

STATE OF THE ART IMMUNOTHERAPY FOR NON-AGA ADVANCED NSCLC

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DECLARATION OF INTERESTS



Interest	Company/organisation
Grants/research support	Roche, Boehringer Ingelheim, AstraZeneca, Takeda, Merck, Pfizer, Novartis, Gilead (institution)
Honoraria or consultation fees	Advisory boards (all institution): Amgen, Boehringer Ingelheim, Lilly, Novartis, Pfizer, Takeda, Merck, Janssen, MSD, Anheart, Bayer, AstraZeneca, Summit Therapeutics, BMS, Pierre Fabre, Daiichi
Participation in a company-sponsored bureau	Not applicable
Stock shareholder	Not applicable
Spouse/partner	Not applicable
Other support/potential conflict of interest	Speaker educationals/webinars: AstraZeneca, Bayer, Lilly, MSD, high5oncology, Takeda, Janssen, GSK, Sanofi, Pfizer (Inst), Medtalks, Benecke, VJOncology, Medimix (self) Member guideline committees: Dutch guidelines on NSCLC, brain metastases and leptomeningeal metastases (self), ESMO guidelines on metastatic NSCLC and SCLC (non-financial) Local PI pharma studies (Inst): MSD, AstraZeneca, GSK, Novartis, Merck, Roche, Takeda, Blueprint, Mirati, Abbvie, Gilead, MSD, Boehringer, Pfizer, Amgen Other (non-financial): secretary NVALT studies foundation, subchair EORTC metastatic NSCLC systemic therapy, vice-chair scientific committee Dutch Thoracic Group

OVERVIEW

Whats in the ESMO guidelines?

First line monotherapy immune checkpoint blocker (ICB)

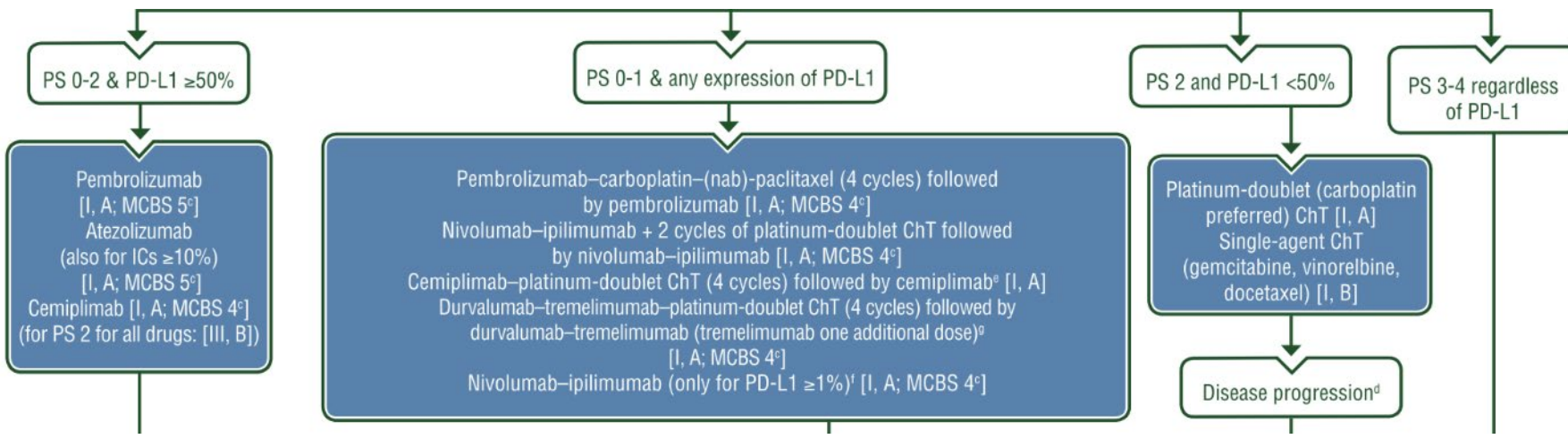
First line chemo-ICB

First line dual ICB combinations

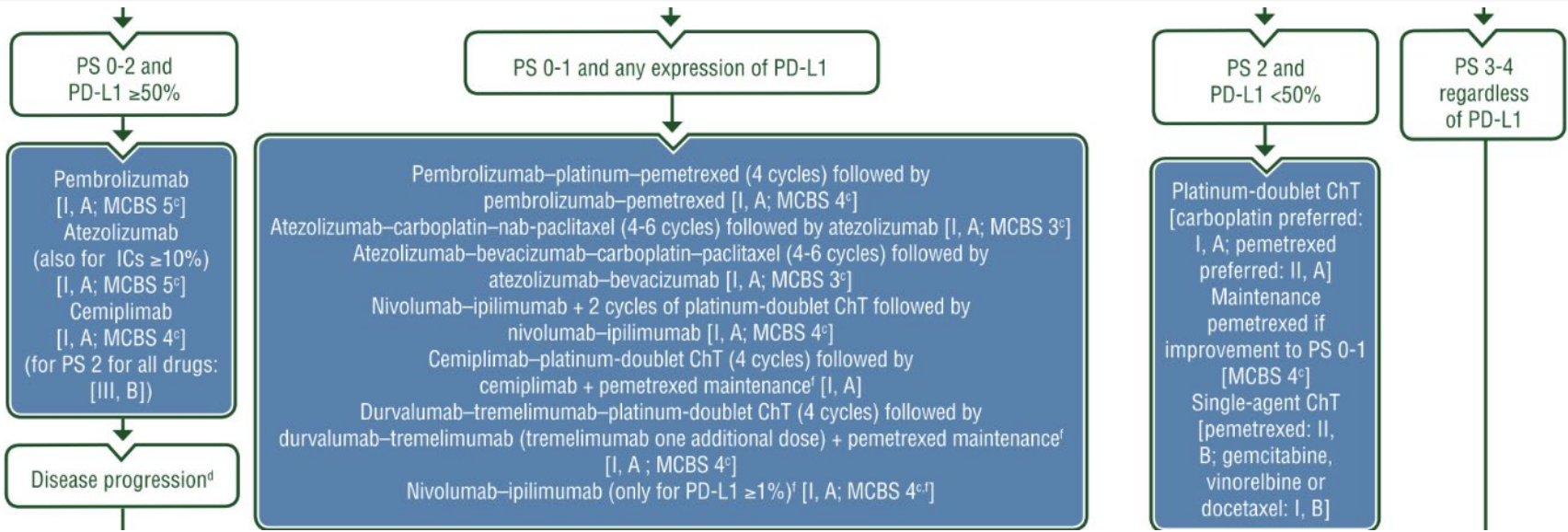
Second line and beyond

Conclusions and take home messages

ESMO CPG FIRST LINE ICB METASTATIC NON-ONCOGENE ADDICTED NSCLC



squamous



Non-squamous

ESMO LIVING GUIDELINE CURRENTLY UPDATED



ESMO Non-Oncogene-Addicted Metastatic Non-Small-Cell Lung Cancer Living Guideline

Version:
v1.1 - March 2024

To cite this living guideline, please include the original Clinical Practice Guideline citation "[Ann Oncol. 2023;34\(4\):358-376](#)" and this online publication, including date and version number: "[ESMO Non-Oncogene-Addicted Metastatic Non-Small-Cell Lung Cancer Living Guidelines, v1.1 March 2024](#)"

This living guideline was prepared by L Hendriks, F Cortiula, E Mariamidze, L Castelo-Branco, D Martins-Branco, C Sessa, G Pentheroudakis and M Reck, on behalf of the Clinical Practice Guideline author group.



FIRST LINE MONOTHERAPY ICB

FIRST LINE MONO ICB DATA



KEYNOTE-024

IMPOWER110 WT

EMPOWER LUNG1

mPFS **7.7** vs **5.5** months
HR 0.50 (0.39-0.65)

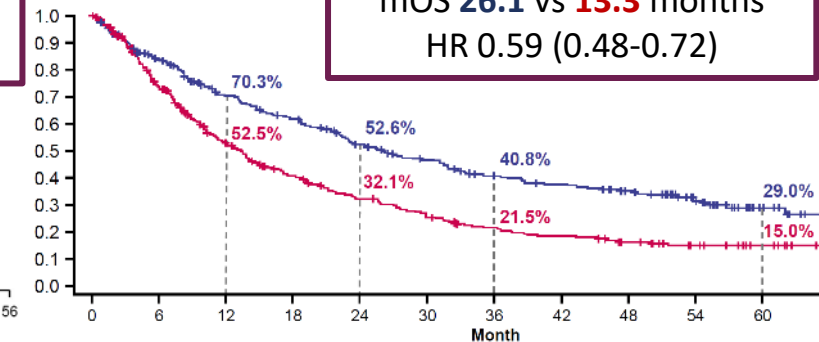
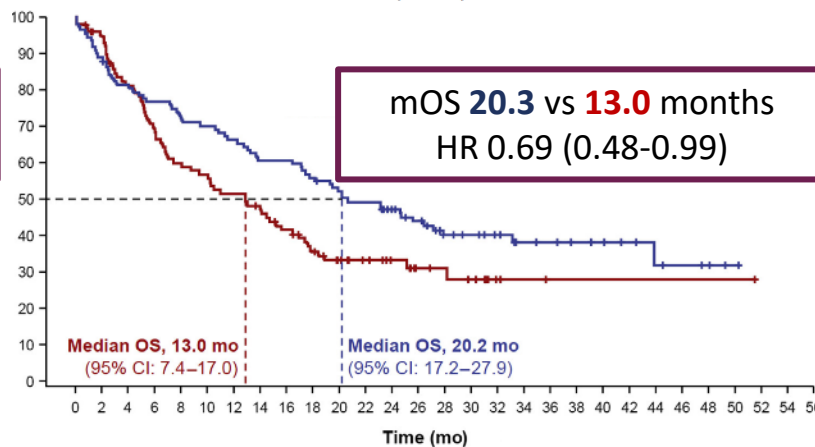
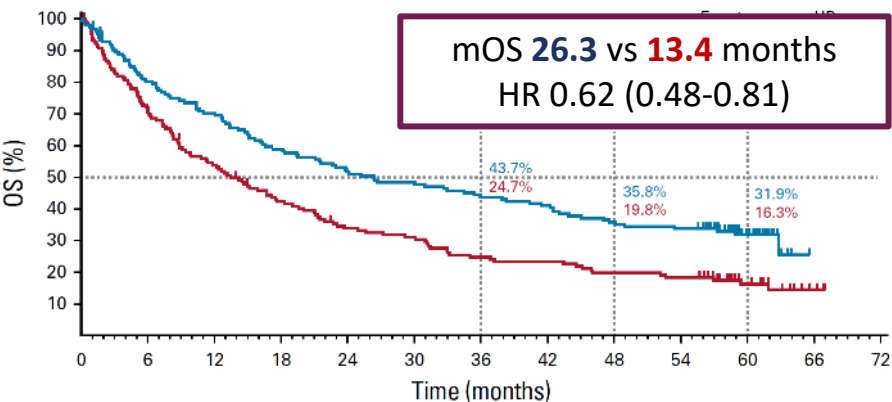
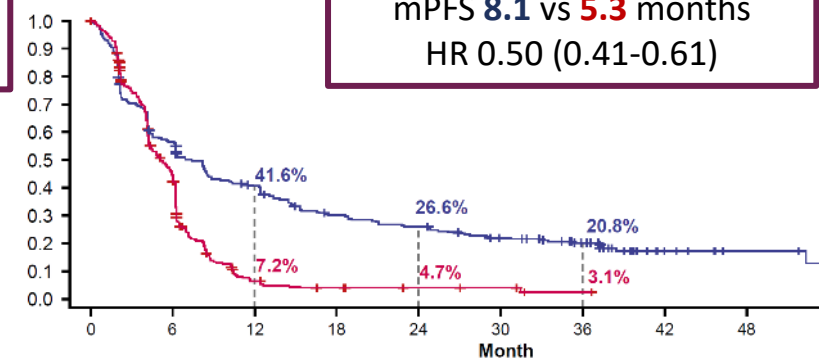
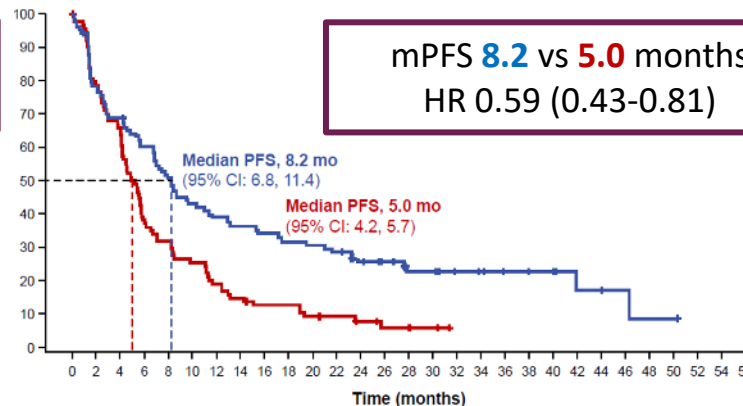
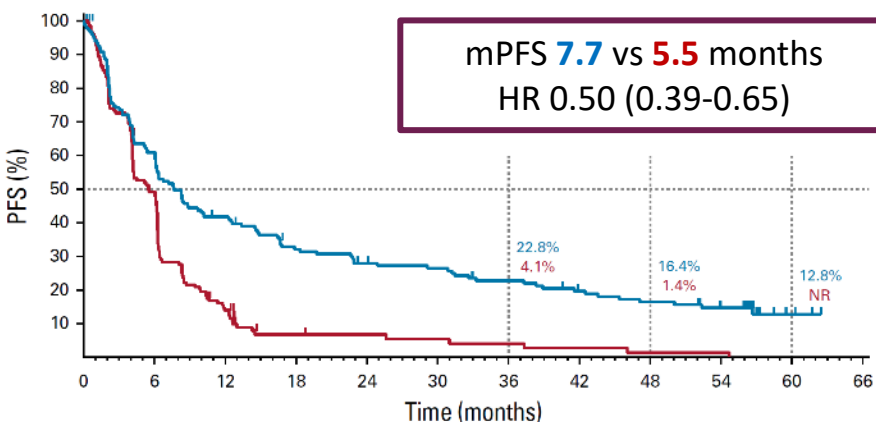
mPFS **8.2** vs **5.0** months
HR 0.59 (0.43-0.81)

mPFS **8.1** vs **5.3** months
HR 0.50 (0.41-0.61)

mOS **26.3** vs **13.4** months
HR 0.62 (0.48-0.81)

