



Cover Story:

# COVID-19 Care Continuum

212 **Giuseppe Galati:**  
Management of COVID-19 in Italy

220 **Prof. Mamas A. Mamas:**  
COVID-19 Pandemic: The Importance  
of Testing and Social Distancing

226 **Prof. Eugene Fidelis Soh:**  
Smart Hospital for the Future

234 **Prof. Andy Tatem:**  
COVID-19: Data Uncertainty and  
Effectiveness of Interventions

248 **Rafael J. Grossman:**  
Telemedicine Post COVID-19

258 **Eric de Roodenbeke:**  
Filling the Gaps: Learning from Each  
Other During the COVID-19 Pandemic



# Grading COVID-19 Severity with CT: CAD and AI

Summary: A radiologist working with COVID-19 patients in Russia looks at how technology has aided imaging-based diagnosis and what this could mean for future practice in grading disease severity.

The pandemic of COVID-19 has presented an unprecedented challenge to modern global healthcare. Today everybody understands that diagnostic imaging has critical importance in detection, grading, and follow-up of this potentially fatal disease. Computed tomography (CT) has proven itself as the best imaging modality for the detection of the most important and typical imaging patterns of lung parenchyma changes in COVID-19 pneumonia.

Guidelines of the most influential national and international radiological societies recommend against the wide use of chest CT for screening, diagnosis, and surveillance of COVID-19 patients. They advise to use it for the differential diagnosis, detection of complications, and cases when results of CT may influence patient management and prognosis.

On the other hand, the typical patterns of COVID-19 pneumonia are well known (multiple peripheral ground-glass opacities (GGO) with or without areas of consolidation and some other manifestations). In cases of COVID-19, and the high occurrence of the disease, CT has a high sensitivity for the detection of patients with COVID-19 pneumonia. For this reason, in most hospitals in Russia,

the standard approach is to perform chest CT for all patients admitted with suspected COVID-19 pneumonia. Structured reports for such patients are very important. The common practice is to use reporting guidelines from RSNA/ACR/STI defining imaging appearances as typical, indeterminate, or atypical for COVID-19.

A less clear situation exists in the grading of disease severity. There are recommendations to use simple subjective scales of the severity of changes in the lungs such as mild-moderate-severe or mild-moderate-severe-critical. Several more complicated grading scales have been proposed. But practical experience shows that the visual scoring of multiple areas of GGO or opacifications in the lungs is very subjective and varies from one radiologist to another. It looks like, for this purpose, the software for computer-aided diagnosis or artificial intelligence (AI) capabilities to detect, delineate, and analyse GGO/consolidations in the lungs allow for much more accurate and reproducible results. These technologies have proven themselves very useful in follow-up studies. Today there are plenty of Computer Aided Detection or AI solutions for COVID-19 from different manufacturers and vendors. Probably they can give different results from

