



*Reprise du sport après  
infection à COVID 19.*

situation à risque ???



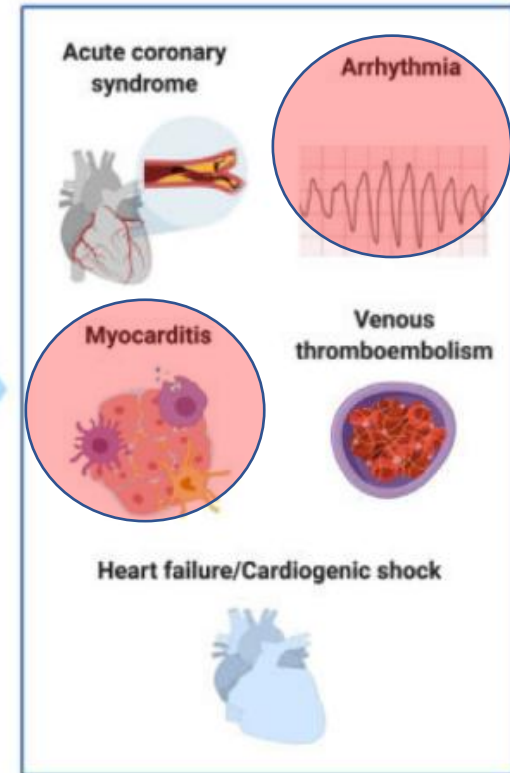
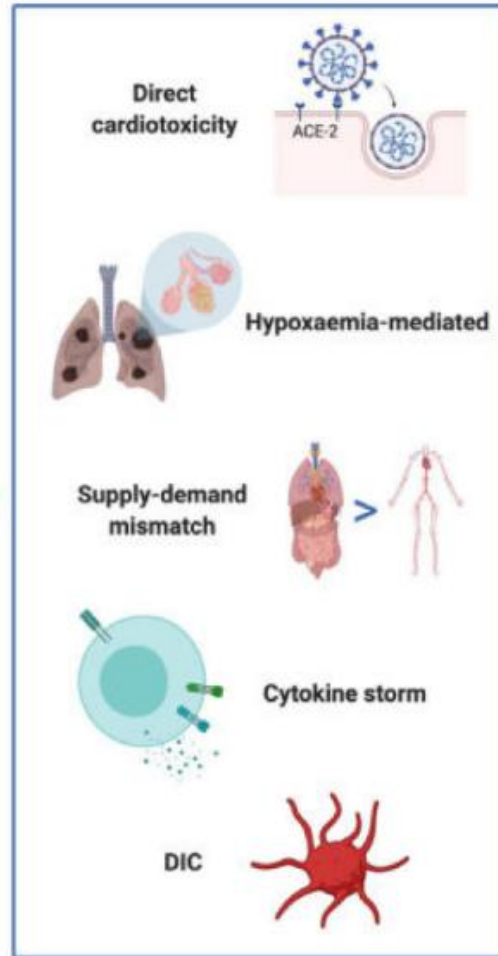
Dr Stéphane CADE  
Clinique du Millénaire

# Interactions Cardio-Vasculaire du SARS-CoV-2

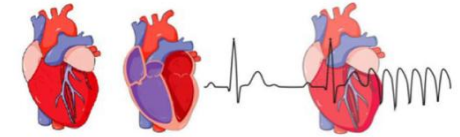
= invasion des cellules / réc-ACE2  
Poumon + Coeur et reins



