

16th
CONGRESS
Lung **ON**
CANCER

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Fusions in lung cancer

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DISCLOSURES

Personal financial interests

- **Consulation Honoraria:** Amgen, AstraZeneca, Bayer, BMS, Boehringer Ingelheim, F. Hoffmann-La Roche, Janssen, Lilly, MSD, Pfizer, Sanofi, Takeda, Pfizer
- **Speaker Honoraria:** Amgen, AstraZeneca, Bayer, BMS, Boehringer Ingelheim, F. Hoffmann-La Roche, Janssen, MSD, Novartis, Pfizer, Takeda, Merck, Amgen, Pfizer

Institutional financial interests

- **Clinical Trials:** Amgen, AstraZeneca, Bayer, Boehringer Ingelheim, BMS, DaiichiSankyo, F. Hoffmann-La Roche, GSK, Janssen, Lilly, Merck, Mirati Therapeutics, MSD, Novartis, Amgen, Pfizer
- **Research Grant:** BMS, F. Merck, Pfizer

ONCOGENIC FUSIONS...RARE

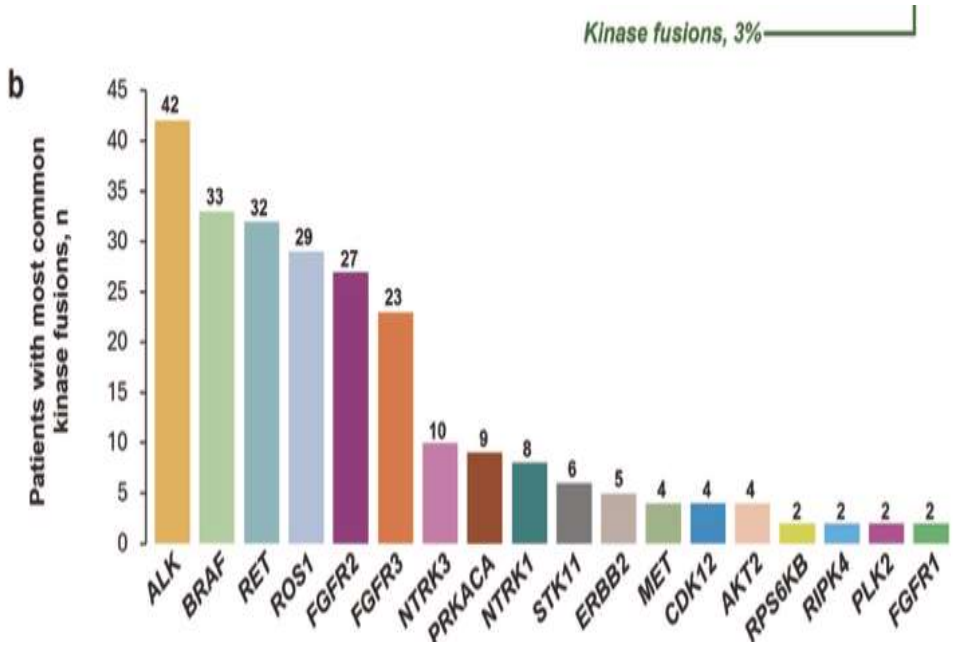
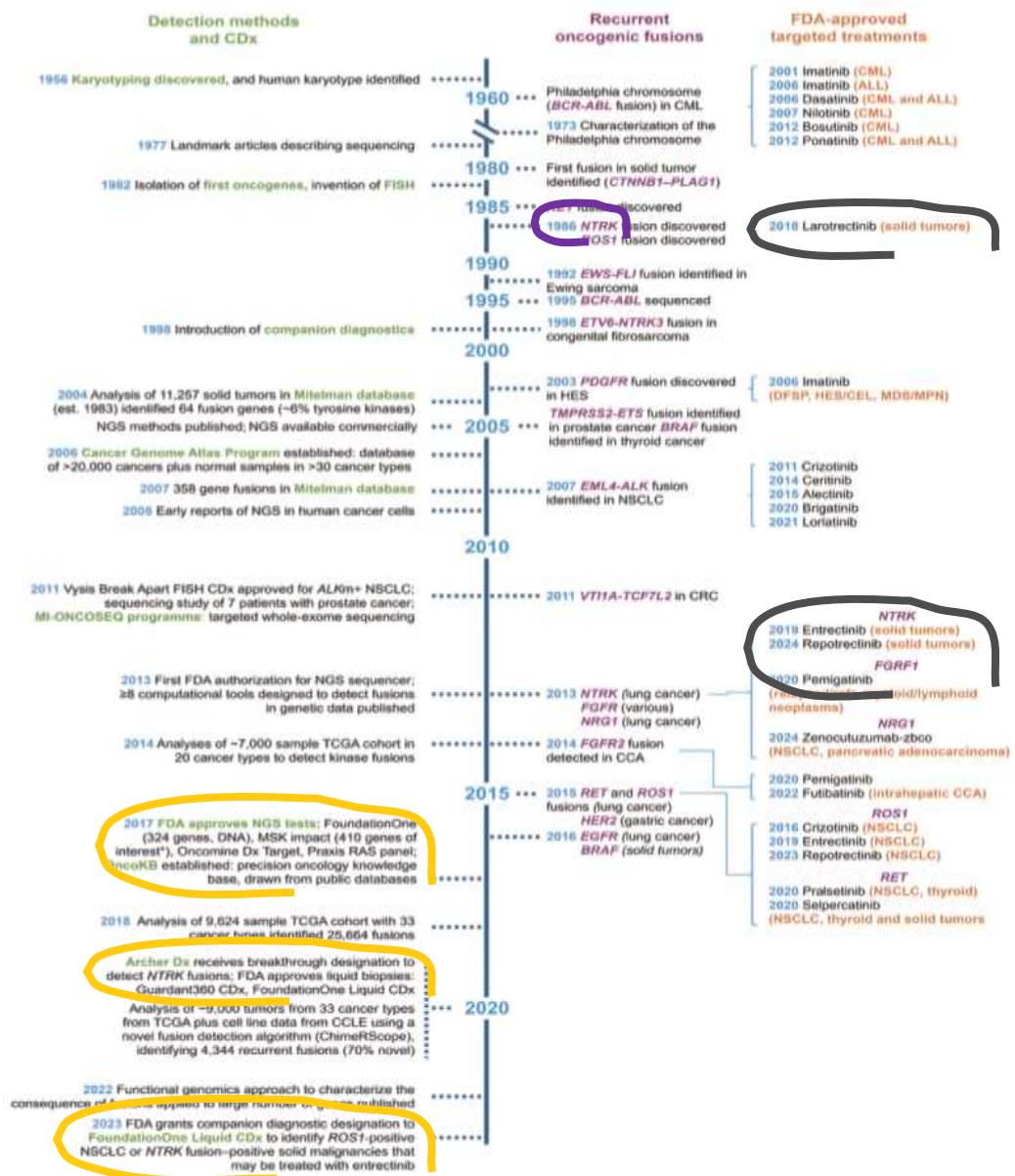
SPAIN... the corner or Europe...A CORUÑA..the corner of Spain...FINISTERRAE...the end of the world



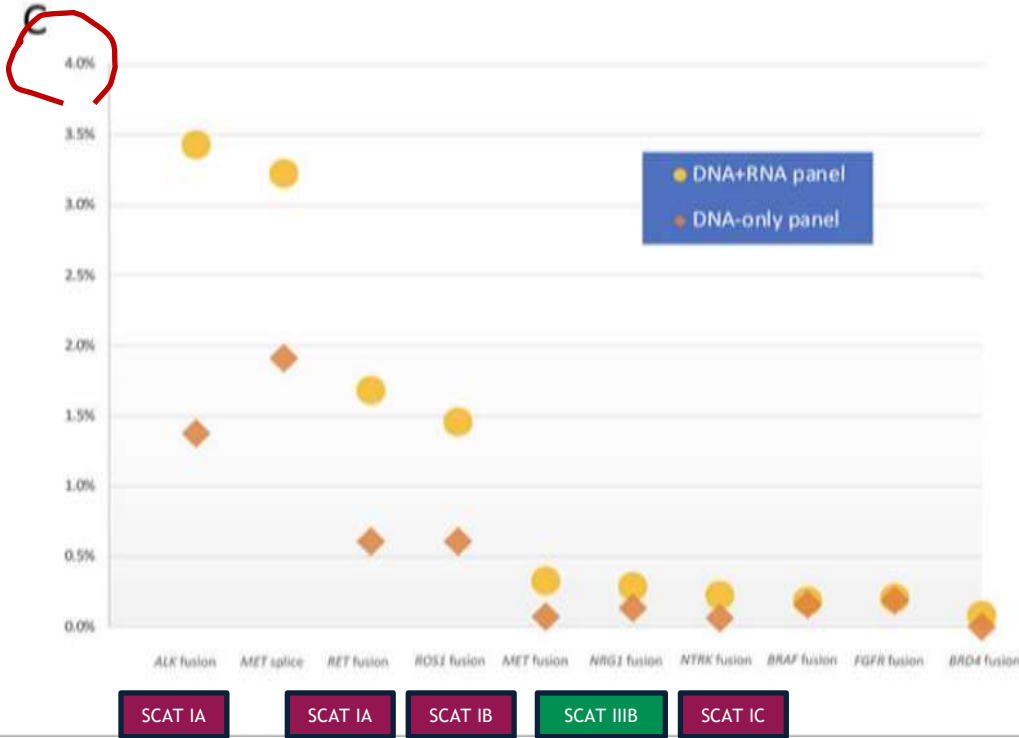
We gather today to explore what is often considered rare, remote, and elusive disease...much like the ancient land of Finisterrae (named by the Roman), once believed to be the end of the known world

The journey to the edge is never easy, but it is always worthwhile

HISTORY AND MILESTONE EVENTS IN PROTEIN FUSIONS



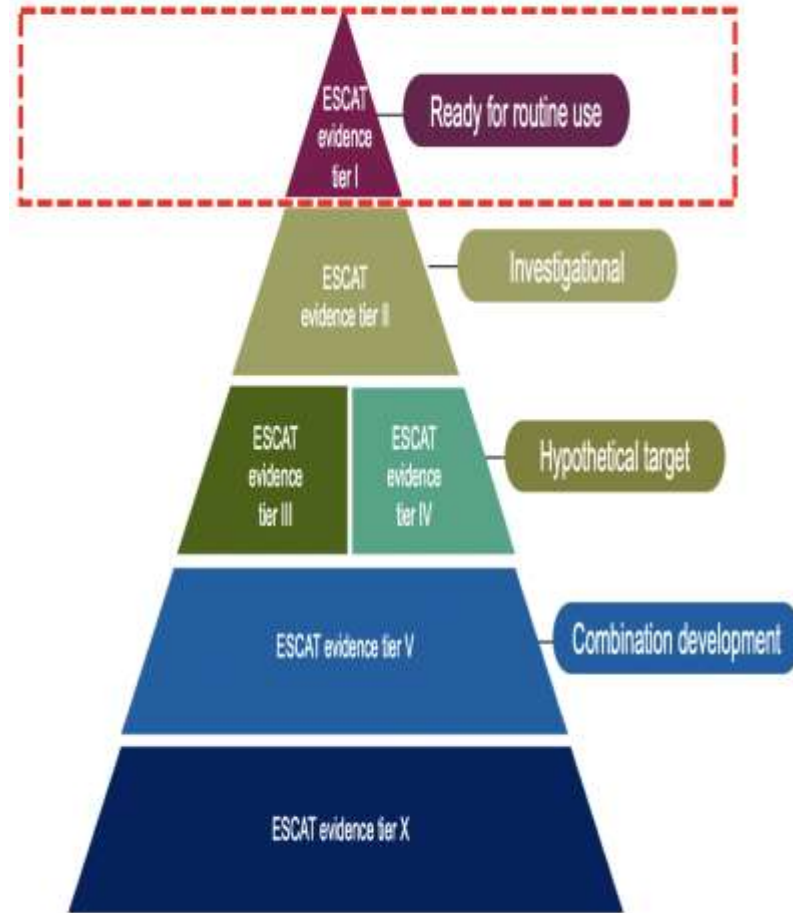
New treatment paradigm in NSCLC 2025



SCAT IA SCAT IA SCAT IB SCAT IIIB SCAT IC

RNA-based NGS is preferred for identifying an expanding range of fusion genes. Whichever testing modality is used, it is mandatory that adequate internal validation and quality control measures are in place and that laboratories participate in, and perform adequately in, external quality assurance schemes for each biomarker test.	III, B
	III, A
Detection of the ALK translocation by FISH remains a standard, but IHC with high-performance ALK antibodies and validated assays may be used for screening and have been accepted as an equivalent alternative to FISH for ALK testing.	III, A
Testing for ROS1 rearrangements should be carried out.	II, A
Detection of the ROS1 translocation by FISH remains a standard; IHC may be used as a screening approach.	II, A
Testing for NTRK rearrangements should be carried out. Screening for NTRK rearrangements may use IHC or NGS, with appropriate testing follow-up to validate a positive result.	II, A

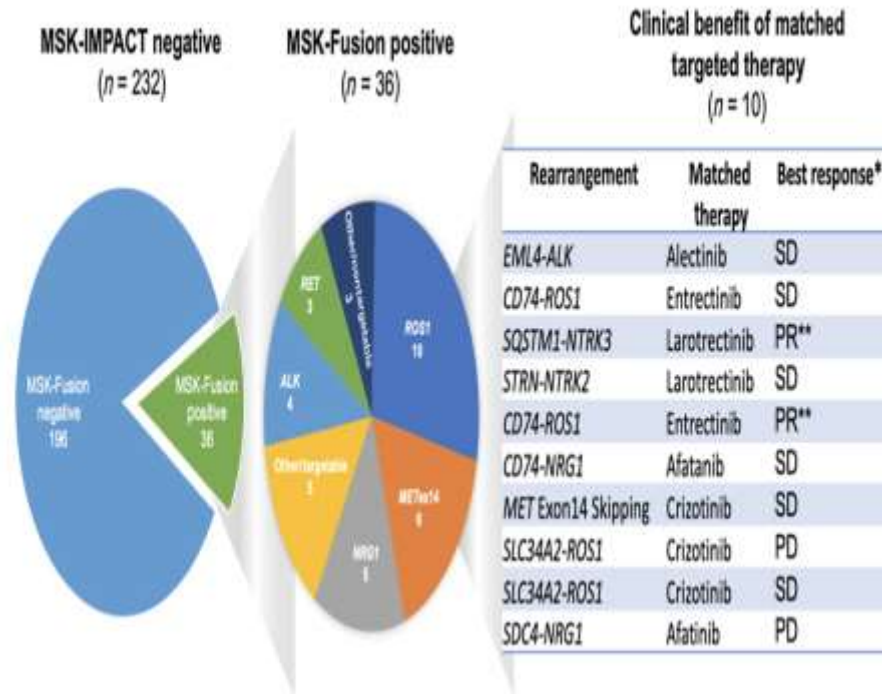
The ESMO Precision Medicine Working Group¹



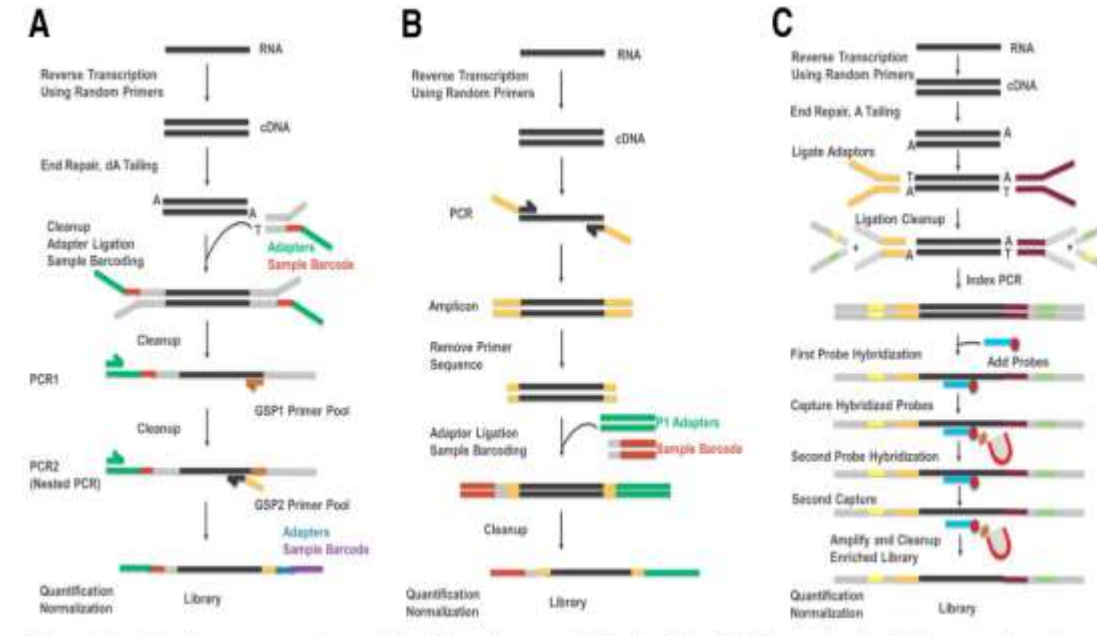
Gene	Alteration	ESCAT
ESCAT TIER EVIDENCE I		
EGFR	Common mutations (Del19, L858R)	IA
	Acquired T790M exon 20	IA
	Uncommon (G719K exon 18, L861Q exon 21, S768I exon 20)	IB
ALK	Fusions (mutations as mechanism of resistance)	IA
MET	Mutations ex 14 skipping	IB
BRAF ^{G609}	Mutations	IB
ROS1	Fusions (mutations as mechanism of resistance)	IB
NTRK	Fusions	IC
RET	Fusions	IA
ESCAT TIER EVIDENCE II-III		
KRAS ^{G12C}	Mutations	IIIB
EGFR	Exon 20 insertion	IIIB
ERBB2	Hotspot mutations and Amplifications	IIIB
MET	Focal amplifications (acquired resistance on EGFR TKI)	IIIB
BRCA 1/2	Mutations	IIIA
PIK3CA	Hotspot mutations	IIIA
NRG1	Fusions	IIIB

FUSIONS ARE BEST DETECTED WITH RNA SEQ

RNA-seq may rescue 14% fusions: 92% actionable



FusionPlex Solid Tumor (ArcherDX) **OncoPrint Comprehensive Assay v3 (Thermo Fisher Scientific)** **TruSight Oncology 500 (Illumina)**

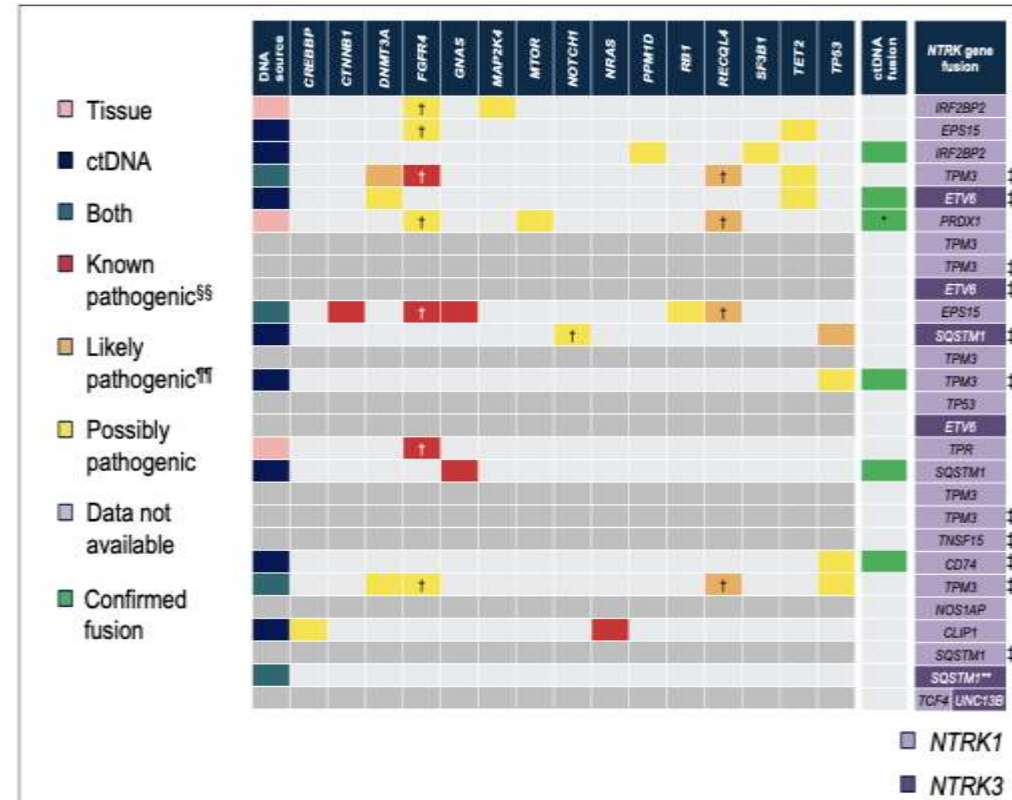
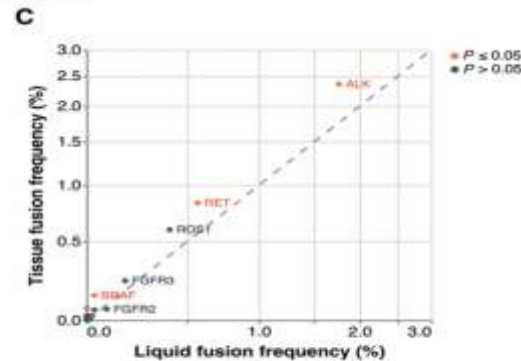
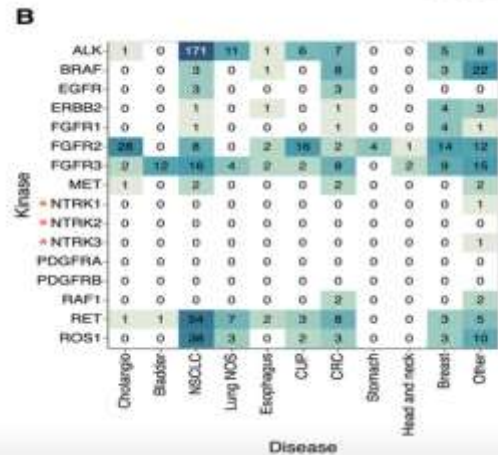


Anchored multiplex PCR, amplicon-based multiplex PCR, and hybrid capture based enrichment method: Highly concordant sensitivity and high-level performance in specificity

The Pan-Tumor Landscape of Targetable Kinase Fusions in Circulating Tumor DNA

Table 1. Clinico-genomic characteristics of the overall cohort and of select cancer types.

