



PRESS RELEASE

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ANTICIPATING ACUTE COMPLICATIONS FROM COVID-19: USING AI TO PREDICT SEVERITY

A study has shown that artificial intelligence can extract clinical and biological information from scanner images that help determine disease severity and prognosis in patients with Covid-19. Doctors and researchers from Gustave Roussy, Assistance Publique-Hôpitaux de Paris, CentraleSupélec, the University of Paris, Paris-Saclay University, Inserm, Inria and TheraPanacea have established a digital signature of biomarkers that predict the evolution of Covid-19. By identifying patients who are at risk of developing severe forms and are likely to require assistance with ventilation, this AI could help hospitals prioritize patient care based on vital urgency. These results were published in the journal *Medical Image Analysis*.

Chest scanners are widely used to manage coronavirus-related pneumonia. In addition to helping diagnose the disease, they play a prognostic role by visually assessing the extent of lung damage. In this retrospective study, doctors and researchers developed an end-to-end artificial intelligence solution to quantify Covid-19 and assess the severity of the disease and its short-term prognosis, with the same degree of precision as that demonstrated by experienced radiologists.

The AI was trained and validated on CT images of 478 patients from five independent cohorts who had been previously diagnosed with Covid-19 using the RT-PCR test. The patient group studied included 110 serious cases, 6% of whom died from Covid-19 and 17% of whom were intubated. Using a deep learning-based approach and 2D and 3D convolutional neural networks, the researchers taught the AI to automatically recognize areas of characteristic disease (ground glass opacity) on CT images. To do this, they used a dataset of more than 20,000 scanner sections annotated by 15 independent and experienced radiologists. The algorithm then determined 10 clinically interpretable biomarkers based on the extent and heterogeneity of the disease, pulmonary involvement and cardiac preservation.

By correlating these biomarkers with patient age and sex and clinical data, the AI learned through a set of supervised classification methods to assess disease severity and short-term patient prognosis, and thus to identify those who will develop severe symptoms associated with ventilator and resuscitation needs.

The advantage also lies in being able to propose early use of drugs currently recommended for severe forms of Covid-19, thus avoiding admitting patients to intensive care.

“Work is continuing and we are planning ongoing enrichment of the dataset. 11,000 soon-to-be-integrated scanners have already been annotated as part of the STOIC project promoted by AP-HP

and coordinated by Prof. Marie-Pierre Revel of Cochin AP-HP hospital. Thanks to the *AI.Dream project funded by Bpifrance, clinical deployment is scheduled for 2021 in partnership with GE Healthcare*". (Prof. Nikos Paragios, CentraleSupélec / Paris-Saclay University, President of TheraPanacea, and member of the National Centre for Precision Medicine PRISM).

Source

AI-Driven CT-based quantification, staging and short-term outcome prediction of COVID-19 pneumonia

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