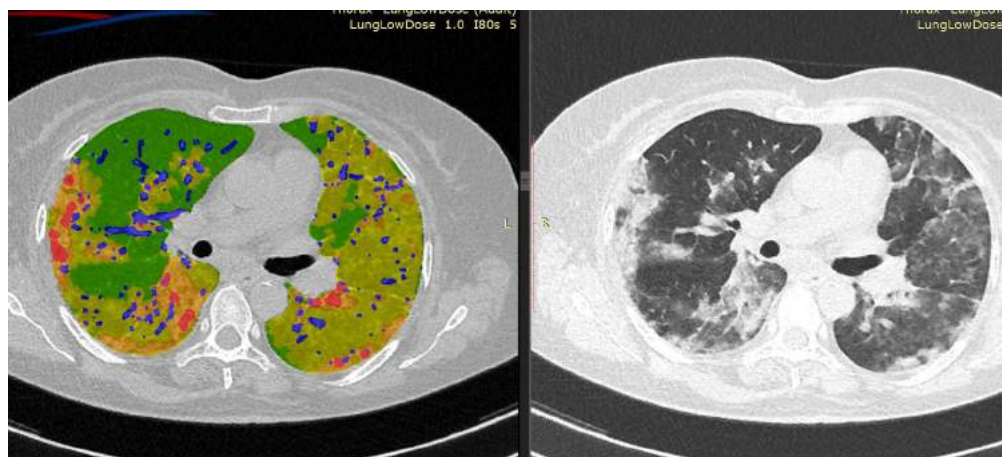


Figure 1. CT scan of lungs of a patient with COVID-19 pneumonia. Right side: native CT, lung window. Multiple areas of ground glass opacities, consolidation, and reticulation are seen in the both lungs. Visual grading of disease severity is difficult. Left image: the result of computer processing of CT dataset with dedicated software (MultiVox). Normal lung parenchyma is marked green, GGO, yellow, consolidation, orange and red and vessels are marked with blue.

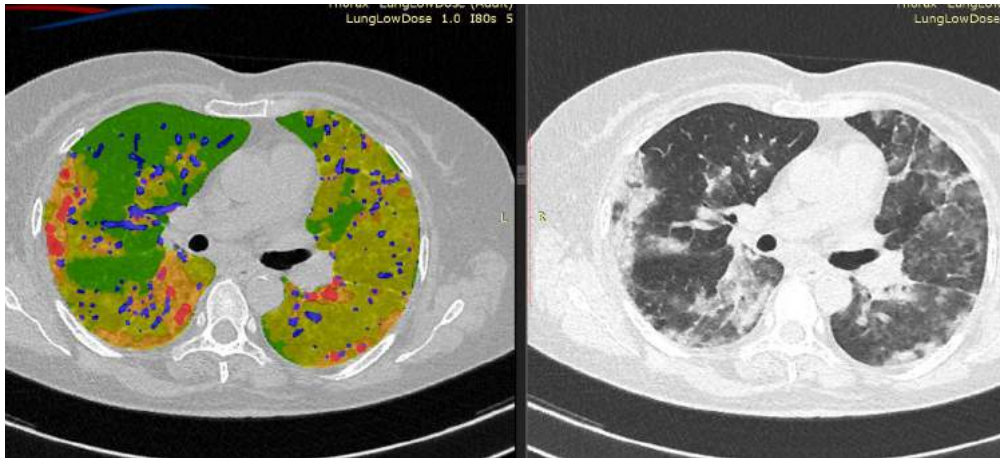


Figure 2. Follow-up of COVID-19 progression with CT. Right side — processed CT image on the day of admission. The total volume of GGO/consolidations in the lungs — 7.2 %. Left side — processed CT image after 5 days. The total volume of GGO/consolidations in the lungs — 26 %, indicating the progression of the disease.

the same datasets. But in the setting of the COVID-19 pandemic, these differences are not so significant, and I believe that they are rather small. They are not time-consuming and help the radiologist to be more objective in grading the disease severity and its progression or regression.

I believe that the epidemic of COVID-19 will accelerate the development and performance of such computer-based assistance for radiologists. Besides the obvious practical value, they are going to be the very useful tools for research of COVID-19 outcomes, patient prognosis, and efficacy of the drugs and other types of treatment in upcoming clinical trials on COVID-19. ■

**Author: Prof. Valentin Sinitsyn**

Member of HealthManagement.org IMAGING Editorial Board, University Hospital of Moscow State University, Professor, Chief of Radiology Department Federal Centre of Treatment and Rehabilitation | Moscow, Russia  
 vsini@mail.ru | [msu.ru](http://msu.ru) | [@MSU\\_1755](https://twitter.com/MSU_1755)

 **Key Points**

- CT has proven itself as the best imaging modality for the detection of typical COVID-19 lung features.
- Chest CT has high sensitivity for detecting signs of the coronavirus disease.
- AI technology could play a role in helping grade the severity of COVID-19.



HealthManagement.org

Follow us on LinkedIn

<https://iii.hm/12x8>



**HealthManagement.org**  
 Promoting Management and Leadership