	All ctDNA cases	NSCLC	Breast	CRC	CUP	Cholangiocarcinoma	Other cancer types
Total cases	36,916	10,754	5,148	2,742	1,918	901	15,453
Median age (y)	68	70	64	63	69	67	69
Gender (M:F)	50%:50%	47%:53%	0.84%:99%	57%:43%	50%:50%	50%:50%	66%:34%
Median ctDNA fraction	1.6%	1.5%	2.2%	3.3%	1.6%	0.96%	1.5%
Cases with ctDNA fraction > 0 (%)	32,492 (88%)	9,604 (89%)	4,617 (90%)	2,471 (90%)	1,667 (87%)	767 (85%)	13,366 (86%)
Cases with ≥1 GA (%)	30,348 (93%)	8,907 (93%)	4,413 (96%)	2,388 (97%)	1,569 (94%)	702 (92%)	12,369 (93%)
Avg GAs/case	3.3	3.0	3.8	4.2	3.1	2.9	3.2
Fusion-positive cases	571 (1.8%)	296 (3.1%)	44 (0.95%)	37 (1.5%)	29 (1.7%)	32 (4.2%)	133 (1.0%)

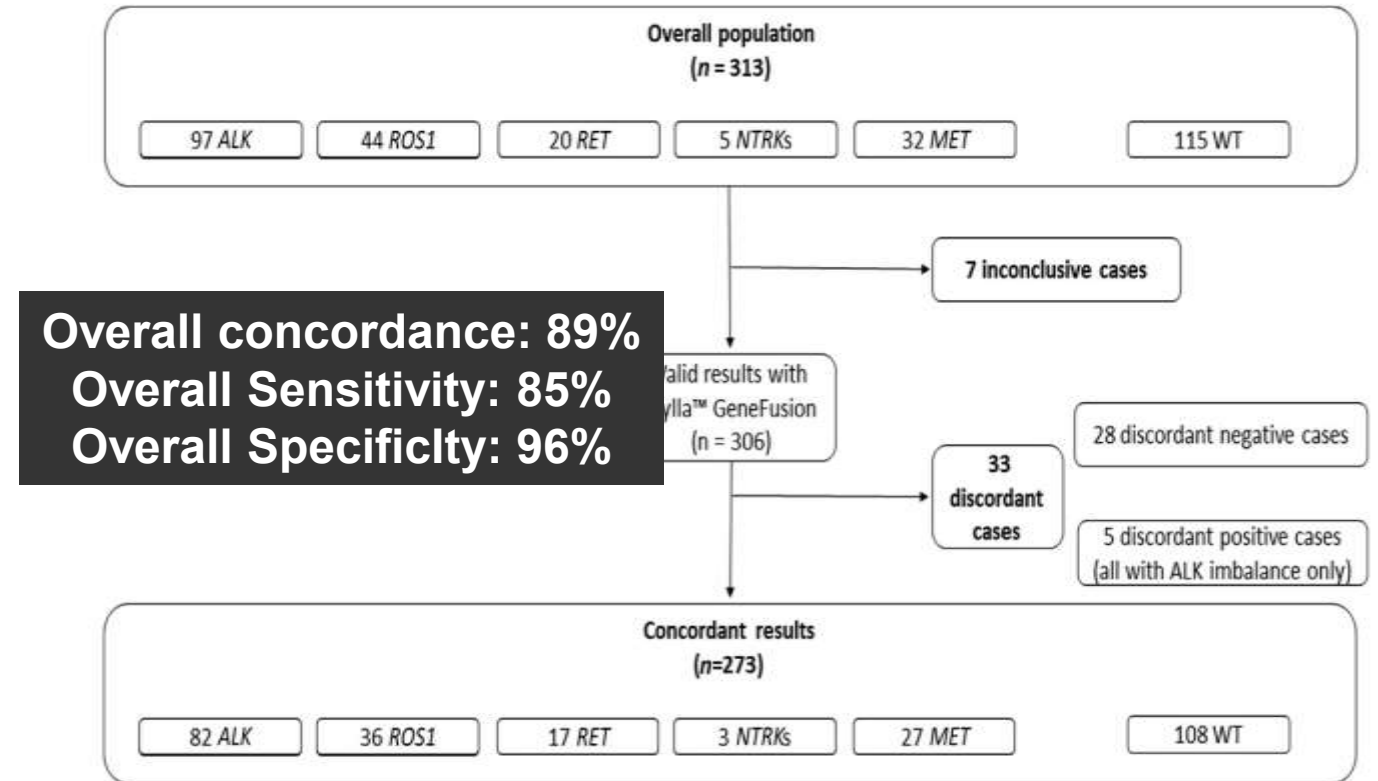


Targetable kinase fusions are identified in ctDNA across cancer types. In pairs with tissue-identified fusions, fusion detection in ctDNA is reliable with elevated ctDNA fraction.

ctDNA data were available for 14 patients out of 27. ctDNA analysis detected *NTRK* gene fusions in 6 of the 14 patients (43%) at the start of treatment.

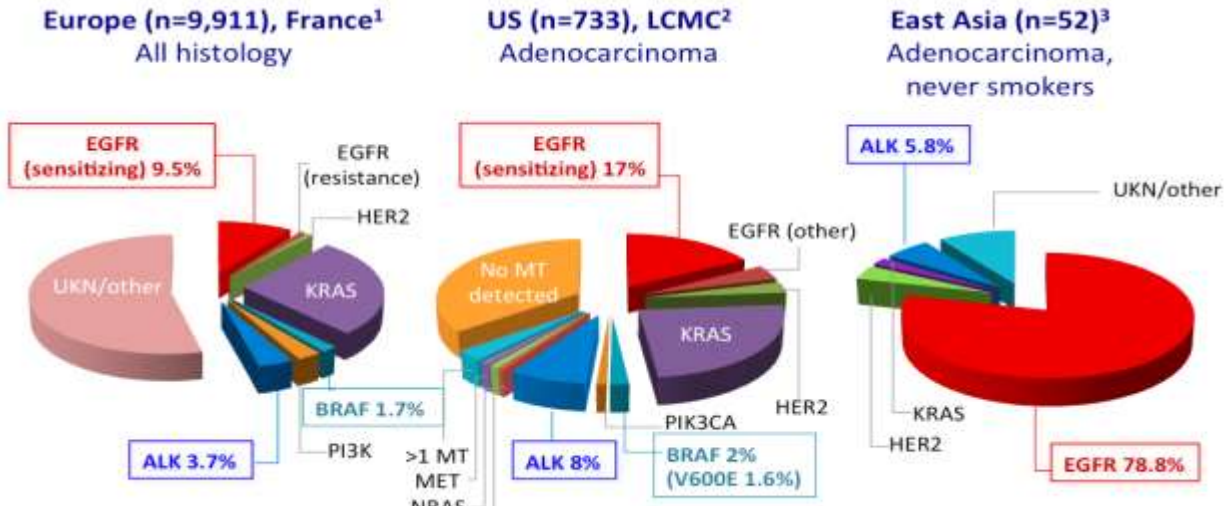
Idylla GeneFusion in NSCLC

- Retrospective study evaluating the Idylla GeneFusion prototype, an automated test, with a short turnaround time (3 hours) to detect fusions (ALK, ROS1, RET, and NTRK1/2/3 genes and MET exon 14 skipping)
- 313 tissue samples from NSCLC lung cancer patients, previously identified with reference methods (RNA-based NGS/ FISH/ qPCR).

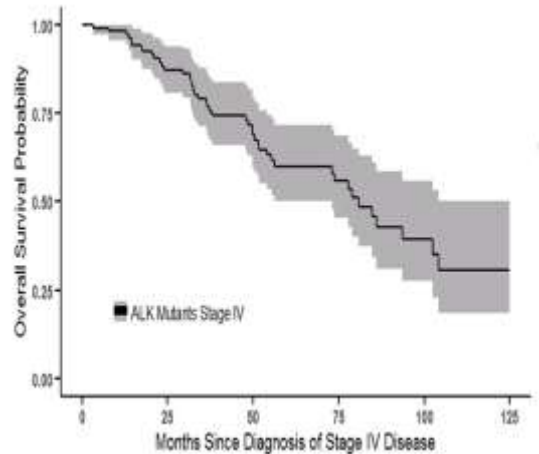


ALK

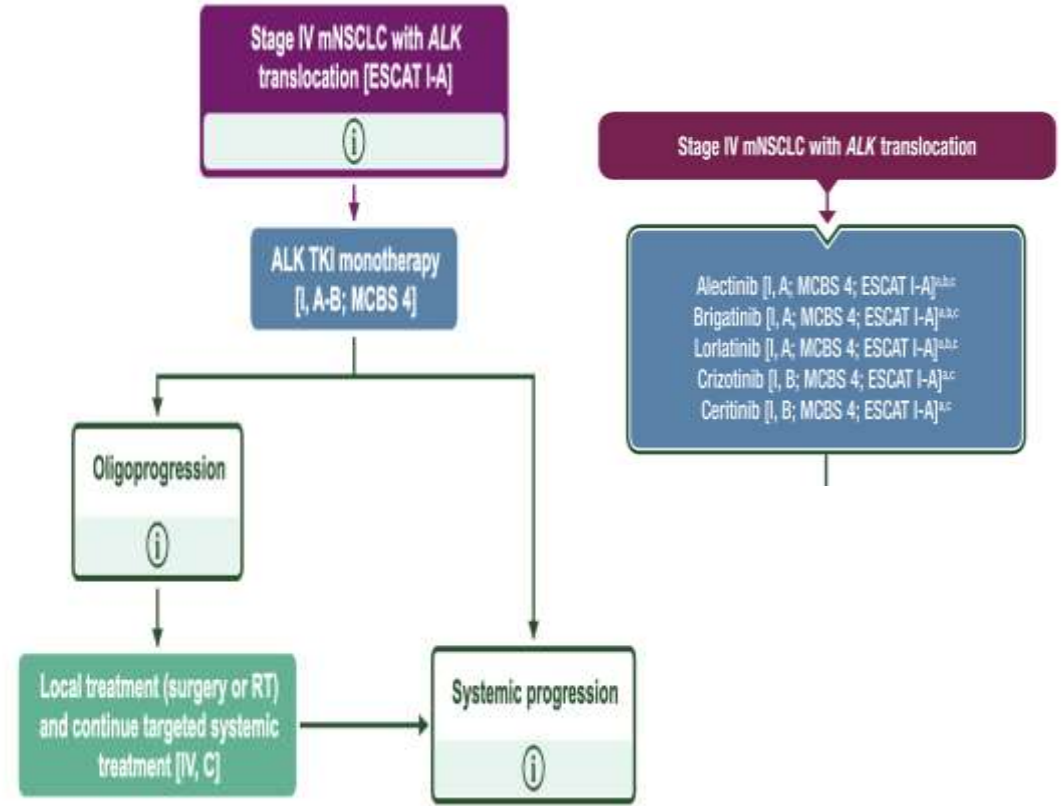
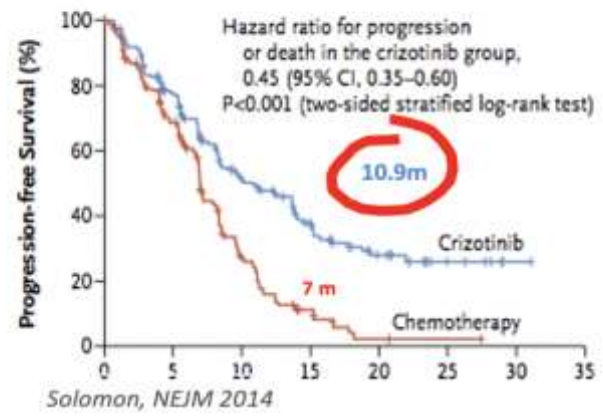
How the history begins...



mOS: 81 months



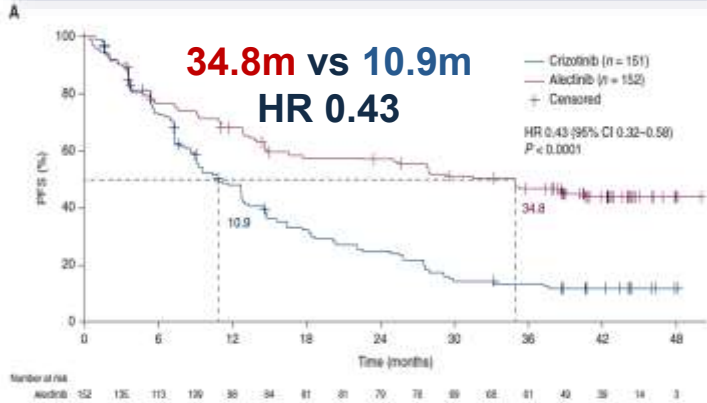
PROFILE 1014: Crizotinib vs Chemo



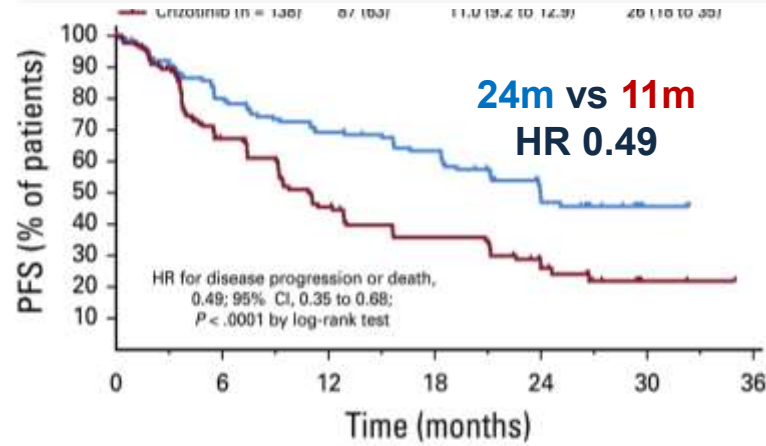
TOO MANY 2ND GENERATION TKI...THEY WORK FOR SURE COMPARED TO CRIZOTINIB



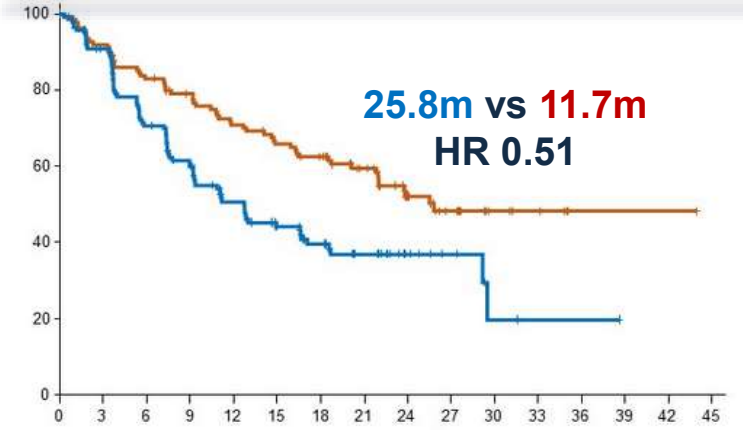
ALEX: Alectinib vs. Crizotinib



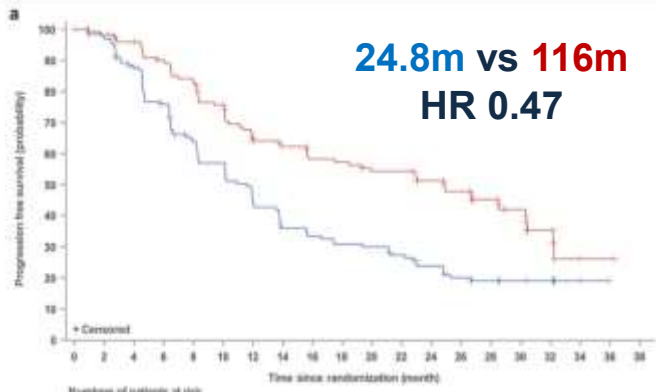
ALTA 1L: Brigatinib vs. Crizotinib



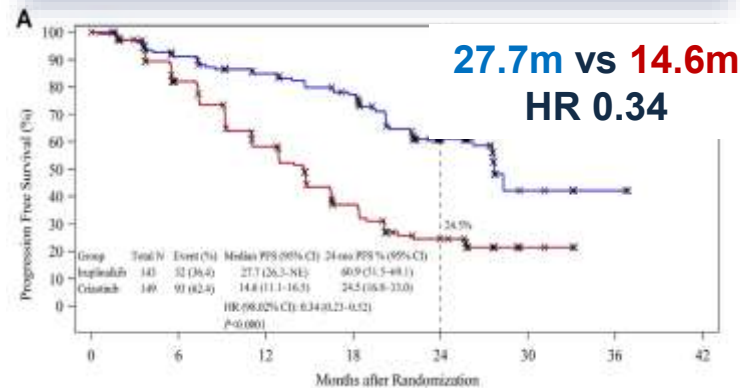
eXalt 3: Ensartinib vs. Crizotinib



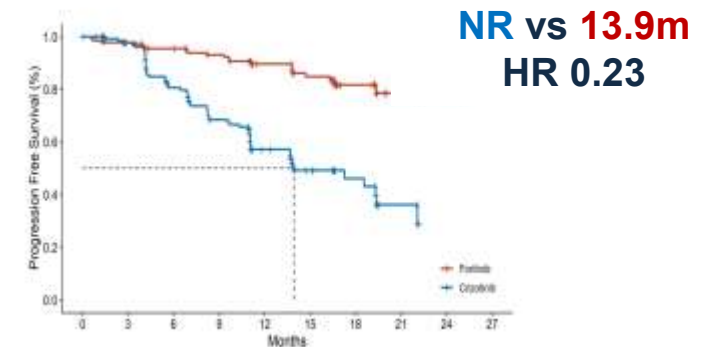
NCT04009317: Envonalkib vs. Crizotinib



INSPIRE: Iruplinalkib vs. Crizotinib



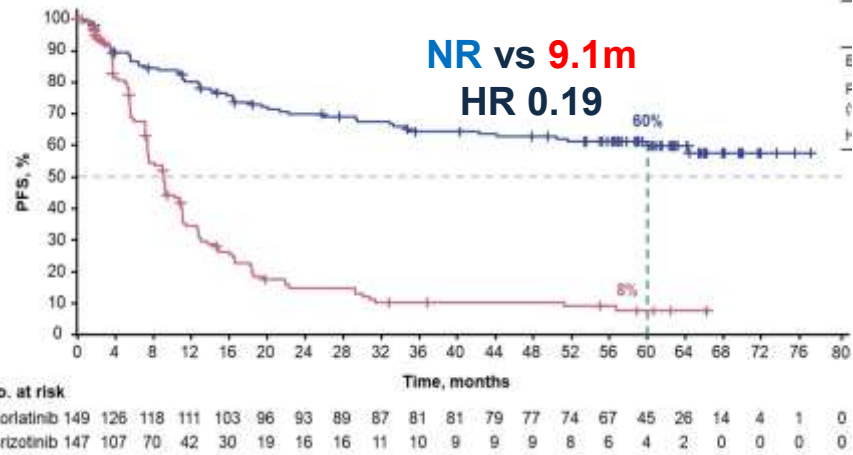
REMARK: Foritinib vs. Crizotinib



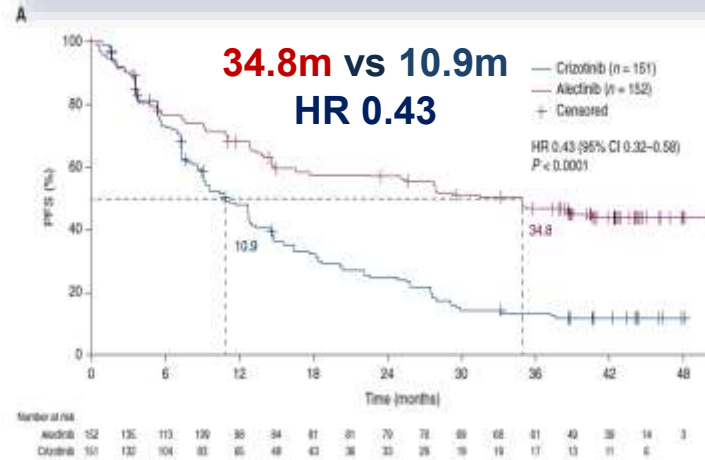
Next generation upfront...no many doubts



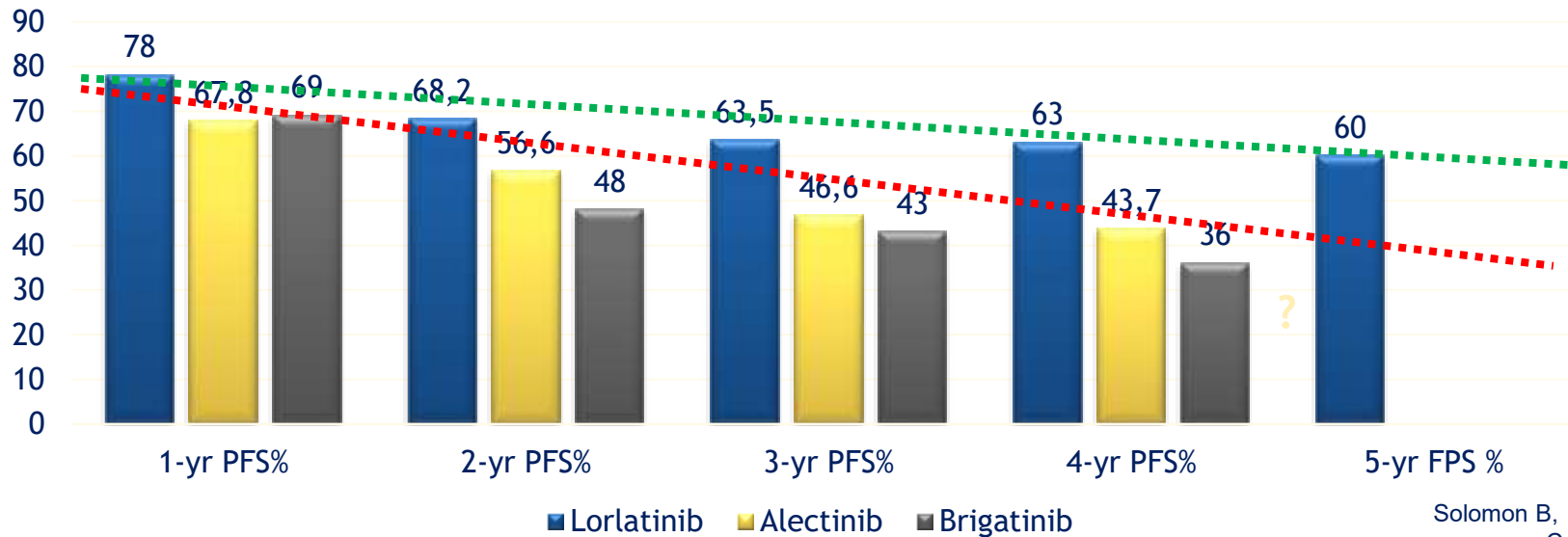
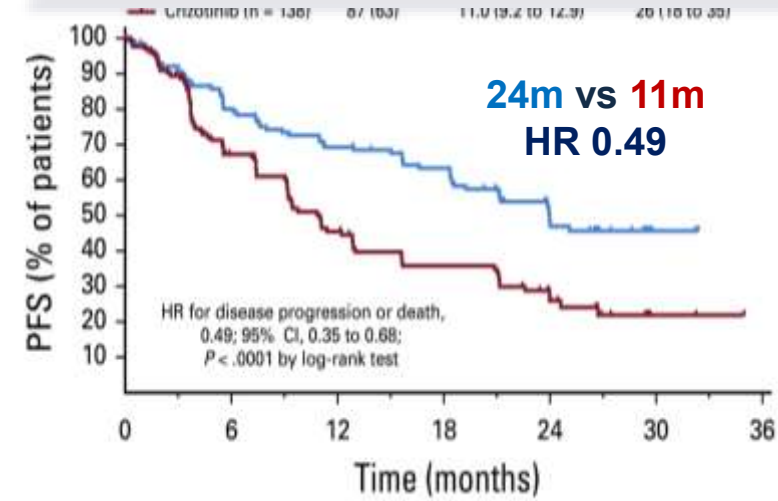
CROWN: Lorlatinib vs. crizotinib



ALEX: Alectinib vs. Crizotinib



ALTA 1L: Brigatinib vs. Crizotinib



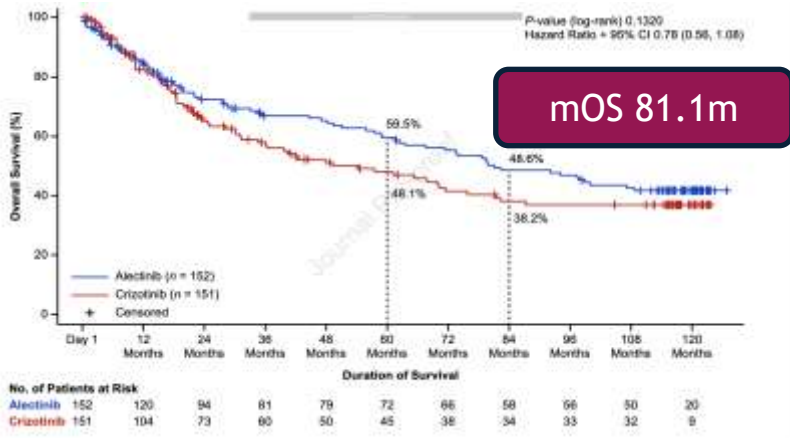
How Relevant Is OS?

