

## LUNG CANCER IN NON-SMOKERS EXPOSED TO BIOMASS IN SOUTHEASTERN PARÁ: SECONDARY DATA ON THE EGFR GENE

Maria Eduarda Ranieri Lima<sup>1</sup>, Maria Eduarda Martins da Veiga Cabral<sup>1</sup>, Lara Thais Sousa Bitencourt<sup>1</sup>, Vitória Alencar Sampaio Rocha<sup>1</sup>, Guilherme Silva Andrade<sup>1</sup>, Giovanna Karla Sousa Pereira<sup>2</sup>, Ana Beatriz Rodrigues da Silva<sup>2</sup>, Yasmin Andrade dias<sup>2</sup>, João Lucas Francisco de Carvalho Sousa<sup>1</sup>, Arthur Fernandes Farias<sup>1</sup>.

<sup>1</sup>Faculty of Medical Sciences of Pará (AFYA), Marabá, Pará, Brazil

<sup>2</sup>Faculty of Medicine, Center for Biological and Health Sciences, State University of Pará (UEPA), Campus VIII, Marabá, Pará, Brazil

**Introduction:** Lung cancer remains one of the leading causes of cancer-related mortality worldwide and is strongly associated with smoking. However, an increasing number of cases have been reported among non-smokers, particularly women in regions with frequent exposure to biomass smoke, such as the Northern region of Brazil. In the Amazon, such exposure commonly results from domestic use of firewood for cooking and recurrent agroforestry burnings, which release carcinogenic substances like fine particulate matter and polycyclic aromatic hydrocarbons. Chronic inhalation of these pollutants is associated with persistent inflammation and potential genetic alterations, including mutations in the *EGFR* gene, a critical biomarker and therapeutic target in pulmonary adenocarcinoma. **Objective:** To describe the epidemiological and molecular profile of non-smoking patients with lung adenocarcinoma exposed to biomass smoke in southeastern Pará, focusing on sex, age, exposure history, and prevalence of *EGFR* mutations. **Methods:** This is a retrospective, observational, and descriptive study using secondary data from institutional medical records and peer-reviewed publications. The sample included non-smoking patients diagnosed with lung adenocarcinoma, residing in southeastern Pará, from 2016 to 2023. Variables analyzed were sex, age, estimated exposure time to biomass smoke, and presence of *EGFR* mutations identified by molecular testing. Descriptive statistics were used to characterize the sample (frequencies, means, standard deviations), and inferential analyses (chi-square and t-test) were applied to compare mutation prevalence according to exposure duration and sex, with statistical significance set at  $p < 0.05$ . **Results:** A total of 48 patients were included. The majority were female (68.8%), with a mean age of 56.3 years (SD  $\pm$  8.1). Most had lived for over 15 years in rural or peri-urban areas with frequent biomass use in poorly ventilated environments. *EGFR* mutations were identified in 62.5% of cases, predominantly in exons 19 (33.3%) and 21 (27.1%). Patients with more than 15 years of biomass exposure showed a significantly higher prevalence of *EGFR* mutations compared to those with shorter exposure ( $p = 0.031$ ). No significant difference was found

between sexes regarding mutation rates, although women tended to have longer cumulative exposure durations. The findings suggest a possible dose-response relationship between exposure time and mutational occurrence. **Conclusion:** The study reveals a distinct epidemiological pattern in southeastern Pará, marked by a predominance of middle-aged women with prolonged exposure to biomass smoke. The high frequency of *EGFR* mutations—particularly in exons 19 and 21—supports the need for routine molecular testing to guide targeted therapies in non-smokers with lung adenocarcinoma. The association between long-term exposure and mutation prevalence also highlights the role of socio-environmental determinants in cancer risk, reinforcing the urgency of public health interventions aimed at improving indoor air quality in vulnerable populations.

**Keywords:** Lung cancer; EGFR; biomass smoke; non-smokers.