



Role of Neoadjuvant and Adjuvant Systemic Therapy in Resectable Non-small Cell Lung Cancer

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Disclosures

- Consultant for Mirati therapeutics, Avellino, GlaxoSmithKline, and Roche

This presentation and/or comments will be free of any bias toward or promotion of the above referenced companies or their product(s) and/or other business interests.

This presentation and/or comments will provide a balanced, non-promotional, and evidence-based approach to all diagnostic, therapeutic and/or research related content.

This presentation has been peer-reviewed and no conflicts were noted.

Cultural Linguistic Competency (CLC) & Implicit Bias (IB)

STATE LAW:

The California legislature has passed [Assembly Bill \(AB\) 1195](#), which states that as of July 1, 2006, all Category 1 CME activities that relate to patient care must include a cultural diversity/linguistics component. It has also passed [AB 241](#), which states that as of January 1, 2022, all continuing education courses for a physician and surgeon **must** contain curriculum that includes specified instruction in the understanding of implicit bias in medical treatment.

The cultural and linguistic competency (CLC) and implicit bias (IB) definitions reiterate how patients' diverse backgrounds may impact their access to care.

EXEMPTION:

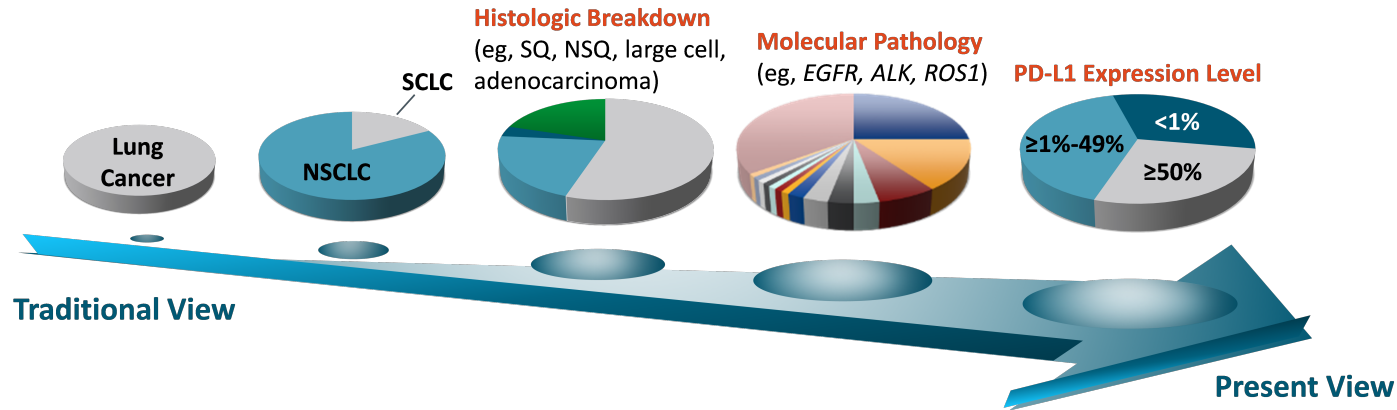
Business and Professions Code 2190.1 exempts activities which are dedicated solely to research or other issues that do not contain a direct patient care component.

The following CLC & IB components will be addressed in this presentation:

- *Will mention underserved populations in clinical research.*
- *Will mention biomarker testing and those that are not tested who are then not served correctly.*

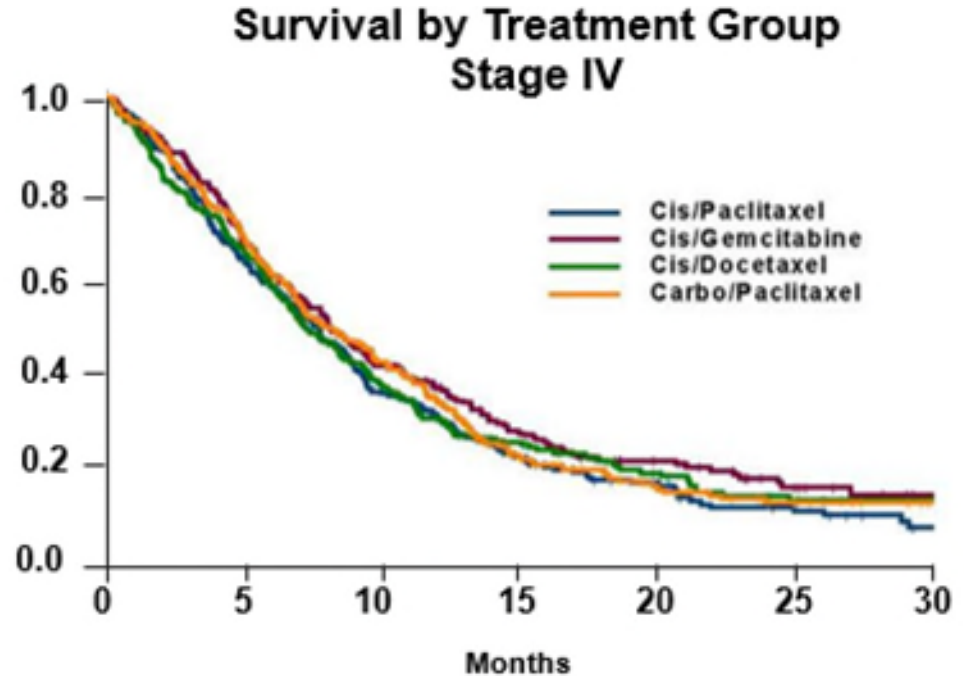
Resectable Lung Cancer:

- 45-75% of Patients diagnosed with resectable NSCLC have high risk for recurrence based on stage



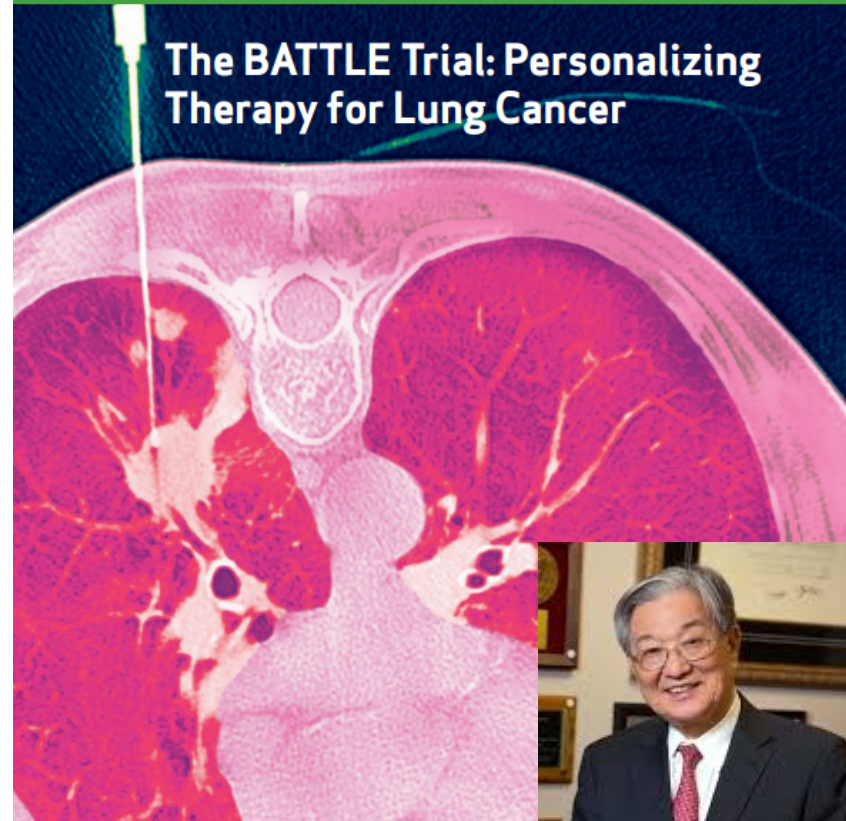
Lung Cancer Treatment 2000: Poor Outcomes

- Nonsquamous and squamous histologies
- No differences
- Efficacy not so encouraging
- Easy for providers to “take home a message”
- “Treat with any doublet you would like



RESEARCH ARTICLE

The BATTLE Trial: Personalizing Therapy for Lung Cancer



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BATTLE Trial 2007

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The BATTLE Trial: Personalizing Therapy for Lung Cancer

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Figure 3. Major efficacy results of BATTLE study. A, landmark analysis of overall survival for patients with or without 8-week disease control. The landmark time point is set at 8 weeks. In time 0 is at 8 weeks after randomization. B, 8-week disease control rates (%) by treatment in patients with tumors harboring wild-type or mutated EGFR (left) and KRAS (right) genes.

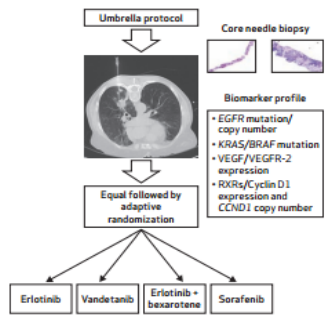
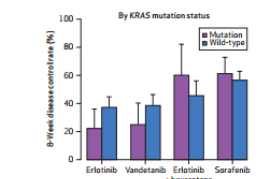
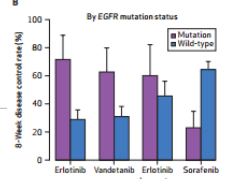
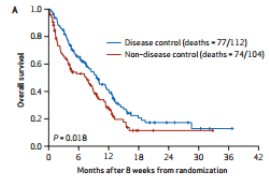
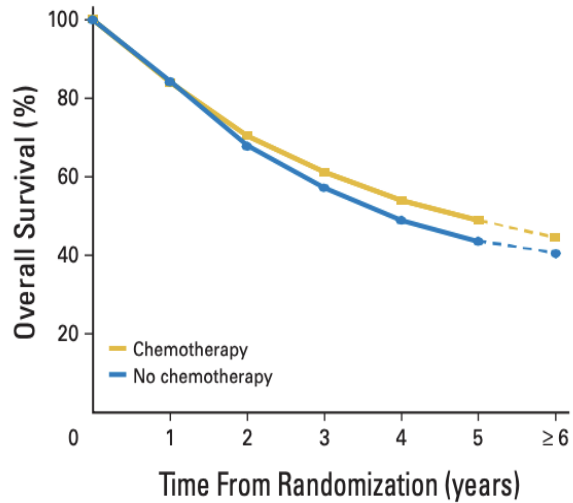


Figure 1. Schema for BATTLE study.

