Medical & healthcare, Drug development

Galectin-10 in serum extracellular vesicles reflects asthma pathophysiology

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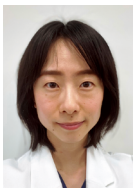



Abstract

In bronchial asthma, galectin-10 was identified as a novel biomarker (BM) useful for pathophysiology and diagnosis. In this study, we focused on extracellular vesicles (exosomes) in blood, which have attracted attention for their function as a novel messenger for cell-tissue communication, and identified galectin-10 (Galectin-10) as one of the novel biomarkers by using the latest non-target proteomics. Galectin-10 not only outperformed the peripheral blood eosinophil count, which is usually considered the gold standard in the diagnosis of asthma, but also showed a significant correlation with airflow obstruction and mucus plug. Furthermore, the same technique suggested its usefulness in diagnosing and determining disease status in eosinophilic sinusitis, which is a complication of asthma.

Background & Results

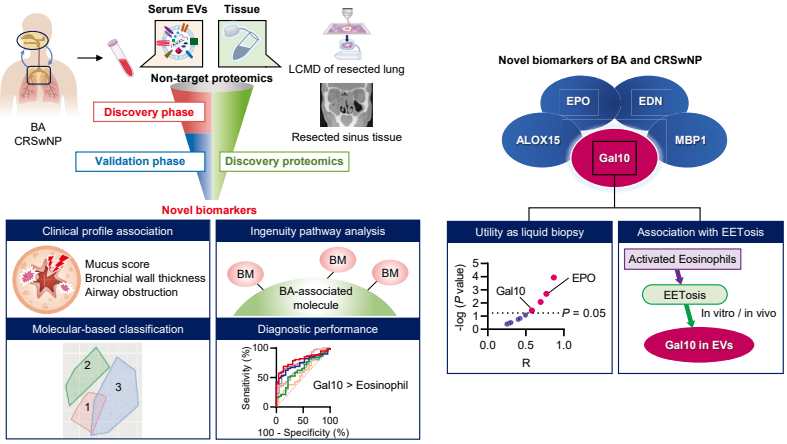
WHO reports that there are approximately 300 million asthma sufferers worldwide, of which 250,000 die from asthma. According to national surveys, the prevalence of asthma in adults is 4.2% and increasing. Although significant advances have been made in the treatment of asthma, the number of asthma cases is still increasing every year, and many people suffer from asthma. Although bronchial asthma is well recognized as a representative of allergic diseases in the lungs, there are many issues to be addressed, such as pathogenesis and diagnostic methods. In particular, the development of novel biomarkers in complex and diverse asthma is inadequate. Our group has not only identified novel BMs in chronic obstructive pulmonary disease (COPD), interstitial pneumonia, and novel coronavirus pneumonia, but has also used exosome proteomics to elucidate and discover new drugs.

Here, the research group has not only identified more than 3,000 kinds of proteins from exosomes floating in blood (a drop of blood) by comprehensive analysis of extracellular vesicles (exosomes), which are attracting attention as novel messengers, but has also identified novel BMs closely related to asthma pathology through integrated proteomics both extracellular vesicles and lungs. This is the first time in the world that a new BM closely related to the pathophysiology of asthma has been identified. Moreover, they found that new BM molecules including galectin-10 are correlated not only with the diagnosis of asthma and airflow obstruction, but also with EETosis (Eosinophil Extracellular trap cell death).

Significance of the research and Future perspective

The results of our study suggest that in complex and diverse asthma, the novel BMs discovered in this study may be useful not only for asthma diagnosis, but also for elucidating the pathophysiology and developing therapeutic approach. In addition, this novel BM may also be applicable to the identification of eosinophilic inflammation in inflammatory diseases. Thus, our approach may be useful as a liquid biopsy for both intractable and malignant diseases in the future.

Gal10 in serum EVs correlates with Type 2 inflammatory pathology in BA and CRSwNP



Gal10: Galectin-10, EV: extracellular vesicle, BA: bronchial asthma, CRSwNP: chronic rhinosinusitis with nasal polyp, LCMD: laser capture micro dissection, BM: biomarker, EPO: eosinophil peroxidase, MBP1: major basic protein-1, EDN: eosinophil derived neurotoxin, ALOX15: arachidonate 15-lipoxygenase, EETosis: eosinophil extracellular trapped cell death

Patent PCT/JP2023/004548, PCT/JP2022/032288, PCT/JP2023/011960, JP2022-167186

Treatise
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Keyword extracellular vesicles, personalized medicine, omics, biomarkers, biologics