

Systemic Therapy in Early-Stage, Wild-Type Non-Small Cell Lung Cancer: Current Standards and Practical Applications

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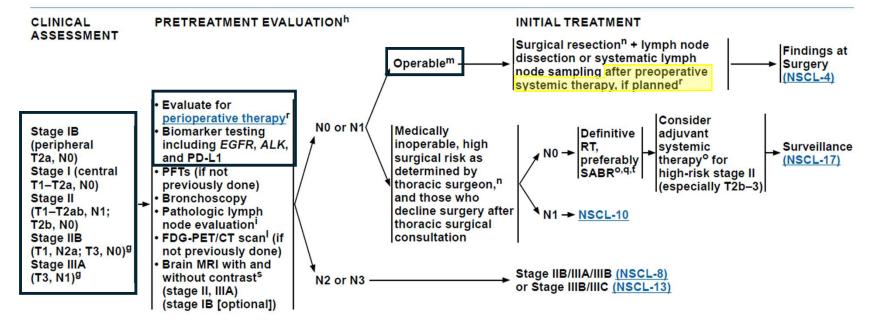
- James Cancer Hospital and Solove Research Institute



Goals

- Describe current NCCN Guidelines recommendations for systemic therapy in early-stage, wild-type non-small cell lung cancer.
- Evaluate clinical trial evidence supporting the use of neoadjuvant and adjuvant immunotherapy.
- Apply practical, team-based strategies for integrating immunotherapy into treatment planning for early-stage wild-type NSCLC.

Recommendations for early-stage NSCLC

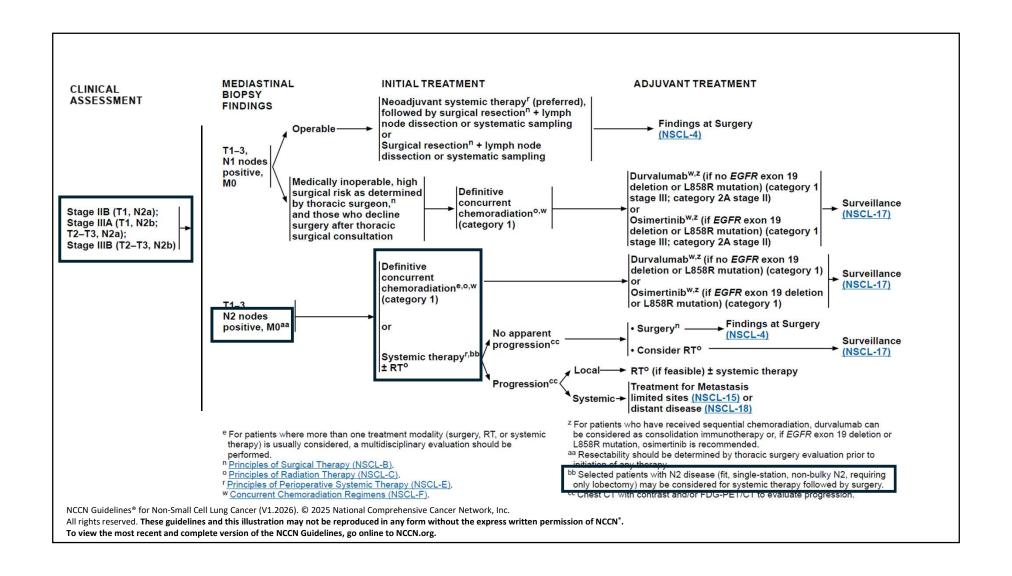


q Prior to treatment, multidisciplinary evaluation that includes treating physicians and specialists in obtaining tissue diagnosis (thoracic surgery, interventional pulmonology, and interventional radiology) is required to determine the safest and most efficient approach for biopsy, or to provide consensus that a biopsy is too risky or difficult, that a clinical diagnosis of lung cancer is appropriate, and that treatment is warranted.

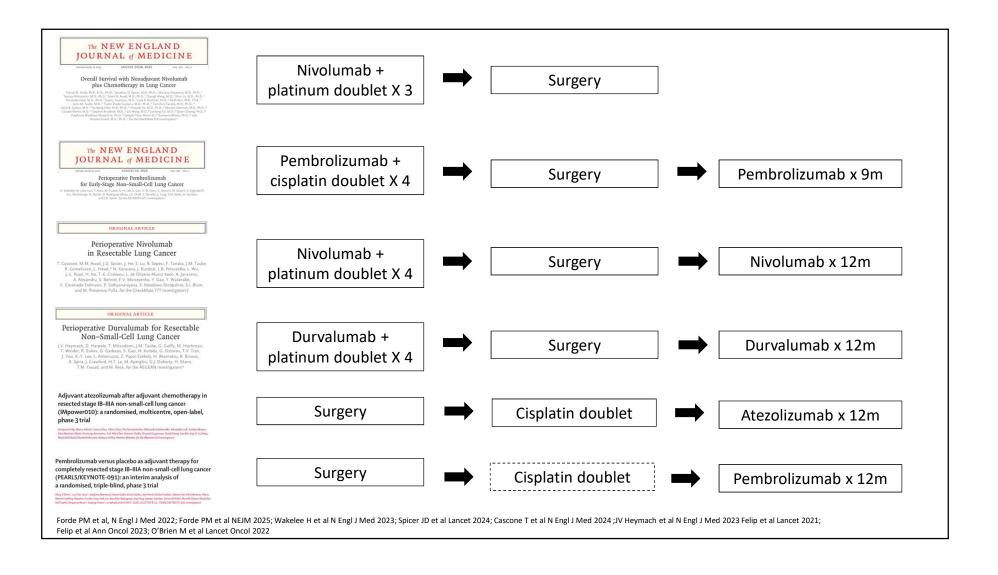
NSCL-3. The NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Non-Small Cell Lung Cancer (V1.2026).