ALESIA TRIAL

Alectinib vs Crizotinib

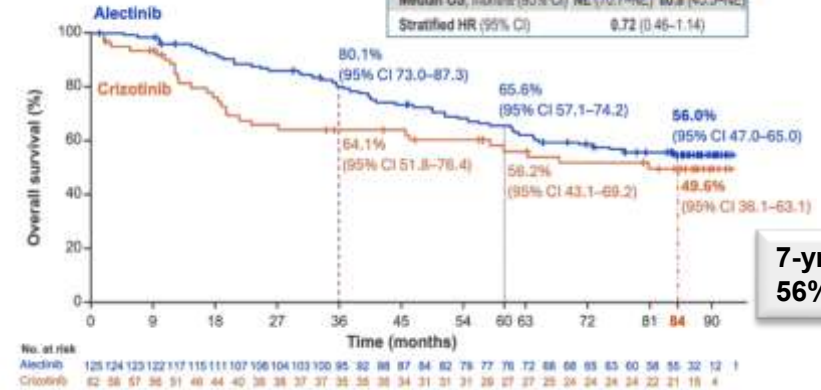
ALEX TRIAL

Alectinib vs Crizotinib



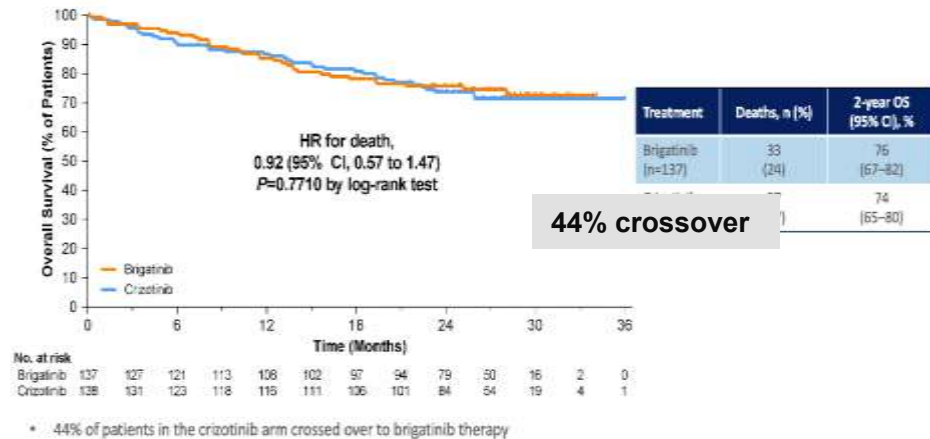
5-yr OS: 62% vs 45%
7y OS: 48% vs 38% HR:0.78; p0.13

	Alectinib n=125	Crizotinib n=87
Median OS, months (95% CI)	NE (70.7-NE)	80.8 (45.5-NE)
Stratified HR (95% CI)	0.72 (0.46-1.14)	



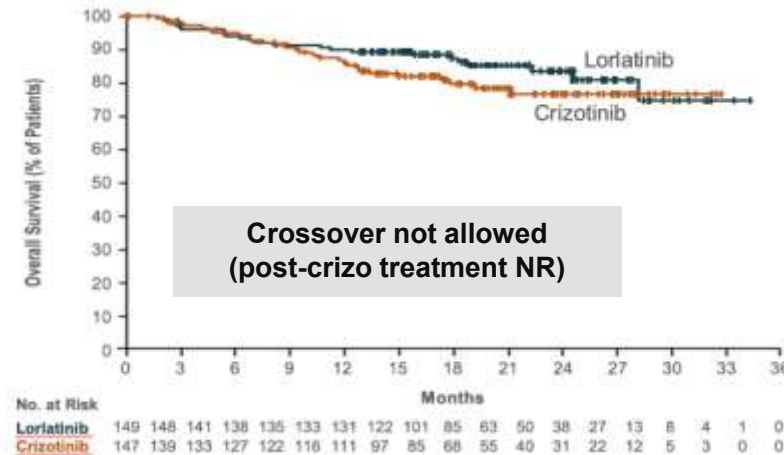
ALTA1L TRIAL

Brigatinib vs Crizotinib



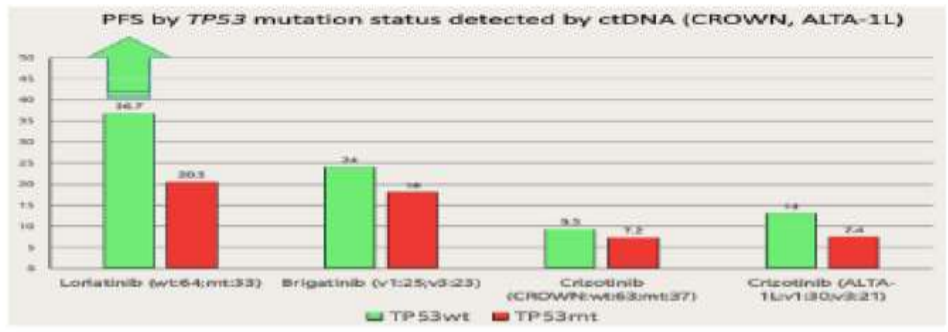
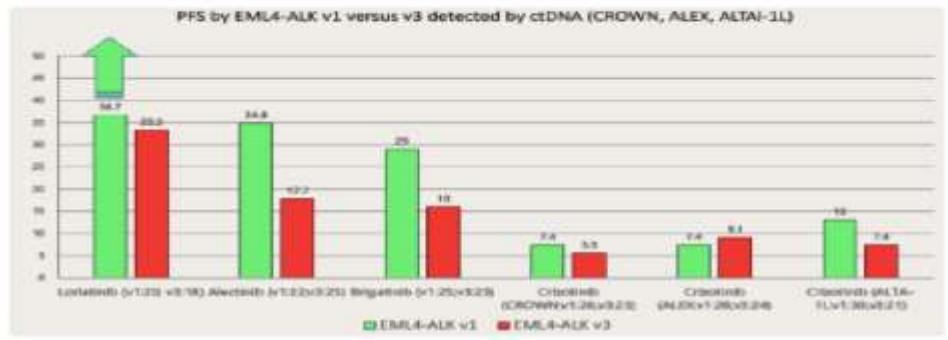
CROWN TRIAL

Lorlatinib vs Crizotinib

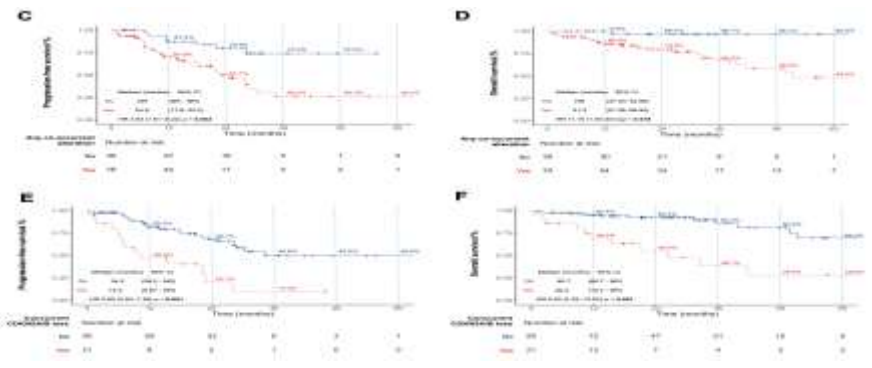


THE TYPE OF VARIANT MAY MATTERS...THE CONCOMITANT ALTERATIONS MAY ALSO IMPACT THE OUTCOME

PFS rates by ALK variant and TP-53 co-mutations

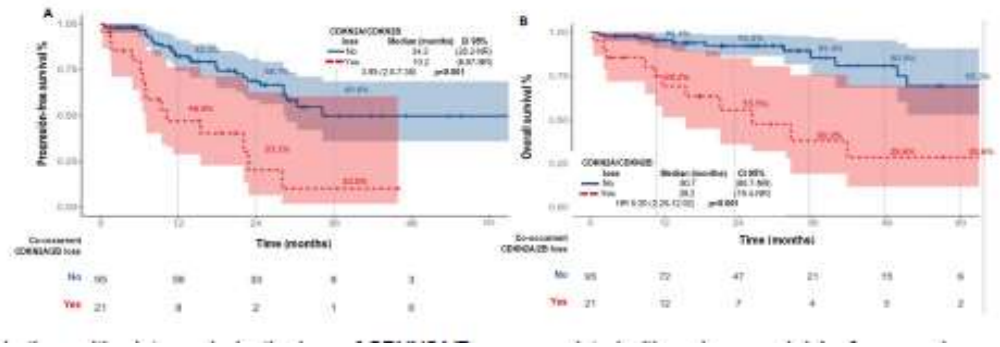


Not only mutations matters... VAF also important

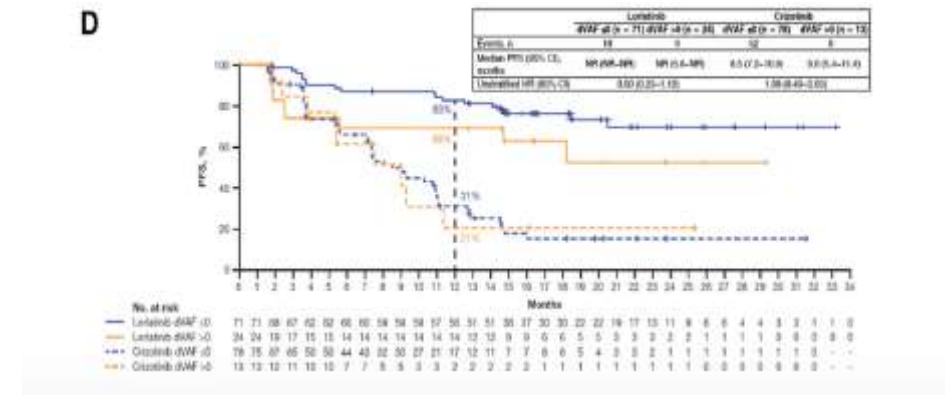


CDKN2A/b Co-mutations may increase risks of TKI failure, BM and poor outcome

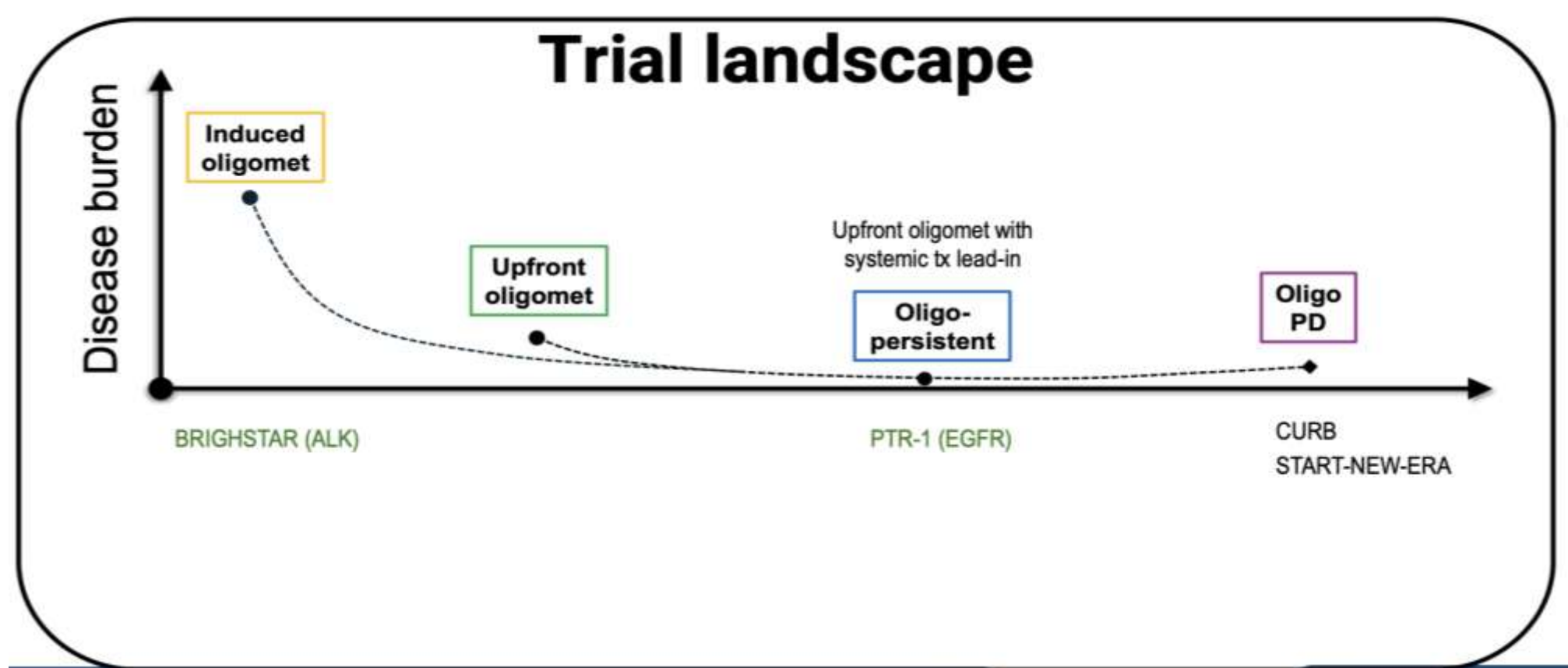
Figure 3. PFS and OS according to the presence of a concurrent CDKN2A/B loss n=116.



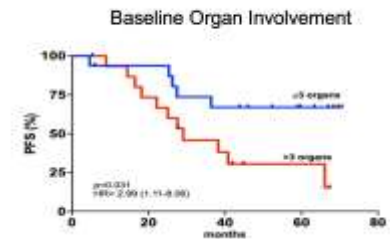
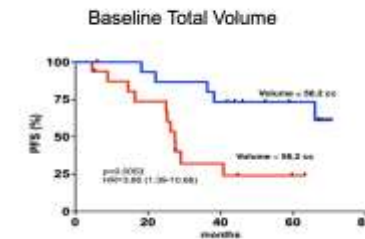
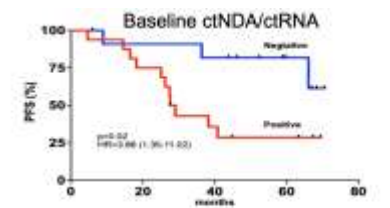
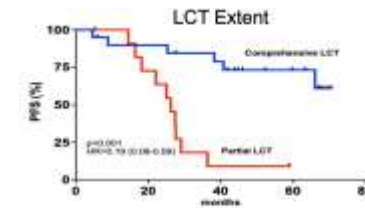
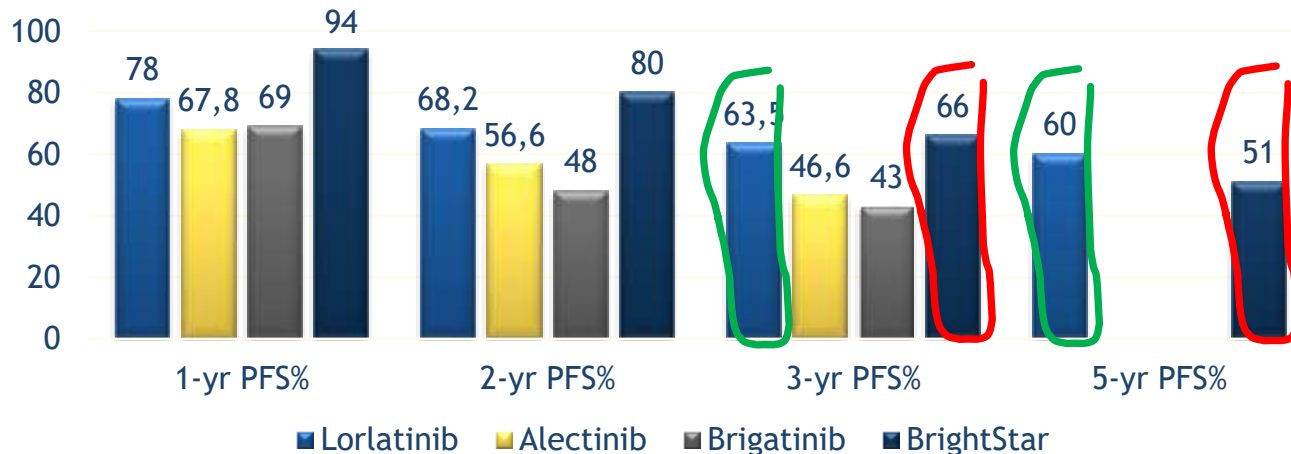
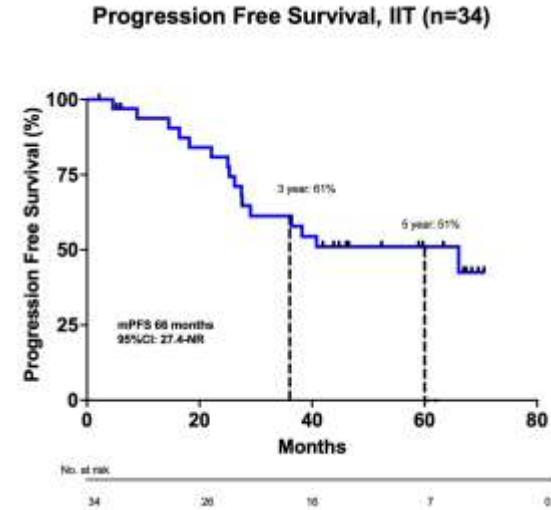
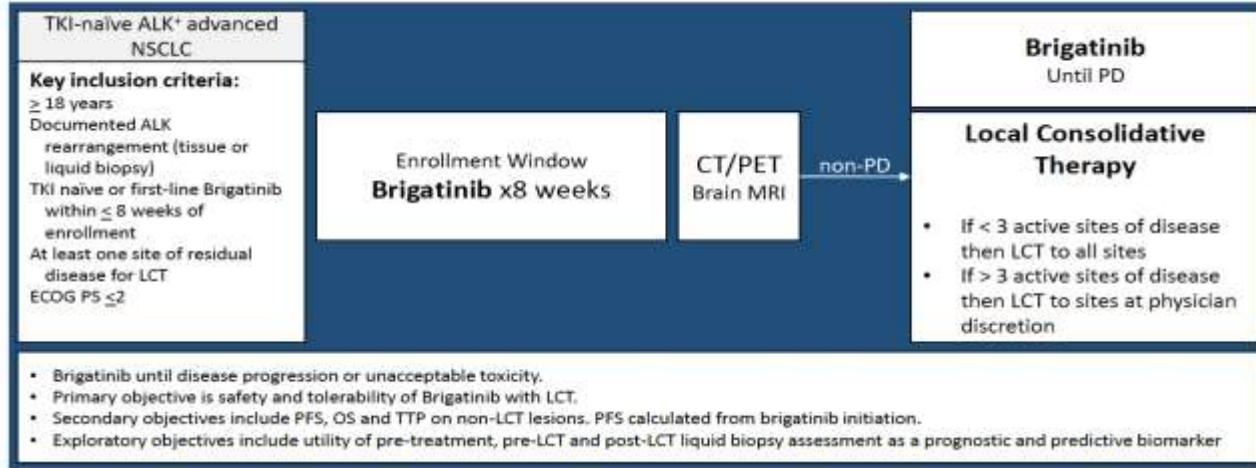
ctDNA clearance in CROWN related to outcomes



Integrating local therapies

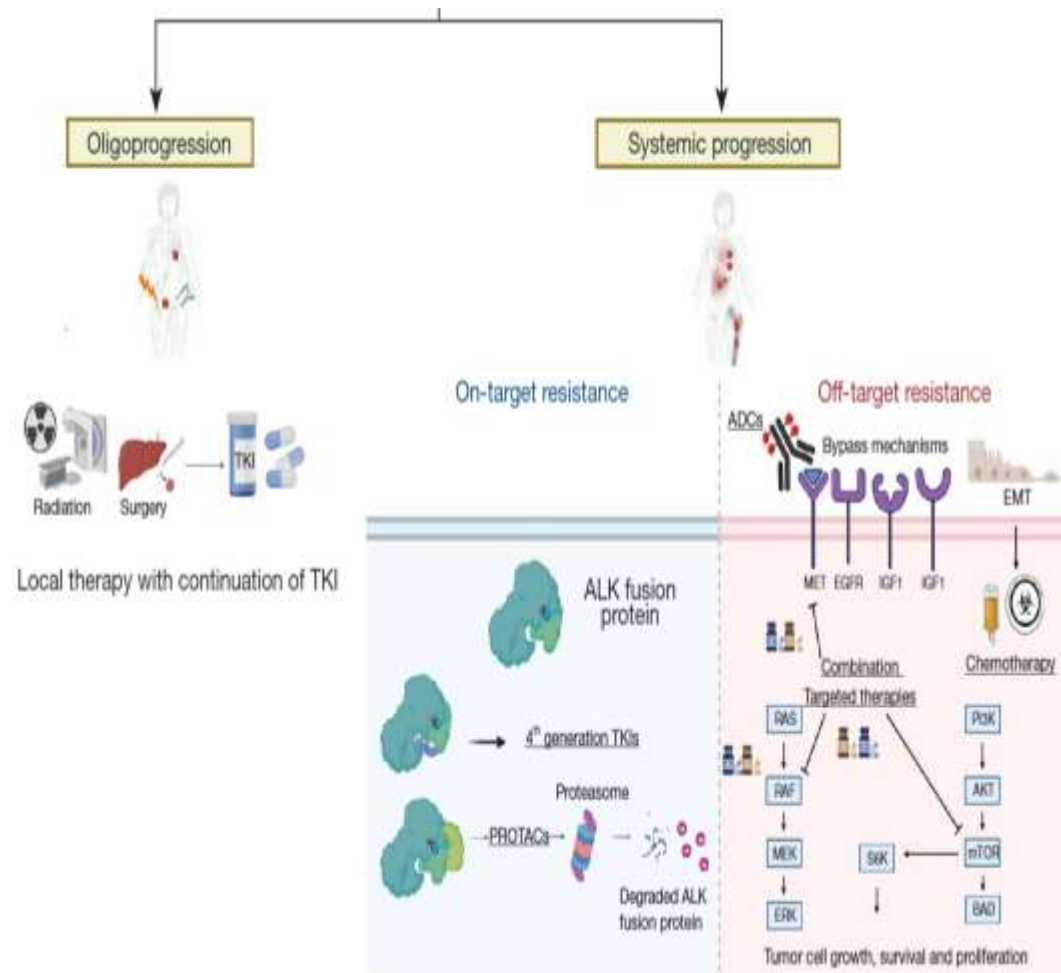


BRIGHTSTAR: a single arm phase II study of brigatinib+ LCT for ALK (oligo/poly) metastatic NSCLC



Strategies to overcome resistance to ALK TKI

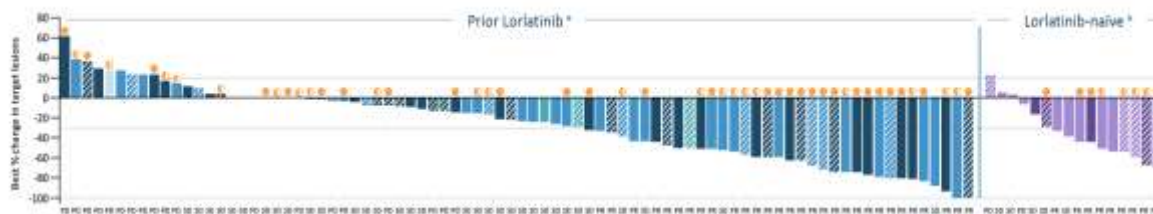
LOCAL ABLATIVE THERAPY + ALK INH.



