

CRT in the era of neo- adjuvant chemo/IO

A radiation oncologist's perspective

M Lambrecht



COI

- Radiation Oncologist



Case 1

- ♂, 79 years
 - 35 PY
 - WHO 1
 - History: rectal adenocarcinoma
 - Increase CEA
- ⇒CT thorax-abdomen



Pathology and imaging

- ♂, 79 years
- WHO 1
- FEV1: 71%, DLCO 49%
- Pathology EBUS-TBNA
 - Adenocarcinoma
 - PD-L1: 40%
 - KRAS G12S

cT4N2M0: bulky N2 disease



What's your treatment of choice

1. Upfront surgery followed by chemo-immunotherapy
2. Induction chemo-immunotherapy followed by surgery
3. Induction chemo-immunotherapy followed by re-evaluation and local modality depending on response
4. Primary CRT followed by Durvalumab

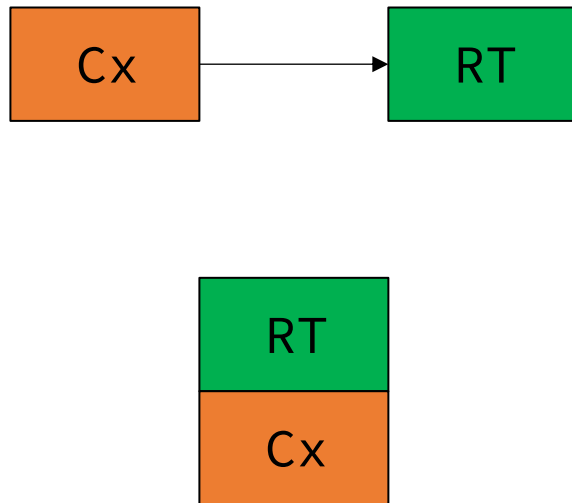
Setting the stage (III)

- 25-30% of all NSCLC patients present with Stage III disease
- Large spectrum
 - Patient
 - Age
 - Co-morbidities
 - Performance status
 - Disease
 - Extension
 - Subtype
 - Molecular profile

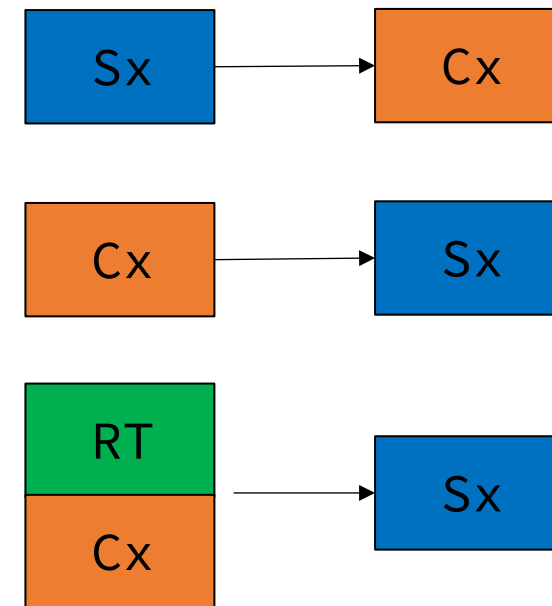
T/M	Categories and Descriptors	N0	N1	N2		N3
				N2a	N2b	
T1	T1a ≤1 cm	IA1	IIA	IIB	IIIA	IIIB
	T1b >1 to ≤2 cm	IA2	IIA	IIB	IIIA	IIIB
	T1c >2 to ≤3 cm	IA3	IIA	IIB	IIIA	IIIB
T2	T2a Visceral pleura / central invasion	IB	IIB	IIIA	IIIB	IIIC
	T2a >3 to ≤4 cm	IB	IIB	IIIA	IIIB	IIIC
	T2b >4 to ≤5 cm	IIA	IIB	IIIA	IIIB	IIIC
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
M1	M1a Contralateral tumor nodules	IVA	IVA	IVA	IVA	IVA
	M1a Pleural / pericardial effusion, nodules	IVA	IVA	IVA	IVA	IVA
	M1b Single extrathoracic metastasis	IVA	IVA	IVA	IVA	IVA
	M1c1 Multiple metastases in 1 organ system	IVB	IVB	IVB	IVB	IVB
	M1c2 Multiple metastases in >1 organ systems	IVB	IVB	IVB	IVB	IVB

Modalities in stage III?

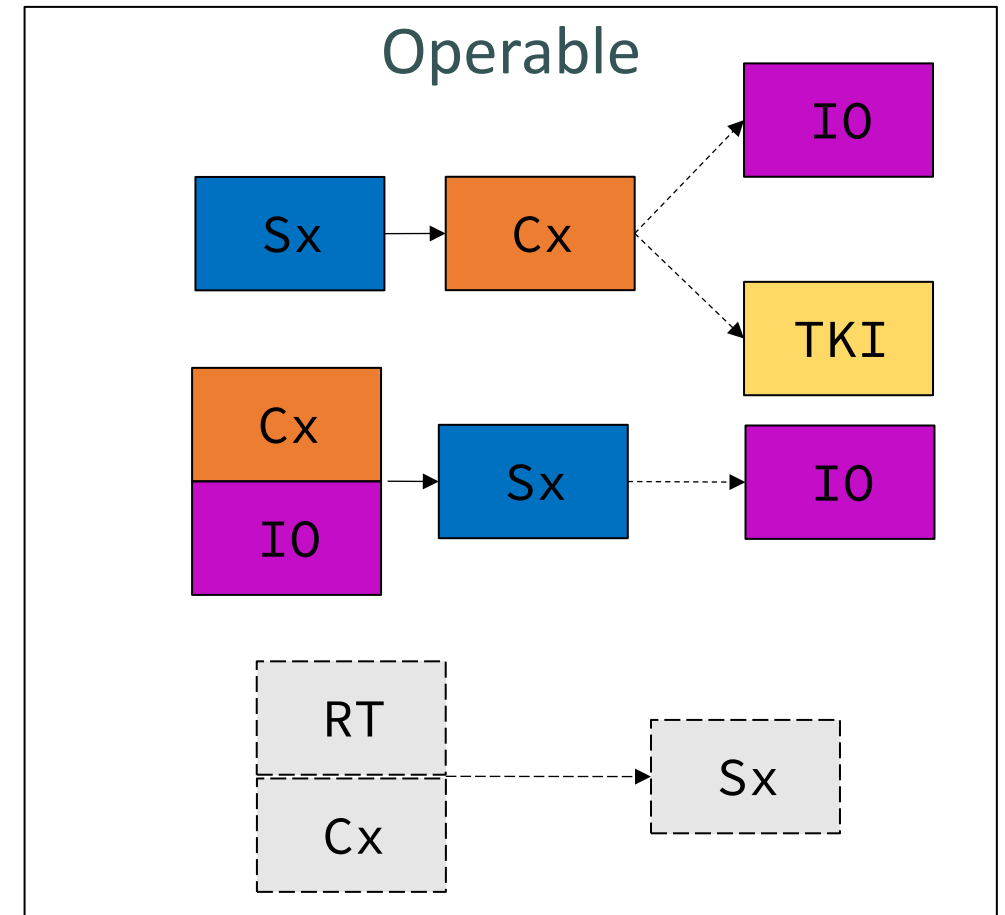
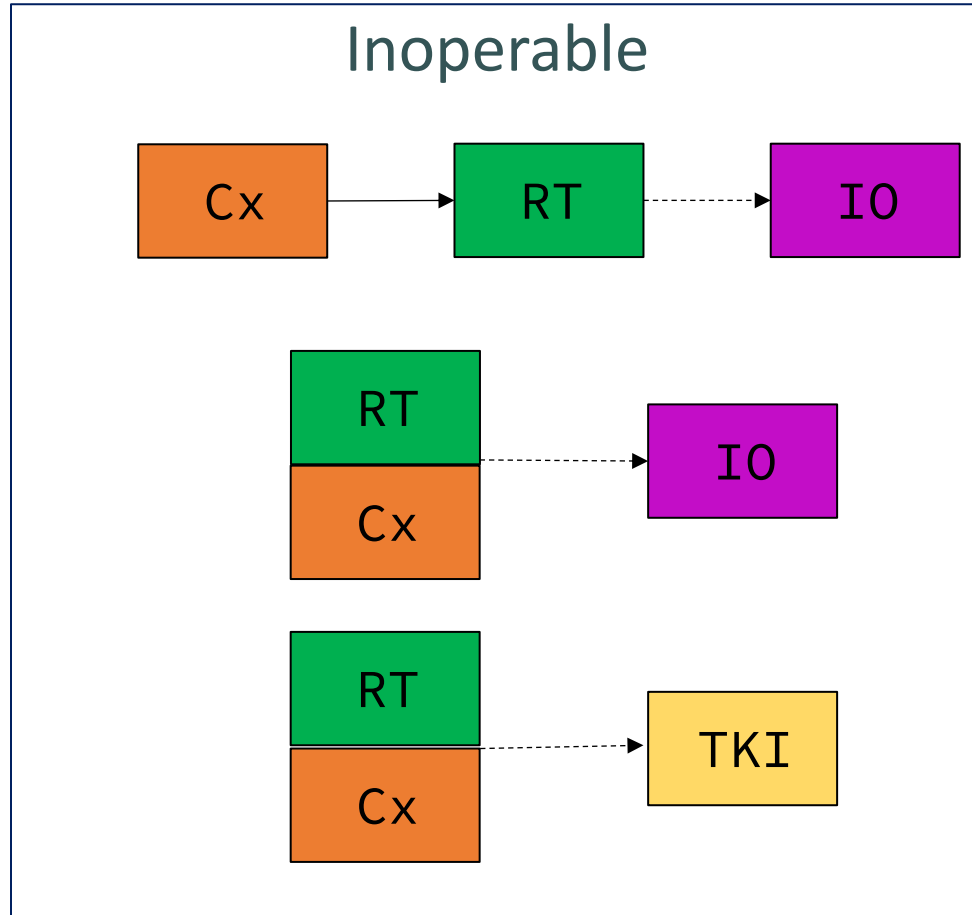
Inoperable



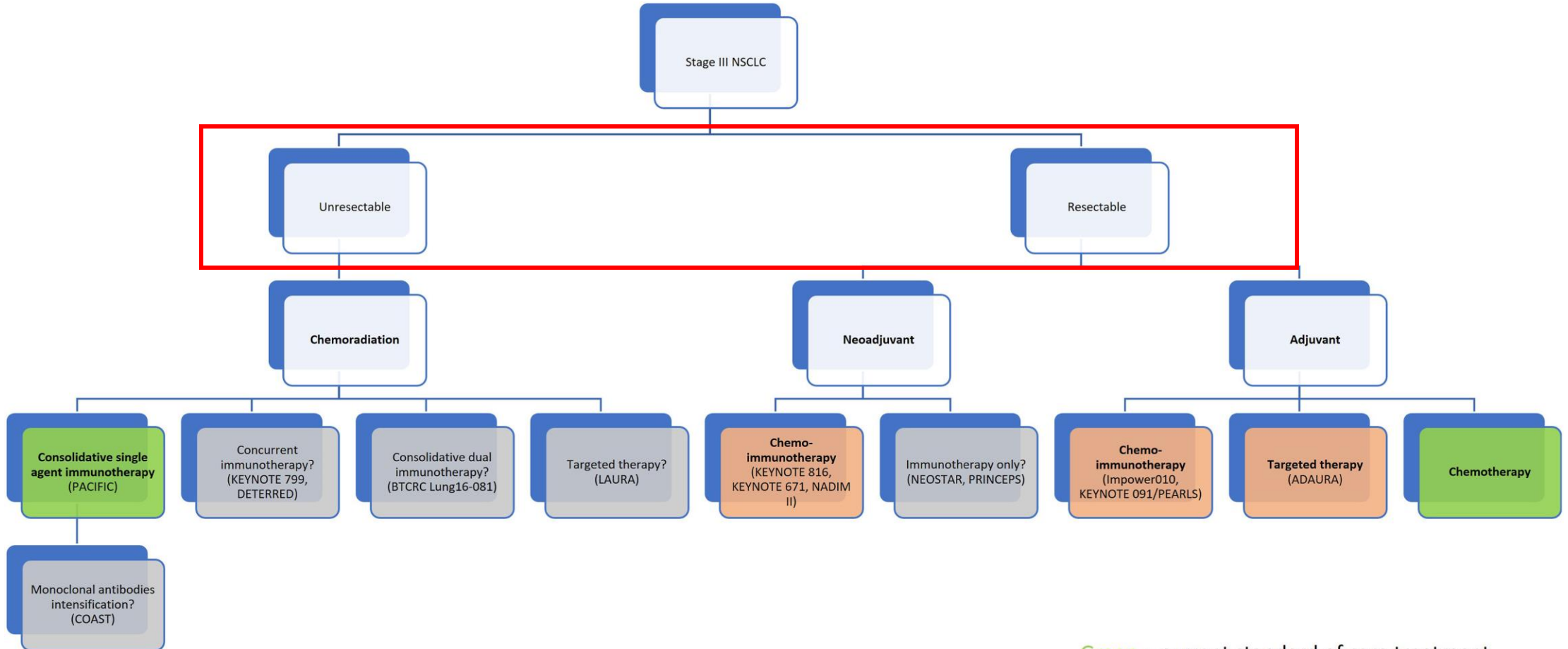
Operable



Modalities in stage III?