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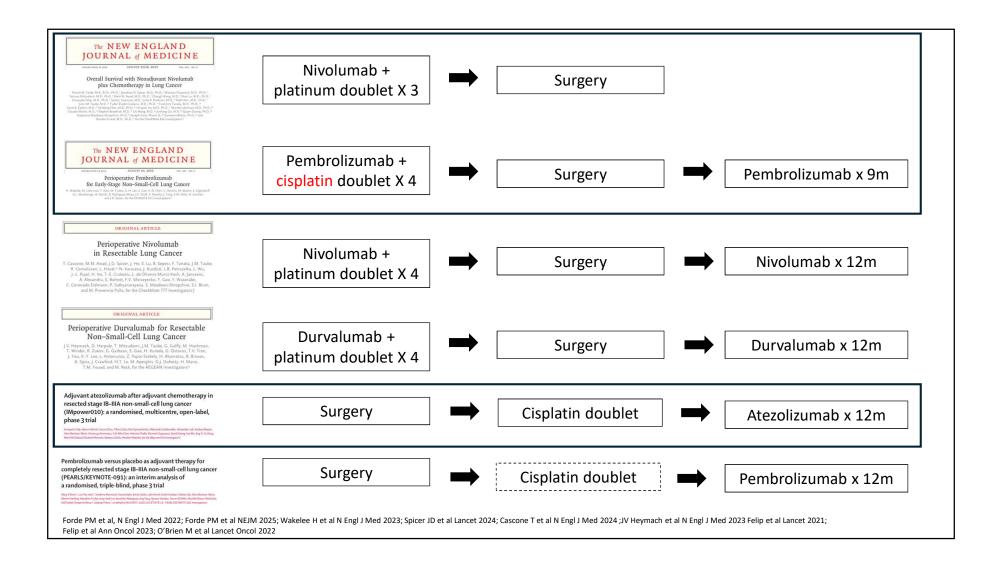
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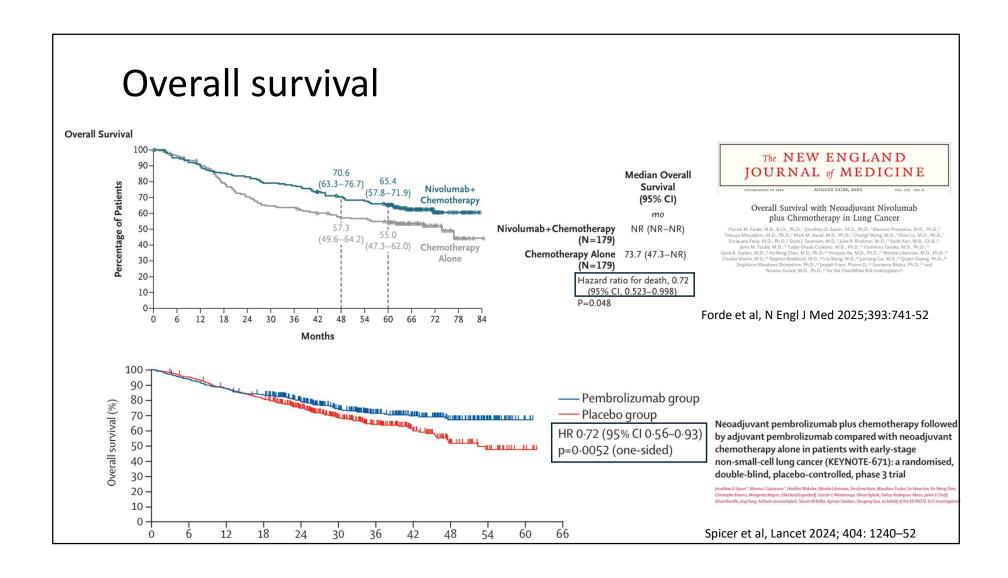
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Phase 3 trials with regulatory approval for resectable NSCLC

Trial	Intervention	N	pCR Rate	EFS (HR, median)	OS (HR; median)	FDA Approval Status
CheckMate 816	Neoadjuvant Nivo + CT vs CT	358 (IB–IIIA)	24%		OS: 0.72; 65% vs 55% (5-yr)	FDA Approved
KEYNOTE-671	Perioperative Pembro + CT vs CT	797 (II–IIIB)	20.9%		OS: 0.72; 71% vs 64% (3-yr)	FDA Approved
AEGEAN	Perioperative Durva + CT vs CT	740 (IIA–IIIB)	17.2%		OS: 0.89; NR vs 53.2 mo	FDA Approved
CheckMate 77T	Perioperative Nivo + CT vs CT	461 (IIA – IIIB)	25.3%		OS: 0.85; 78% vs 72% (30 mo)	FDA Approved

Forde P, NEJM 2022; Forde P, NEJM 2025; Wakelee H, NEJM 2023; Spicer JD, Lancet 2024; Heymach J, NEJM 2023; Heymach JTO 2024; Cascone T, NEJM 2024; Cascone T, ASCO 2025

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Narrowing the focus

- How to approach N2 positivity in the current era
- Role of PD-L1 expression
- What about earlier stage, node negative tumors?
- Pathological response implications
- A look at adjuvant chemotherapy
- How biomarker testing should guide decisions

Adjuvant, neoadjuvant, or perioperative?

