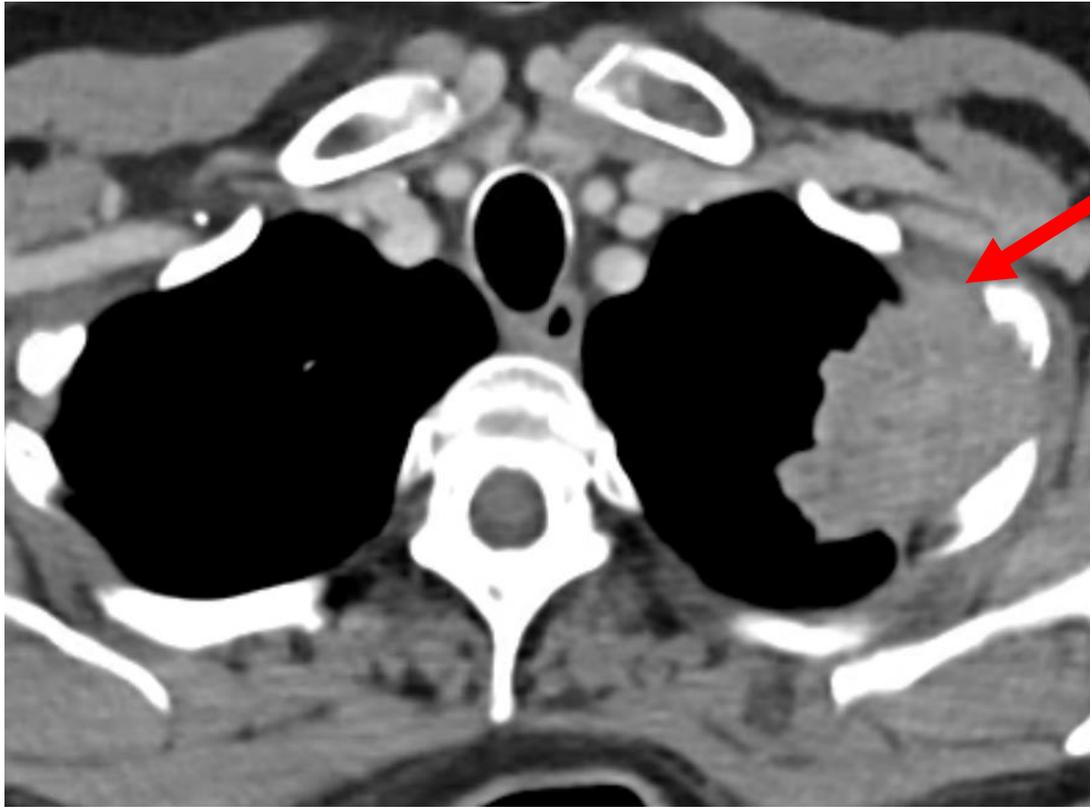


Plattenepithel-CA (Infiltration Thoraxwand, Rippen II-III, PD-L1 70%)

