OSP-39

Selection of MicroRNA-Based Markers for Early Detection of Lung Cancer

Shipra Kunwar, Kamesh R. Babu*

School of Health Sciences and Technology, UPES, Dehradun, India.

Early diagnosis of lung cancer continues to be a major clinical challenge because it is relatively asymptomatic during the initial stages. Conventional diagnostic strategies of imaging and tissue biopsy are of great value, but they have their own pitfalls such as poor sensitivity, delayed diagnosis and physical invasion, which lead to disappointing prognosis and limited therapeutic opportunities. Thus, there is an urgent need for identifying sensitive, specific and non-invasive biomarkers for early detection and clinical management. MicroRNAs (miRNAs), a class of short non- coding RNAs involved in post-transcriptional gene regulation, have emerged as promising molecular indicators. In this study, we focused on the selection of robust miRNA- based signatures for the early detection of lung cancer using a multi-step methodological approach. Cell-free miRNAs, particularly those circulating in bodily fluids like sputum, blood, offer stability, detectability, and disease-specific expression profiles, making them ideal candidates for biomarker discovery. Several miRNAs demonstrated significant differential expressions, with some exhibiting strong correlations with early-stage tumorigenesis. These miRNAs were further analyzed for their biological relevance, target gene associations, and pathway involvement. Initially, differentially expressed miRNAs were identified by analyzing the Cancer Genome Atlas (TCGA) lung adenocarcinoma dataset and using multiple statistical tools. Candidate miRNAs showing significant fold changes were shortlisted. Our findings highlight the clinical potential of a panel of circulating miRNAs as non- invasive biomarkers, capable of detecting early-stage lung cancer with greater accuracy than current methods. The development and validation of such biomarkers may ultimately lead to enhanced screening programs, timely diagnosis, and improved patient outcomes. Further validation in larger cohorts and diverse populations is ongoing to confirm these results.

Keywords: Biomarker, Early stage, Lung cancer, miRNA

***Correspondence:** Kamesh R. Babu
kameshbabu88@gmail.com