*Virus à  
ARN  
simple brin*



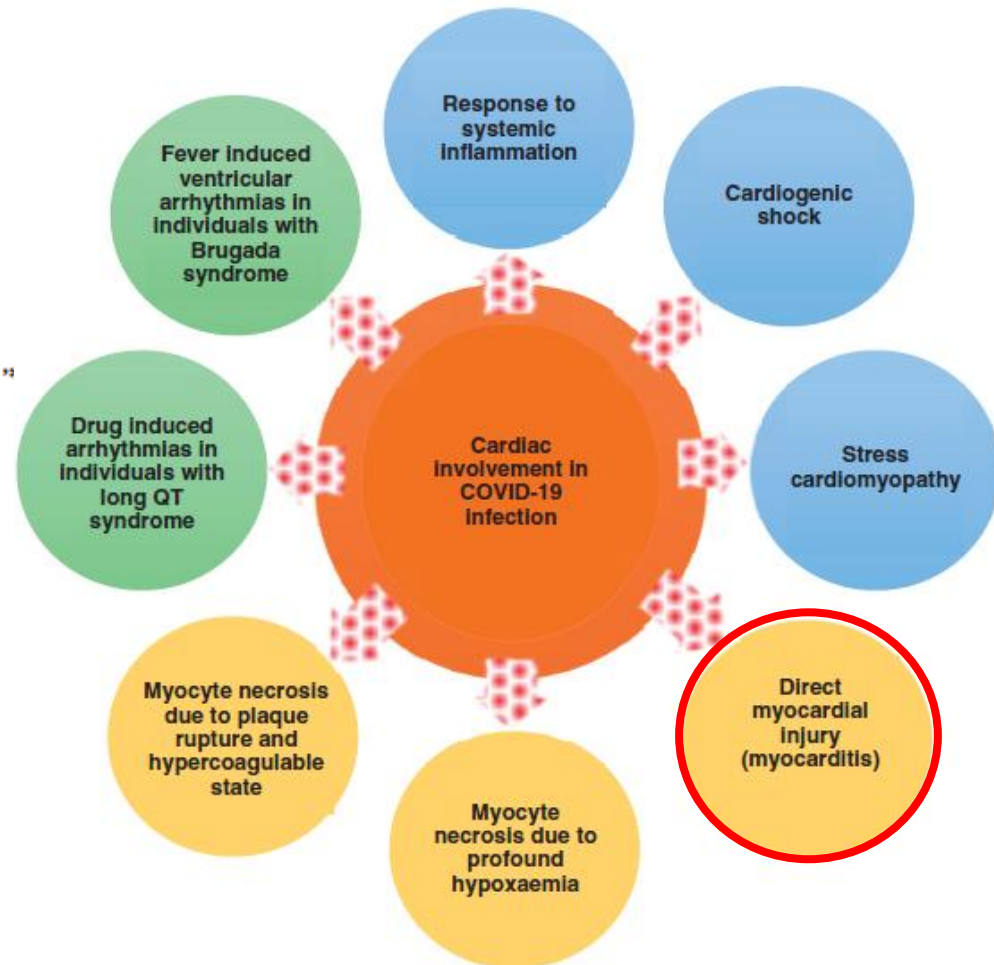
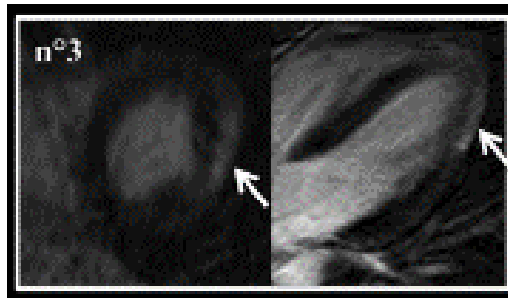
➔ Tn compatible avec une lésion myocardique ?



# Lésion myocardique et Covid-19

**Exercise in the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) era: A Question and Answer session with the experts Endorsed by the section of Sports Cardiology & Exercise of the European Association of Preventive Cardiology (EAPC)**

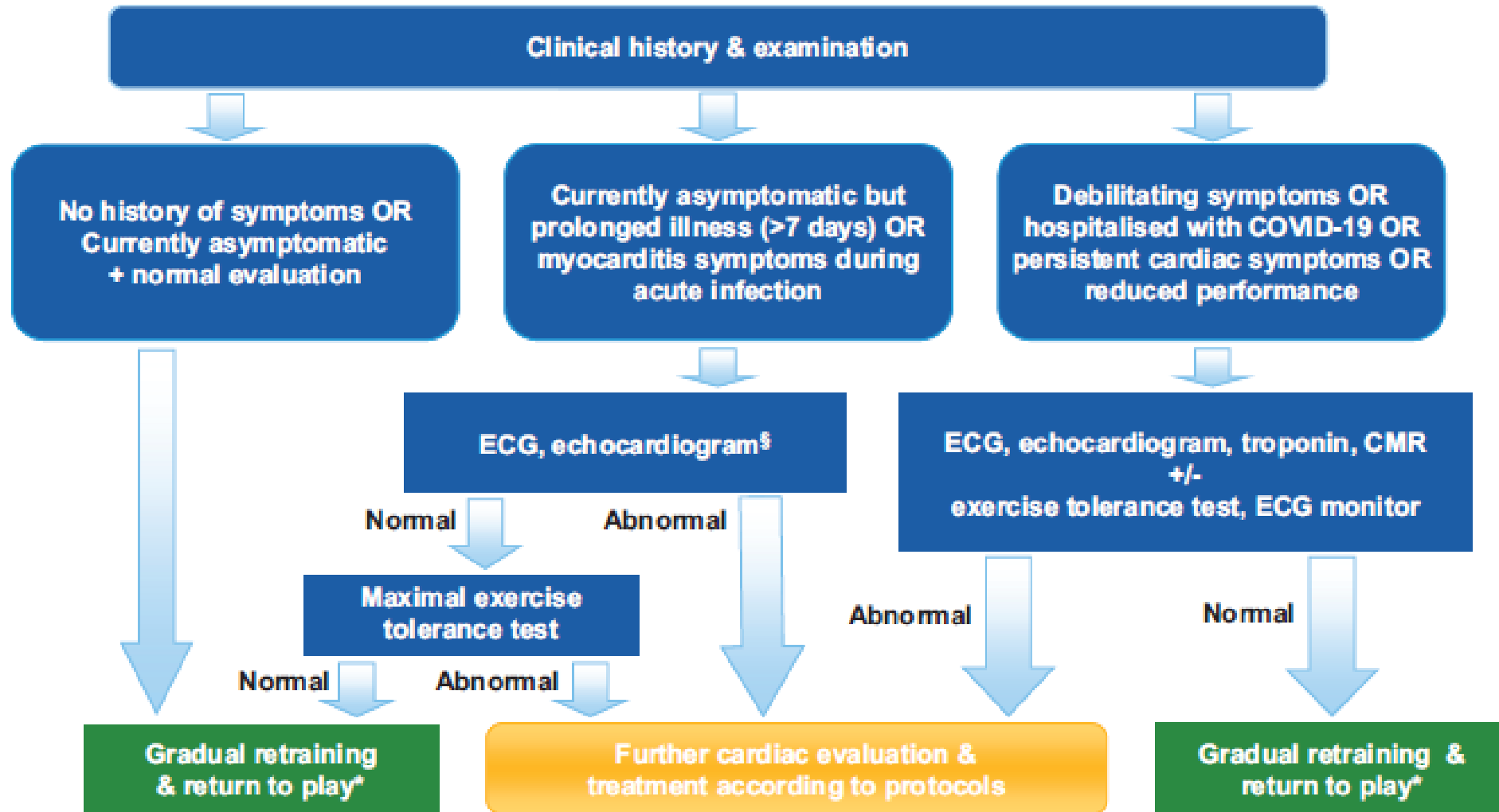
Raghav T Bhatia<sup>1</sup>, Sarandeep Marwaha<sup>1</sup>, Aneil Malhotra<sup>2</sup>, Zafar Iqbal<sup>3</sup>, Christopher Hughes<sup>4</sup>, Mats Börjesson<sup>5</sup>, Josef Niebauer<sup>6</sup>, Antonio Pelliccia<sup>7</sup>, Christian Schmied<sup>8</sup>, Luis Serratos<sup>9</sup>, Michael Papadakis<sup>1,\*</sup> and Sanjay Sharma<sup>1,11</sup>