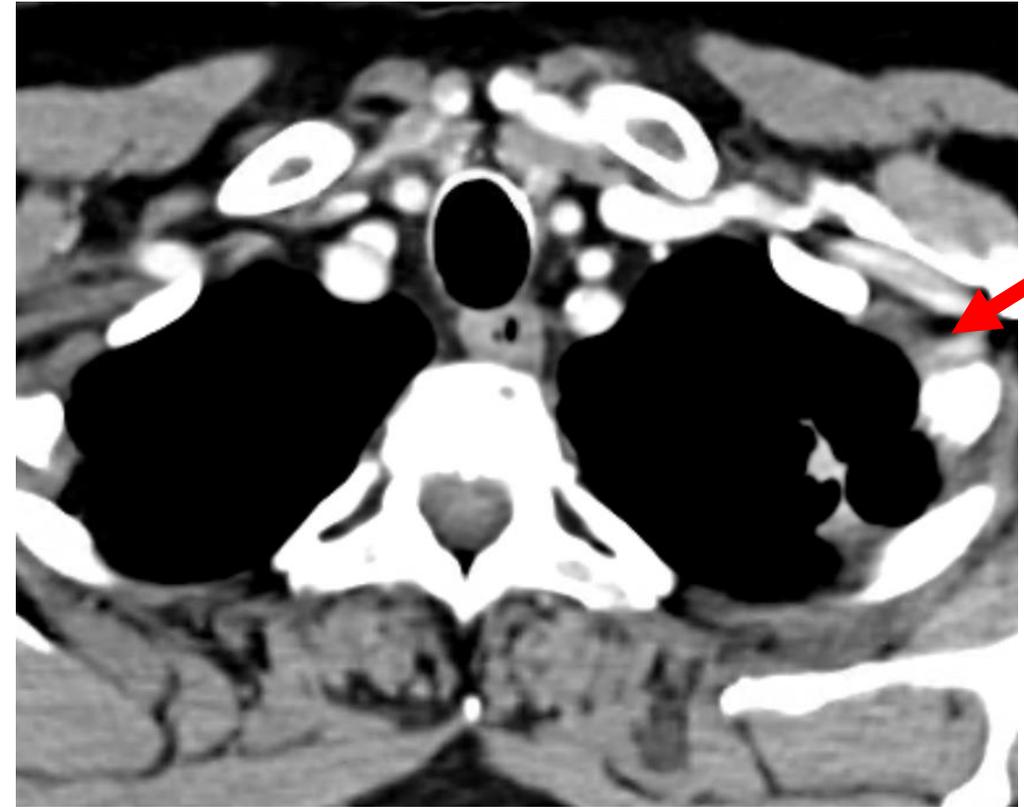


4 Zyklen neoadjuvante Chemoimmuntherapie

VOR CHT/IO

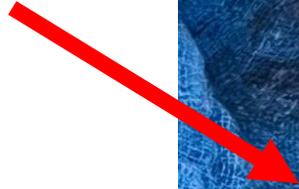


NACH CHT/IO



OP Präparat

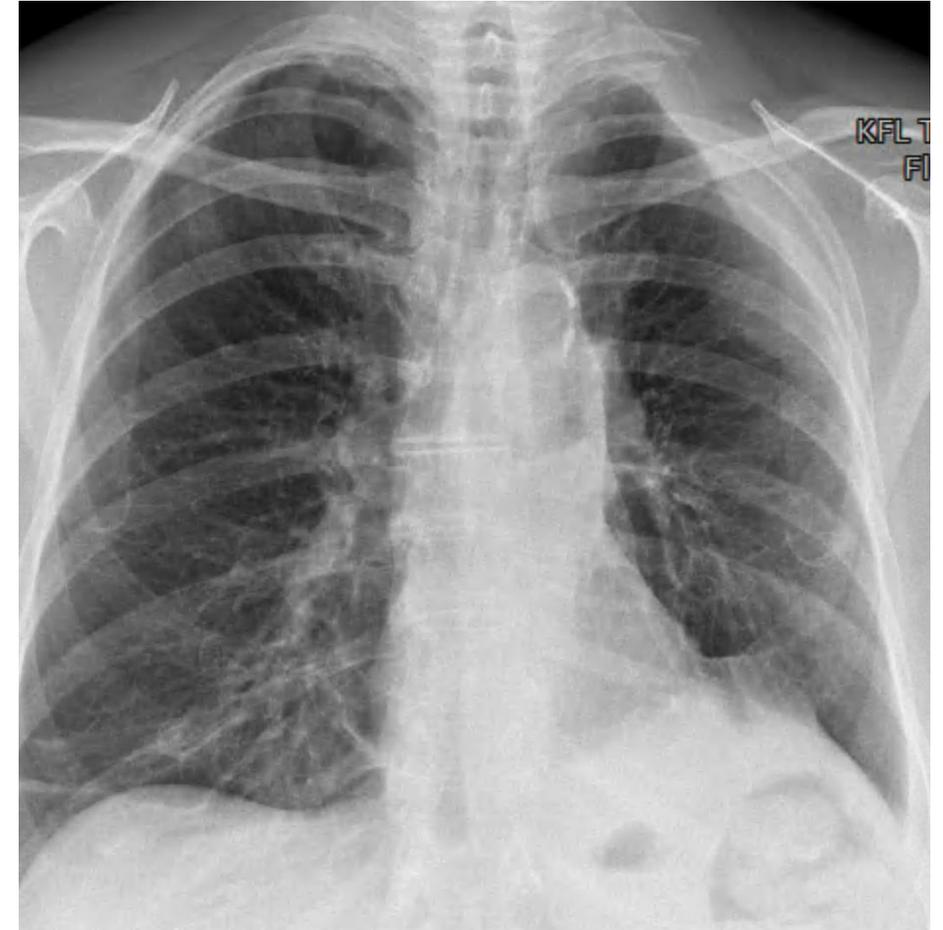
Linker Oberlappen



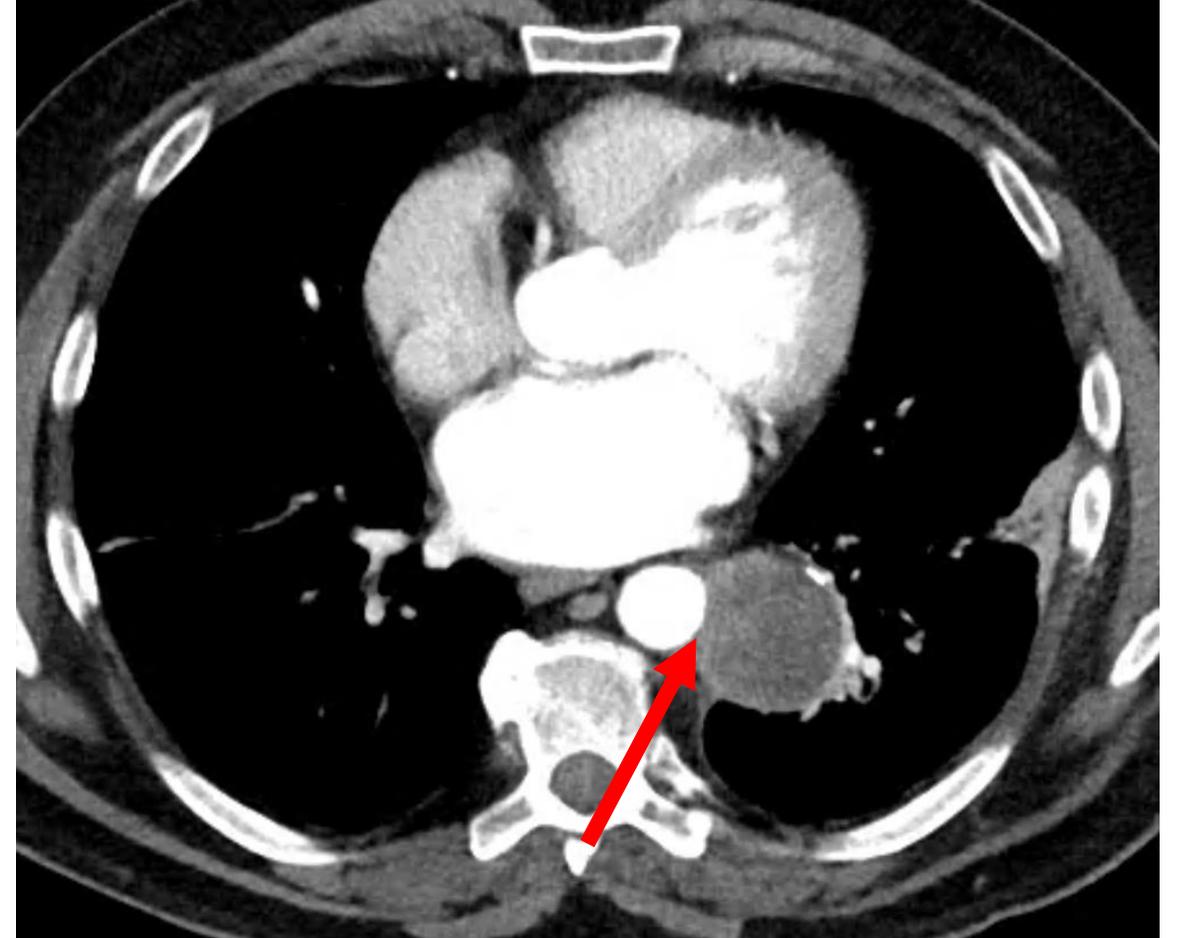
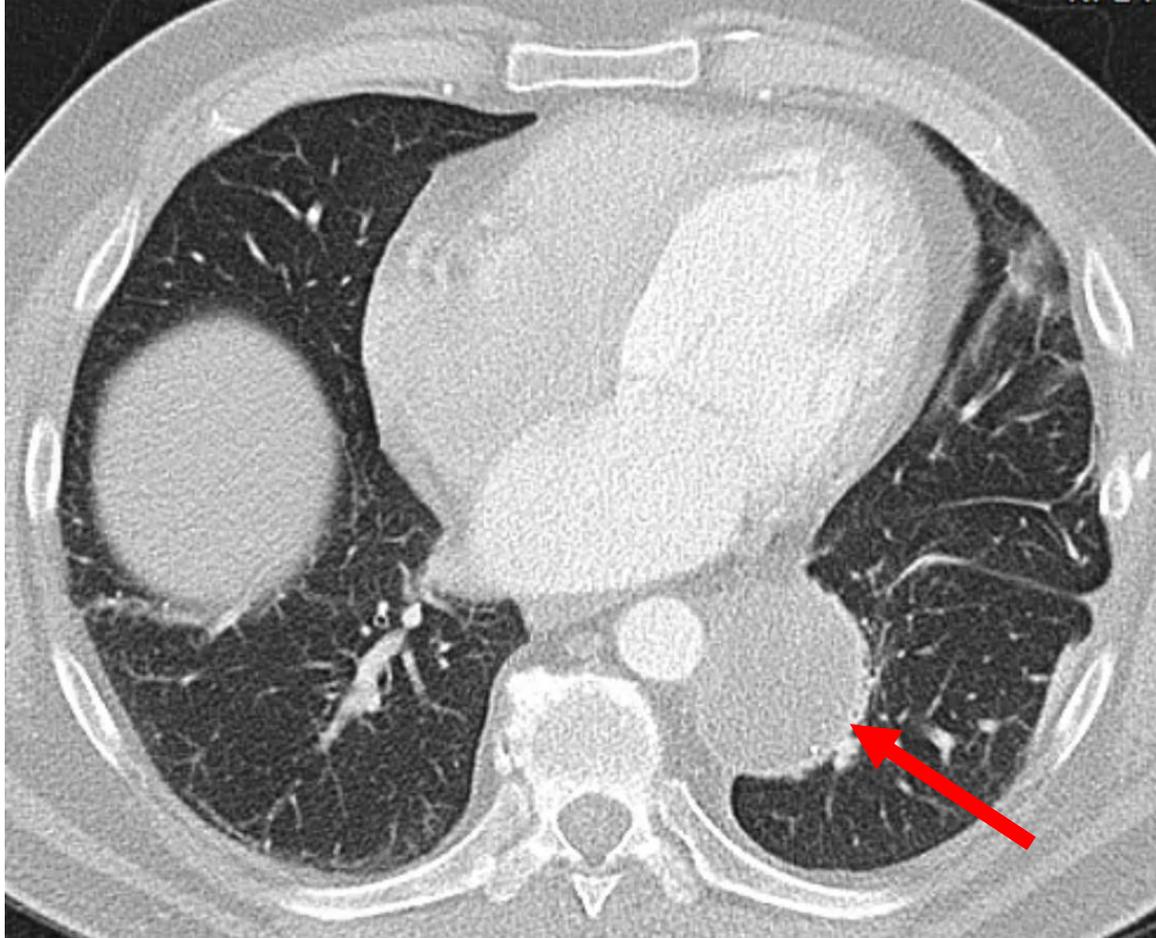
Thoraxwand
Rippen II-III

Outcome

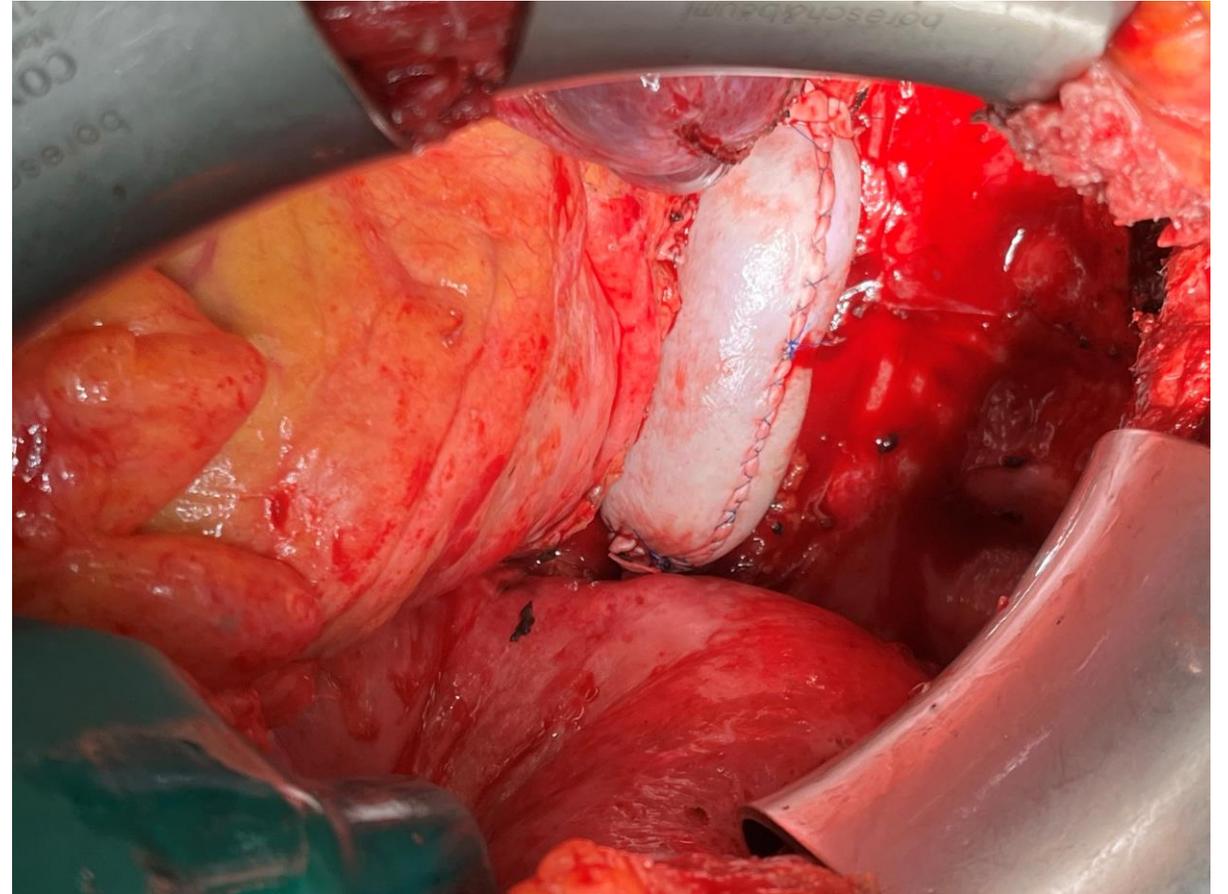
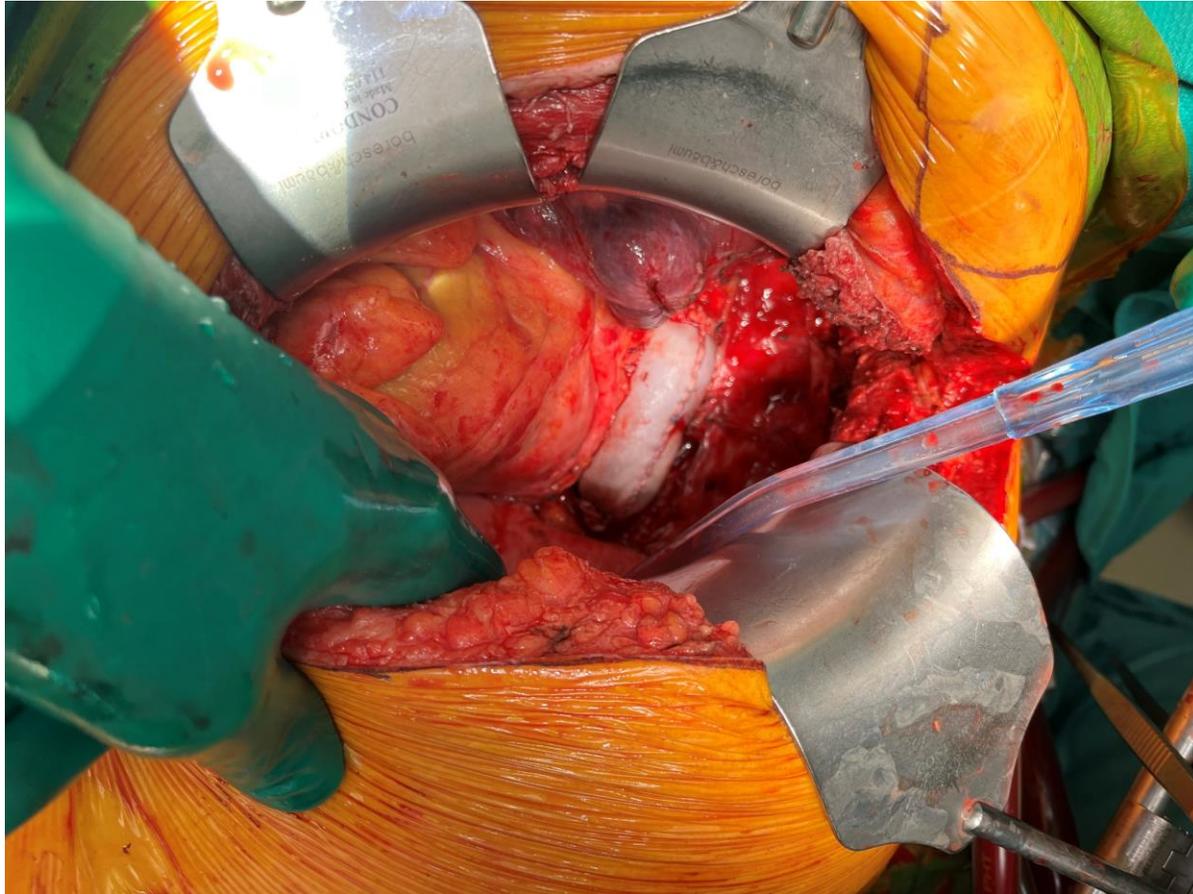
- Thoraxwandrekonstruktion mittels Goretex-Patch
- Entlassung POD 5
- Pathologie
 - 50% Fibrose, 40% Entzündung, 10% Nekrose
 - Pathologic complete response (pCR)
- Immuntherapie mono weiter



T4 Tumor mit Infiltration der Aorta descendens



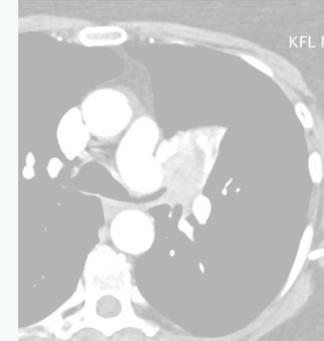
Resektion an der Herz-Lungen Maschine mit Aorten-Ersatz



