

Biomarker Testing Overview

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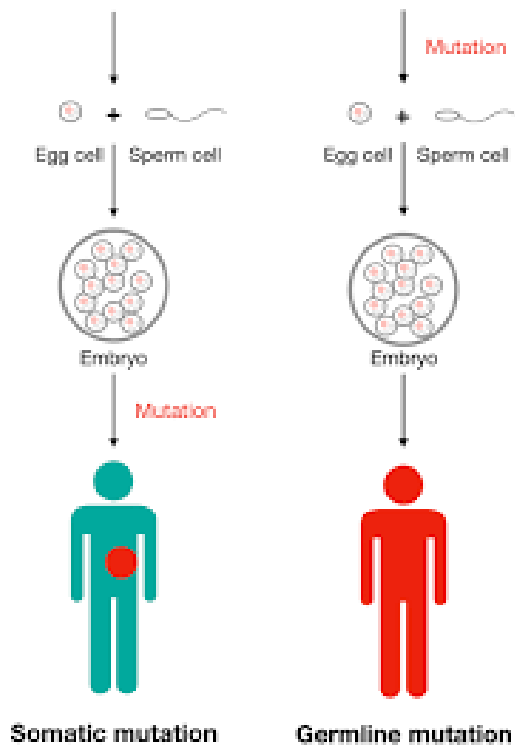
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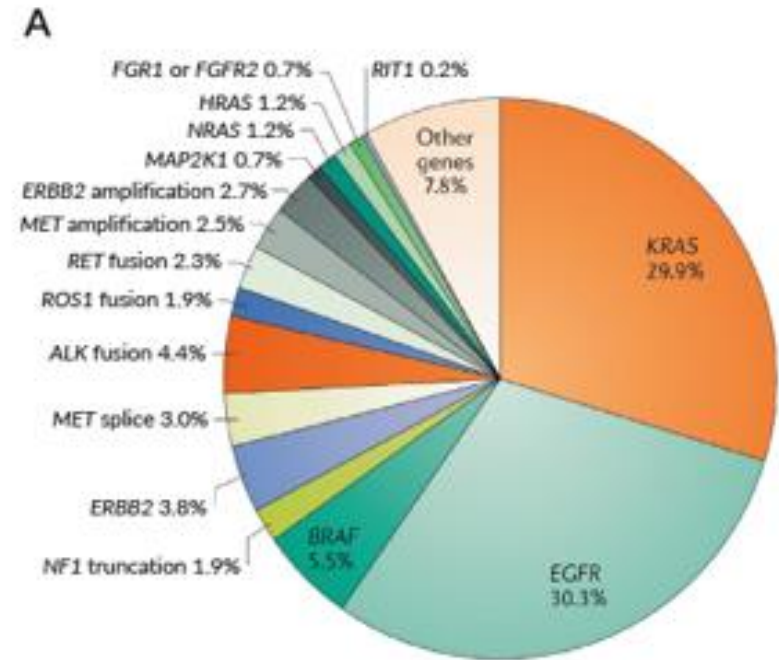
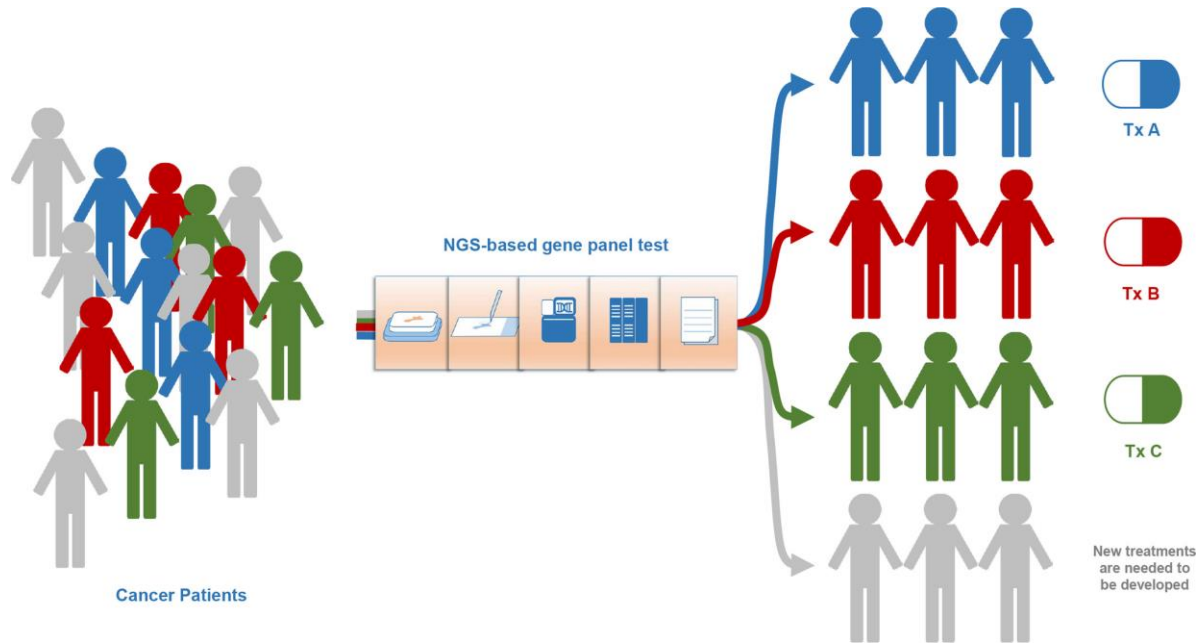