Early-Stage NSCLC: Role of Adjuvant Chemo






- Adjuvant chemotherapy is considered for patients with resected stage IB and higher NSCLC, including those with tumors >4 cm
- Adjuvant chemotherapy conferred a 5-year absolute benefit of ~5% (OS HR 0.89)
- **Given the advances we have made in NSCLC since 2008, what is the role of newer therapies (specifically targeted therapy) in early-stage disease?**







Deaths / person years by period	<u>Years 0-3</u>	<u>Years 4-5</u>	<u>Years ≥ 6</u>
Control	966 / 5,155	239 / 1,668	49 / 720
Chemotherapy	857 / 5,181	203 / 1,817	76 / 790





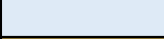






































Resectable Lung Cancer:

Stage-guided treatment strategy for NSCLC

	AJCC Stage	Stage grouping (Lung TNM 8th edition) ⁷	Frequency at diagnosis ¹⁰ (unknown 6%)	Treatment ^{32,33}	5-year survival for clinical staging ⁷	Adjuvant chemotherapy ²⁸	Adjuvant Osimertinib ³⁰ (EGFR L858R or Exon 19 Deletion)	Adjuvant ICI (Atezolizumab ³⁶ or Pembrolizumab ³⁶) (EGFR wild type)
	IA1	T1miN0M0 T1aN0M0	30%	Surgery or definitive radiation (for medically inoperable patients)	92%	N/A	N/A	N/A
	IA2	T1bN0M0			83%			
	IA3	T1cN0M0			77%			
	IB	T2aN0M0	9%	Surgery followed by adjuvant systemic therapy	68%	+5% absolute survival at 5 years (stage IB-IIIa)	+46% DFS at 2 years (stage IIA-IIIa)	+12% DFS and +3% OS (PD-L1 expression >50%) at 3 years with Atezolizumab (stage IIA-IIIa)
	IIA	T2bN0M0			60%			
	IIb	T1a-T2bN1M0 T3N0M0		For unresected stage III: definitive concurrent chemoradiation followed by consolidation PD-L1 inhibitor	53%			+28% DFS at 3 years with Pembrolizumab (stage IB-IIIa) (OS is not mature)
	IIIA	T1a-T2bN2M0 T3N1M0 T4N0 or N1M0			36%			
	IIIB	T1-T2N3M0 T3N2M0 or T4N2M0	18%	For unresected stage III: definitive concurrent chemoradiation followed by consolidation PD-L1 inhibitor	26%	N/A	+14.7% DFS	N/A
	IIIC	T3N3M0 or T4N3M0			13%			
	IVA	AnyTAnyNM1a or M1b	37%	Palliative systemic therapy	10%			
	IVB	AnyTAnyNM1c			0%			

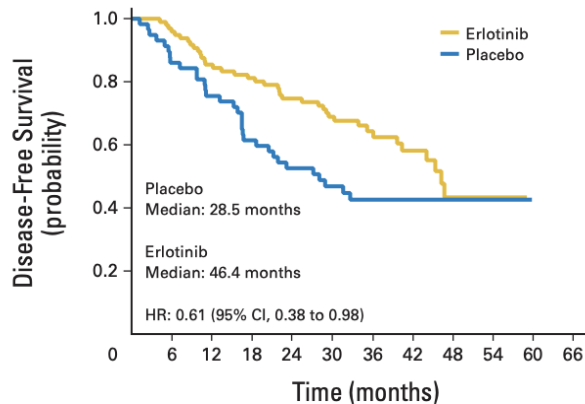
Current Molecular Testing Guidelines

-  Recommended
-  Recommended as part of larger panel (not stand-alone)
-  preferred, consider if available
-  Consider if DNA-based testing negative
-  Recommended for all squamous cell
-  Recommended only if clinical features indicate a higher probability of an oncogenic driver (age<50 years, never smoker, former light smoker<15 years, quit smoking >15 years ago)

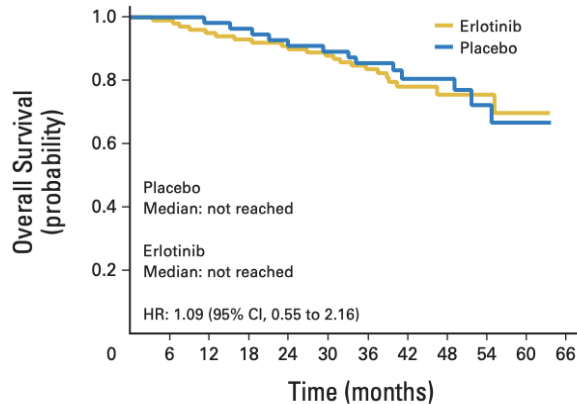
	NCCN	ESMO	Pan-Asian [‡]	Updated CAP/ IASLC/AMP
<i>Year [Reference]</i>	2023 [33]	2023 [96]	2019 [97]	2018 [10]
<i>Multi-panel testing</i>				
<i>RNA-based testing</i>				
<i>Testing for SqCC</i>				
<i>Testing for non-sqCC</i>				
ALK*				
ROS-1				
EGFR***				
BRAF				
KRAS G12C				
HER2				
NTRK				
METex14				
RET				

Older Studies of Adjuvant EGFR-Directed Therapy Did Not Show Definitive Benefit

- The RADIANT trial randomized patients to 2 years of adjuvant erlotinib vs placebo, but only a small subset (161/973 patients) had *EGFR*-positive NSCLC
- Among these patients, a **trend toward improved disease-free survival was seen with adjuvant erlotinib**



No. at risk	0	6	12	18	24	30	36	42	48	54	60	66
Placebo	59	49	43	35	30	23	15	12	10	5	0	0
Erlotinib	102	94	80	76	68	56	35	22	10	3	0	0



No. at risk	0	6	12	18	24	30	36	42	48	54	60	66
Placebo	59	57	56	53	51	50	41	30	24	14	5	0
Erlotinib	102	100	94	91	88	86	75	43	26	15	7	0

Molecular and PD-L1 Testing

Initial Diagnosis of NSCLC

Early Stage (IB-III A)

Stage III

Advanced

Neoadjuvant:
EGFR/ALK testing*
and
PD-L1 IHC

- **Approved Therapies:**
 1. Nivolumab: CheckMate 816 Trial
 2. Neoadjuvant Nivolumab + Chemotherapy/Adjuvant Nivolumab: CheckMate77T
 3. EGFR: Adjuvant Osimertinib: ADAURA Trial
 4. ALK Fusion: Adjuvant Alectinib: ALINA Trial

Adjuvant:
EGFR/ALK testing and
PD-L1 IHC

- **Approved Therapies:**
 1. Atezolizumab: IMpower010 Trial
 2. Pembrolizumab: KEYNOTE-091 trial
 3. EGFR: Adjuvant Osimertinib: ADAURA Trial
 4. ALK Fusion: Adjuvant Alectinib: ALINA Trial

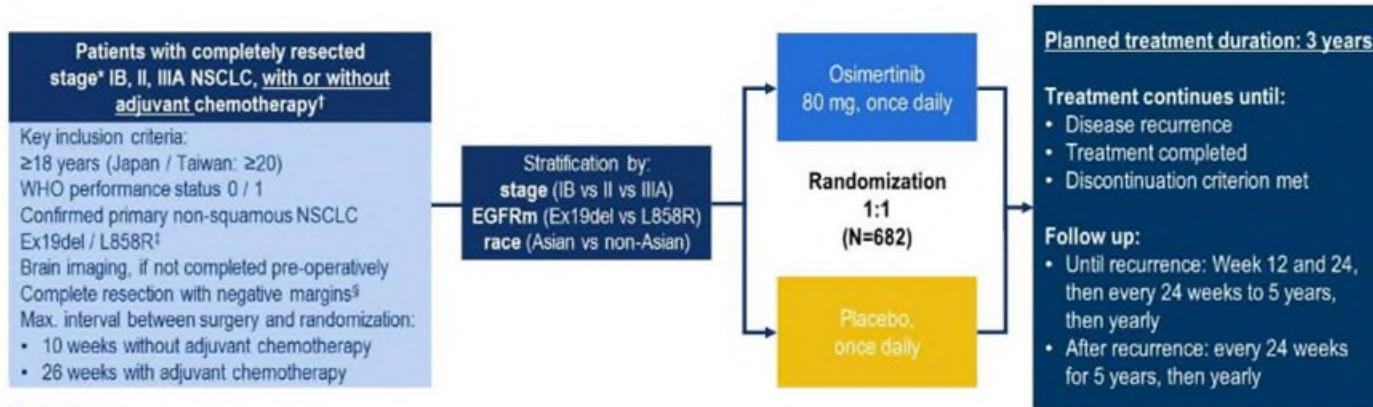
Unresectable:
EGFR testing

- **Approved Therapies:**
 1. EGFR: Consolidation Osimertinib: LAURA trial

Broad NGS testing and
PD-L1 IHC
(at diagnosis)

*NSQ or young, never-smoker SQ

ADAURA Trial: Phase III



Endpoints

- **Primary:** DFS, by investigator assessment, in stage II/IIIA patients; designed for superiority under the assumed DFS HR of 0.70
- **Secondary:** DFS in the overall population¶, DFS at 2, 3, 4, and 5 years, OS, safety, health-related quality of life

- Following IDMC recommendation, the study was unblinded early due to efficacy; here we report an unplanned interim analysis
- At the time of unblinding the study had completed enrollment and all patients were followed up for at least 1 year

PRESENTED AT: **2020 ASCO ANNUAL MEETING**

#ASCO20
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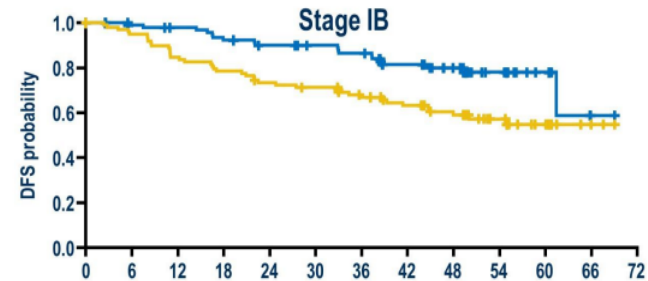
PRESENTED BY: Roy S. Herbst

NCT02211119; ADAURA data cutoff: January 17, 2020. *AJCC 7th edition. †Prior post- or planned re-therapy, seen and allowed. ‡Centrally confirmed. §In Japan, †Patients received a CT scan after procedure and within 30 days prior to treatment. ¶Stage II/III/IIIA. †CT, computed tomography; Ex19del, exon 19 deletion; IDMC, Independent Data Monitoring Committee; WHO, World Health Organization.