Definition der Resektabilität

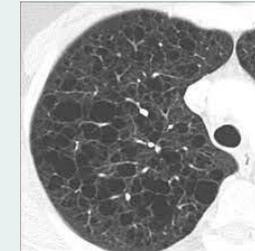
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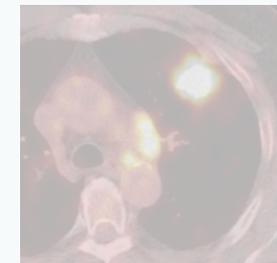
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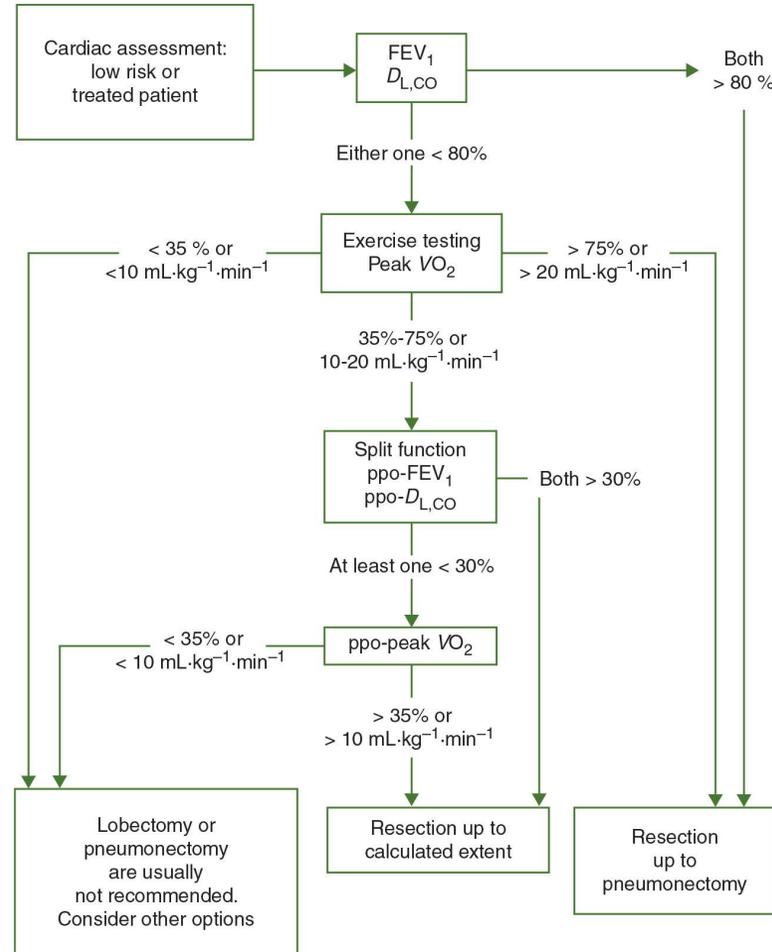


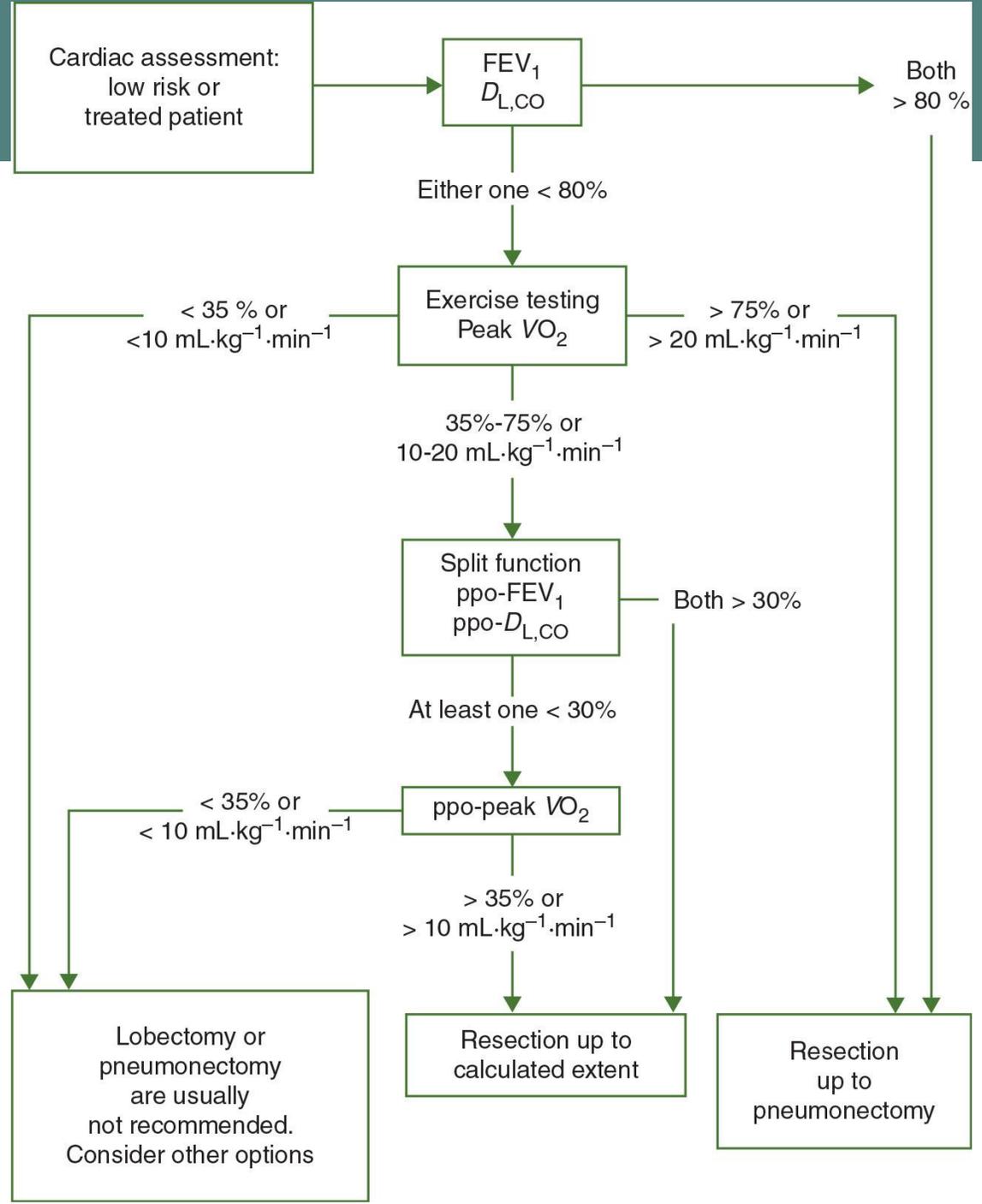
▪ Onkologische Sinnhaftigkeit

- Ausmaß LK Befall



ERS/ESTS Guidelines pre-OP Workup





ERS/ESTS Guidelines pre-OP Workup

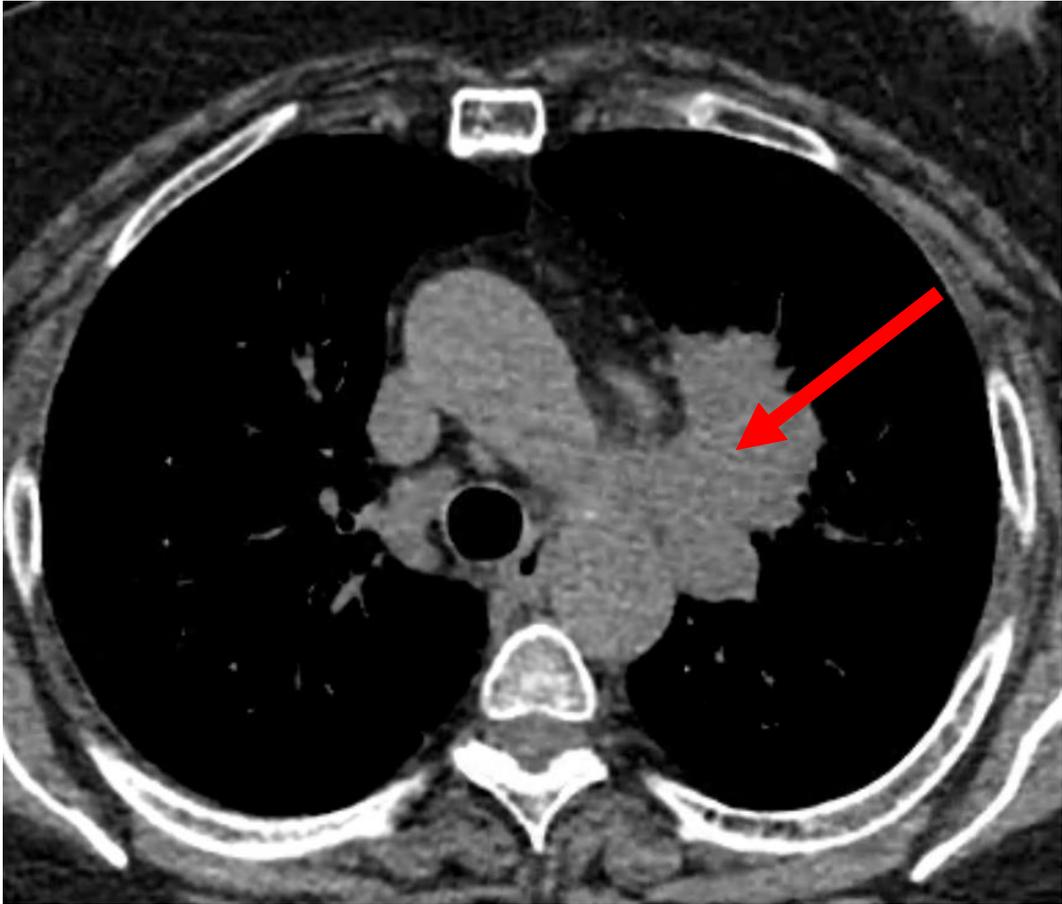
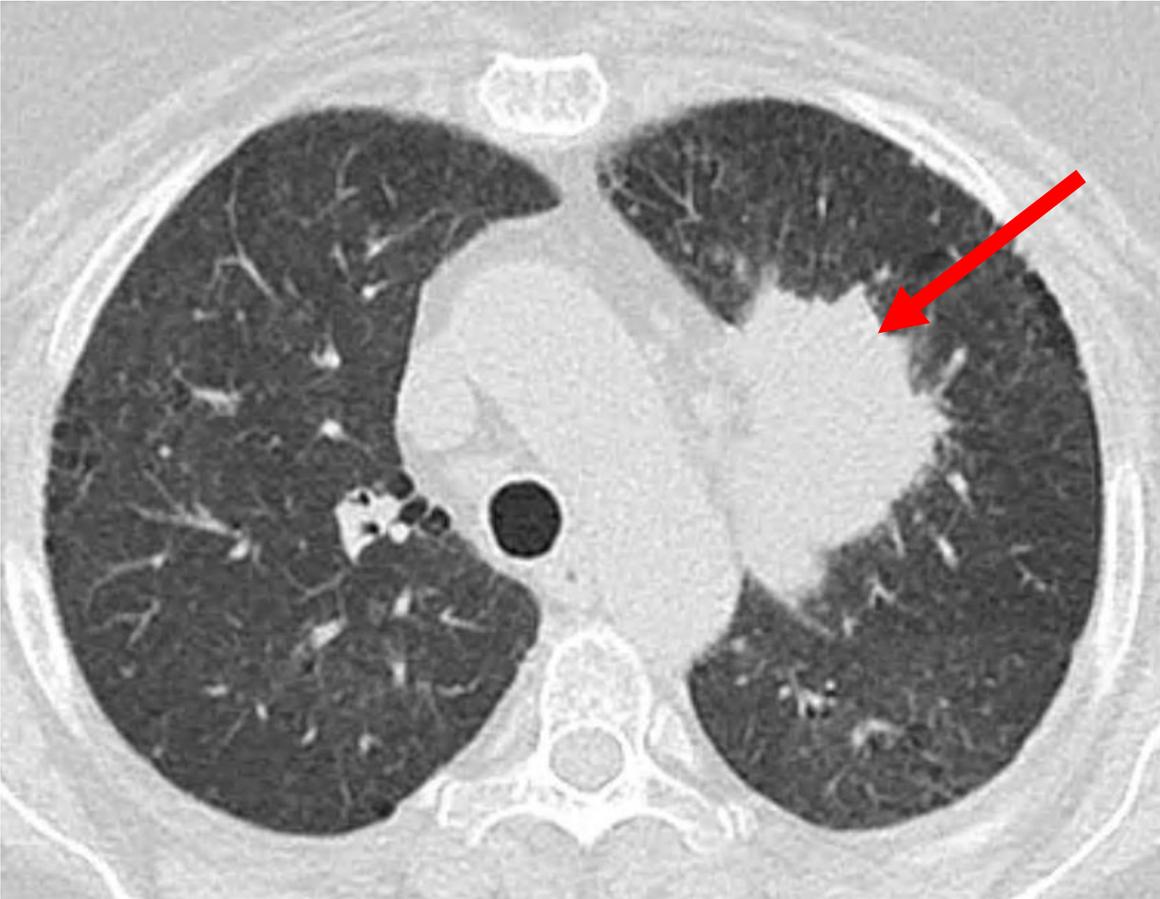
Table 3. Recalibrated thoracic revised cardiac risk index (adapted from [47])