Somatic versus Inherited Genetic Variability (Mutation)



	Somatic	Germline
Location	Only some cells	All cells
Heritability	Not passed to children	Passed to children
Diseases	Cancer (90%)	Cancer (10%) Inborn errors of metabolism Cardiac defects Malignant hyperthermia Drug metabolism
How to test	Tumor tissue (biopsy needed) Liquid biopsy (detects circulating cancer cells shed from tumor)	Blood sample Buccal swab
Use	Diagnosis of cancer Selection of treatment	Selection of treatment Prevention of disease Prevention of adverse effects
Cost	~\$2500	Varies of number of genes sequence

Next Generation Sequencing (Somatic, Tumor Only) for Lung Cancer



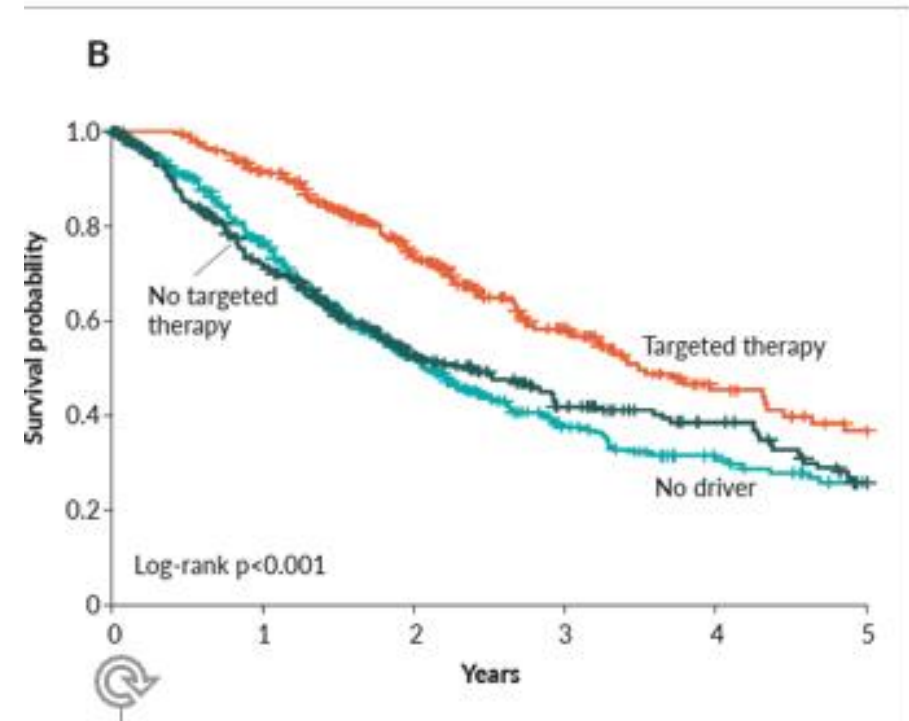
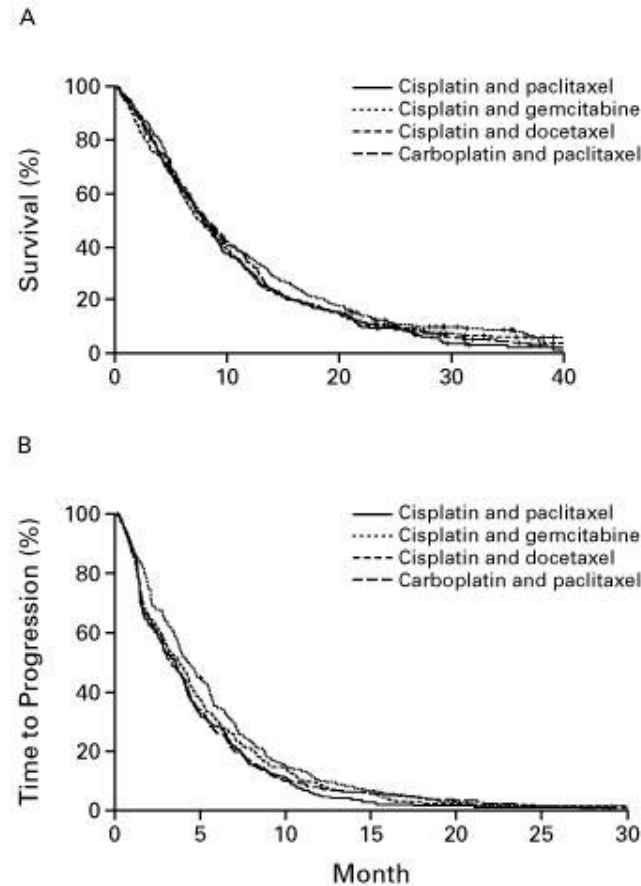
~40% of NSCLC will have a targetable mutation, of these ~30% are EGFR and ~30% are KRAS