Treatment options



Green = current standard of care treatment
Orange = emerging treatments
Grey = trials in progress

Resectability

	N0	N1	N2 _{SINGLE}	N2 _{MULTI}	N2 _{BULKY}	N2 _{INVASIVE}
T1-2	N/A	N/A	POTENTIALLY RESECTABLE (95%)	NO AGREEMENT (50%)	UNRESECTABLE (75%)	UNRESECTABLE (84%)
T3_{SIZE}	N/A	RESECTABLE (83%) ^a	POTENTIALLY RESECTABLE (87%)	NO AGREEMENT (39%)	UNRESECTABLE (80%)	UNRESECTABLE (88%)
T3_{SATELLITE}	N/A	POTENTIALLY RESECTABLE (94%)	POTENTIALLY RESECTABLE (79%)	NO AGREEMENT (34%)	UNRESECTABLE (84%)	UNRESECTABLE (91%)
T3_{INVASION}	N/A	POTENTIALLY RESECTABLE (89%)	NO AGREEMENT (71%) ^b	NO AGREEMENT (28%) ^c	UNRESECTABLE (87%)	UNRESECTABLE (92%)
T4_{SIZE}	POTENTIALLY RESECTABLE (94%)	POTENTIALLY RESECTABLE (90%)	NO AGREEMENT (66%)	UNRESECTABLE (77%)	UNRESECTABLE (88%)	UNRESECTABLE (93%)
T4_{SATELLITE}	POTENTIALLY RESECTABLE (78%)	NO AGREEMENT (71%) ^b	NO AGREEMENT (44%)	UNRESECTABLE (85%)	UNRESECTABLE (92%)	UNRESECTABLE (94%)
T4_{INVASION}	NO AGREEMENT (62%) ^b	NO AGREEMENT (57%) ^b	NO AGREEMENT (34%) ^c	UNRESECTABLE (90%)	UNRESECTABLE (95%)	UNRESECTABLE (94%)

Resectability/Operability

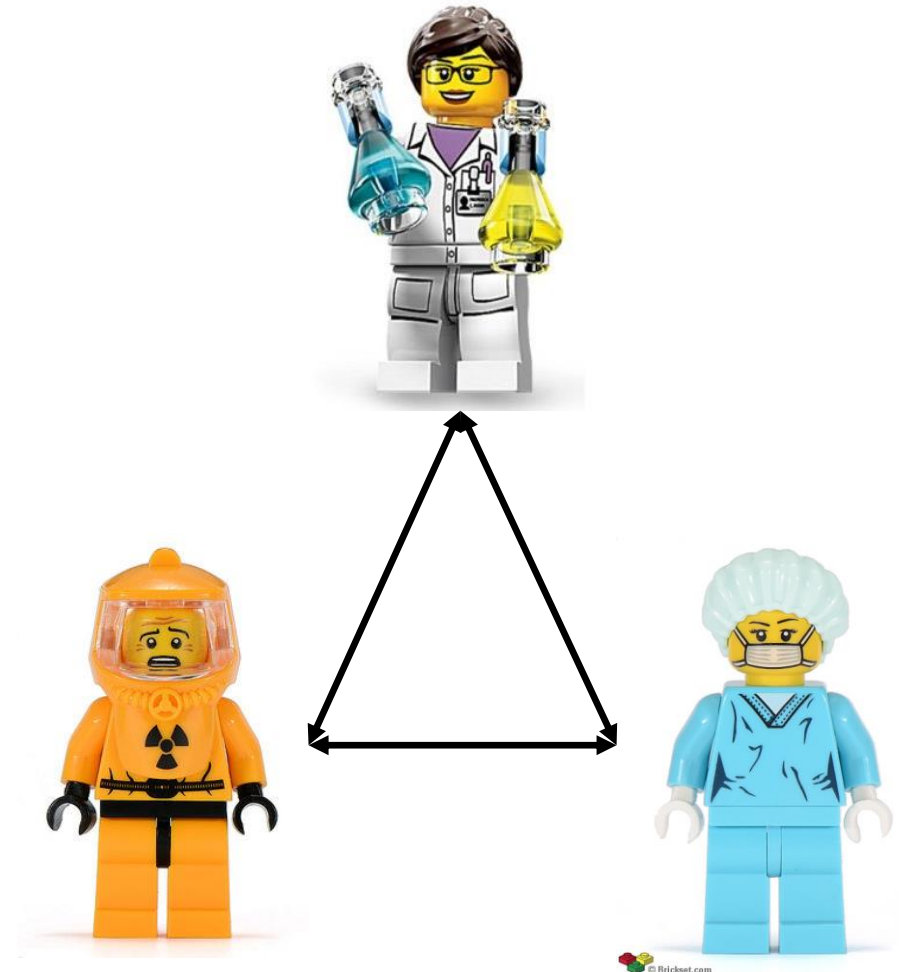
1. Resecability

- a) Tumor extent
- b) Surgeon experience

2. Operability

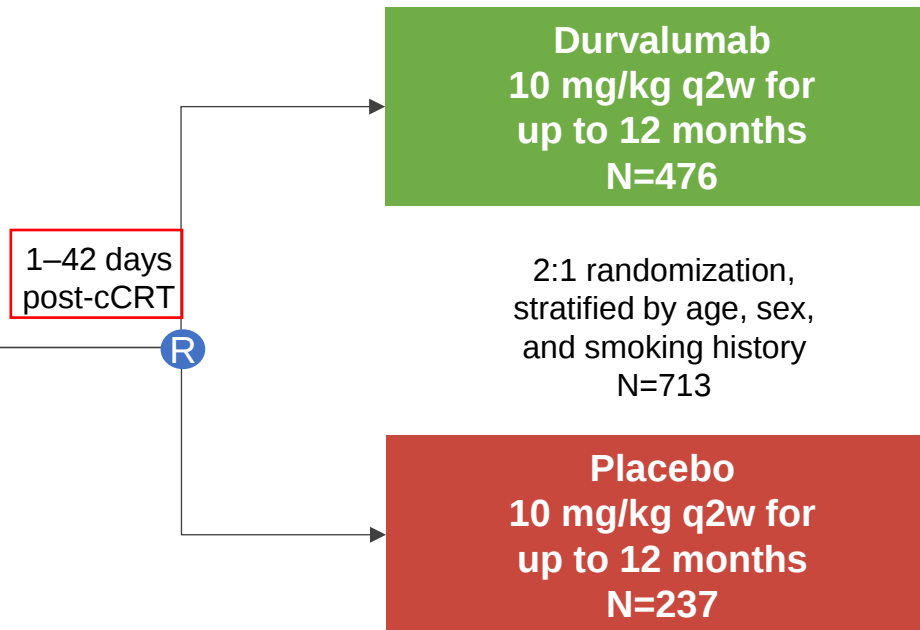
- a) Patient's condition
- b) Outcome after surgery

3. Patient's perspective



Unresectable Stage III NSCLC

- Patients with stage III, locally advanced, unresectable NSCLC who have not progressed following definitive platinum-based **cCRT** (≥ 2 cycles)
- 18 years or older
- **WHO PS score 0 or 1**
- Estimated life expectancy of ≥ 12 weeks
- Archived tissue was collected



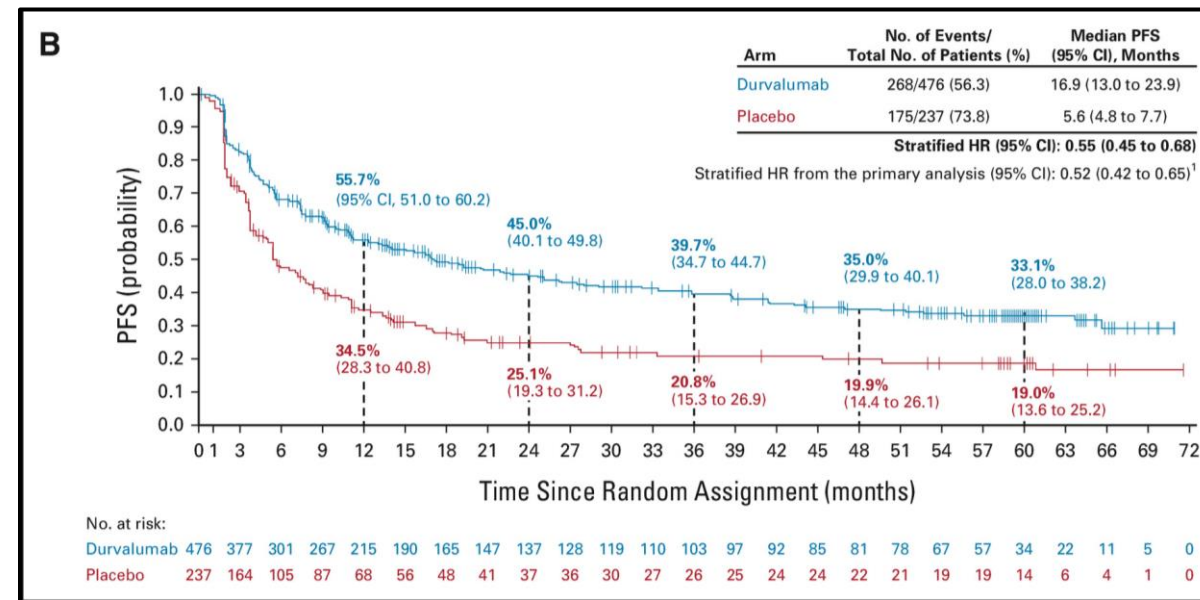
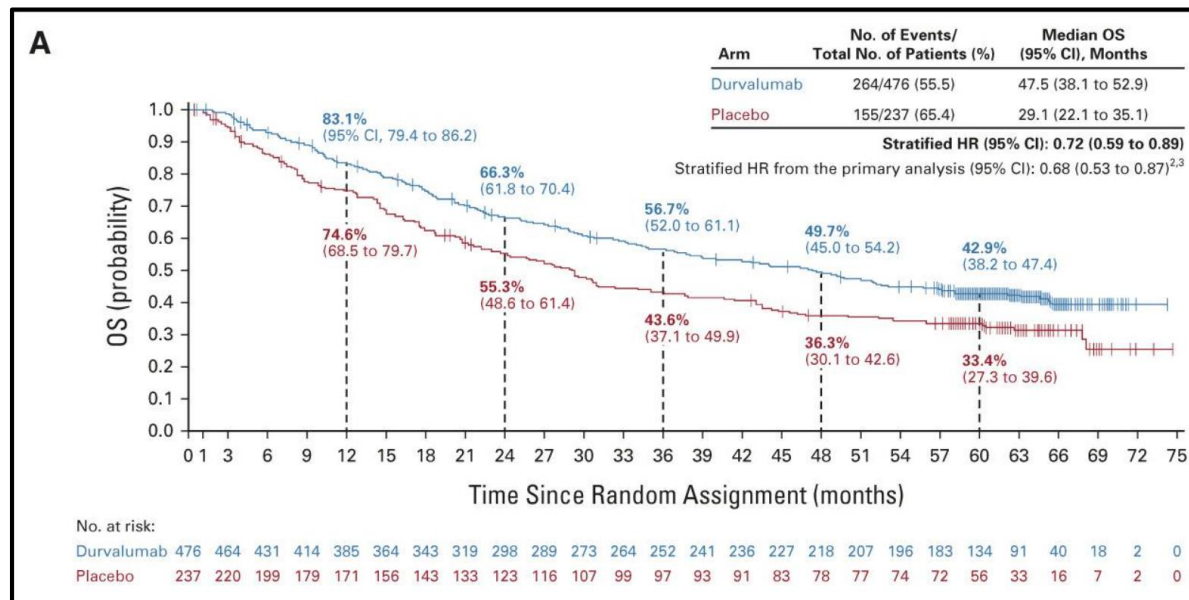
Co-primary endpoints

- PFS by BICR using RECIST v1.1*
- OS

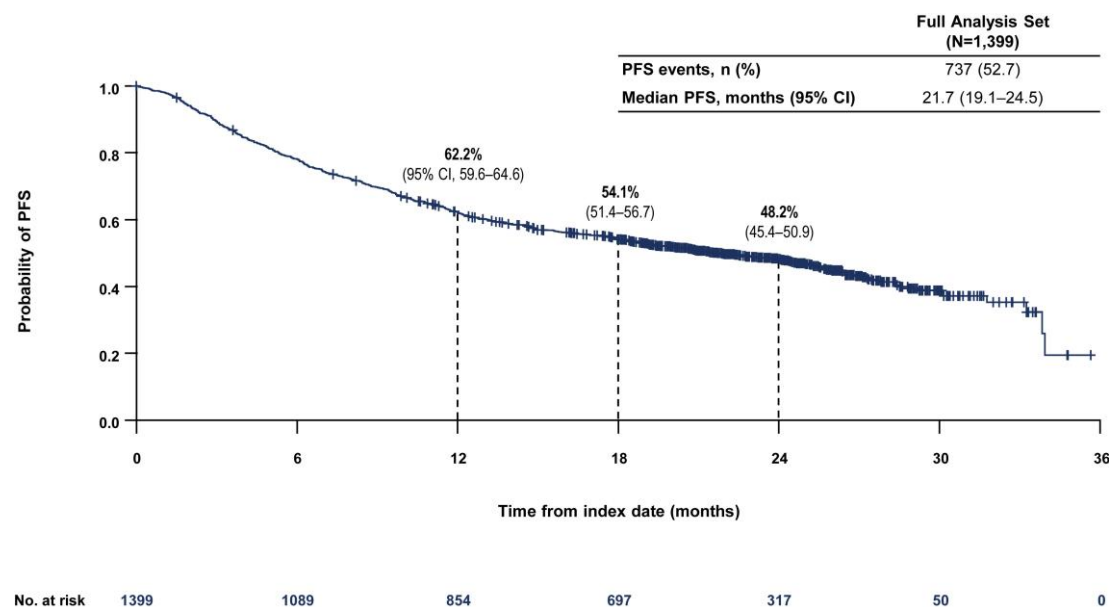
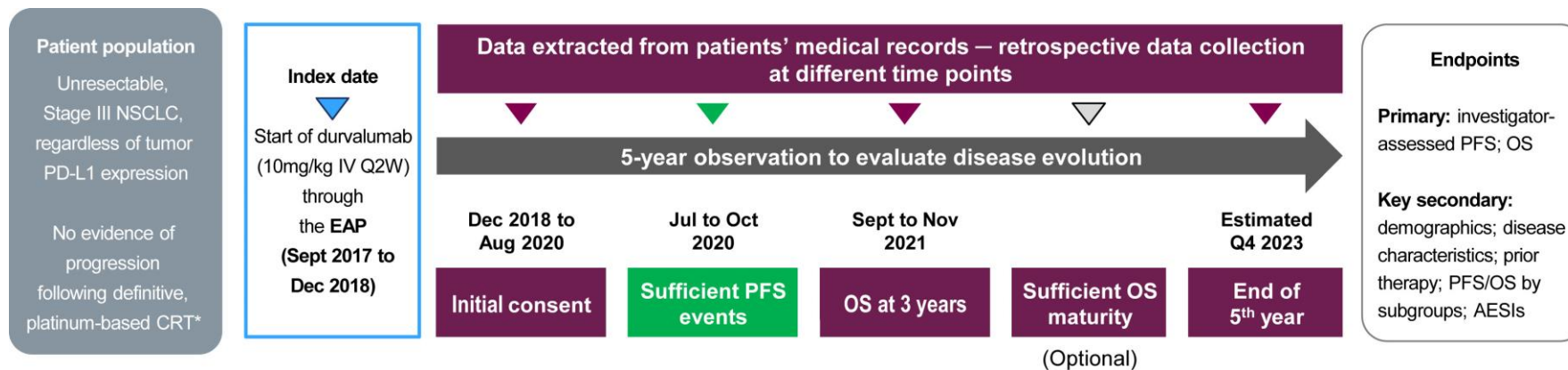
Key secondary endpoints