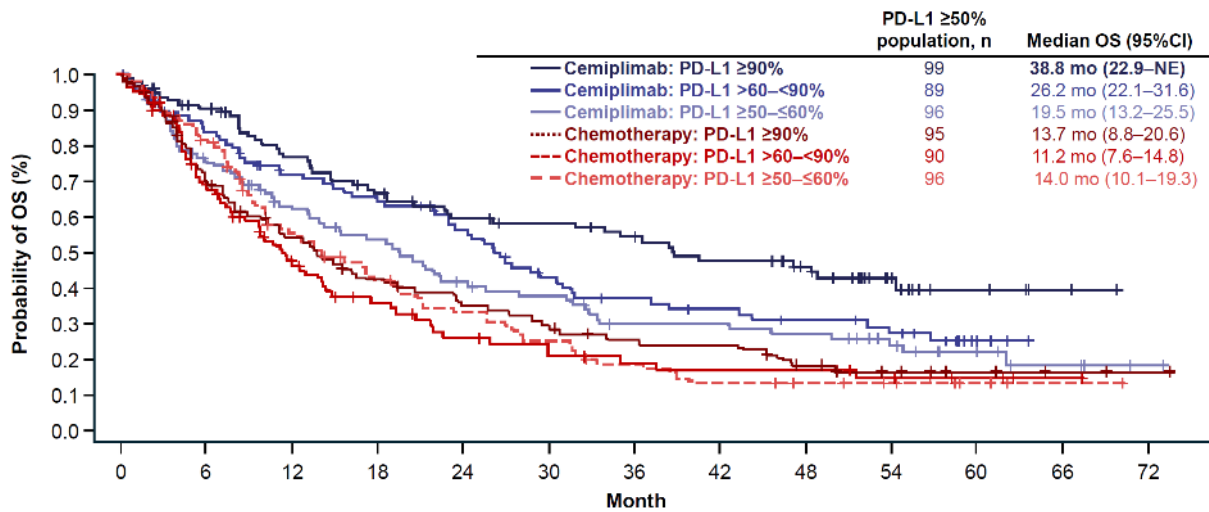
mOS **20.3** vs **13.0** months
HR 0.69 (0.48-0.99)

mOS **26.1** vs **13.3** months
HR 0.59 (0.48-0.72)

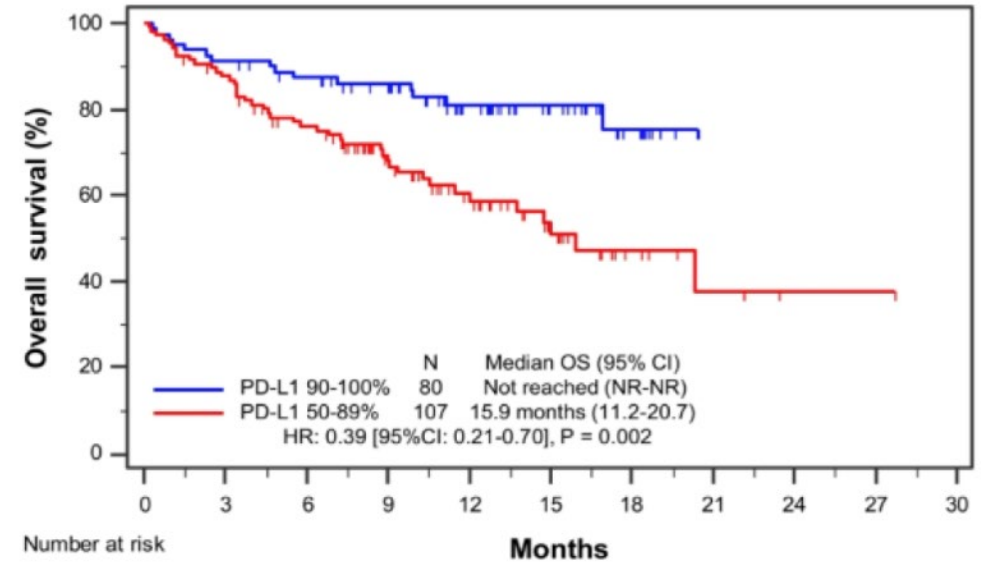


HIGHER PD-L1 = MORE BENEFIT

EMPOWER LUNG1



Pembro data



	0	3	6	9	12	15	18	21	24	27	30
PD-L1 90-100%	80	73	66	57	38	22	10	0	0	0	0
PD-L1 50-89%	107	92	75	51	33	18	8	4	1	1	0

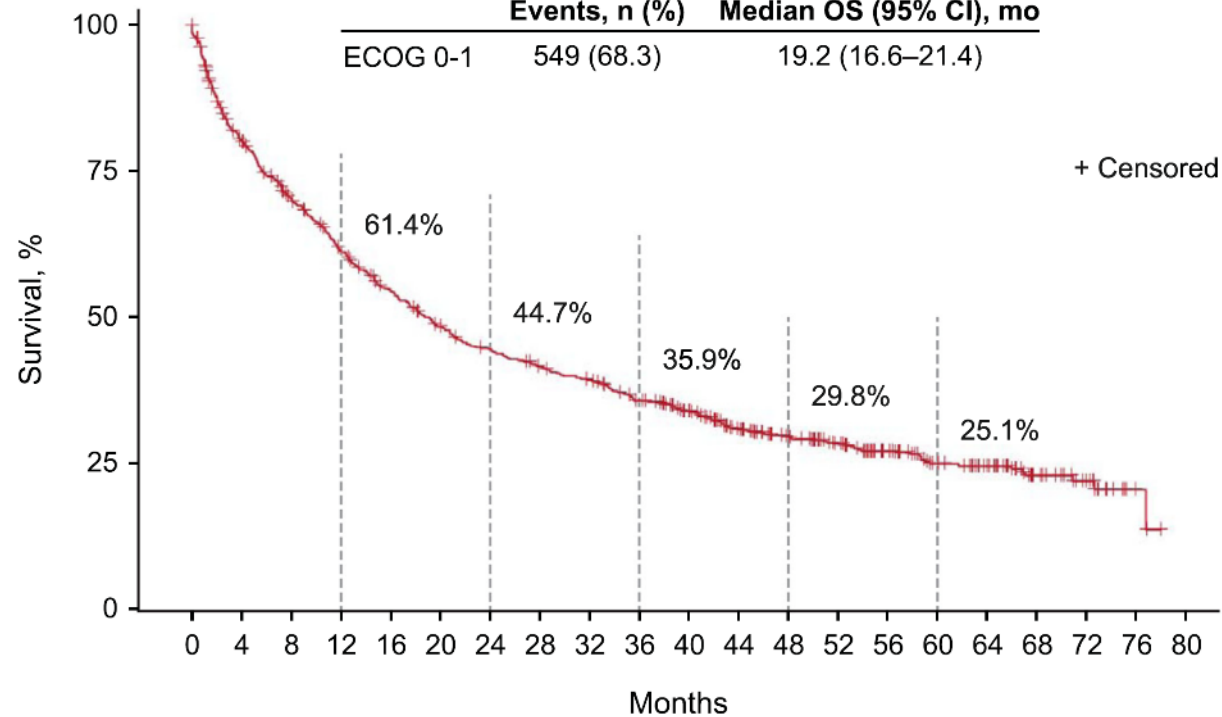
REAL WORLD DATA

Pembrolizumab PD-L1 $\geq 50\%$



N = 804 ECOG PS 0-1

	Events, n (%)	Median OS (95% CI), mo
ECOG 0-1	549 (68.3)	19.2 (16.6–21.4)



mOS slightly lower vs trials

5y OS comparable – slightly lower

FIRST LINE CHEMO-ICB COMBOS

CHEMO-ICB VS CHEMO PHIII TRIALS

Non-squamous



Anti-PD-L1 + ChT		Patients	PFS (months)	OS (months)
Keynote 189 (pembrolizumab)	CisP/CbP + pemetrexed	616	9 vs 4.9, HR 0.50	5 years OS 19.4%
IMPower 150 (atezolizumab)	CbP-paclitaxel ± bevacizumab	800	8.3 vs 6.8, HR 0.62	19.5 vs 14.7, HR 0.80
IMPower 130 (atezolizumab)	CbP + nab-paclitaxel	679	7.0 vs 5.5, HR 0.64	18.6 vs 13.9, HR 0.79
IMPower 132 (atezolizumab)	CisP/CbP + pemetrexed	578	7.7 vs 5.2, HR 0.56	17.5 vs 13.6, HR 0.86
ORIENT-11 (sintilimab)	CisP/CbP + pemetrexed	397	9.2 vs 5.0, HR 0.49	24.2 vs 16.8, HR 0.65
Camel-Nsq (camrelizumab)	CbP + pemetrexed	412	11.3 vs 8.3, HR 0.60	NR vs 20.9, HR 0.73
Rationale-304 (tislelizumab)	Cis-CbP + pemetrexed	332	9.8 vs 7.6, HR 0.61	21.4 vs 21.3, HR 0.9

All PD-L1 levels eligible

Outcomes ↓ with ↓ PD-L1

Slide S Peters

L Hendriks

ChT, chemotherapy; HR, hazard ratio; OS, overall survival; PD-L1, programmed death-ligand 1; PFS, progression-free survival. Gandhi KN189, NEJM 2018; Rodriguez-Abreu, ASCO 2020; Socinski, NEJM 2018 and AACR 2020; Papadimitrakopoulou, WCLC 2018; Cappuzzo, ESMO 2018; Yang, JTO 2021; Nishio, ESMO Asia 2020 and JTO 2020; Gray, WCLC 2020; Zhou, Lancet Respir Med 2020; Lu, JTO 2021; Yang, ELCC 2022.

CHEMO-ICB VS CHEMO PHIII TRIALS

Squamous



Anti-PD-L1 + ChT		Patients	PFS (months)	OS (months)
Keynote 407 (pembrolizumab)	CisP/CbP + paclitaxel or nab-paclitaxel	559	8.0 vs 5.1, HR 0.59	5 years OS 18.4%
IMPower 131 (atezolizumab)	CisP/CbP + paclitaxel or nab-paclitaxel	684	6.3 vs 5.6, HR 0.71	14.2 vs 13.5, HR 0.88
Orient-12 (sintilimab)	CisP/CbP + gemcitabine	357	5.5 vs 4.9, HR 0.54	NR vs NR, HR 0.57
Camel-Sq (camrelizumab)	CbP-paclitaxel	389	8.5 vs 4.9, HR 0.37	NR vs 14.5, HR 0.55
Rationale-307 (tislelizumab)	CbP-(nab)paclitaxel	355	7.7 vs 9.9 vs 5.5 HR 0.45 and 0.43	22.8 vs NE vs 20.2 HR 0.68 and 0.75

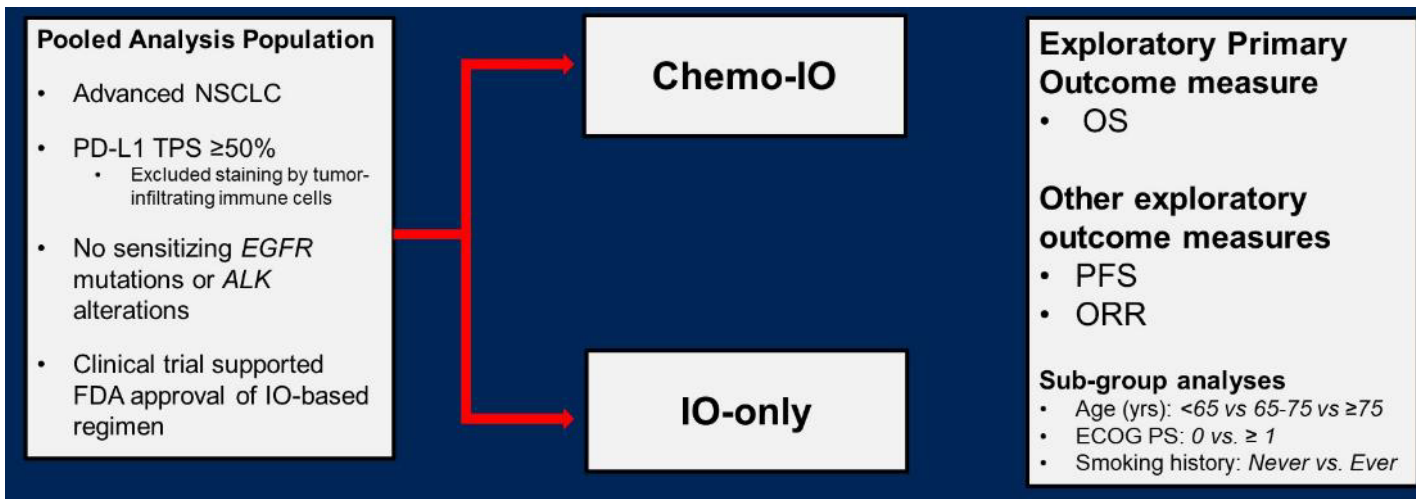
All PD-L1 levels eligible

Outcomes ↓ with ↓ PD-L1

Slide S Peters

WHO NEEDS CHEMO IN THE HIGH PD-L1 SUBGROUP?