NSCLC Treatment After Genomics

2002: Survival 8 months

2022: Survival 4 YEARS



Current Treatment of First Line IIb/IV NSCLC

Genetics	%	PS	Treatment
EGFR	~15%	0-4	Erlotinib, gefitinib, afatinib, osimertinib, dacomitinib Mobocertinib, amivantinamab-lpyl (exon 20 only)
ALK	~4%	0-4	Crizotinib, ceritinib, alectinib, brigatinib, lorlatinib
ROS1	~1%	0-4	Crizotinib, entrectinib, lorlatinib
BRAF V600E	~3%	0-4	Dabrafenib + trametinib
KRAS G12C	~13%	0-4	Sotorasib
NTRK gene fusion	<1%	0-4	Larotrectinib, entrectinib
HER2 (mutations and amplifications)	~1-3%	0-4	Fam-trastuzumab deruxtecan
RET	~1-3%	0-4	Selpercatinib, pralsetinib
MET (exon 14 skipping or > 5 fold CN)	~3%	0-4	Crizotinib, capmatinib, tepotinib
TMB > 10	~35	0-4	Pembrolizumab
PD-L1 positive (>1%)	~60%	0-4	Pembrolizumab +/- chemotherapy
MSI-High	<1%	0-4	Pembrolizumab
No target		0-1	Doublet chemotherapy** +/- immunotherapy +/- bevacizumab

** Doublet chemotherapy= cisplatin+ docetaxel, cisplatin + paclitaxel, carboplatin + paclitaxel, or cisplatin +



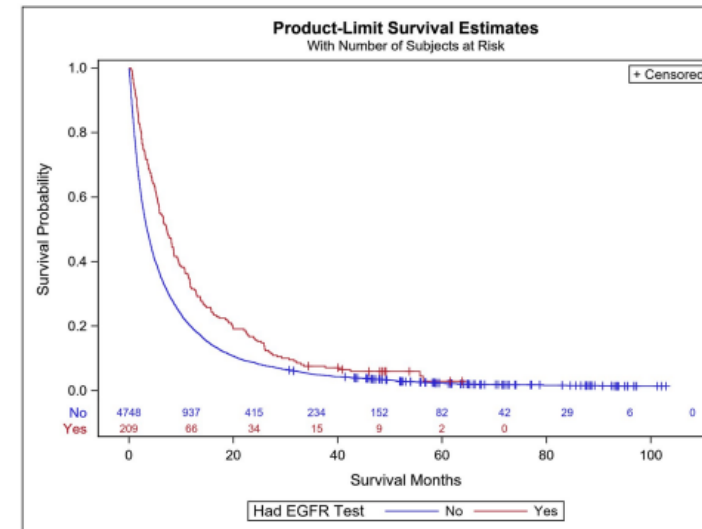
Cancer Mutation Testing in Kentucky

- Population: Stage IIIb-IV NSCLC in SEER with associated claims data (Medicare or private)
- EGFR Testing Rate 2010: 5.9%
- EGFR Testing Rate 2011: 10.6%

HR:0.77; 95% CI 0.67-0.79 p=0.0003

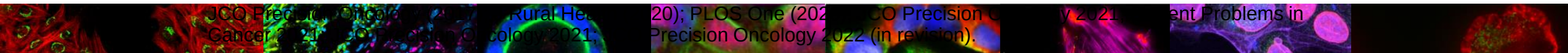
Table 3. Factors associated with having EGFR somatic mutation testing in Stage IIIb–Stage IV NSCLC patients.