- ORR (per BICR)
- DoR (per BICR)
- Safety and tolerability
- PROs

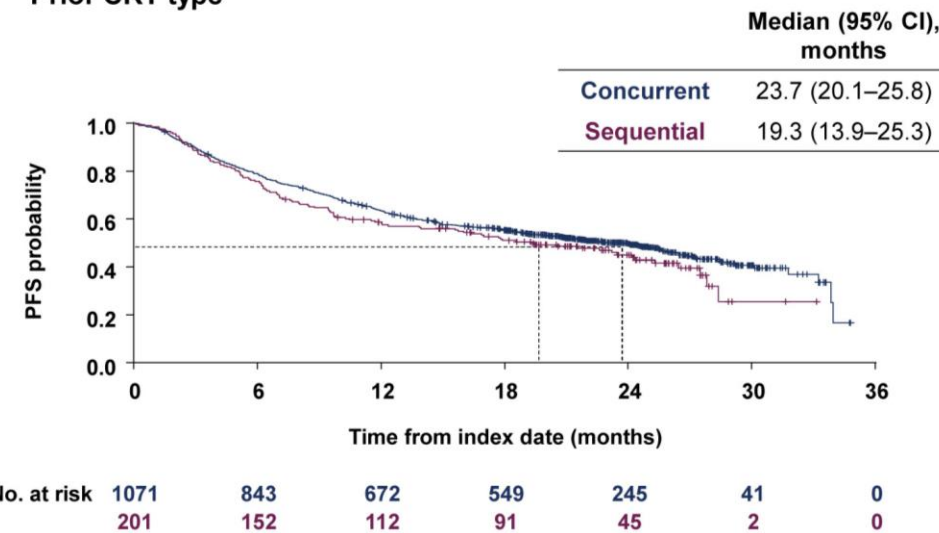
PACIFIC



Real world data

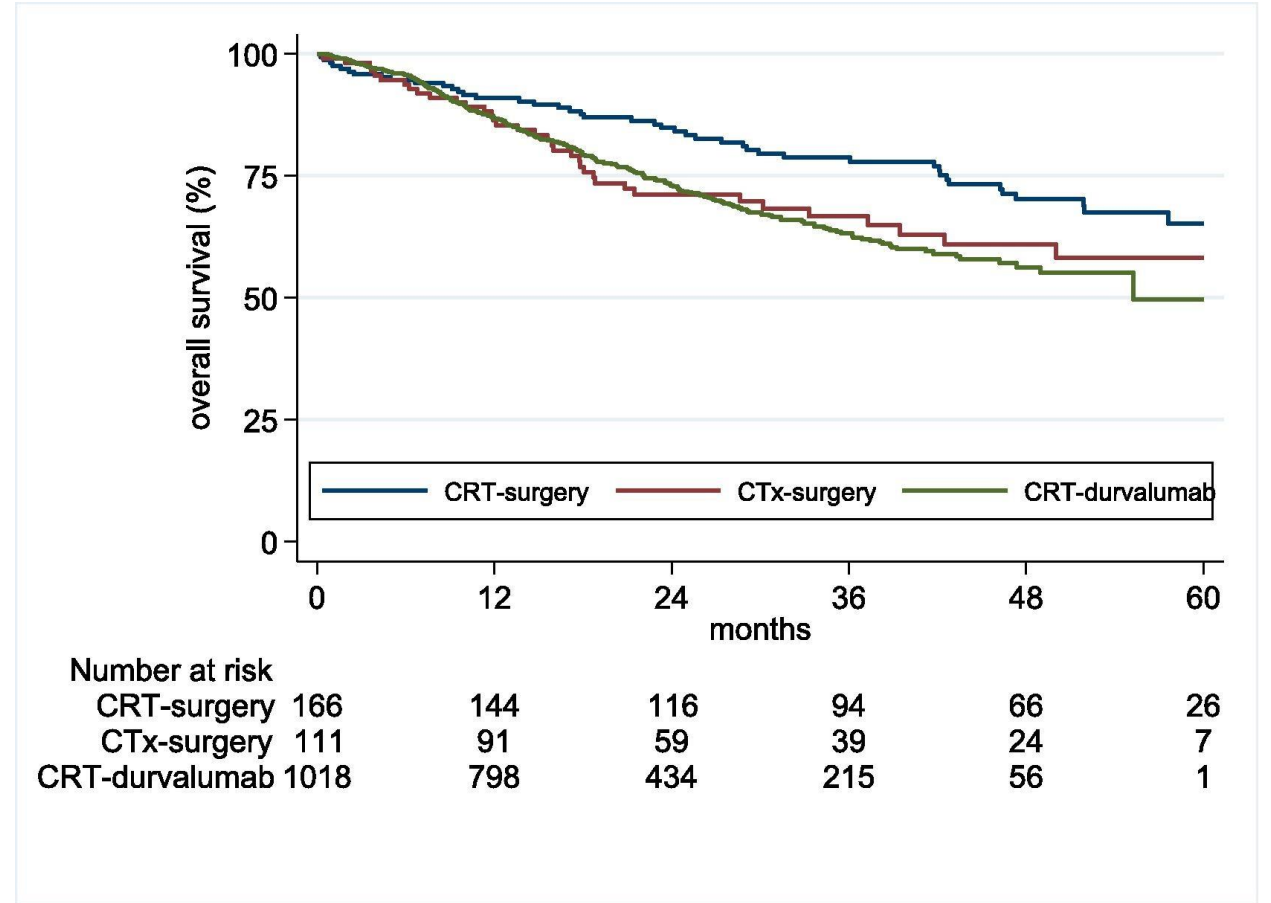
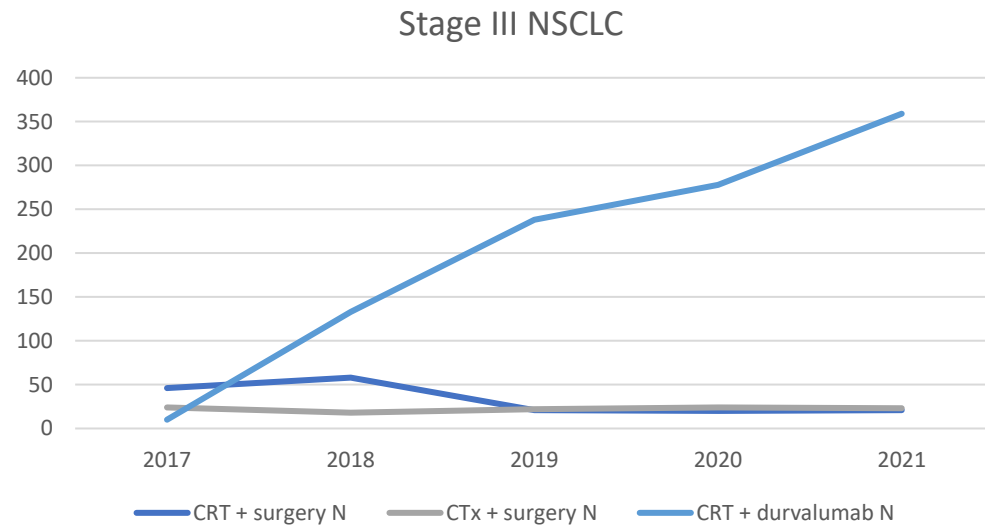


D Prior CRT type



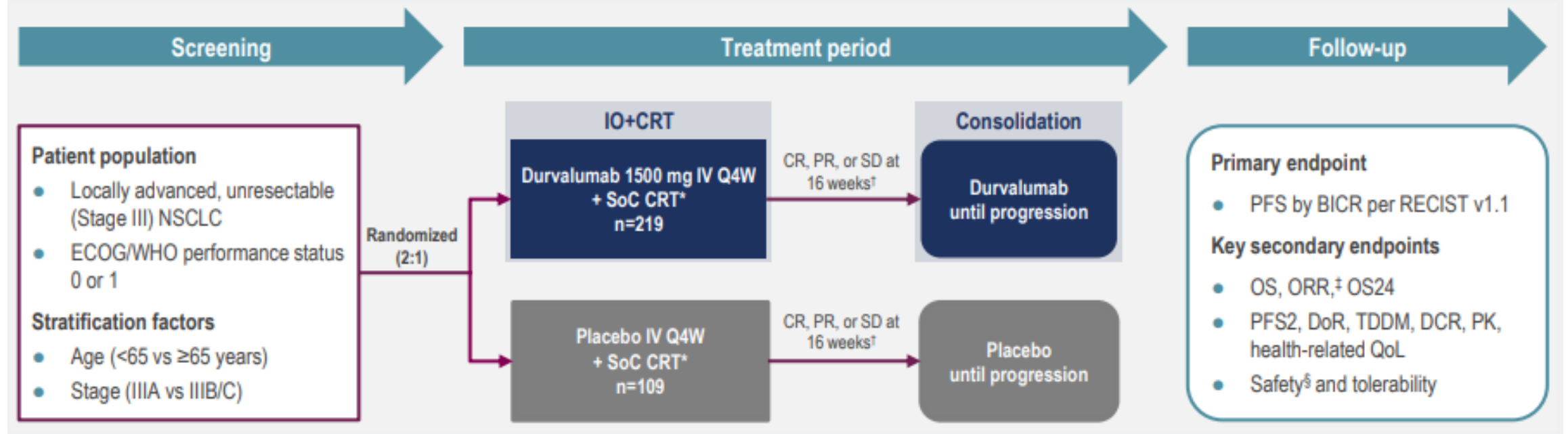
What happened?

- STAGE III from NCR
- 1016 patients
 - 3yr OS:
 - CRT-Sx: 78,7%
 - Ctx-Sx: 66,7%
 - CRT-ICI: 63,2%



How to improve?

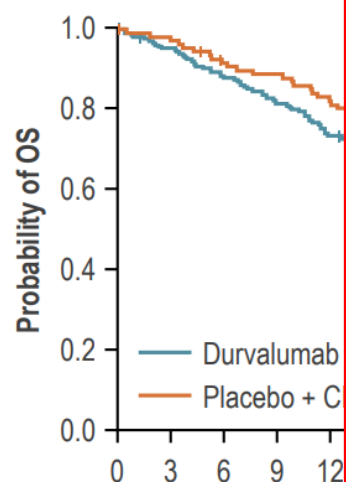
PACIFIC-2 (NCT03519971) is a phase 3, randomized, double-blind, placebo-controlled, multicenter, global study of durvalumab + CRT followed by durvalumab versus placebo + CRT followed by placebo



Patients were recruited from 29 March 2018 through 24 June 2019 across 106 sites in Asia, Eastern Europe, and the Americas, including: Brazil, Czech Republic, Hungary, India, Japan, Mexico, Peru, Philippines, Poland, Republic of Korea, Russia, Turkey, Thailand, and Vietnam.

PACIFIC-2

OS and ORR (ITT population)



No. at risk:

Durvalumab + CRT	219	207	191	177	160	152	141	132	126	120	114	111	107	100	95	94	89	75	49	31	15	1	0
Placebo + CRT	109	106	98	95	87	83	75	66	62	57	51	47	45	43	43	39	35	27	17	9	2	0	0

Summary of AEs (safety population)

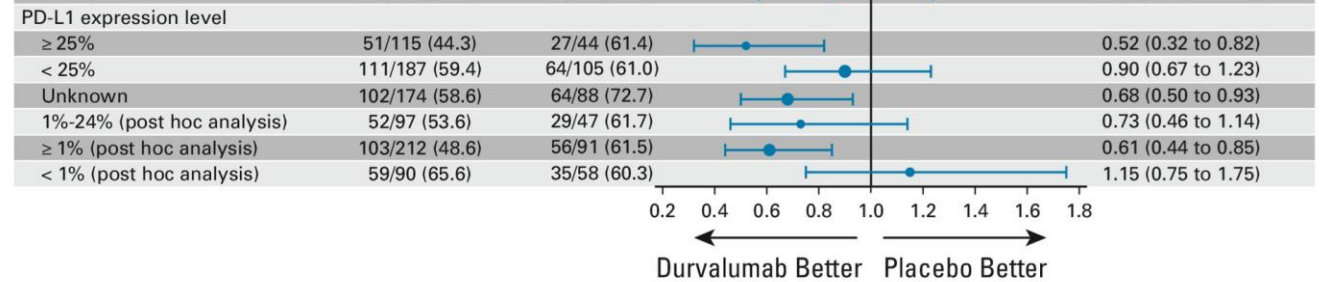
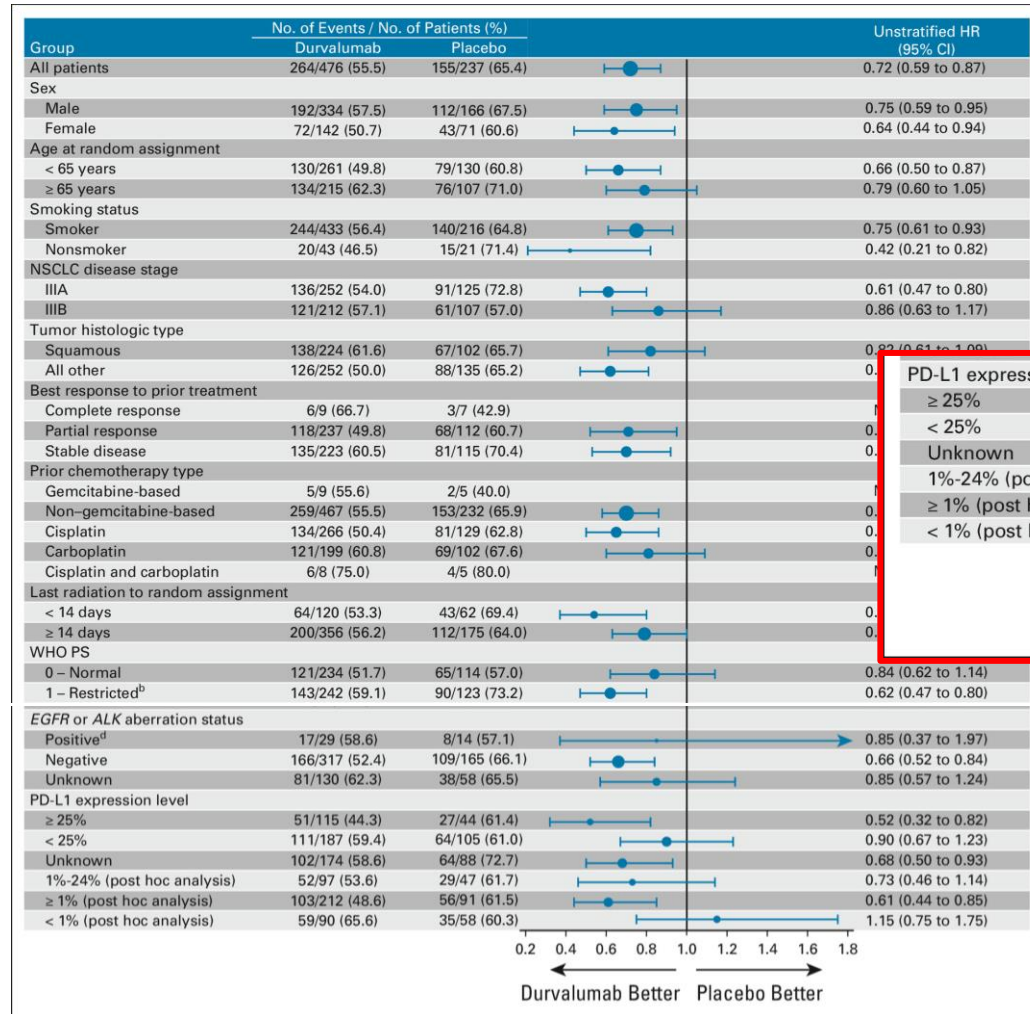
AE category, n (%)	Durvalumab + CRT (n=219)	Placebo + CRT (n=108)
Any AE	216 (98.6)	108 (100)
Maximum grade 3 or 4*	117 (53.4)	64 (59.3)
Outcome of death	30 (13.7)	11 (10.2)
SAE	103 (47.0)	56 (51.9)
Any AE leading to discontinuation of durvalumab/placebo†	56 (25.6)	13 (12.0)
0 to ≤4 months from start of treatment (approximates the duration of IO+CRT and ends at the first post-baseline scan)	31 (14.2)	6 (5.6)
>4 to ≤16 months from start of treatment (approximates the duration of consolidation IO in the SoC PACIFIC regimen)	12 (5.5)	6 (5.6)
>16 months from start of treatment (approximates treatment beyond the duration of consolidation IO in the SoC PACIFIC regimen)	13 (5.9)	1 (0.9)

There was no difference in ORR between the durvalumab (60.7%; 95% CI: 53.9, 67.2) and placebo (60.6%; 95% CI: 50.7, 69.8) arms (p=0.976).