TRIAL/SITES	TREATMENT	N	NCT	YEARS
All Mets				
OPTALK (Phae II) (Groupo Francais De Pneumo-Cancerologie)	3-9 mos SD/PR to brigatinib → locally treat all remaining sites [PFS]	N=45	NCT06620835	2024- 2030
A-SAB (Phase I-II) (Karolinska)	2-3 mos SD/PR to alectinib → locally treat all remaining sites [PFS]	N=70	NCT05724004	2023- 2031
Bright-Star2 (RCT Phase II) (MDACC)	Brigatinib ,vs brigatinib + local consolidation therapy [PFS]	N=168	NCT06522360	2024- 2031
COMLORLA (RWD) (Peking University)	Lorlatinib → any local treatment [TTD]	N=100	NCT06690541	2024- 2030
Brain Mets				
DURABLE (Phase Ib-II) (USA/ Ohio/Stanford)	Delayed vs upfront brain SRS with alectinib for asymptomatic/min symp brain mets	N=56	NCT05987644	2024- 2027

Preliminary Activity: Radiographic Tumor Responses Across Previously Treated Patients with ALK+ NSCLC

RECIST 1.1 ORR, % (n/N) All patients ± chemotherapy	NSCLC Response-Evaluable (Any Prior ALK TKI, range 1 – 5)			Prior Lorlatinib (≥2 ALK TKIs)			Lorlatinib-naïve (≥1 2G ± 1G)	
	All	Any ALK mutation	G1202R	All	Any ALK mutation	Compound ALK mutation	All	Any ALK mutation
All Doses	38% (39/103)	52% (30/58)	69% (22/32)	35% (30/85)	47% (23/49)	54% (15/28)	53% (9/17)	88% (7/8)
RP2D	38% (15/39)	55% (12/22)	71% (10/14)	35% (11/31)	50% (8/16)	64% (7/11)	57% (4/7)	80% (4/5)

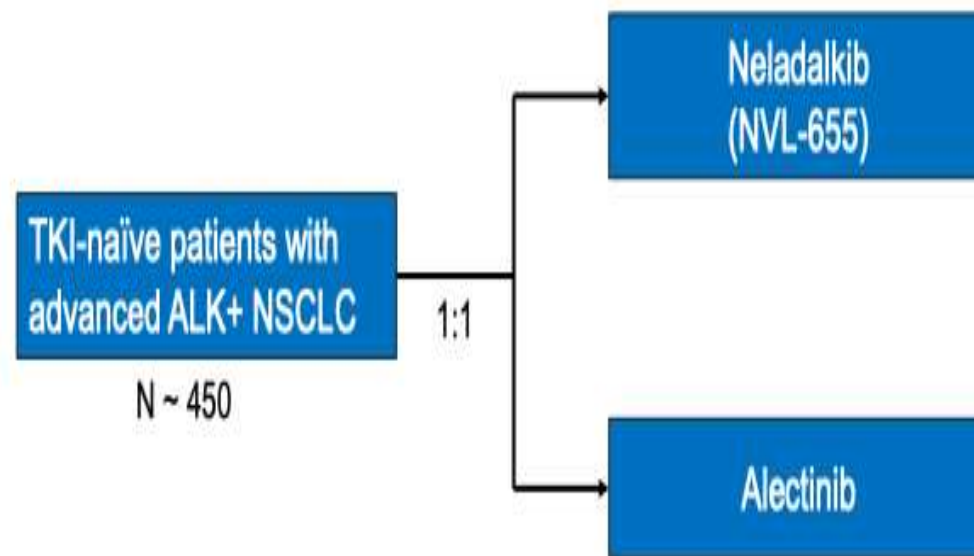


Durable Tumor Response: Previously Treated Patients with ALK+ NSCLC



NSCLC Response-Evaluable	Any Prior ALK TKIs ± Chemotherapy		Prior Lorlatinib (≥2 Prior ALK TKIs ± Chemotherapy)		Lorlatinib-naïve (≥1 2G ± 1G ALK TKI ± Chemotherapy)	
	All Dose Levels	RP2D	All Dose Levels	RP2D	All Dose Levels	RP2D
Median DOR, m (95% CI)	14.4 (6.9, NE)	Not Reached (6.9, NE)	9.2 (6.9, NE)	Not Reached (6.9, NE)	Not Reached (3.3, NE)	Not Reached (NE, NE)
DOR ≥ 6 m* (95% CI)	78% (58, 89)	100% (100, 100)	75% (52, 88)	100% (100, 100)	88% (39, 98)	100% (100, 100)

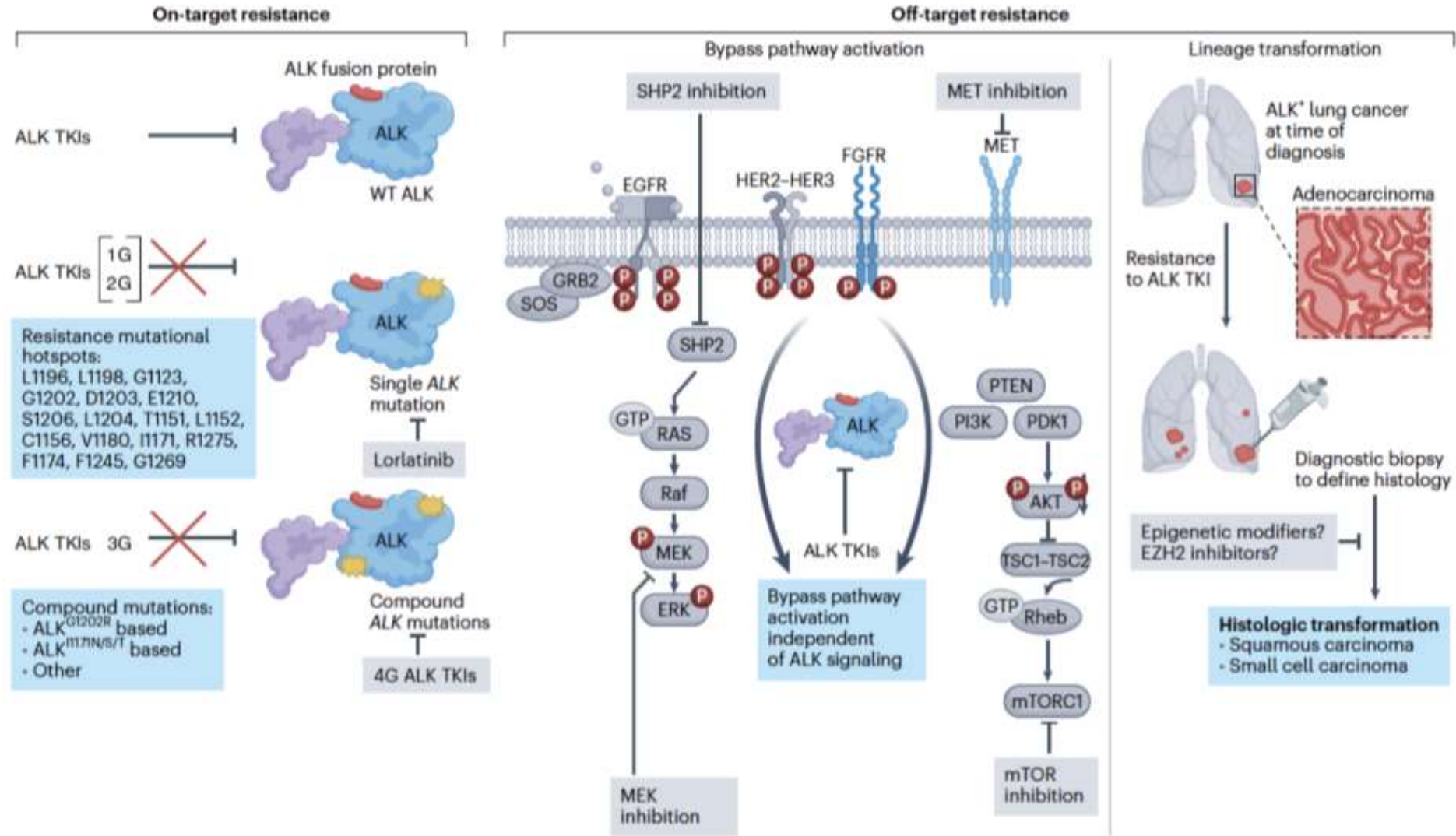
ALKAZAR PHASE III TRIAL



Primary endpoint: PFS per BICR

Secondary endpoints: PFS per investigator assessment, BICR-ORR, IC-ORR, OS, safety

The real challenge: Understanding drug resistance

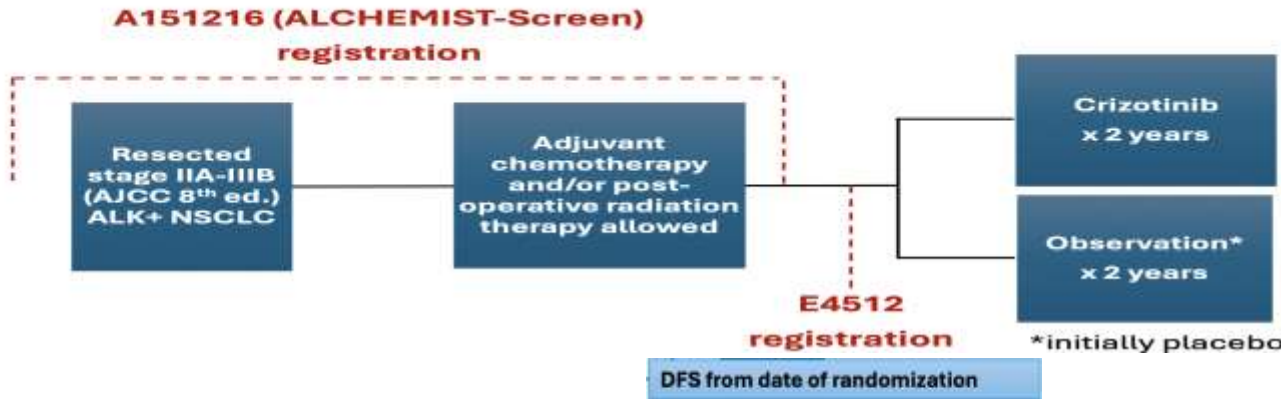


**CAN WE INCREASE CURE RATE
INTEGRATING THIS
PERSONALIZED APPROACH IN
EARLY STAGES?**

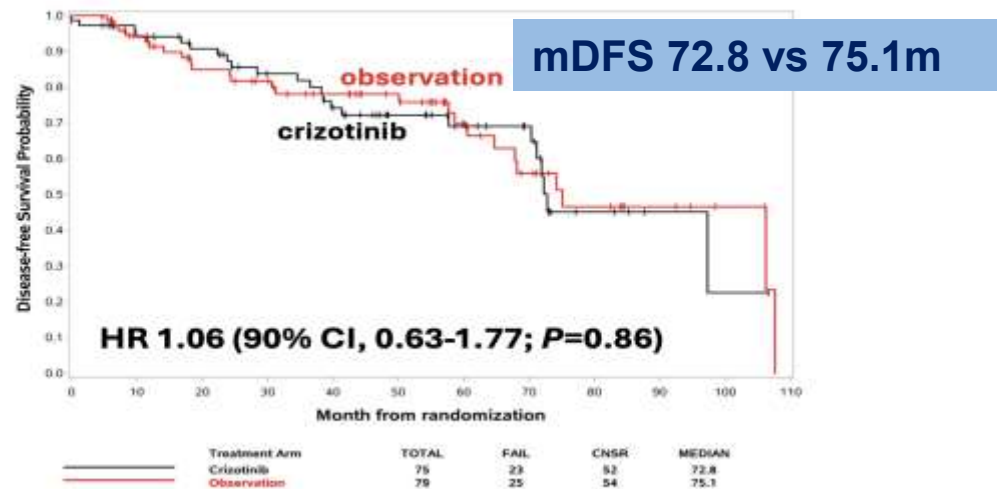
ECOG-ACRIN 4512

Adjuvant Crizotinib..not an option

E4512 design and endpoints

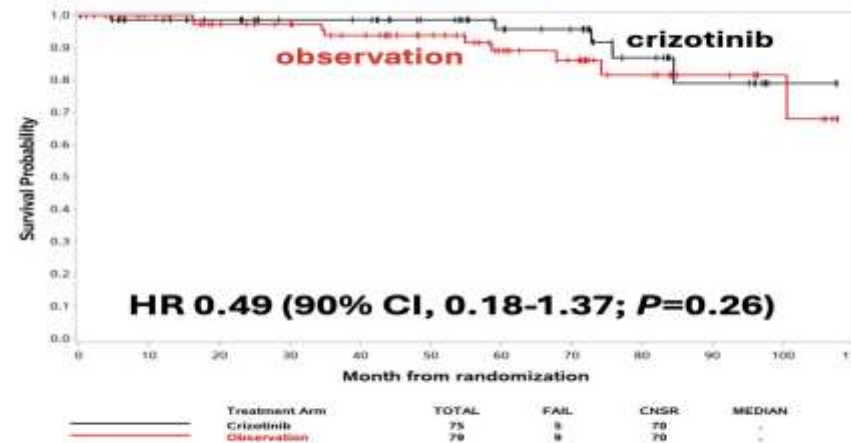


Disease-free survival



Median follow-up = 58.3 months

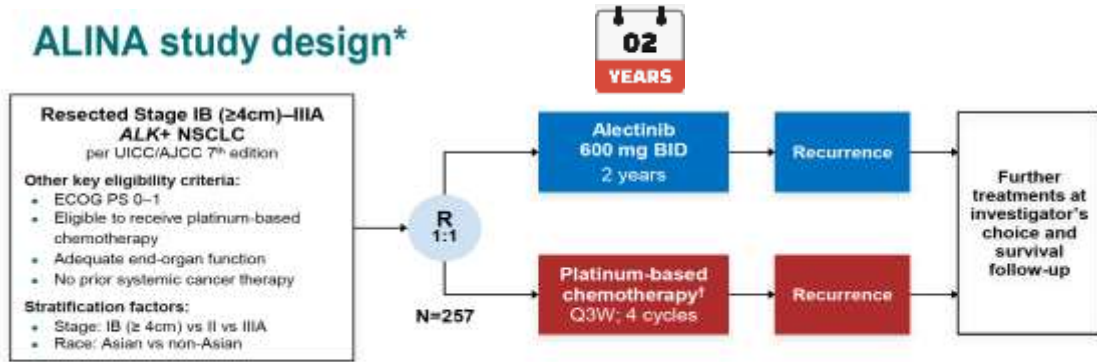
Overall survival



Median follow-up = 58.3 months

ALINA

ALINA study design*



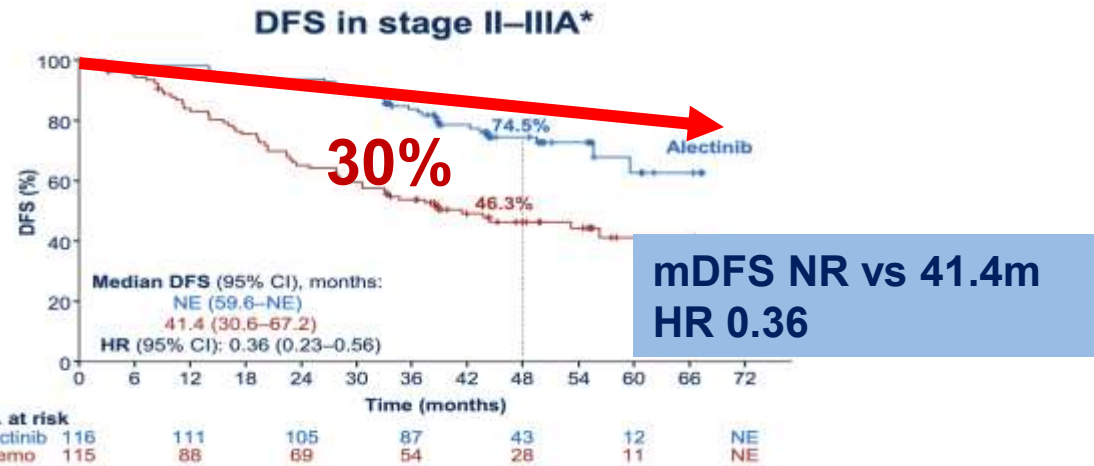
Primary endpoint

- DFS per investigator,[‡] tested hierarchically:
 - Stage II–IIIA → ITT (Stage IB–IIIA)

Other endpoints

- CNS disease-free survival
- OS
- Safety

Disease assessments (including brain MRI)[†] were conducted: at baseline, every 12 weeks for year 1–2, every 24 weeks for year 3–5, then annually

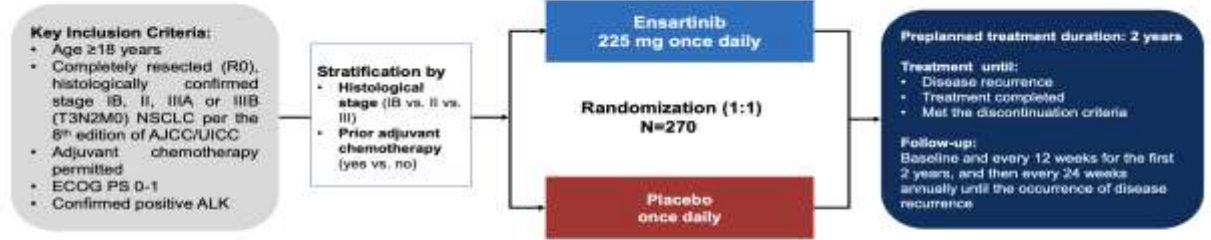


76% reduction in risk of disease recurrence or death in stage II / IIIA population

ELEVATE



Randomized, double-blind phase III trial (data cut **02 YEARS** interim analysis: 6/26/2025)



Primary endpoint: Investigator-assessed DFS* in patients with stage II to IIIB disease

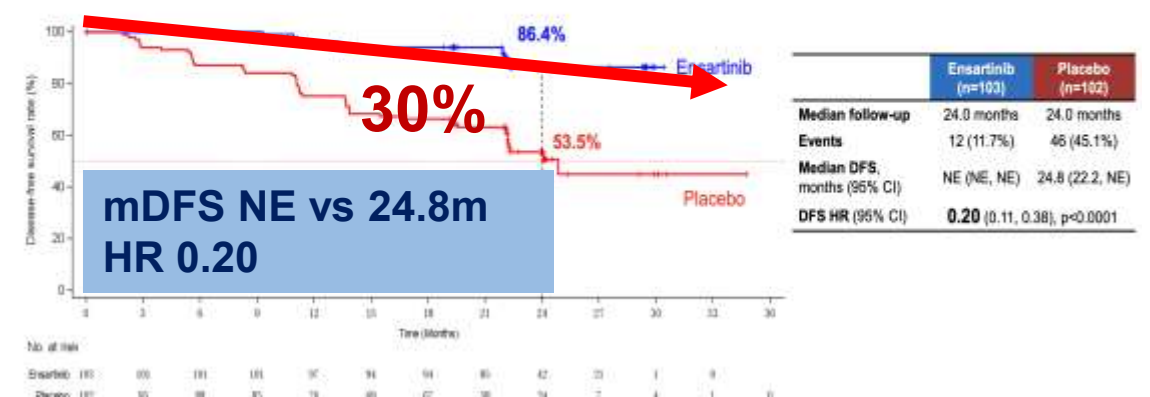
Secondary endpoints: Investigator-assessed DFS in patients with stage IB–IIIB disease (ITT), 3/5-year DFS rate, OS, safety

Statistical analysis:

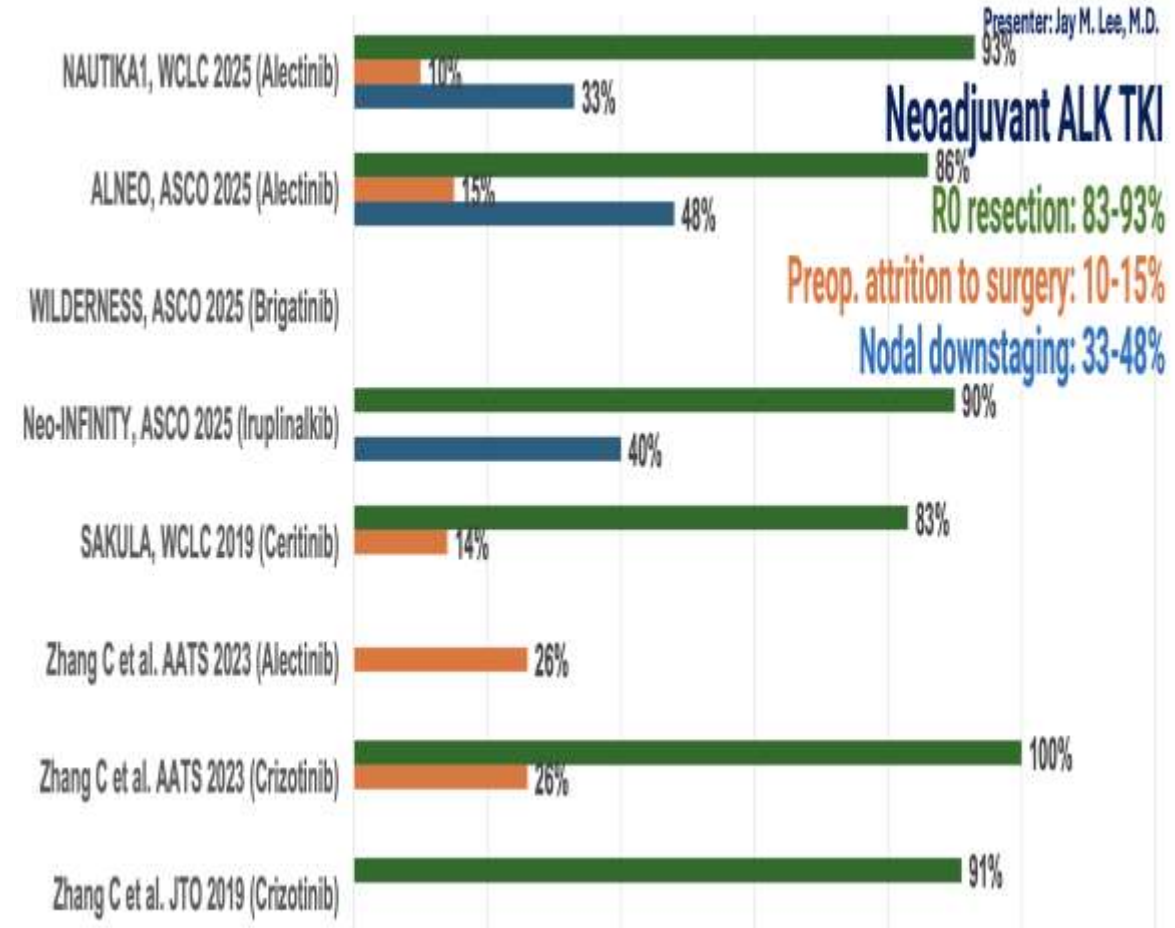
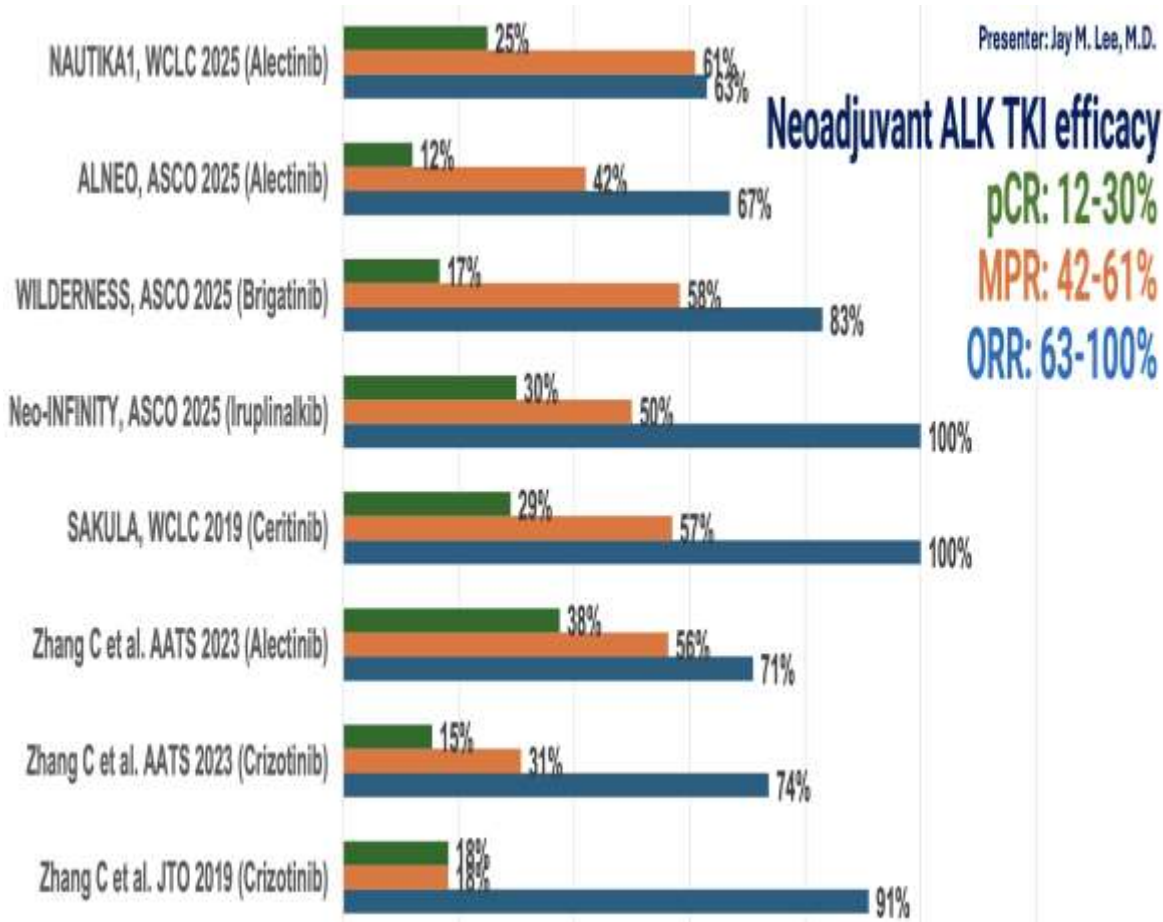
- This preplanned interim analysis was performed when 70% of events (57 events) were observed in patients with stage II–IIIB disease.

