



Cardiac MRI demonstrated signs of non-ischemic myocardial fibrosis in 30% of patients with post-acute COVID-19 syndrome | 1

More than two years after the global COVID-19 pandemic, it is clear that infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can lead to a new disease called long-COVID-19 or post-acute COVID-19 syndrome (PACS). It is more common in hospitalization survivors, but, even those who have experienced mild acute COVID-19 have a wide range of frequent, persistent, and disabling symptoms. In this study, German scientists used cardiac magnetic resonance imaging (MRI) to investigate the prevalence and extent of cardiac abnormalities in patients diagnosed with PACS.

Although PACS/ long COVID syndrome encompasses a wide range of organ dysfunction, reports on the prevalence of cardiovascular symptoms in patients with PACS vary. The reasons could be inconsistencies in inclusion criteria and definitions of acute myocardial inflammation. Therefore, the Society for Cardiovascular MRI has proposed optimized cardiac MRI protocols for patients in the active or convalescent phase of COVID-19 infection.

Two host-cell factors are important for SARS-CoV-2 viral entry into many cell types: angiotensin-converting enzyme 2 (ACE2), which is bound by the spike (S) protein, and transmembrane protease, serine 2 (TMPRSS2), which cleaves S-protein, allowing this binding to take place. ACE2 receptor is more highly expressed in the heart than other organs, and in cardiomyocytes from patients with heart failure than in healthy individuals. A recent *in vitro* study demonstrated a high risk of cardiac dysfunction in the heart tissues with persistent SARS-CoV-2 infection. Hypoxic conditions mimicking ischemic heart disease further deteriorated cardiac function and disrupted vascular network formation. The authors suggested that an explosive increase in the number of virus-infected patients may result in an enormous increase in the number of patients at potential risk for future heart failure.

<https://discovermednews.com/deterioration-heart-function-cardiac-model-sars-cov-2-infection/>

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Cardiac MRI demonstrated signs of non-ischemic myocardial fibrosis in 30% of patients with post-acute COVID-19 syndrome | 2



About the study

This two-center retrospective study investigated the presence and extent of cardiac abnormalities in all patients referred for cardiac MRI due to clinical signs of PASC within a time of two years.

Results

The study included 129 patients (51% were women, the mean age was 41 years) diagnosed with PASC. The most common symptoms of PASC were exertional dyspnea (23%) and tachycardia/palpitations (22%). Other symptoms included fatigue, exercise intolerance, and chest pain lasting more than four weeks after the acute infection.

The median interval between a positive reverse transcription polymerase chain reaction test for SARS-CoV-2 and cardiac MRI was four months.

The results of the volumetric analysis showed an abnormal (<55%) ejection fraction in 21% of patients diagnosed with PASC, whereas 19% of patients with PASC had left ventricular dilation. 14% of patients had pericardial effusion (>5 mm) and 5% of patients with PASC had pleural effusion (>20 mm).

In 57% (73 patients), cardiac abnormalities were not found. 8% of patients with normal cardiac results had suspected pulmonary abnormalities (pulmonary fibrosis/atelectasis).

The most common diagnosis resulting from cardiac MRI was non-ischemic, possibly post-inflammatory fibrosis, found in 30% (39 patients). The results also showed other cardiac



Cardiac MRI demonstrated signs of non-ischemic myocardial fibrosis in 30% of patients with post-acute COVID-19 syndrome | 3

abnormalities like post-ischemic fibrosis (in 4% of patients) and structural heart disease (in 9% of patients).

There was no case of active myocarditis or an acute myocardial infarction.

Conclusion

This study shows that 57% of patients diagnosed with PASC had normal cardiac MRI results. However, a significant portion of the cohort (30%) had signs of non-ischemic myocardial fibrosis. The authors emphasized that this prevalence is particularly concerning as it exceeds the prevalence of this disease in the normal adult population. Furthermore, this suggests that a history of myocarditis might be the reason for the persistent symptoms in patients with PASC.

The authors noted that their study focused only on patients referred for cardiac MRI, and strictly relied on established international guidelines for myocardial inflammation detection. This article highlighted the significance of cardiac MRI in patients who developed PASC with cardiovascular symptoms.

The article was published in *Diagnostics*.

Journal Reference

Halfmann MC. *et al.* Cardiac MRI Findings in Patients Clinically Referred for Evaluation of Post-Acute Sequelae of SARS-CoV-2 Infection. *Diagnostics* 2023, *13*, 2172. (Open Access) <https://doi.org/10.3390/diagnostics13132172>