Editorial

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Artificial Intelligence in Chronic Obstructive Pulmonary Disease Phenotyping: A Valuable Tool?

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Editorial

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation. It is a leading cause of morbidity and mortality world-wide and presents a substantial financial burden in Health systems everywhere [1]. Furthermore, it is marked by considerable heterogeneity, which creates significant challenges in daily clinical practice [1,2]. To enhance the proper clinical management of COPD patients the concept of phenotypes had been developed to cluster individuals exhibiting similar clinical, radiological, functional and biological traits [3].

Phenotyping has advanced precise medicine, particularly in quiding treatment decisions to each individual patient [3]. However, because of the numerous types, their variability and especially their overlap this valuable process of phenotyping is regarded as quite intense and challenging [2,3]. Recently, the application of Artificial Intelligence (AI) in Medicine had demonstrated notable advancements in diagnosis, severity, prognosis, and efficacy of different treatment approaches. While approximately 300 studies have explored the use of AI in COPD, only a very small number focus on the topic of phenotypes. Some researchers employed radiological image-based AI methods to analyse the phenotypes of COPD. They mainly utilized data bases of CT-images and compered their findings with those of methods using clinical and lung function data. These studies highlighted the effectiveness of radiological AI techniques asserting that these methods could play a significant role in the phenotypic analysis [4,5]. Another approach focus on clinical and spirometric data noting that these databases are essential for AI driven phenotypic studies [6,7] A third approach employed specialized Deep Learning methods to predict disease exacerbations, overall prognosis and specific comorbidities such us sleep disorders and cardiovascular [5,8,9]. Other studies utilized the GENE-COPD data to investigate the phenotypic variability based on genetic findings [10]. Recently, cellular, multi-omic, and other biological biomarkers have been integrated into data for AI exploration of COPD phenotypes with very promising results [11]. Finally, Paoletti et al added clinical data, lung function tests, radiological CT-images and blood gases into an AI algorithm and improved phenotypic analysis [12]. This Editorial concludes that while the application of AI in the phenotypic analysis of COPD patients shows great promises it is still in its early stage. Currently it tends to rely on a limited number of parameters rather than adapting a holistic approach. Consequently, there is a need for a comprehensive AI system that integrates clinical, radiological, functional, biological, cellular, multi-omic, and genetic data to enhance personalized management in COPD., considering though the potential risks of AI in Medicine [13].

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