

Cardiac Screening Guidelines for Return To Play After COVID-19: The Current Evidence

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- Cardiac injury post COVID-19
- Myocarditis
  - Signs and symptoms
  - Investigations & diagnosis
- Current cardiac testing protocols & their evidence
- Updated Return to Play guidelines post COVID-19

## Cardiac Injury in COVID-19



Siripanthong et al, 2020

## Cardiac Injury in COVID-19



Akhmerov et al, 2020

## Myocarditis

Signs and Symptoms

- Varies amongst patients (within 2-3 weeks of infection)
  - Fatigue
  - Dyspnea (at rest or exertional)
  - Chest pain on exertion
  - Tachycardia
  - Severe cases: Right heart failure (raised JVP, peripheral edema)

Investigations

- ECG
  - ST elevation, new BBB, pseudoinfarct pattern, PVCs, bradyarrhythmia with advanced AV node block, t-wave inversions
- BW
  - troponin, lactate, ESR, CRP, consider BNP
- TTE and/or Cardiac MRI

## Myocarditis - Diagnosis

- Clinically suspected myocarditis
  - $\geq$ 1 clinical symptom +  $\geq$ 1 diagnostic criterion
  - ≥2 diagnostic criteria

- Diagnostic Criteria:
  - ECG or rhythm abnormalities
  - Elevated troponin
  - Structural/functional abnormalities on echo
  - Abnormal tissue characterisation on CMR

NOTE: CMR has not been studied as a primary screening tool in the diagnosis of myocarditis

# **ECG** Utility

### Screen for SCD

- ECG (when added to H&P) increases diagnosis of cardiac disease in athletes
- Data suggestive that ECG screening decreases sudden cardiac death in athletes

#### Education in Heart Physical activity and sport in primary and secondary prevention



ECG screening in athletes: differing views from two sides of the Atlantic

#### Rachel Lampert

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BMJ Learning Take

COVID Specific

- 6/170 abnormal ECG
- ?symptomatic
- 0 myocarditis, 2 pericarditis
- Restricted from exercise x4 wks, 2 wks tx with indomethacin
- Gradual RTP with no adverse events

#### ORIGINAL ARTICLE



Use of Electrocardiographic Screening to Clear Athletes for Return to Sports Following COVID-19 Infection

Jacob L. Erickson, DO; Joseph T. Poterucha, DO; Alecia Gende, DO; Mark McEleney, MD; Corey M. Wencl, LAT; Marisa Castaneda, MS, ATC; Lindsay Gran, CMA; Joel Luedke, ATC, LAT; Jill Collum, LAT; Karen M. Fischer, MPH; and Andrew R. Jagim, PhD

# **Troponin Utility**

- Two Italian Serie A teams
- 13/58 players (22.4%) COVID +ve
- all had a negative cardiovascular examination
- 2/13 (15%) elevated troponin
- 2/45 COVID -ve players had elevated troponin
- Negative CMR in all



International Journal of Cardiology Volume 326, 1 March 2021, Pages 248-251



Short communication

Interpretation of elevated high-sensitivity cardiac troponin I in elite soccer players previously infected by severe acute respiratory syndrome coronavirus 2 ★

Giuseppe Mascia <sup>a</sup>, Fabio Pescetelli <sup>b</sup>, Amedeo Baldari <sup>c</sup>, Piero Gatto <sup>d</sup>, Sara Seitun <sup>e</sup>, Paolo Sartori <sup>a</sup>, Maurizio Pieroni <sup>f</sup>, Leonardo Calò <sup>g</sup>, Roberta Della Bona <sup>a</sup>, Italo Porto <sup>a, b</sup> २ छ

### Troponin increase indicative of myocardial injury prognostic in COVID-19

 Increases are nonspecific - can be due to chronic injury, acute nonischemic injury, or acute MI

#### JACC Journals > JACC > Archives > Vol. 76 No. 10

#### Previous Next

Cardiac Troponin for Assessment of Myocardial Injury in COVID-19: JACC Review Topic of the Week

#### JACC Review Topic Of The Week

Yader Sandoval, James L. Januzzi, and Allan S. Jaffe

J Am Coll Cardiol. 2020 Sep, 76 (10) 1244-1258

## The Case For Cardiac MRI

#### May 27, 2021

### **Prevalence of Clinical and Subclinical Myocarditis in Competitive Athletes With Recent SARS-CoV-2 Infection** Results From the Big Ten COVID-19 Cardiac Registry