Multiplés mécanismes et expressions cliniques

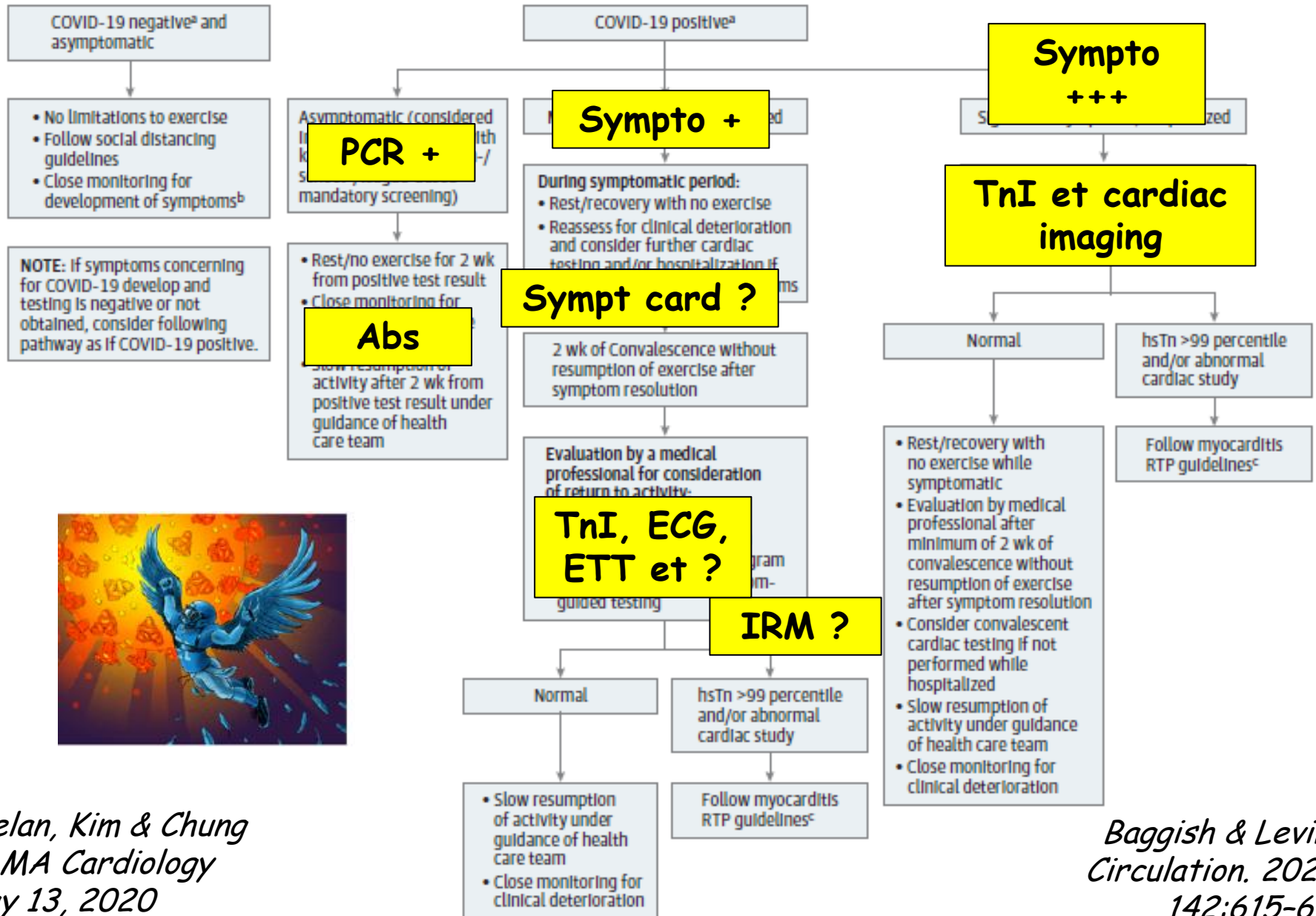
# Proposed cardiac evaluation of elite athletes prior to return to competitions.

