

## Expert Perspectives



**Prof. Sebastian Kelle**  
**MD, FESC, FAHA, FSCMR**  
German Heart Center Berlin  
Charité University Medicine  
Berlin, Germany

### Cardiovascular MR for patients with COVID-19

Recent publications<sup>1</sup> show that COVID seems to be an endothelial disease that is affecting many organs and potentially resulting in injury to kidneys, brain, vascular system and the heart. There is currently only limited data available about COVID-19 and the heart (especially follow-up data in non-hospitalized patients). We are seeing an increased number of patients with cardiac symptoms post COVID-19, and cardiac MR offers an effective way of assessment of potential myocardial injury.

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“We are just beginning to understand the kind of cardiac damage caused by COVID-19. Cardiac MR offers a significant opportunity because of the availability to use quantitative tools such as strain measurement, T1 and T2 mapping, and the ability to combine imaging of myocardial deformation and potential edema with stress MRI,” says Prof. Kelle.

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# Is COVID-19 an ongoing disease?

The number of organ systems affected by COVID-19 and the degree of damage suggest that it might very well be an endothelial disease with systemic inflammation. Reports have been published demonstrating very severe cases of cardiac damage associated with COVID-19, including acute myocarditis and myocardial infarction (MI).

We're now learning more about COVID-19 and its effect on the heart. Myocardial injury has been seen across patient groups worldwide. For example, recent research found that among 150 patients in London hospitalized with COVID-19 (average age 70 years), a high percentage presented with myocardial injury with troponin release. The myocardial injury included myocarditis, MI, myocarditis with MI, and ischemia. The quantitative measure of native T1 in the septum, however, was not significantly elevated in these COVID-19 patients compared to age-matched control subjects, which differs from the classical presentation of viral myocarditis.

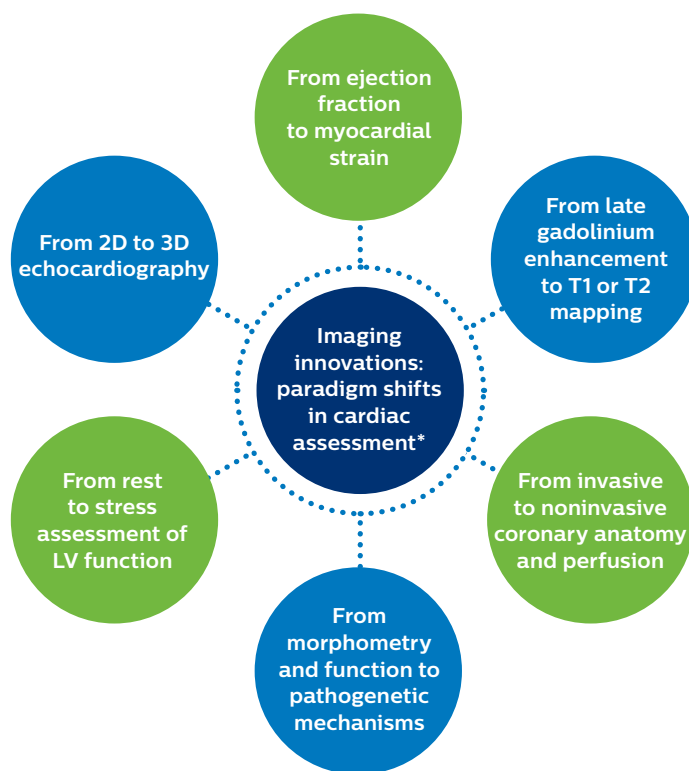
Prof. Kelle's team has seen patients several weeks or months into the convalescent phase of COVID-19 who present with persistent dyspnea.

## Cardiac MR is providing answers

Imaging advances are improving cardiac assessment. Cardiac MR is proving to be an effective way to assess damage in both the acute and convalescent phases of COVID-19. Cardiac MR offers not only anatomical data, but also quantitative tools such as strain, T1 or T2 mapping and the ability to assess function by combining tests with stress MR.

