Biomarkers that could help determine who's at risk for severe COVID-19 symptoms

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One of the many mysteries still surrounding COVID-19 is why some people experience only mild, flu-like symptoms, whereas others suffer life-threatening respiratory problems, vascular dysfunction and tissue

damage. Now, researchers reporting in ACS' *Analytical Chemistry* have used a combination of metabolomics and machine learning to identify possible biomarkers that could both help diagnose COVID-19 and assess the risk of developing severe illness.

Although some pre-existing conditions, such as diabetes or obesity, can increase the risk of hospitalization and death from COVID-19, some otherwise healthy people have also experienced severe symptoms. As most of the world's population awaits vaccination, the ability to simultaneously diagnose a patient and estimate their risk level could allow better medical decision-making, such as how closely to monitor a particular patient or where to allocate resources. Therefore, Anderson Rocha, Rodrigo Ramos Catharino and colleagues wanted to use mass spectrometry combined with an artificial intelligence technique called machine learning to identify a panel of metabolites that could do just that.

The cross-sectional study included 442 patients who had different severities of COVID-19 symptoms and tested positive by a reverse transcriptase-polymerase chain reaction (RT-PCR) test, 350 controls who tested negative for COVID-19 and 23 people who were suspected of having the virus despite a negative RT-PCR test. The researchers analyzed blood plasma samples from the participants with mass spectrometry and machine learning algorithms, identifying 19 potential biomarkers for COVID-19 diagnosis and 26 biomarkers that differed between mild and severe illnesses.

Of the COVID-19-suspected patients, 78.3% tested positive with the new approach, possibly indicating these were RT-PCR false negatives. Although the identified biomarkers, which included metabolites involved in viral recognition, inflammation, lipid remodeling and cholesterol homeostasis, need to be further verified, they could reveal new clues to how SARS-CoV-2 affects the body and causes severe

illness, the researchers say.

More information: Jeany Delafiori et al. Covid-19 Automated Diagnosis and Risk Assessment through Metabolomics and Machine Learning, *Analytical Chemistry* (2021). DOI: 10.1021/acs.analchem.0c04497

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