Bhatia et al. EAPC



été 2020

# COVID-19 Return-to-Play Algorithm



oct 2020

# COVID-19 Return-to-Play Algorithm

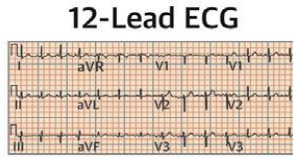
Clinical scenario	Recommended assessment	Comments
Athletes with <i>prior asymptomatic infection</i> as confirmed antibody to severe acute respiratory syndrome coronavirus 2 <b>PCR +</b>	<i>Focused medical history and physical examination</i> to screen for findings newly emergent in the COVID-19 era Consider 12-lead ECG* ▶ If ECG is abnormal, further evaluation with minimum echocardiogram and exercise test is warranted in conjunction with a sports cardiologist.	▶ Myopericarditis related to COVID-19 should be considered in patients with a history of new-onset chest pain/pressure (even in the absence of fever and respiratory symptoms), palpitations or exercise intolerance. ▶ Comprehensive clinical evaluation, regardless of ECG findings, is indicated in athletes with new-onset cardiovascular symptoms or exercise intolerance.
Athletes with a <i>history of mild illness (non-hospitalised)</i> related to confirmed or suspected COVID-19 <b>Peu sympt</b>	<i>Focused medical history and physical examination</i> to screen for persistent or new postinfectious findings following COVID-19 infection Perform 12-lead ECG* ▶ <i>If ECG is abnormal, further evaluation with minimum echocardiography and exercise testing, in conjunction with a sports cardiologist.</i>	▶ <i>ECG findings</i> that may indicate viral-induced myocardial injury include pathological Q waves, ST segment depression, (new) diffuse ST segment elevation and T-wave inversion. ▶ Comprehensive clinical evaluation, regardless of ECG findings, is indicated in athletes with new-onset cardiovascular symptoms or exercise intolerance.
Athletes with a <i>history of moderate to severe illness (hospitalised)</i> related to confirmed or suspected COVID-19 <b>Sympto +</b>	<i>Comprehensive evaluation</i> prior to return to sport, in conjunction with a sports cardiologist, including biomarkers, echocardiography and cardiac monitoring. <b>TnI, ECG, ETT, EE, ECG/24h</b>	▶ <i>Myocardial injury is more likely in patients with a more severe disease course, and normal cardiac function and exercise tolerance should be confirmed prior to a return to exercise.</i> ▶ Cardiac MRI may be considered based on clinical suspicion of myocardial injury. <sup>†</sup>
Athletes with a <i>history of COVID-19 infection (regardless of severity)</i> with one or more of the following: chest pain/pressure, changes, hs-TnT or NP ejection fraction, or impaired cardiac function <b>Sympto +++</b>	<i>Comprehensive evaluation</i> prior to return to sport, in conjunction with a sports cardiologist, including biomarkers, echocardiography and cardiac monitoring. <b>TnI, ECG, ETT, EE, ECG/24h + IRM</b>	▶ Return to training should be gradual and under the supervision of a cardiologist. ▶ Longitudinal follow-up, including serial cardiac imaging, may be required in athletes with initially abnormal cardiac function.

Déc 2020

# COVID-19 Return-to-Play Algorithm

Sympto +

ECG

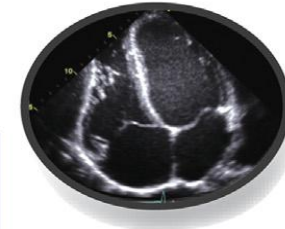


hs-cTn

TnI

ETT

Transthoracic Echo



Consider Exercise-induced Cardiac Remodeling

Non-COVID-19 related pathology

LV dysfunction:

- Myocarditis
- Ischemic injury
- Stress cardiomyopathy

Clinical Concerns

RV dysfunction:

- RV strain from acute hypoxia
- Pathologic RV dilation

Pericardial disease

- Pericardial Effusion (pericarditis)

Permit graded return to play

- Normal TTE
- Normal ECG
- Normal hs-cTn
- Post-isolation with resolved symptoms

IRM ?

Indications  
IRM

- Symptômes (DT, dyspnée, Lim<sup>o</sup> exer, syncope rythmique) même si ETT N
- Tn ↗ prolongée
- Modif<sup>o</sup> ECG (↗ ST ou T<0, ESV ou TV)
- Tb segmentaire (dont VD) ou FE VG <50%
- Dysfonction Diastolique ou ↘ strain SGL
- Epanch. péricarde

**IRM**

Ongoing clinical concern

**Cardiac Magnetic Resonance**



- Gold standard assessment of LV/RV structure and function and myocarditis/pericarditis
- Diagnosis of myocarditis predicated on demonstrating injury (increase in T1, ECV, or presence of LGE) and inflammation (elevated T2)
- Diagnosis of pericarditis predicated on pericardial enhancement +/- presence of pericardial effusion
- Should be done at experienced centers