Surgical resection upfront

VS

• In patients who completed neoadjuvant therapy

Should we consider these separately?

Adjuvant, neoadjuvant, or perioperative?

Surgical resection upfront

VS

- In patients who completed neoadjuvant therapy
 - With pathCR? Without pCR? What about MPR? RVT?
- Should we consider these separately?

Clinical Scenario/Case: Role of N2

77 yo man with DM and abnormal LFTs prompted imaging

- CT abd revealed 2.7 cm RLL lesion
- PET shows RLL lesion and retro tracheal LN uptake
- EBUS confirms N2 positive disease, NSCLC, adenocarcinoma
- NGS: CDKN2A; PD-L1 50%
- What data do we have for N2 in perioperative NSCLC?





Trial ID	Stage III (%)	Stage III HR (95% CI)	Outcome
Adjuvant ICI			
IMpower 010	47%	0.62 (0.42, 0.90)	DFS
IMpower 010	47%	0.71 (0.44, 1.15)	OS
KEYNOTE-091	30%	0.92 (0.69, 1.24)	DFS
Neoadjuvant/Perio	perative		
KEYNOTE-671	70%	0.74 (0.55, 0.98)	OS
KEYNOTE-671	70%	0.58 (0.46, 0.72)	EFS
CheckMate 816	63%	0.54 (0.37, 0.80)	EFS
CheckMate 816	63%	0.70 (0.47, 1.05)	OS
CheckMate 77T	64%	0.51 (0.36, 0.72)	EFS
AEGEAN	71%	IIIA 0.57 (0.39, 0.83) IIIB 0.83 (0.52, 1.32)	EFS
Adjuvant TKI			
ADAURA	35%	0.12 (0.07, 0.20)	DFS
ADAURA	35%	0.37 (0.20, 0.64)	OS
ALINA	53%	0.25 (0.12, 0.53)	DFS

Felip et al Lancet 2021; Felip et al Ann Oncol 2023; O'Brien M et al Lancet Oncol 2022; Wakelee H et al N Engl J Med 2023; Spicer JD et al Lancet 2024; Forde PM et al, N Engl J Med 2022; Forde PM et al NEJM 2025; Cascone T et al N Engl J Med 2024; JV Heymach et al N Engl J Med 2023; YL Wu et al N Engl J Med 2023; YL Wu et al N Engl J Med 2024

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IMpower 010	47%	0.71 (0.44, 1.15)	OS
KEYNOTE-091	30%	0.92 (0.69, 1.24)	DFS
Neoadjuvant/Perio	perative		
KEYNOTE-671	70%	0.74 (0.55, 0.98)	OS
KEYNOTE-671	70%	0.58 (0.46, 0.72)	EFS
CheckMate 816	63%	0.54 (0.37, 0.80)	EFS
CheckMate 816	63%	0.70 (0.47, 1.05)	OS
CheckMate 77T	64%	0.51 (0.36, 0.72)	EFS
AEGEAN	71%	IIIA 0.57 (0.39, 0.83) IIIB 0.83 (0.52, 1.32)	EFS
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ADAURA	35%	0.37 (0.20, 0.64)	OS
ALINA	53%	0.25 (0.12, 0.53)	DFS

Felip et al Lancet 2021; Felip et al Ann Oncol 2023; O'Brien M et al Lancet Oncol 2022; Wakelee H et al N Engl J Med 2023; Spicer JD et al Lancet 2024; Forde PM et al, N Engl J Med 2022; Forde PM et al NEJM 2025; Cascone T et al N Engl J Med 2024; JV Heymach et al N Engl J Med 2023; YL Wu et al N Engl J Med 2022; M Tsuboi et al N Engl J Med 2023; YL Wu et al N Engl J Med 2024

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Trial ID	Stage III (%)	Stage III HR (95% CI)	Outcome	N2 (%)
Adjuvant ICI				
IMpower 010	47%	0.62 (0.42, 0.90)	DFS	37%
IMpower 010	47%	0.71 (0.44, 1.15)	OS	37%
KEYNOTE-091	30%	0.92 (0.69, 1.24)	DFS	21%
Neoadjuvant/Perio	perative			
KEYNOTE-671	70%	0.74 (0.55, 0.98)	OS	42%
KEYNOTE-671	70%	0.58 (0.46, 0.72)	EFS	42%
CheckMate 816	63%	0.54 (0.37, 0.80)	EFS	NR
CheckMate 816	63%	0.70 (0.47, 1.05)	OS	NR
CheckMate 77T	64%	0.51 (0.36, 0.72)	EFS	40%
AEGEAN	71%	IIIA 0.57 (0.39, 0.83) IIIB 0.83 (0.52, 1.32)	EFS	50%
Adjuvant TKI				
ADAURA	35%	0.12 (0.07, 0.20)	DFS	31%
ADAURA	35%	0.37 (0.20, 0.64)	OS	31%
ALINA	53%	0.25 (0.12, 0.53)	DFS	49%

