Outcomes and Disparities in Lung Cancer: Insights from a Real-World Registry before, during and after the COVID-19 pandemic

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INTRODUCTION

Lung cancer remains the leading cause of cancer-related death globally, driven by a complex interplay of genetic, environmental, and socioeconomic factors.
Despite advances in personalized medicine, comprehensive real-world data on lung cancer treatment outcomes remain limited. The COVID-19 pandemic has further complicated treatment access and continuity, potentially impacting survival outcomes. We hypothesize that integrating genetic, demographic, and socioeconomic data will reveal key predictors of survival, enabling more effective, targeted interventions in lung cancer care.

METHODS

Lung Cancer Registry

This single-center, retrospective study evaluated a registry of 746 lung cancer patients between 01.01.2018 and 30.07.2024 to assess molecular and outcome parameters affected by the COVID-19 pandemic. The registry was approved by local ethics committee.

Statistics

Analyses (Baseline statistics, Cox proportional hazards models, survival analyses etc) were performed using R v4.4.2.

Socioeconomic analysis

To incorporate socioeconomic data, the Swiss Socioeconomic Position Index (SSEP3) was used to approximate patients' socioeconomic position relative to a national reference building from the Swiss National Cohort. This approximation employed the Euclidean distance function referencing the index building of the SSEP3.

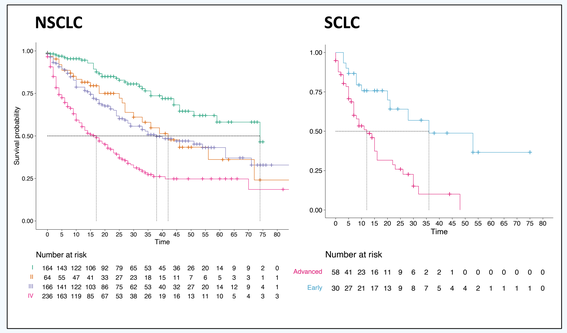
Abbreviations

AdNSCLC = Adenocarcinoma of the Lung
COVID = Corona virus disease
NSCLC = Non-Small Cell Lung Cancer
SCC = Squamous Cell Carcinoma
SCLC = Small Cell Lung Cancer
SSEP Index = Swiss Socioeconomic Position (SEP) Index

RESULTS

Baseline Characteristic	N=746
Age at diagnosis (yr) - median (IQR)	69 (IQR: 62, 75)
Male at birth -% (nr)	54.8 (407)
Never Smoker - % (nr); Active Smoker - % (nr)	8.2 (62); 34.7 (260)
Pack years (py) -median	44.5
Histology Non-Small Cell Lung Carcinoma - % (nr) AdNSCLC - % (nr) SCLC - % (nr)	 82.4 (630) 56.2 (417) 10.3 (77)
Stage IV at diagnosis NSCLC - % (nr)	38.7 (236)
Extensive disease at diagnosis SCLC - % (nr)	34.2 (30)
First line treatment intention palliative - % (nr)	48 (354)
Radiotherapy received - % (nr)	28.5 (213)
Surgery received - % (nr)	39.9 (298)

Baseline Characteristics

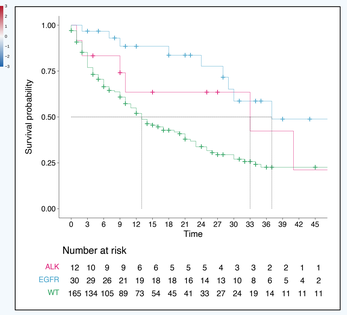


Stage-dependent Survival NSCLC versus SCLC

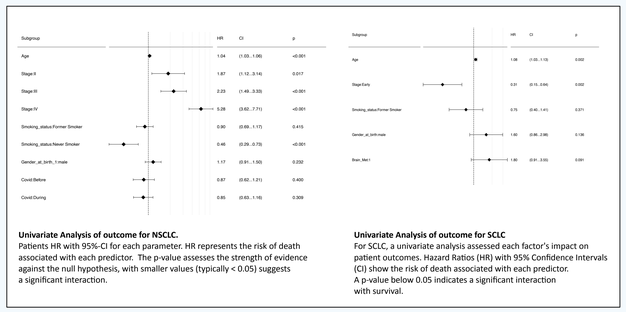
Mutations in metAdNSCLC at Diagnosis	N=187
Age at diagnosis (yr) - median (IQR)	67.5 (60.3, 75.8)
Male at birth -% (nr)	52.9 (98)
EGFR - % (nr)	10.2 (19)
ALK - % (nr)	3.74 (7)
ERBB2- % (nr)	2.67 (5)
BRAF - % (nr)	2.67 (5)
KRAS - % (nr)	28.3 (53)
c-Met- % (nr)	2.67 (5)
RET - % (nr)	2.14 (4)
ROS1 - % (nr)	1.6 (3)
NTRK - % (nr)	0.53 (1)

Mutations in metAdNSCLC

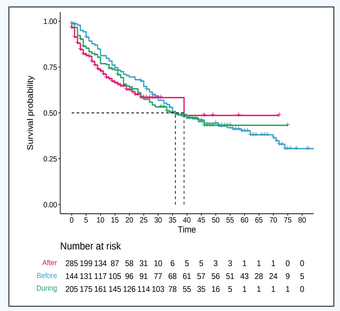
Interactions of co-occurring mutations in metAdNSCLC



Outcome for AdNSCLC with targetable mutations



Predictors of outcome NSCLC versus SCLC



COVID Infection and Outcome

SSEP3 (Median 55.44; IQR 49.35, 62.05)	ALIVE versus DEAD	Pack years	Surgery	COVID
Low - %	48.6 versus 45.4	43.3	25.3	5.4
Mid-low -%	51.1 versus 45.6	39.02	22.7	10.3
Mid-high - %	53.3 versus 44.0	52.8	24.0	3.78
High - %	53.5 versus 43.2	52.7	28.0	10.27

Abbreviations

metAdNSCLC = metastatic AdNSCLC
COVID = Corona virus disease
NSCLC = Non-Small Cell Lung Cancer
SCLC = Small Cell Lung Cancer

CONCLUSION

This study highlights comprehensive real-world data in lung cancer patients. The study revealed significant differences in survival across NSCLC stages, with median overall survival (mOS) ranging from 74 months in early stages to 17 months in advanced disease.
Notably, AdNSCLC patients with actionable EGFR mutations in stage IV experienced a marked improvement in mOS. Molecular analyses identified key genetic alterations, including frequent mutations in KRAS and TP53. Univariate analysis highlighted improved outcomes for early-stage AdNSCLC, never-smokers, and younger patients.
SCLC patients had poorer overall outcomes.
Survival outcomes remained consistent across pre-, peri-, and post-COVID-19 periods.
The study also integrates ongoing disparities in socioeconomic groups based on Swiss Socioeconomic Position Index (SSEP3).

DISCUSSION

This study highlights the varied survival outcomes among lung cancer patients, with NSCLC subtypes differing by stage and genetic mutations. Actionable mutations, like EGFR in metAdNSCLC, are linked to improved survival, underscoring the role of precision oncology in a real-world setting. Smoking status, age, but not the COVID-19 period impacted survival, although longer observation is needed to draw definite conclusion. SCLC patients have poorer outcomes, highlighting the need for earlier interventions and new treatment options.

PERSPECTIVE

The findings of this study underscore the value of genetic profiling and early diagnosis, especially in light of consistent survival trends across COVID-19 periods. Going forward, structured real-world data collection could support large-scale analyses to enhance personalized treatments globally.

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