**Angio-TDM thorax**

Secondary imaging directed by

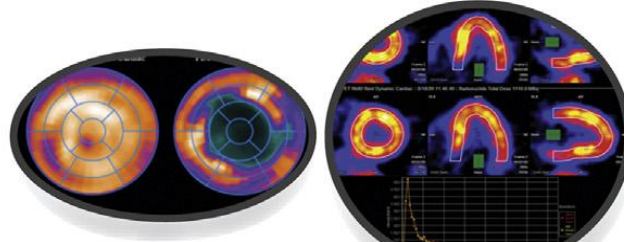
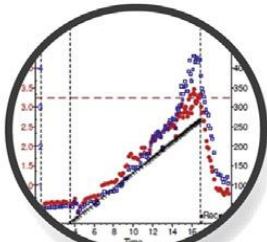
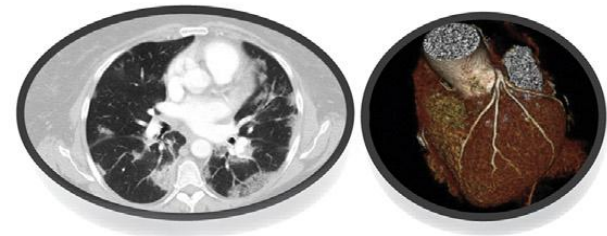
**PET-scan**

**Stress Echo / VO2**

- Computed Tomography Angiography**
- Considered for assessment of ongoing chest pain or hypoxia
  - Optimal assessment of the coronary arteries
  - Optimal assessment for pulmonary embolus
  - Assessment of lung parenchyma

- Stress Echocardiography / CPET**
- Active myocarditis is a contraindication
  - Avoid during active infection due to potential risk of aerosolization
  - Stress Echo: Assessment of borderline ventricular function when EICR is considered likely
  - CPET: Assessment of ongoing exercise intolerance

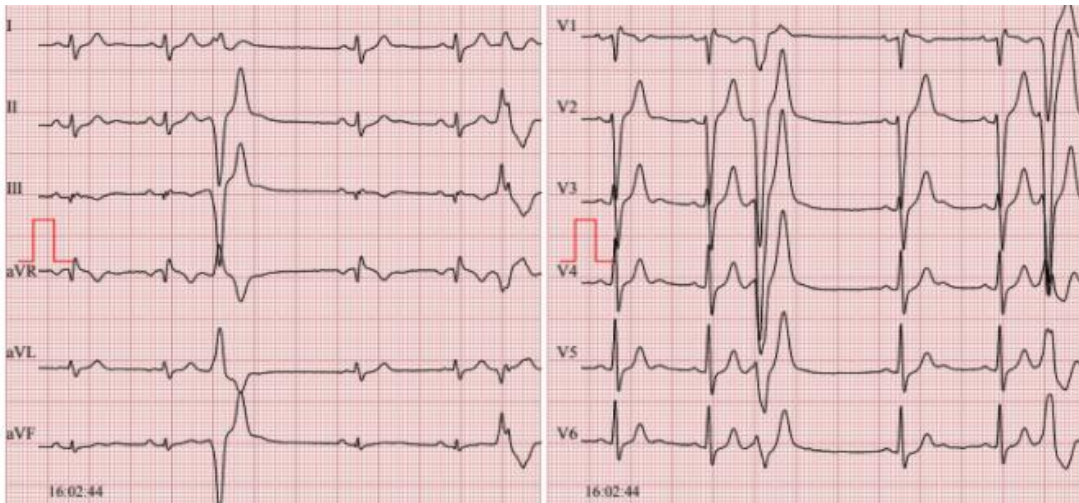
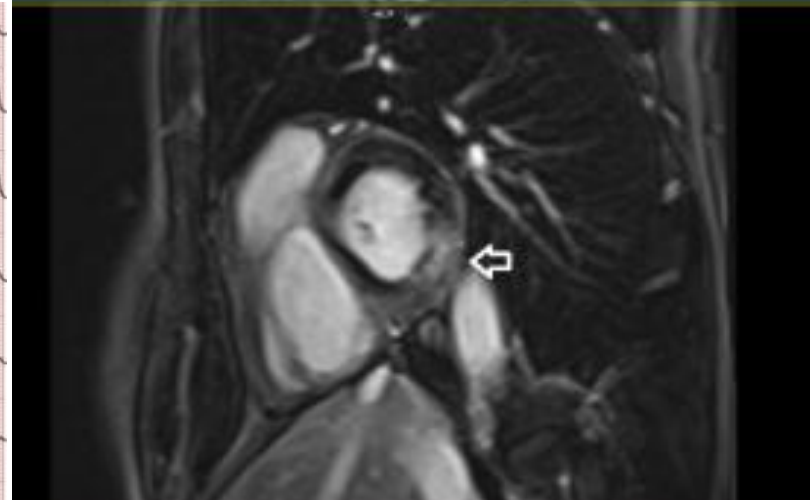
- Nuclear/PET**
- Can be secondary modality for assessment of myocardial inflammation, myocardial ischemia, and absolute myocardial blood flow
  - Not first line, considered if first-line and other imaging modalities sub-optimal or contraindicated



