

Expression of CUG2, β IGH3 (TGFB1), and TGF- β in bronchoscopic biopsy specimens of lung cancer patients

Submission date 06/06/2026	Recruitment status No longer recruiting	☐ Prospectively registered ☐ Protocol
Registration date 11/06/2026	Overall study status Completed	☒ Statistical analysis plan ☐ Results
Last Edited 11/06/2026	Condition category Cancer	☐ Individual participant data ☒ Record updated in last year

Plain English summary of protocol

Background and study aims

Lung cancer is one of the most common and deadly cancers worldwide. When patients are first diagnosed, doctors need to know whether the cancer has spread (metastasized) to other parts of the body, and whether the tumor in the chest is a primary lung cancer or a cancer that has spread from elsewhere. This information is critical for choosing the right treatment.

This study investigates whether three proteins — CUG2, β IGH3 (also called TGFB1), and TGF- β — measured in tissue samples taken during a bronchoscopy (a routine procedure where a thin flexible tube is passed into the airways to take small tissue samples) can help answer these questions.

Who can participate?

Adults aged 18 years or older who are undergoing diagnostic bronchoscopy for suspected lung cancer or suspected spread of another cancer to the chest. Patients must have a confirmed tissue diagnosis and adequate biopsy sample quality for laboratory analysis.

What does the study involve?

Participants undergo routine diagnostic bronchoscopy as part of their standard clinical care. A small additional portion of the biopsy sample obtained during this procedure is used for laboratory analysis. Gene expression levels of three biomarkers (CUG2, β IGH3/TGFB1, and TGF- β) are measured using a technique called quantitative PCR (qPCR). No additional procedures, medications, or interventions are administered. Cancer spread (metastatic status) is determined by PET/CT scan as part of routine staging.

What are the possible benefits and risks of participating?

There are no direct benefits or risks to participants from this study. The biopsy is performed as part of standard diagnostic care. The biomarker measurements are performed on existing tissue samples and do not require any additional procedures. Results are not used to guide individual patient treatment in this study.

Where is the study run from?

Süleyman Demirel University Faculty of Medicine, Department of Pulmonology, Turkey.

When is the study starting and how long is it expected to run for?

January 2019 to June 2022

Who is funding the study?

Süleyman Demirel University Scientific Research Projects Coordination Unit, Turkey.

Who is the main contact?

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Süleyman Demirel University Scientific Research Projects Coordination Unit (SDÜ-BAP) Grant No

TDK-2019-6958

Study information

Scientific Title

Expression of CUG2, β IGH3 (TGFB1), and TGF- β in bronchoscopic biopsy specimens of lung cancer patients: predictive value for metastasis and differential diagnosis from other thoracic malignancies — a pilot study

Study objectives

1. To evaluate the diagnostic accuracy of CUG2, β IGH3 (TGFB1), and TGF- β gene expression in bronchoscopic biopsy specimens for predicting metastatic status at the time of lung cancer diagnosis (primary objective).
2. To assess the utility of CUG2, β IGH3 (TGFB1), and TGF- β expression for differential diagnosis of primary lung cancer

from other thoracic malignancies.

3. To examine correlations between biomarker expression levels and clinical variables including age, smoking history, PET/CT stage, and overall survival.

4. To evaluate the prognostic significance of biomarker expression for overall survival using Kaplan-Meier and Cox regression analyses.

5. To compare biomarker expression across histopathological subtypes (squamous cell carcinoma, adenocarcinoma, and small cell lung cancer).

Ethics approval required

Ethics approval required

Ethics approval(s)

Approved 13/12/2018, Süleyman Demirel University Faculty of Medicine Clinical Research Ethics Committee (Süleyman Demirel Üniversitesi Tıp Fakültesi Dekanlığı Morfoloji Binası İdari Ofisler 2. Kat Doğu Kampüsü Çünür, Isparta, Merkez,, 32260, Türkiye; +90246 211 32 30; tipetik@sdu.edu.tr), ref: 239

Primary study design

Observational

Secondary study design

Prospective observational diagnostic accuracy study

Study type(s)

Health condition(s) or problem(s) studied

Lung cancer; thoracic malignancy; lung neoplasms; bronchoscopic biopsy; metastasis; differential diagnosis

Interventions

This is a prospective observational diagnostic accuracy study. No intervention was administered to participants.