	Points
Weighted factors	
Ischaemic heart disease	1.5
History of cerebrovascular disease	1.5
Serum creatinine > 2 mg/dL	1
Pneumonectomy planned	1.5
Class groupings	
A	0
B	1–1.5
C	2–2.5
D	> 2.5

ThRCRI Score	Risk Class	Number of Cases	Major Cardiac Complications
0	A	1,173	18 (1.5%)
1–1.5	B	468	27 (5.8%)
2–2.5	C	16	3 (19%)
>2.5	D	39	9 (23%)

ThRCRI = thoracic revised cardiac risk index.

Tumor links zentral



Tumor links zentral

- **Platter**

- PD-L1

- **Klinisc**

- cT4 (M)

- Stadium

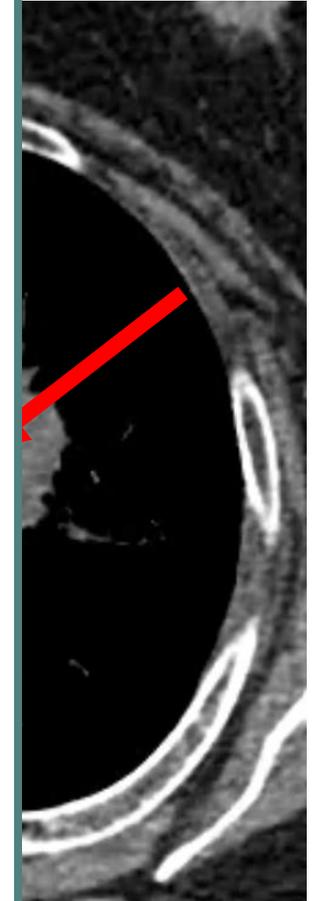
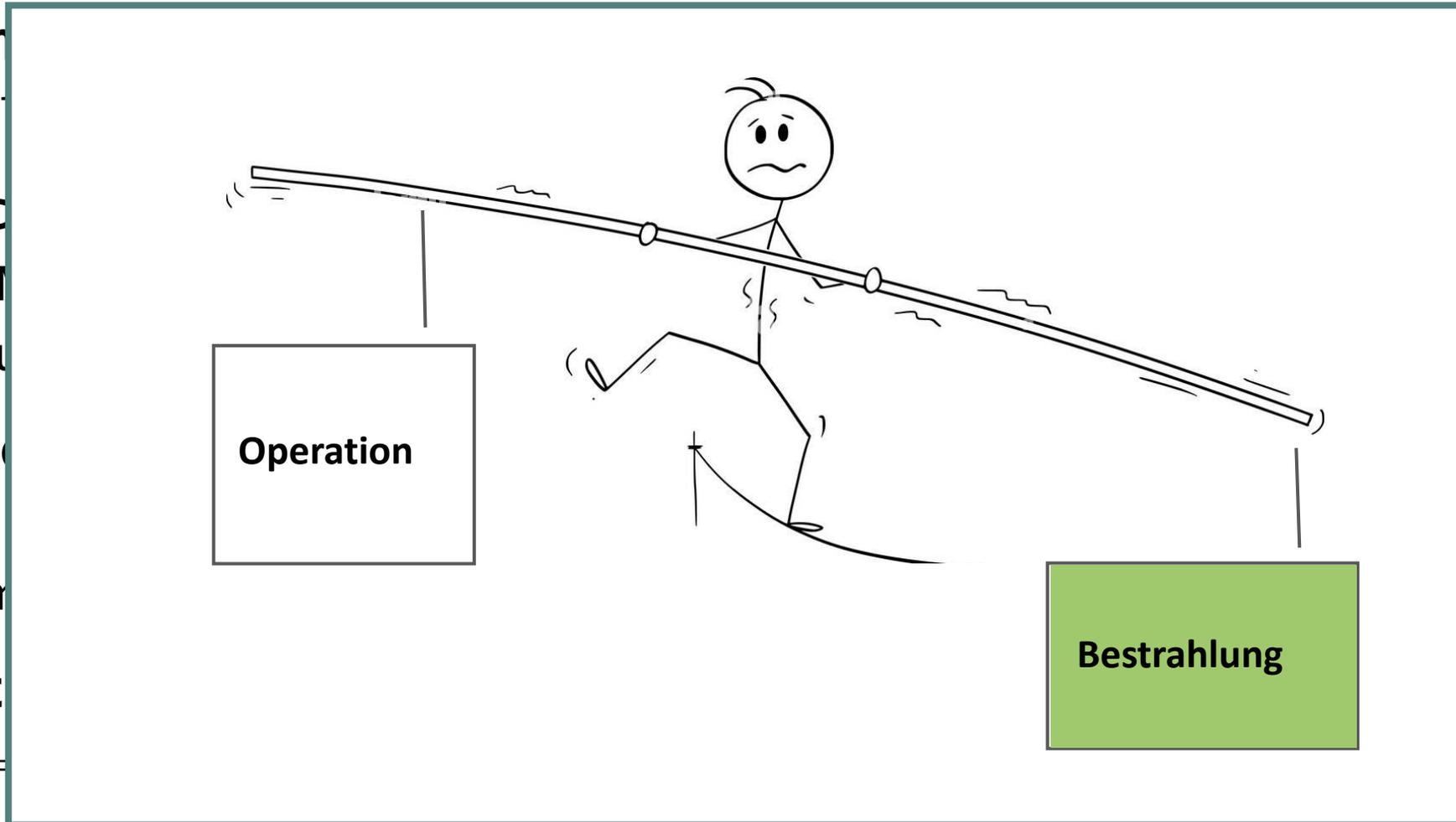
- **Funktio**