FDA pooled analysis

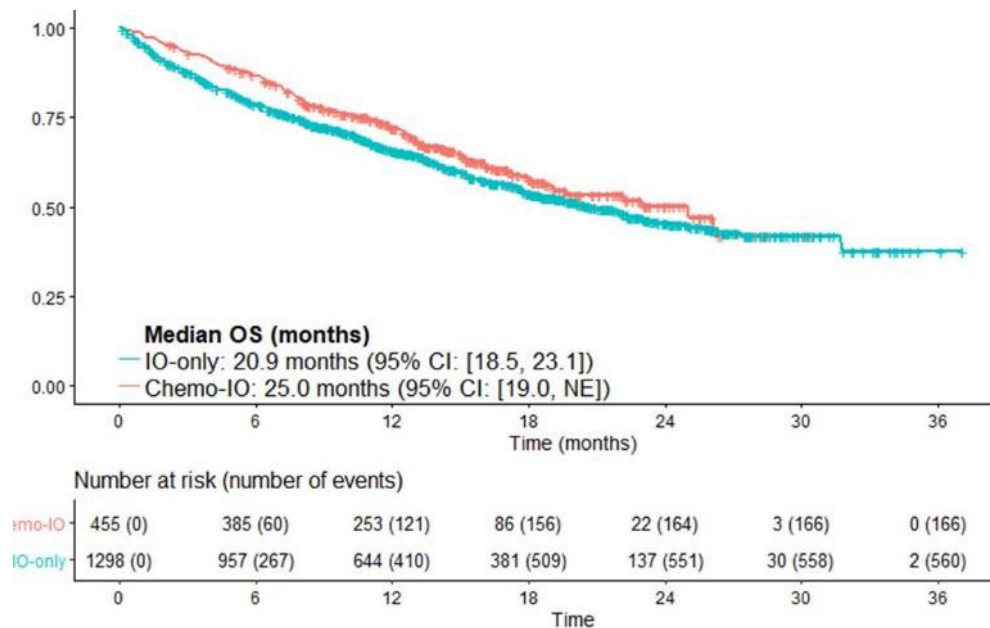


N = 455 chemo-ICB
N = 1298 ICB
N = 1436 chemo
 Baseline characteristics similar

Similar findings retrospective RWD (HR 1.04)

 Esp 75+ NO benefit Chemo-ICB
 (similar data in Japanese retrosp series N=1245)

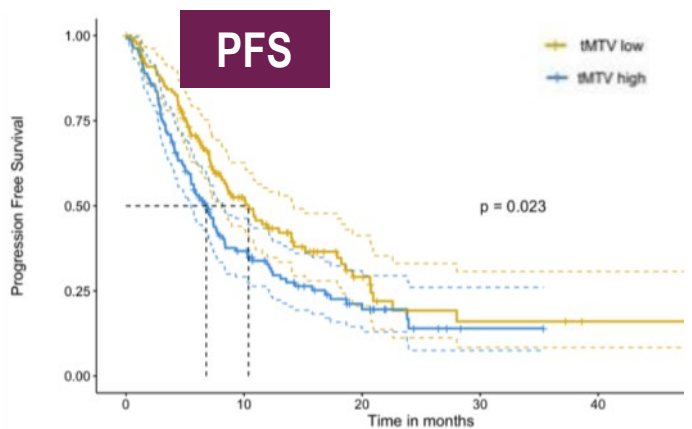
 Esp never smokers BENEFIT chemo-ICB



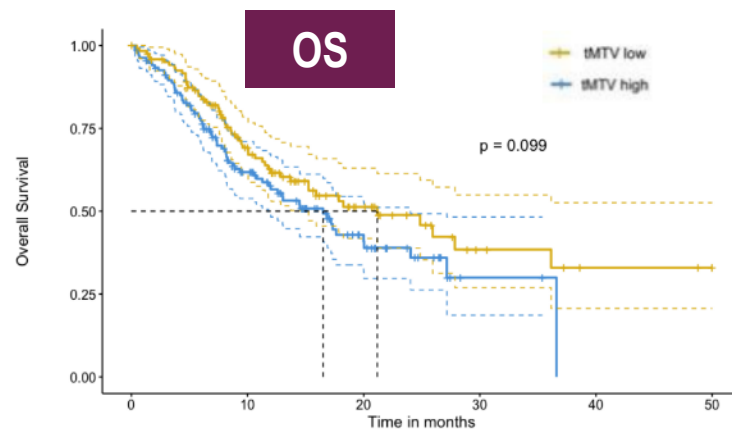
WHO NEEDS CHEMO IN THE HIGH PD-L1 SUBGROUP?



Radiological / tumor-related biomarkers? – data not specifically for PD-L1 high

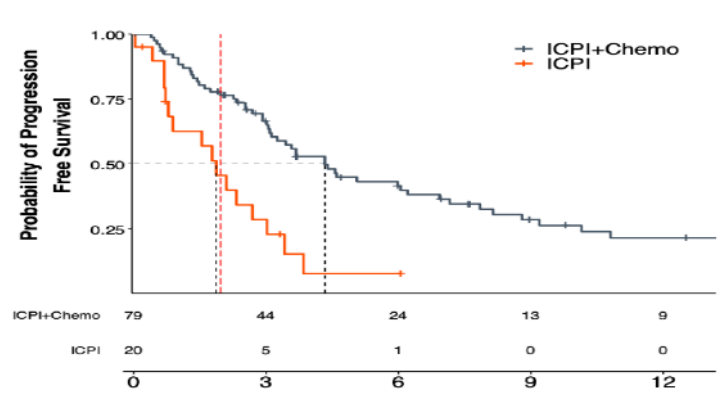
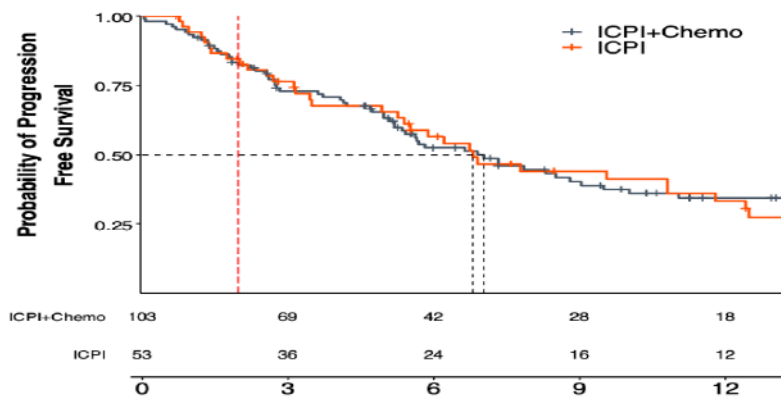


Number at risk: n (%)



Number at risk: n (%)

N = 257 PD-L1+
tMTV ↑ with ↓ survival in ICB mono, but not chemo-ICB

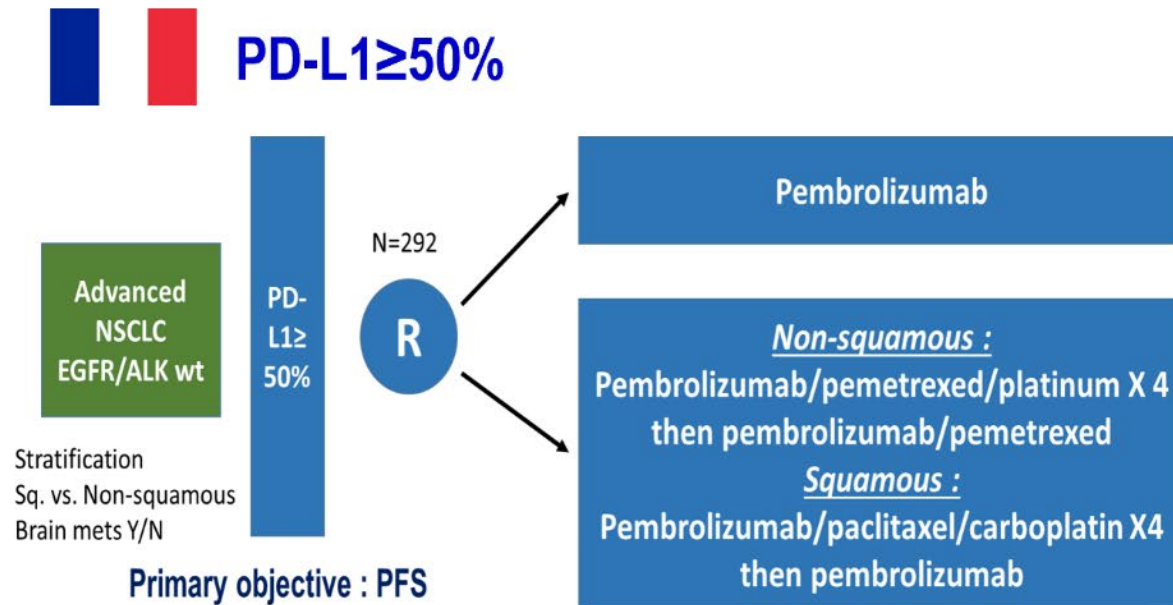


N = 255
High, but not low tumor fraction associated with ↓ PFS on ICB mono vs chemo-ICB

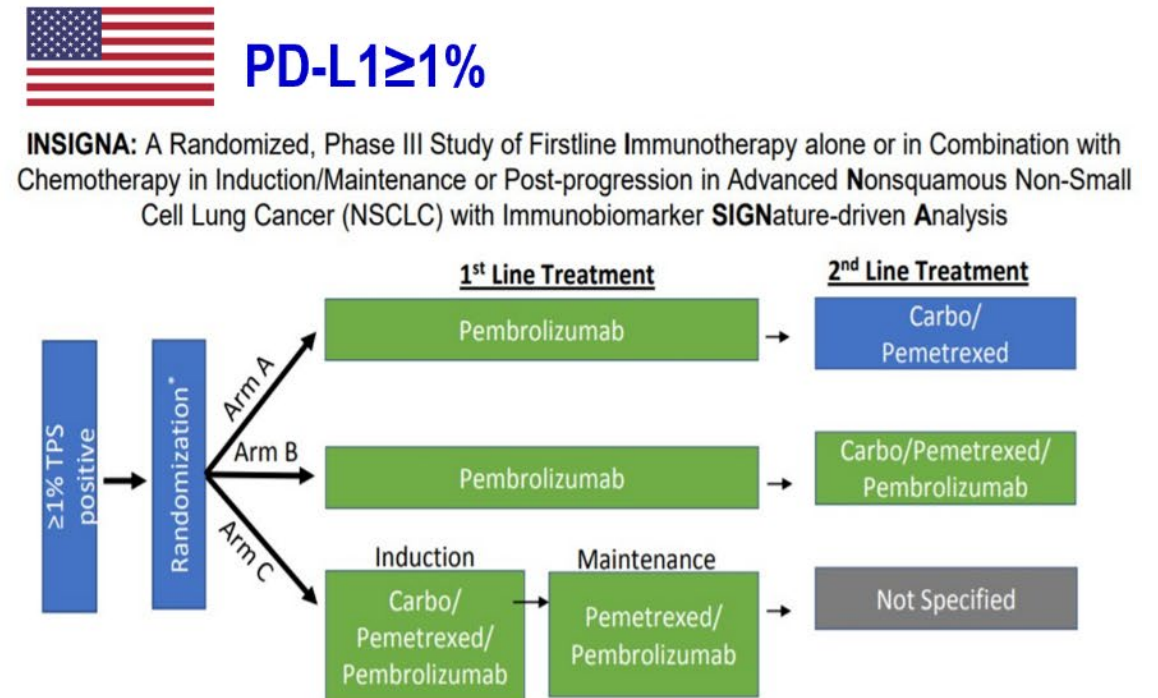
In other series (N=) lower PD-L1, disease burden (liver mets), JAK2 and STK11 mutations associated with early PD on ICB mono, but no OS difference

PROSPECTIVE TRIALS ICI VS CHEMO-ICI ONGOING

PERSEE NCT04547504



INSIGNA NCT03793179



(Slide courtesy of Dr. Planchard)

DUAL ICB COMBOS

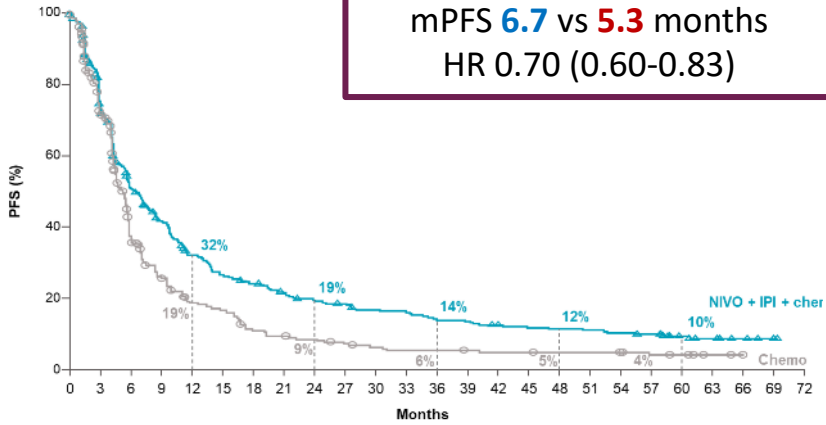


DUAL ICB +/- CHEMO PHIII TRIAL DATA

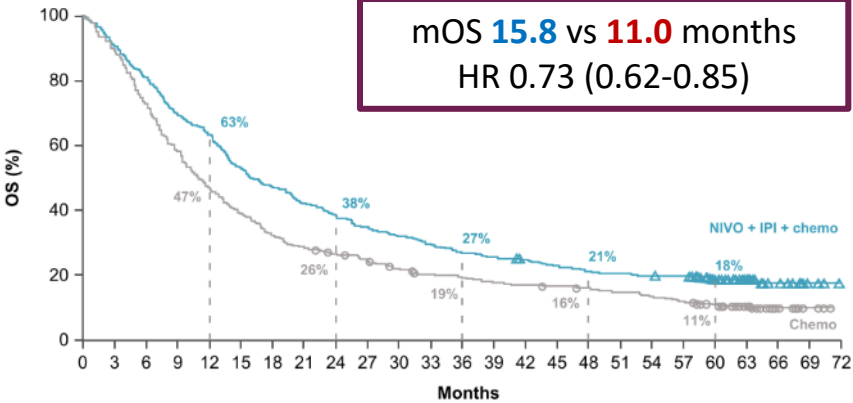


CM9LA

mPFS **6.7** vs **5.3** months
HR 0.70 (0.60-0.83)