Ensertinib showed an improved DFS in patients with II–IIIB disease

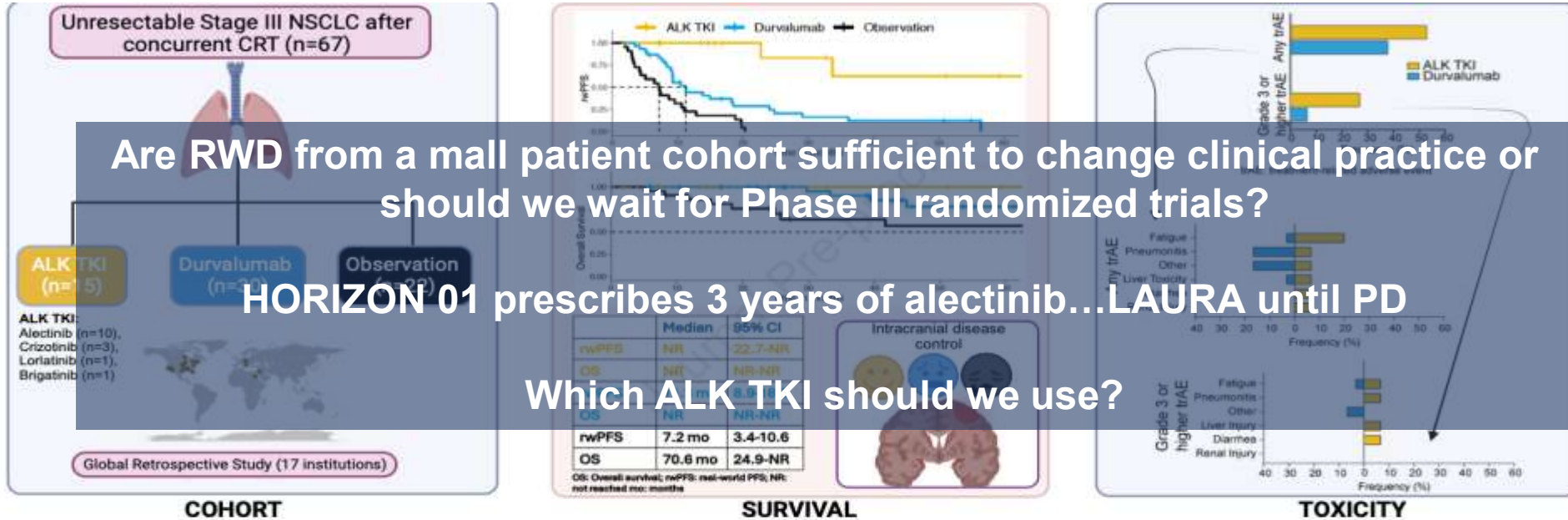
Investigator-assessed DFS



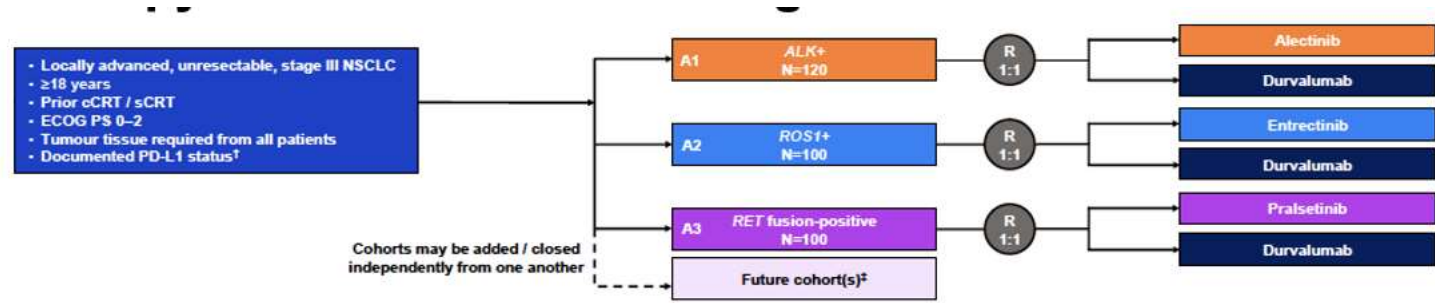
Neoadjuvant ALK TKIs...phase II trials



CONSOLIDATION ALK TKI IN UNRESECTABLE STAGE III: RWD



CONCLUSION: Consolidation ALK TKI treatment is associated with significantly improved real-world progression-free survival compared to Durvalumab or observation in patients with ALK+ NSCLC



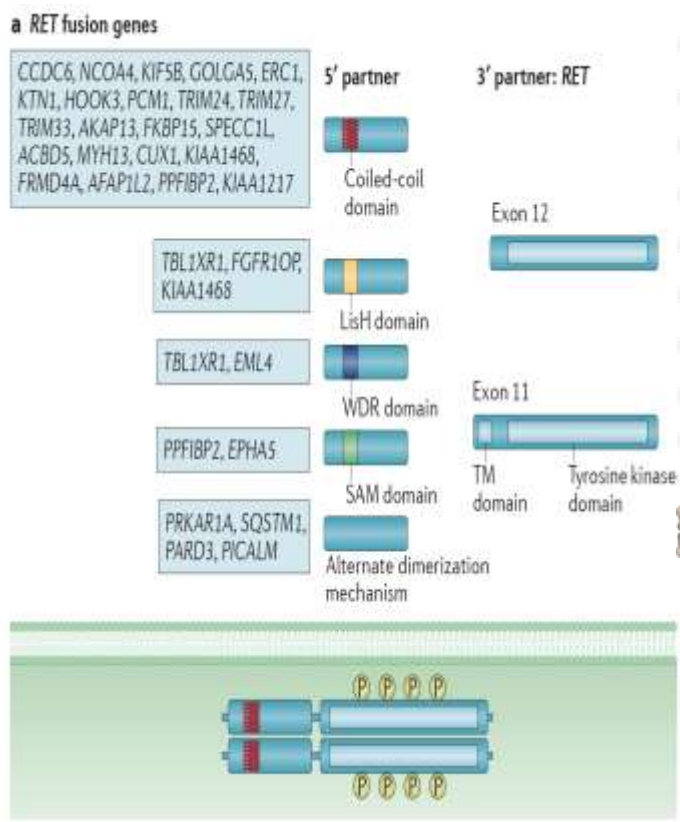
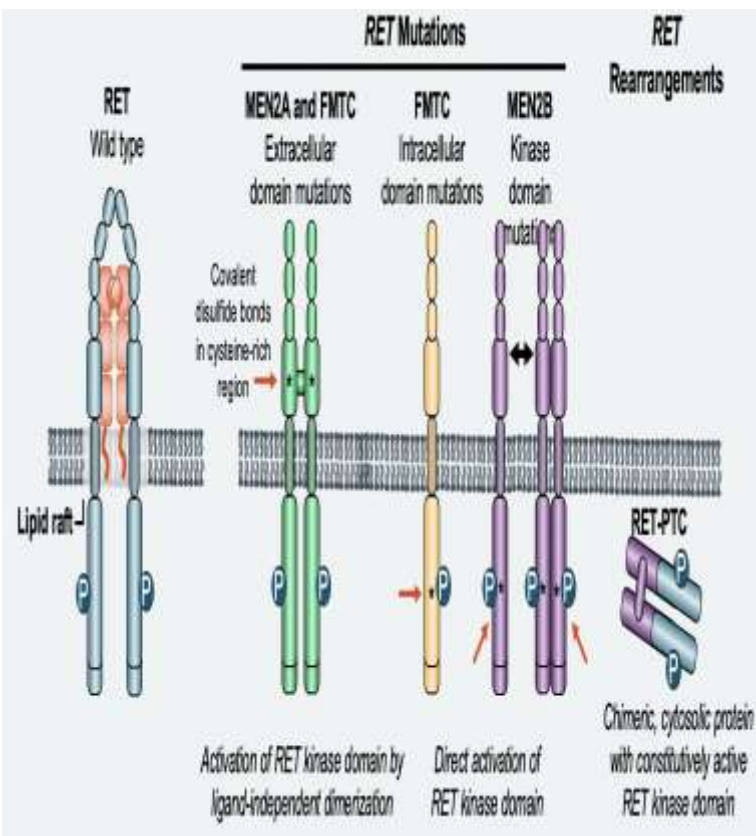
Oncogenic RET fusions and mutations result in constitutive TK activity

RET ONCOGENIC MECHANISMS

RET FUSIONS

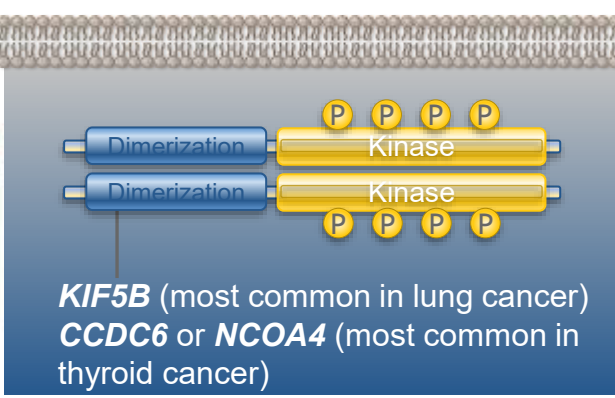
Incidence of RET fusions

Clinico-path characteristics



- NSCLC (1%-2%)
- Papillary thyroid cancer (10%-20%)
- Pancreatic cancer (<1%)
- Salivary gland cancer (<1%)
- Spitz tumors (<1%)
- Colorectal cancer (<1%)
- Ovarian cancer (<1%)
- Myeloproliferative disorders (<1%)
- Many others (<1%)

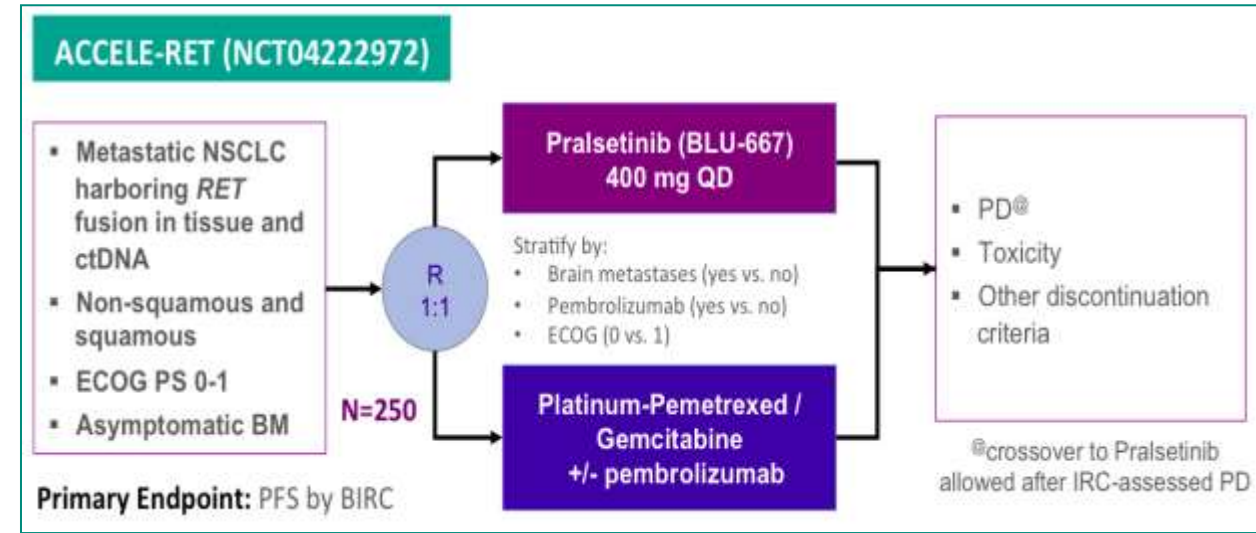
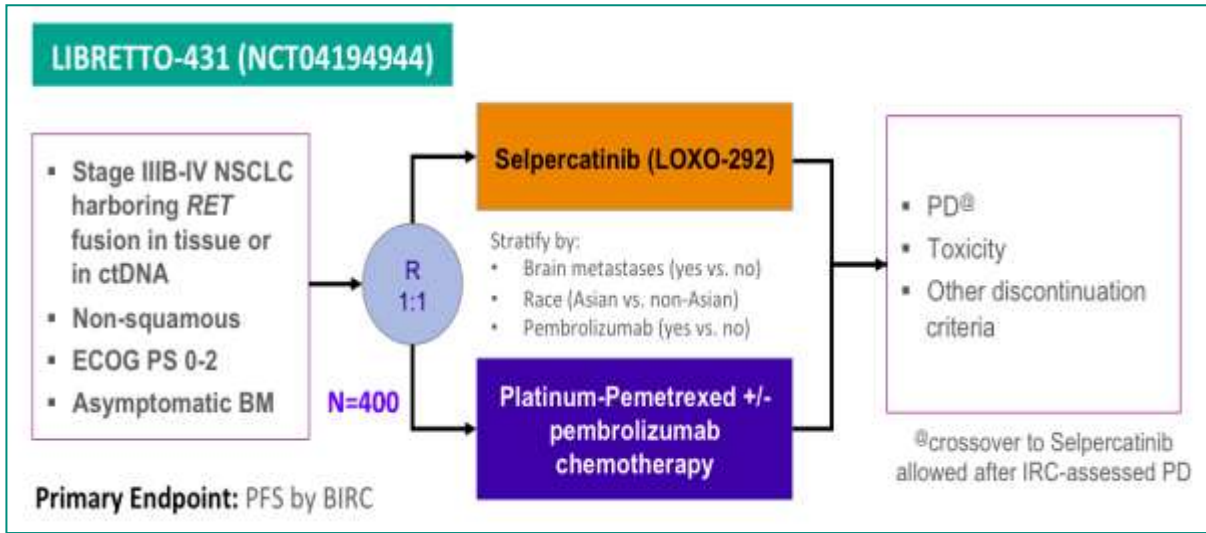
- 40% had a smoking history
- Poorly differentiated,
- 'solid-predominant subtype'
- Presence of signet ring cells
- BM: 25% upfront,
- 25% concomitant p53 mut



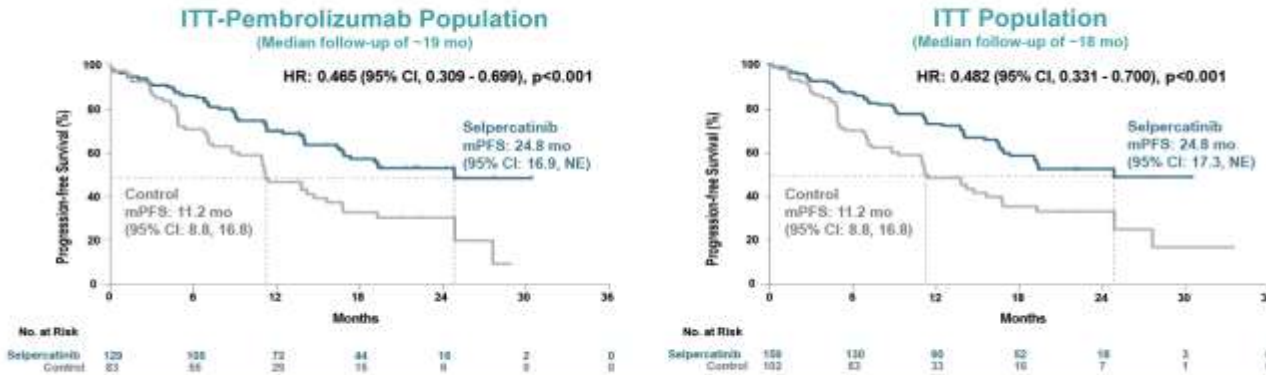
Randomized first line studies in mNSCLC RET+



AcceleRET Lung: Pralsetinib versus SOC **CLOSED** and end of recruitment (23 Jan 2024)

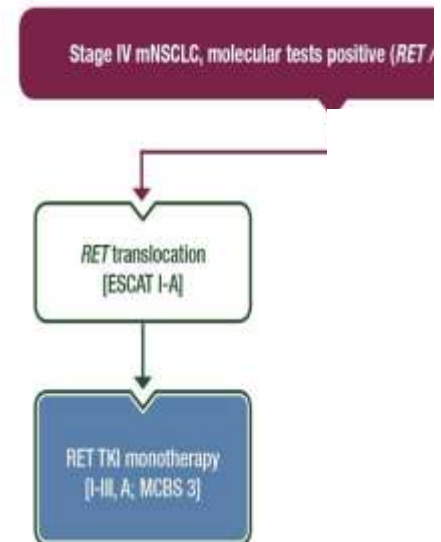


Progression-free survival (PFS) assessed by BICR



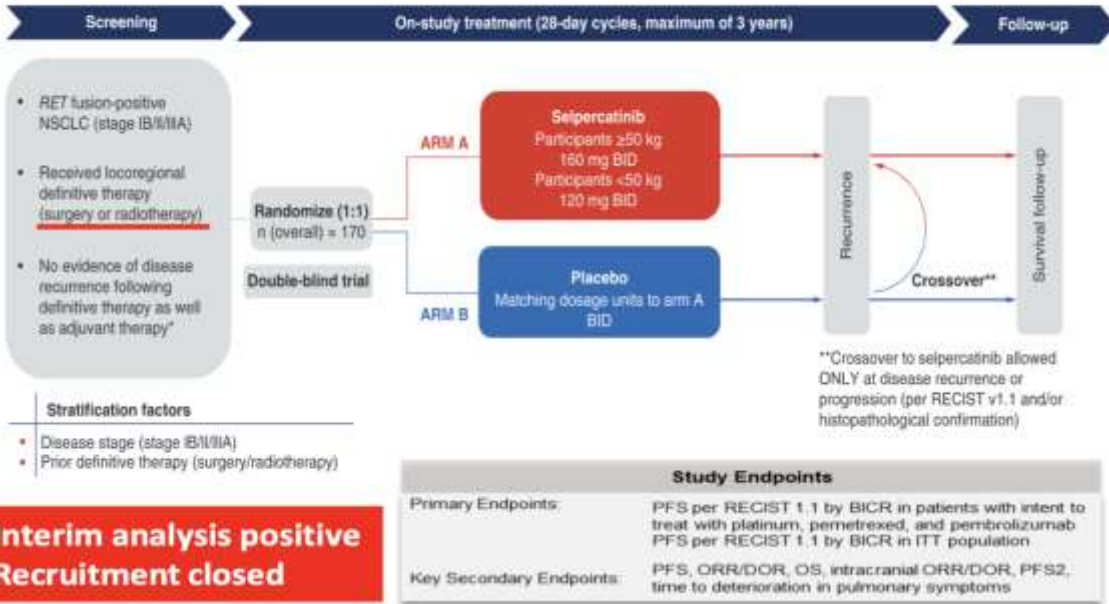
ORR: 83.7% vs 65.1%
mPFS: 24.8m vs 11.2m
mDoR: 24.2m vs 11.5m
icORR: 82.4% vs 58.3%
icPFS 16.1m vs 10.4m

The primary endpoints were met, as selpercatinib resulted in a statistically significant improvement in PFS in both pre-specified populations

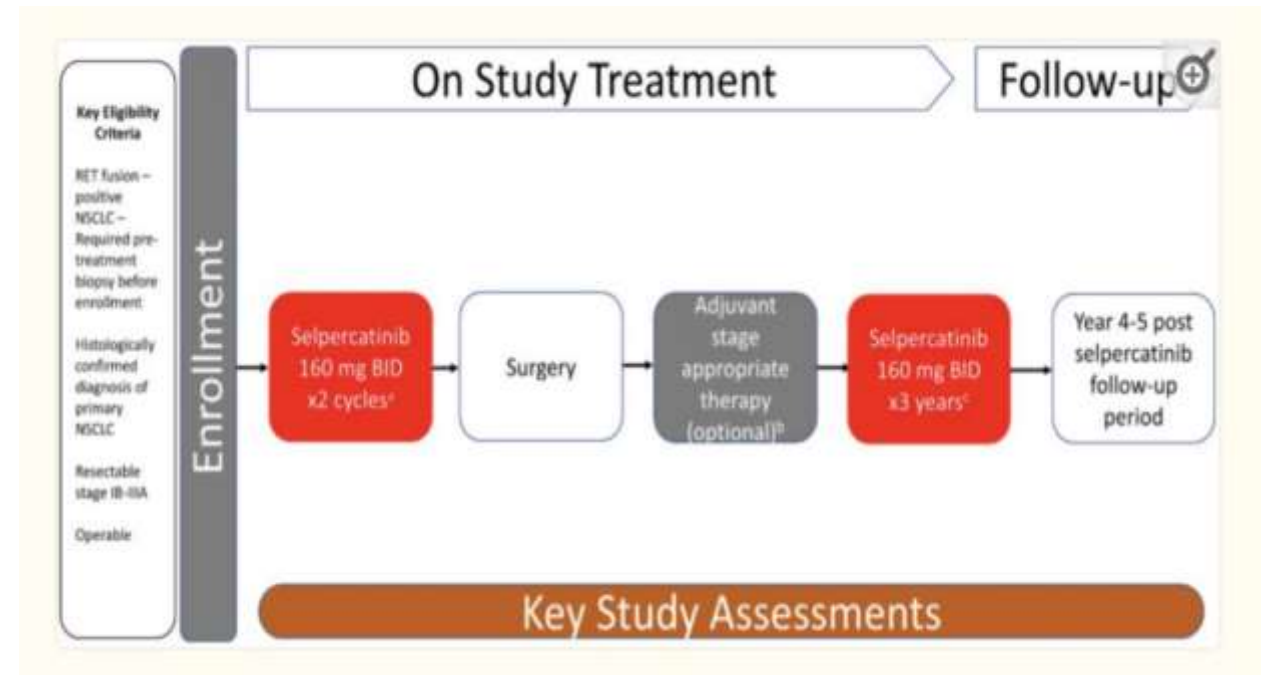


MOVING TO EARLY STAGES

LIBRETTO-432 (Adj, Phase III, RET+. NCT04819100)



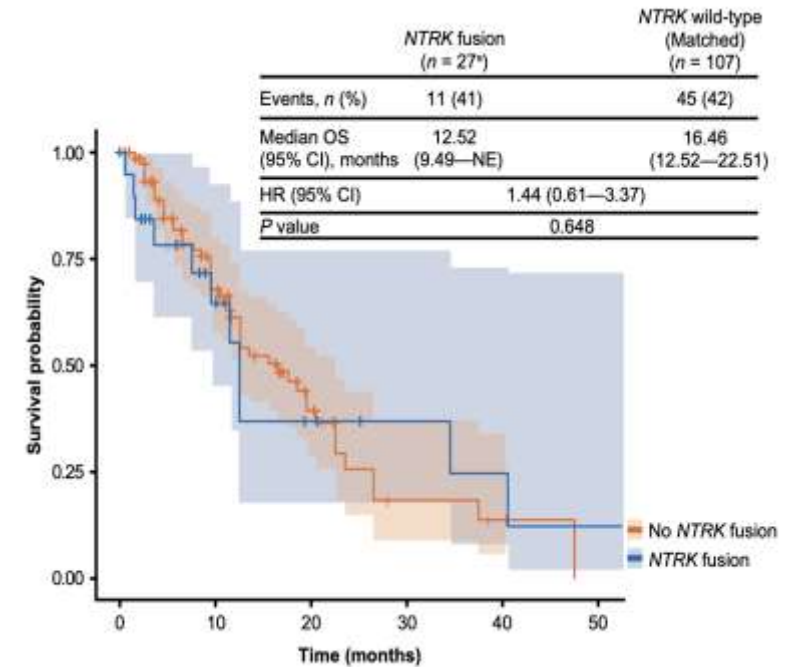
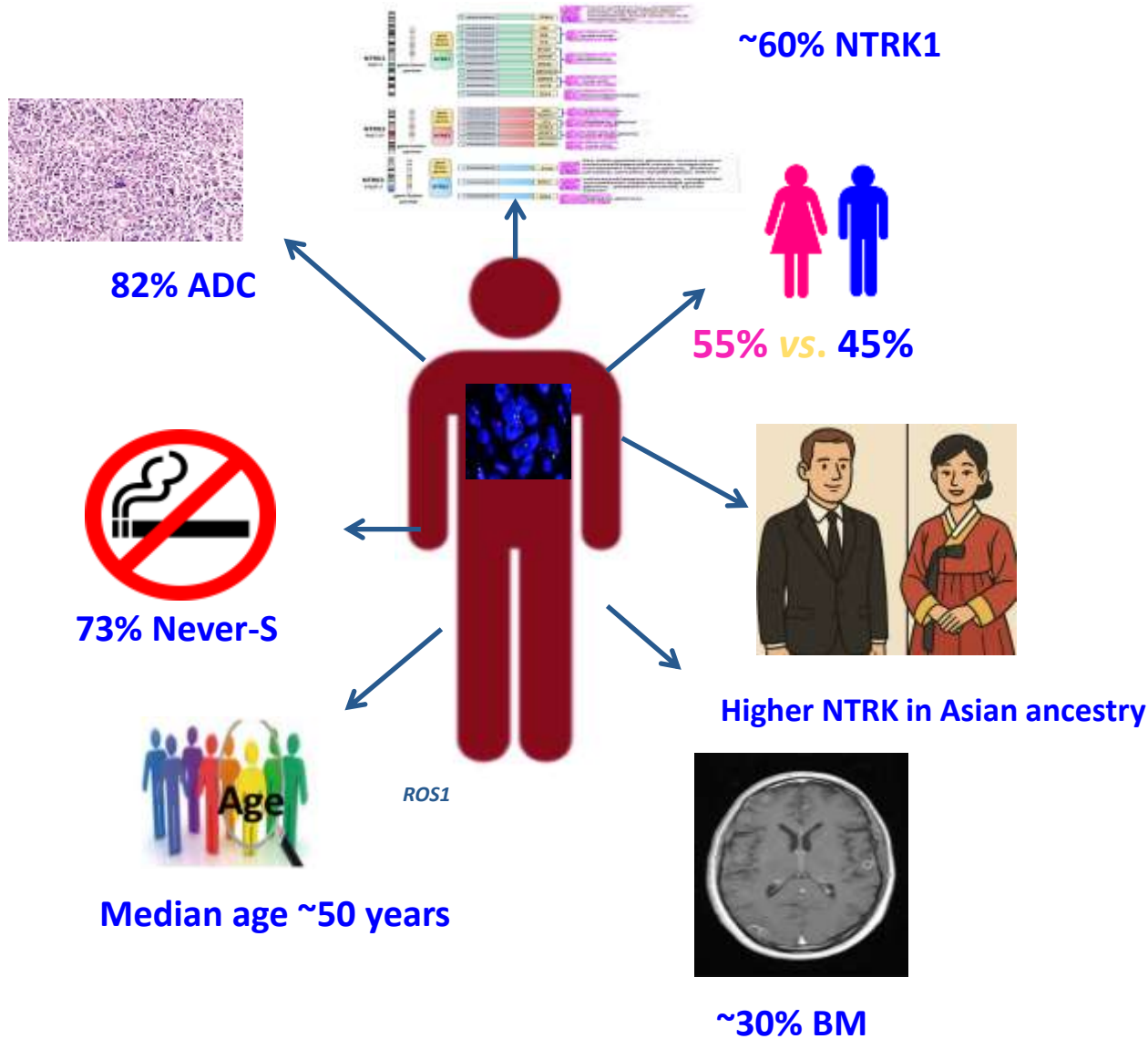
Ph 2: LIBRETTO-001 (Periop Selpercatinib RET+. NCT03157128)