- FEV1

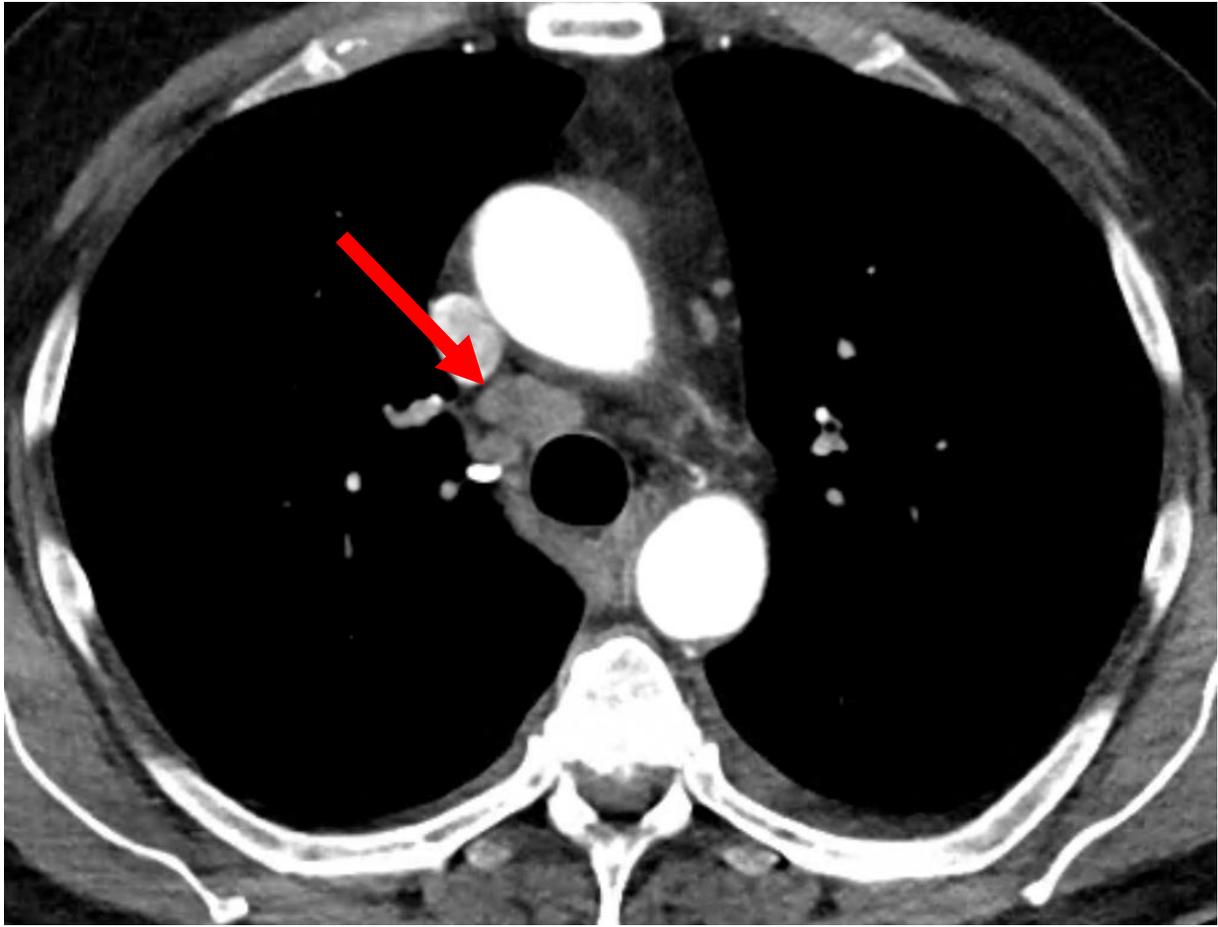
- VO2m

- **V/P Sc**

- re:li =



Tumor rechter Oberlappen



Tumor rechter Oberlappen

▪ Bronchoskopie

- Plattenepithel-CA, PD-L1 50%
- LK Regionen 4R, 7, 11L negativ

▪ Herzecho

- EF 20–25%
- Hochgradige MI

▪ Herzkatheter

- HS 70%, LAD 90% Stenose
- CX 99%, RCA 90% Stenose



Tumor rechter Oberlappen

- Herz-OP
 - Koronarer 3-fach Bypass

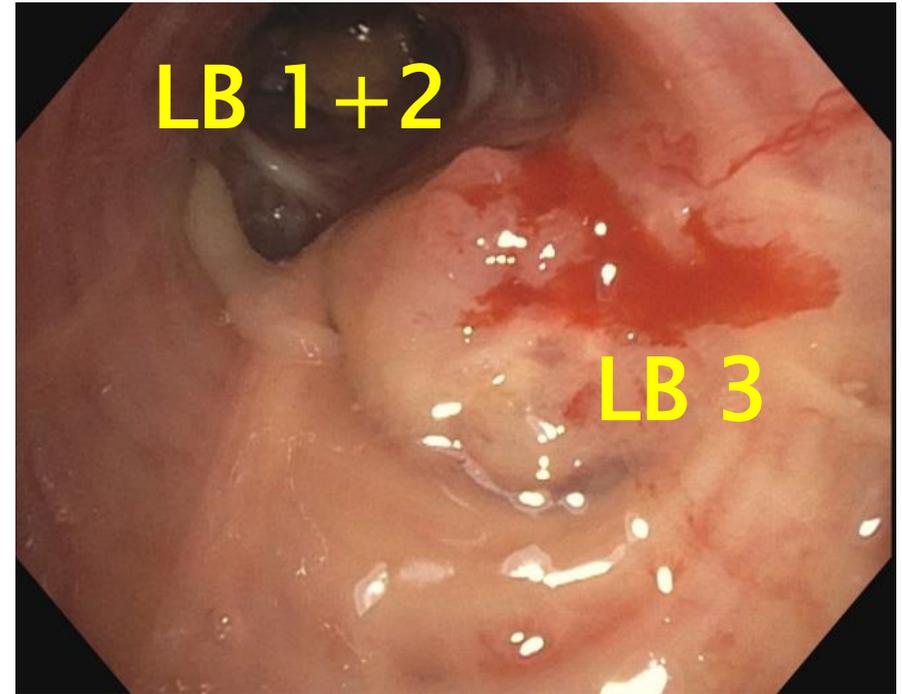
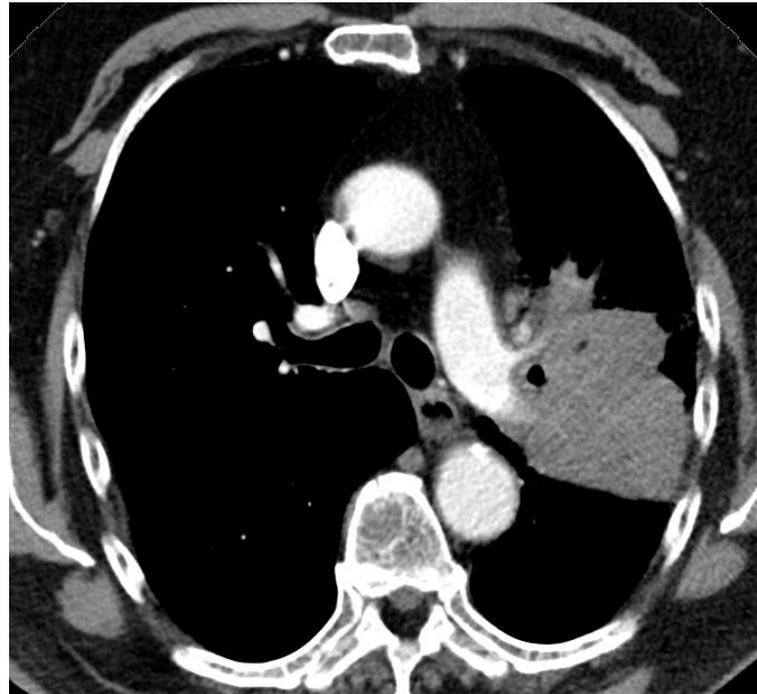
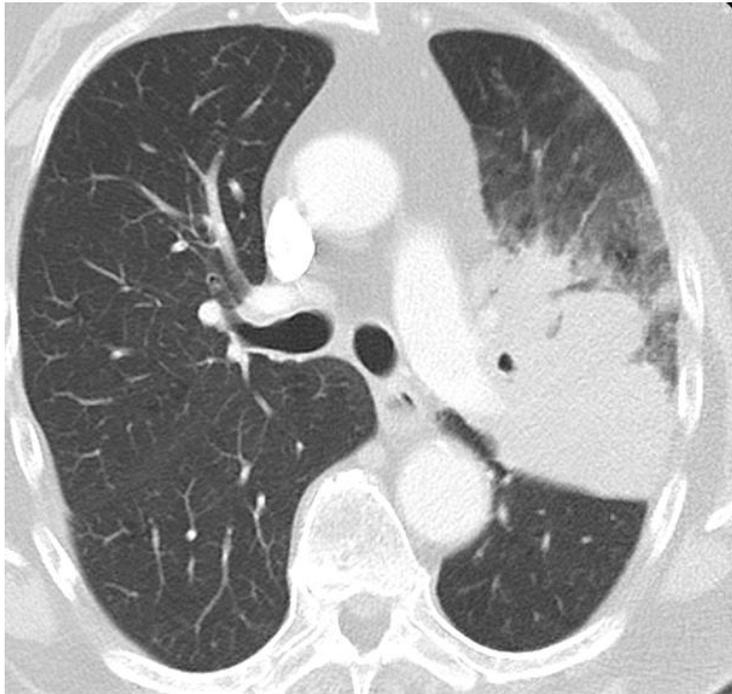
8 Wochen später

- Prä-OP Simdax
- Lobektomie ROL + MLND
 - PEC pT2b pN0
- Entlassung POD 5



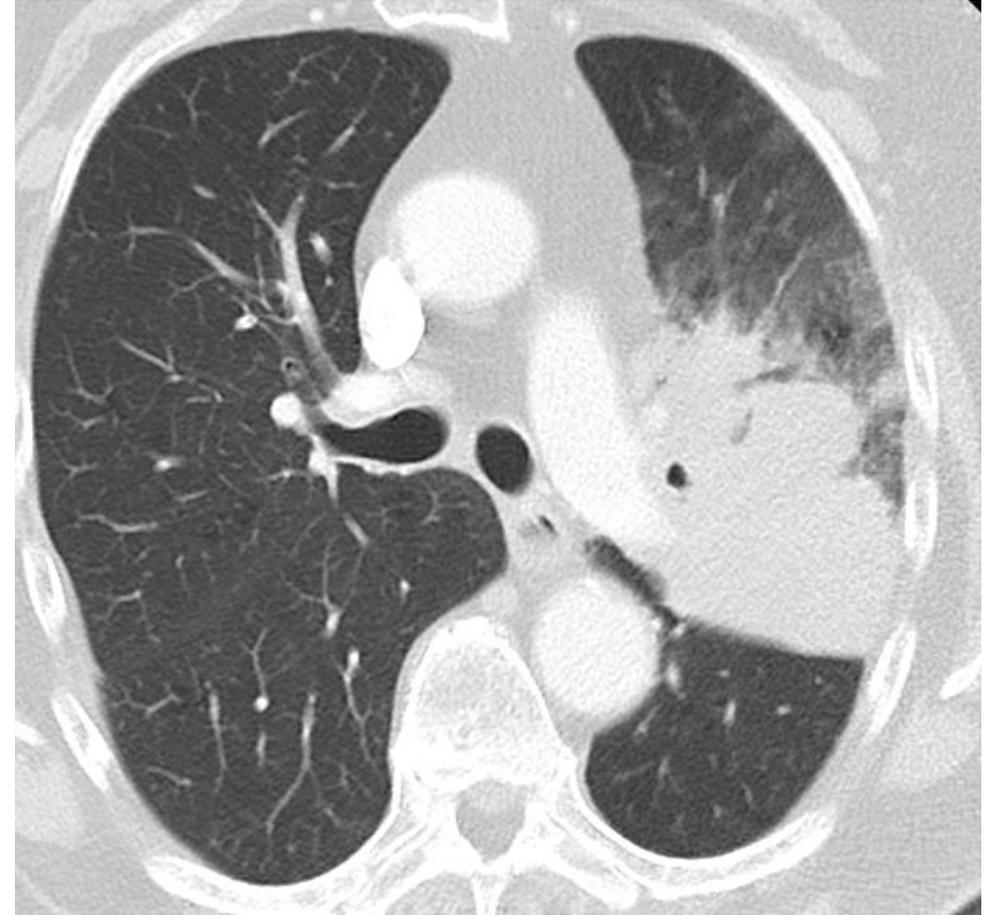
Limit Alter ?

- Männlich, 81 Jahre, ehemaliger Raucher



Work-up

- **Bronchoskopie + EBUS TBNA**
 - Adenokarzinom
 - PD-L1 TPS 0%
 - NGS: KRAS G12V
- **Lungenfunktion**
 - FEV1 2,2 L / 85%
 - DLCO 5.76 / 75%
- **Sonstiges**
 - Keine wesentlichen Komorbiditäten
 - 81 Jahre!!

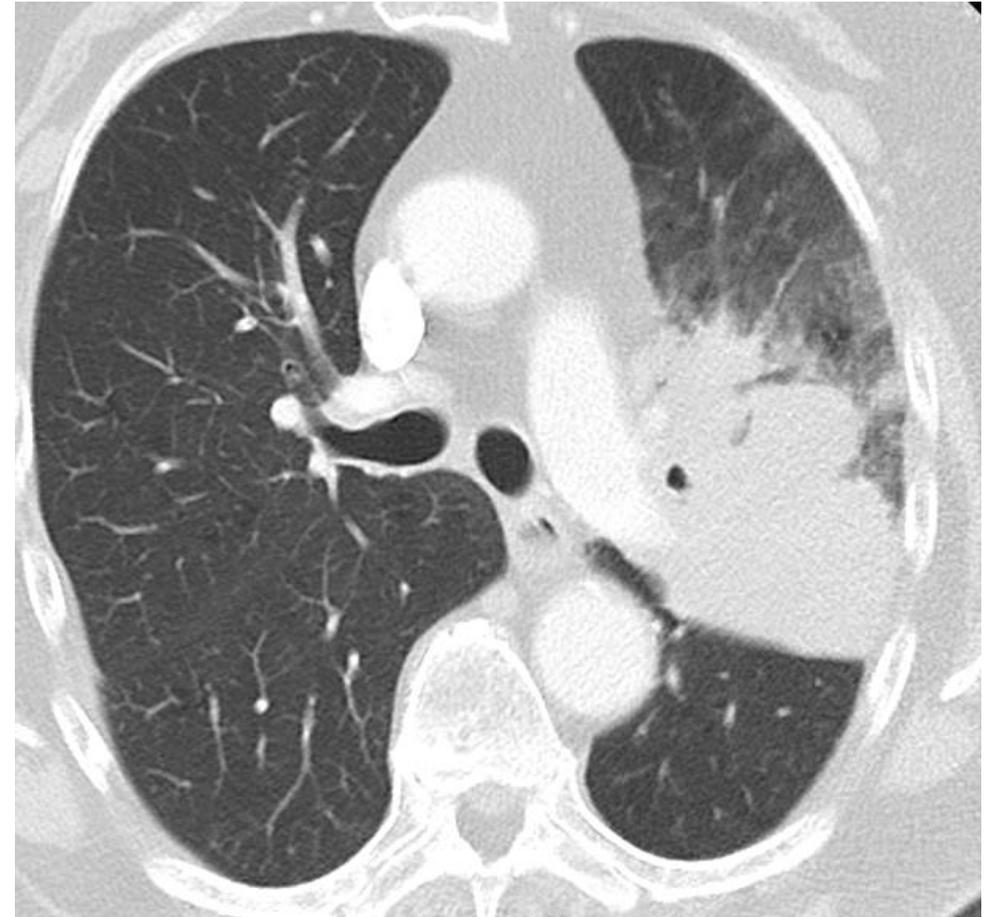


▪ Klinisches Staging

- **cT4** (TU Größe >7 cm + fragl. Mediastinalinfiltration)
- **cN0**
- **cM0**
- Stadium IIIA (TNM-9)