Modeling Had EGFR Testing		
Variable	OR (95% CI)	P-Value
Age (ref = 75+)		0.0001
20–49	4.15 (2.17–7.91)	
50–64	1.76 (1.16–2.67)	
65–74	1.39 (0.98–1.98)	
Sex (ref = Male)		0.0142
Female	1.44 (1.08–1.93)	
Appalachian Status (ref = Non-Appalachia/Metro)		0.0011
Appalachian/Metro	0.67 (0.28–1.59)	
Appalachian/Non-Metro	0.51 (0.36–0.73)	
Non-Appalachian/Non-Metro	0.60 (0.40–0.89)	
Year of Diagnosis (ref = 2007)		<0.0001
2008	3.81 (0.43–34.68)	
2009	22.30 (3.00–165.41)	
2010	58.56 (8.12–422.26)	
2011	113.47 (15.81–814.21)	
Insurance (ref = Private)		<0.0001
Medicaid	0.19 (0.09–0.40)	
Medicare	0.61 (0.44–0.84)	

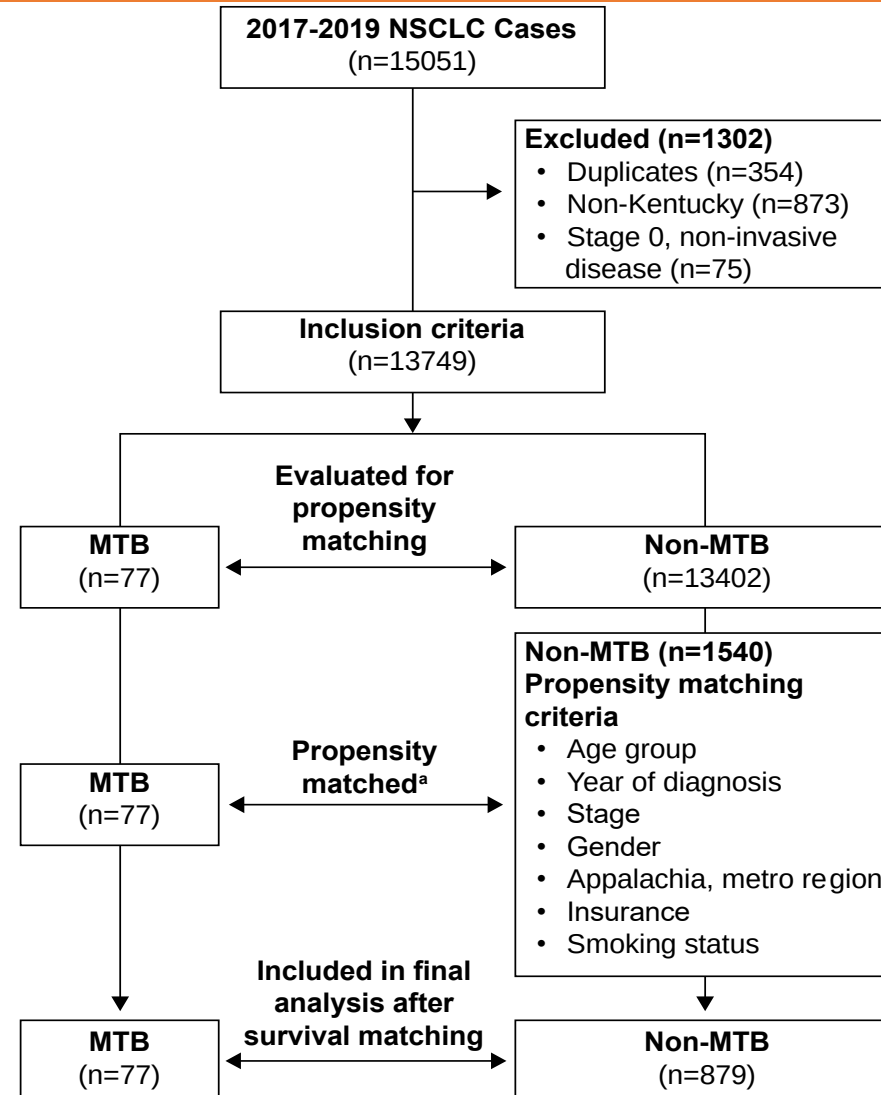


Kolesar, etal 2020, PLOS One

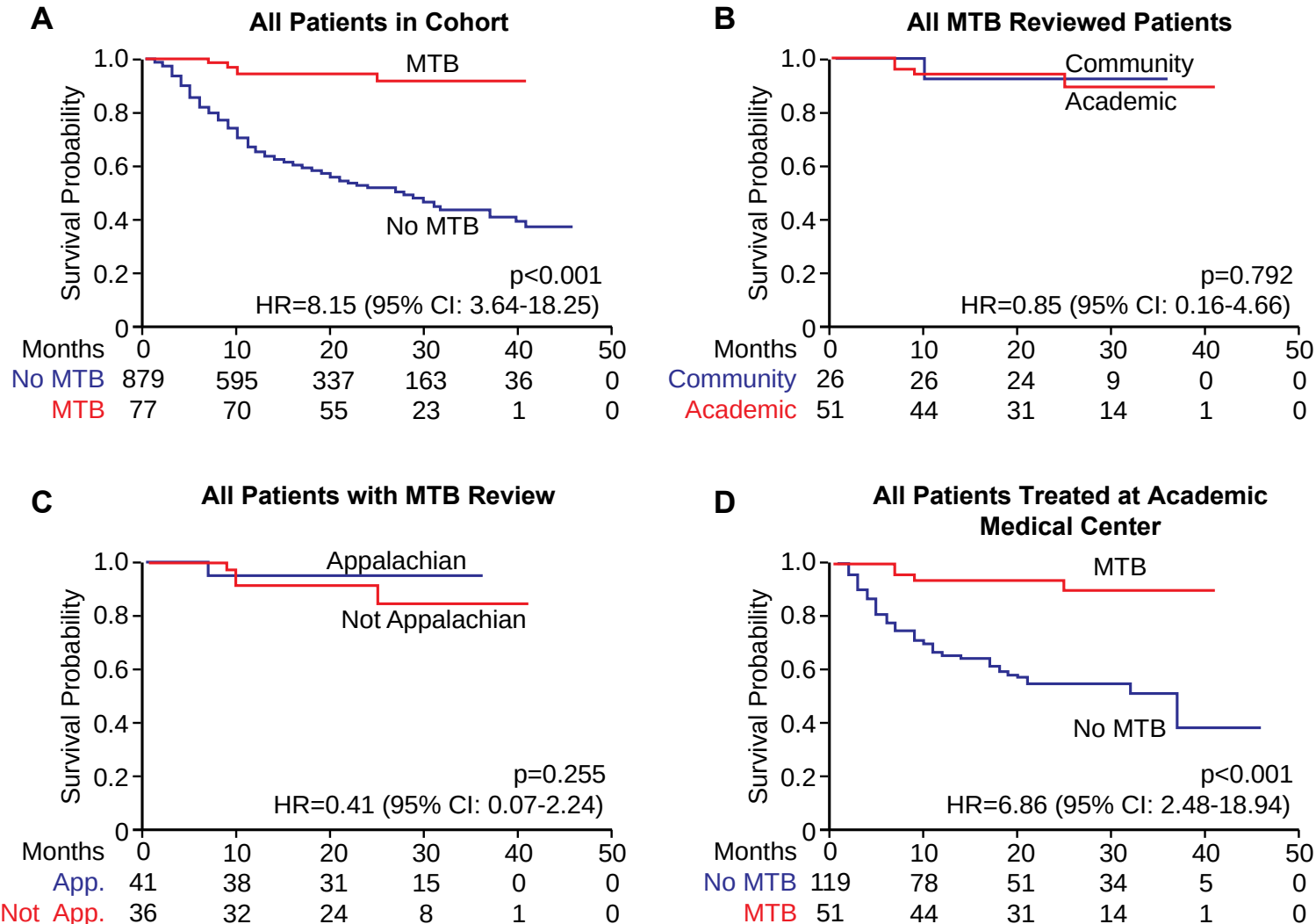




Background: Design Case Control Study in NSCLC



Background – Outcomes of Case Control Study



Thank you!

Questions?

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