Lung Cancer Medical Documentation Paper

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1. Overview of Lung Cancer

1.1 Definition and Classification

Lung cancer is a malignant tumor characterized by the uncontrolled growth of abnormal cells in one or both lungs. These abnormal cells do not carry out the functions of normal lung cells and do not develop into healthy lung tissue. Instead, they divide rapidly and form tumors that can interfere with the lung's primary function of providing oxygen to the body via the bloodstream. Without treatment, these tumors can spread within the lungs and to other parts of the body, further impairing lung function and overall health.

Lung cancer is broadly classified into two main categories based on the appearance of the cancer cells under a microscope:

- **Non-Small Cell Lung Cancer (NSCLC)**: This is the most common type, accounting for approximately 85% of all lung cancer cases.

- **Small Cell Lung Cancer (SCLC)**: Less common and more aggressive, accounting for about 15% of cases.

These classifications are crucial as they guide the therapeutic strategy and have different prognosis and biological behaviors.

1.2 Histological Types: NSCLC vs. SCLC

NSCLC comprises several histological subtypes, each with distinct pathological and clinical characteristics:

- **Adenocarcinoma**: The most prevalent subtype of NSCLC, particularly among non-smokers and younger individuals. It originates from glandular epithelial cells and is frequently located in the lung periphery. Adenocarcinomas exhibit significant histological heterogeneity and may present mixed patterns, such as acinar, papillary, solid, or bronchioloalveolar features. The WHO/IASLC classification recognizes several variants, including mucinous, fetal, and signet ring types. [1]
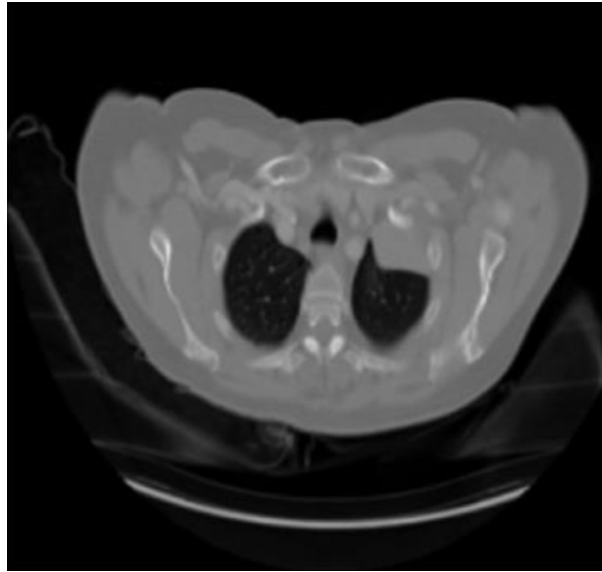
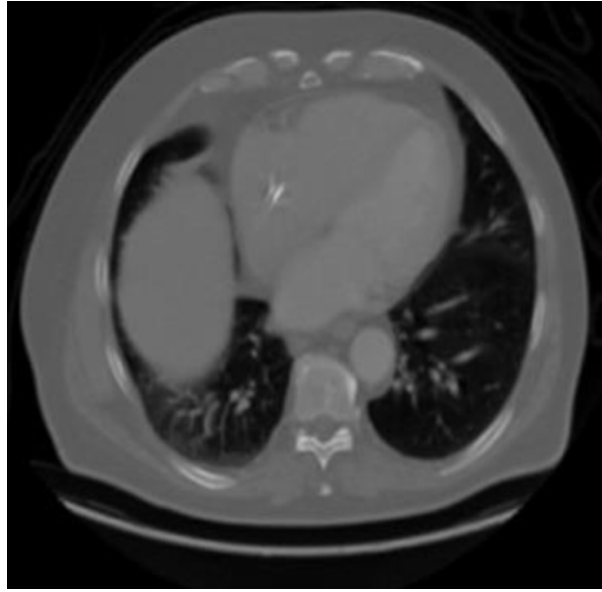*CT scan of patient diagnosed with lung Adenocarcinoma. [3]*