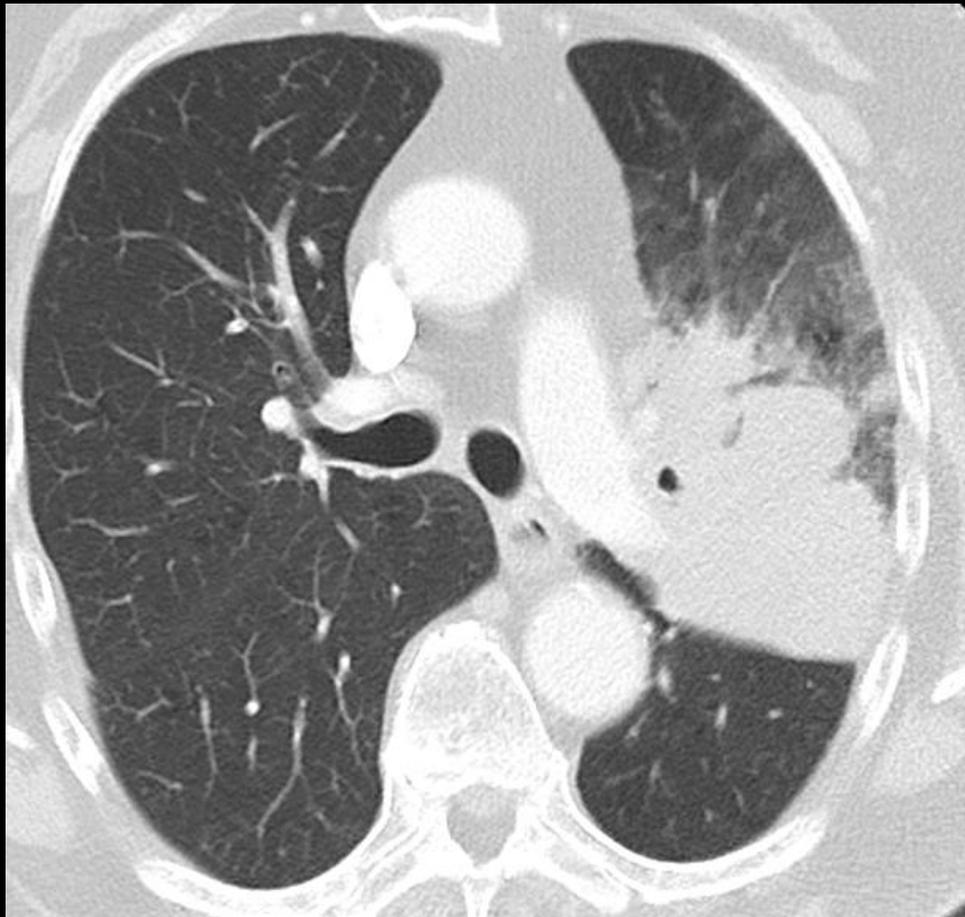
Tumorboard-Empfehlung:

(neoadjuvante) Chemoimmuntherapie
und anschließend Re-Staging

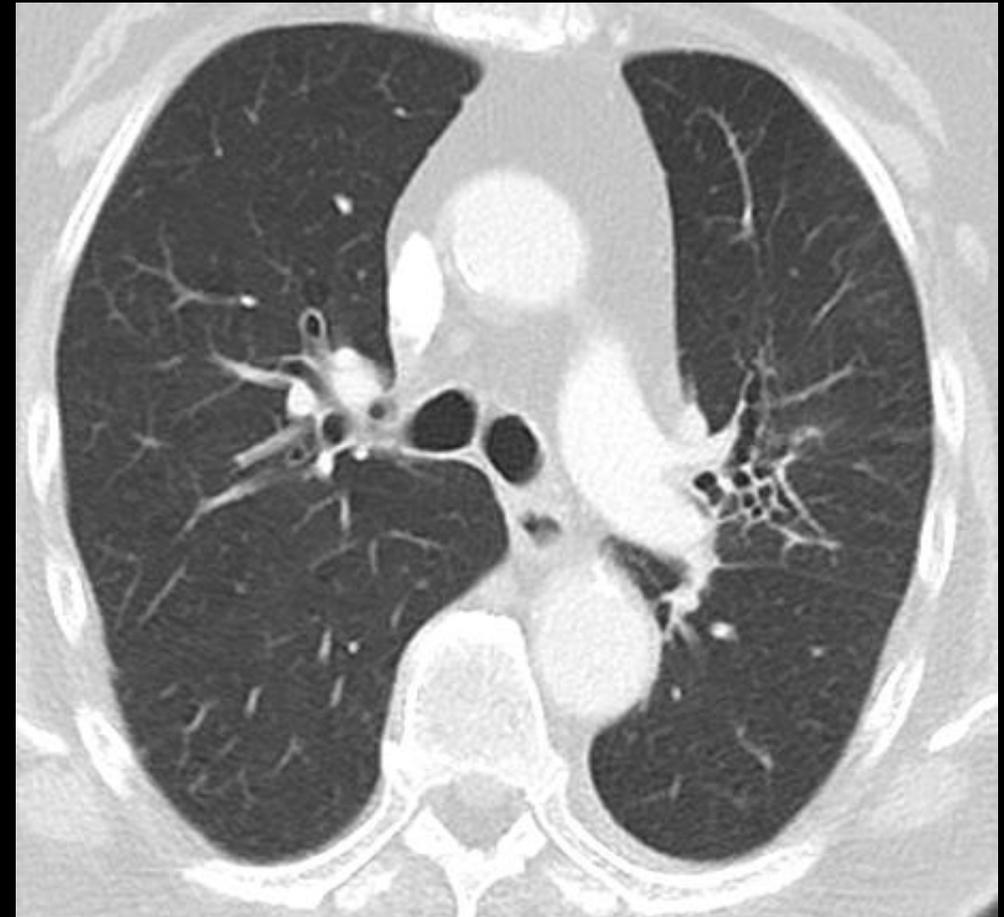


4 Zyklen neoadjuvante Chemoimmuntherapie

Initial

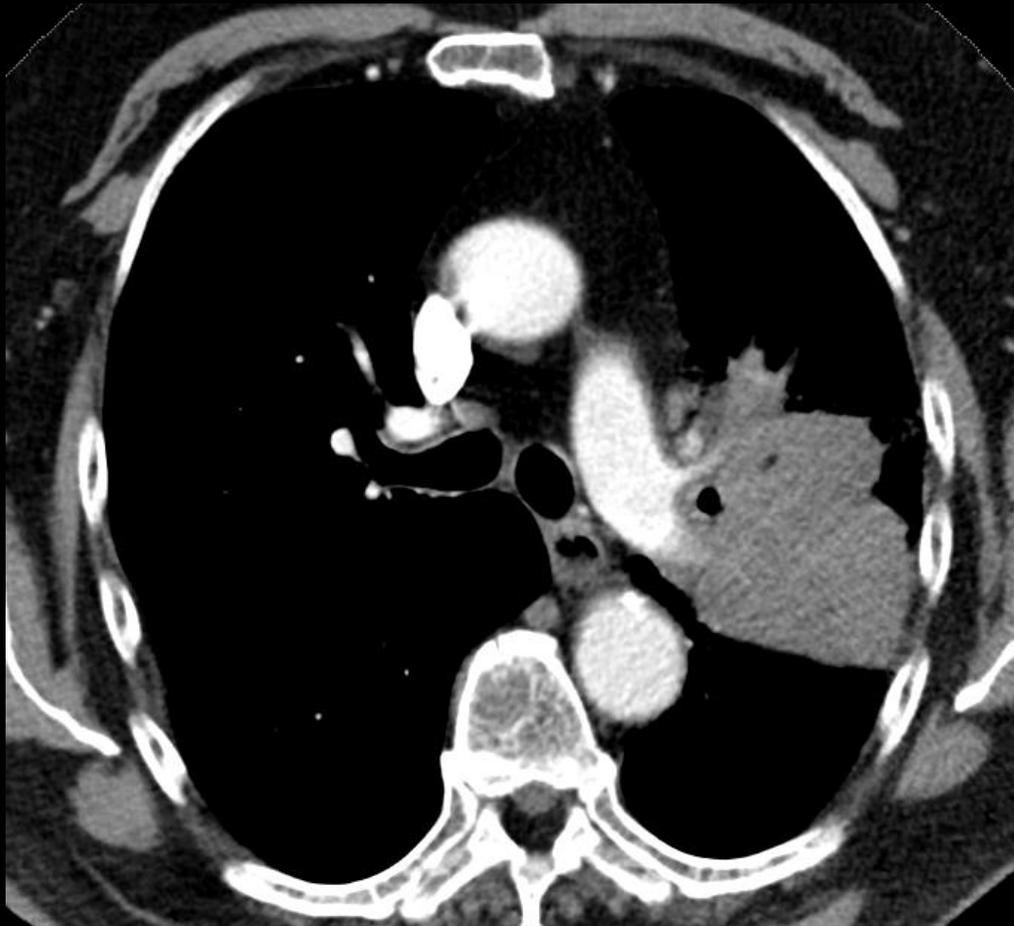


Nach neoadjuvanter Therapie



4 Zyklen neoadjuvante Chemoimmuntherapie

Initial



Nach neoadjuvanter Therapie

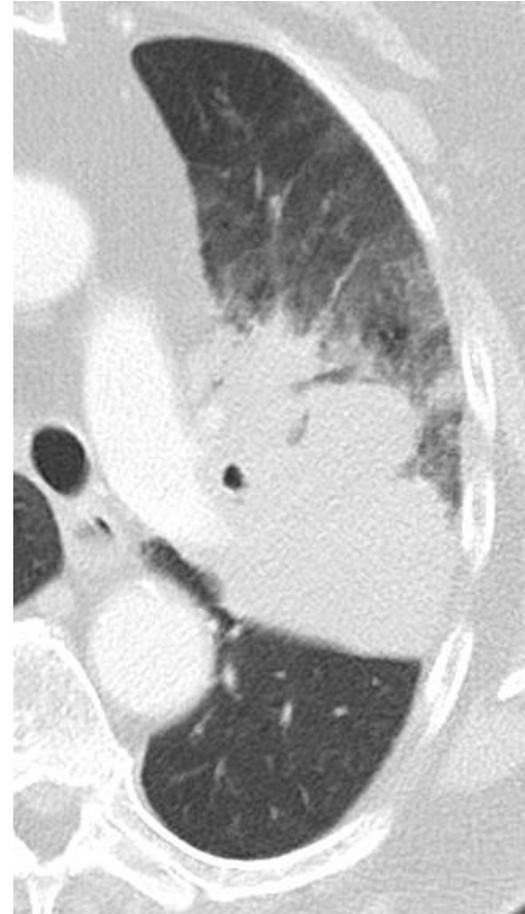


Lobektomie LOL + MLND

Gefrierschnitt:
Bronchialer Resektionsrand tumorfrei

Histologie:

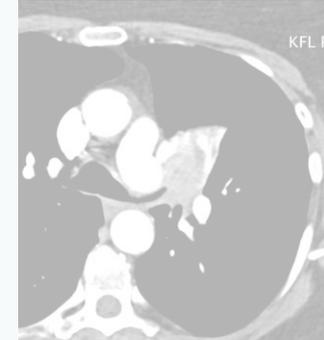
- 99,5% Fibrose, 0,5% Nekrose
- ypT0 ypN0 (0/17)
- Pathologic complete response (pCR)



Definition der Resektabilität

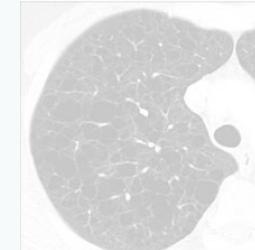
▪ Technische Resektabilität

- Minimalinvasive Zugänge
- Erweiterte Resektionen (z.B. Thoraxwand, Gefäße, extrakorporale Unterstützung)



