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Artificial intelligence could improve diagnostic power of lung function tests

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Artificial intelligence could improve the interpretation of lung function tests for the diagnosis of long-term lung diseases, according to the findings of a new study.

The results, presented today (04 September, 2016) at the European Respiratory Society's International Congress, are the first to explore the potential use of artificial intelligence for improving the accuracy of the diagnosis of lung diseases.

Current testing requires a series of methods including a spirometry test, which measures the amount (volume) and the speed (flow) of air during breathing, followed by a body plethysmography test measuring static lung volumes and airways resistance and finally a diffusion test, which measures the amount of oxygen and other gases that cross the lungs' air sacs. Analysis of the results of these tests is largely based on expert opinion and international guidelines, attempting to detect a pattern in the findings.

In this new study, researchers included data from 968 people who were undergoing complete lung function testing for the first time. All participants received a first clinical diagnosis based on lung function tests and all other necessary additional tests (such as CT scans, electrocardiogram, etc.). The final diagnosis was validated by the consensus of the large group of expert clinicians.

The researchers subsequently investigated whether a concept known as

'machine learning' could be used to analyse the complete lung function tests. Machine learning utilises algorithms that can learn from and perform predictive data analysis.

The team developed an algorithm process in addition to the routine lung function parameters and clinical variables of smoking history, body mass index, and age. Based on the pattern of both the clinical and lung function data, the algorithm makes a suggestion for the most likely diagnosis.

Wim Janssens, the senior author of the study from the University of Leuven in Belgium, commented: "We have demonstrated that artificial intelligence can provide us with a more accurate diagnosis in this new study. The beauty of our development is that the algorithm can simulate the complex reasoning that a clinician uses to give their diagnosis, but in a more standardised and objective way so it removes any bias. "

Clinicians must currently rely on analysing the results using population-based parameters. With artificial intelligence, the machine can observe a combination of patterns at one time to help produce a more accurate diagnosis. This has previously happened in other fields of health with an automated interpretation of results from an electrocardiogram being routinely used in clinical practice as a decision support system.

Marko Topalovic, the first author of the study from the University of Leuven in Belgium, said: "The benefit of this method is a more accurate and automated interpretation of pulmonary function tests, and thus better disease detection. Not only can this help non-experienced clinicians, but it also has many benefits for healthcare overall as it is time saving in achieving a final diagnosis as it could decrease the number of redundant additional tests clinicians are taking to confirm the diagnosis."

The next step for the research team will be to test the algorithm in

different populations and increase the decision power of the system with continuous updates on lung function data with a validated clinical [diagnosis](#).

  More information: Artificial intelligence to improve the diagnostic power of complete pulmonary function tests, European Respiratory Society's International Congress, 2016.

Provided by European Lung Foundation