- **Squamous Cell Carcinoma**: Commonly found in the central airways, this subtype arises from squamous epithelial cells and is strongly associated with tobacco smoking. It is characterized histologically by keratinization and intercellular bridges. The incidence of squamous cell carcinoma has declined in recent years due to reduced smoking rates. [1]
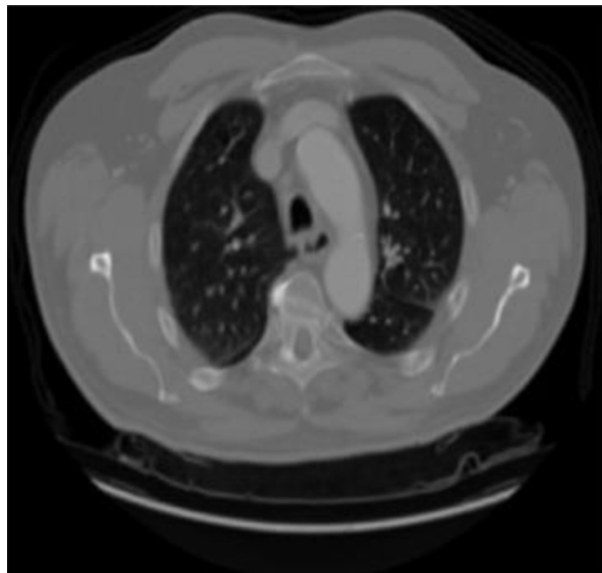
CT scan of patient diagnosed with lung Squamous Cell Carcinoma. [3]

- **Large Cell Carcinoma**: A heterogeneous group of poorly differentiated tumors lacking glandular or squamous characteristics. It is often aggressive and located in peripheral lung tissue. The WHO/IASLC classification includes variants such as large cell neuroendocrine carcinoma (LCNEC), basaloid carcinoma, and large cell

carcinoma with rhabdoid phenotype. [1]

CT scan of patient diagnosed with lung Large Cell Carcinoma. [3]

- **Others**: This category encompasses a diverse group of rare or poorly differentiated NSCLC histologies.

  Adenosquamous carcinoma exhibits both glandular (adenocarcinoma) and squamous components, and is typically more aggressive than either component alone.

  Sarcomatoid carcinomas are poorly differentiated tumors that show sarcoma-like features and include pleomorphic carcinoma, spindle cell carcinoma, and giant cell carcinoma. These are rare and generally associated with a poor prognosis.

  Salivary gland-type tumors, such as mucoepidermoid carcinoma and adenoid cystic carcinoma, are histologically similar to tumors of the salivary glands and are extremely rare in the lungs.

  Carcinoid tumors are neuroendocrine in origin and tend to be less aggressive, although atypical variants can exhibit more malignant behavior.