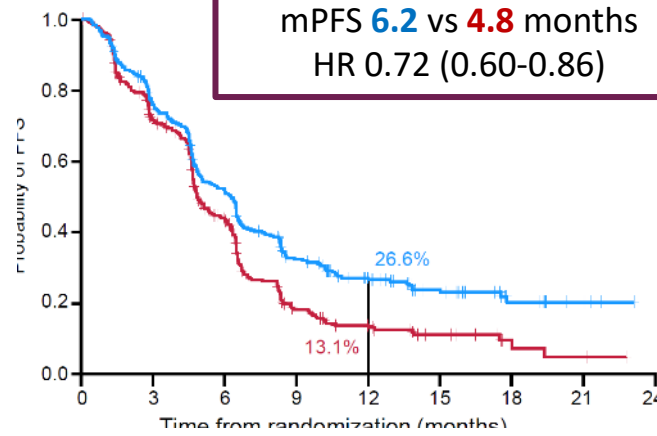


mOS **15.8** vs **11.0** months
HR 0.73 (0.62-0.85)

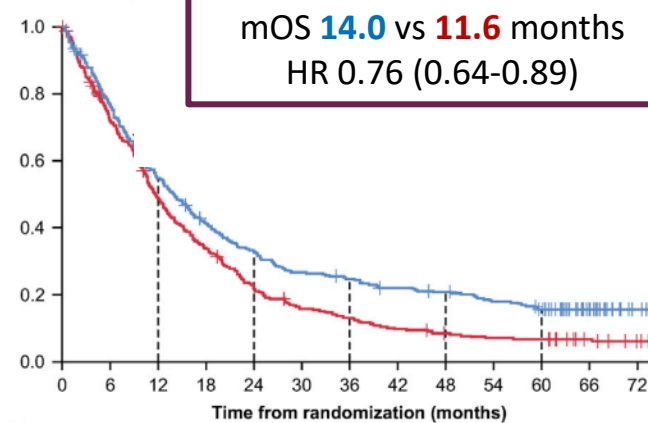


POSEIDON

mPFS **6.2** vs **4.8** months
HR 0.72 (0.60-0.86)

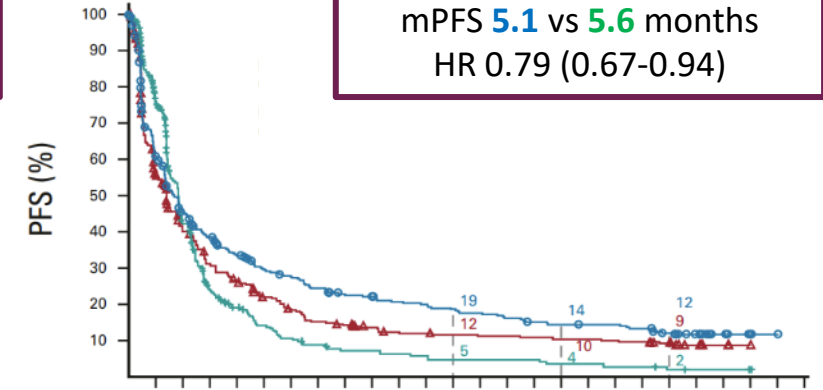


mOS **14.0** vs **11.6** months
HR 0.76 (0.64-0.89)

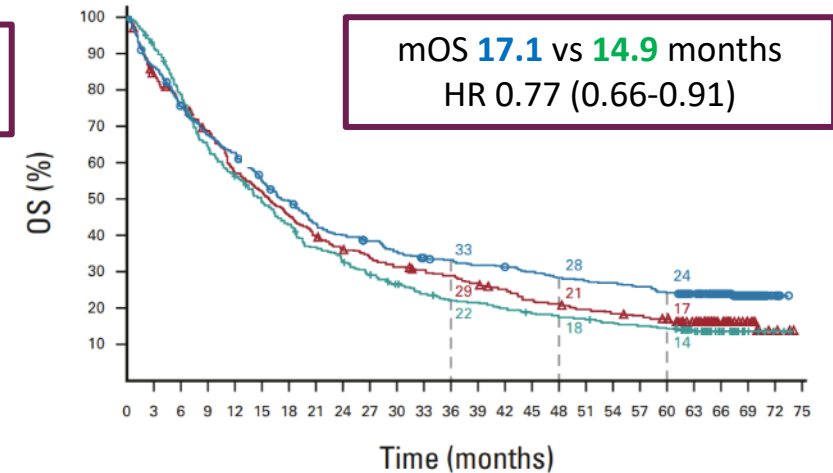


CM227 PD-L1+

mPFS **5.1** vs **5.6** months
HR 0.79 (0.67-0.94)

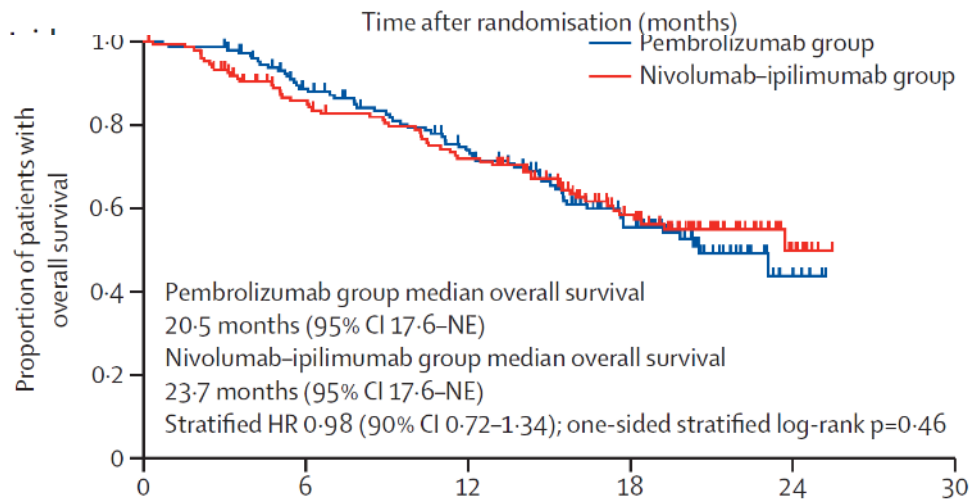
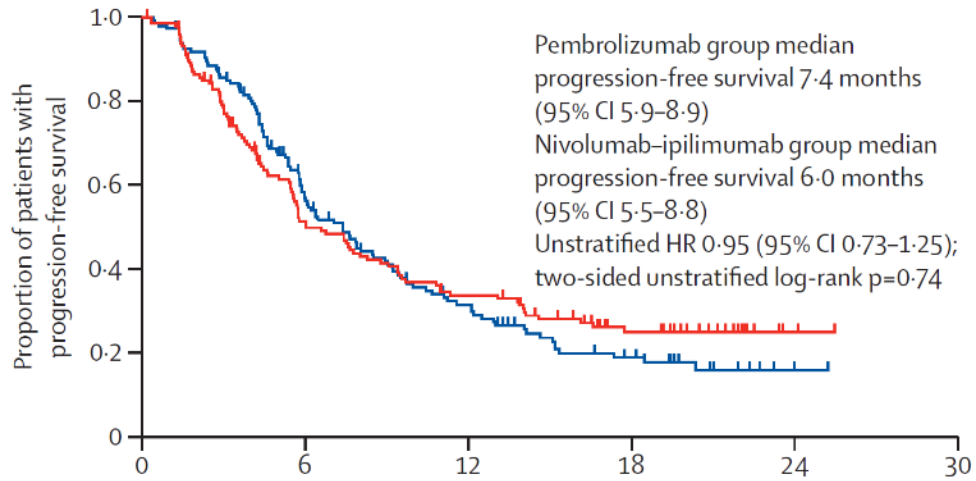


mOS **17.1** vs **14.9** months
HR 0.77 (0.66-0.91)



DUAL ICB + CHEMO OR MONO ICB + CHEMO?

NIPPON (JCOG2007): CM9LA vs KEYNOTE



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Shiraishi Lancet Resp Med 2024

Prematurely closed because of ↑ tox in CM9LA arm
N=295/planned 414

OS

	Events/patients		Unstratified HR (95% CI)
	Pembrolizumab	Nivolumab-ipilimumab	
Clinical stage			
IV	45/111	45/115	1.00 (0.66-1.51)
III or recurrent	15/36	12/33	0.84 (0.39-1.80)
Sex			
Male	46/116	43/120	0.92 (0.60-1.39)
Female	14/31	14/28	1.15 (0.55-2.41)
Histology			
Squamous cell carcinoma	13/32	13/33	1.02 (0.47-2.21)
Non-squamous cell carcinoma	47/115	44/115	0.94 (0.62-1.42)
PD-L1 TPS			
<1%	22/61	29/58	1.44 (0.82-2.50)
1-49%	24/47	15/49	0.58 (0.30-1.10)
≥50%	6/25	5/23	0.93 (0.28-3.06)
Unknown	8/14	8/18	0.89 (0.33-2.38)
Age, years			
<75	49/125	47/123	1.01 (0.68-1.51)
≥75	11/22	10/25	0.65 (0.27-1.59)
ECOG performance status			
0	27/66	24/70	0.79 (0.46-1.37)
1	33/81	33/78	1.11 (0.69-1.80)
Smoking status			
Never	8/17	5/17	0.59 (0.19-1.81)
Current or former	52/130	52/131	1.02 (0.69-1.49)

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OPEN QUESTIONS IN (FIRST LINE) ICB TREATMENT

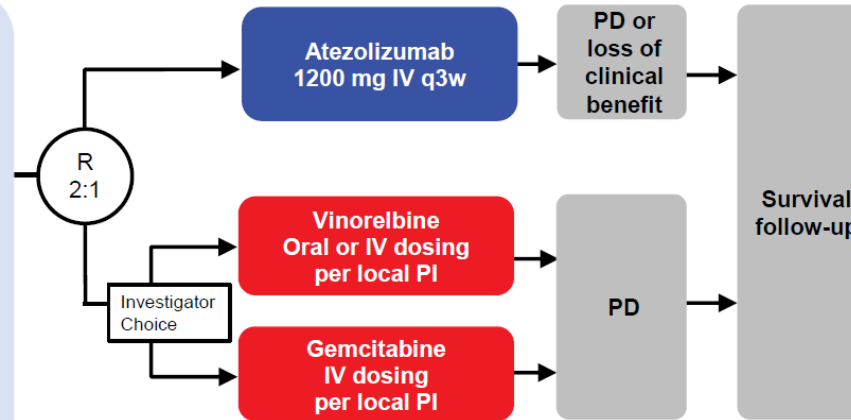
WHAT ABOUT THE ELDERLY / POOR PS? – IPSOS PHII



Treatment-naïve stage IIIB^a/IV (AJCC 7th edition) NSCLC

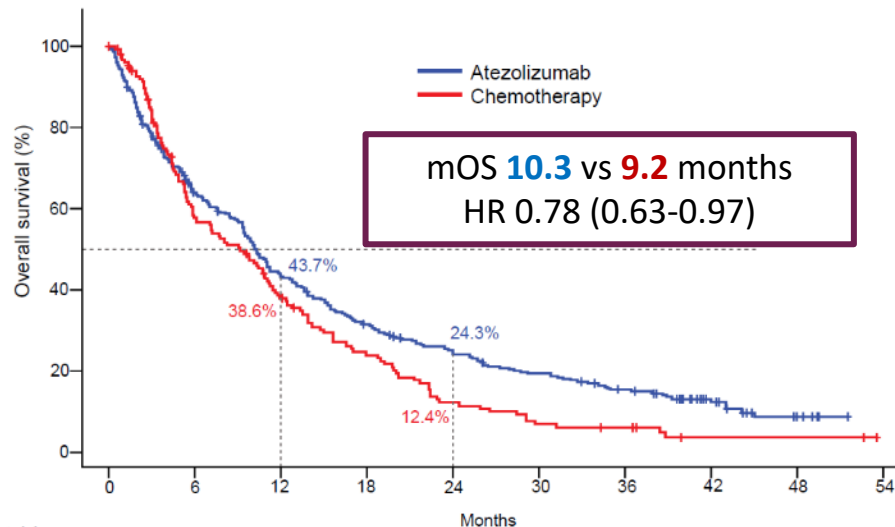
- Squamous or non-squamous histology
- Platinum ineligible because of:
 - ECOG PS 2 or 3
 - ECOG PS 0 or 1 permitted if ≥70 years of age with substantial comorbidities or other contraindications to platinum chemotherapy
- *EGFR*+ (L858R or exon 19 deletion) or *ALK*+ excluded
- Patients with treated asymptomatic brain metastases permitted

n=453



Primary endpoint: OS

Baseline characteristics
Majority PS 2



Benefit regardless of PD-L1 level
PS 0-1 > benefit (HR 0.64) vs PS 2/3 (HR 0.86-0.74)

EMA approval+

WHAT ABOUT COMBINATION REGIMENS IN ELDERLY/PS2? PHIII ENERGY

Key Eligibility Criteria

- Stage IV or recurrent
- Squamous or Non-Squamous
- No prior systemic therapy for advanced disease
- No known EGFR mutations or ALK or ROS1 alteration
- Age ≥ 70 ECOG PS 0-1 or PS 2