New combinations

Study	Intervention	Number	NCT number
A5181	CRT + durvalumab ⇒ durvalumab CRT ⇒ durvalumab	n = 660	NCT04092283
KEYLINK-012	CRT + pembrolizumab ⇒ pembrolizumab + placebo CRT + pembrolizumab ⇒ pembrolizumab + olaparib CRT ⇒ durvalumab	n = 870	NCT04380636
KEYVIBE-006	CRT + pembrolizumab + vibostolimab ⇒ pembrolizumab + vibostolimab CRT ⇒ durvalumab	n = 784	NCT05298423
CheckMate73L	CRT + nivolumab ⇒ nivolumab + ipilimumab CRT + nivolumab ⇒ nivolumab CRT ⇒ durvalumab	n = 888	NCT04026412
PACIFIC-9 ^a	CRT ⇒ durvalumab + oleclumab CRT ⇒ durvalumab + monalizumab CRT ⇒ durvalumab	n = 999	NCT05221840
SKYSCRAPER-03 ^a	CRT ⇒ atezolizumab + tiragolumab CRT ⇒ durvalumab	n = 800	NCT04513925

PACIFIC: for everyone?

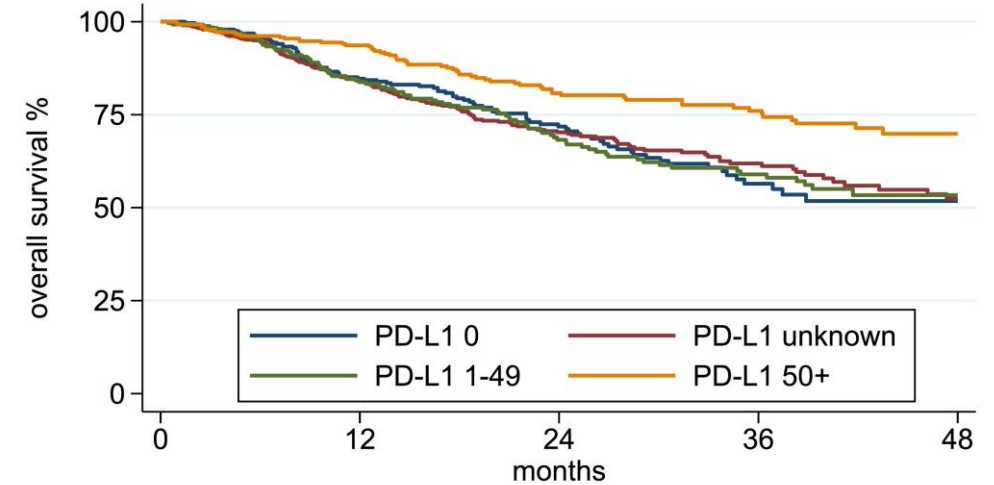
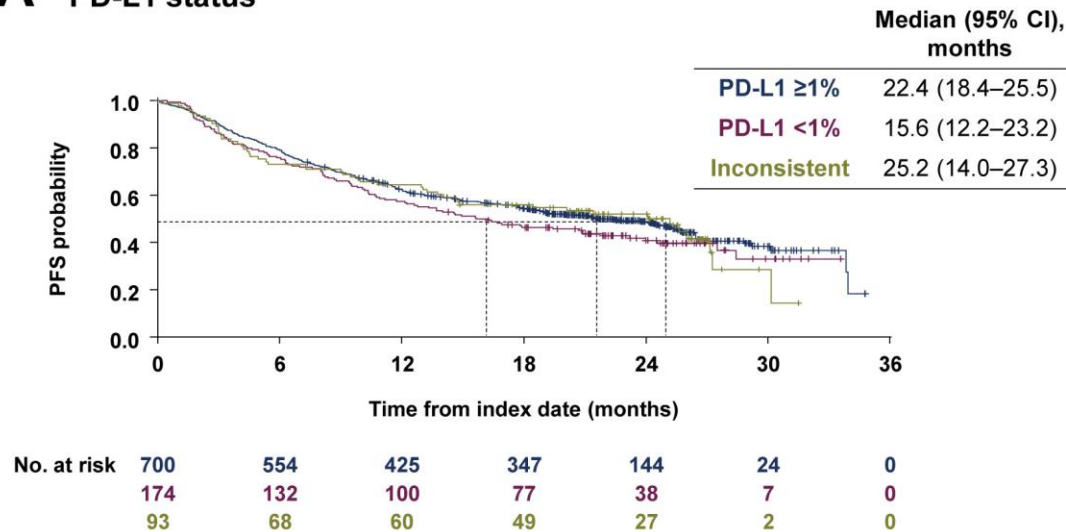


While consistent benefit in most subgroups
EMA approval in PD-L1≥1%

PD-L1 status in real world?

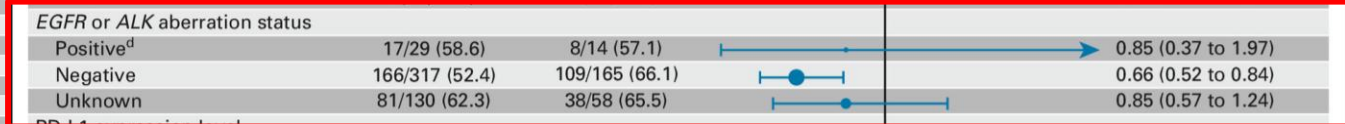
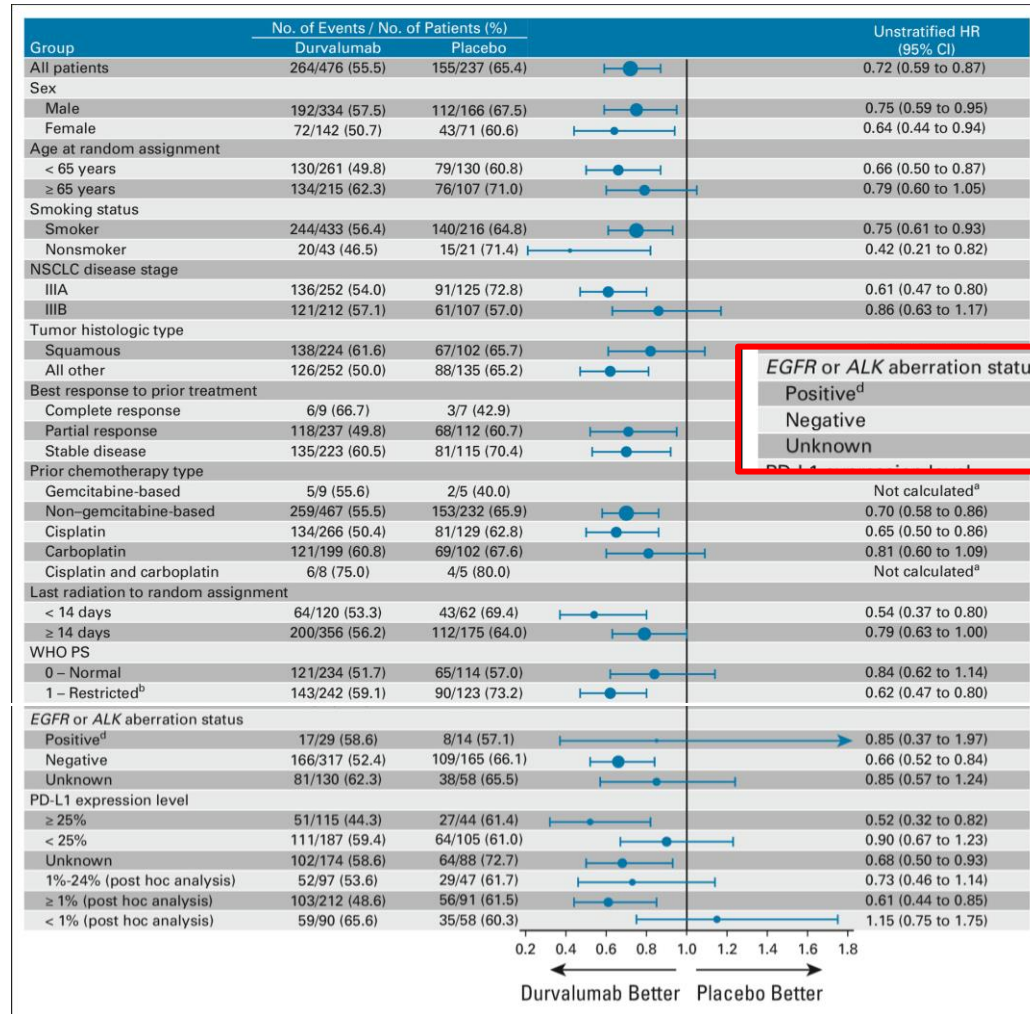
PACIFIC-R

A PD-L1 status*



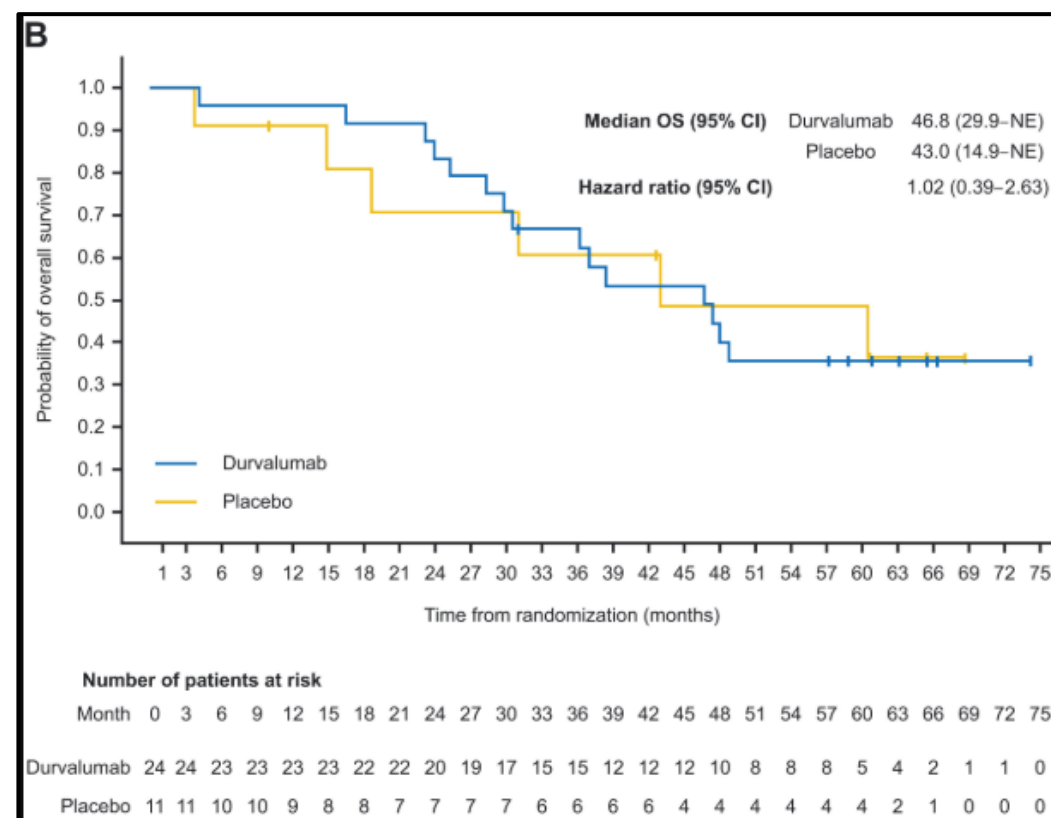
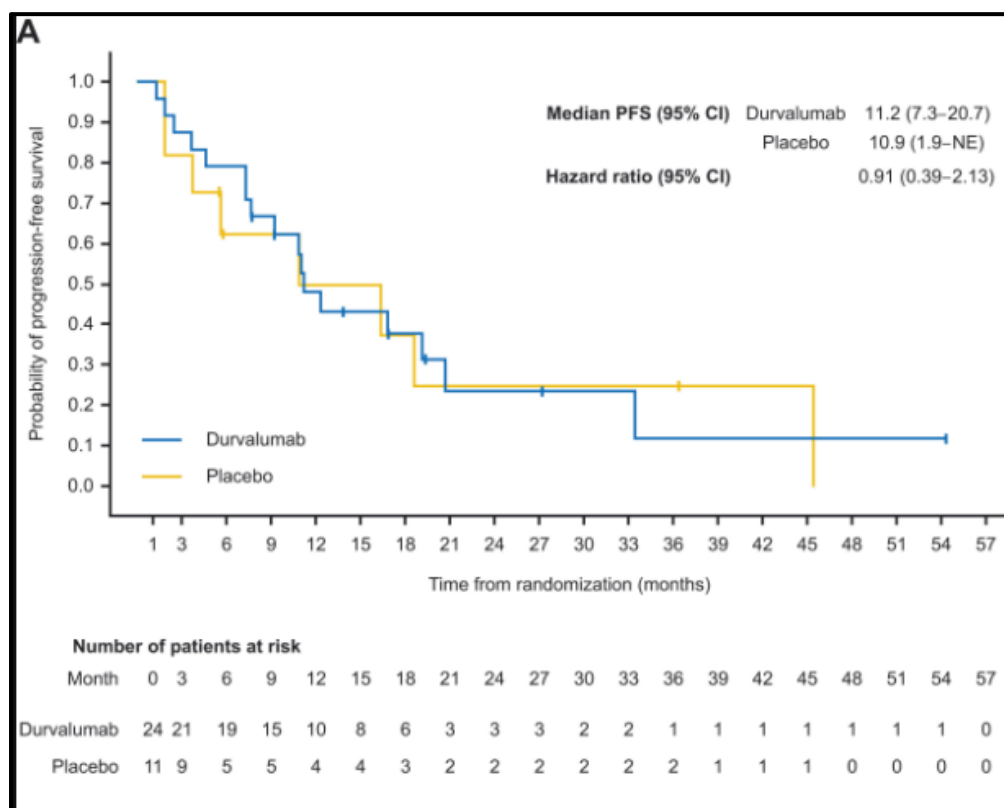
Number at risk					
PD-L1 0	284	219	118	46	11
PD-L1 unknown	515	390	202	92	41
PD-L1 1-49	256	198	110	66	7
PD-L1 50-99	286	247	145	93	19

PACIFIC: for everyone?