  Finally, some tumors remain *unclassified* due to ambiguous histological features or inadequate sampling, and are grouped as NSCLC not otherwise specified (NOS). [4]
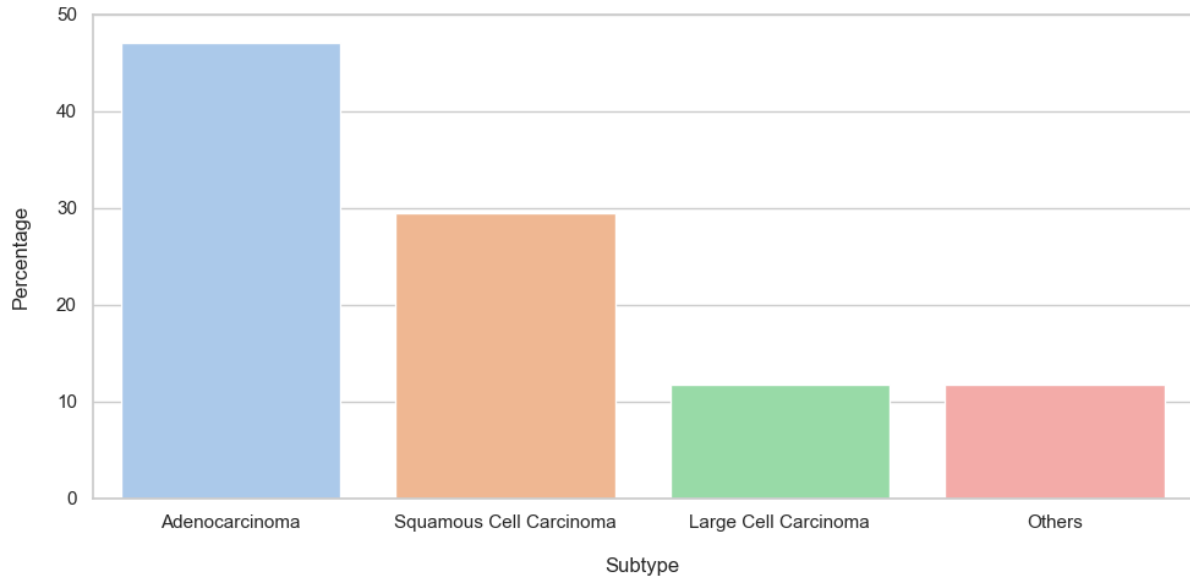
Distribution of NSCLC histological subtypes. Data source: [1].

SCLC, in contrast, tends to grow rapidly and spread early to distant body sites. It is strongly associated with cigarette smoking and is often diagnosed at an advanced stage.

1.3 Epidemiology and Global Burden

Lung cancer remains one of the leading causes of cancer-related deaths worldwide. According to the World Health Organization (WHO), lung cancer causes approximately 1.8 million deaths annually, making it the most lethal form of cancer. [5]

- **Incidence**: Varies globally, significantly depending by region, often reflecting differences in tobacco use, environmental exposure, and socioeconomic status. High-income countries generally show declining trends in incidence due to successful tobacco control efforts, while many low and middle-income countries are seeing rising rates due to increased smoking prevalence and industrial pollution.
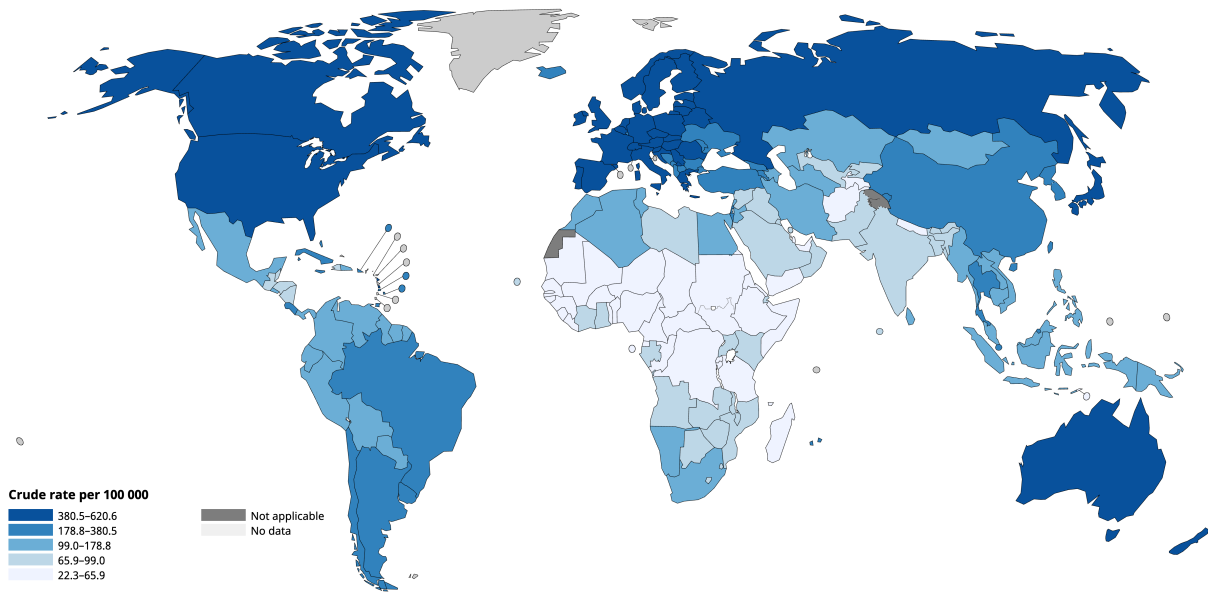
*Lung cancer estimated incidence crude rate (per 100.000 people). [5]*