Stratified by :

- Age \geq versus $<$ 70 years
- PS 0/1 versus 2
- Histology : squamous/non-squamous



Until disease progression, unacceptable toxicity, or for 2 years for immunotherapy

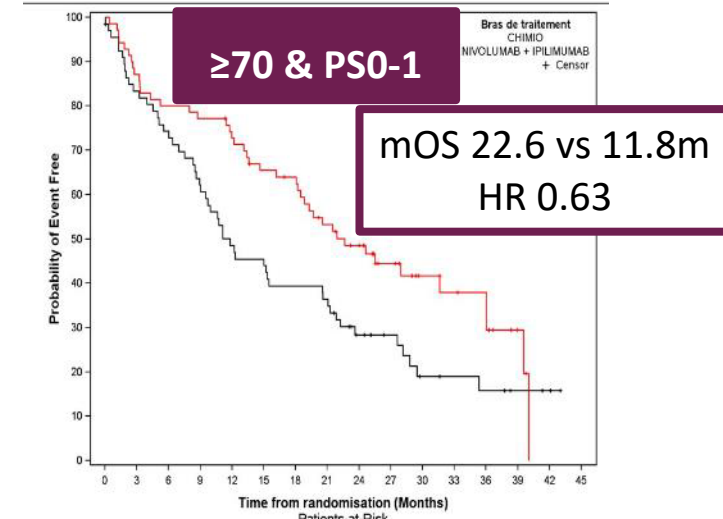
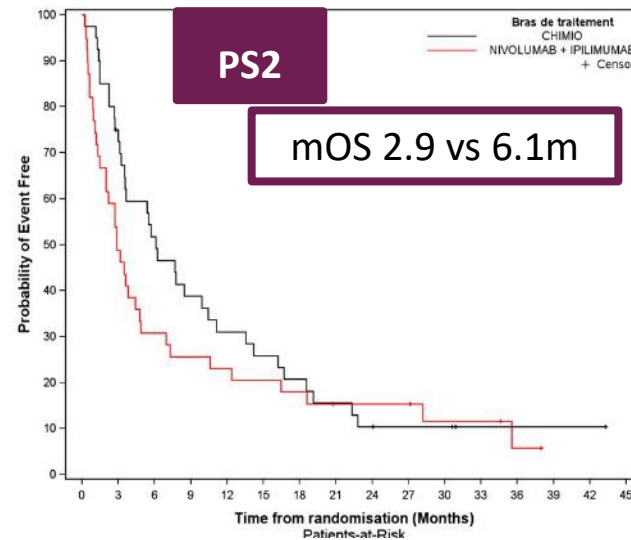
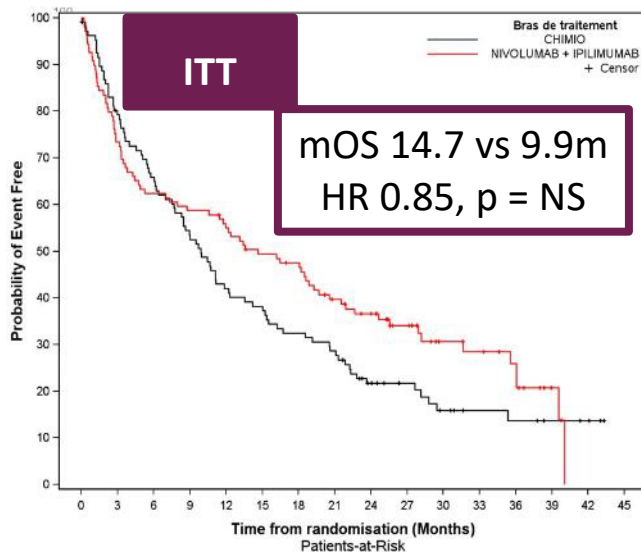
Almost 80% 70+
Over 1/3 PS2

Primary endpoint

- OS

Secondary endpoints

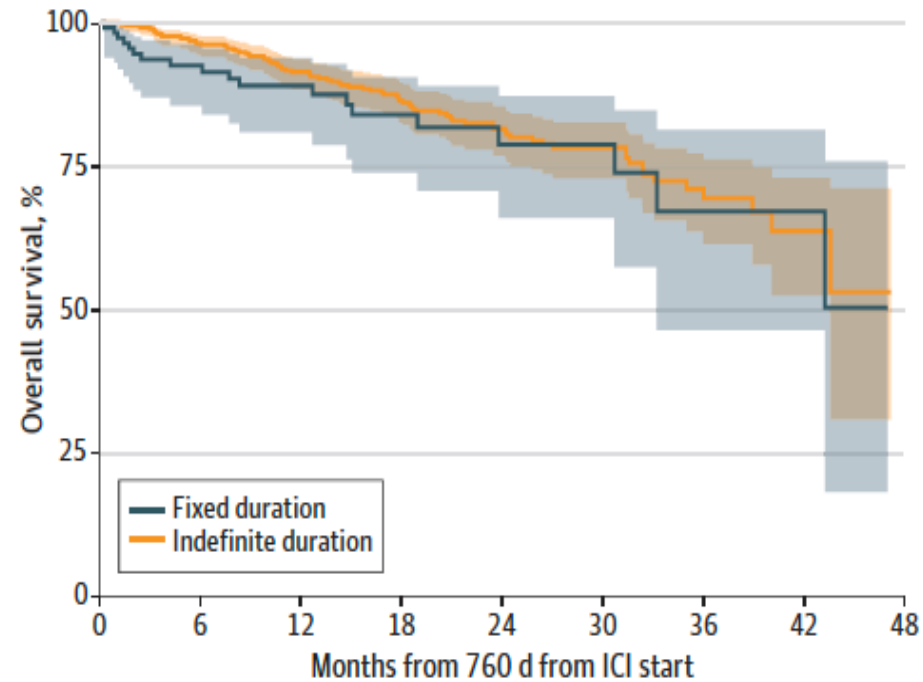
- PFS
- ORR
- Efficacy by tumor PD-L1 expression
- QOL, geriatric mini dataset



CAN WE SAFELY STOP AFTER 2 YEARS OF TREATMENT?

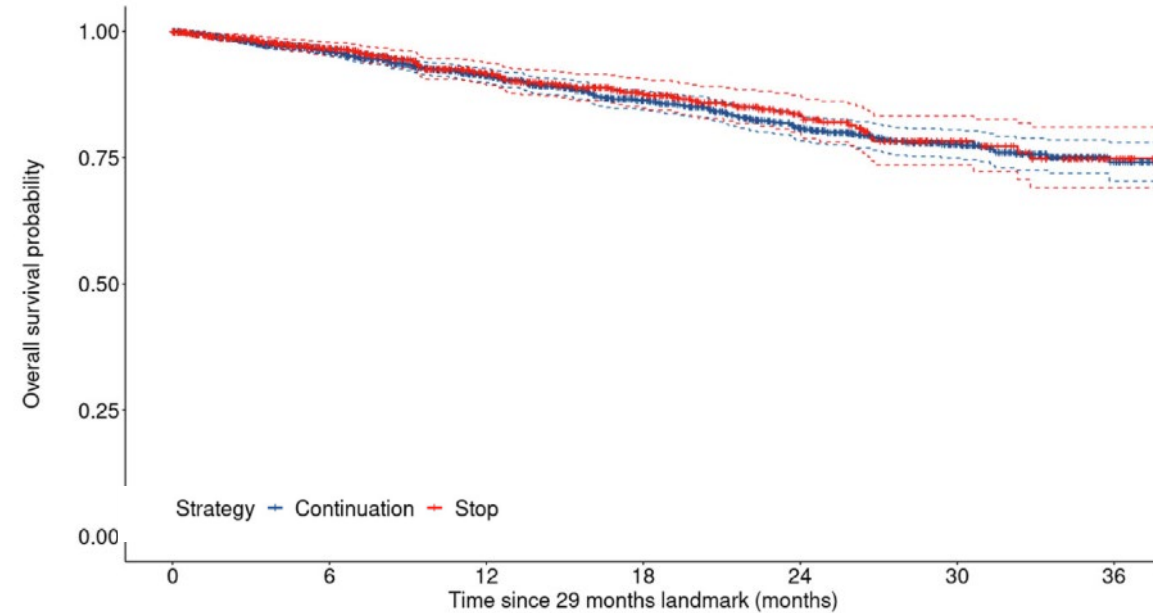
No difference in OS for continue vs stop

US data (N=706): only 20% stops after 2y



No. at risk	0	6	12	18	24	30	36	42	48
Fixed	113	81	62	39	25	17	7	4	1
Indefinite	593	458	340	244	167	96	46	11	1

French data (N=3075): 30% stops after 2y



CAN WE GIVE A LOWER DOSE OF ICB?

No MTD with a-PD(L1) blockers

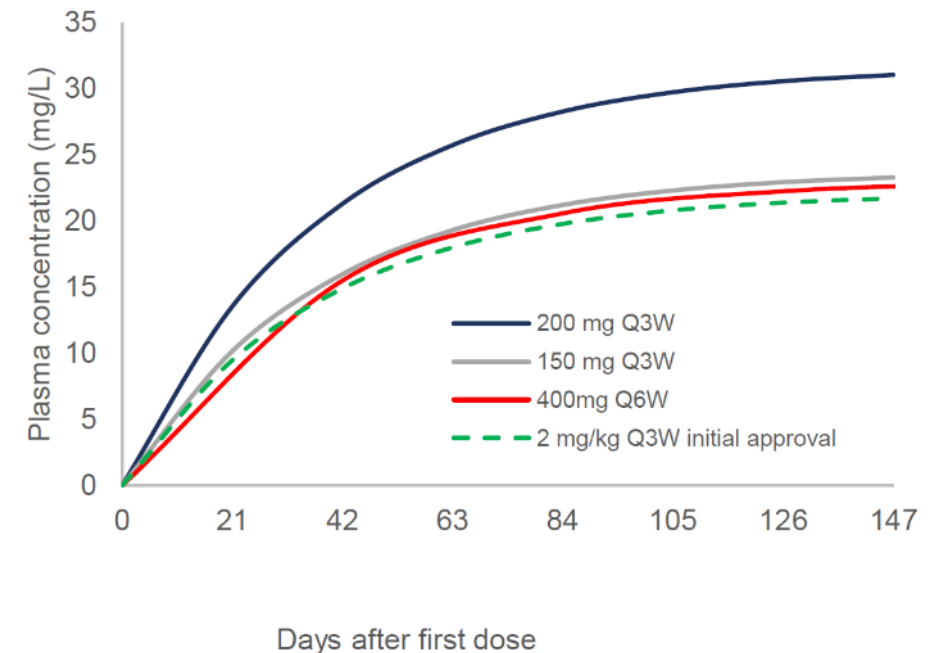
Dose-response & exposure response curves flatton

Sustained mean occupancy 70% of PD-1 on T-cells

Maintained for 2 months after single infusion

We overdose with current (flat) dose

Pembrolizumab trough concentrations versus time

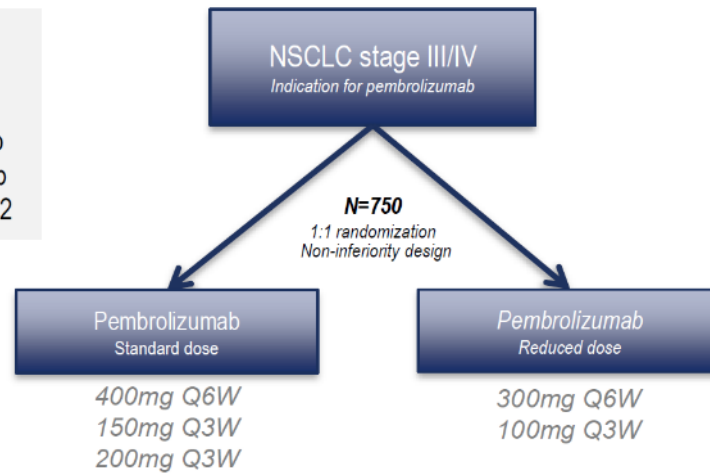


NVALT30 – DEDICATION TRIAL

Interim analysis

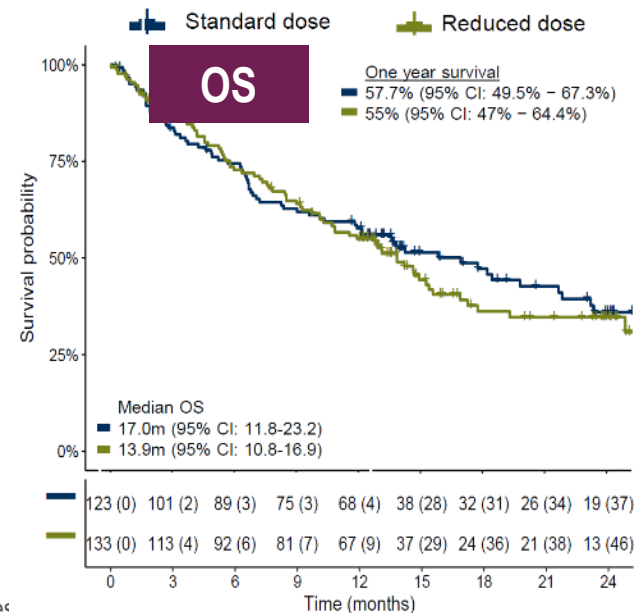
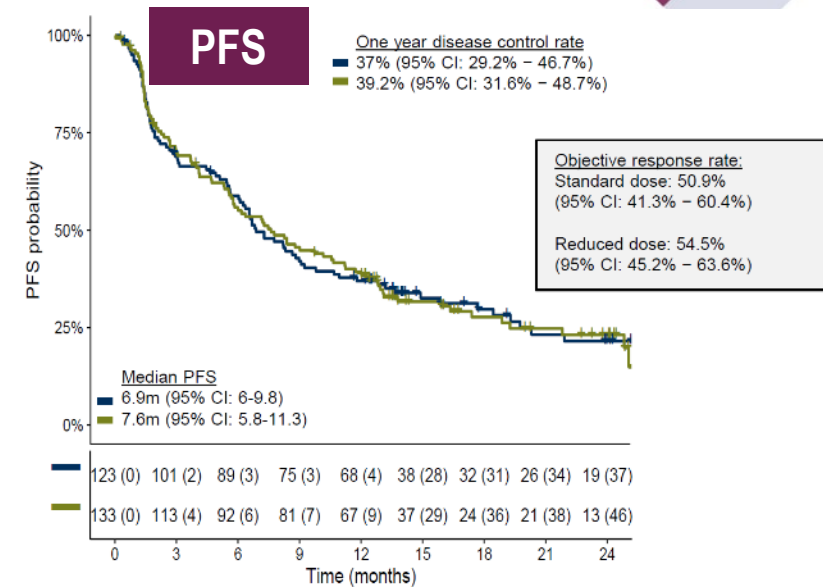
Stratification factors:

- Type of treatment:
 - Pembrolizumab
 - Pemetrexed / platinum / pembrolizumab
 - Carboplatin / paclitaxel / pembrolizumab
- Smoking, PDL1 status, Gender, PS 0/1 vs 2



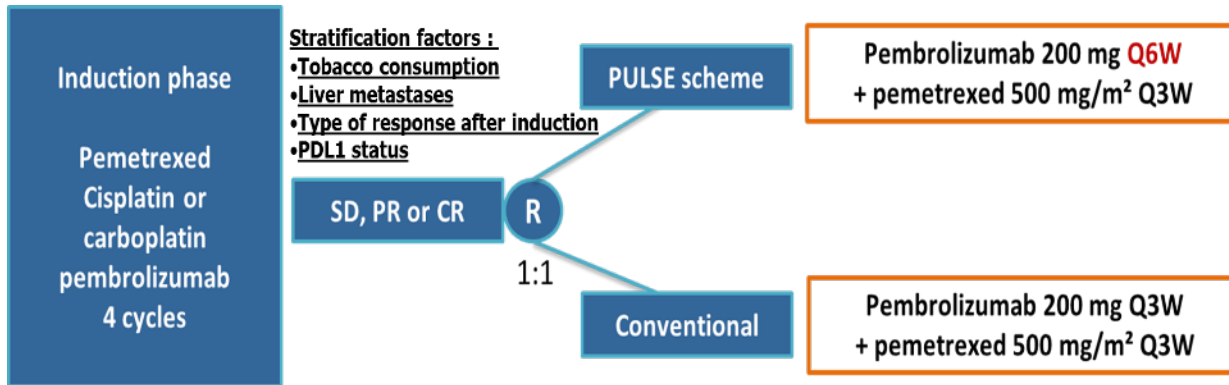
Primary endpoint: OS (non-inferiority)

Interim analysis: $\geq 10\%$ difference between arms in 1-y OS = stopping criterium



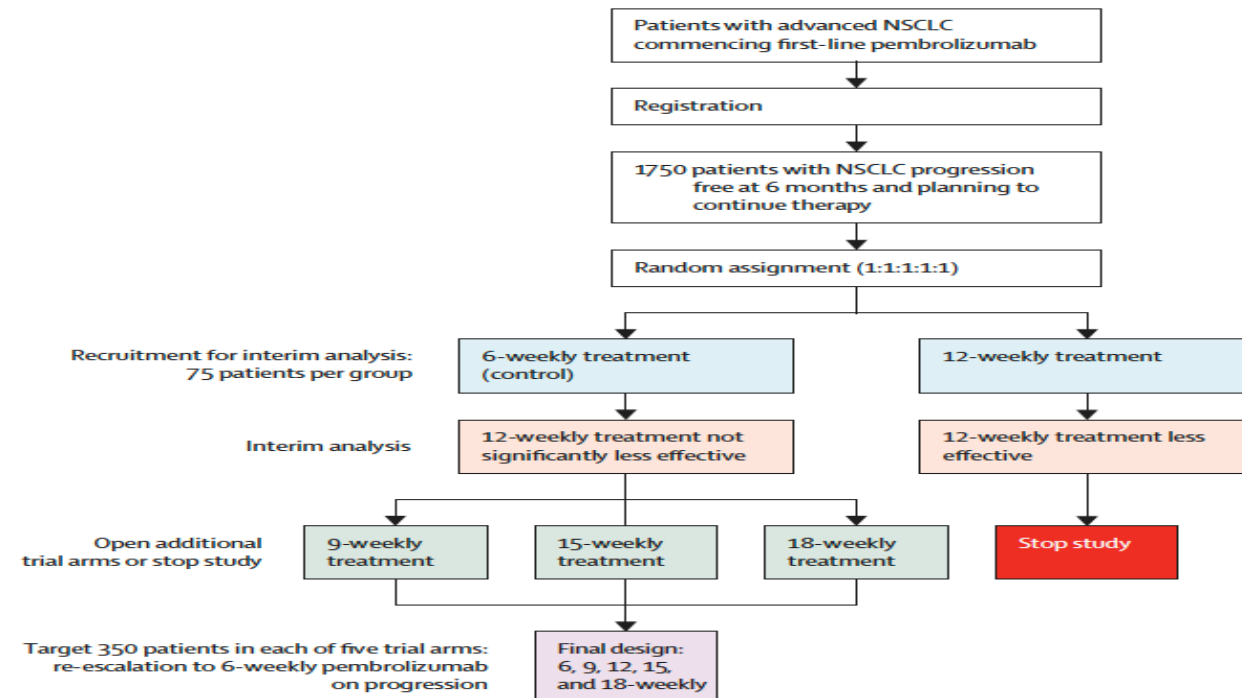
OTHER TRIALS WITH ICB DOSE REDUCTION ONGOING

PULSE (NCT05692999), non-inferiority study



Primary endpoint: Overall survival

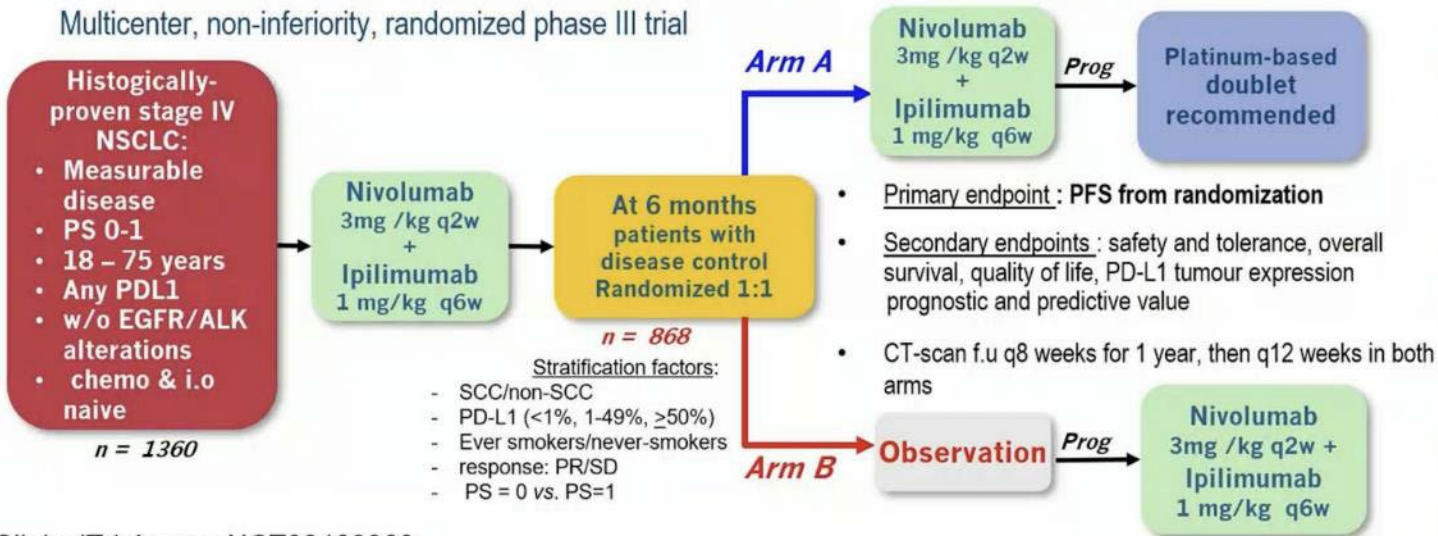
REFINE LUNG (NCT05085028)



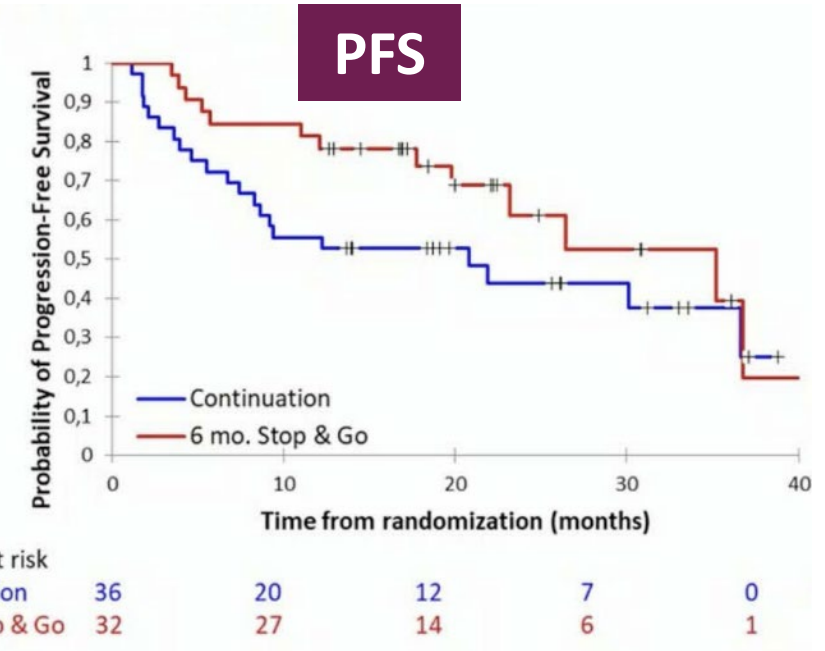
Primary endpoint: Overall survival @2Y

SHORTER DURATION?

DICIPLÉ phIII non-inferiority trial



ClinicalTrials.gov: NCT03469960



816 patients/651 events needed for 80% power – 1-sided error
0.025, non-inferiority margin HR 1.25
Accrual stopped early: nivo-ipi no EMA approval

Continuation vs stop & go
mPFS 20.8 vs 35.2 months
12m PFS 56 vs 81% p = 0.12

PhII/III DIAL (IFCT-2103, NCT05255302) ongoing and Dutch trial will start



CAN WE IMPROVE THE FIRST LINE REGIMEN?

CAN WE IMPROVE FIRST LINE THERAPY?

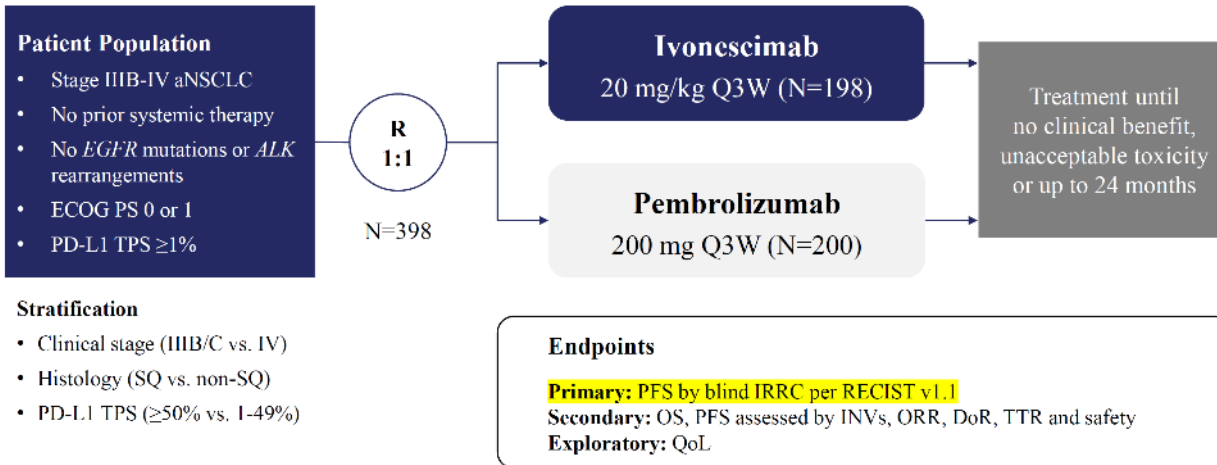
DESPITE PROMISING PHASE I OR II DATA, GLOBAL PHASE III TRIALS NEGATIVE



Trial	Phase	Drugs	N	PFS, HR	OS, HR
KEYNOTE 598 PD-L1 ≥50%	III	Pembrolizumab ± Ipilimumab	568	1.06 (0.86-1.30)	1.08 (0.85-1.37)
INTREPID-Lung 037 PD-L1 ≥80% (73-10)	III	Pembrolizumab vs. M7824 (bifunct fusion protein targeting TGF-beta & PD-L1)	304	1.23 (0.89-1.71)	1.20 (0.89-1.81)
LEAP007 PD-L1 ≥1%	III	Pembrolizumab ± Lenvatinib (multikinase inhibitor)	623	0.78 (0.64-0.95)	1.10 (0.87-1.39)
SKYSCRAPER-01 PD-L1 ≥50%	III	Atezolizumab ± Tiragolumab (aTIGIT)	135	Press release: NEG for co-primary endpoint PFS OS still immature	
KEYLYNK-006/008 Non-Sqcc / Sqcc	III	Maint pembro + Olaparib (PARPi) vs pembro + pem/PCB, after 4 cycles ChT-ICB	672 591	1.12 (0.92-1.36) 0.77 (0.63-0.93)	1.04 (0.87-1.25) 1.01 (0.83-1.24)

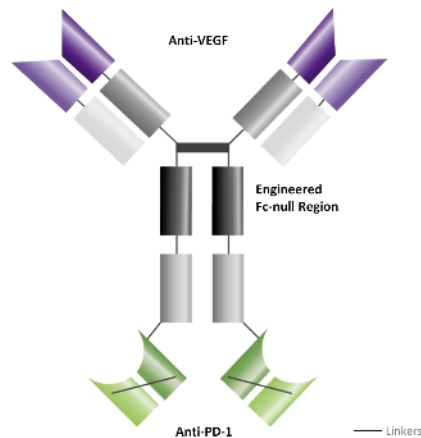
CAN WE IMPROVE FIRST LINE THERAPY?