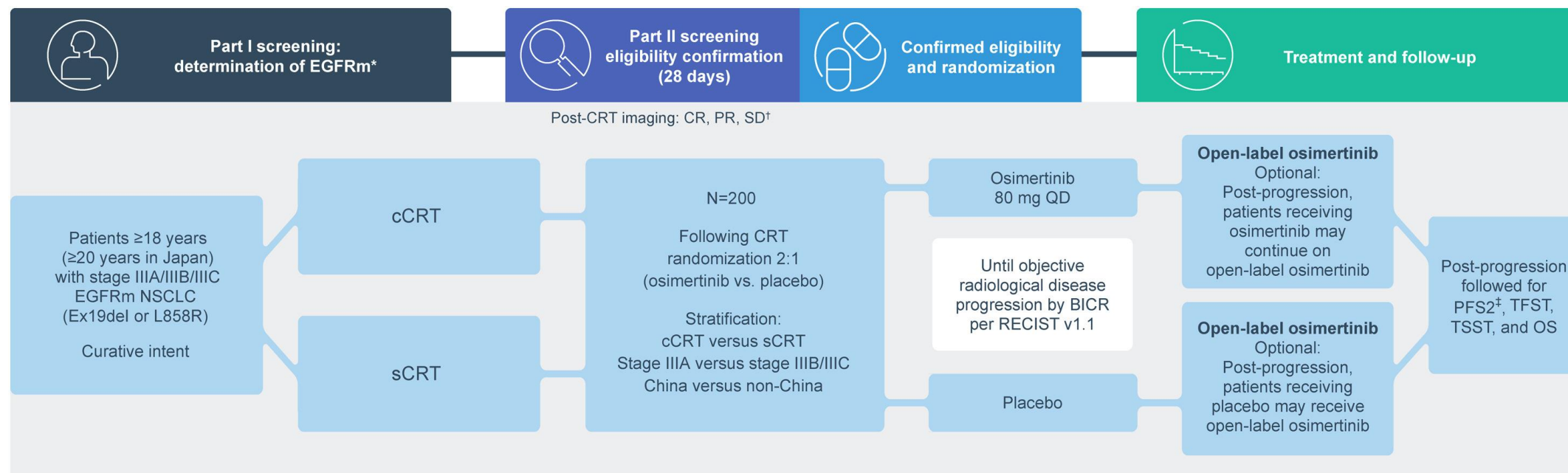


For everyone?

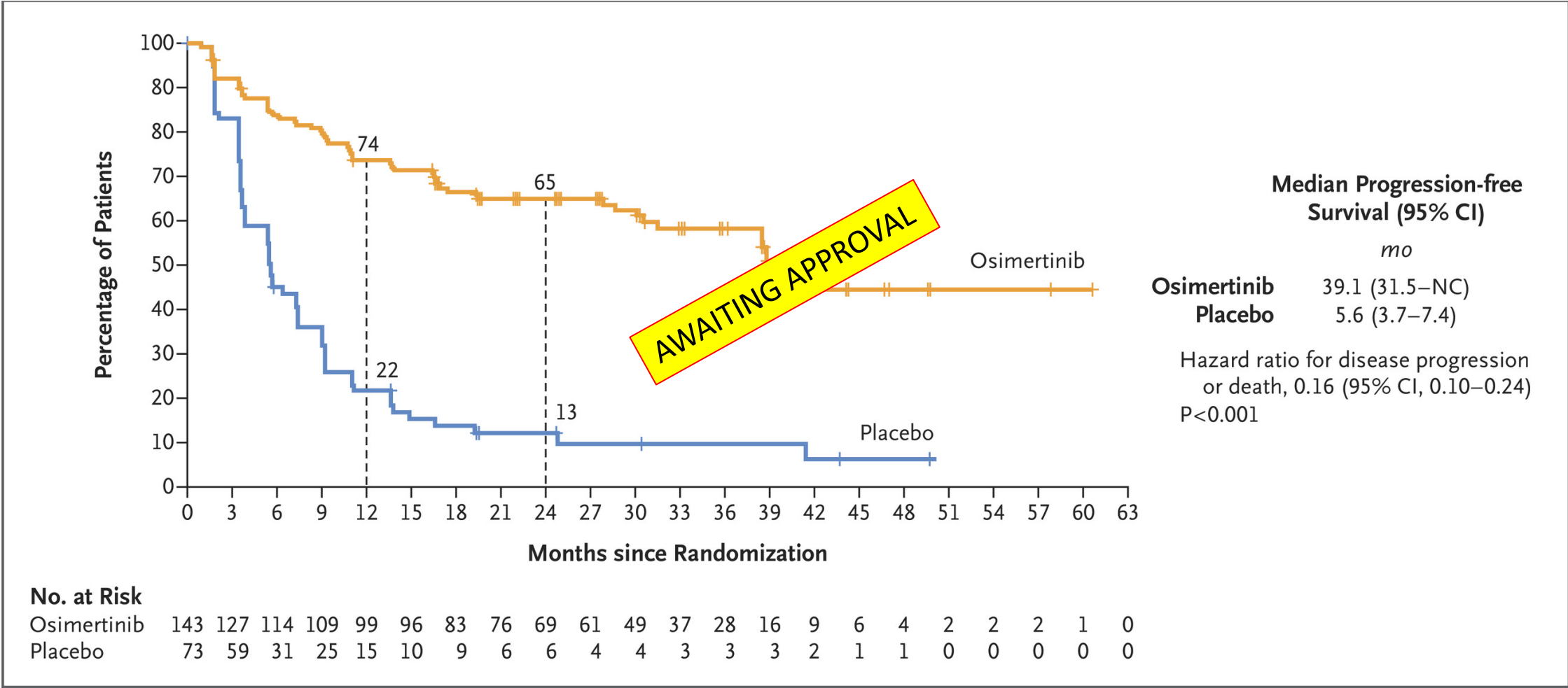
- Subgroup analysis of PACIFIC



LAURA

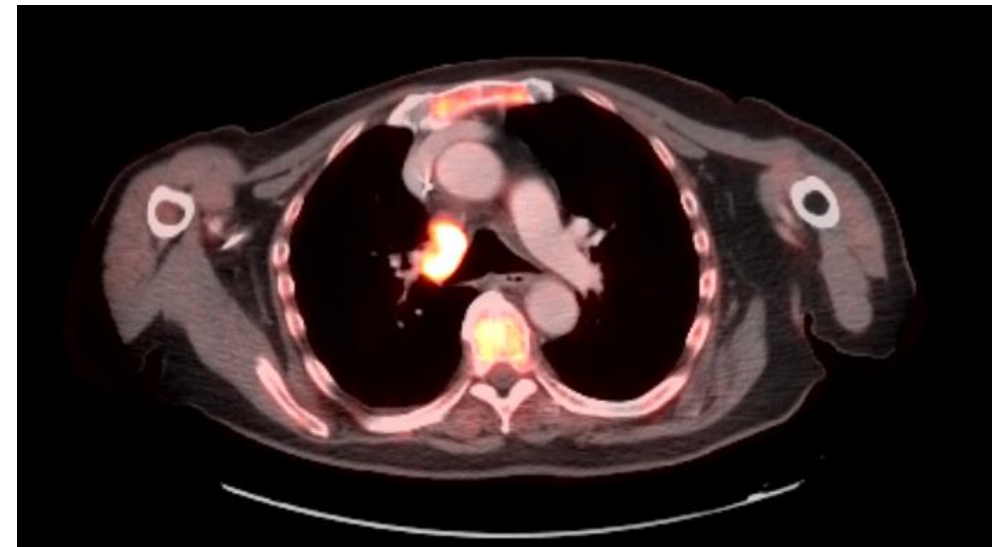
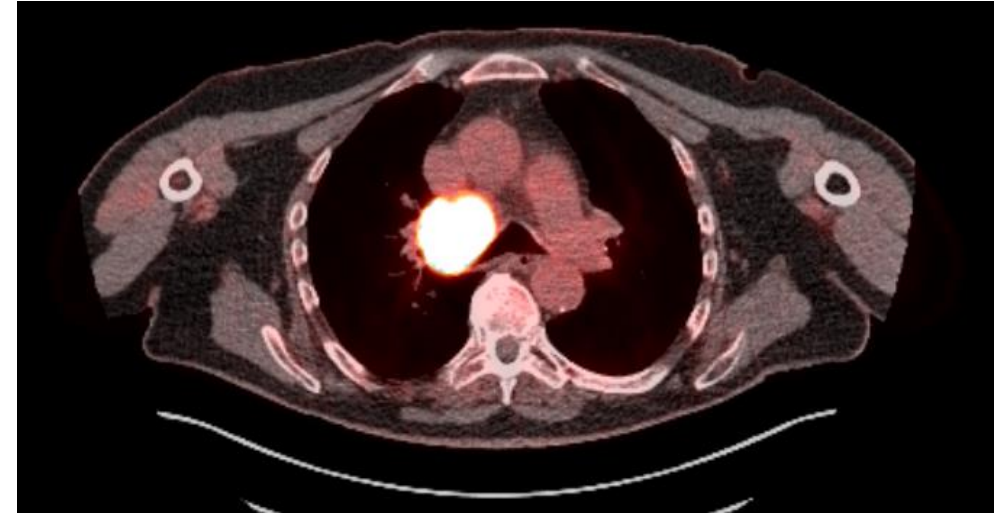


LAURA



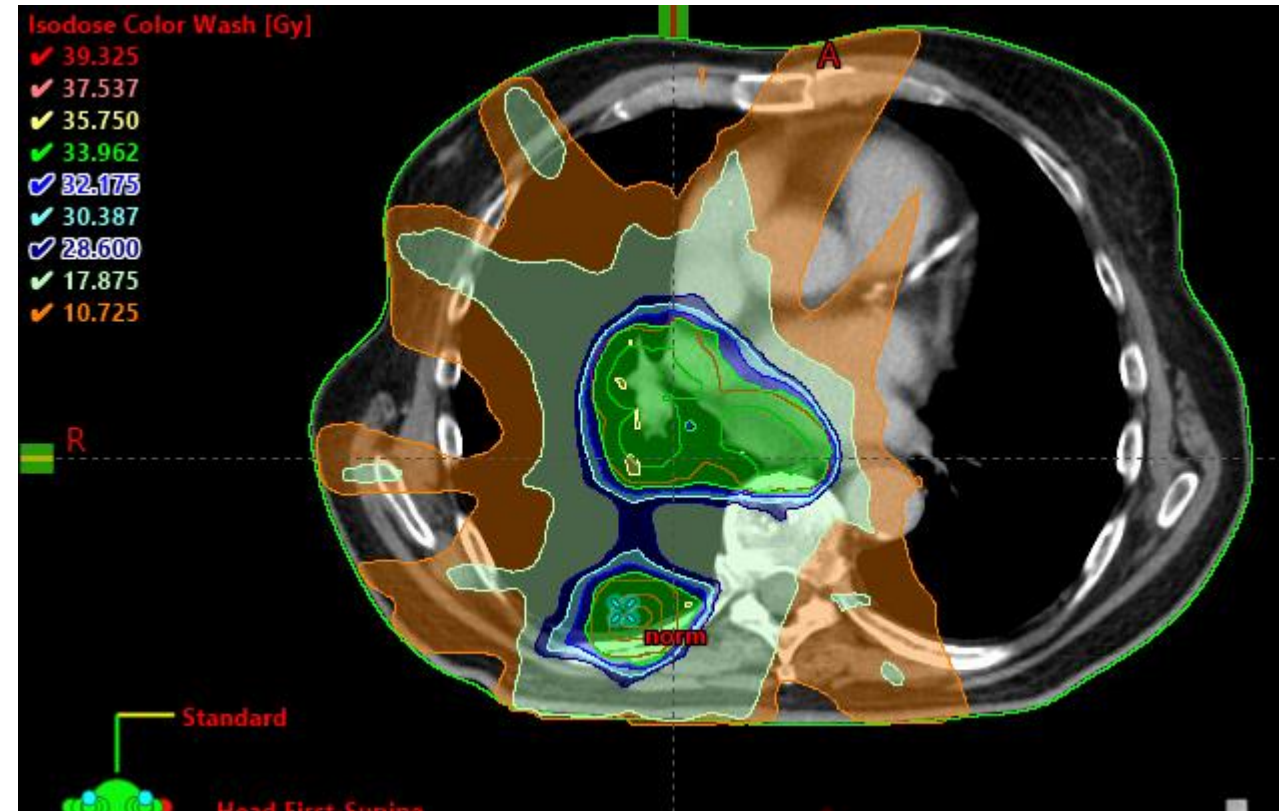
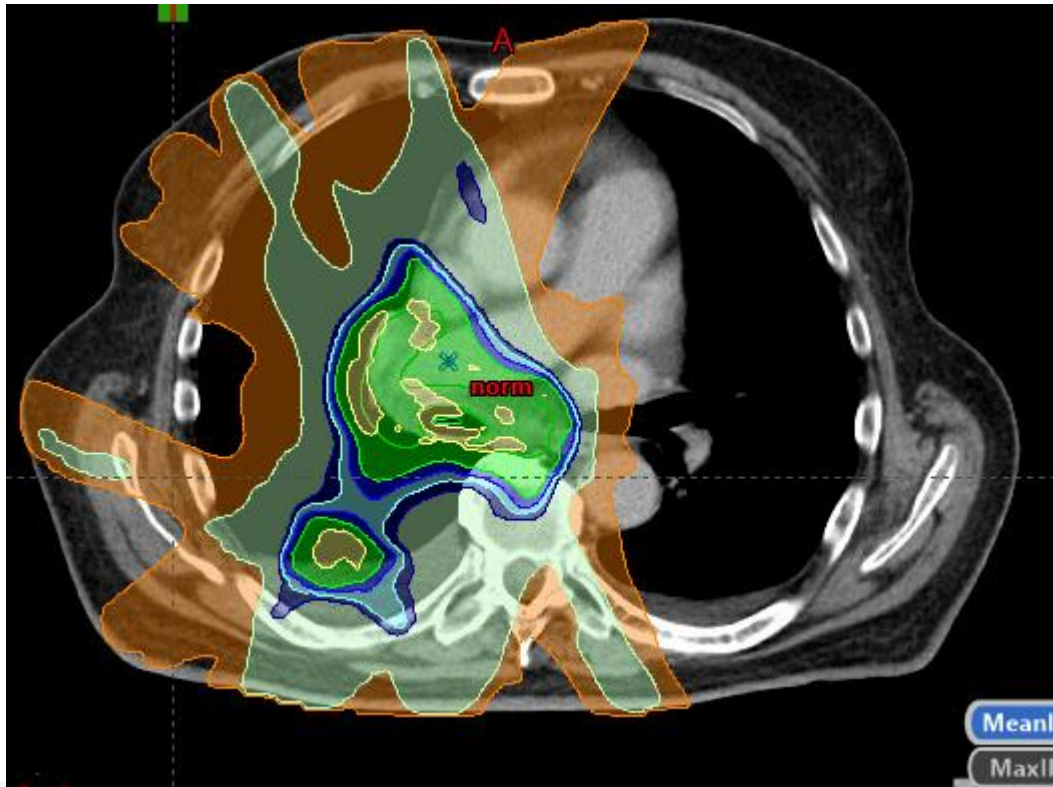
Back to the case

