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Editorial

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Biomarkers for Diagnosis and Treatment of Chronic Obstructive Pulmonary Disease (COPD): What is the Role of microRNAs?

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Chronic Obstructive Pulmonary Disease (COPD) is a heterogeneous respiratory disease characterized by a progressive, not fully reversible airflow limitation associated with an abnormal inflammatory response of the lungs to noxious stimuli.[1,2] Demographic data show that more than 200 million patients worldwide suffer COPD, leading the scientific community to speculate that in 2020 it will be the third important cause of mortality in the world.[3] Several immune system cells (e.g. macrophages, eosinophils) and biochemical mediators (e.g. tumor necrosis factor-alpha, transforming growth factor beta, Interleukins and metalloproteases) are involved in its development and in symptoms severity.[2] It has been suggested that in COPD patients there is a spill over of peripheral lungs inflammation markers into systemic circulation that in turns result in an increased level of different inflammatory markers such as: IL-1β, IL-6, IL-8, and TNF-α. The increase of those systemic inflammatory markers could be the link of COPD patients co-morbidities, since they are responsible *per se* of many other complication such as cardiovascular disease, hypertension, skeletal muscle weakness, diabetes, obesity and metabolic syndrome.[4] COPD diagnosis is based on clinical evaluation and spirometry and actually several biochemical parameters (i.e. interleukins, C-reactive protein (CRP), serum amyloid A, and fibrinogen) are increased in blood circulation during COPD exacerbations as well asduring COPD treatments.[5-7] COPD exacerbation and progression, is due to the absence of a plasmatic markers able to identify the stage of the disease and/or the response to the treatment. This represents, in real life, a common problem during COPD treatment that is also linked with an increase of sanitary health costs. Last year, the European Health Bill for COPD treatment increased by 10 million USD and the market is thought to increase up to 37.7 million USD by 2030.[8] Therefore, considering all these aspects the identification of biomarkers indicative for early diagnosis of COPD is mandatory. Recently we suggested that the search for phenotype-specific biomarkers could help to better understand the individual driving mechanisms of disease as well as identify drug targets possibly useful for personalized treatments of COPD.[7,9]

It has been suggested that systemic inflammatory markers levels (in plasma) such as Tumor Necrosis Factor-alpha (TNFα), Interleukin 6 (IL-6) and C-reactive protein (CRP), persist also in the stable period COPD patients and CRP levels correlate with the COPD Assessment Test.[10] On the other hand, CRP is not a specific marker of lung disease, while to date more appropriate marker could be represented by microRNAs (miRs), a class of gene expression regulators, that plays a role in the fine-tuning regulatory networks that govern inflammation and epithelial-to-mesenchymal transition tissue change.[11,12] Post-transcriptional control of gene expression is critical for the proper control of inflammation. There is now increasing evidence that miRNAs regulate inflammation and fibrosis in multiple organs including the lungs. A number of miRNAs such as miR-29b, miR-483-5p, miR-152, miR-629, miR-26b, miR-101, miR-

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133b, miR-532-5p and particularly miR-106b are significantly down regulated in plasma of COPD patients, while others such as miR-1343, miR-21 and miR-29 families, are emerging as common regulators of fibrosis.[13-15] It is worth to mention that microRNAs (miRs) represent an important mechanism for post-transcriptional control. There is a large body of work demonstrating the complex role that miRs play in the fine-tuning of the regulatory networks that govern inflammation and epithelial-to-mesenchymal transition tissue change (fibrosis).[11,12,15]

However, clinical research is necessary to validate the role of miRs in COPD; but it is important to consider that the identification of a miRs signature must be performed through a robust and sensitive technology able to identify a COPD diagnostic prediction testable to perform both, early diagnosis and monitoring of therapy.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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