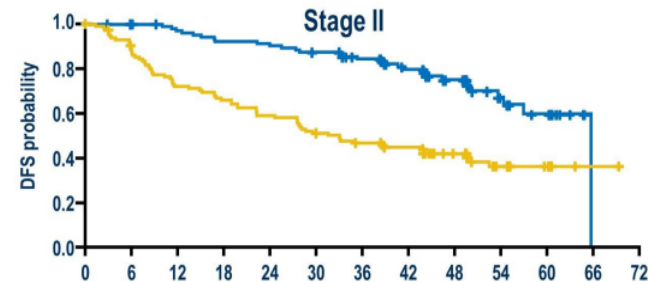
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* At the time of recruitment, staging was determined according to the 7th edition of the *Cancer Staging Manual* of the AJCC

ADAURA: Updated DFS (INV) by Stage (8th Edition AJCC)

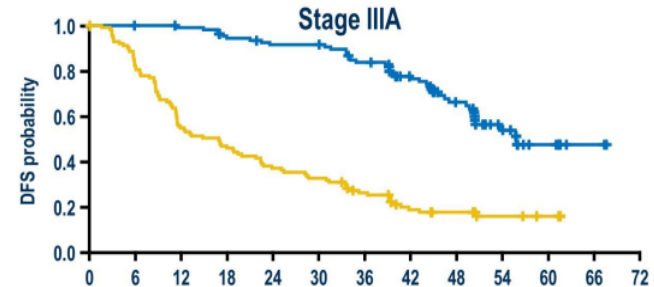


No. at risk		Time from randomisation (months)												
		0	6	12	18	24	30	36	42	48	54	60	66	72
Osimertinib	101	90	87	83	78	75	72	59	47	26	12	3	0	
Placebo	98	92	82	76	70	67	59	52	42	25	14	3	0	



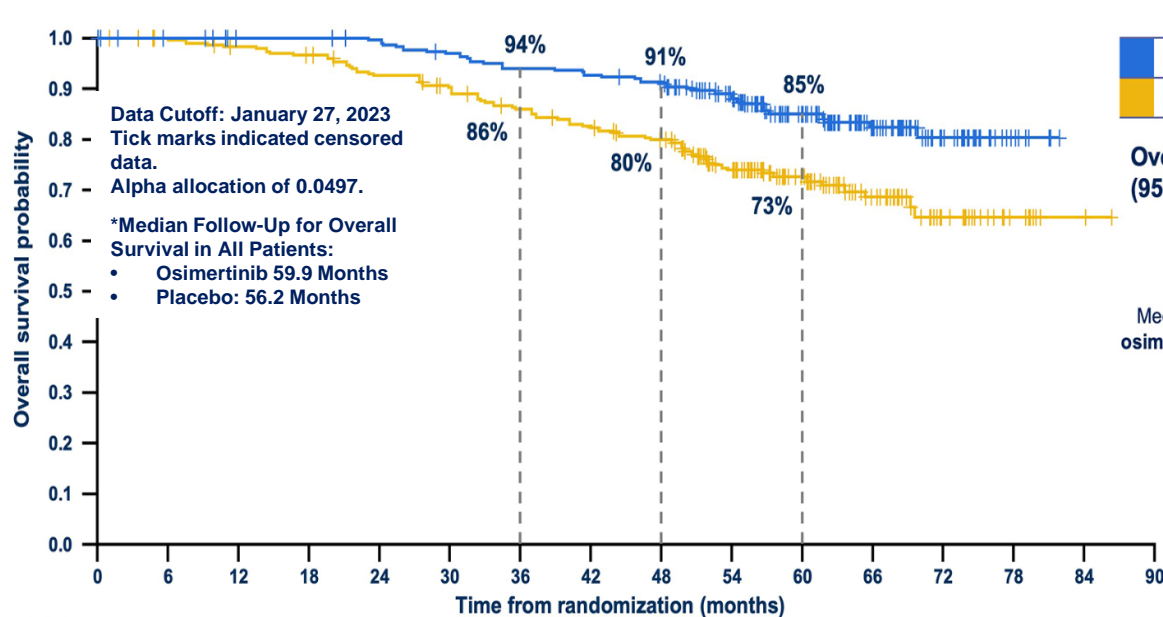
No. at risk		Time from randomisation (months)												
		0	6	12	18	24	30	36	42	48	54	60	66	72
Osimertinib	113	105	101	96	94	90	81	64	42	22	13	0		
Placebo	119	100	84	77	69	59	53	48	30	16	7	1	0	

	Stage IB	Stage II	Stage IIIA
4 year DFS rate, %			
(95% CI)			
- Osimertinib	80 (69, 87)	75 (65, 83)	66 (55, 75)
- Placebo	60 (49, 69)	43 (34, 52)	16 (10, 24)
Overall HR	0.44	0.33	0.22
(95% CI)	(0.25, 0.76)	(0.21, 0.50)	(0.15, 0.31)



No. at risk		Time from randomisation (months)												
		0	6	12	18	24	30	36	42	48	54	60	66	72
Osimertinib	110	107	105	98	94	93	84	66	43	20	8	2	0	
Placebo	115	89	59	50	40	35	24	15	12	7	4	0		

ADAURA: Final OS Analysis



Data Cutoff: January 27, 2023
Tick marks indicated censored data.
Alpha allocation of 0.0497.

*Median Follow-Up for Overall Survival in All Patients:
• Osimertinib 59.9 Months
• Placebo: 56.2 Months

No. at risk	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
Osimertinib	233	229	224	224	221	214	208	205	200	170	115	69	33	9	0	-
Placebo	237	232	226	221	210	202	190	182	171	138	94	53	25	8	2	0

5-year OS rate, % (95% CI)	
Osimertinib (N = 233)	85 (79, 89)
Placebo (N = 237)	73 (66, 78)

Overall OS HR 0.49 (0.33, 0.73);
(95.03% CI) **P = .0004**

Maturity: 21%
osimertinib 15%, placebo 27%

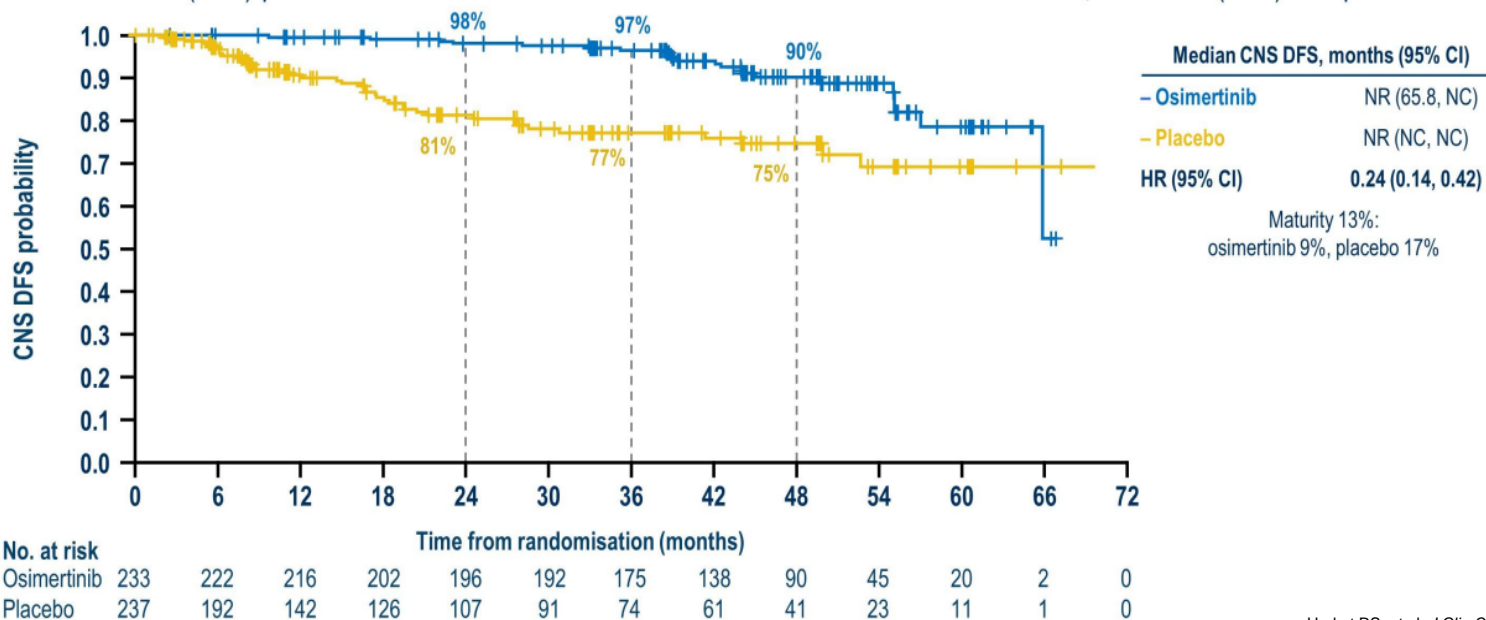
Median follow-up for OS* (censored patients):
osimertinib 61.7 months, placebo 60.4 months

- **Consistent OS benefit**
 - **Consistent across all patient subgroups, including those with stage IB, II, or IIIA disease and in patients who did or did not receive prior adjuvant chemotherapy.**

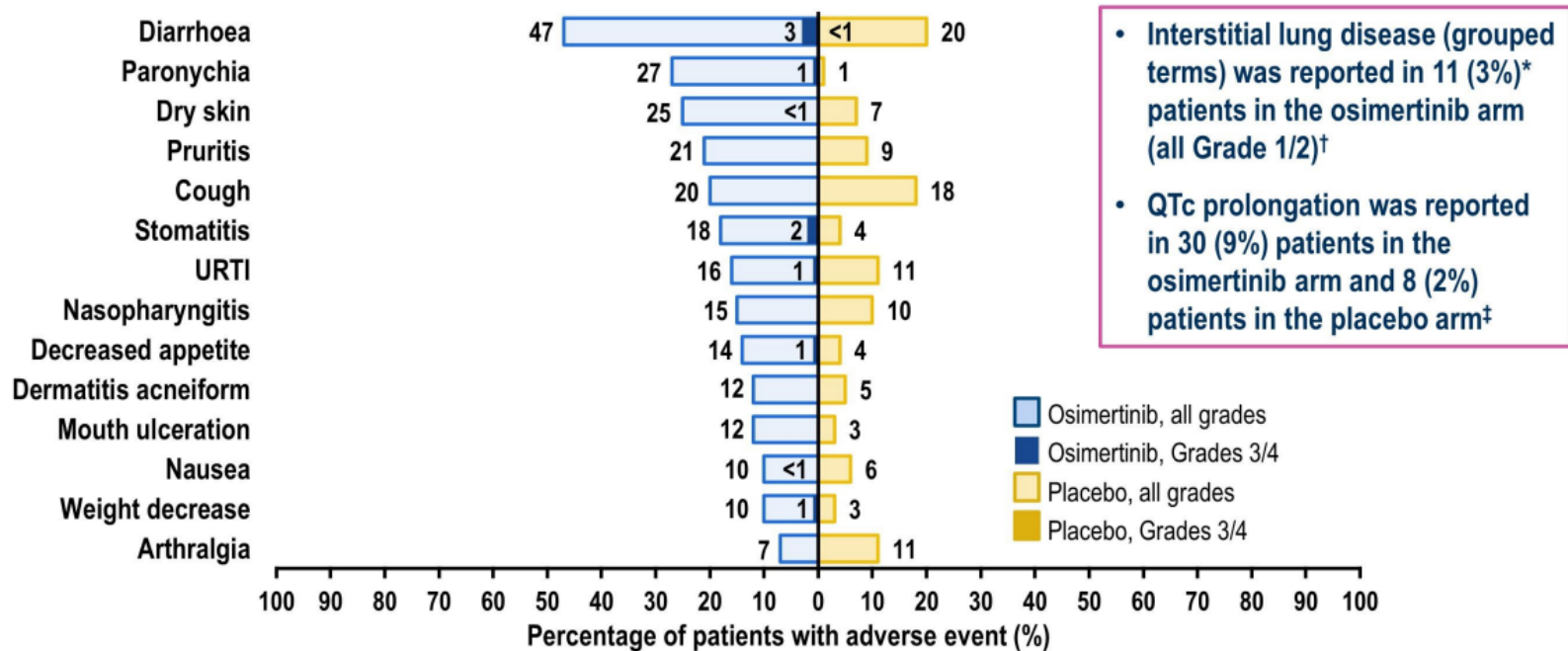
Data cut-off: January 27, 2023.
Tick marks indicate censored data. Alpha allocation of 0.0497. *Median follow-up for OS (all patients): osimertinib 59.9 months, placebo 56.2 months.