Felip et al Lancet 2021; Felip et al Ann Oncol 2023; O'Brien M et al Lancet Oncol 2022; Wakelee H et al N Engl J Med 2023; Spicer JD et al Lancet 2024; Forde PM et al, N Engl J Med 2022; Forde PM et al NEJM 2025; Cascone T et al N Engl J Med 2024; JV Heymach et al N Engl J Med 2023; YL Wu et al N Engl J Med 2022; M Tsuboi et al N Engl J Med 2023; YL Wu et al N Engl J Med 2024

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Trial ID	Stage III (%)	Stage III HR (95% CI)	Outcome	N2 (%)	N2 HR (95%CI)
Adjuvant ICI					
IMpower 010	47%	0.62 (0.42, 0.90)	DFS	37%	0.66 (0.44, 0.99)
IMpower 010	47%	0.71 (0.44, 1.15)	OS	37%	0.74 (0.51, 1.07)
KEYNOTE-091	30%	0.92 (0.69, 1.24)	DFS	21%	NR
Neoadjuvant/Perio	perative				
KEYNOTE-671	70%	0.74 (0.55, 0.98)	OS	42%	0.74 (0.51, 1.07)
KEYNOTE-671	70%	0.58 (0.46, 0.72)	EFS	42%	0.63 (0.48, 0.82)
CheckMate 816	63%	0.54 (0.37, 0.80)	EFS	NR	NR
CheckMate 816	63%	0.70 (0.47, 1.05)	OS	NR	NR
CheckMate 77T	64%	0.51 (0.36, 0.72)	EFS	40%	0.46 (0.30, 0.70)
AEGEAN	71%	IIIA 0.57 (0.39, 0.83) IIIB 0.83 (0.52, 1.32)	EFS	50%	NR
Adjuvant TKI					
ADAURA	35%	0.12 (0.07, 0.20)	DFS	31%	NR
ADAURA	35%	0.37 (0.20, 0.64)	OS	31%	NR
ALINA	53%	0.25 (0.12, 0.53)	DFS	49%	0.21 (0.09, 0.47)

Felip et al Lancet 2021; Felip et al Ann Oncol 2023; Felip et al JCO 2025; O'Brien M et al Lancet Oncol 2022; Wakelee H et al N Engl J Med 2023; Spicer JD et al Lancet 2024; Forde PM et al, N Engl J Med 2022; Forde PM et al NEJM 2025; Cascone T et al N Engl J Med 2024; JV Heymach et al N Engl J Med 2023; YL Wu et al N Engl J Med 2023; YL Wu et al N Engl J Med 2024

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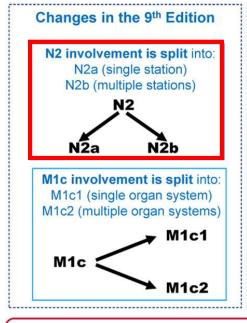
Trial ID	Stage III (%)	Stage III HR (95% CI)	Outcome	N2 (%)	N2 HR (95%CI)	N2a(%)	N2a HR (95% CI)	N2b (%)	N2b HR (95% CI)
Adjuvant ICI									
IMpower 010	47%	0.62 (0.42, 0.90)	DFS	37%	0.66 (0.44, 0.99)				
IMpower 010	47%	0.71 (0.44, 1.15)	OS	37%	0.84 (0.50, 1.40)				
KEYNOTE-091	30%	0.92 (0.69, 1.24)	DFS	21%	NR				
Neoadjuvant/Perio	perative								
KEYNOTE-671	70%	0.74 (0.55, 0.98)	OS	42%	0.74 (0.51, 1.07)				
KEYNOTE-671	70%	0.58 (0.46, 0.72)	EFS	42%	0.63 (0.48, 0.82)				
CheckMate 816	63%	0.54 (0.37, 0.80)	EFS	NR	NR				
CheckMate 816	63%	0.70 (0.47, 1.05)	OS	NR	NR				
CheckMate 77T	64%	0.51 (0.36, 0.72)	EFS	40%	0.46 (0.30, 0.70)	26%	0.49 (0.29, 0.84)	14%	0.43 (0.21, 0.88)
AEGEAN	71%	IIIA 0.57 (0.39, 0.83) IIIB 0.83 (0.52, 1.32)	EFS	50%	NR	39%	0.61 (0.39, 0.94)	9%	0.69 (0.33, 1.38)
Adjuvant TKI									
ADAURA	35%	0.12 (0.07, 0.20)	DFS	31%	NR				
ADAURA	35%	0.37 (0.20, 0.64)	OS	31%	NR				
ALINA	53%	0.25 (0.12, 0.53)	DFS	49%	0.21 (0.09, 0.47)				

Felip et al Lancet 2021; Felip et al Ann Oncol 2023; O'Brien M et al Lancet Oncol 2022; Wakelee H et al N Engl J Med 2023; Spicer JD et al Lancet 2024; Forde PM et al, N Engl J Med 2022; Forde PM et al NEJM 2025; Cascone T et al N Engl J Med 2024; JV Heymach et al N Engl J Med 2023; YL Wu et al N Engl J Med 2022; M Tsuboi et al N Engl J Med 2023; YL Wu et al N Engl J Med 2024