# Cas clinique

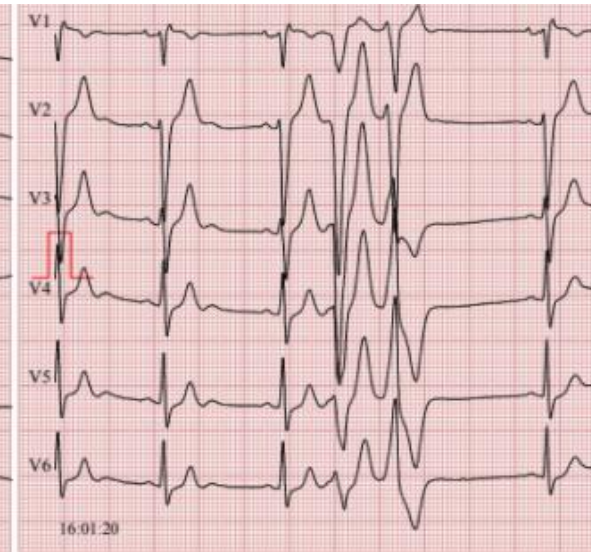
- H, 47 ans, sans ATCD, sans FDR, très sportif.
- Très probable COVID fin mars, pas de test, 14 jours de fièvre + toux (épouse et fils malades), puis asthénie et palpitations à type d'ES, surtout au repos, pas trop gêné à l'effort, DE modérée.

- ETT N, EE N mais ESV sur Holter,
- SOTALEX = stoppé / patient
- BNP N mais Tn 30 à 2 reprises
- 1 salve de TV à 200 sur Holter
- IRM séquelle de myocardite.



Qu'en pensez-vous?

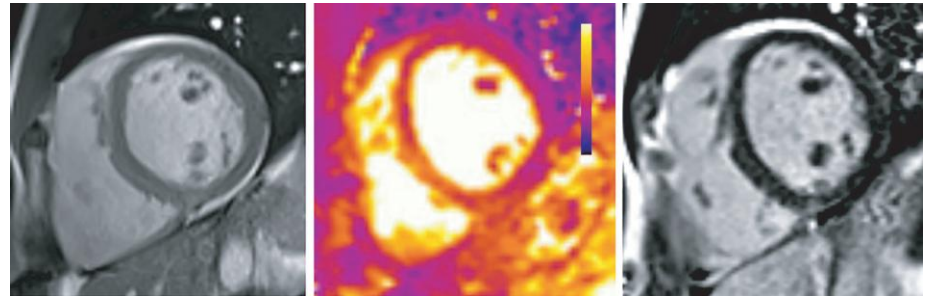
# Cas clinique



# Revue littérature complication Sport-Covid 19

## RESEARCH LETTER

Cardiovascular Magnetic Resonance Findings in Competitive Athletes Recovering From COVID-19 Infection

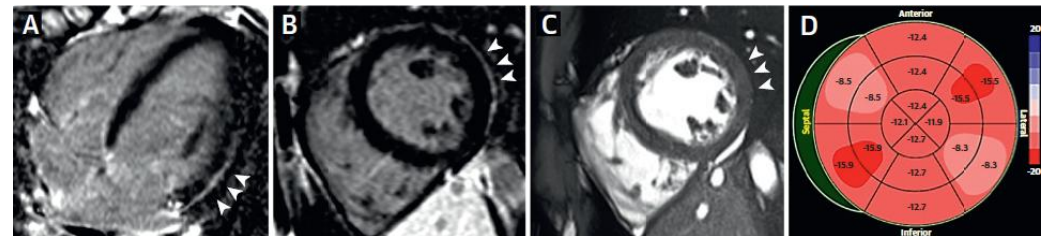


*Rajpal et Al. JAMA Cardiol 2020 Sep 11*

**26 competitive athletes**

- 4 (15%) CMR findings suggestive of myocarditis
- 8 (30.8%) LGE without T2 ↗ suggestive of prior myocardial injury.

High Prevalence of Pericardial Involvement in College Student Athletes Recovering From COVID-19



*Brito et Al. JACCci. Article in press*

**n = 54 (19 ans)**

16 asympt

38(2) sympt (+)

**39,5% atteinte péricardique  
mais**

**aucun signe en faveur d'une myocardite**

# Revue littérature complication Sport-Covid 19

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>



13/58 players (22.4%) SARS-CoV-2  
- Tn: apport non contributif  
- Pas de lésion IRM

*G. Mascia et Al. Int J Card*



Cardiovascular screening of athletes during the COVID-19 pandemic: The (ir)relevance of elevated cardiac troponins

Caroline M Van De Heyning<sup>1</sup>, Hielko Miljoen<sup>2</sup>

# Revue littérature complication Sport-Covid 19

Original research

Is extensive cardiopulmonary screening useful in athletes with previous asymptomatic or mild SARS-CoV-2 infection?