HARMONI-2 Chinese PhIII RCT



Stratification

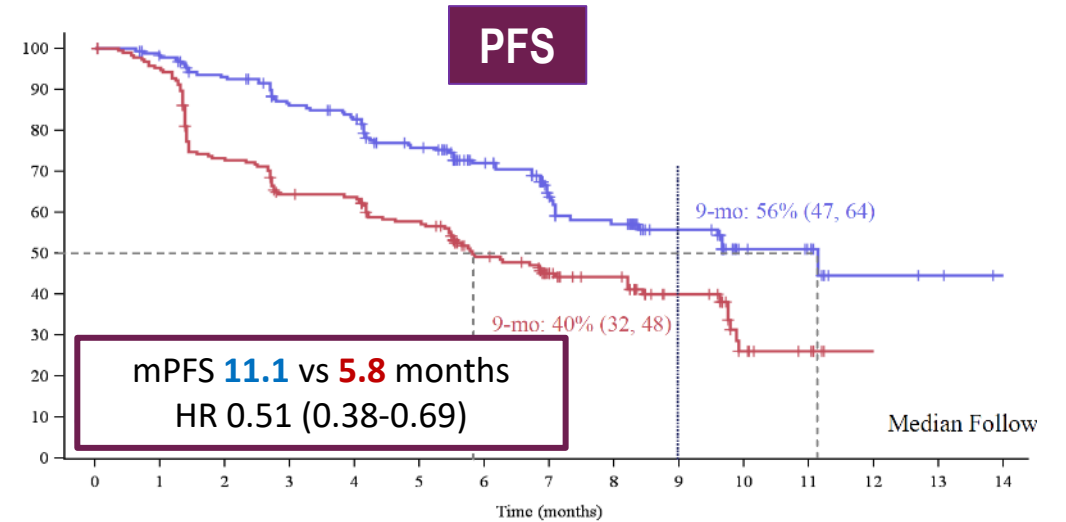
- Clinical stage (IIIB/C vs. IV)
- Histology (SQ vs. non-SQ)
- PD-L1 TPS ($\geq 50\%$ vs. 1-49%)



Cooperative Binding

Presence of VEGF increases binding of PD-1 by >10 -fold in-vitro⁶

VEGF dimer leads to potential interconnection of multiple ivonescimab molecules, which may lead to increased binding of T-cells in-vitro⁶



PFS benefit regardless of PD-L1
 $\geq 50\%$ HR 0.48, 1-49% HR 0.54

Will data be similar in global population?

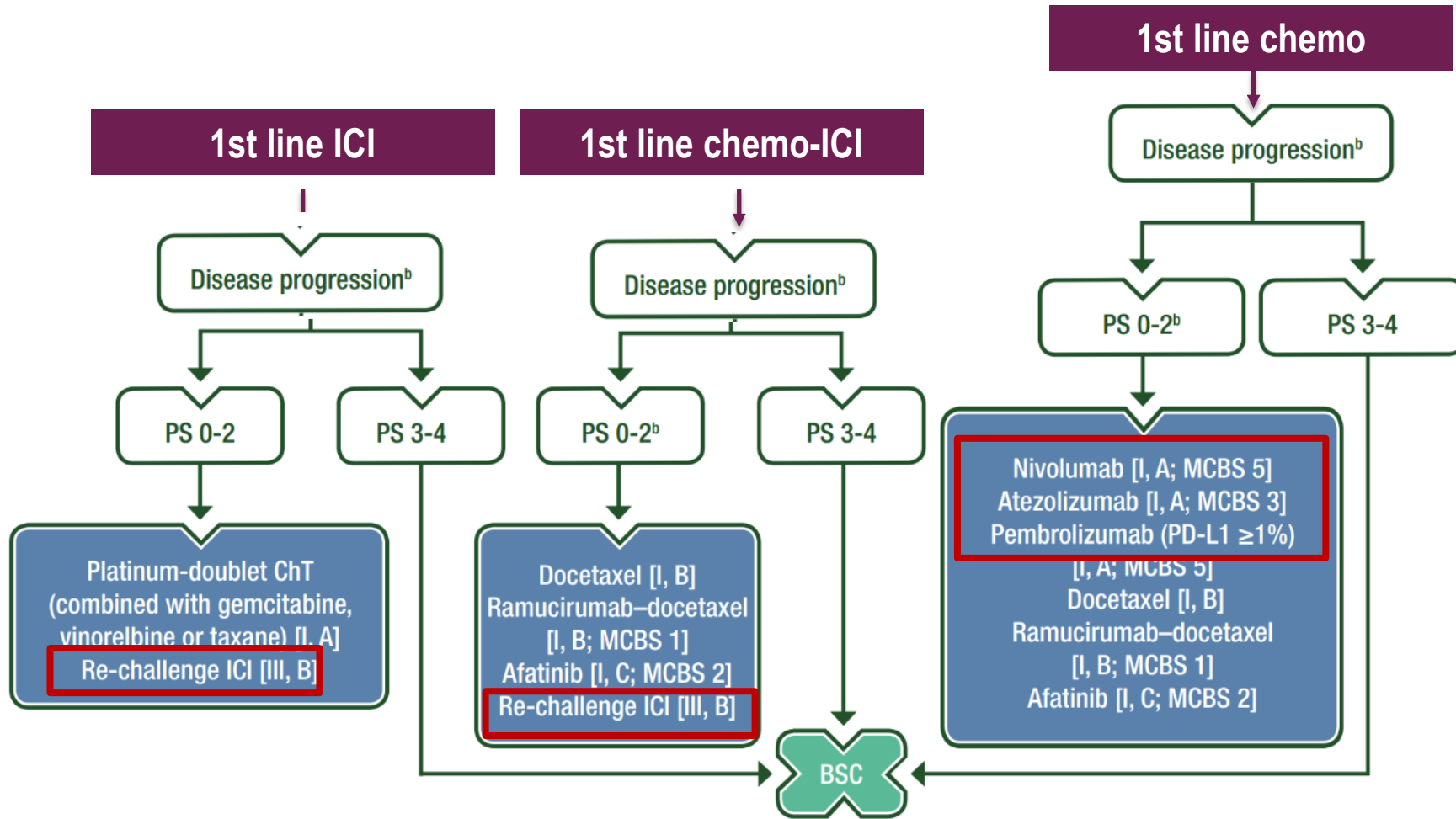
Will OS be positive with adding angiogenesis inhibition?

Tox profile favourable, low high grade bleeding events

SECOND LINE AND BEYOND

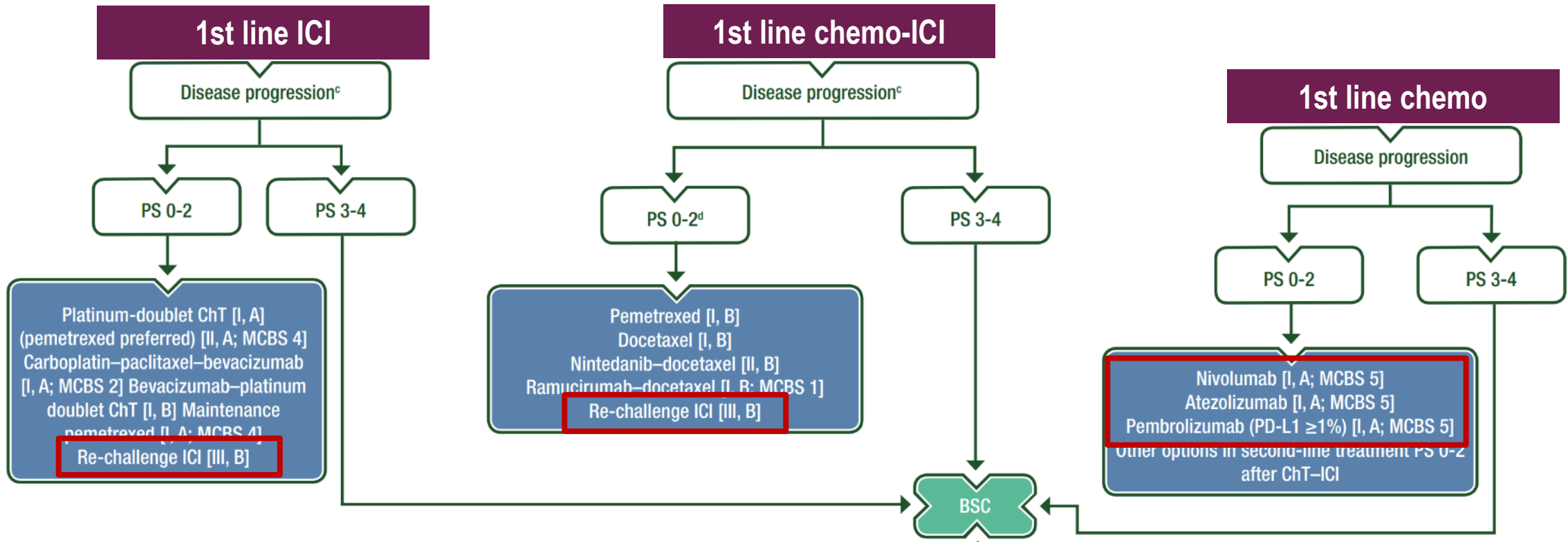


SECOND LINE ICB OPTIONS FOR SQUAMOUS NSCLC



SECOND LINE OPTIONS FOR NON-SQUAMOUS NSCLC

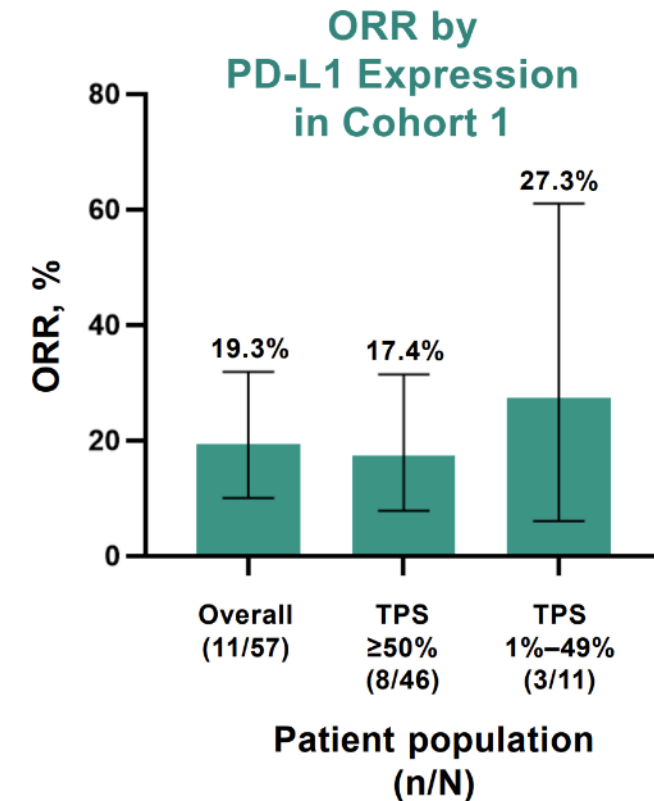
Non-oncogene addicted



CAN I RECHALLENGE ICB?

Pooled analysis pIII KEYNOTE trials: 2nd line pembro after completing 2y in 1st line OR \geq 6 months pembro and confirmed CR and minimally 2 cycles after CR

	Cohort 1 (pembro monotherapy) N = 57	Cohort 2 (pembro + chemo) N = 14
ORR ^a (95% CI), %	19.3 (10.0–31.9)	0 (0.0–23.2)
DCR ^a (95% CI), %	73.7 (60.3–84.5)	50.0 (23.0–77.0)
Best overall response, ^a n (%)		
CR	0	0
PR	11 (19.3)	0
SD	31 (54.4)	7 (50.0)
PD	8 (14.0)	2 (14.3)
NA ^b	7 (12.3)	5 (35.7)
DOR, ^a median (range), mo	NR (0.0+ to 20.0+)	–
DOR \geq 6 mo, %	78.8	–
OS, ^c median (95% CI), mo	27.5 (21.7–NR)	NR (NR–NR)
6-mo rate (95% CI), %	85.1 (72.4–92.3)	85.1 (52.3–96.1)
PFS, ^{a,c} median (95% CI), mo	10.3 (5.6–14.0)	7.7 (1.8–NR)
6-mo rate (95% CI), %	60.8 (46.0–72.7)	54.5 (22.9–78.0)



CAN I ADD OTHER DRUG TO THE ICB?