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The IASLC Lung Cancer Staging Project: Proposals for Revision of the TNM Stage Groups in the Forthcoming (Ninth) Edition of the TNM Classification for Lung Cancer





T/M	Subcategory,	NO	NIA	N2		NO
category	Descriptor	N0	N0 N1 -		N2b	N3
T1	T1a T1b T1c	IA	IIA	IIB	IIIA	IIIB
T2	T2a	IB	IIIB	AIII	IIIB	IIIB
12	T2b	IIA	IIIB	IIIA	ШБ	IIID
Т3	Size Invasion Nodule	IIB	IIIA	IIIA	IIIB	IIIC
T4	Size Invasion Nodule	IIIA	IIIA	IIIB	IIIB	IIIC
N/4	M1a, M1b			IVA		
M1	M1c1, M1c2	IVB				

CONCLUSION: The proposed changes improve the granularity of nomenclature of anatomic extent that has benefits as treatment becomes increasingly differentiated and complex.



Rami-Porta et al. J Thorac Onc (2024)

Clinical Scenario/Case

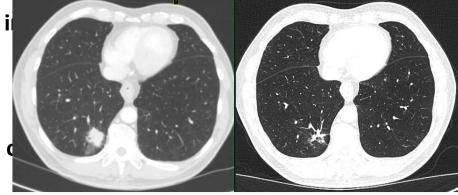
 Patient planned for neoadjuvant chemoimmunotherapy

CT after three cycles shows response in primary

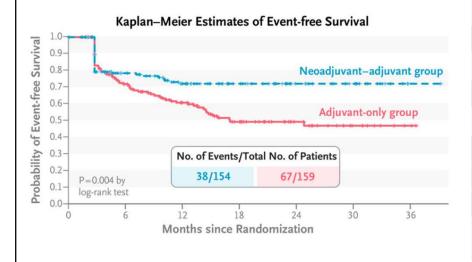
• PET confirms improvement in mediastinal uptake

Taken to OR: non-pCR with clearance of N2 nodes

What to offer as adjuvant therapy?



The Dream



Patel et al, N Engl J Med 2023; 388:813-823

The Reality

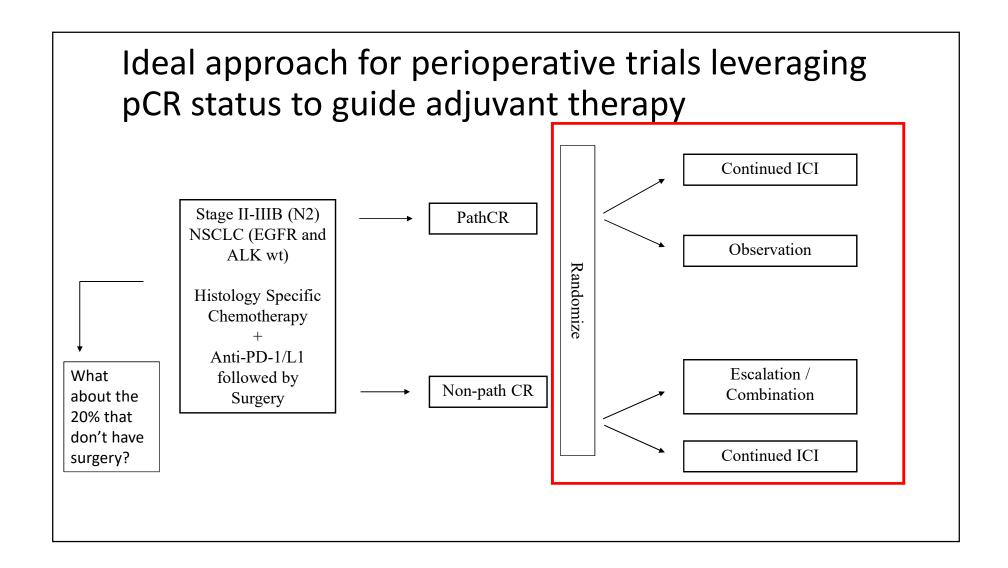
Trial	Regimen	N						
Neoadjuvant only								
CheckMate 816	Nivo + chemo → surgery	358						
	Peri-operative							
CheckMate 77T	Nivo + chemo → nivo	452						
KEYNOTE-671	Pembro + chemo → pembro	786						
IMpower030	Atezo + chemo → atezo	453						
AEGEAN	Durva + chemo → durva	802						
	Adjuvant							
ANVIL	Surgery → nivo	903						
ACCIO	Surgery → chemo → pembro Surgery → chemo + pembro	1210						
KEYNOTE-091	Surgery → pembro	1177						
IMpower010	Surgery → atezo	1280						
BR.31	Surgery → durva	1360						

Source: clinicaltrials.gov

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Challenges

- Many of the perioperative studies require enrollment during neoadjuvant phase
- Locked in choice of neoadjuvant ICI based on sponsor
- Need for real world enrollment of patients without pCR regardless of neoadjuvant ICI/chemo combination
- While awaiting results of these studies, how do we interpret the available data?