- **Gender Distribution**: Historically more prevalent in men, but the gap is narrowing due to increased smoking rates among women over time. Biological differences, including hormonal and genetic factors, may also contribute to distinct patterns of disease development and progression between sexes.
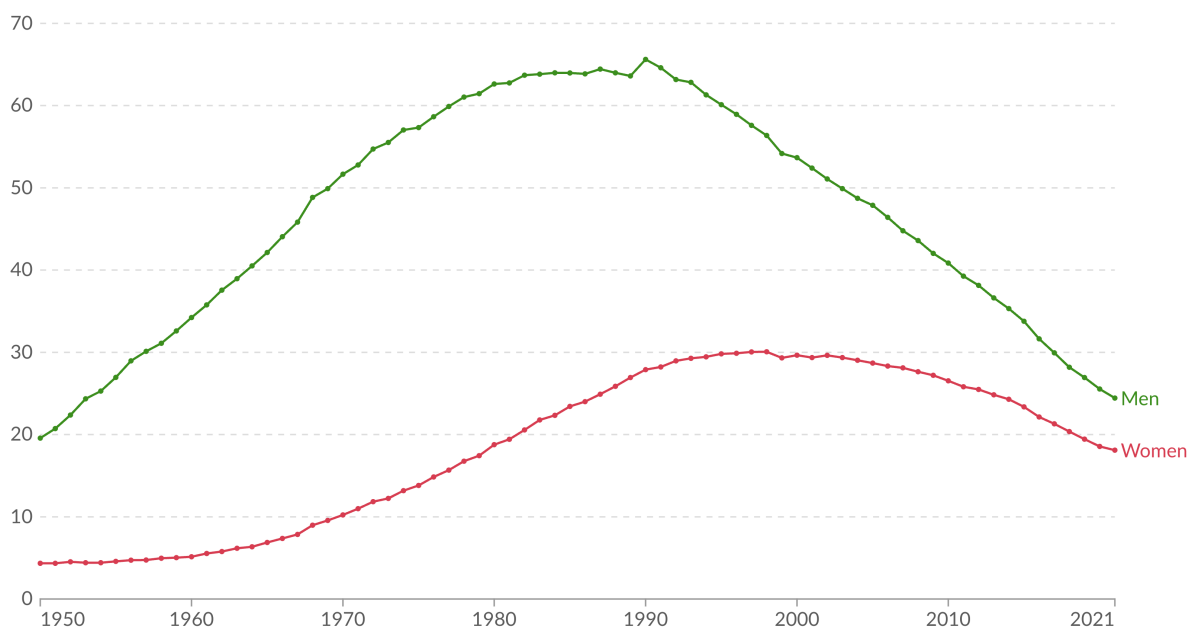
Lung cancer death rates (per 100.000 people). [2, 5]

- **Survival Rates**: The 5-year survival rate remains low (around 20%) [1], especially for cases diagnosed at a late stage. Mortality closely mirrors incidence rates, with lung cancer accounting for nearly one in five cancer deaths. Non-small cell lung