Curt J. Daniels, MD<sup>1</sup>; Saurabh Rajpal, MBBS, MD<sup>1</sup>; Joel T. Greenshields, MS<sup>2</sup>; <u>et al</u>

 $\gg$  Author Affiliations | Article Information

JAMA Cardiol. 2021;6(9):1078-1087. doi:10.1001/jamacardio.2021.2065

- 13 universities, 2810/9255 (30.4%) COVID +ve
- 2461/2810 completed cardiac evaluation, 1597 with CMR
- CMR imaging for all athletes yielded a 7.4-fold increase in detection of myocarditis (clinical and subclinical).



# The Case Against Cardiac MRI

- Outcomes Registry for Cardiac Conditions in Athletes (ORCCA) within NCAA sports
- 19,378 athletes tested, 3018 +ve COVID
- Diagnostic yield of CMR 4.2 times higher for a clinically indicated CMR (15 of 119 [12.6%]) vs primary screening CMR (6 of 198 [3.0%])
- Predictors of SARS-CoV-2 cardiac involvement included:
  - Cardiopulmonary symptoms
  - At least 1 abn triad test result

### SARS-CoV-2 Cardiac Involvement in Young Competitive Athletes 😒 🔞

Nathaniel Moulson, Bradley J. Petek, Jonathan A. Drezner, Kimberly G. Harmon, Stephanie A. Kliethermes, Manesh R. Patel, and Aaron L. Baggish 🖂

and for the Outcomes Registry for Cardiac Conditions in Athletes Investigators

Originally published 17 Apr 2021 | https://doi-org.libaccess.lib.mcmaster.ca/10.1161/CIRCULATIONAHA.121.054824 | Circulation. 2021;144:256–266



# Cardiac MRI Indicated?

### • Myocarditis prevalence:

- 0.6% to 0.7% clin. indicated CMR
- 2.3%–3.0% primary CMR screen
- CMR abnormalities, in the absence of symptoms/diagnostic abnormalities, do not fulfil the definition of clinical myocarditis
- Technical imaging challenges with CMR cause heterogeneity
  - Big Ten registry diagnosis ranged from 0% to 7.6% on CMR
  - Rajpal et al, 2021: prevalence of reported myocarditis ranged from 0% to 15% with CMR

## When to consider cardiac MRI in the evaluation of the competitive athlete after SARS-CoV-2 infection $\,$ Jan 2022 $\,$

Dermot Phelan<sup>1</sup>, D Jonathan H Kim<sup>2</sup>, D Jonathan A Drezner<sup>3</sup>, Michael D Elliott<sup>4</sup>, Matthew W Martinez<sup>5</sup>, Eugene H Chung<sup>6</sup>, Sheela Krishan<sup>7</sup>, Benjamin D Levine<sup>8</sup>, Aaron L Baggish<sup>9</sup>

Correspondence to Dr Dermot Phelan, Sports Cardiology Center, Atrium Health Sanger Heart & Vascular Institute, Charlotte, NC 28203, USA; Dermot, Phelan, Qatriumhealth.org

Clark et al, 2021

- COVID-19-positive athletes were compared to retrospective controls
- Focal LGE at the RV insertion present in 22% of study subjects, 24% of athletic controls

# **Updated RTP Guidelines**

### Mild

 Anosmia, ageusia, headache, mild fatigue, mild upper respiratory tract illness, and mild gastrointestinal illness

### Moderate

 Persistent fever, chills,myalgias, lethargy, dyspnea, and chest tightness

CV symptoms

 Dyspnea, exercise intolerance, chest tightness, dizziness, syncope, and palpitations



### **Updated RTP Guidelines**



NOTE: THIS GUIDANCE IS SPECIFIC TO SPORTS WITH AN AEROBIC COMPONENT

## Summary

- COVID affects the heart directly and through an inflammatory cascade
- Myocarditis is a major concern in the athlete post-COVID as a cause of SCD
- The evidence does not support cardiac MRI as a screening tool
- Cardiology associations worldwide have differing testing protocols
- BJSM RTP guidelines most up to date albeit quite conservative

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