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Role of PD-L1 in treatment decisions

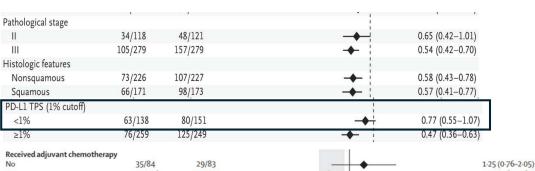
CheckMate 816

Forde PM et al, N Engl J Med 2022; 386:1973-1985

Disease stage at baseline				1	
IB or II	127	NR (27.8-NR)	NR (16.8-NR)		0.87 (0.48-1.56)
IIIA	228	31.6 (26.6-NR)	15.7 (10.8-22.7)		0.54 (0.37-0.80)
Histologic type of tumor					
Squamous	182	30.6 (20.0-NR)	22.7 (11.5-NR)		0.77 (0.49-1.22)
Nonsquamous	176	NR (27.8-NR)	19.6 (13.8-26.2)		0.50 (0.32-0.79)
Smoking status					
Current or former smoker	318	31.6 (30.2-NR)	22.4 (15.7-NR)		0.68 (0.48-0.96)
Never smoked	39	NR (5.6-NR)	10.4 (7.7-20.8)		0.33 (0.13-0.87)
PD-L1 expression level					
<1%	155	25.1 (14.6-NR)	18.4 (13.9-26.2)		0.85 (0.54-1.32)
≥1%	178	NR (NR-NR)	21.1 (11.5-NR)		0.41 (0.24-0.70)
1–49%	98	NR (27.8-NR)	26.7 (11.5-NR)		0.58 (0.30-1.12)
≥50%	80	NR (NR-NR)	19.6 (8.2-NR)	←	0.24 (0.10-0.61)

KEYNOTE-671

Wakelee H et al N Engl J Med 2023; 389:491-503

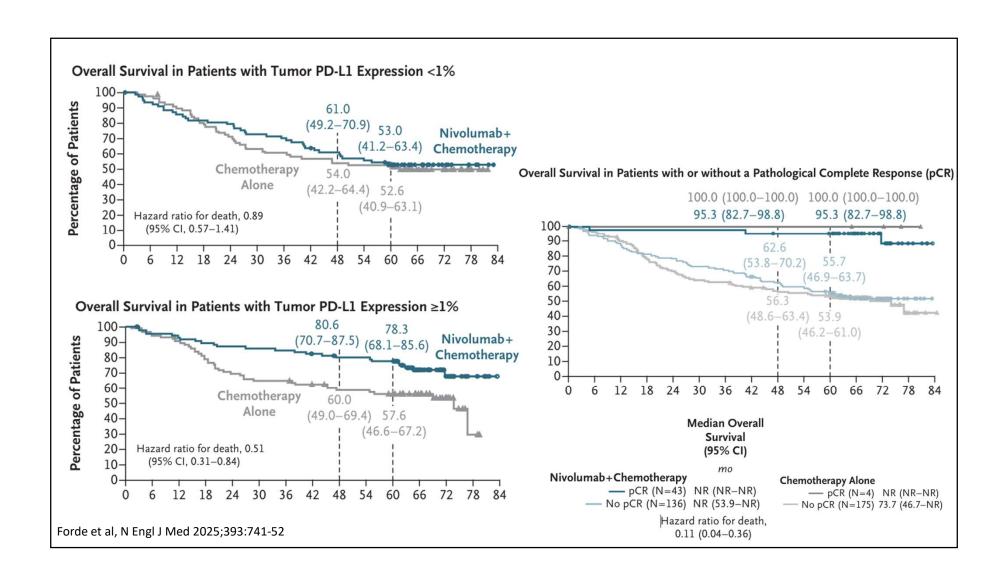


KEYNOTE-091

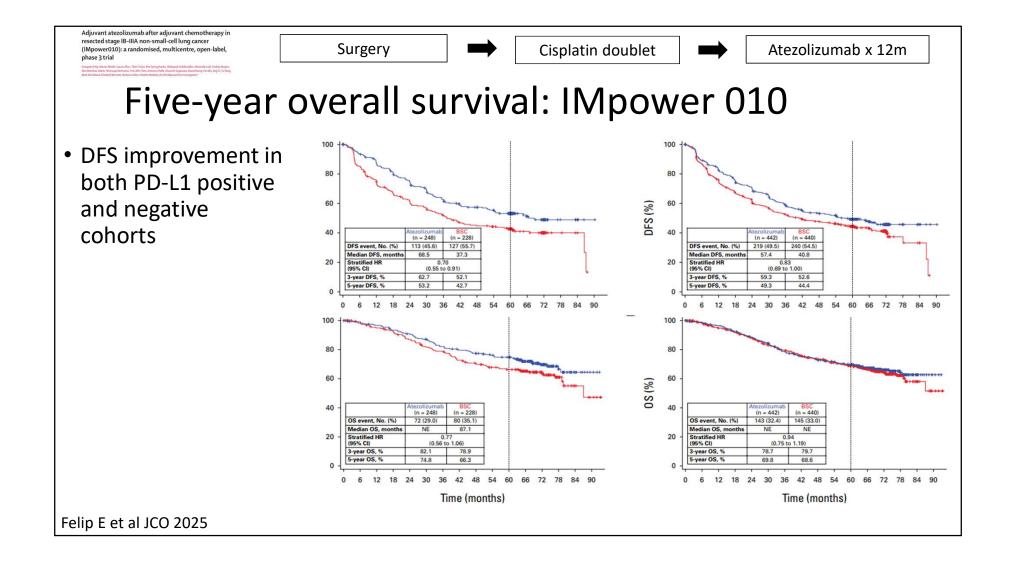
O'Brien M et al Lancet Oncol 2022; 1274-1286