cancer (NSCLC), the most common type, generally has better outcomes than small cell lung cancer (SCLC), especially when diagnosed early.
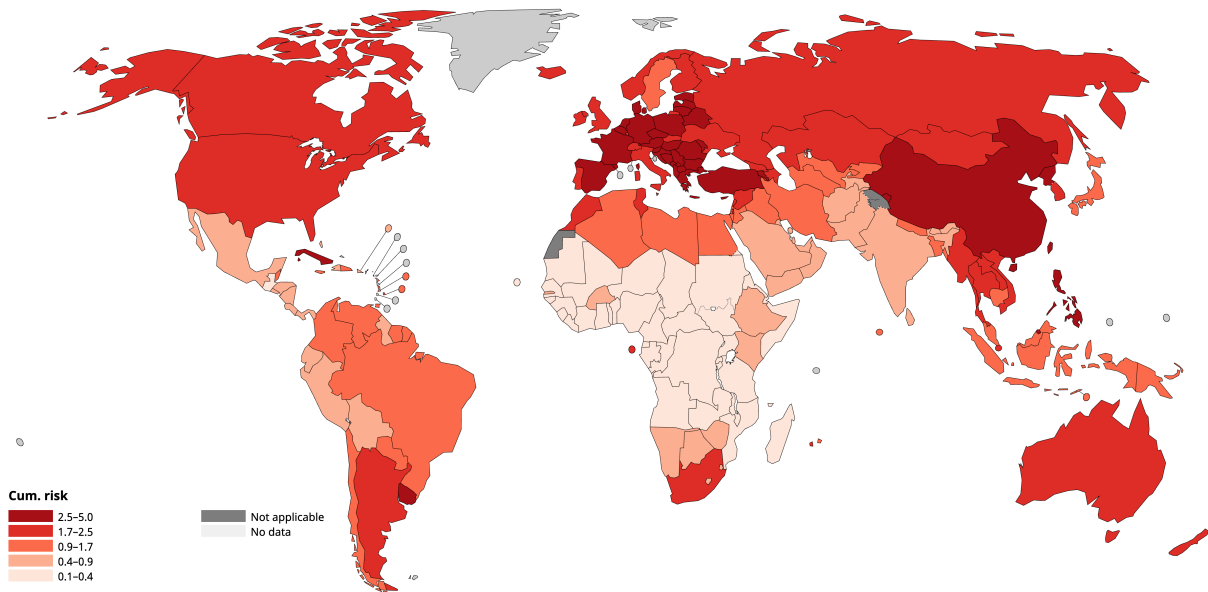
Lung cancer estimated mortality cumulative risk (per 100.000 people). [5]

The global burden of lung cancer is not only reflected in mortality rates but also in the economic and social costs of treatment and loss of productivity. Prevention and early detection remain critical in reducing this burden.

References

[1] National Library of Medicine. *Non-Small Cell Lung Cancer Treatment (PDQ)– Health Professional Version*. Accessed: 2025-05-12. 2025. URL: `https://www.cancer. gov/types/lung/hp/non-small-cell-lung-treatment-pdq`.

[2] Our World in Data. *Lung cancer death rates*. Accessed: 2025-05-12. 2024. URL: `https://ourworldindata.org/grapher/lung-cancer-deaths-per-100000- by-sex-1950-2002`.

[3] Mohammad Q. Shatnawi, Qusai Abuein, and Romesaa Al-Quraan. "Deep learning-based approach to diagnose lung cancer using CT-scan images". In: *Intelligence-Based Medicine* 11 (2025), p. 100188. ISSN: 2666-5212. DOI: `10.1016/j.ibmed. 2024.100188`. URL: `https://www.sciencedirect.com/science/article/pii/ S2666521224000553`.

[4] Travis, W. D. and Brambilla, E. and Nicholson, A. G. and et al. "The 2015 World Health Organization Classification of Lung Tumors: Impact of Genetic, Clinical and Radiologic Advances Since the 2004 Classification". In: *J Thorac Oncol* 10.9 (2015). PUBMED Abstract, pp. 1243–1260. URL: `https://pubmed.ncbi.nlm.nih.gov/ 26291008/`.

[5] World Health Organization. *Lung Cancer - Key Facts*. Accessed: 2025-05-12. 2024. URL: `https://www.who.int/news-room/fact-sheets/detail/lung-cancer`.