

# Lung perfusion SPECT/CT images associated with COVID-19 — a case series

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Coronavirus disease 2019 (COVID-19) most often presents with mild symptoms, but it can also present with viral pneumonia and acute respiratory distress syndrome, which predispose to thromboembolic disease. There is an increasing number of case studies which report the significance of ventilation/perfusion scintigraphy in the diagnosis of pulmonary embolism in COVID-19 patients [1, 2]. Since most of the patients in Poland were managed in an outpatient setting, this population has been excluded from many studies and its characteristics are not well-documented. Dhawan et al. [3] emphasize the importance of the evaluation of the prevalence and extent of perfusion abnormalities in survivors of COVID-19 through the whole spectrum of illness, from non-hospitalised patients to those in the intensive care unit (ICU).

We report a case series of three patients after recovery from COVID-19, who underwent lung perfusion SPECT/CT. Scintigraphic

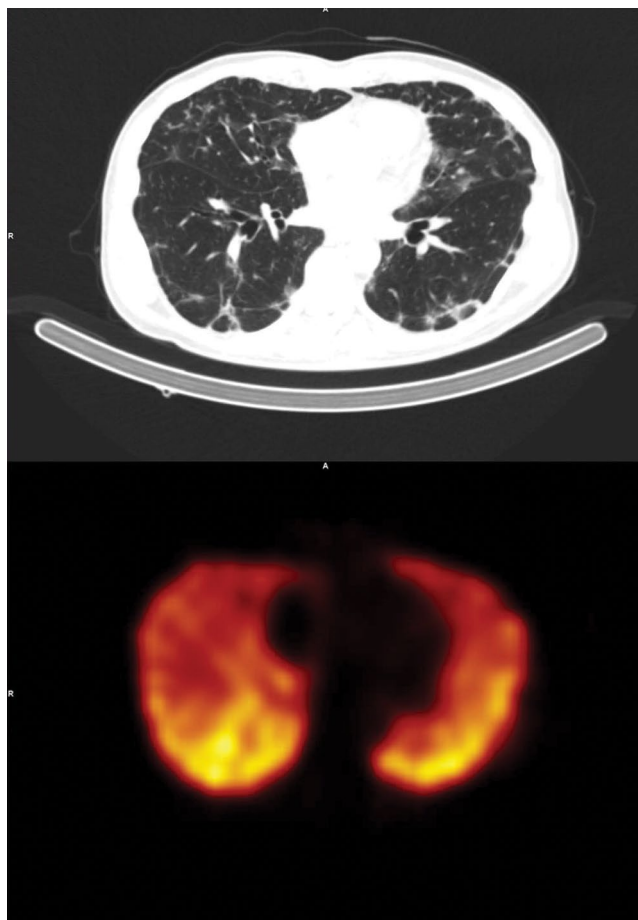
examinations were performed after administration of <sup>99m</sup>Tc-Makro-Albumon with an activity of about 2 MBq/kg of patient's body weight. All patients were examined using Symbia Intevo Bold with a protocol including SPECT/CT acquisition with the following parameters: LEHR collimator, 360 degrees, 120 projections, time per projection 15 sec, matrix 128x128; low-dose CT protocol. The examinations were performed to assess lung lesions in these patients. All patients were diagnosed through RT-PCR for SARS-CoV2 and were presenting mild-to-moderate symptoms. Treatment was symptomatic, including paracetamol and ibuprofen in all patients and additional azithromycin in case of Patient 1. None of them required hospitalization.

Data and perfusion SPECT/CT findings of the patients are presented in the Table 1 below. Figure 1 and 2 show SPECT/CT findings of Patients 1 and 3, respectively.

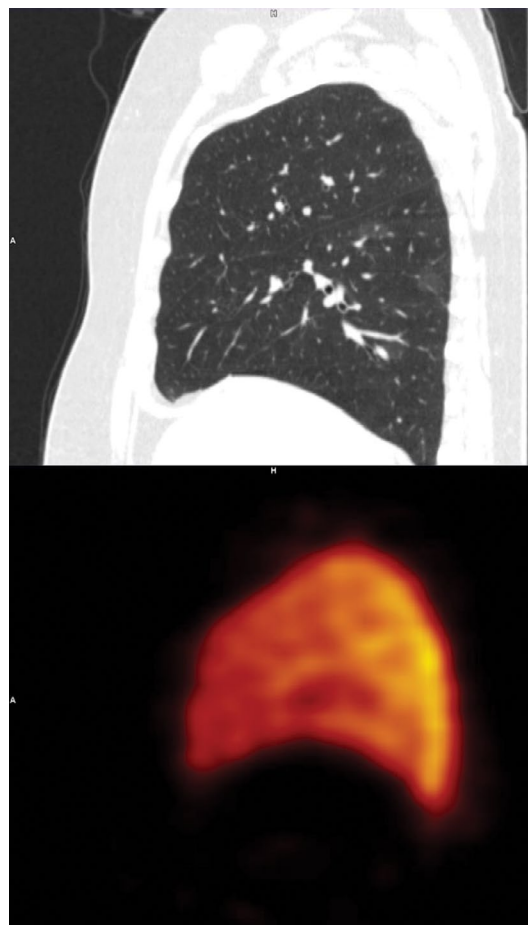
**Table 1.** Data, symptoms and lung perfusion SPECT/CT findings of three patients

	Age [years]	Sex	COVID-19 symptoms	Time from RT-PCR results to SPECT/CT examination	CT findings	Lung perfusion
Patient 1	65	Male	Tiredness, fever for a week with maximum 38,7°C, loss of appetite, headache, dry cough	4 weeks	Multilobar consolidative opacities with mostly subpleural distribution, reticular bronchial adhesions with traction bronchiectasis	Preserved
Patient 2	40	Male	Tiredness, fever for 5 days with maximum 38.0°C, dry cough	5 weeks	Subpleural reticulations with posterior distribution in both lungs	Preserved
Patient 3	40	Female	Tiredness, fever for 5 days with maximum 39.0°C, headache, dry cough	5 weeks	Discrete, bilateral ground-glass opacification (GGO) with a posterior distribution	Preserved

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**Figure 1.** Lung perfusion SPECT and CT transverse slices show preserved perfusion and consolidative opacities in Patient 1



**Figure 2.** Lung perfusion SPECT and CT sagittal slices show preserved perfusion and GGO in Patient 3

Even though these patients present different pulmonary involvement in the unenhanced CT scans, the perfusion of all three patients was preserved, which excludes clinically significant perfusion deficit. In another series of cases, Cobes et al. [1] report that the areas affected by COVID-19 were most often responsible for ventilatory anomalies with a relatively preserved perfusion. In more serious cases of pneumonia, both perfusion and ventilation were reduced.

Reports about the prevalence of the thromboembolic disease among non-hospitalised COVID-19 patients have been published [4, 5], however, the extent to which there is a risk of hypercoagulability in the outpatient setting is still poorly-documented. Dhawan et al. [3] propose a follow-up strategy to evaluate residual clot burden, with perfusion imaging as a key triage tool, which can help to understand the different characteristics of the ventilatory and perfusion patterns related to COVID-19 pneumonia and can be important in the future to evaluate long-term outcomes of this disease.

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