Next generation selective RET TKIs development

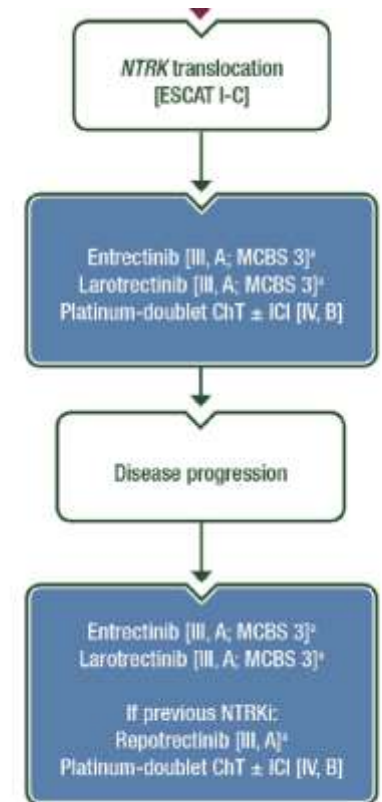
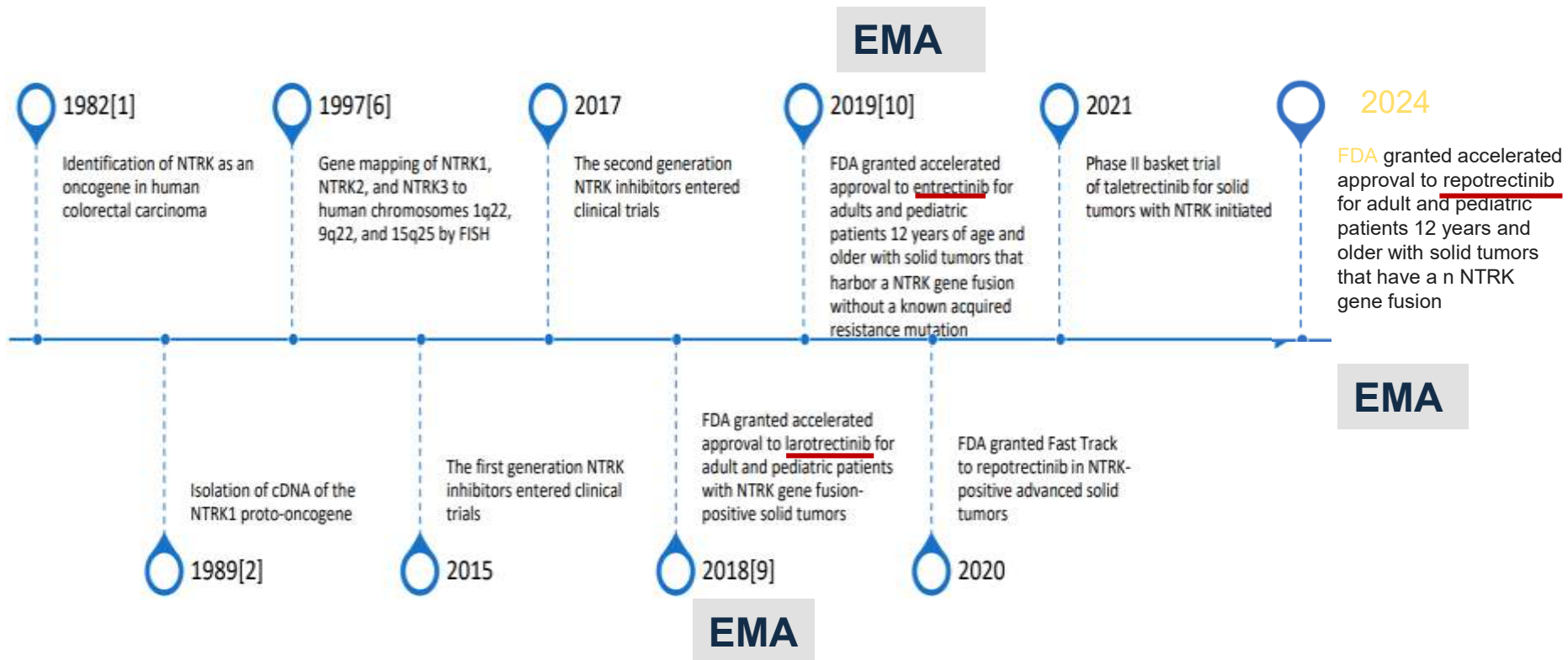
Agent	ClinicalTrials.gov identifier	Patient population, No.	Phase/design	Status
TPX0046 (RET/SRC inhibitor)	NCT04161391	Advanced solid tumors harboring <i>RET</i> fusions or mutations, 41	Phase 1/2, FIH	Terminated (adverse change in risk/benefit)
BOS172738	NCT03780517	Advanced solid tumors with <i>RET</i> gene alterations including NSCLC and MTC, 117	Phase 1	Completed recruitment
TAS0953/HM06	NCT04683250	Advanced solid tumors with <i>RET</i> gene abnormalities, 202	Phase 1/2	Recruiting in US and Japan
LOXO-260	NCT05241834	Advanced <i>RET</i> fusion-positive solid tumors, MTC, and other tumors with <i>RET</i> activation refractory to selective <i>RET</i> inhibitors, 110	Phase 1	Active, not recruiting
SY-5007	NCT05278364	Advanced solid tumors, including <i>RET</i> fusion-positive NSCLC or <i>RET</i> -mutated NSCLC or other <i>RET</i> -altered advanced solid tumors, 184	Phase 1/2, FIH	Recruiting in China
EP0031	NCT05443126	Advanced <i>RET</i> -altered malignancies, 265	Phase 1/2	Recruiting in US and Europe
APS03118	NCT05653869	Unresectable locally advanced or metastatic solid tumors harboring <i>RET</i> mutations or fusions, 35	Phase 1, FIH	Recruiting in China
TY-1091	NCT05675605	Advanced <i>RET</i> -altered NSCLC, MTC, and other <i>RET</i> -altered solid tumors that have progressed after standard therapy, 248	Phase 1/2, FIH	Recruiting in China
HEC169096	NCT05451602	Advanced solid tumors, including <i>RET</i> fusion-positive NSCLC, MTC, and other tumors with <i>RET</i> activation, 456	Phase 1/2	Recruiting in China
HS-10365	NCT06147570	Treatment-naïve locally advanced or metastatic <i>RET</i> fusion-positive NSCLC, 62	Phase 2	Recruiting in China
HS269	NCT05058352	Advanced solid tumors that fail or where no standard treatment is available, 36	Phase 1, FIH	Recruiting in China
KL590586	NCT05265091	Advanced solid tumors carrying <i>RET</i> -fusion or -mutant genes, 414	Phase 1/2	Recruiting in China
HA121-28	NCT05117658	<i>RET</i> fusion-positive NSCLC after at least one line of therapy, 83	Phase 2	Recruiting in China

NTRK NSCLC patients



Patients with NTRK fusions do not have better or worse prognosis than those patients with NTRK WT

Timeline of NTRK genes discovery and NTRK therapy approvals



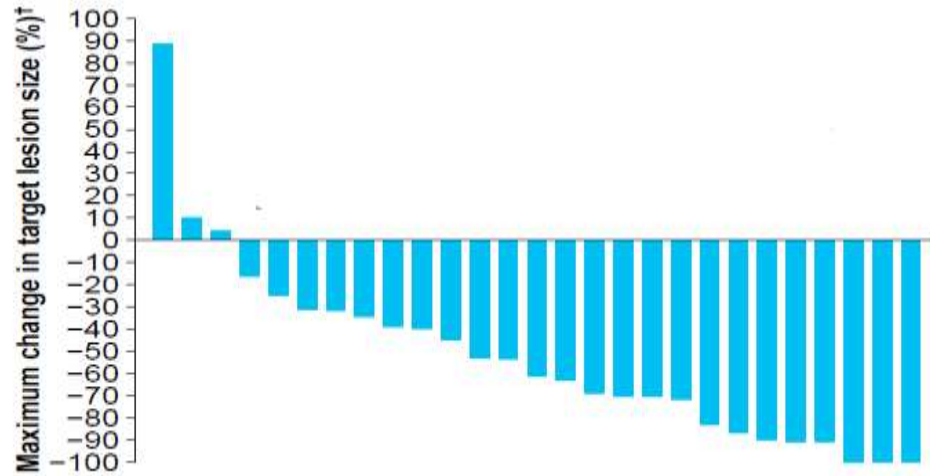
1st generation TKI updated efficacy in NSCLC



LAROTRECTINIB

Pooled analysis
LOXO-TRK, SCOUT, NAVIGATE

N=32 adults, 38% >3 lines, 38% BM

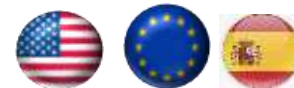


ORR 66%
mPFS 22m (95% CI 10-NE)
mOS 39m (95% CI 17-NE)

12p



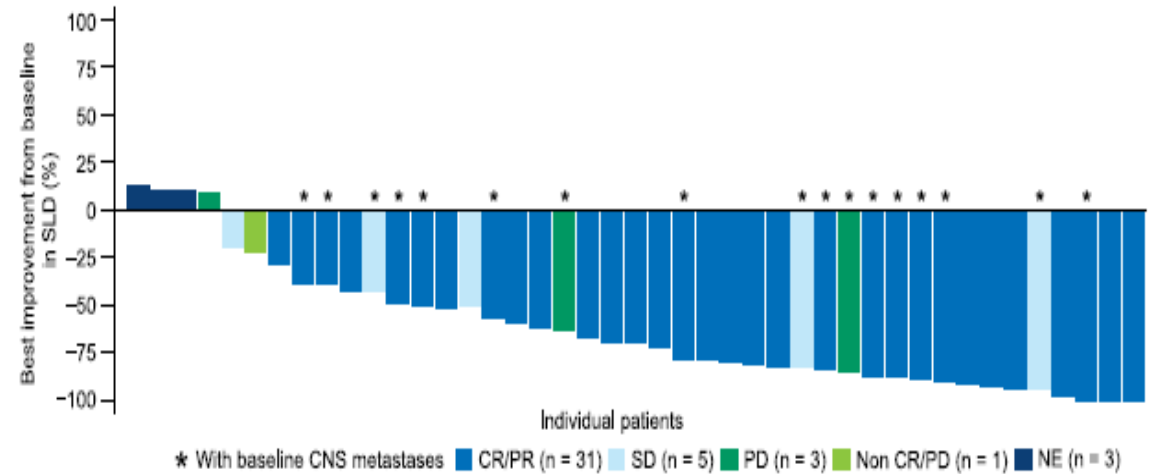
icORR 67% (PR 100%)
mPFS 9.9m
mOS 19.4m



ENTRECTINIB

Pooled analysis
ALKA 372-001, STARTRK-1, STARTRK-2

N=51 adults, 40% >2 lines, 39% BM



ORR 63% (w/o BM 78%, w BM 54%)
mPFS 28m (95% CI 15.8-30.4)
mOS 41.5m (95% C 30.9-NE)

20p

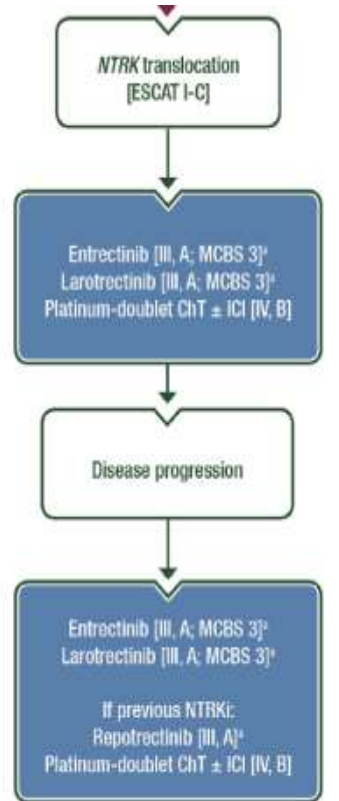
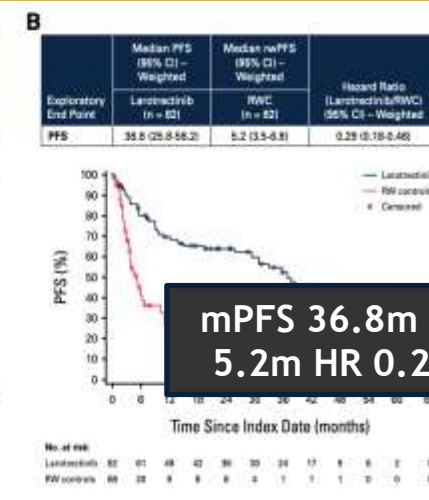
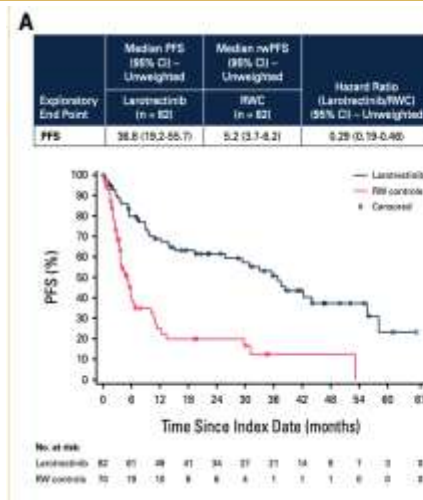
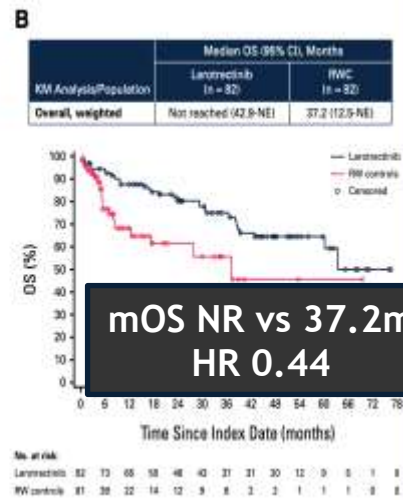
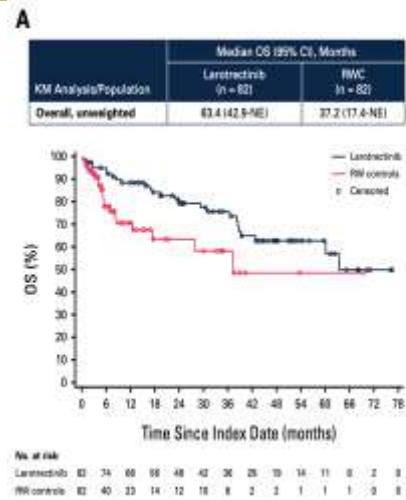
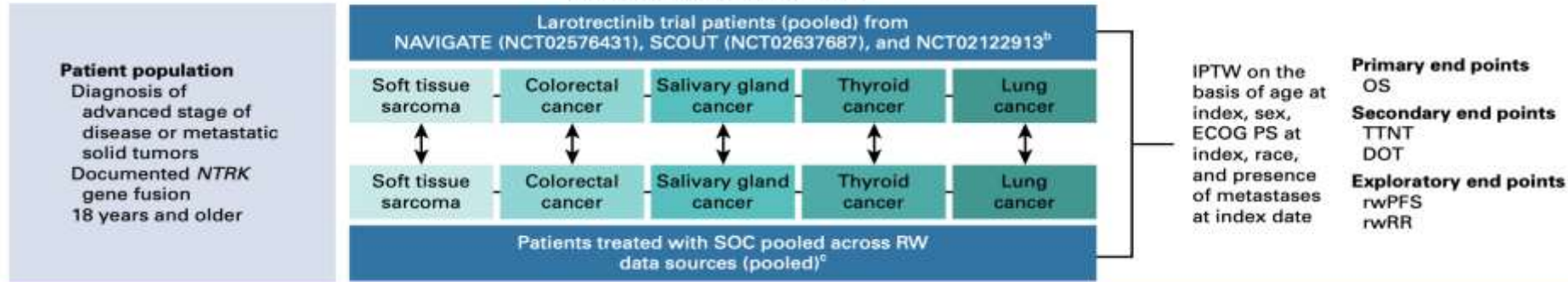


icORR 64% (CR 50%)
icDoR 55.7m
icPFS 32.7m

We don't have a comparative phase III trial NTRK TKI vs SOC...

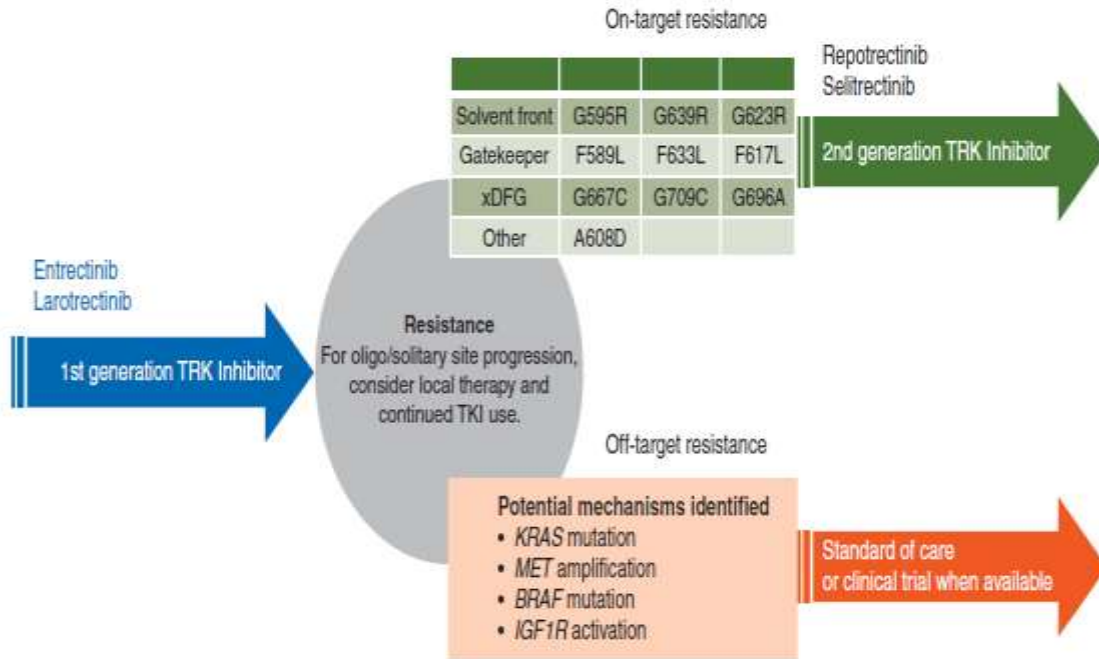
164 pts, 5 tumor types, matched 1:1

Patients Matched on the Basis of Tumor Type and Number of Lines of Systemic Therapies^a

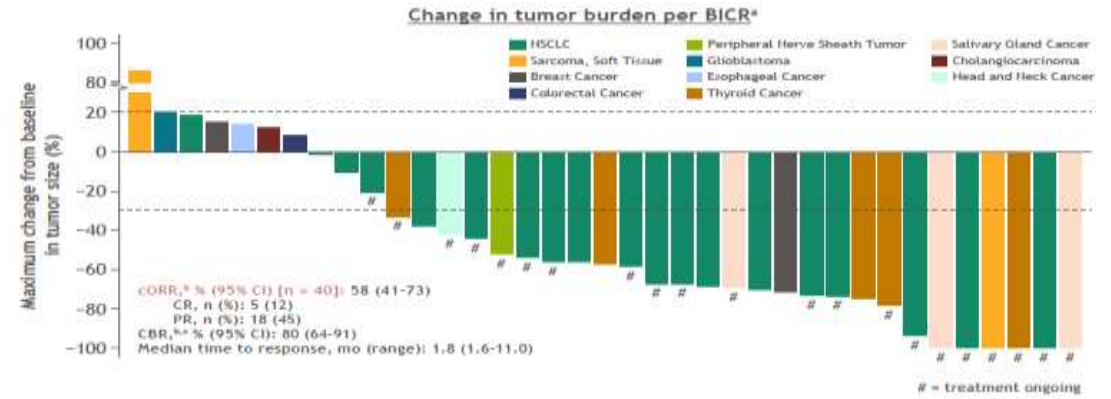


In the absence of randomized clinical trial, this analysis demonstrates the feasibility of external control-arm on the basis of RWD, even in the context of ultra-rare alterations

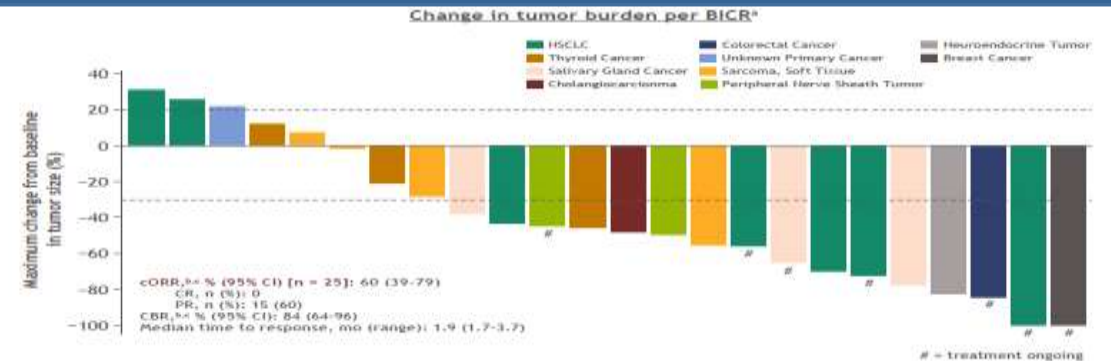
MANAGING SECONDARY RESISTANCE: REPOTRECTINIB



REPOTRECTINIB: TRIDENT1
n=17 NSCLC TKI naive ORR 79%



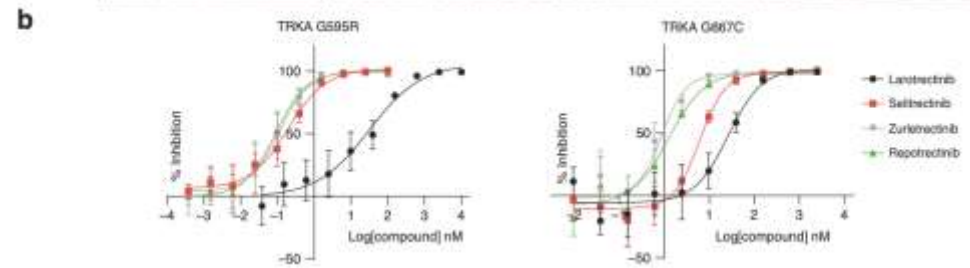
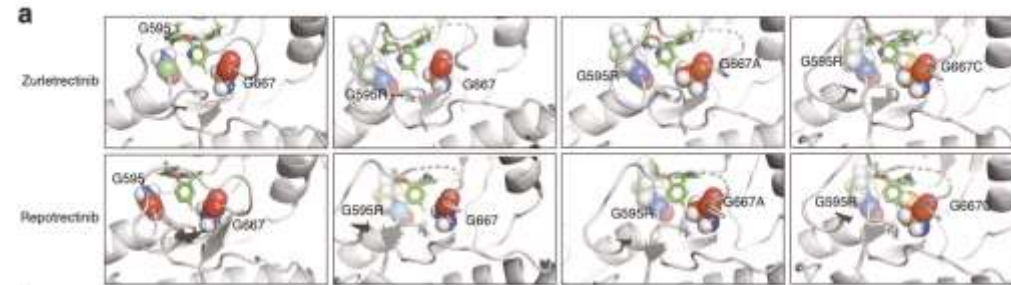
REPOTRECTINIB in acquired resistance
n=7 NSCLC TKI pretreated with solvent front mutations
ORR = 71%