## Innovative imaging methods in heart failure are producing a shifting paradigm in cardiac assessment<sup>1</sup>

Protocols and interpretation are being refined by the Society for Cardiovascular Magnetic Resonance (SCMR), which also provides practical advice on running a CMR service during COVID-19.<sup>2</sup> SCMR protocols for COVID-19 infection sequelae are designed to address limitations of the breath-hold of patients. They also help minimize the risk of exposure for technologists and patients.



\*Adapted from Čelutkienė J, et al.

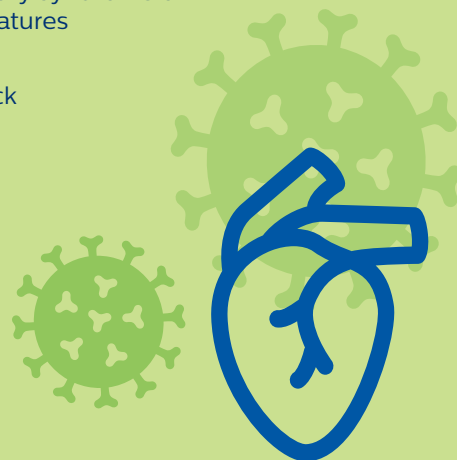
## Expected CMR indications in patients within active or convalescent phase of COVID-19<sup>2</sup>

### Adults

- Left and right ventricular dysfunction (heart failure)
- Myocarditis (including systemic inflammatory disease, cardiotoxicity)
- Pericarditis
- Myocardial infarction with non-obstructive coronary arteries (MINOCA)
- Chest pain (chronic coronary syndrome)
- Acute myocardial infarction
- Stress-induced cardiomyopathy (Takotsubo)
- Ventricular arrhythmia, resuscitated cardiac arrest
- Pulmonary hypertension
- Vasculitis