- ♂, 79 years
- Because of age and general condition: sequential CRT
- 3 courses of carboplatin-pemetrexed



Radiotherapy

- 22 fractions of 2.75 Gy
- Adaptive approach



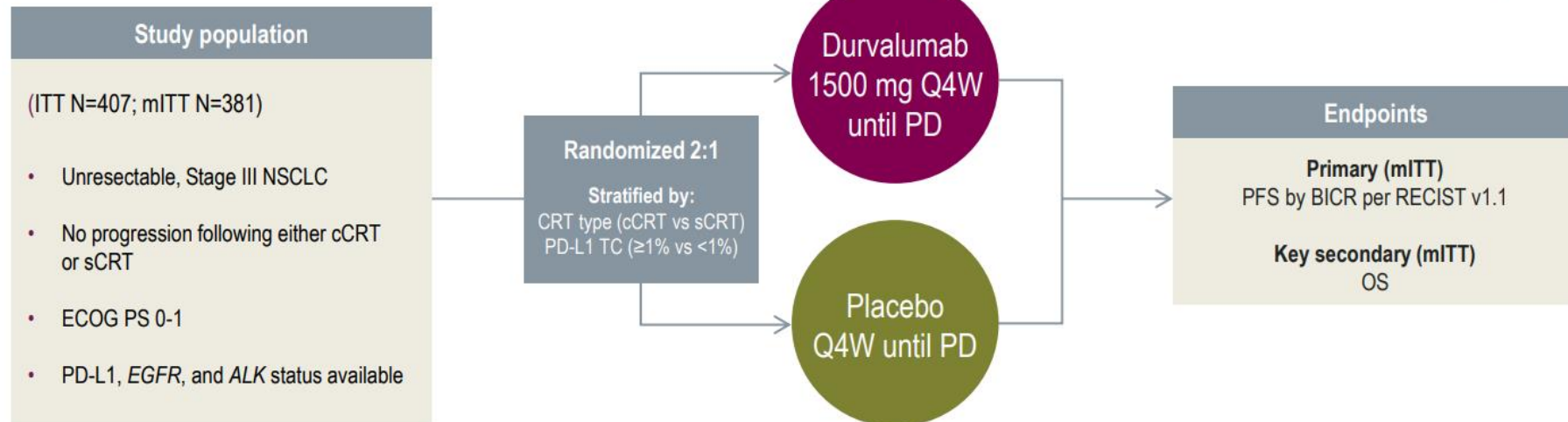
Concurrent vs Sequential?

- PACIFIC: no sCRT
- Reimbursement allows sequential approach

		Durvalumab (n=252)	Placebo (n=129)
Prior therapy, n (%)	cCRT	168 (66.7)	90 (69.8)
	sCRT	84 (33.3)	39 (30.2)

PACIFIC-5 study design

- A phase 3, randomized, double-blind, placebo-controlled, multicenter study of durvalumab as consolidation therapy in patients with locally advanced, unresectable, NSCLC (Stage III) who have not progressed following definitive, platinum-based chemoradiotherapy

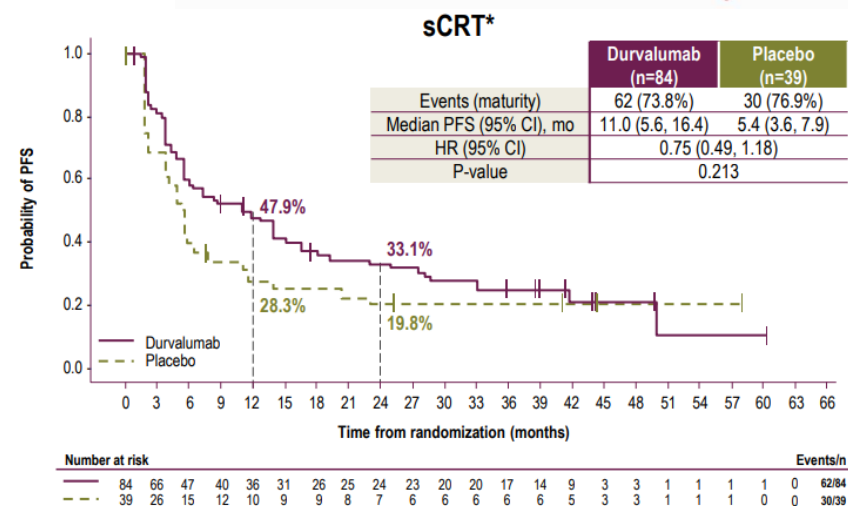
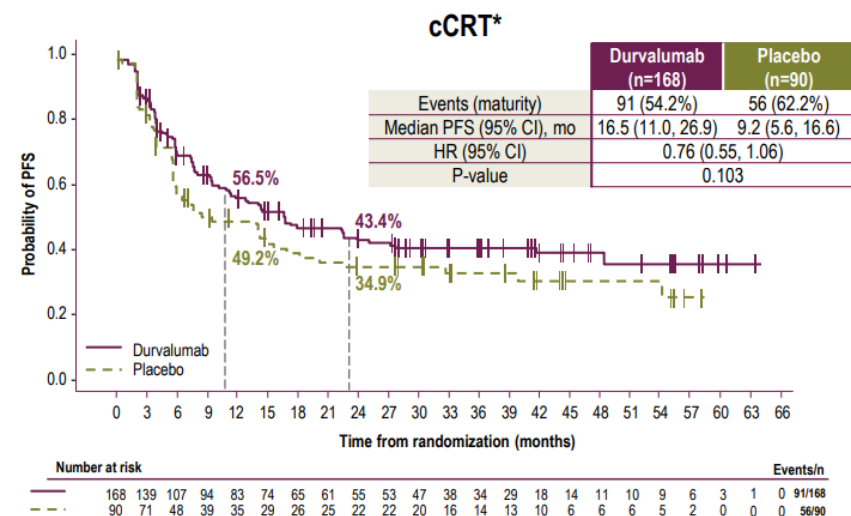
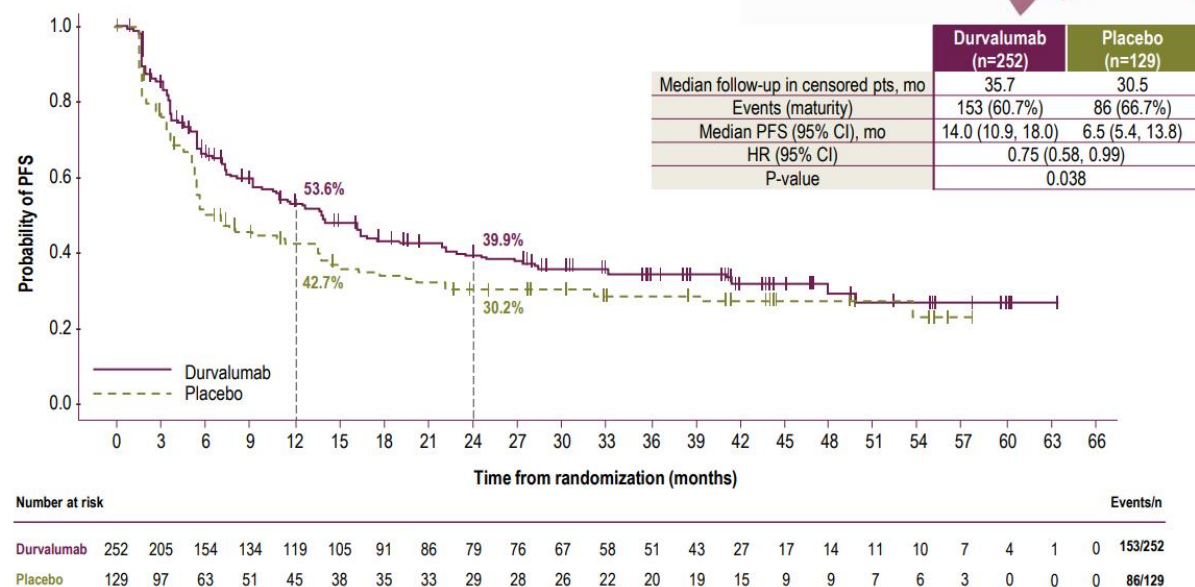


Modified intent-to-treat (mITT): all randomized patients in the ITT who are without sensitizing *EGFR* mutations or *ALK* rearrangement

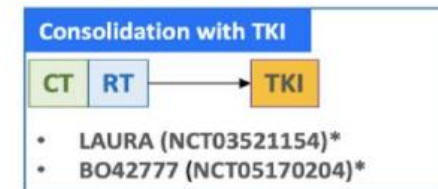
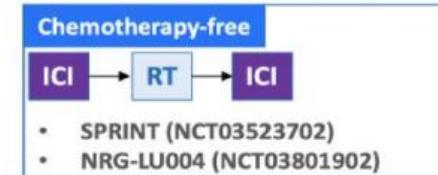
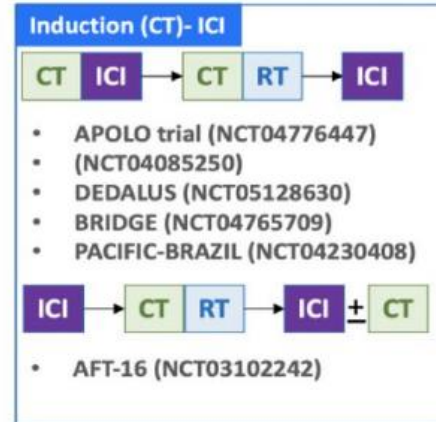
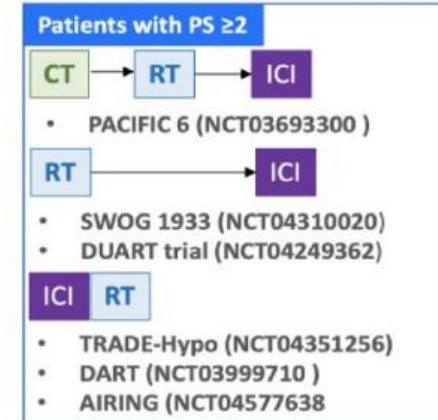
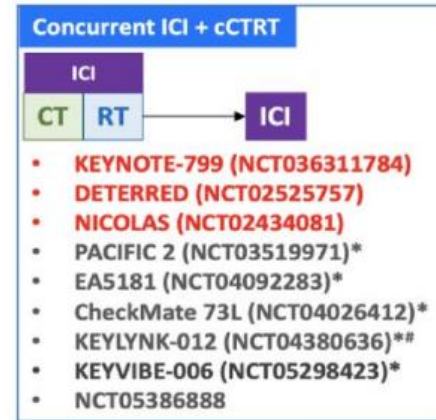
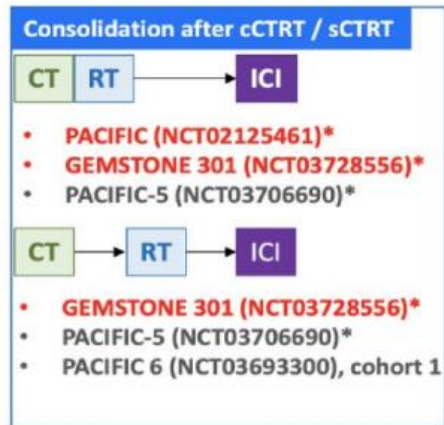
PACIFIC-5

PFS by BICR (mITT)

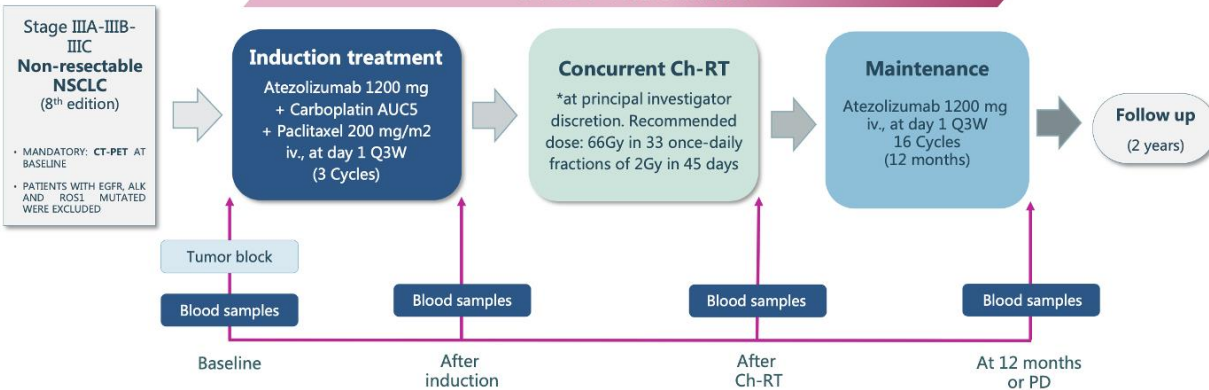
- Durvalumab demonstrated a statistically significant and clinically meaningful benefit in PFS compared to placebo