ADAURA: Full Analysis Set (INV): Updated CNS Patients With Stage II/IIA Disease

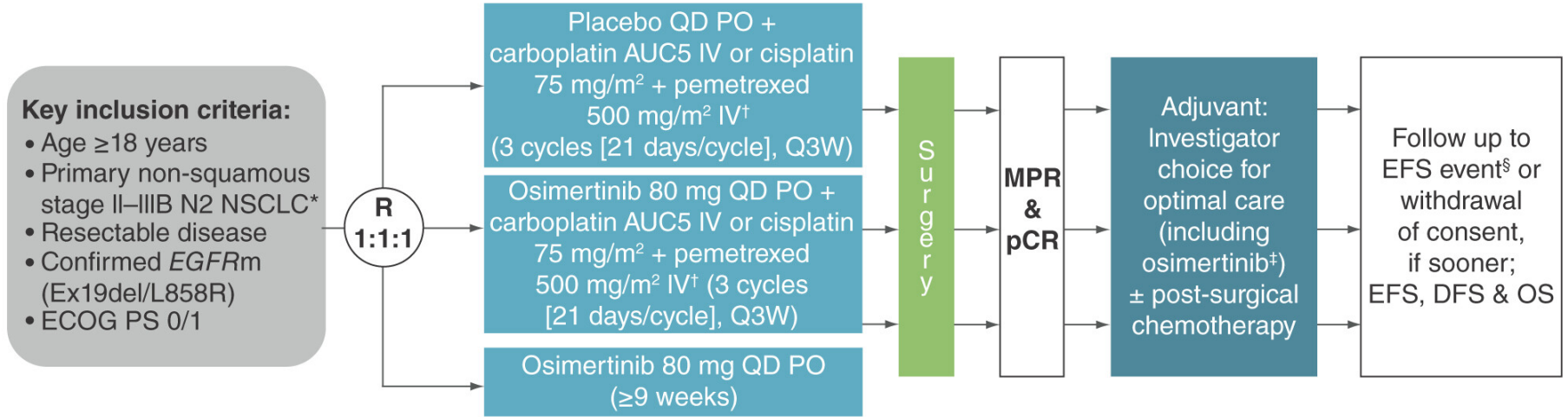
- Overall, 63 patients (osimertinib n=22, placebo n=41) had CNS DFS events:*
 - 3 (14%) patients were on treatment at the time of CNS recurrence with osimertinib, versus 29 (71%) with placebo



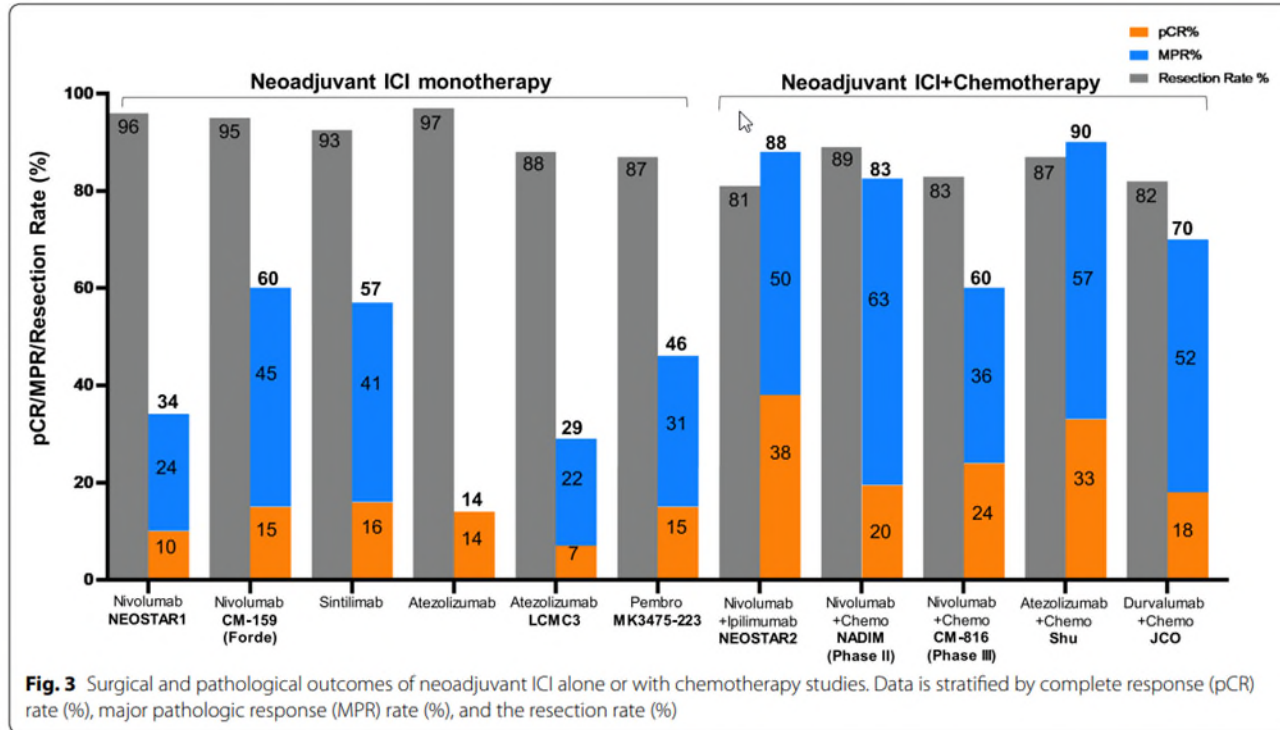
ADAURA: All Causality Adverse Events (>10% of patients)



NeoADAURA Trial: Phase III



Treatment of Early-Stage NSCLC with Immunotherapy

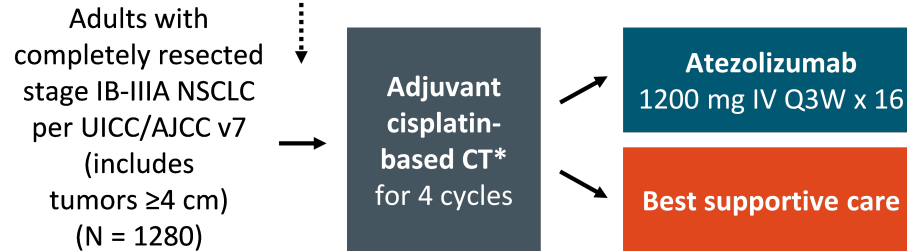


Adjuvant Immunotherapy in Resected NSCLC

IMpower010¹⁻³

Chemotherapy mandatory

Stratification by sex, stage, histology, PD-L1 status



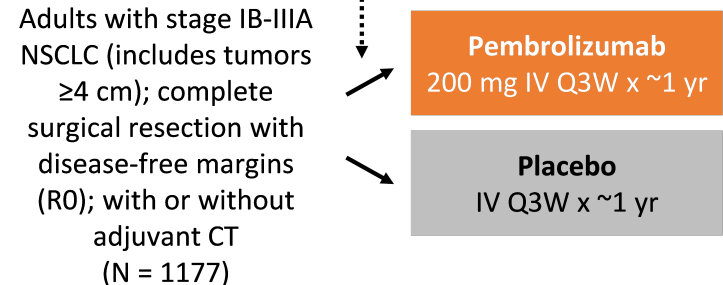
*Cisplatin + pemetrexed (nonsquamous), gemcitabine, docetaxel, or vinorelbine.

- **Primary endpoint:** DFS by investigator among 3 populations: stage II-IIIa with PD-L1 TC $\geq 1\%$, all stage II-IIIa, and ITT population (randomized stage IB-IIIa)

PEARLS/KEYNOTE-091⁴⁻⁶

Chemotherapy not mandatory

Stratified by stage, PD-L1 status, prior adjuvant CT, geographic location

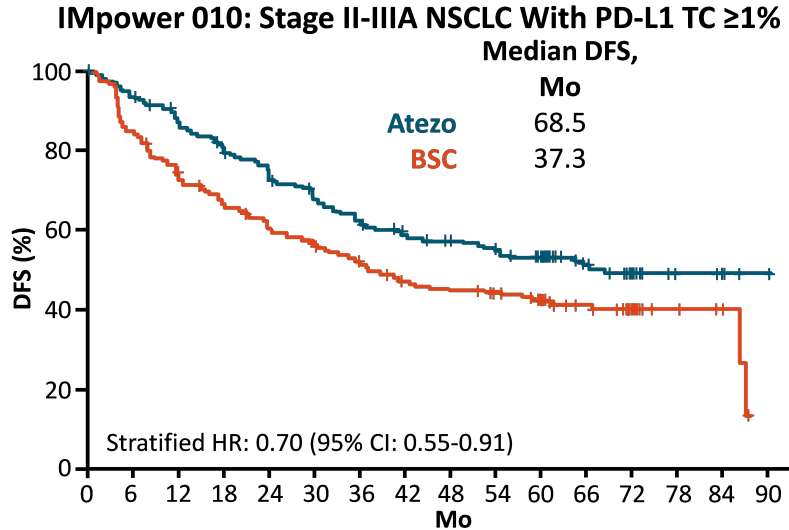


- **Primary endpoint:** DFS in overall and PD-L1 TPS $\geq 50\%$ population

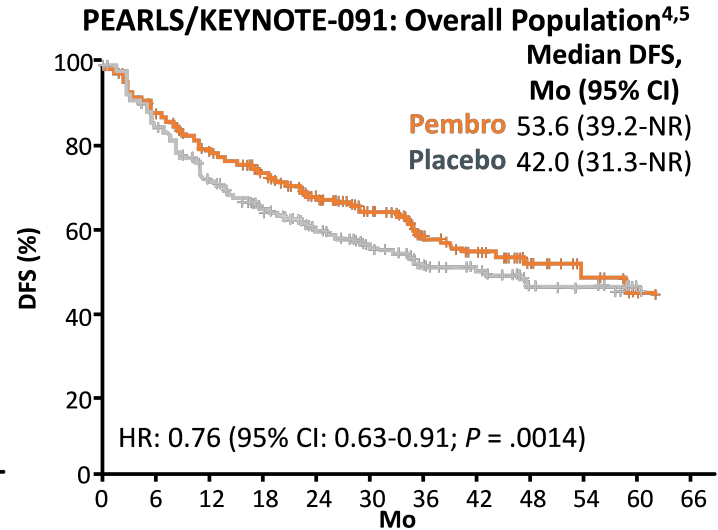
NOTE: Cross-trial comparisons have significant limitations.