Index test: Quantitative real-time PCR (qPCR) measurement of CUG2, β IGH3 (TGFB1), and TGF- β gene expression using the $2^{-\Delta\Delta Ct}$ method with β -actin as reference gene, performed on RNA extracted from bronchoscopic biopsy specimens obtained during routine diagnostic fiberoptic bronchoscopy.

Reference standard: Metastatic status determined by PET/CT imaging and thoracic CT in accordance with the 8th edition TNM classification; histopathological diagnosis confirmed from bronchoscopic biopsy specimens.

Non-randomised. Participants were assigned to study groups (primary lung cancer vs. other thoracic malignancies; metastatic vs. non-metastatic) based on histopathological diagnosis and PET/CT findings at the time of diagnostic bronchoscopy, not by randomisation.

Intervention Type

Other

Primary outcome(s)

1. Diagnostic accuracy of CUG2 expression for predicting metastatic status at diagnosis measured using area under the receiver operating characteristic curve with 95% confidence interval derived by bootstrap resampling (2000 iterations), with optimal cutoff determined by Youden Index and corresponding sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy reported at a single time point at diagnostic fiberoptic bronchoscopy between January 2018 and January 2022

Key secondary outcome(s)

1. Diagnostic accuracy and cut-off validation for biomarkers measured using ROC curve analysis: AUC with 95% CI by bootstrap resampling (2000 iterations); optimal cut-off by Youden Index; sensitivity, specificity, PPV, NPV at optimal cut-off. Mann-Whitney U test for between-group comparison; rank-biserial correlation for effect size; and, ROC curve analysis: AUC with 95% CI by bootstrap resampling (2000 iterations); sensitivity, specificity, PPV, NPV at Youden-optimal cut-off at a single time point at diagnosis (January 2018 – January 2022)

2. Correlation analysis measured using Spearman rank correlation coefficient (ρ) with two-sided p-value; point-biserial correlation for biomarker vs. metastatic status (binary variable), at a single time point at diagnosis (January 2018 – January 2022)

3. Survival analysis (prognosis) measured using Kaplan-Meier survival curves; log-rank test (χ^2) for between-group comparison; median OS with 95% CI; 1-year OS rate. Univariate Cox proportional hazards regression: hazard ratio (HR) with 95% CI.5.Kruskal-Wallis H test for overall between-subtype comparison; Dunn post-hoc test with Bonferroni correction for pairwise comparisons, at a single time point at diagnosis (January 2018 – January 2022)

Completion date

20/06/2022

Eligibility

Key inclusion criteria

1. Adult patients aged 18 years or older
2. Undergoing diagnostic fiberoptic bronchoscopy (FOB) for suspected primary lung cancer or suspected thoracic involvement by an extrapulmonary malignancy
3. Histopathologically confirmed diagnosis from bronchoscopic biopsy specimen
4. Adequate RNA yield from biopsy specimen (A260/A280 ratio 1.7–2.0)
5. Written informed consent obtained prior to enrollment

Healthy volunteers allowed

No

Age group

Mixed

Lower age limit

18 Years

Upper age limit

99 Years

Sex

All

Total final enrolment

57

Key exclusion criteria

1. Benign histology on bronchoscopic biopsy specimen
2. Insufficient RNA yield from biopsy specimen (A260/A280 ratio outside 1.7–2.0 range)
3. Non-evaluable biomarker measurements
4. Duplicate patient records
5. Age under 18 years
6. Refusal to provide written informed consent

Date of first enrolment

01/01/2019

Date of final enrolment

01/01/2022

Locations**Countries of recruitment**

Türkiye

Sponsor information**Organisation**

Süleyman Demirel University

ROR

<https://ror.org/04fjtte88>

Funder(s)**Funder type****Funder Name**

Süleyman Demirel Üniversitesi

Alternative Name(s)

Süleyman Demirel University, SDÜ

Funding Body Type
Government organisation

Funding Body Subtype
Local government

Location
Türkiye

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Statistical Analysis Plan	version 1.0	01/06/2026	11/06/2026	No	No