**Athlètes (n =30) avec SARS-CoV-2 asympt/modéré**

- blood tests
- resting ECG
- stress-test ECG with oxygen saturation monitoring
- Echocardiogram
- spirometry,

**Aucune  
anomalie**

*Gervasi et al. Br J Sports Med 2020;0:1-8*

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**Lancement d'un  
travail local**

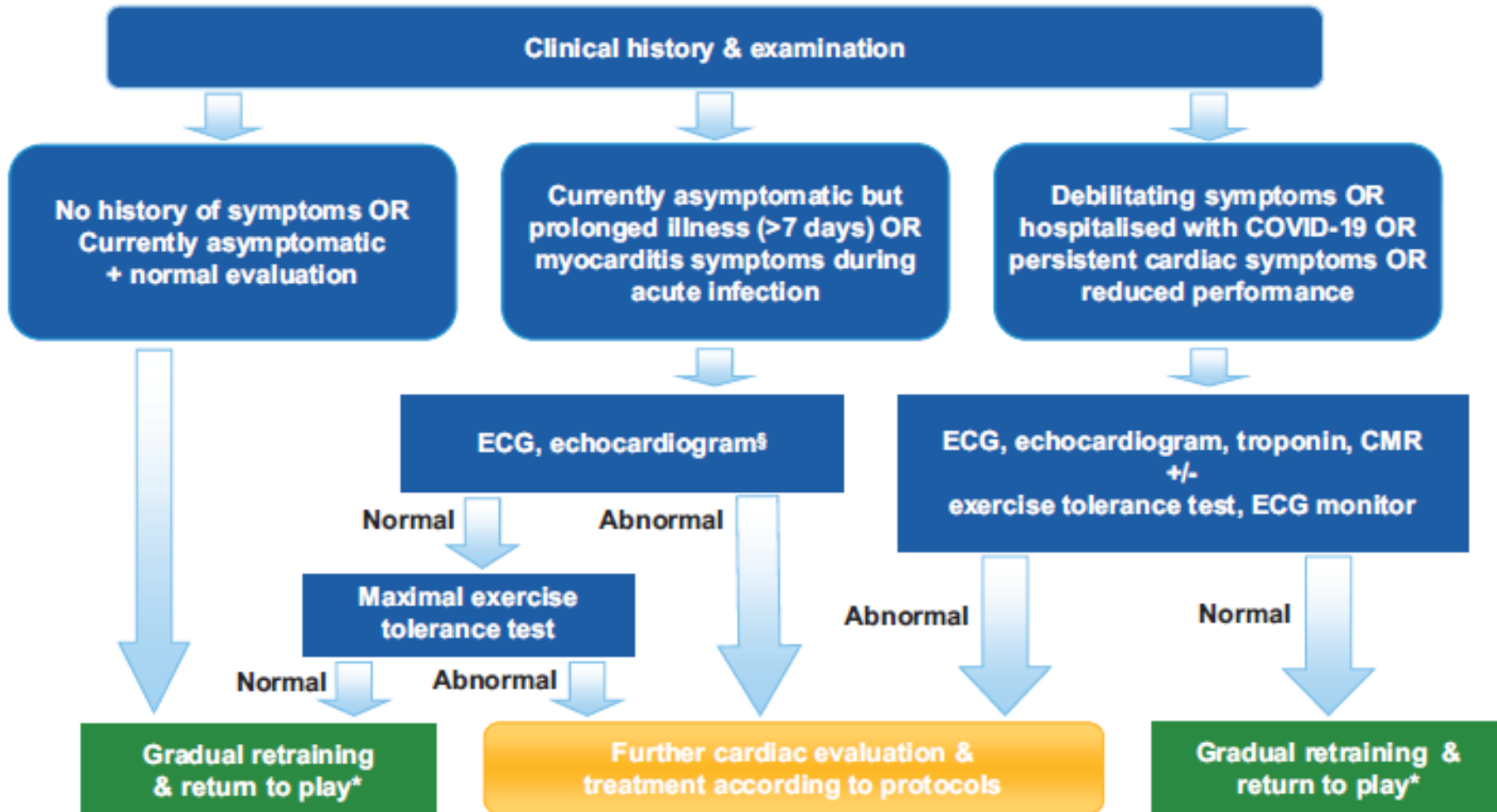
**Athlètes de haut niveau**

> PCR-Covid + ou Séro + adressé pour bilan cardiologique de reprise du sport avec

- Interrogatoire
- Examen clinique
- ECG
- ETT
- Ep Effort +/- VO2
- ➔ Incidence des anomalies CV