Phase III trials so far negative

	COSMIC-021 Cohort 7	LUNG-MAP S1800A	MRTX-500	Phase II	Retrospective	Phase I
Schedule	Cabozantinib Atezolizumab	Ramucirumab Pembrolizumab	Sitravatinib Nivolumab	Bevacizumab Atezolizumab	Ramucirumab Atezolizumab	Lenvatinib Pembrolizumab
N	80	69	68	24	21	21
ORR (%)	19*	22	18	13	4.8	33**
PFS (mo.)	4.5*	4.5	5.7	5.6	3.4	NR
OS (mo.)	13.8*	14.5	14.9	14.0	16.5	NR
G≥3 TRAE (%)	53	42	66	4.2	43	42
Phase III	CONTACT	Pragmatica-lung	SAPPHIRE			LEAP-007

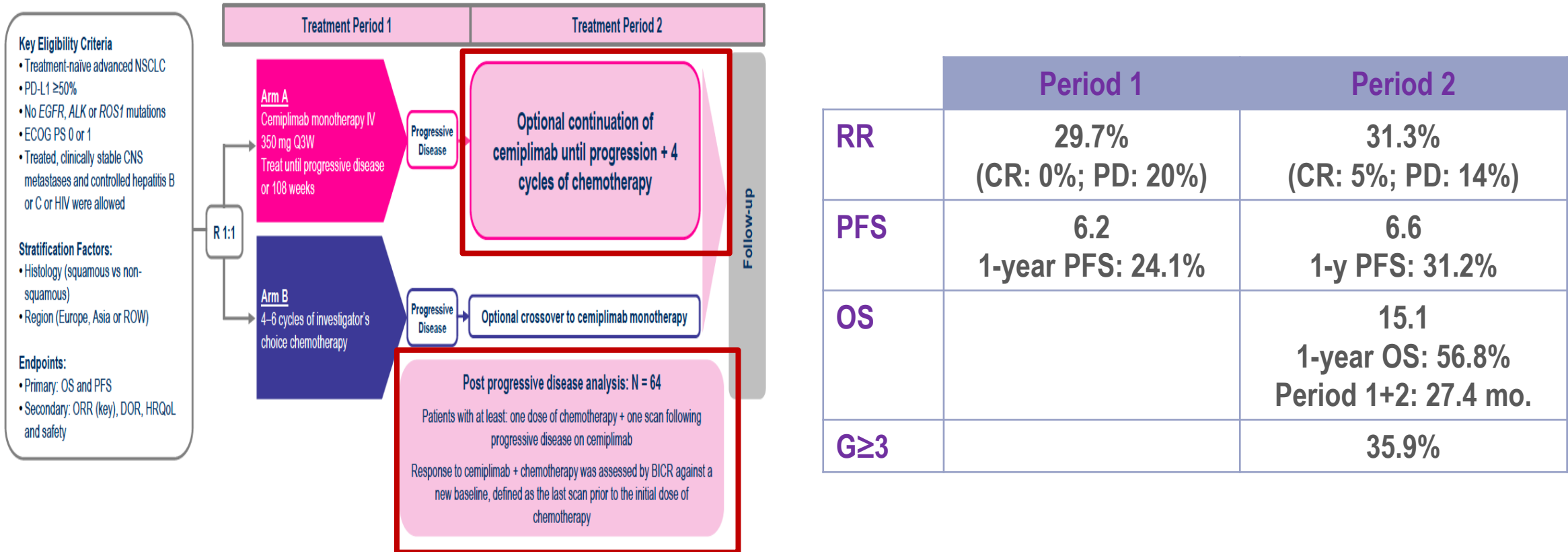
*RR: PD-L1<1%: 11% ; PD-L1≥1%: 20%. PFS: PD-L1<1%: 4.7; PD-L1≥1%: 5.4. OS: PD-L1<1%: 10.4 ; PD-L1≥1%: 17.8

** Includes treatment naïve population.

Slide courtesy J Remon, adapted

CAN WE CONTINUE ICB BEYOND PD ON FIRST LINE?

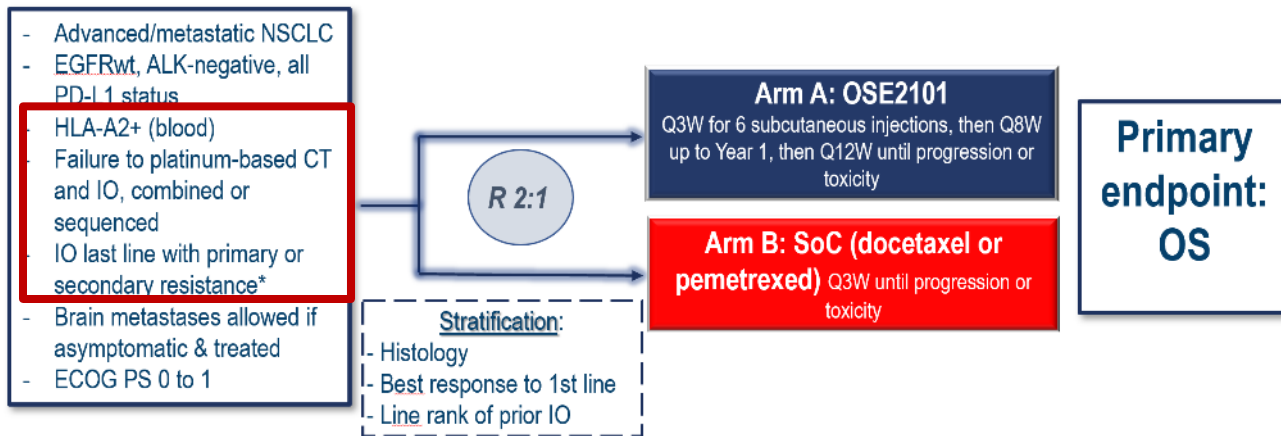
EMPOWER-LUNG1 data



PhII RCT: NO benefit of continuing ICB with next line of ChT if PD on 2nd/3th line ICB

DOES A VACCINE WORK?

PhIII ATALANTE TRIAL



COVID: prematurely closed (219/400 enrolled)
 Final primary analysis in IO secondary resistance (>12 weeks IO, N=118, 68% of total)
 Stats revised: HR 0.55, power 80%, 2-sided level 5%

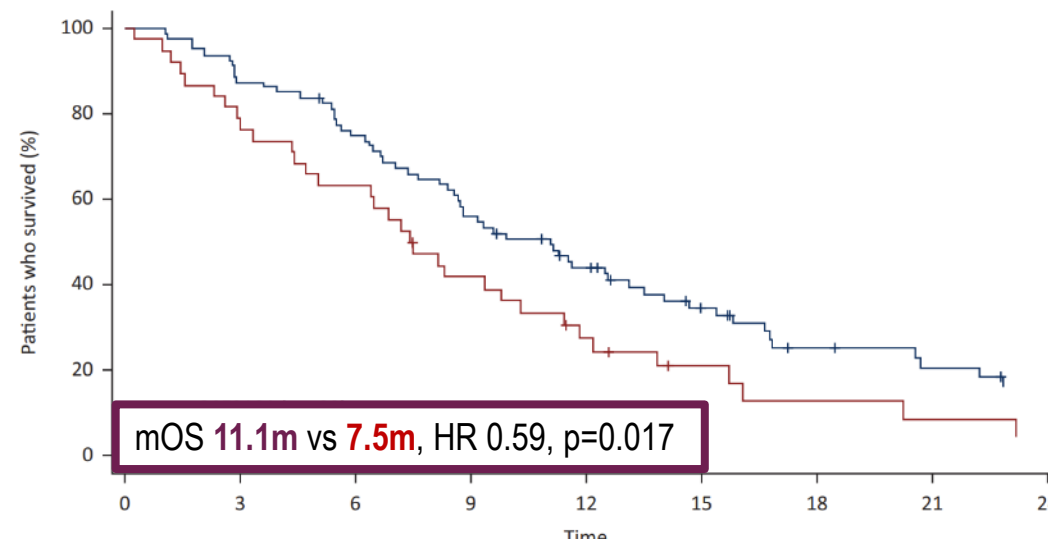
9 EPITOPES (TAA PEPTIDES) TARGETING 5 TAAS FREQUENTLY OVEREXPRESSED IN MANY CANCERS:

TAAs	Wild-type and neo-epitopes
CEA	1 heterocyclic*
p53	1 heterocyclic
HER-2	1 heterocyclic
MAGE-2	1 fixed-anchor**
MAGE-3	1 fixed-anchor
	1 fixed-anchor
	1 wild-type***
	1 wild-type
	1 heterocyclic

+ 1 Pan DR T Helper cell epitope (PADRE)

Emulsified in mineral oil adjuvant.

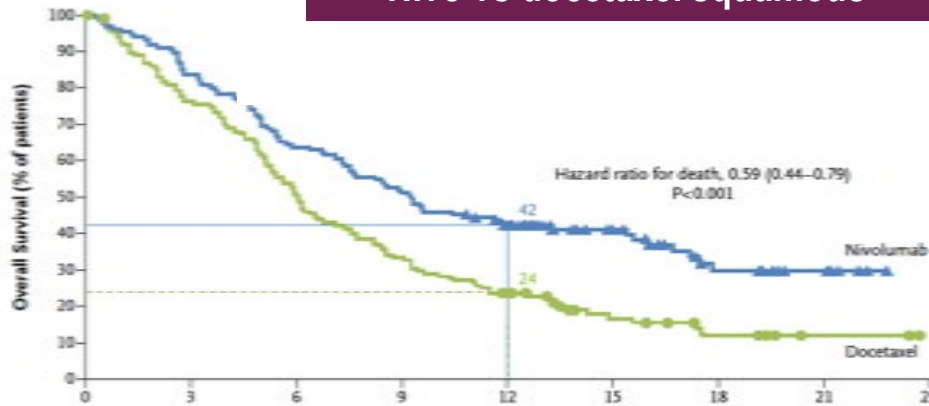
* Heterocyclic analogs have an increased TCR affinity^{††}.
 ** Anchor analogs have an increased affinity to HLA binding^{††}.
 *** Wild-type epitopes with a high HLA-A2 binding.



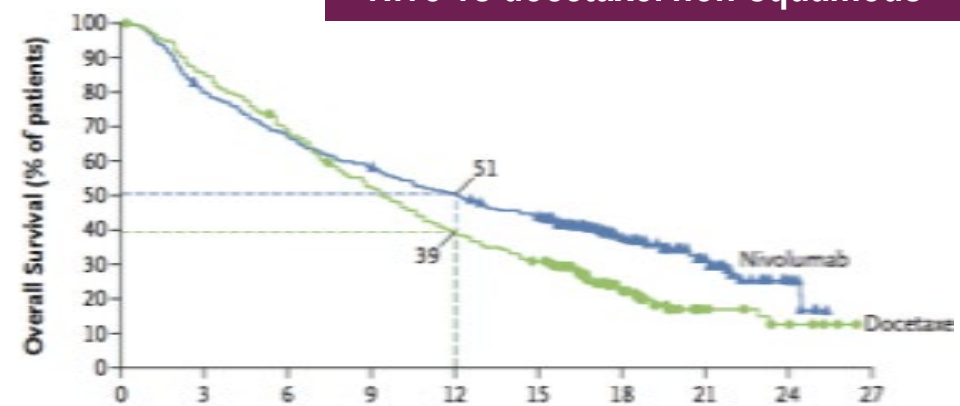
SECOND LINE ICI MONO AFTER FIRST LINE CHEMO



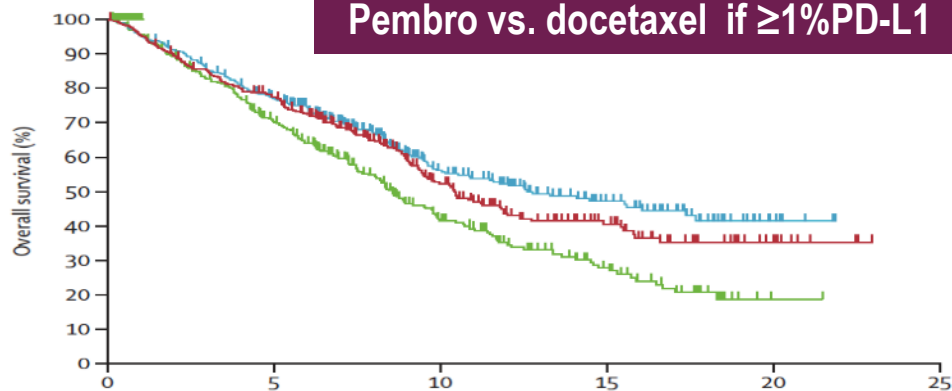
Nivo vs docetaxel squamous



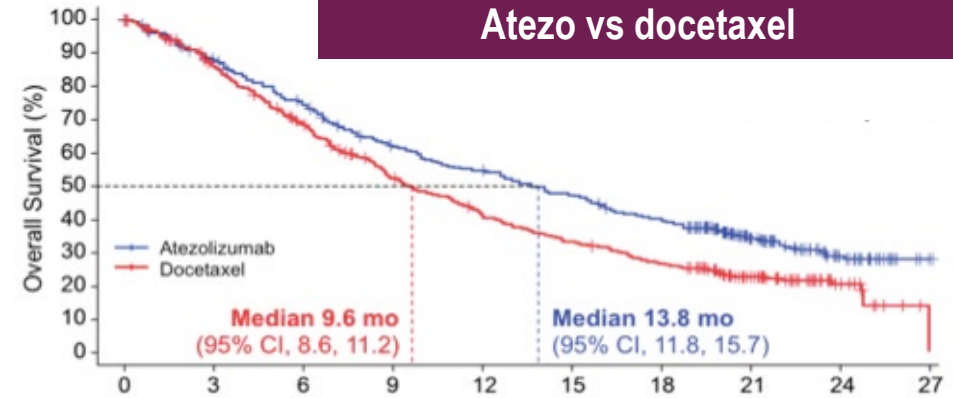
Nivo vs docetaxel non-squamous



Pembro vs. docetaxel if $\geq 1\%$ PD-L1



Atezo vs docetaxel



CONCLUSIONS AND TAKE HOME MESSAGES



ICB have revolutionized the treatment landscape of metastatic NSCLC

However, majority will not obtain long-term benefit

PD-L1 main criterium in 1st line for treatment decisions, and predictive biomarker

Second line: no approved new ICB, rechallenge is option

THANK YOU!

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