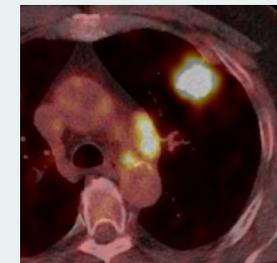
▪ Funktionelle Resektabilität

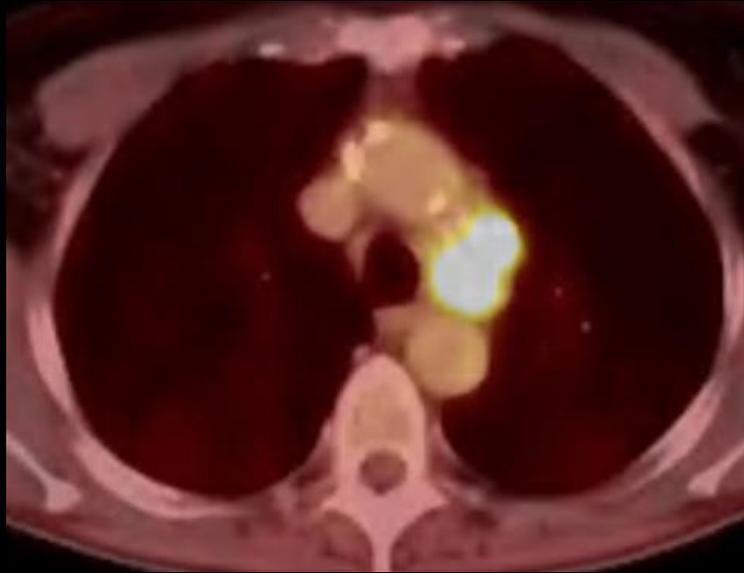
- Pulmonale und kardiale Reserve, Komorbiditäten



