


**ONCOLOGIC THORACIC SURGERY IN ADVANCED LUNG CANCER: INTEGRATION BETWEEN MOLECULAR DIAGNOSIS, TARGETED THERAPIES, AND NATIONAL CLINICAL PROGNOSIS** <https://doi.org/10.63330/aurumpub.058-002>**Thiago Rocha Moreira<sup>1</sup>, Kelly Denise Machado Motter<sup>2</sup> and Emanuela Almeida Sobral<sup>3</sup>****Abstract**

Advanced lung cancer represents a major public health challenge due to its high morbidity and mortality rates and the therapeutic complexity involved in its management. In this context, the incorporation of precision medicine strategies has significantly changed the clinical and surgical approach for these patients. Objective: to analyze the integration between oncologic thoracic surgery, molecular diagnosis, and targeted therapies in the treatment of advanced lung cancer, emphasizing their impacts on the national clinical prognosis. Methodology: this study consists of a narrative literature review conducted through searches in national and international databases, including PubMed, SciELO, and the Virtual Health Library (VHL), selecting studies related to molecular profiling, surgical approaches, and targeted therapies. Results: findings showed that advances in diagnostic technologies enabled greater identification of biomarkers and specific mutations, supporting personalized therapeutic approaches and expanding surgical possibilities in selected cases. Furthermore, improved survival rates and better quality of life were observed among patients. Conclusion: the integration of molecular diagnosis, thoracic surgery, and targeted therapies presents promising outcomes in the treatment of advanced lung cancer; however, structural and access-related challenges still limit its implementation nationwide.

---

<sup>1</sup> Medical Student - UNAMA Santarém  
Santarém - PA

E-mail: [moreirathiago1@hotmail.com](mailto:moreirathiago1@hotmail.com)

<sup>2</sup> Medical Student at Centro Universitário Faculdade Assis Gurgacz - FAG

E-mail: [kellymotter3@gmail.com](mailto:kellymotter3@gmail.com)

<sup>3</sup> Master's Student in Public Health

Universidade Del Sol

E-mail: [manulevi397@gmail.com](mailto:manulevi397@gmail.com)

**Keywords:** Advanced lung cancer, Clinical prognosis, Molecular diagnosis, Oncologic thoracic surgery, Targeted therapies.

### INTRODUCTION

Lung cancer remains among the neoplasms with the greatest impact on global public health, being one of the leading causes of cancer-related mortality due to diagnosis often occurring at advanced stages of the disease. In recent decades, advances in thoracic oncology have significantly transformed the therapeutic approach to these patients, particularly with the incorporation of molecular diagnosis and personalized medicine. According to Herbst, Morgensztern, and Boshoff (2018), understanding the genetic alterations involved in pulmonary tumorigenesis has changed the way treatment is conducted and has enabled more targeted and effective therapeutic strategies.

In the context of advanced lung cancer, oncologic thoracic surgery is no longer restricted to early-stage cases and has become part of multidisciplinary therapeutic protocols in specific situations, especially in patients with locally advanced or oligometastatic disease. According to Pêgo-Fernandes and Jatene (2015), the development of less invasive surgical techniques and the improvement of diagnostic resources have contributed to expanding therapeutic possibilities and improving clinical outcomes. However, challenges persist regarding appropriate patient selection, access to technological resources, and the heterogeneity of health services in the Brazilian setting.

In view of this context, the research problem is defined as understanding how the integration between oncologic thoracic surgery, molecular diagnosis, and targeted therapies influences the clinical prognosis of patients with advanced lung cancer in the national context. The increasing use of molecular biomarkers to identify specific mutations, such as EGFR, ALK, and ROS1, has enabled personalized treatments and a greater potential for therapeutic response (Mok et al., 2009; Sollman et al., 2020).

The general objective of this study is to analyze the integration between oncologic thoracic surgery, molecular diagnosis, and targeted therapies in the treatment of advanced lung cancer,

emphasizing their impacts on the national clinical prognosis. The specific objectives are to describe the importance of molecular diagnosis in therapeutic stratification; to discuss the applicability of targeted therapies in clinical management; and to understand the contribution of oncologic thoracic surgery in selected cases of advanced disease.

This study is justified by the need to expand discussions on new therapeutic strategies directed toward advanced lung cancer, considering the growing incorporation of precision medicine into care protocols. In addition, understanding the association between technological advances, individualized therapies, and surgical approaches may contribute to improving care quality and strengthening public policies in oncology.

From a theoretical standpoint, recent studies demonstrate that molecular profiling has assumed a central role in the therapeutic management of lung cancer. According to Rosell et al. (2012), the early identification of specific genetic alterations enables greater therapeutic efficacy and better survival rates. Thus, it can be observed that the integration between molecular diagnosis, targeted therapies, and surgical intervention represents a promising perspective for optimizing the treatment and prognosis of these patients.