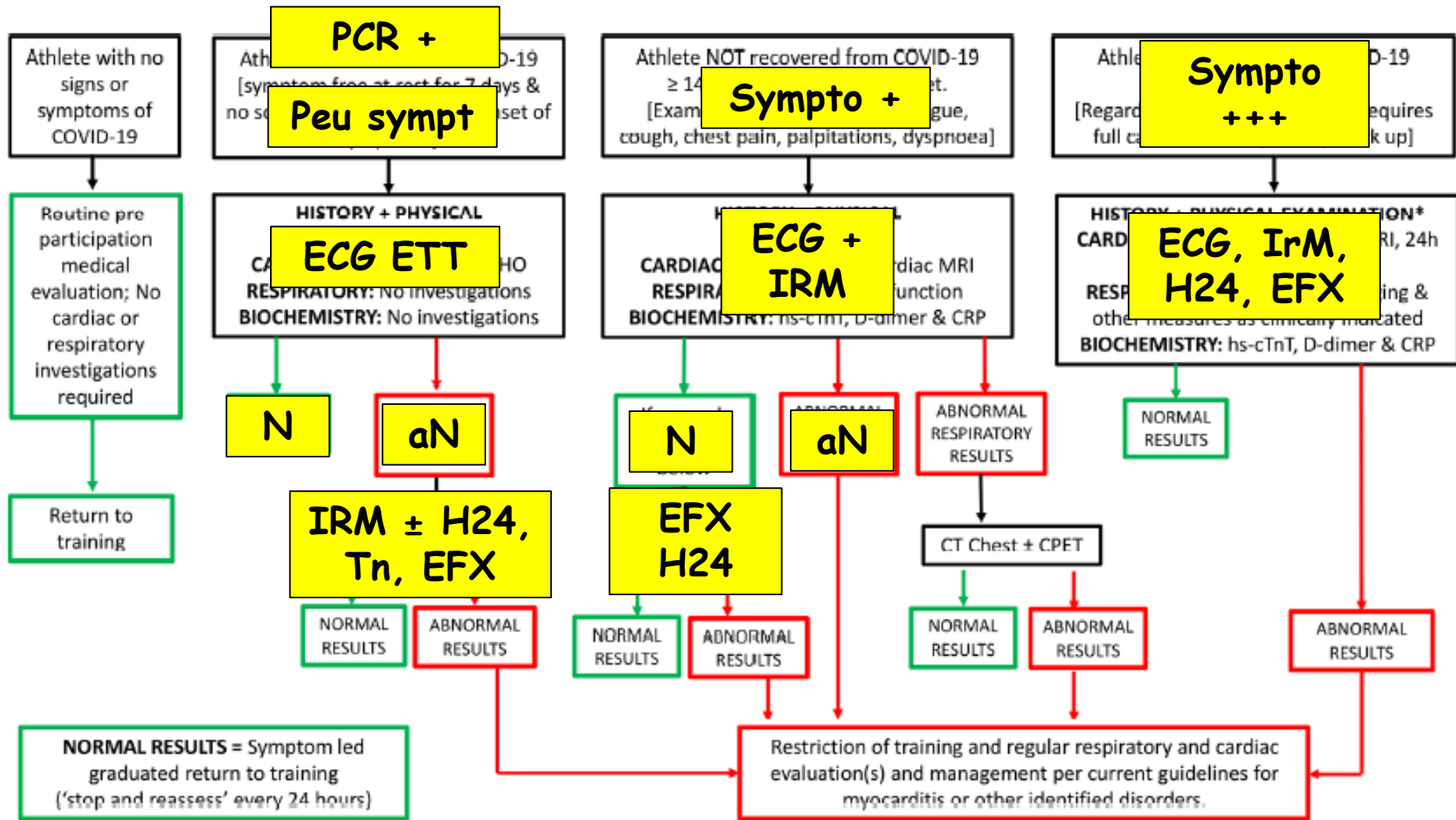
été 2020

# COVID-19 Return-to-Play Algorithm



Oct 2020

# COVID-19 Return-to-Play Algorithm



# Etapes de réflexion après infection à Covid 19 avant la reprise du sport

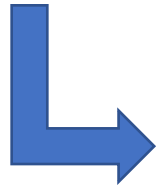
« niveau du Covid 19 »

- Test +
- Symptômes - à +++  
dont S. cardio



Ds tous les cas

- Arrêt du sport 7-10(-14) jours
- Après - test +
- fin des symptômes



Examens ?

- ECG (si possible)
- ETT
- Bio-Marqueurs / Tn hs

Comparatif  
+++

EE ( $\pm$ SaO<sub>2</sub>  $\pm$ VO<sub>2</sub>)  
À distance



IRM



Holter ECG/24H  
(en situation d'entraînement)

Si myocardite

→ 3-6 mois sans  
Sport Compétition

Zones grises

# Etapas de réflexion après infection à Covid 19 avant la reprise du sport



Cœur et activité sportive :



## Les 10 règles d'or

« Absolument, pas n'importe comment »

Recommandations édictées par le Club des Cardiologues du Sport

- 
- 1** Je signale à mon médecin toute douleur dans la poitrine ou tout essoufflement anormal survenant à l'effort\*
  - 2** Je signale à mon médecin toute palpitation cardiaque survenant à l'effort\*
  - 3** Je signale à mon médecin tout malaise survenant à l'effort ou juste après l'effort\*
  - 4** Je respecte toujours un échauffement et une récupération de 10 min lors de mes activités sportives
  - 5** Je bois 3 ou 4 gorgées d'eau toutes les 30 min d'exercice, à l'entraînement comme en compétition
  - 6** J'évite les activités intenses par des températures extérieures  $< -5^{\circ}\text{C}$  ou  $> +30^{\circ}\text{C}$  et lors des pics de pollution
  - 7** Je ne fume pas, en tout cas jamais dans les 2 heures qui précèdent ou suivent ma pratique sportive
  - 8** Je ne consomme jamais de substance dopante et j'évite l'automédication en général
  - 9** Je ne fais pas de sport intense si j'ai de la fièvre ni dans les 8 jours qui suivent un épisode grippal (fièvre + courbatures)
  - 10** Je pratique un bilan médical avant de reprendre une activité sportive intense (plus de 35 ans pour les hommes et plus de 45 ans pour les femmes)

\* Quels que soient mon âge, mes niveaux d'entraînement et de performance ou les résultats d'un précédent bilan cardiologique.

[www.clubcardiosport.com](http://www.clubcardiosport.com)