231/504 Yes 177/506 0.73 (0.60-0.89) Histology Non-squamous 146/398 184/363 0.67 (0.54-0.83) 76/224 1.04 (0.75-1.45) 66/192 PD-L1 TPS 89/233 106/232 0.78 (0.58-1.03)* 1-49% 0.67 (0.48-0.92)* 69/189 91/190 ≥50% 0.82 (0.57-1.18)

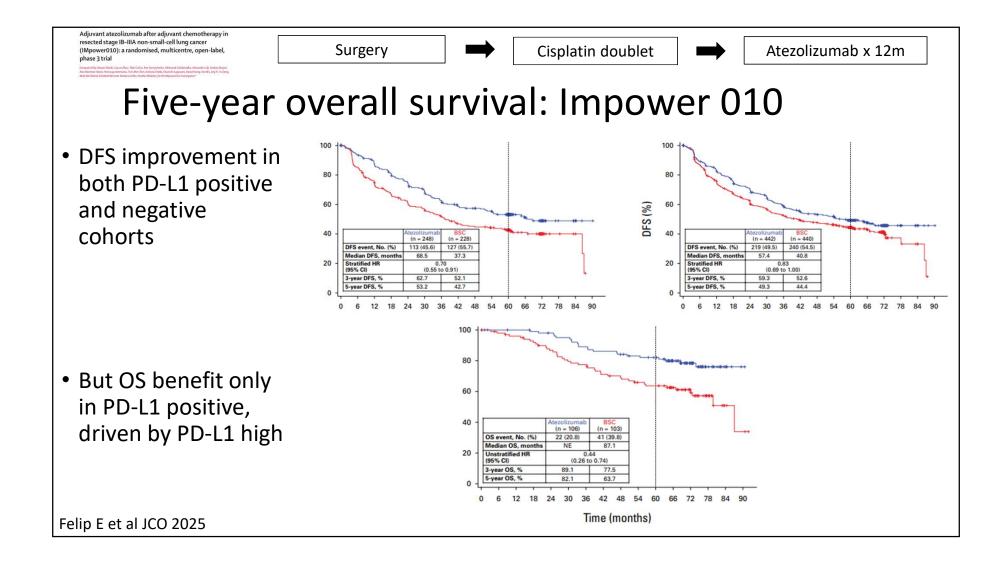
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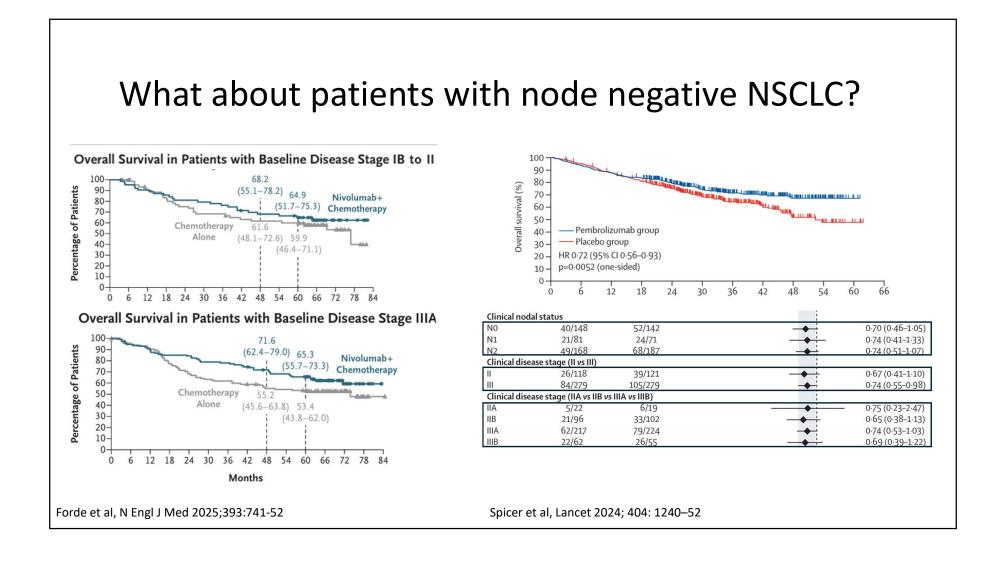
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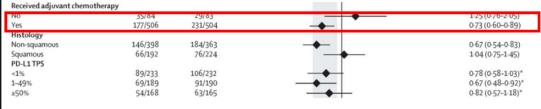
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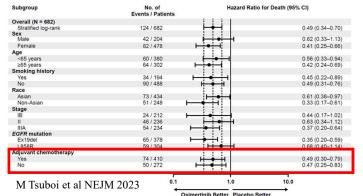
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Still a role for adjuvant chemotherapy?