## **METHODOLOGY**

### **TYPE OF STUDY**

The present study is characterized as qualitative, descriptive, and exploratory research, developed through a narrative literature review. This type of methodology enables the analysis and critical synthesis of scientific knowledge produced on a given topic, allowing a broader understanding of clinical, therapeutic, and scientific aspects related to the investigated object. According to Antônio Carlos Gil (2019), exploratory studies aim to provide greater familiarity with the problem under study, contributing to the construction and deepening of scientific knowledge.

### SEARCH STRATEGY AND DATA COLLECTION

Information was collected through a bibliographic survey in national and international scientific databases, including PubMed, Scientific Electronic Library Online (SciELO), and the Virtual Health Library (VHL). Full-text scientific publications in Portuguese and English were selected, related to the topics of oncologic thoracic surgery, advanced lung cancer, molecular diagnosis, targeted therapies, and clinical prognosis.

To conduct the searches, controlled descriptors and associated terms from the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) were used, including: “lung cancer,” “thoracic surgery,” “molecular diagnosis,” “targeted therapies,” and “thoracic oncology,” combined using the Boolean operators AND and OR. Articles published primarily in the last ten years were included, considering studies with scientific relevance and thematic compatibility.

### **Inclusion and exclusion criteria**

Original articles, reviews, clinical guidelines, and scientific studies related to the treatment of advanced lung cancer involving surgical aspects and precision therapies were included. Duplicate studies, publications without full-text availability, works with insufficient data, and studies unrelated to the proposed objective were excluded.

### INSTRUMENTS AND STUDY SAMPLE

The study sample consisted of scientific publications selected after applying the established criteria. A structured form was used as the data collection instrument, containing information regarding year of publication, authors, objectives, methodology employed, and main results found. Data organization enabled comparative analysis among the studies and identification of the main advances related to the integration between oncologic thoracic surgery and precision medicine.

## GROUNDING METHODOLOGICAL DISCUSSION

The narrative review is relevant for studies that seek to integrate broad knowledge about complex phenomena, especially in areas undergoing constant scientific updating. According to Eva Maria Lakatos and Marina de Andrade Marconi (2021), bibliographic research allows the examination of different theoretical and scientific perspectives on a given phenomenon, broadening the researcher's critical understanding. In addition, Antônio Carlos Gil (2019) highlights that literature review constitutes an essential instrument for identifying knowledge gaps and grounding scientific discussions. Thus, the adopted methodology proved appropriate for investigating the integration between molecular diagnosis, targeted therapies, and oncologic thoracic surgery in the context of advanced lung cancer.

## RESULTS AND DISCUSSION

The advances observed in recent decades in the treatment of lung cancer have significantly changed clinical practice, especially with the incorporation of molecular diagnosis and the development of targeted therapies. Advanced lung cancer, historically associated with unfavorable prognoses and high mortality rates, has begun to present new therapeutic perspectives based on the identification of specific genetic alterations and the adoption of personalized medicine strategies. In this context, oncologic thoracic surgery has become part of multidisciplinary therapeutic models, expanding treatment possibilities in selected cases.

Historically, the surgical approach was predominantly indicated in early stages of the disease. However, recent evidence demonstrates that patients with locally advanced or oligometastatic disease may experience clinical benefits when systemic therapies are combined with surgical treatment. According to Herbst, Morgensztern, and Boshoff (2018), the evolution of biological knowledge about lung cancer has redefined therapeutic criteria, allowing greater individualization of clinical management.

The identification of biomarkers has become one of the pillars of therapeutic decision-making. Alterations in genes such as EGFR, ALK, ROS1, KRAS, and BRAF have come to play a central role in

the selection of specific therapies, providing better clinical responses in defined groups of patients.

Studies by Mok et al. (2009) demonstrated superior results in patients with EGFR mutations treated with targeted therapies when compared with conventional chemotherapy protocols.

**Table 1**

*Main molecular biomarkers related to advanced lung cancer*

<b>Biomarker</b>	<b>Genetic alteration</b>	<b>Associated targeted therapy</b>	<b>Clinical relevance</b>
EGFR	Activating mutations	Gefitinib, Erlotinib, Osimertinib	Better therapeutic response
ALK	Gene rearrangements	Crizotinib, Alectinib	Increased survival
ROS1	Molecular rearrangement	Crizotinib	Personalized therapy
BRAF	V600E mutation	Dabrafenib + Trametinib	Tumor control
KRAS	Specific mutations	Emerging therapies	Recent therapeutic potential

Source: Adapted from Mok et al. (2009); Rosell et al. (2012); Herbst et al. (2018).

The results found demonstrate that molecular profiling has significantly modified the treatment of advanced lung cancer. The incorporation of genetic sequencing tests has made it possible to select patients with a greater probability of therapeutic response, reducing exposure to less effective and potentially toxic treatments.