Personalizing the managing “on target” resistance Zurletrectinib...A new player

Cell lines/NTRK status	IC ₅₀ [nM]			
	Larotrectinib	Selitrectinib	Zurletrectinib	Repotrectinib
Ba/F3 LMNA -NTRK1	21.8	3.38	1.2	2.23
Ba/F3 ETV6 -NTRK2	53.6	9.1	5.61	5.94
Ba/F3 ETV6 -NTRK3	14.2	1.89	1.4	1.46
Ba/F3 LMNA -NTRK1 -F589L	614	46.9	40.8	4.43
Ba/F3 ETV6 -NTRK2 -F633L	3113	119	163	11.9
Ba/F3 ETV6 -NTRK3 -F617L	893	21.1	31.2	2.41
Ba/F3 LMNA -NTRK1 -G595R	3204	18.1	11	16.2
Ba/F3 ETV6 -NTRK2 -G639R	3809	81.2	40	60.1
Ba/F3 ETV6 -NTRK3 -G623R	962	6.7	6.45	11.6
Ba/F3 ETV6 -NTRK3 -G623E	61.3	3.23	0.69	3.06
Ba/F3 LMNA -NTRK1 -G667A	118	21.1	5.27	6.48
Ba/F3 LMNA -NTRK1 -G667C	1368	163.6	38.8	68.1
Ba/F3 LMNA -NTRK1 -G667S	3196	537	193	139
Ba/F3 ETV6 -NTRK2 -G709C	2788	323	72.6	116
Ba/F3 ETV6 -NTRK3 -G696A	45.7	5.1	2.24	2.84
Ba/F3 ETV6 -NTRK3 -G696C	780	51.6	15.5	32.2
Ba/F3 LMNA -NTRK1 -V573M	45.4	5.47	2.33	2.22
Ba/F3 LMNA -NTRK1 -A608D	19.7	3.16	1.18	2.12
Ba/F3 ETV6 -NTRK2 -V689M	13.9	1.44	1.01	1.24

- ★ Gate keeper substitutions
- ▲ Solvent front substitutions
- ☼ xDFG mutations



News | Article | May 2, 2025

Zurletrectinib Receives Priority Review from NMPA for NTRK Gene Fusion+ Advanced Solid Tumors

Author(s): Ashley Chan



Abstract
2025 ASCO Annual Meeting

Updated efficacy and safety of zurletrectinib in adult patients (pts) with locally advanced or metastatic NTRK fusion-positive (NTRK+) solid tumors.

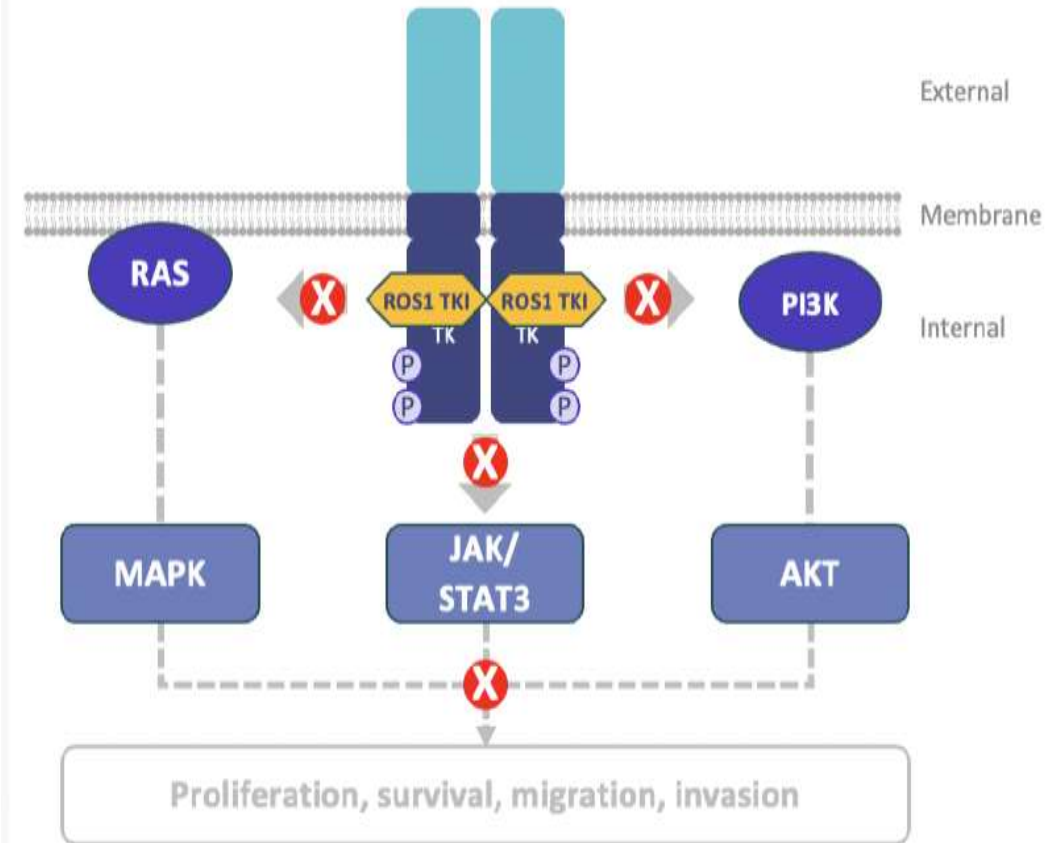
The full, final text of this abstract will be available at 5:00 PM ET on May 22, 2025

So crowded scenario...

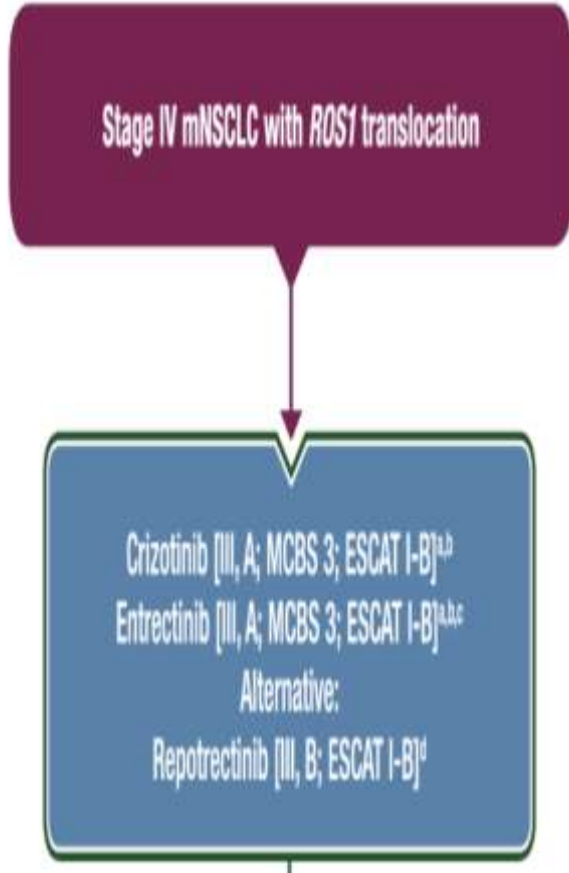
Study	Phase	Drug	Gene alteration	Tumor Type	Status
NCT04671849	I	SIM1803-1A	NTRK, ROS1 or ALK fusion	All Solid	Recruiting
NCT04687423	II	FCN-011	NTRK fusion	All Solid	Recruiting
NCT05212987	I	FCN-098	NTRK fusion	All Solid	Recruiting
NCT04996121	I/II	XZP-5955	NTRK, ROS1 Fusion	All Solid	Recruiting
NCT05745623	I/II	ICP-723	NTRK fusion	All Solid	Recruiting
NCT05769075	I	TY-2136b	NTRK, ROS1 or ALK fusion	All Solid	Recruiting
NCT04879121	II	Larotrectinib	NTRK Amplification	All Solid	Recruiting
NCT01639508	II	Cabozantinib	NTRK, ROS1 fusions, MET/AXL	NSCLC	Recruiting
NCT06010342	II	TL118	NTRK fusion	All Solid	Not Yet Recruiting
NCT05302843	I	BPI-28592	NTRK fusion	All Solid	Recruiting
NCT03556228	I	VMD-928	NTRK fusion	All Solid	Recruiting




ALK & ROS-1 fusion kinases: high degree of homology

- Located on chromosome 6q22, the ROS1 gene encodes an orphan receptor tyrosine kinase for which an activating ligand has yet to be described.
- ROS1 gene fusions account for 1-2% of NSCLC.
- 40% baseline CNS metastases
- Poor outcomes with platinum-based CT
- ROS1 and ALK are phylogenetically related, leading to a biological rationale for the use of some ALK inhibitors in ROS1 NSCLC.



ROS1 fusions: general outcomes with current options (1L)



	 CRIZOTINIB	 ENTRECTINIB	 REPOTRECTINIB
N	270	67	71
ORR (%)	65-73	77	79
mPFS, months (95%CI)	19-24.7	17.7 (11.8-39.4)	35.7m (27.4-NR)
mOS, months (95%CI)	17-51.4	47.7 (43.2-NR)	NA 88% surv. rate @18m
TRAEs (Gr3/4), %	94-98 (23-36)	92 (34)	96 (29)

Efficacy of ROS1 TKI in naive patients

ROS1 Inhibitor	ORR (%)	Median PFS	BM Prevalence	Intracranial ORR
Crizotinib (PROFILE 1001)	72%	19.2 mo	Not eligible	-
Crizotinib (OxOnc)	72%	15.9 mo	Not eligible	-
Brigatinib	71%	12.0 mo	11% (3/28)	0%
Entrectinib	68%	15.7 mo	29% (48/168)	52%
Ceritinib	62%	19.3 mo	25% (8/32)	25%
Lorlatinib	62%	21.0 mo	52% (11/21)	64%

Lorlatinib after failure of first line ROS1: IFCT -2003 ALBATROS study

54 patients; 57% Brain Mts; 94% prior crizotinib

Efficacy of lorlatinib after failure of a first-line ROS1 tyrosine kinase inhibitor (ROS1 TKI) in patients (pts) with advanced ROS1-positive non-small cell lung cancer (ROS1+ NSCLC):

IFCT-2003 ALBATROS trial

NCT04621188 / EU CT 2024-512028-12-00

Single-arm, multicenter phase II trial

- ROS1-positive advanced NSCLC according to IHC and confirmed with FISH or NGS (local)
- Progression after a first-line therapy with ROS1 TKI
- PS 0, 1 or 2
- Stable and asymptomatic brain metastases allowed
- Measurable disease according to RECIST 1.1



- Lorlatinib 100 mg once daily
- Planned inclusion of 84 patients *
- Until progression or intolerable toxicity
- Required blood samples at time of progression

Primary endpoint: investigator-assessed confirmed Overall Response Rate (cORR)

Secondary endpoint: BICR cORR, DCR, PFS, DoR, OS, CNS ORR, safety

Results

- cORR of 30%
- median PFS 7.4 months
- median DoR 20.4 months
- median OS 42.3 months

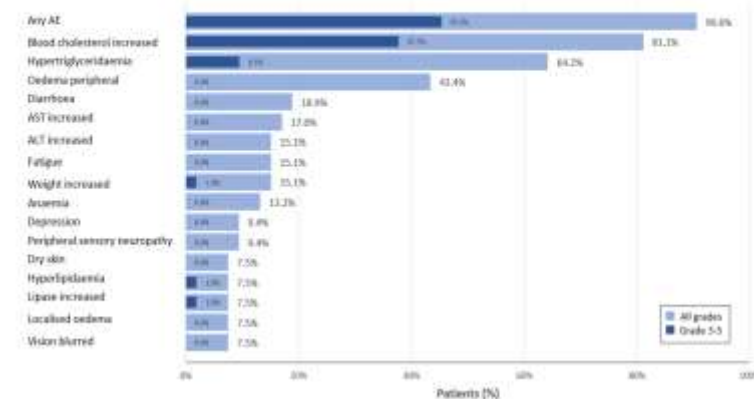
Secondary endpoints: inv-assessed CNS ORR

	Investigator assessed N = 13 patients with measurable CNS disease
Complete Response	7 (53.8%) [26.7% ; 80.9%]
Partial Response	5 (38.5%) [12.0% ; 64.9%]
Objective Response	12 (92.3%) [77.8% ; 100.0%]
Stable Disease	1 (7.7%) [0.0% ; 22.2%]
Disease Control	13 (100.0%) [100.0% ; 100.0%]
Progressive Disease	0

Safety

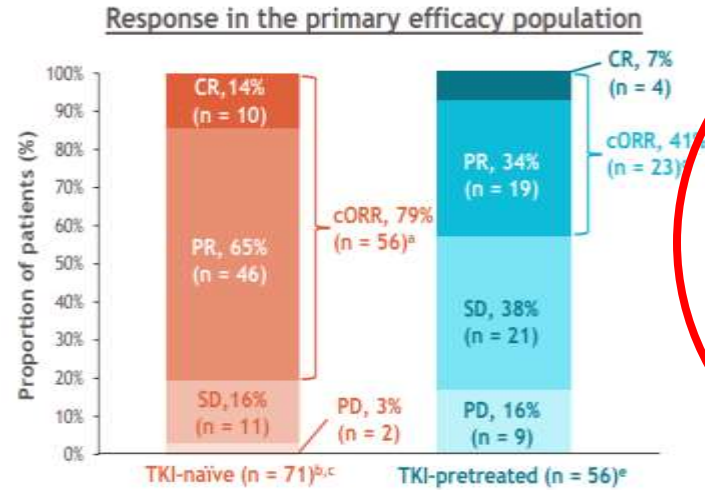
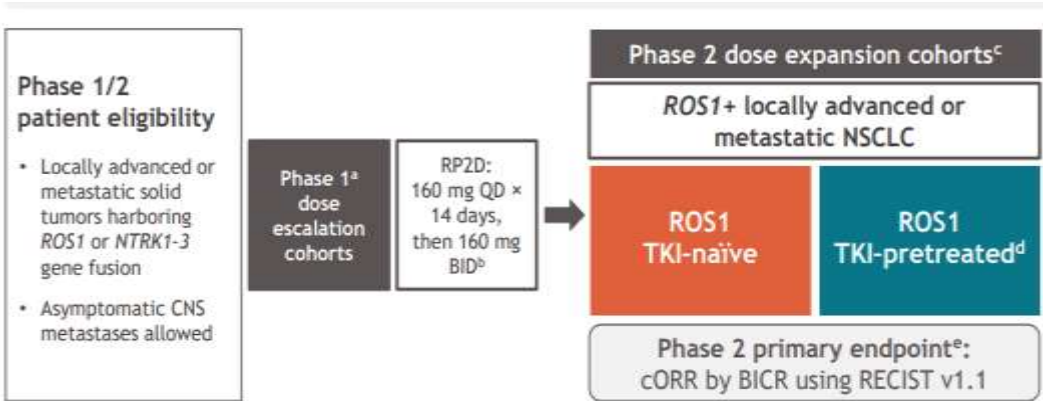
TRAE grade ≥ 3 rate: 45%
 Dose modification rate: 30%
 TRAE permanent discontinuation rate: 1%

TRAEs with incidence ≥7.5%

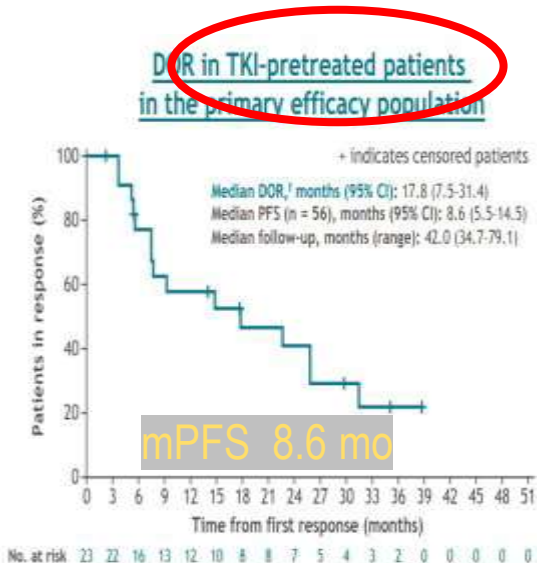
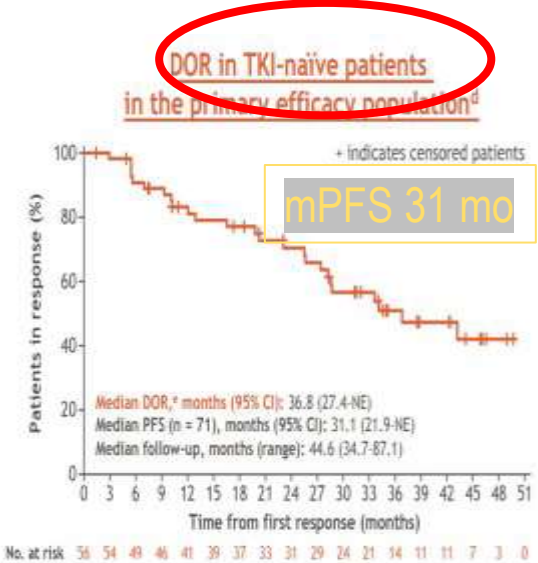




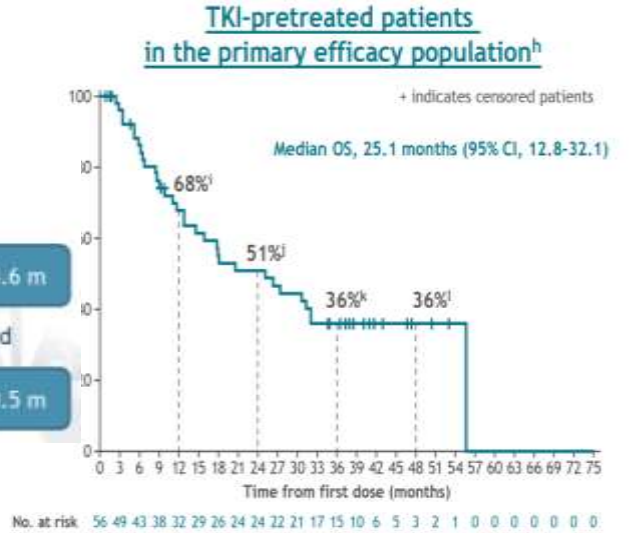
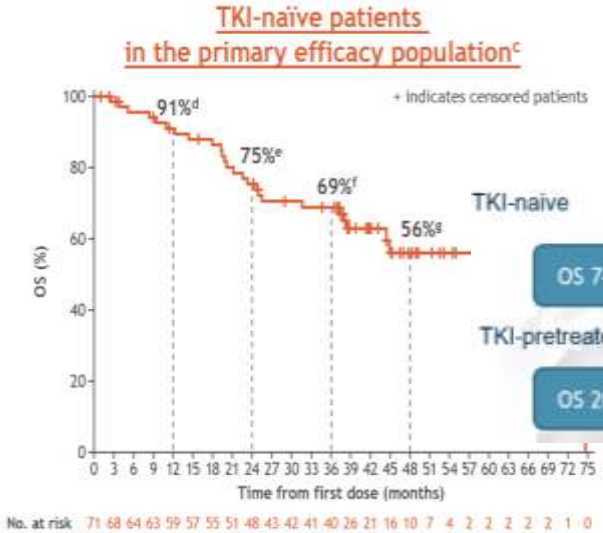
REPOTRECTINIB: long-term FW from phase 1/2 TRIDENT-1 trial



- Among patients with measurable brain metastases at baseline^f:
 - icORR was 89% in TKI-naïve patients (95% CI, 52-100; n/N = 8/9)^g; median icDOR was 43.2 months (95% CI, 11.1-NE)
 - icORR was 38% in TKI-pretreated patients (95% CI, 14-68; n/N = 5/13)^h; median icDOR was NE (95% CI, 3.0-NE)
- Among patients with the *ROS1* G2032R (solvent front) mutation across the 3 TKI-pretreated cohorts (n = 17), cORR was 59% (95% CI, 33-82)



- In the expanded efficacy population, median follow-up was 37.7 months for TKI-naïve patients (n = 121) and 34.8 months for TKI-pretreated patients (n = 107)
 - Median DOR^a was 33.6 months (95% CI, 25.5-NE) for TKI-naïve patients and 14.9 months (95% CI, 7.7-31.4) for TKI-pretreated patients
 - Median PFS was 30.2 months (95% CI, 19.3-38.6) for TKI-naïve patients and 9.2 months (95% CI, 7.4-11.3) for TKI-pretreated patients



- In the expanded efficacy population,^m median OS was 74.6 months (95% CI, 44.4-NE) for TKI-naïve patients (n = 121) and 20.5 months (95% CI, 17.8-31.4) for TKI-pretreated patients (n = 107)



ZIDESAMTINIB in TKI Pretreated Patients with Advanced/Metastatic ROS1+ NSCLC: ARROS1



ZIDESAMTINIB DESIGN GOALS:



ROS1 Activity

+



ROS1 Mutant Activity

+



Brain Penetration

+



Avoiding TRK

PHASE 1: Zidesamtinib dose escalation (25 – 150 mg QD) in ROS1 TKI pre-treated patients with advanced *ROS1*+ solid tumors

PHASE 2: Zidesamtinib 100 mg QD (RP2D)

ARROS-1 PHASE 2 PATIENT POPULATION	PRIOR ROS1 TKI	PRIOR CHEMO/I-O
<i>ROS1</i> + NSCLC	ROS1 TKI-naïve ^a	≤ 1
	1 prior ROS1 TKI ^b	None 1 ^c
	≥ 2 Prior ROS1 TKIs ^d	≤ 1
Any <i>ROS1</i> + Solid Tumor ^e	Any	Any

PHASE 2 OBJECTIVES

- **Primary:** ORR by blinded independent central review (BICR)
- **Secondary:** Additional efficacy measures (DOR, TTR, CBR, PFS, OS), intracranial activity, overall safety and tolerability, confirmation of PK profile, PROs

Patient Populations

Data cut-off: March 21, 2025

Total Enrolled: N = 514

Any *ROS1*+ solid tumor, any dose
Phase 1 + Phase 2 pooled

Pivotal Safety Population: N = 432

Advanced *ROS1*+ NSCLC
Received zidesamtinib at 100 mg QD

Pivotal Efficacy Population:

ROS1 TKI Pre-treated
with measurable disease by BICR

Treated by May 31, 2024
(≥ 6 months DOR follow up)

n = 117

Preliminary Data

TKI-Naïve
with measurable disease by BICR

Treated by August 31, 2024

n = 35

PIVOTAL DATASET

Preliminary

Advanced <i>ROS1</i> + NSCLC	Any prior <i>ROS1</i> TKIs (range 1-4) ± chemotherapy	1 prior <i>ROS1</i> TKI (crizotinib or entrectinib) ± chemotherapy	<i>ROS1</i> TKI-naïve
ORR (BICR)	44%	51%	89%
% DOR ≥ 12 months	78%	93%	96%
% DOR ≥ 18 months	62%	93%	
% PFS ≥ 12 months	48%	68%	
% PFS ≥ 18 months	40%	68%	
Intracranial Activity	Any prior <i>ROS1</i> TKIs ± chemotherapy	Prior crizotinib only ± chemotherapy	<i>ROS1</i> TKI-naïve
IC-ORR (BICR)	48%	85%	83%
IC-DOR	71% ≥ 12 months	91% ≥ 12 months	No CNS progression among confirmed CNS responders

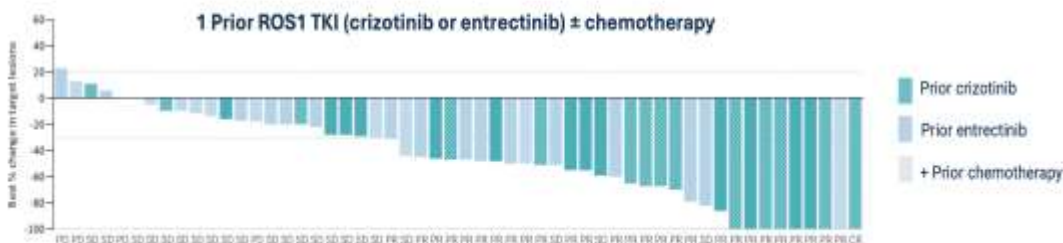
ARROS-1: Objective Response in *ROS1* TKI Pre-treated Patients

Advanced <i>ROS1</i> + NSCLC RECIST 1.1 by BICR	Any prior <i>ROS1</i> TKI (range 1 - 4) ± chemotherapy	1 prior <i>ROS1</i> TKI (crizotinib or entrectinib) ± chemotherapy
ORR, % (n/N) [95% CI]	44% (51/117) [34, 53]	51% (28/55) ^a [37, 65]
CR, % (n/N)	1% (1/117)	2% (1/55)

^a Prior crizotinib only ± chemotherapy: ORR = 68% (19/28). Prior entrectinib only ± chemotherapy: ORR = 33% (9/27).