This information is presented to generate discussion, not to make direct comparisons between study results.

Adjuvant Immunotherapy in Resected NSCLC

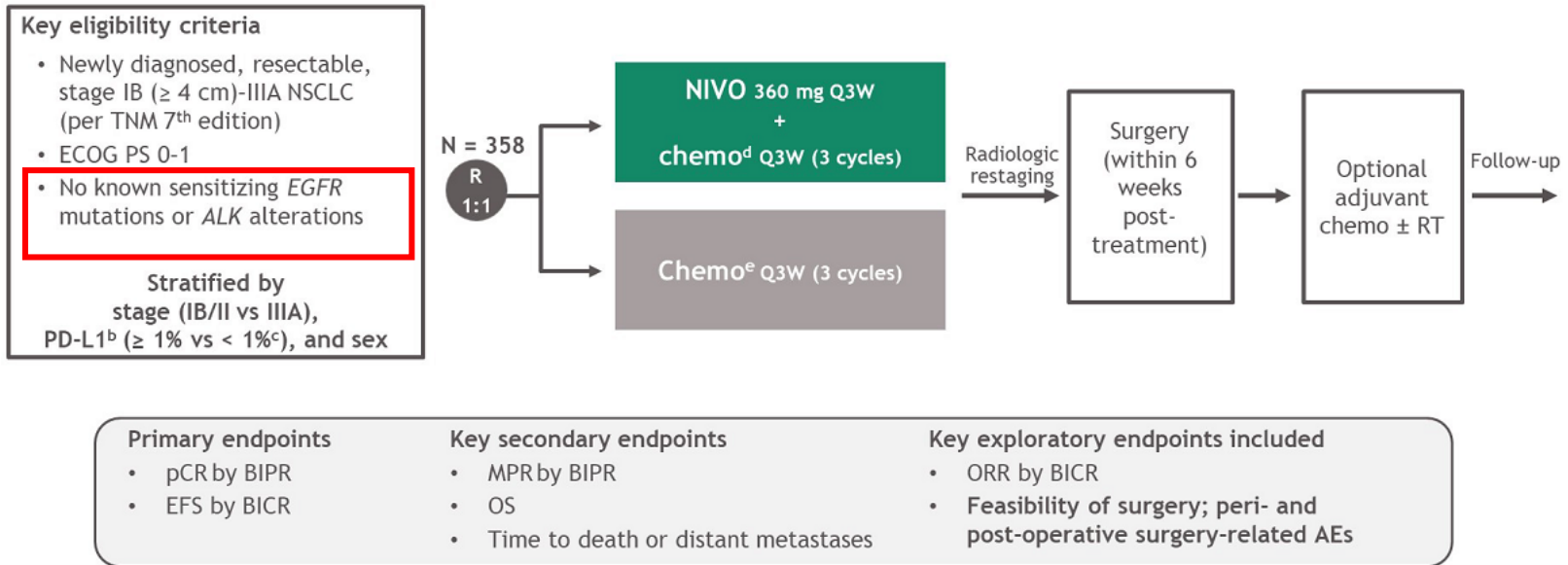


FDA approved in October 2021 as **adjuvant treatment** following resection and platinum-based CT for adults with stage II-IIIa NSCLC and PD-L1 expression on \geq 1% of tumor cells³

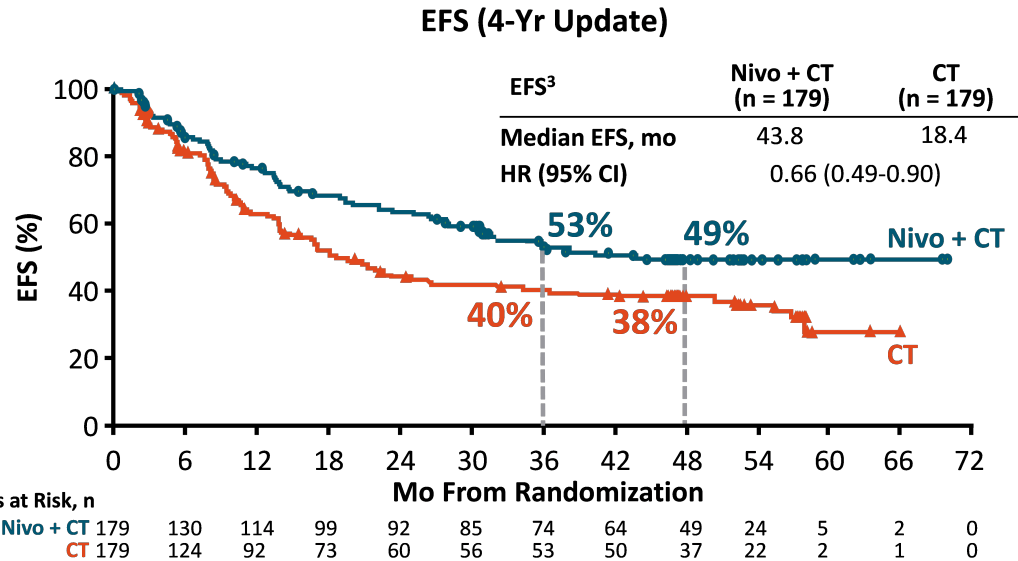
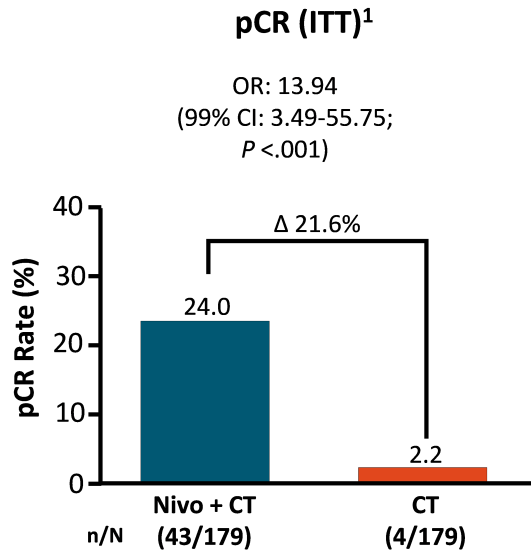


FDA approved in January 2023 as **adjuvant treatment** following resection and platinum-based CT for adult patients with stage IB-IIIa, including T2a \geq 4 cm, NSCLC⁶

Neoadjuvant Immunotherapy: CheckMate 816



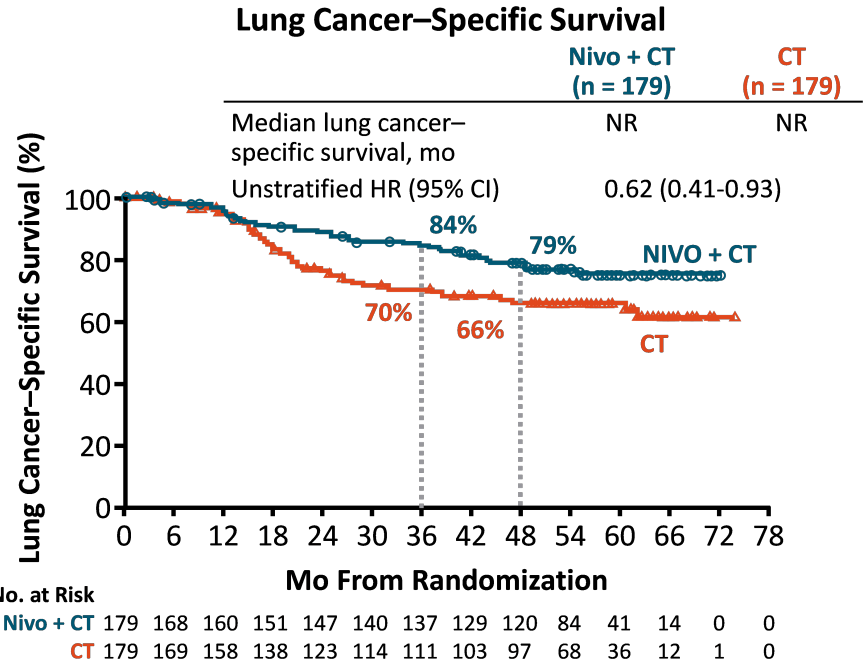
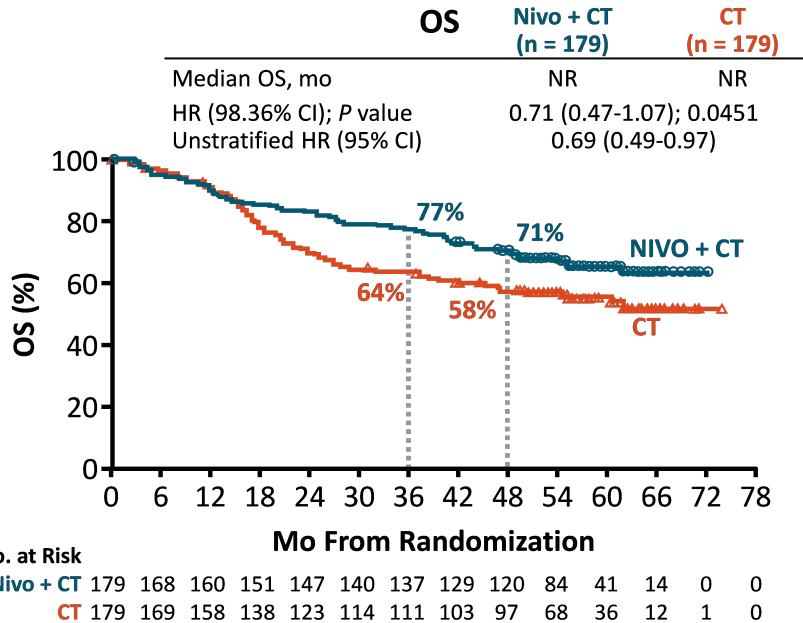
CheckMate 816:



FDA-approved in March 2022 for adults with resectable NSCLC (tumors ≥4 cm or N+) in combination with platinum doublet CT in the neoadjuvant setting²

CheckMate 816:

- Patients who received Nivo + CT and had pCR continued to have improved OS vs those who did not (HR: 0.08; 95% CI: 0.02-0.34; 4-yr OS rates: 95% vs 63%)