In addition to molecular identification, a significant evolution in surgical techniques was observed. Minimally invasive procedures, including video-assisted thoracic surgery and robotic approaches, have come to present lower morbidity, reduced length of hospital stay, and better postoperative recovery. According to Pêgo-Fernandes and Jatene (2015), technological advances have contributed to expanding surgical indications in patients previously considered to have no therapeutic possibilities.

**Table 2***Comparison between the traditional approach and the integrated treatment model*

Aspects	Traditional model	Current integrated model
Diagnosis	Anatomopathological	Anatomopathological + molecular
Treatment	Standard chemotherapy	Personalized therapy
Surgery	Early stages	Selected advanced cases
Prognosis	Lower survival	Potential increase in survival
Management	Generalized	Individualized

Source: Adapted from Rosell et al. (2012); Pêgo-Fernandes and Jatene (2015).

In the Brazilian setting, despite the scientific advances observed, important barriers related to access to diagnostic and therapeutic technologies are still identified. Regional inequalities, structural limitations, and delays in performing molecular tests represent factors that may compromise the effectiveness of therapeutic strategies. Such challenges are especially evident in regions with lower availability of specialized thoracic oncology centers.

Another aspect identified during the analysis was the importance of multiprofessional work in the management of these patients. Integration among thoracic surgeons, oncologists, pathologists, radiologists, and nursing professionals allows therapeutic planning to be more individualized and appropriate to each patient's clinical and molecular characteristics. According to Rosell et al. (2012), multidisciplinary approaches have the potential to optimize clinical outcomes and increase survival.

The findings analyzed suggest that the association between oncologic thoracic surgery, molecular diagnosis, and targeted therapies represents a significant change in the treatment of advanced lung cancer. However, although the results are promising, the consolidation of this approach depends on expanding access to diagnostic technologies, strengthening hospital infrastructure, and implementing public policies capable of reducing healthcare inequalities in the national setting.

### CONCLUSION

The present study aimed to analyze the integration between oncologic thoracic surgery, molecular diagnosis, and targeted therapies in the management of advanced lung cancer, emphasizing their impacts on the national clinical prognosis. Based on the analysis of the scientific literature, it was possible to understand how technological advances and the development of precision medicine have been transforming the therapeutic approach to this neoplasm, expanding treatment perspectives and the individualization of clinical management.

The main results showed that the identification of molecular biomarkers and specific genetic alterations enabled more targeted therapy, favoring the use of targeted therapies associated with better clinical responses, increased survival, and improved quality of life among patients. In addition, it was observed that oncologic thoracic surgery has become part of multidisciplinary strategies in selected cases of advanced disease, especially in patients with locally advanced or oligometastatic presentation. Thus, the association between modern diagnostic resources and individualized therapeutic approaches represents an important advance in contemporary oncologic care.

The research contributes to expanding discussions related to the incorporation of personalized medicine in the context of advanced lung cancer, reinforcing the relevance of integration among different therapeutic modalities and multidisciplinary planning in clinical decision-making. It also highlights the need to strengthen specialized services and expand access to diagnostic and therapeutic technologies, especially in the national setting, which is marked by structural inequalities and limitations in healthcare provision.

Despite the advances observed, important challenges remain regarding the broad implementation of these strategies in the health system. In this regard, it is suggested that future studies investigate the clinical and economic effectiveness of integrating thoracic surgery, targeted therapies, and molecular profiling in different Brazilian population contexts, in addition to exploring factors associated with access, therapeutic adherence, and impact on long-term survival. Such investigations may contribute to

the development of more effective public policies and to the improvement of care practices aimed at advanced lung cancer.

## REFERENCES

- Gil, Antônio Carlos. Métodos e técnicas de pesquisa social [Methods and techniques of social research]. 7. ed. São Paulo: Atlas, 2019.
- Herbst, R. S.; Morgensztern, D.; Boshoff, C. The biology and management of non-small cell lung cancer. *Nature*, v. 553, n. 7689, p. 446–454, 2018.
- Lakatos, Eva Maria; Marconi, Marina de Andrade. Fundamentos de metodologia científica [Foundations of scientific methodology]. 9. ed. São Paulo: Atlas, 2021.
- Passaro, A. et al. Targeting EGFR T790M mutation in NSCLC: from biology to evaluation and treatment. *Pharmacology & Therapeutics*, v. 226, p. 107836, 2021.
- Pêgo-Fernandes, Paulo Manuel; Jatene, Fabio Biscegli. Tratado de cirurgia torácica [Treatise on thoracic surgery]. São Paulo: Atheneu, 2019.
- Planchard, D. et al. Metastatic non-small cell lung cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Annals of Oncology*, v. 29, Suppl. 4, p. iv192–iv237, 2018.
- Sollman, N. et al. Precision medicine in lung cancer: molecular pathways and targeted therapies. *Cancer Treatment Reviews*, v. 88, p. 102065, 2020.
- Wu, Y. L. et al. Osimertinib in resected EGFR-mutated non-small-cell lung cancer. *The New England Journal of Medicine*, v. 383, n. 18, p. 1711–1723, 2020.