Responses were also observed in patients previously treated with:

- ≥2 prior *ROS1* TKIs ± chemotherapy: ORR = 38% (22/58; 95% CI: [26, 52])
- Prior repotrectinib: ORR = 47% (8/17), DOR range 3.5 to 17.2 months
- Prior taletrectinib: ORR = 43% (3/7), DOR range 5.2 to 7.0+ months



<i>ROS1</i> G2032R Resistance Mutation		
Advanced <i>ROS1</i> + NSCLC Analysis by BICR	Any prior <i>ROS1</i> TKI ± chemotherapy	1 prior <i>ROS1</i> TKI (crizotinib or entrectinib) ± chemotherapy ^a
ORR, % (n/N) [95% CI]	54% (14/26) [33, 73]	83% (5/6) [36, 100]
% DOR ≥ 6 months [95% CI] ^b	79% [47, 93]	80% ^c [20, 97]
% DOR ≥ 12 months [95% CI] ^b	60% [28, 81]	80% ^c [20, 97]

Responses were also observed in patients with:

- ROS1* G2032R mutation following ≥2 prior *ROS1* TKIs ± chemotherapy, including lorlatinib or repotrectinib
- Other *ROS1* resistance mutations, including G1957A, L1982V, S1986F, F2004C/V, G2032K, and D2033N

^a Patients received zidesamtinib as their first TKI designed with activity against *ROS1* G2032R.
^b Analyses of DOR based on Kaplan-Meier estimates.
^c One progression event among responders.

Measurable CNS lesions by BICR at baseline		
Advanced <i>ROS1</i> + NSCLC Analysis by BICR	Any prior <i>ROS1</i> TKI ± chemotherapy	Prior crizotinib only ± chemotherapy
IC-ORR, % (n/N) [95% CI]	48% (27/56) ^a [35, 62]	85% (11/13) [55, 98]
IC-CR, % (n/N)	20% (11/56)	54% (7/13)
% IC-DOR ≥ 6 months [95% CI] ^b	79% [56, 91]	91% ^c [51, 99]
% IC-DOR ≥ 12 months [95% CI] ^b	71% [46, 87]	91% ^c [51, 99]

CNS responses also observed in patients who had received ≥1 prior brain-penetrant TKI, including prior entrectinib, lorlatinib, repotrectinib, or taletrectinib: IC-ORR: 37% (16/43; [95% CI 23, 53]), including 4 IC-CRs

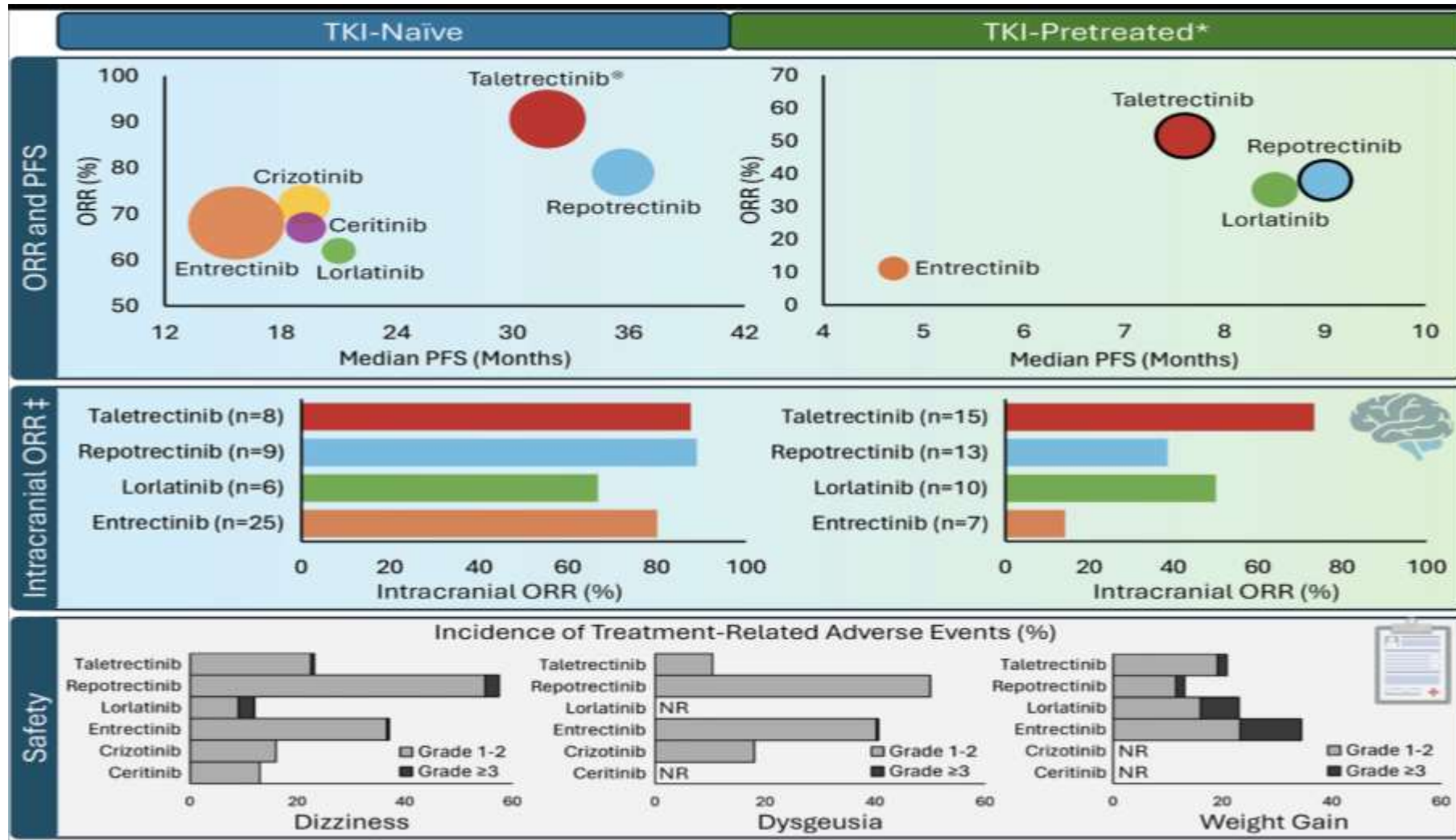
No CNS progression was observed among patients who entered the study without brain metastases at baseline per BICR

^a Includes 2 unconfirmed intracranial partial responses (PR).
^b Analyses of DOR based on Kaplan-Meier estimates.
^c One CNS progression event among CNS responders (n=11).

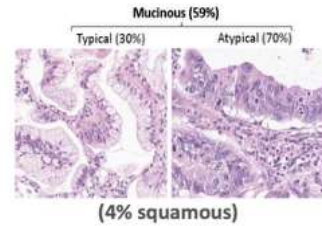
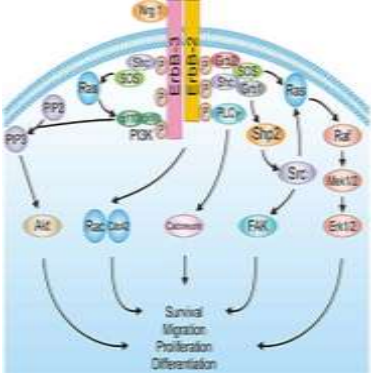
Efficacy of ROS1 TKI in naive patients

ROS1 Inhibitor	ORR (%)	Median PFS	BM Prevalence	Intracranial ORR
Crizotinib (PROFILE 1001)	72%	19.2 mo	Not eligible	-
Crizotinib (OxOnc)	72%	15.9 mo	Not eligible	-
Brigatinib	71%	12.0 mo	11% (3/28)	0%
Entrectinib	68%	15.7 mo	29% (48/168)	52%
Ceritinib	62%	19.3 mo	25% (8/32)	25%
Lorlatinib	62%	21.0 mo	52% (11/21)	64%
Repotrectinib	79%	31 mo	13% (9/71)	89%
Taletrectinib	88%	44.6 mo	57% (17/130)	76.5%
Zidesamtinib	89%	NR		83%

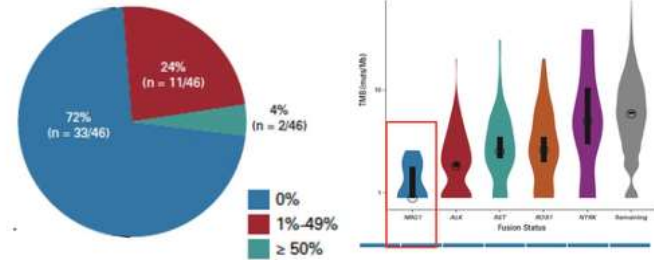
EFFICACY AND TOXICITY of ROS1 TKI INH



NRG-1 (Neuregulin-1) Fusions



PDL1 <1% in 72% of tumors and low TMB



- Part of a large family of growth factors with EGF-like sequence
- NRG-1 binds to ErbB3 and ErbB4 receptors inducing dimerization and activation
- Actionable genomic driver in various tumor types (overall incidence 0.2%), enriched NSCLC ADC and Kras^{wt} pancreatic cancer
- 8–32% of NSCLC Invasive Mucinous ADC
- DETECTION: NGS/RNA
- Mucinous adenocarcinoma with CD74-NRG-1 fusion expressed phosphorylated ErbB3 protein (pErbB3) → pErbB3 IHC as a screening for NRG-1 fusion ??

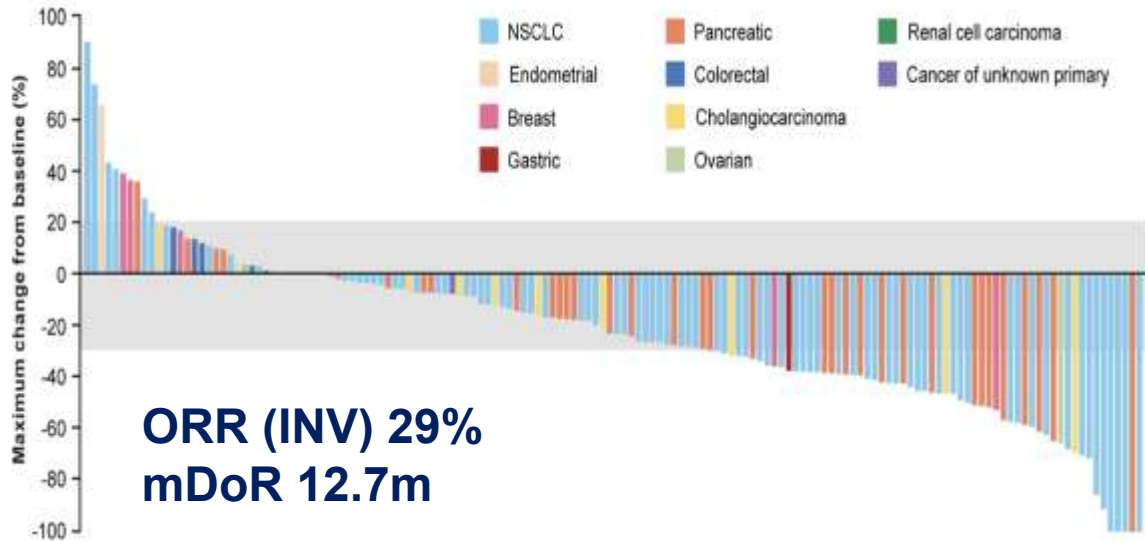
ENERGY1 REGISTRY: CLINICAL OUTCOMES THE PAST...NRG1-FUSION NSCLC an unmet need

Response, n (%)	Plat-doublet chemo (N = 15)	Taxane-based chemo (N = 7)	Combined chemo/immunotx (N = 9)	Single-agent immunotx (N = 5)	Targeted therapy with afatinib (N = 20)
CR	0	0	0	0	0
PR	2 (13)	1 (14)	0	1 (20)	5 (25)
SD	7 (47)	1 (14)	4 (44)	1 (20)	3 (15)
PD	6 (40)	5 (71)	5 (56)	3 (60)	12 (60)
ORR	2 (13)	1 (14)	0	1 (20)	5 (25)
Survival, mo (95% CI)	Plat-doublet chemo	Taxane-based chemo	Combined chemo/immunotx	Single-agent immunotx	Targeted therapy with afatinib
Median PFS	5.8 (2.2-9.8)	4.0 (0.8-5.3)	3.3 (1.4-6.3)	3.6 (0.9-undefined)	2.8 (1.9-4.3)

Zeconotuzumab and Seribantumab



ZENOCOTUZUMAB (anti HER3-HER2 Ab) 750mg iv Q2W
 Agnostic Phase II registrational trial
 161p, 95 NSCLC



G \geq 3 TRAE 2%, Discontinuation: <1
 Most TRAE were grade 1 and 2, commonly diarrhea, fatigue

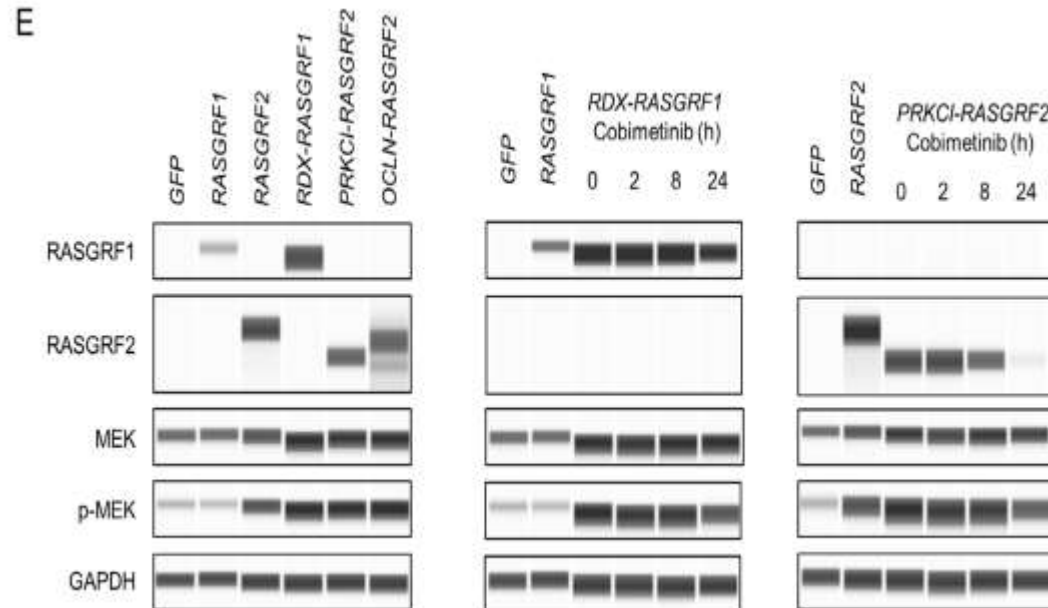
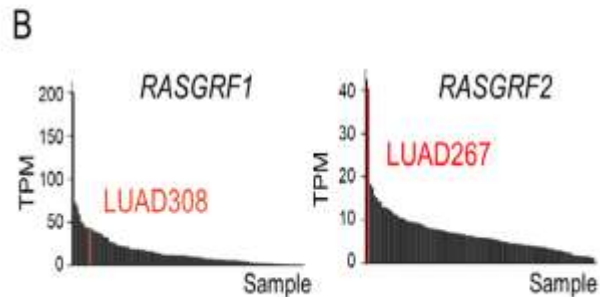
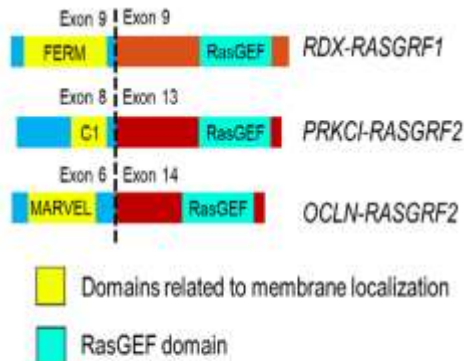
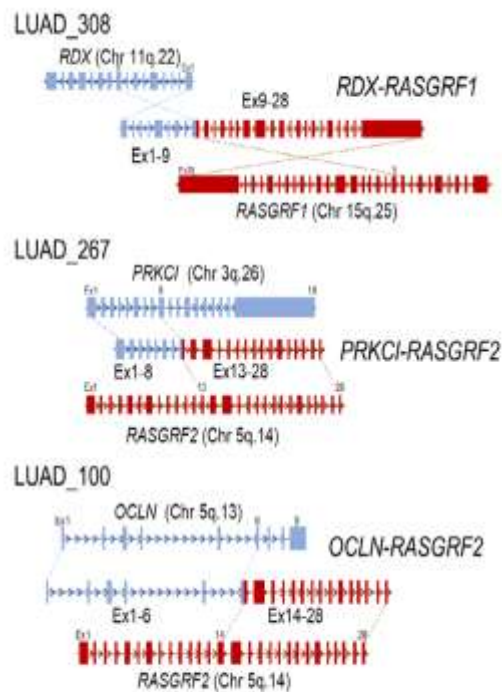
CRESTONE
 Phase II SERIBANTUMAB (HER3 mAb IgG2) in NRG
 fusion Cancers



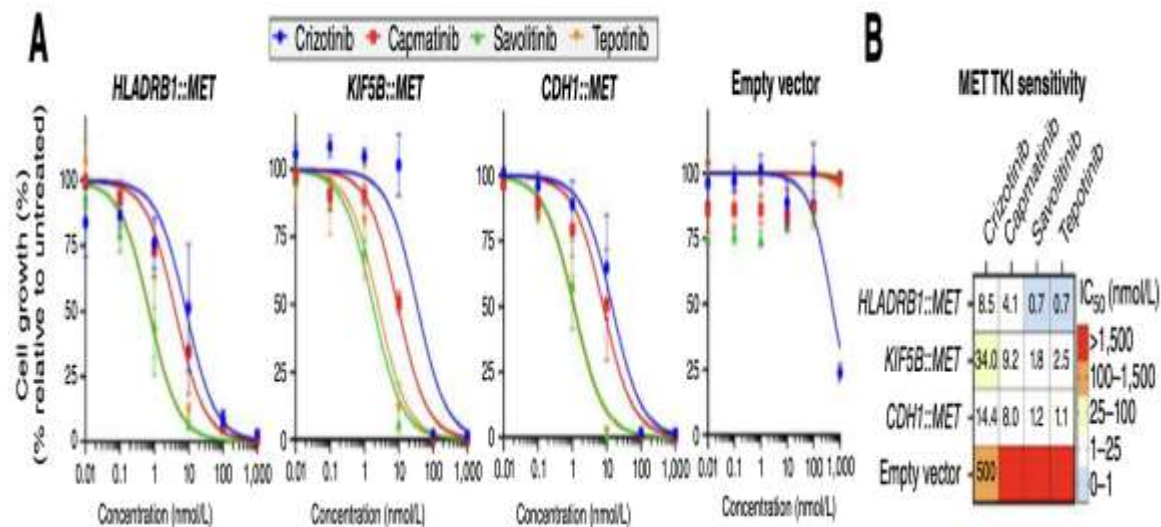
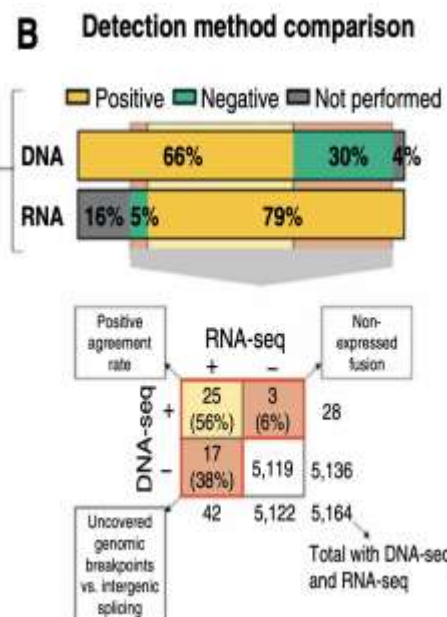
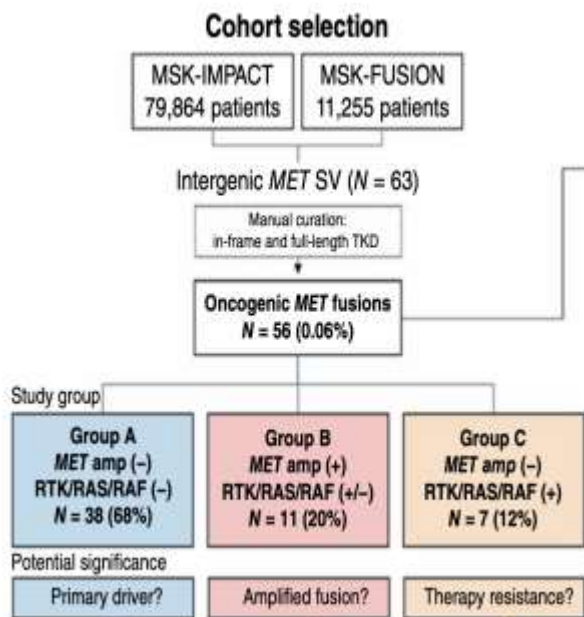
G \geq 3 TRAE: 6%, Discontinuation 0%
 Most TRAE were grade 1 and 2, commonly diarrhea, fatigue, rash.

Discovery of Novel *RASGRF2* Fusions as a Therapeutic Target in Lung Adenocarcinoma of Never or Light Smokers

Yuki Terashima^{1,2} | Soohwan Park^{1,3} | Hiroshi Ikeuchi^{1,3} | Takuo Hayashi⁴ | Shinya Kojima¹ | Toshihide Ueno¹ | Masachika Ikegami¹ | Rina Kitada¹ | Yoshiyuki Suehara¹ | Shinya Tanaka^{2,5} | Kenji Suzuki³ | Hiroyuki Mano¹ | Kazuya Takamochi³ | Shinji Kohsaka¹



Pan-Cancer Analysis of Oncogenic MET Fusions Reveals Distinct Pathogenomic Subsets with Differential Sensitivity to MET-Targeted Therapy



Knowledge, Testing, Access.... EVEN IF YOU ARE RARE, THE LAST, THE END OF THE WORLD...

- Relevant number of oncogenic fusions with SCAT I in NSCLC
- NGS-RNA based testing-blood based are the best choice
- 4 fusions with targeted therapy approved
- Moving more potent new TKI to first line setting...sequencing approach, toxicities...
- How are we going to treat these patients in early/ locally advanced disease?
- Undoubtedly managing these tumors will require expertise, comprehensive analytical approach and funding.
- Be aware of unusual toxicities
- Resistance...always resistance



FIG 1. Barriers to globalizing precision oncology.

16th
CONGRESS
Lung ON
CANCER

BARCELONA
27 / 28
NOVEMBER 2025

THANK YOU