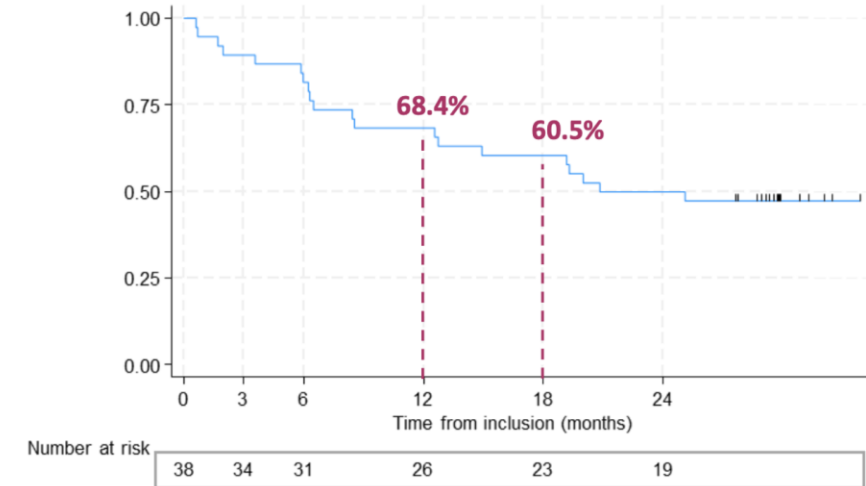
Future strategies



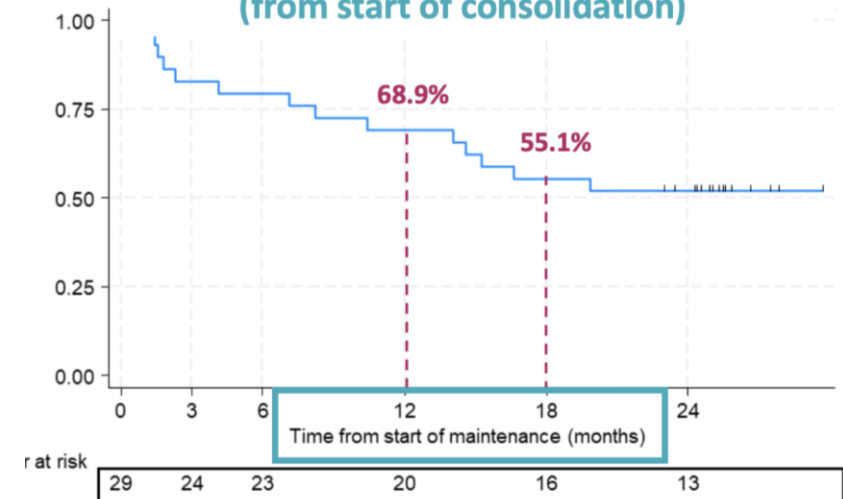
Rethink strategies



PFS in ITT population

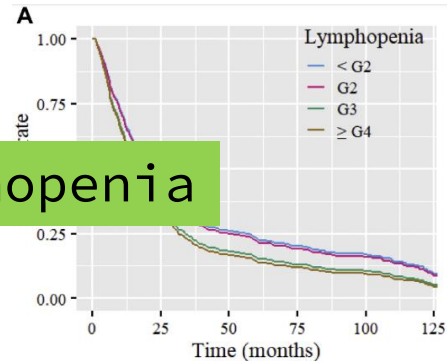
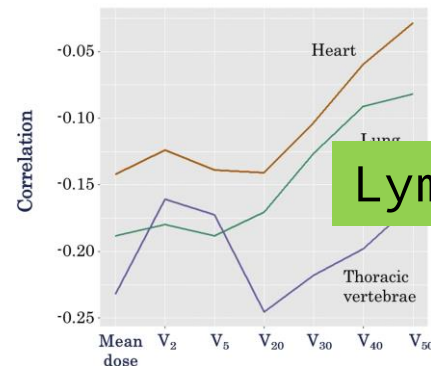
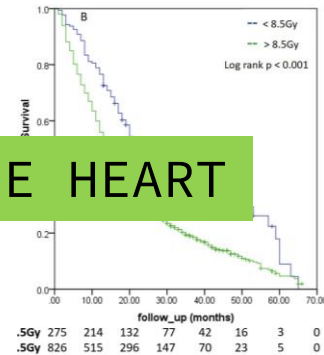


PFS "PACIFIC-like" (from start of consolidation)

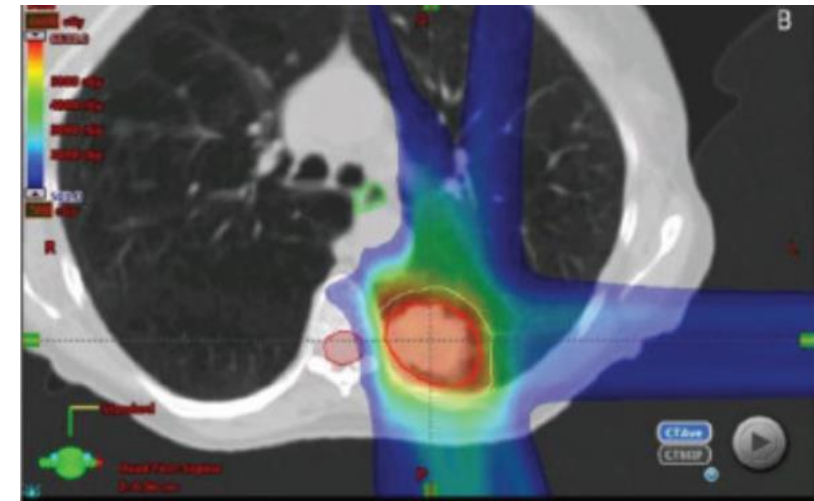


Radiotherapy is evolving

New OAR



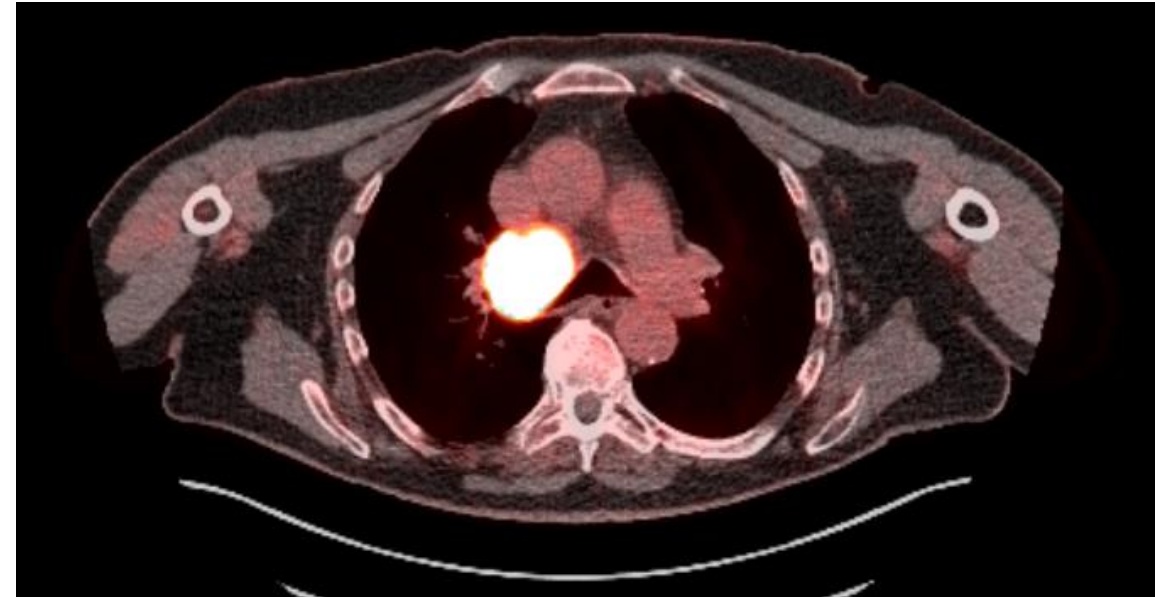
New techniques



What if??

- ♂, 45 years
- WHO 1
- FEV1: 95%, DLCO 50%
- Pathology EBUS-TBNA
 - Adenocarcinoma
 - PD-L1: 100%

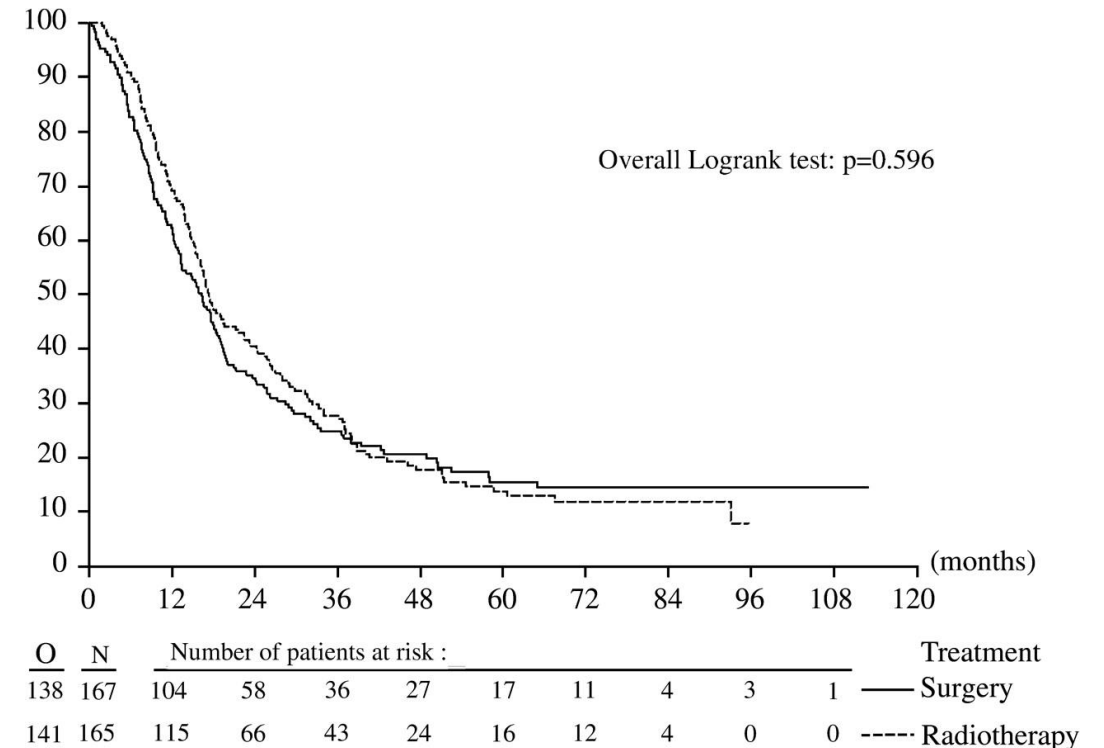
cT4N2M0: bulky N2 disease



Resectable after chemo?

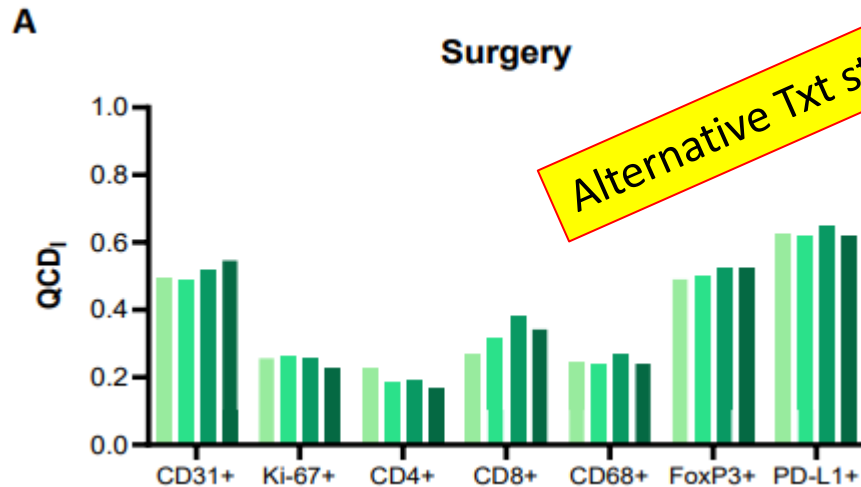
- EORTC 08941
 - Unresectable stage IIIA-N2 NSCLC
 - Induction chemotherapy
 - Followed by Sx vs RT
 - No OS benefit
 - pCR rate: 5%
 - R0: 50%
 - However:
 - Definition unresectable?
 - No cCRT, no min invasive surgery

⇔ pCR rates 17-25% with chemo-IO



Biomarkers

- PD-L1 not an optimal biomarker
 - Sensitivity
 - Heterogeneity



Alternative Txt strategies => Clinical TRIALS

PD-L1 <1%

Forde et al, ⁸ 2022	78	77	0.84 (0.54-1.32)
Wakelee et al, ¹⁰ 2023	138	151	0.75 (0.56-1.01)
Heymach et al, ⁴¹ 2023	122	125	0.76 (0.49-1.17)
Lu et al, ⁶³ 2023	69		0.59 (0.33-1.03)
Cascone et al, ⁶¹ 2023	92		0.73 (0.47-1.15)
Random-effects model		516	0.74 (0.62-0.89)

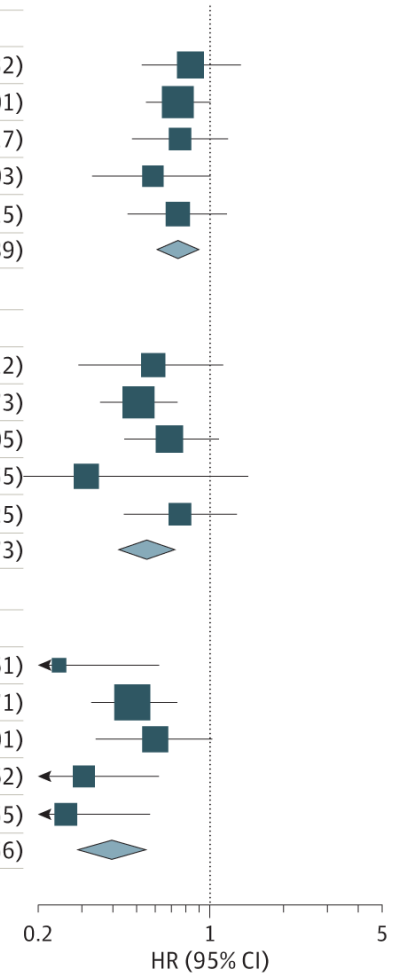
PD-L1 1%-49%

Forde et al, ⁸ 2022	51	47	0.58 (0.30-1.12)
Wakelee et al, ¹⁰ 2023	127	115	0.52 (0.36-0.73)
Heymach et al, ⁴¹ 2023	135	142	0.70 (0.46-1.05)
Lu et al, ⁶³ 2023	69	68	0.31 (0.18-0.55)
Cascone et al, ⁶¹ 2023	83	76	0.76 (0.46-1.25)
Random-effects model	465	448	0.56 (0.42-0.73)

PD-L1 ≥50%

Forde et al, ⁸ 2022	38	42	0.25 (0.10-0.61)
Wakelee et al, ¹⁰ 2023	132	134	0.48 (0.33-0.71)
Heymach et al, ⁴¹ 2023	109	107	0.60 (0.35-1.01)
Lu et al, ⁶³ 2023	64	64	0.31 (0.15-0.62)
Cascone et al, ⁶¹ 2023	45	52	0.26 (0.12-0.55)
Random-effects model	388	399	0.40 (0.28-0.56)