Lung Cancer: New FDA Approvals in Resectable NSCLC

- **Alectinib**

- 04/2024 approved for adjuvant therapy for ALK positive NSCLC
- ALINA trial

- **Durvalumab**

- 08/2024 approved in combination with chemotherapy for neoadjuvant treatment for resectable NSCLC followed by adjuvant durvalumab treatment after surgery
- AEGEAN trial

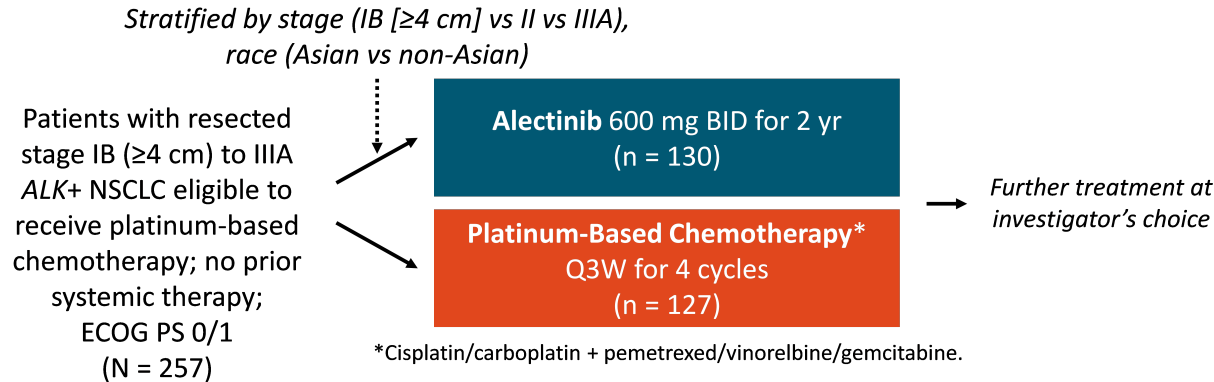
- **Neoadjuvant Nivolumab + Chemotherapy/Adjuvant Nivolumab**

- 10/2024 approved in resectable NSCLC with no known EGFR mutations or ALK rearrangements
- CheckMate 77T

ALINA Trial

FDA approves alectinib as adjuvant treatment for ALK-positive non-small cell lung cancer

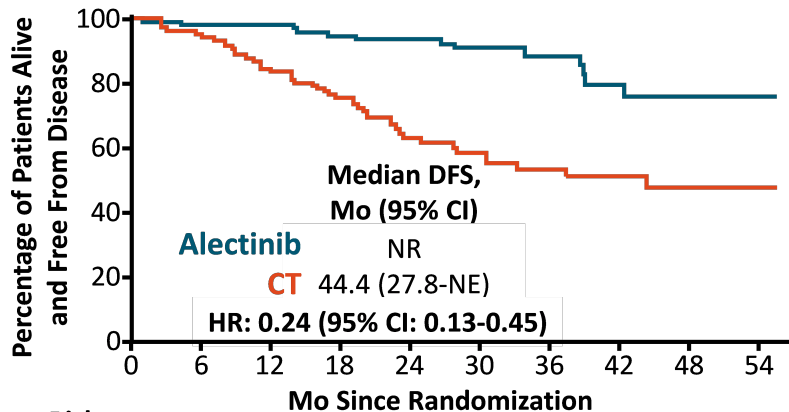
- International, randomized, open-label phase III trial



- Primary endpoint:** DFS per investigator (hierarchical: stage II-III A; then stage IB-III A [ITT population])
- Secondary endpoints:** CNS DFS, OS, safety

ALINA Trial

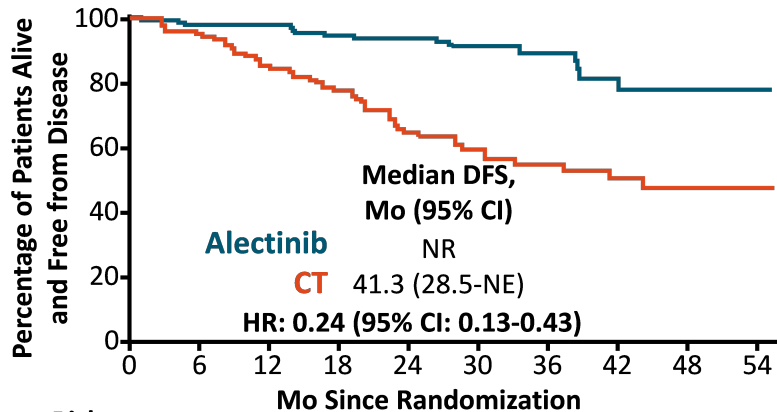
Patients With Stage II to IIIA Disease



No. at Risk

Alectinib	116	111	111	107	67	49	35	21	10	3
CT	115	102	88	79	48	35	23	17	10	2

Overall Patient Population



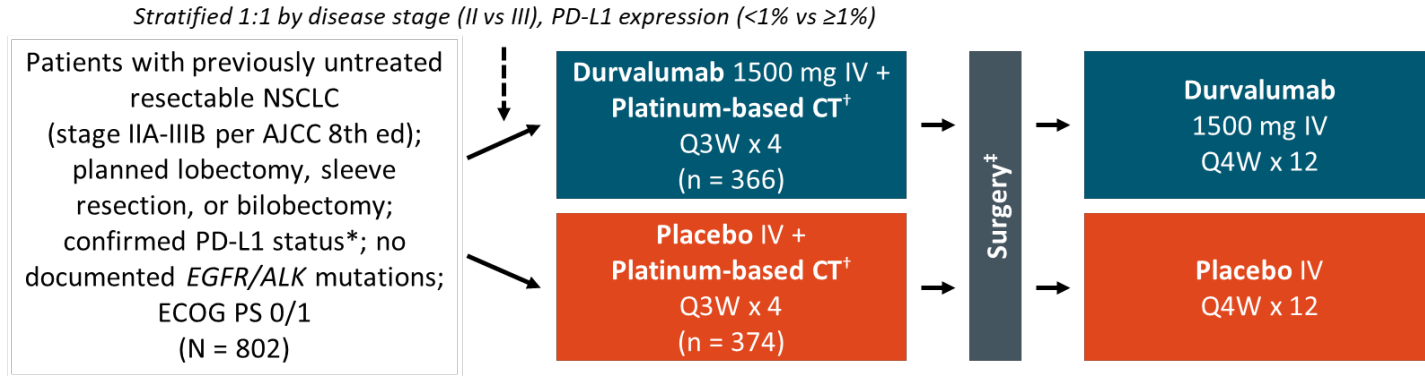
No. at Risk

Alectinib	130	123	123	118	74	55	39	22	10	3
CT	127	112	98	89	55	41	27	18	11	2

- DFS benefit with alectinib vs chemotherapy observed across all subgroups of the ITT population, including age, sex, race, baseline ECOG PS, tobacco use history, tumor stage, and regional LN status

AEGEAN Trial

- International, randomized, double-blind phase III trial
 - Current analysis focuses on surgical outcomes using descriptive statistics (data cutoff: November 10, 2022)

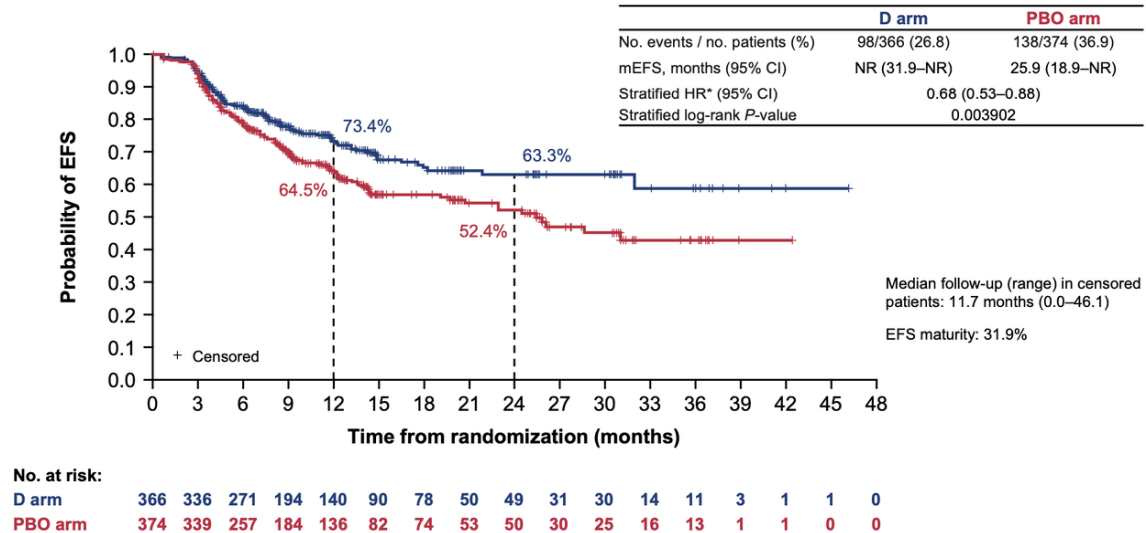


*Per Ventana PD-L1 (SP263) IHC. [†]Based on histology and investigator decision: nonsquamous, cisplatin + pemetrexed or carboplatin + pemetrexed; squamous, carboplatin + paclitaxel, cisplatin + gemcitabine, or carboplatin + gemcitabine if comorbidities present and/or unlikely to tolerate cisplatin. [‡]Postoperative RT permitted per local guidance.