▪ Onkologische Sinnhaftigkeit

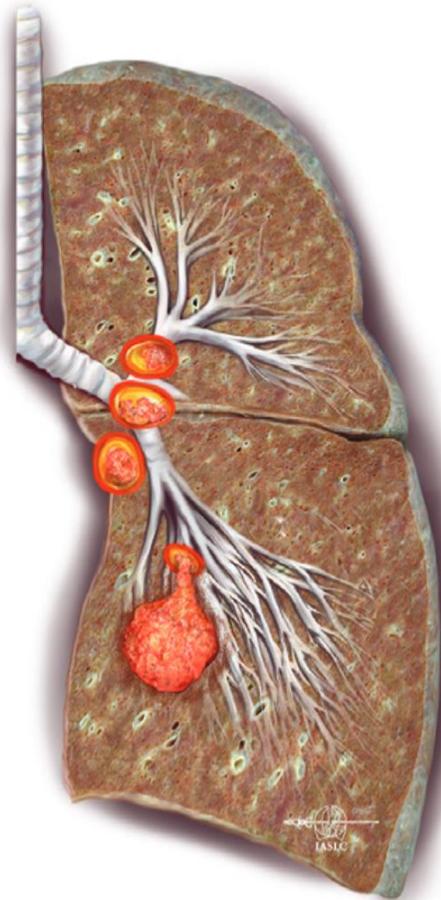
- Ausmaß LK Befall



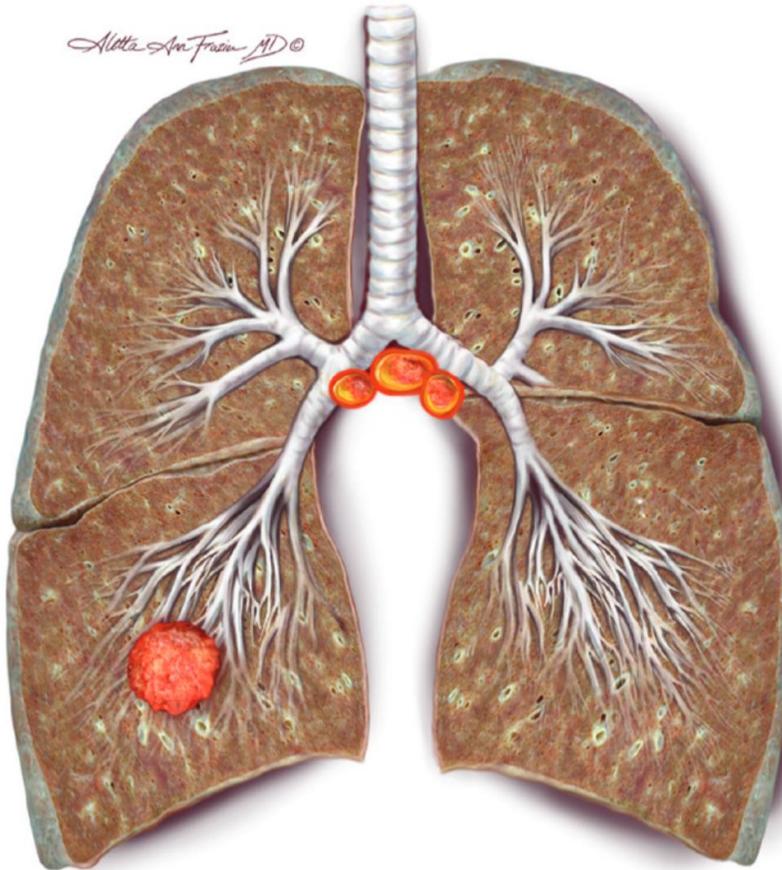


Neue N2 Klassifikation

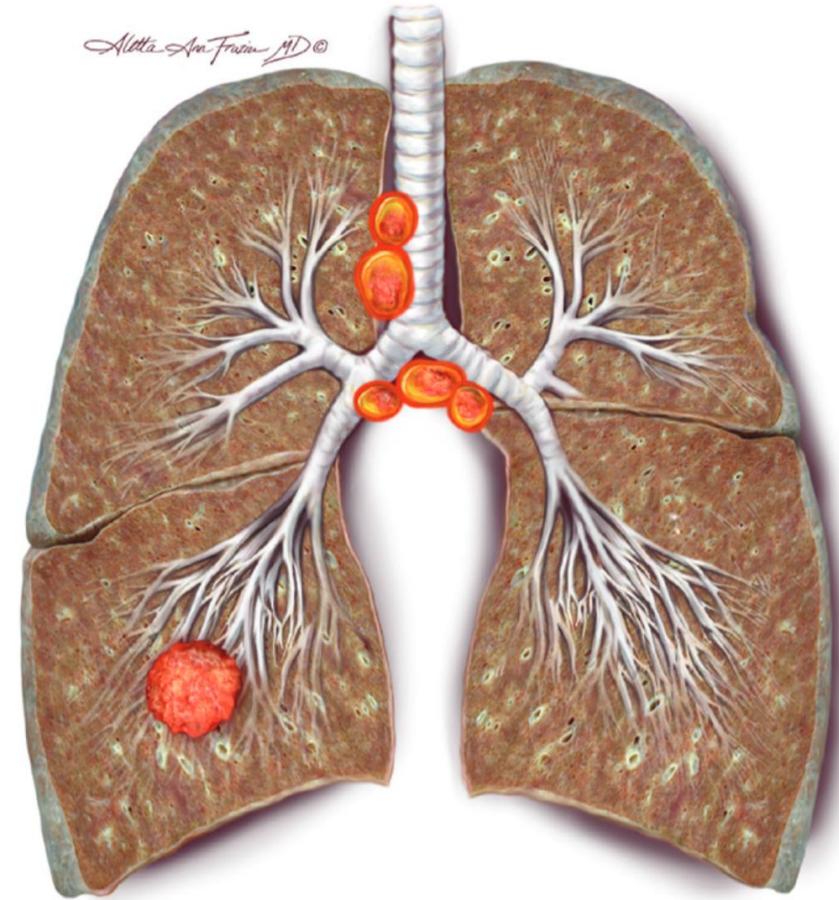
N1



N2a

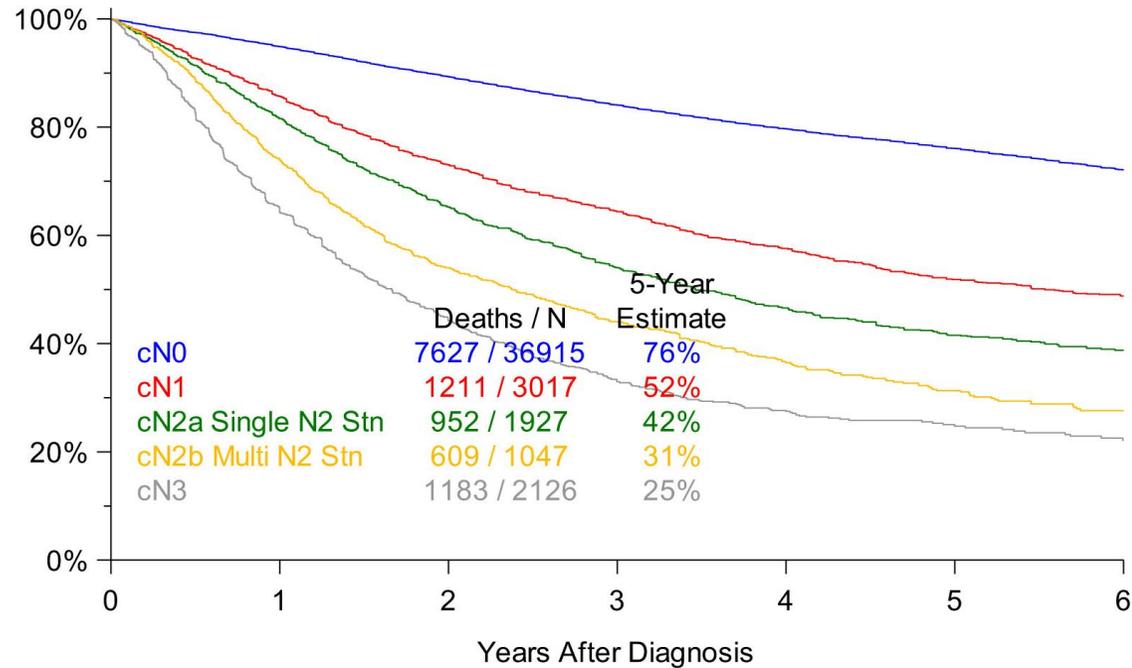


N2b

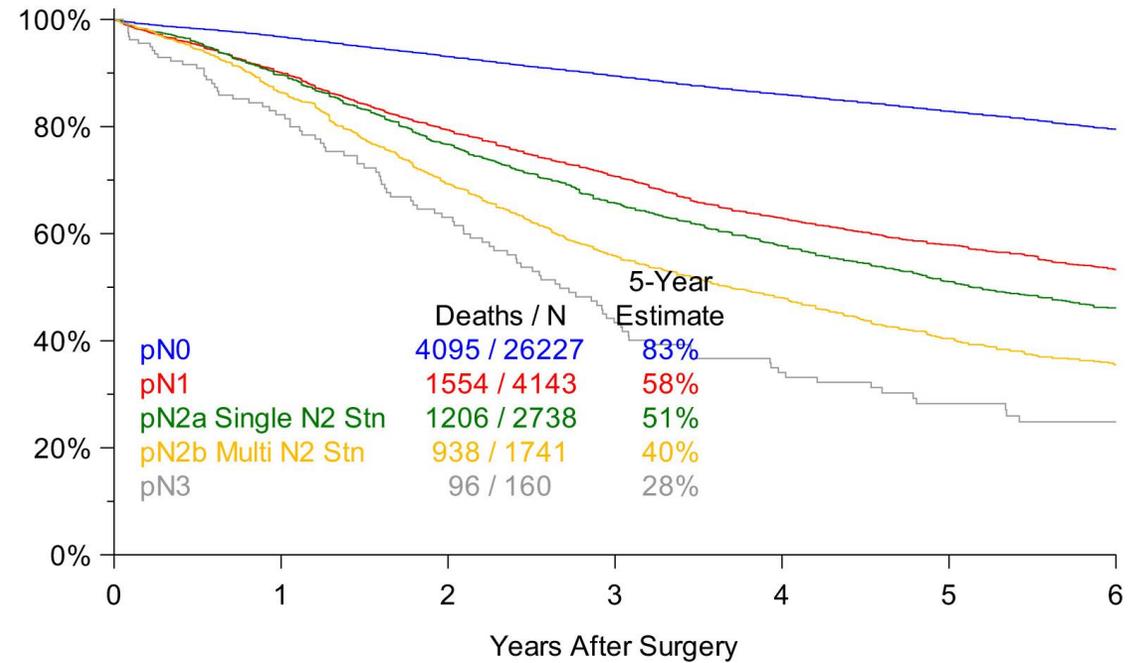


Neue N2 Klassifikation

A2 Proposed ninth edition cN



B2 Proposed ninth edition pN



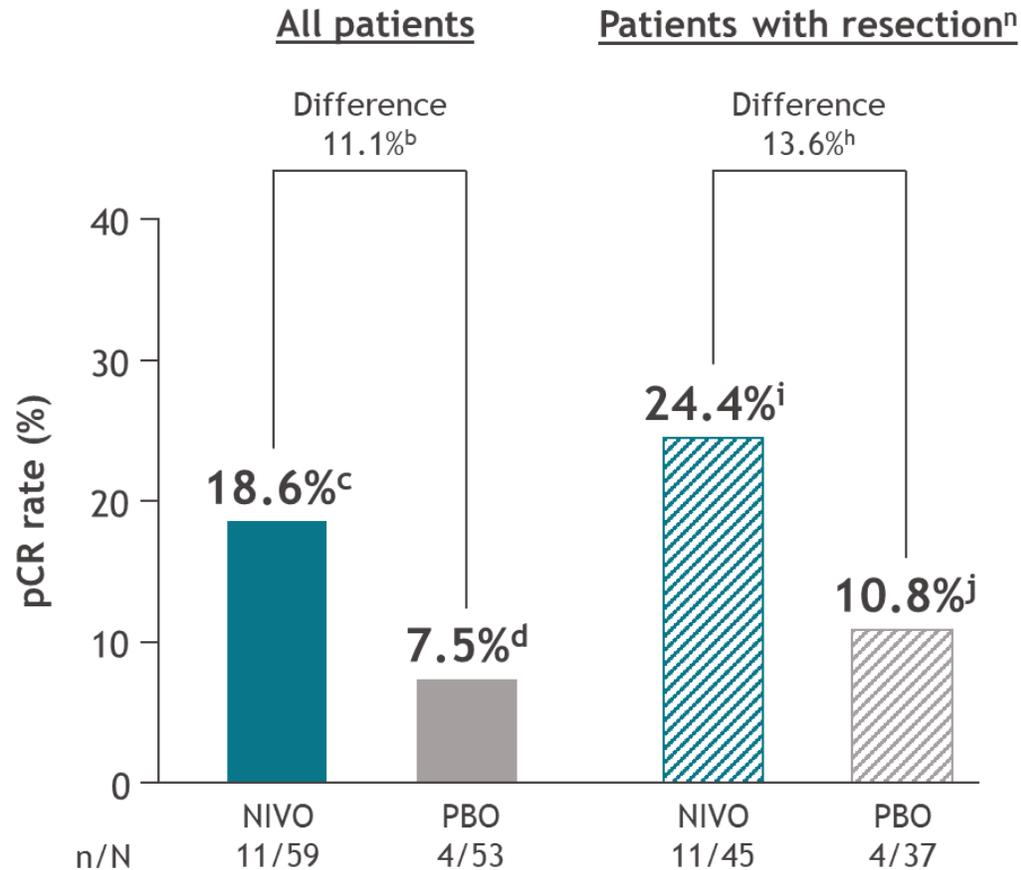
EORTC/ESTS/ESTRO/ERS/ETOP/IASLC Consensus zur Resektabilität

	N0	N1	N2 single	N2 multi	N2 bulky	N3
T1-2			resectable	unresectable	unresectable	unresectable
T3 size						resectable
T3 satelite						resectable
T3 invasion						resectable
T4 size						resectable
T4 satelite	resectable	no cases	resectable	unresectable	unresectable	unresectable
T4 invasion	no consensus	unresectable	unresectable	unresectable	unresectable	unresectable

Sollen wir uns wirklich so zurückhalten ?

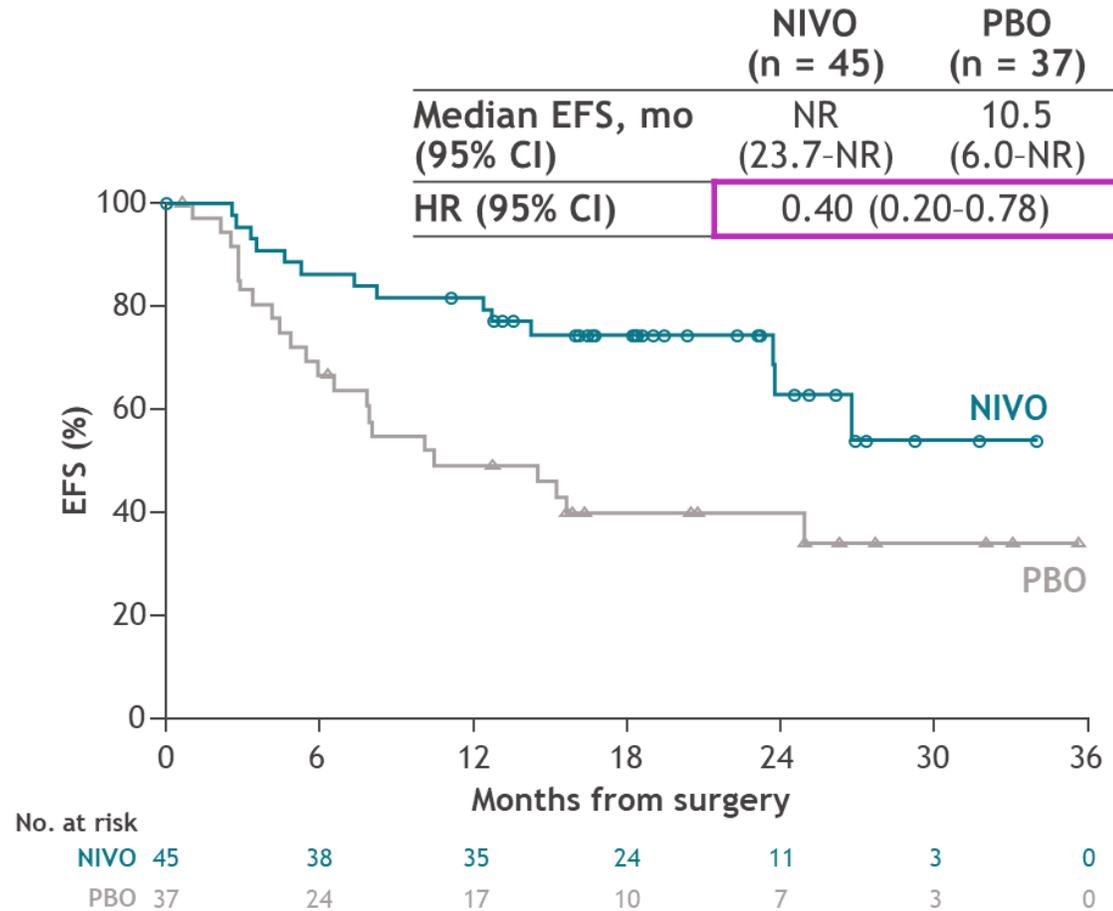
Checkmate 77T (perioperative Chemoimmuntherapie)

Stage III single-station N2^a

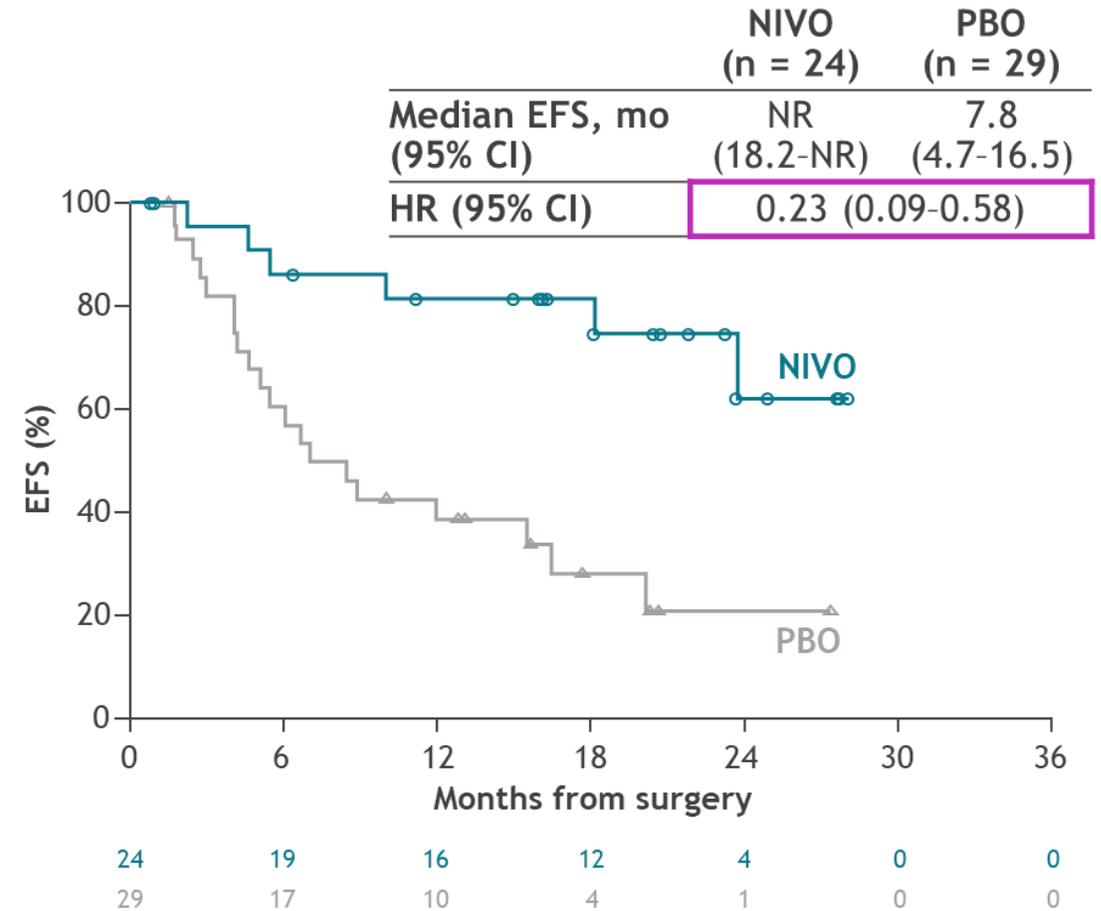


Checkmate 77T (perioperative Chemoimmuntherapie)

Stage III N2 single-station^a



Stage III N2 multi-station^a



Was brauchen wir zur Beurteilung der Resektabilität ?

Interdisziplinäres Tumorboard

Wie ist die
Lungenfunktion?

Gibt's ein MRT?

Wurde ein EBUS
gemacht?

In welchem
Lappen ist der
Tumor?

PD-L1 ? NGS ?
Liquid biopsy?



Danke für die Aufmerksamkeit



Wiener Gesundheitsverbund
Klinik Floridsdorf



Für die
Stadt Wien



Karl Landsteiner Institut für
klinische und translationale
thoraxchirurgische Forschung