Heterogeneity: $I^2 = 32.1\%$; $\tau^2 \leq 0.1$; $P = .21$

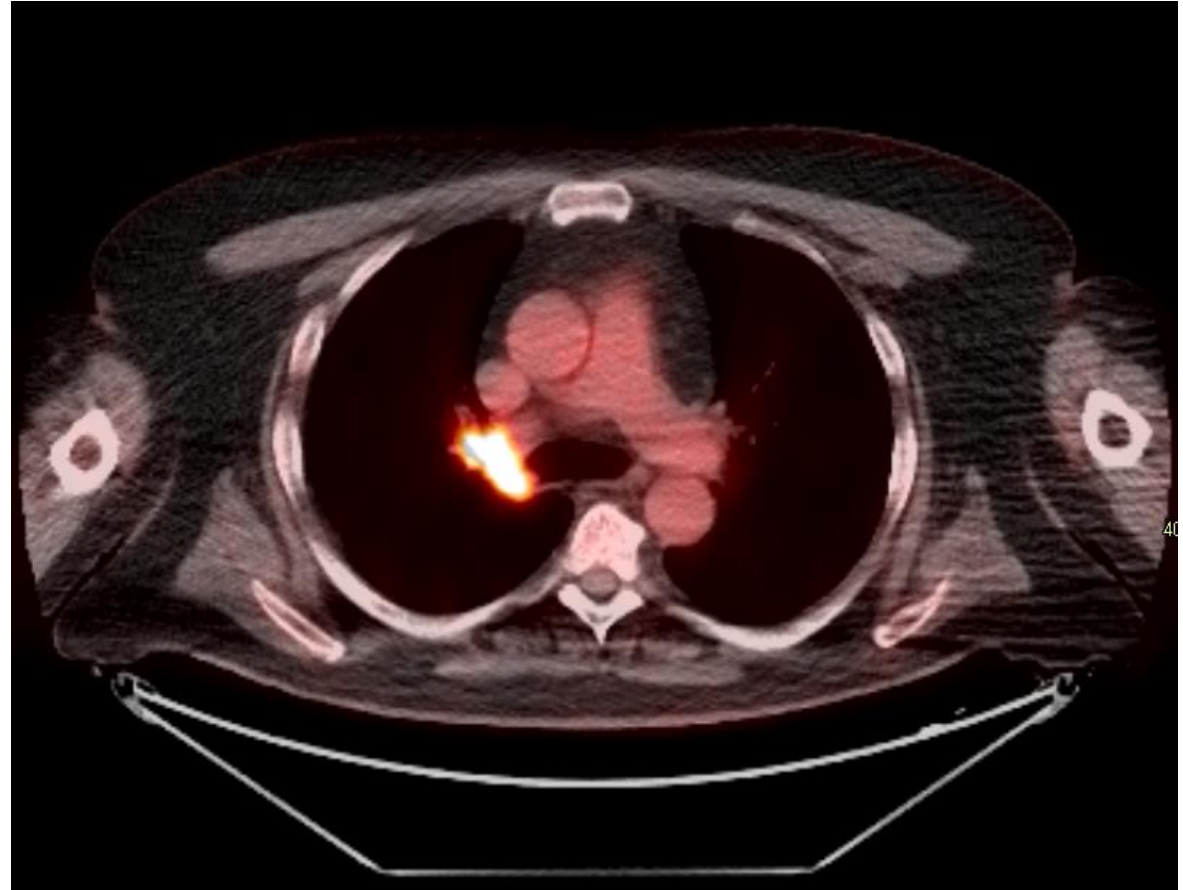


Conclusions Unresectable

- PACIFIC regimen remains SOC in unresectable, EGFR-, NSCLC PD-L1 $\geq 1\%$
- Resectability should be determined upfront
- Toxicity is major issue in treatment intensification
- Novel RT techniques/approaches
 - Adaptive RT
 - Heart sparing
 - Importance of lymphopenia
- In EGFR mutated patients: consolidation osimertinib is coming

Case 2

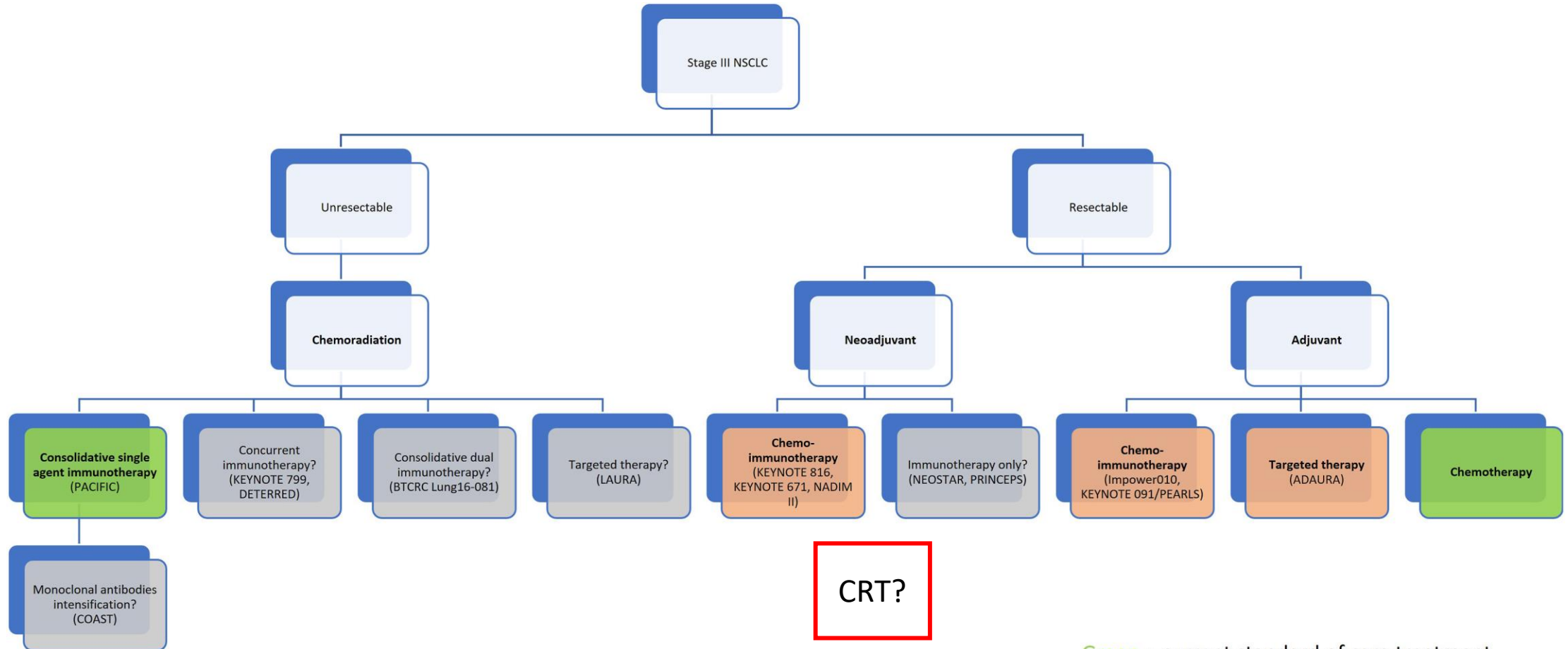
- ♂, 59 years
- 20 PY
- Adenocarcinoma
- PD-L1: 80%
- FEV1: 69%, DLCO: 103%
- cT4N0



What's your treatment of choice

1. Upfront surgery followed by chemo-immunotherapy
2. Induction chemo-immunotherapy followed by surgery
3. Induction chemoradiotherapy followed by surgery
4. Primary CRT followed by Durvalumab

Treatment options



Green = current standard of care treatment
Orange = emerging treatments
Grey = trials in progress

What happened to induction CRT?

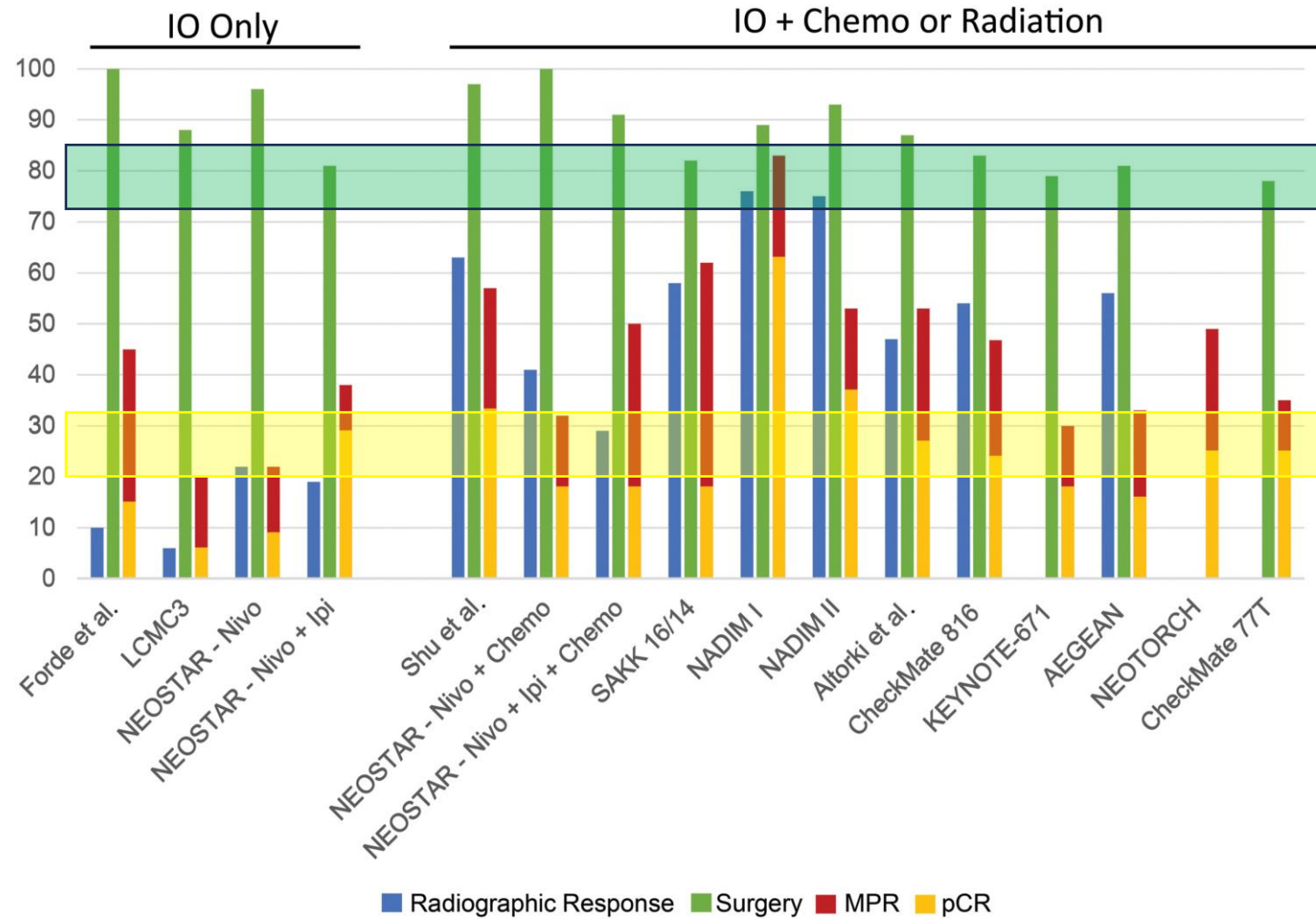
	SWOG9416/ INT0160	JCOG9806	ESPATUE	INT0139	SAKK trials
Dose	45Gy	45Gy	45Gy	45Gy	s44Gy
pCR	34%	21%	33%	18%	19%
MPR	61%	46%	/	/	/
PD	9%	5%	1.6%	/	/
Progressed to surgery	80%	76%	/	81%	79%
R0 resection	94%	89%	/	87%	80%

Rusch et al JCO 2007
Kunitoh et al. JCO 2008

Albain et al Lancet 2009
Eberhardt et al. JCO 2015
Konig ESMO Open 2022



Comparable to Chemo-IO



Induction C-RT

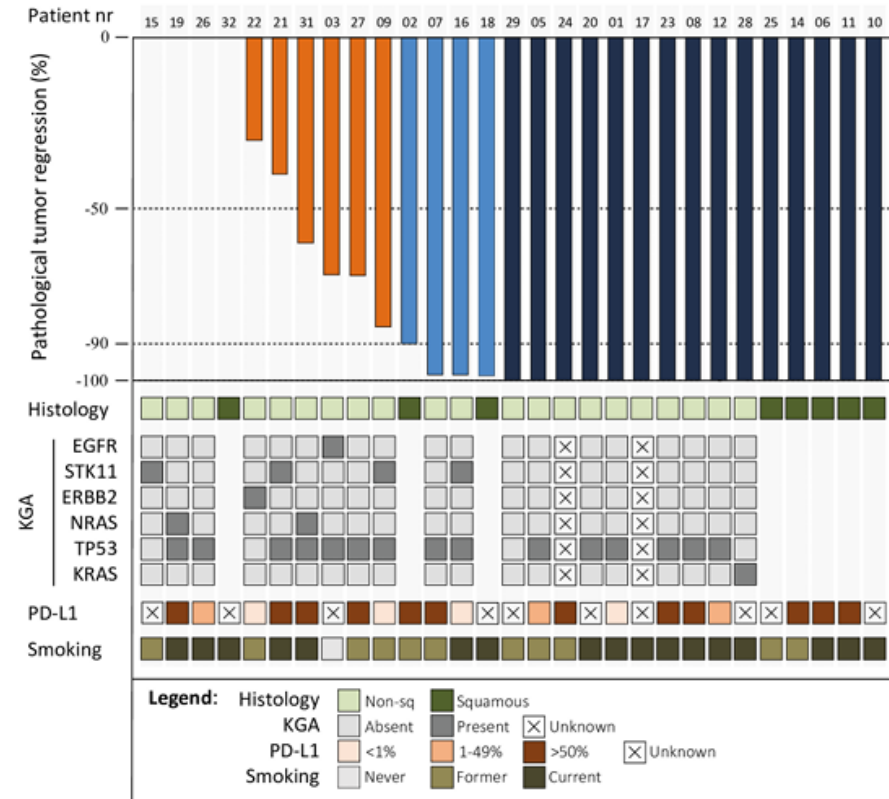


I0-CRT induction

Phase II INCREASE trial

- 30 pts
- cT3-4N0-2M0 NSCLC
- Ipi-Nivo-CRT
 - pCR: 50%
 - MPR: 63%
 - R0 rate: 100%
 - Grade 3-4 TRAE: 70%

A



Back to the case

- Upfront resectable
 - Advanced T-stage
 - cN0
 - No reliable biomarker
- => cCRT 45Gy



Conclusions

- Evolution in systemic treatment is rapidly changing the landscape in NSCLC and stage III disease
- Complexity increases
- Rethink dogmas on how local Txt fits into new treatment paradigms
 - True multidisciplinary cooperation
 - Need for well-run academic trials



Thank you for your attention



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QUESTIONS?