- Primary endpoints:** pCR by central lab, EFS by BICR (RECIST v1.1)
- Secondary endpoints:** MPR by central lab, DFS by BICR (RECIST v1.1), OS

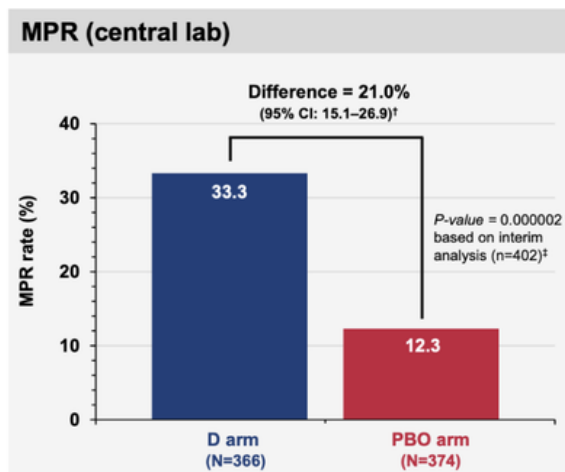
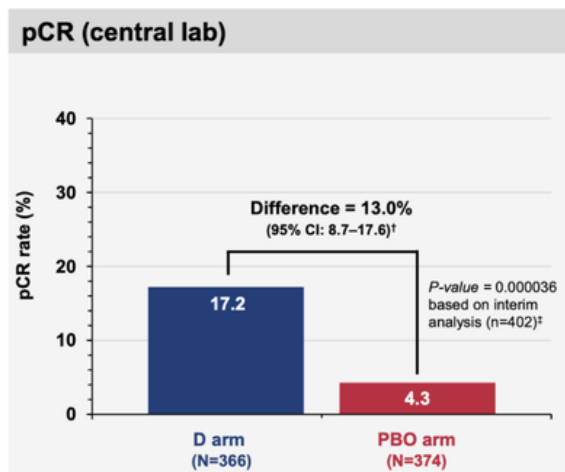
AEGEAN Trial

EFS using RECIST v1.1 (BICR) (mITT) First planned interim analysis of EFS



AEGEAN Trial

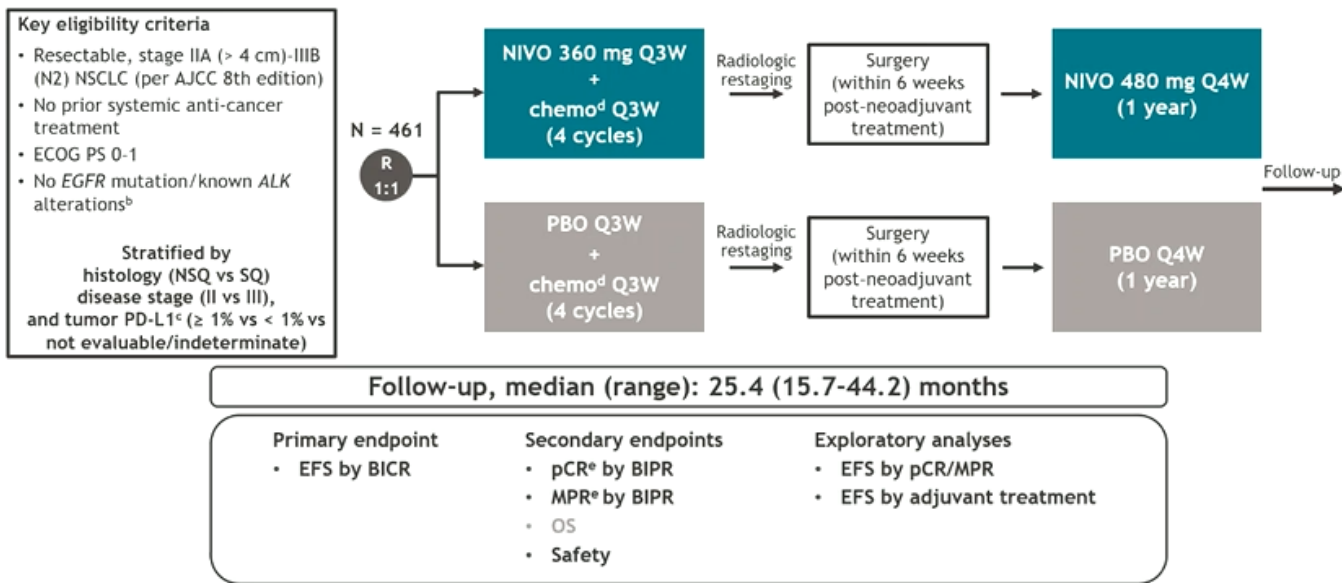
Pathologic response per IASLC 2020 methodology* (mITT)
Final analysis



CheckMate 77T Trial

CheckMate 77T: perioperative NIVO in resectable NSCLC

CheckMate 77T^a study design



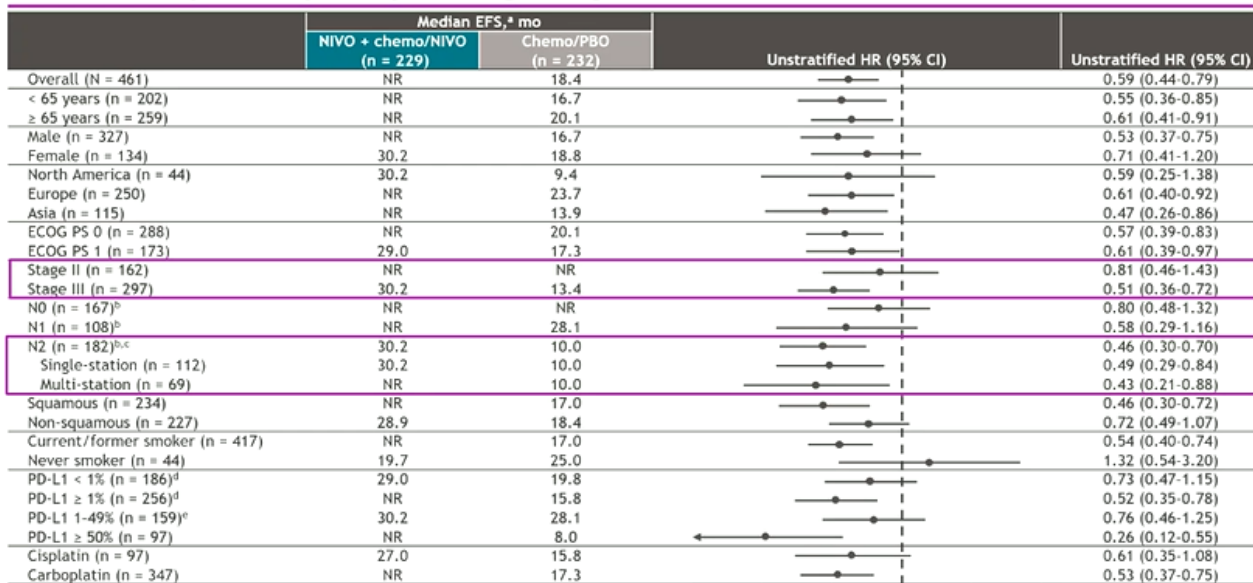
Database lock date: September 6, 2023.

^aNCT04025879. ^b*EGFR* testing was mandatory in all patients with NSQ histology. *ALK* testing was done in patients with a history of *ALK* alterations. *EGFR/ALK* testing done using US FDA/local health authority-approved assays. ^cDetermined by the PD-L1 IHC 28-8 pharmDx assay (Dako). ^dNSQ: cisplatin + pemetrexed, carboplatin + pemetrexed, or carboplatin + paclitaxel; SQ: cisplatin + docetaxel or carboplatin + paclitaxel. ^eAssessed per immune-related pathologic response criteria. ^fBICR, blinded independent central review; BIPR, blinded independent pathological review. 1. Cottrell TR, et al. *Ann Oncol* 2018;29:1853-1860.

CheckMate 77T Trial

CheckMate 77T: perioperative NIVO in resectable NSCLC

EFS analysis by key subgroups



Median follow-up (range): 25.4 months (15.7-44.2).

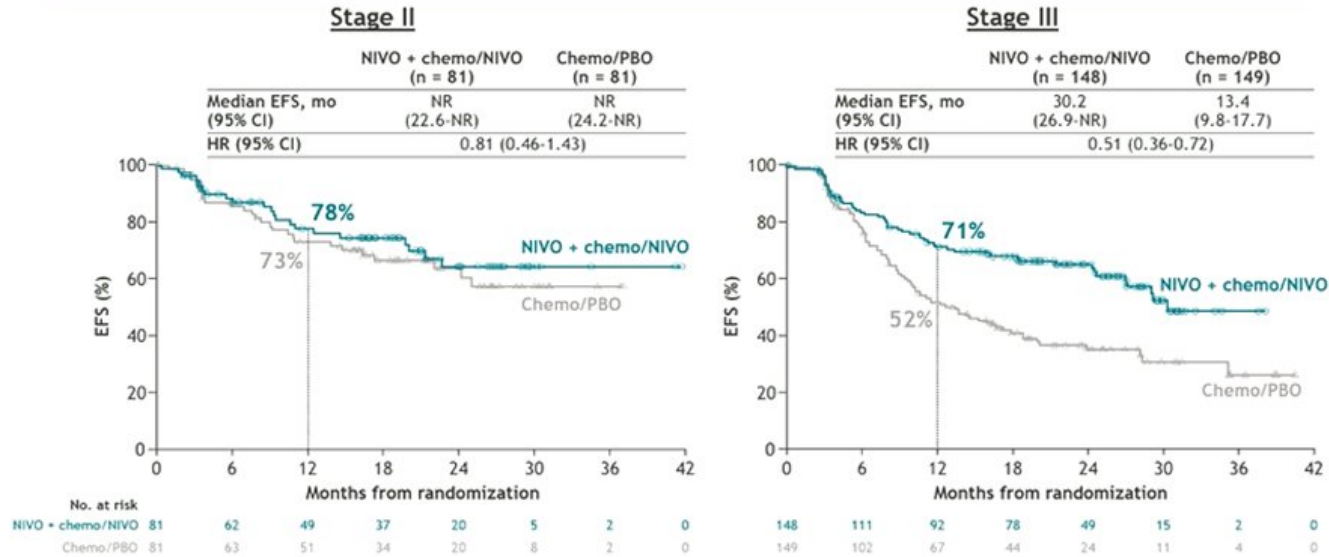
^aPer IBCR. ^bNodal status was N3 in 4 patients. ^cN2 subcategory was not reported in 1 patient. Baseline characteristics were similar across treatment arms in the N2 nodal status subgroup, which comprised ~40% of patients. ^dTumor PD-L1 expression was not evaluable/indeterminate in 19 patients. ^eMost patients in this subgroup had low PD-L1 expression (median 10% across both arms).

0.125 0.25 0.5 1 2 4
 Favors NIVO + chemo/NIVO ← → Favors chemo/PBO

CheckMate 77T Trial

CheckMate 77T: perioperative NIVO in resectable NSCLC

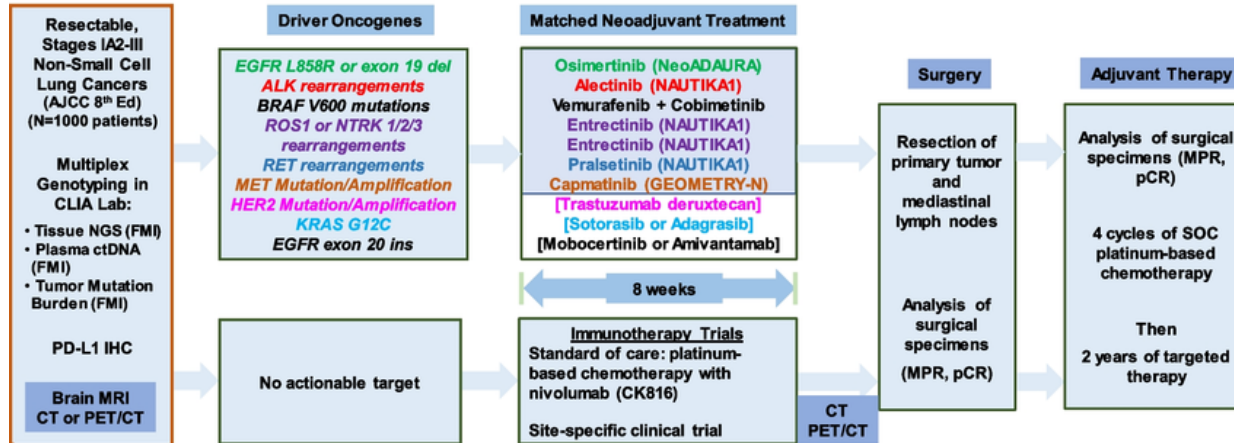
EFS by baseline disease stage



Median follow-up (range): 25.4 months (15.7-44.2).