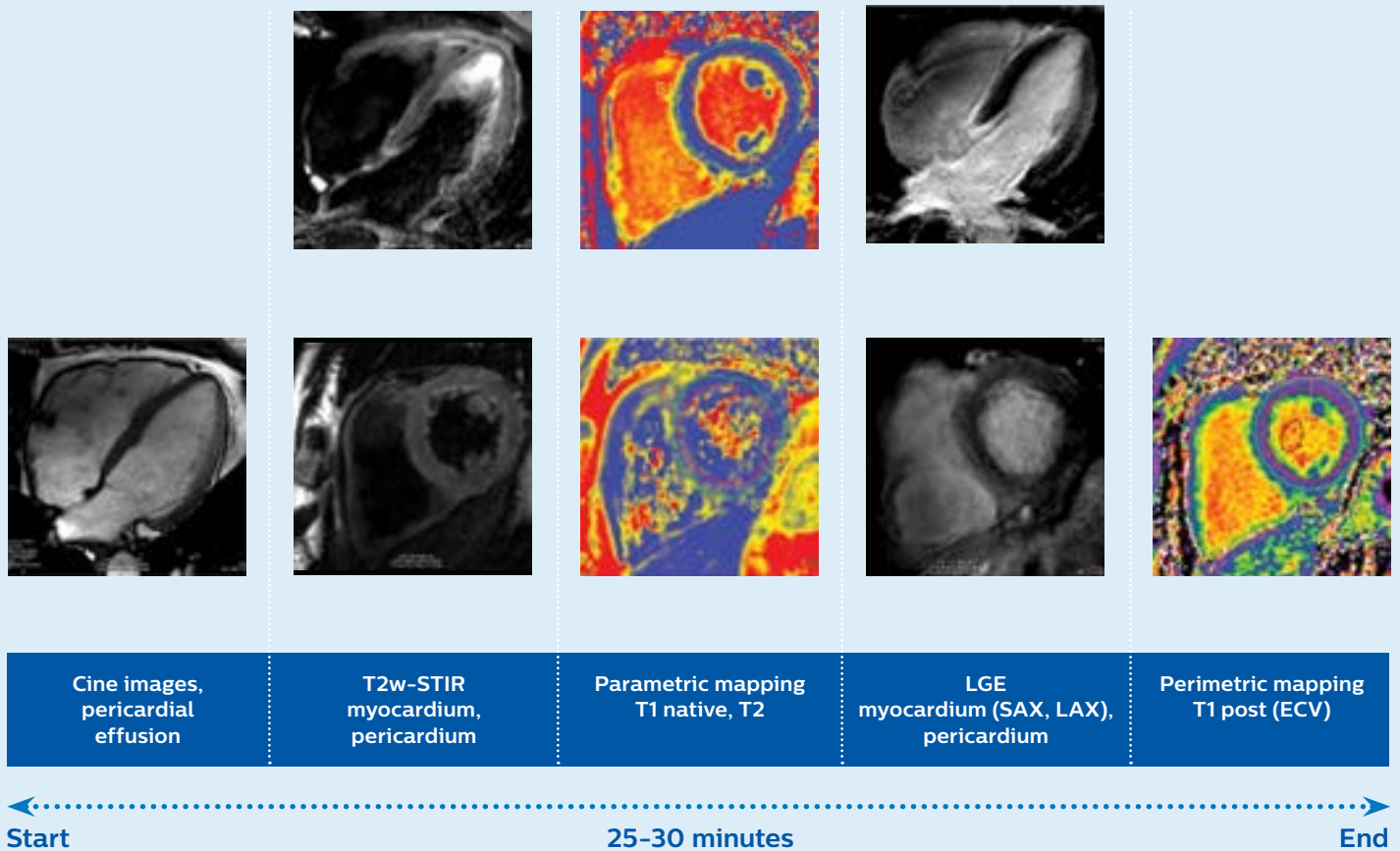
### Children

- Left and/or right ventricular dysfunction (heart failure)
- Hyperinflammatory syndrome or Kawasaki-like features
- Acute vasculitis
- Cardiogenic shock



## Recommended CMR protocol (German Heart Center Berlin, Germany)

Prof. Kelle shares his organization's recommended CMR protocol, noting that it can usually be performed in less than 30 minutes.



## Cardiovascular MR findings in patients with COVID-19

**Prof. Kelle stresses the need for more data, and summarizes his thoughts on COVID-19 and the heart.**

- There is currently only limited data available (especially follow-up data in non-hospitalized patients)
- With COVID-19, the degree of myocardial injury and onset is unclear
- There are an increasing number of patients with the clinical indication for cardiovascular MR post COVID-19
- If clinical cardiac symptoms occur after COVID-19, a cardiovascular MR test should be considered
- There is a difference in patients with acute COVID-19 and those in the convalescent phase of COVID-19
- International registries such as SCMR-COVID-19 should be supported
- Data will help us better understand the effect of other infectious diseases on the cardiovascular system

**See the video on cardiovascular MR on patients with and post COVID 19**

<https://youtu.be/QiBMHuQJvPA>

### References

1. Čelutkienė J, Plymen CM, Flachskampf FA, et al. Innovative imaging methods in heart failure: a shifting paradigm in cardiac assessment. Position statement on behalf of the Heart Failure Association of the European Society of Cardiology. *Eur J Heart Fail.* 2018;20:1615-1633. DOI,org/10.1002/ejhf.1330.
2. Kelle S, Bucciarelli-Ducci C, Judd RM, et al. Society for Cardiovascular Magnetic Resonance (SCMR) recommended CMR protocols for scanning patients with active or convalescent phase COVID-19 infection. *J Cardiovasc Magn Reson.* 2020;22(61).DOI, org/10.1186/s12968-020-00656-6.

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

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