- IMpower010: required at least one cycle of chemo prior to atezolizumab
- KEYNOTE-091: chemotherapy optional
- ADAURA: chemotherapy optional
- ALINA: alectinib vs chemotherapy



O'Brien M et al Lancet Oncol 2022; 1274-1286



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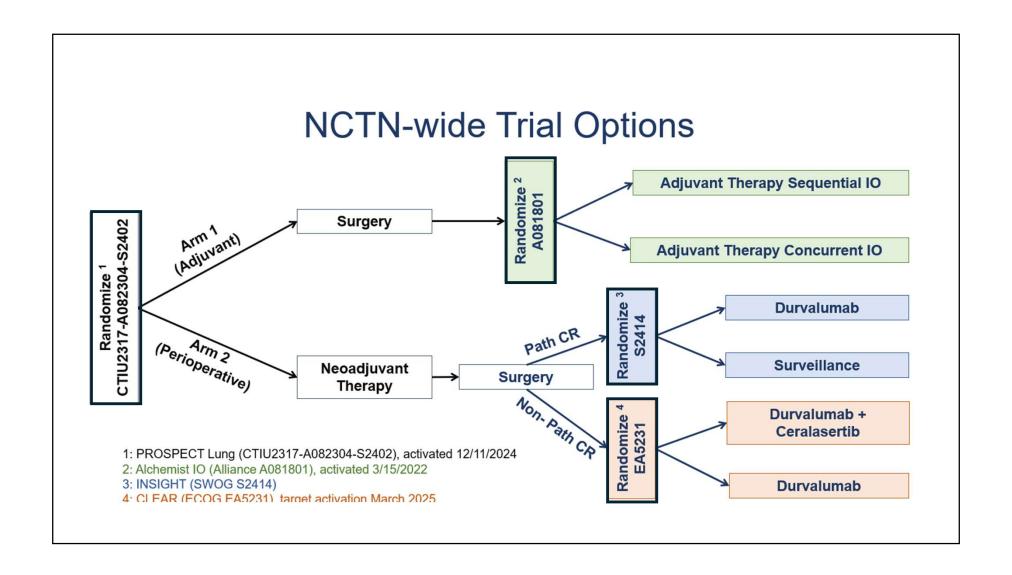
Importance of ruling out EGFR/ALK

- Biomarker testing drives clinical decision-making in perioperative NSCLC
 - Identify logistics for streamlining testing in the clinic among the multidisciplinary team
- PD-L1 TPS, EGFR and ALK at a minimum:
 - ALL patients planned for neoadjuvant therapy
 - ALL patients with Stage IB-IIIA NSCLC after surgery
- EGFR and ALK positive: excluded from most perioperative trials
 - IO + TKIs have been shown to be toxic without a consistent benefit
 - These patients should get adjuvant targeted therapy
 - It is important to have all biomarker testing done upfront
 - Sequential ICI then TKI may predispose patients to toxicities

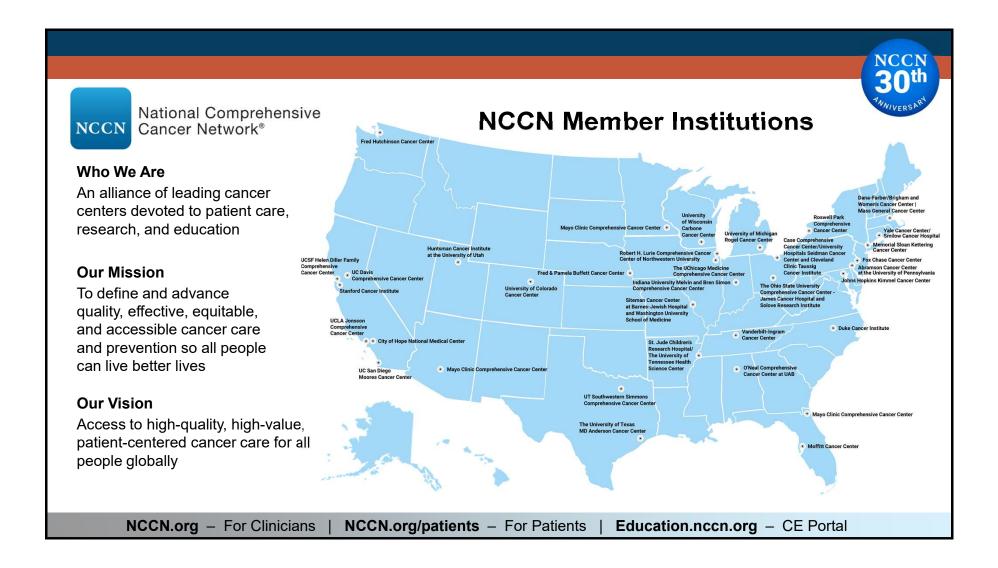
Lisberg A et al J Thorac Oncol. 2018 Adderly H et al, Cancer Immunol Immunother. 2020

Future directions

- Need to develop approaches for both adjuvant and perioperative therapies.
 - Adaptive trials to incorporate both
- Utilizing pathCR status (+/- ctDNA) to tailor adjuvant therapy
- Does non-path CR really = non-responder? MPR? RVT?
- Unmet need for patients with PD-L1 negative NSCLC in both perioperative and adjuvant therapies



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