LEARN Trial

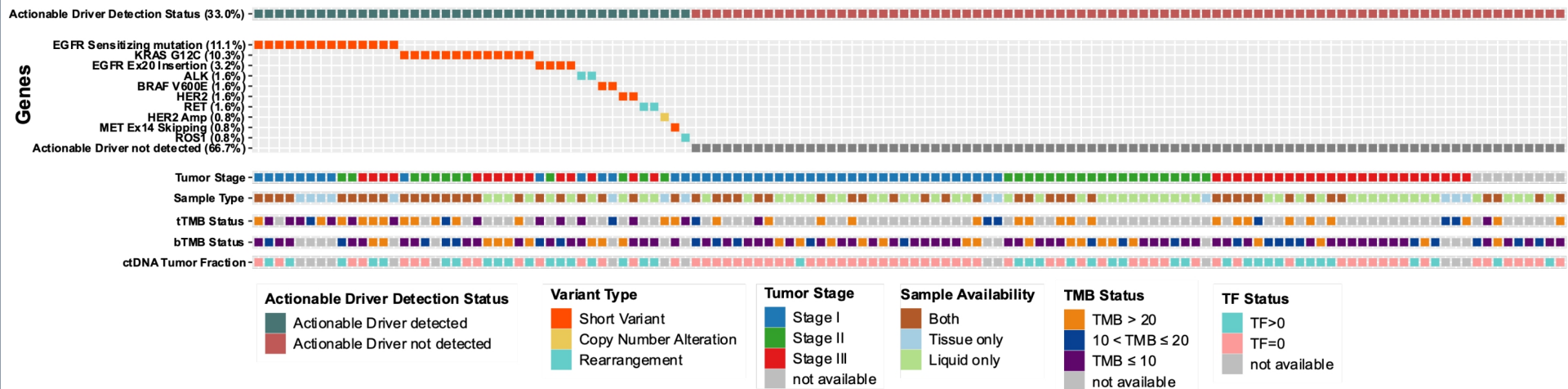
Schema for Biomarker-Driven Precision Neoadjuvant Therapy for stage IA2-III NSCLC



- **LCMCA (LEADER) Screening Trial**

- Umbrella trial – detect actionable oncogenic drivers by NGS in patients with resectable, early-stage NSCLC
- Oncogenic driver detected – matched to effective targeted therapy for metastatic NSCLC
- No oncogenic driver detected – standard of care or neoadjuvant nivolumab and chemotherapy

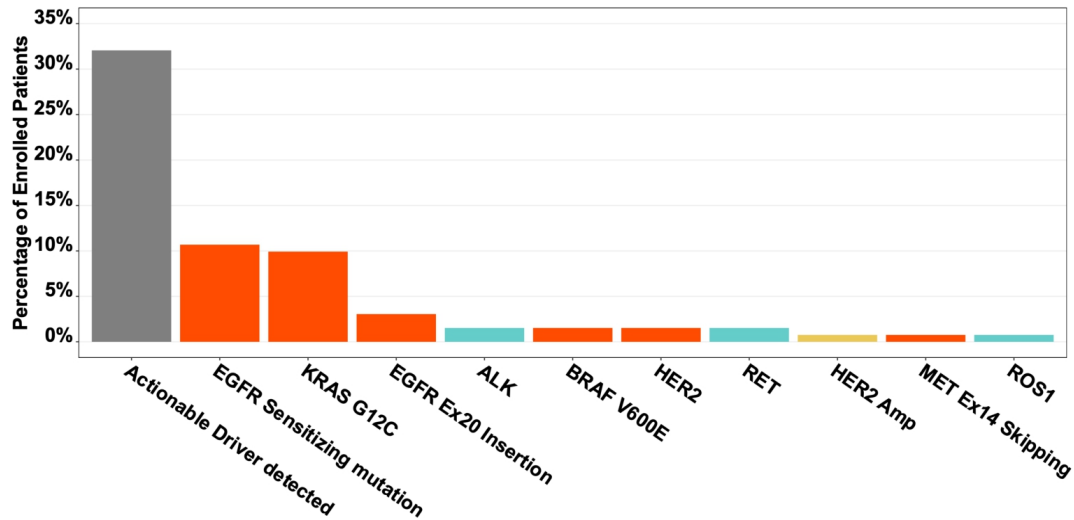
LEARN Trial



- **33% of patients with tissue and/or liquid testing had an actionable driver mutation**

LEARN Trial

Prevalence of Actionable Alterations in Tissue and/or Liquid Samples (N=126)



Expanding Eligibility Criteria

▪ Initial recommendations prioritized assessment of specific eligibility criteria:

- Brain Metastases
- Minimum Age
- HIV/AIDS
- Organ Dysfunction
- Prior and Concurrent Malignancies

JOURNAL OF CLINICAL ONCOLOGY

ASCO SPECIAL ARTICLE

Broadening Eligibility Criteria to Make Clinical Trials More Representative: American Society of Clinical Oncology and Friends of Cancer Research Joint Research Statement

Edward S. Kim, Suanna S. Bruinooge, Samantha Roberts, Gwynn Ison, Nancy U. Lin, Lia Gore, Thomas S. Uldrick, Stuart M. Lichtman, Nancy Roach, Julia A. Beaver, Rajeshwari Sridhara, Paul J. Hesketh, Andrea M. Denicoff, Elizabeth Garrett-Mayer, Eric Rubin, Pratik Multani, Tatiana M. Prowell, Caroline Schenkel, Marina Kozak, Jeff Allen, Ellen Sigal, and Richard L. Schilsky

• Expanded recommendations for eligibility criteria:

- Washout Periods and Concomitant Medications
- Prior Therapies
- Laboratory Reference Ranges and Test Intervals
- Performance Status

Published OnlineFirst February 9, 2021; DOI: 10.1158/1078-0432.CCR-20-3852

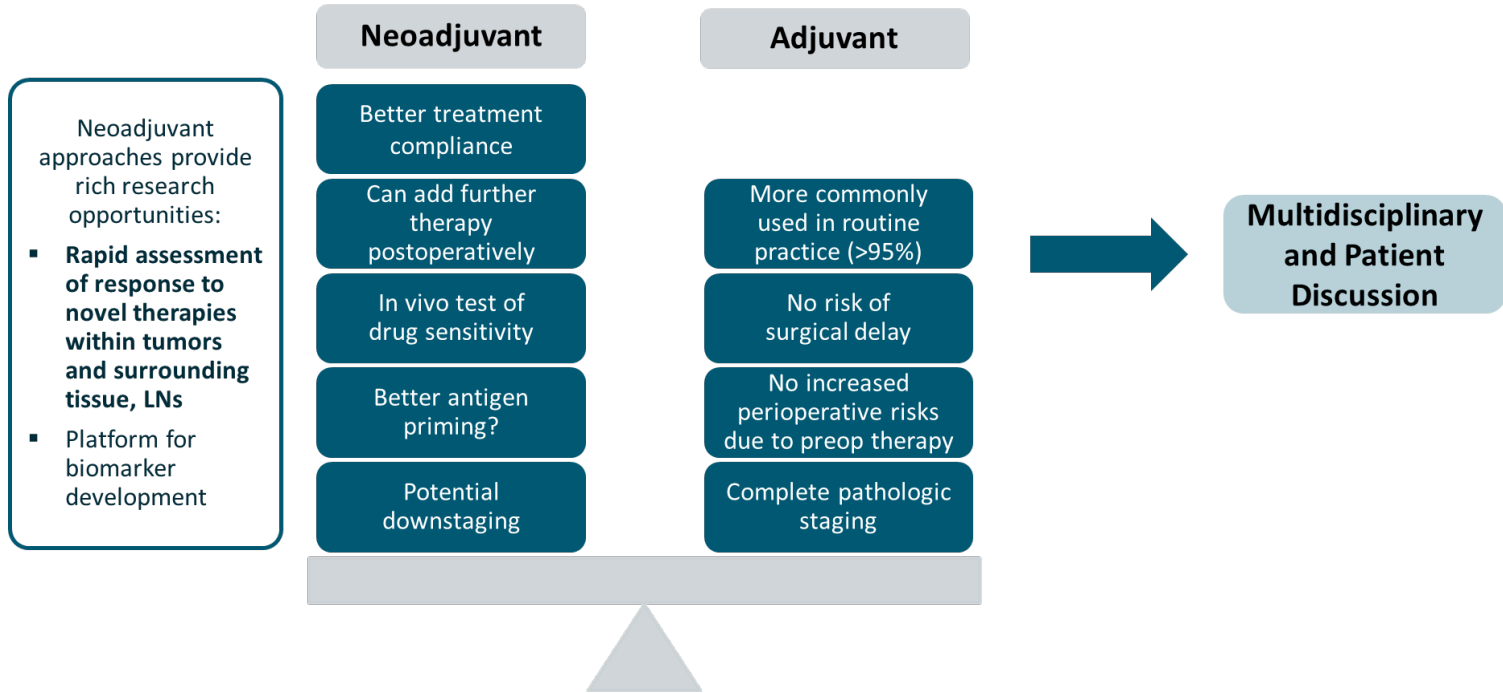
CLINICAL CANCER RESEARCH | PERSPECTIVES

Continuing to Broaden Eligibility Criteria to Make Clinical Trials More Representative and Inclusive: ASCO–Friends of Cancer Research Joint Research Statement

Edward S. Kim¹, Thomas S. Uldrick², Caroline Schenkel³, Suanna S. Bruinooge³, R. Donald Harvey⁴, Allison Magnuson⁵, Alexander Spira⁶, James L. Wade⁷, Mark D. Stewart⁸, Diana Merino Vega⁹, Julia A. Beaver⁹, Andrea M. Denicoff¹⁰, Gwynn Ison⁹, S. Percy Ivy¹⁰, Suzanne George¹¹, Raymond P. Perez¹², Patricia A. Spears¹³, William D. Tap¹⁴, and Richard L. Schilsky³



Multidisciplinary Approach



Conclusions

- Lung cancer has dramatically changed the landscape of precision medicine
- Neoadjuvant/adjuvant therapies can help improve outcomes and reduce recurrences
- Biomarker-driven therapy extending from advanced stage to early-stage NSCLC requires a multidisciplinary approach

Thank you!



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