



The diagnostic and prognostic value of exosomal microRNAs in lung cancer: a systematic review

Bingbing Yang^{1,2} · Xiaoqi Xin^{1,2} · Xiaoqing Cao³ · Lubanga Nasifu^{3,4} · Zhenlin Nie³ · Bangshun He^{1,3}

Received: 13 January 2024 / Accepted: 16 February 2024

© The Author(s), under exclusive licence to Federación de Sociedades Españolas de Oncología (FESEO) 2024

Abstract

Background Studies have shown that many exosomal microRNAs (miRNAs) can be used as non-invasive biomarkers of lung cancer, but their diagnostic and prognostic values need to be further clarified.

Methods We conducted a systematic literature search in Web of Science, PubMed, and ScienceDirect databases, obtained relevant articles and extracted data, and used statistical methods and statistical software to comprehensively evaluate the diagnostic and prognostic value of exosomal miRNAs in lung cancer. Registration number: PROSPERO CRD42023447398.

Results In terms of diagnosis, two exosomal miRNAs (miR-486-5p and miR-451a) were reported with the highest frequency in lung cancer patients, both of which had good diagnostic value. Compared with the control group, the pooled sensitivities of miR-486-5p and miR-451a were 0.80 (95% CI: 0.73–0.86) and 0.76 (95% CI: 0.60–0.87), specificities: 0.93 (95% CI: 0.63–0.99) and 0.85 (95% CI: 0.72–0.92), and AUCs: 0.85 (95% CI: 0.81–0.88) and 0.88 (95% CI: 0.84–0.90), for the respective miRNAs. For prognosis, in lung cancer patients with abnormally expressed exosomal miRNAs, miR-1290 was associated with PFS outcome; miR-382, miR-1246, miR-23b-3p, miR-21-5p, and miR-10b-5p were associated with OS outcome; miR-21 and miR-4257 were associated with DFS outcome; miR-125a-3p and miR-625-5p were associated with PFS and OS outcomes; miR-216b and miR-451a were associated with OS and DFS outcomes.

Conclusions Exosomal miRNAs are valuable biomarkers in lung cancer patients. Exosomal miR-486-5p and miR-451a can be used as new diagnostic biomarkers for lung cancer. Dysregulated exosomal miRNAs could serve as indicators of survival outcomes in lung cancer patients.

Keywords Lung cancer · Exosomal miRNAs · Prognosis · Diagnosis · Meta-analysis

Introduction

Lung cancer is a malignant tumor, including small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC), accounting for 15 and 85% of lung cancer patients,

respectively [1, 2]. NSCLC can be divided into lung squamous cell carcinoma (LUSC), lung adenocarcinoma (LUAD) and large cell carcinoma (LCLC) [3]. In 2020, there were 2,206,771 new cases and 1,796,144 deaths of lung cancer, respectively accounting for 11.4% of the new cases of malignant tumors (ranking second) and 18% of the deaths from malignant tumors worldwide (ranking first) [4]. Although research has made great progress in lung cancer treatment, through surgery, chemotherapy, and targeted therapy [5, 6], the 5-year survival rate of patients is still very low, with 15% for NSCLC [1], and <7% for SCLC [7]. The poor survival rate of lung cancer patients could be since most patients were diagnosed at an advanced stage or with metastatic spread, with a high recurrence rate and poor prognosis after treatment, leading to treatment failure [8, 9]. Therefore, biomarkers of early diagnosis and postoperative recurrence of lung cancer may be an effective means to reduce the mortality of lung cancer and improve the prognosis for patients.

✉ Zhenlin Nie
zhenlinnie@126.com

✉ Bangshun He
bhe@njmu.edu.cn

¹ Department of Laboratory Medicine, Nanjing First Hospital, China Pharmaceutical University, Nanjing 210006, China

² Department of Clinical Pharmacy, School of Basic Medicine and Clinical Pharmacy, China Pharmaceutical University, Nanjing 211198, China

³ Department of Laboratory Medicine, Nanjing First Hospital, Nanjing Medical University, Nanjing 210006, China

⁴ Department of Biology, Muni University, Arua, Uganda