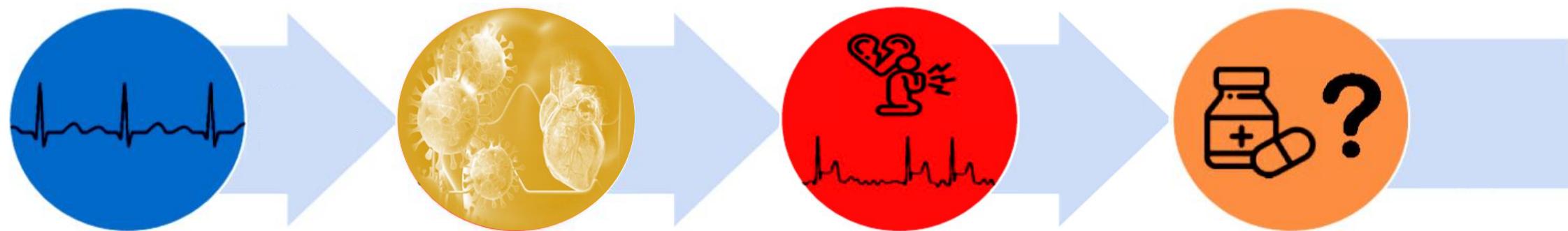


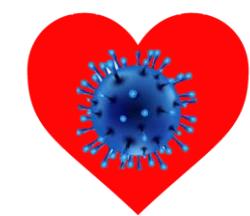
27 de ABRIL de 2022

Peculiaridades de la MIOPERICARDITIS ASOCIADA al COVID y su VACUNACIÓN



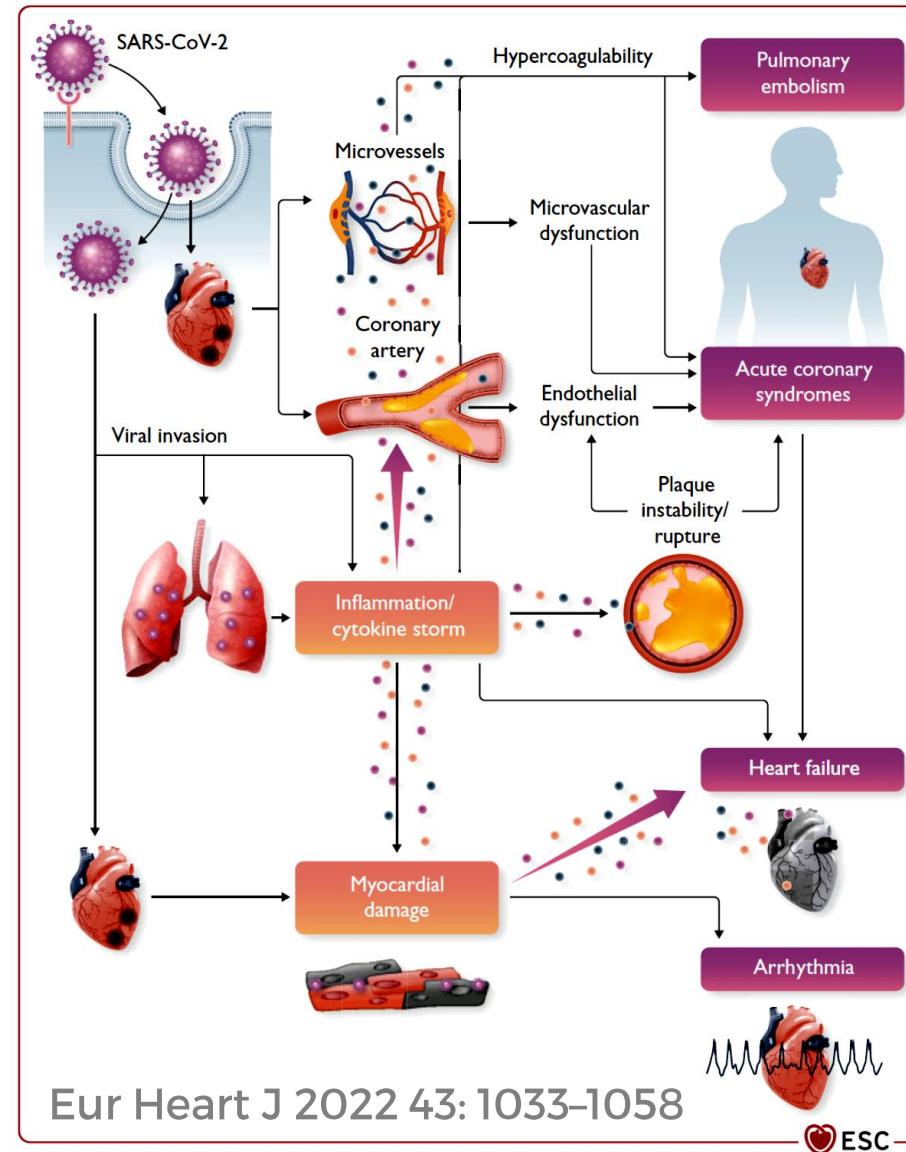
Sergio Raposeiras Roubín

Unidad de hospitalización y cuidados coronarios intermedios

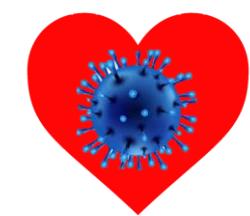


Introducción

COVID Y PATOLOGÍA CV



Dr. Sergio Raposeiras Roubín



Cuestiones epidemiológicas

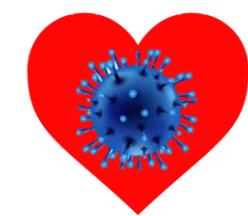


718,365 patients with COVID- 19

35,820 (**5.0%**) developed new-onset **myocarditis**

10,706 (**1.5%**) developed new-onset **pericarditis**

Eur J Clin Invest. 2021;51:e13679.



Cuestiones epidemiológicas

La incidencia anual de miocarditis se ha incrementado x 5

Incidencia anual de miocarditis por millón de habitantes

Pre-COVID

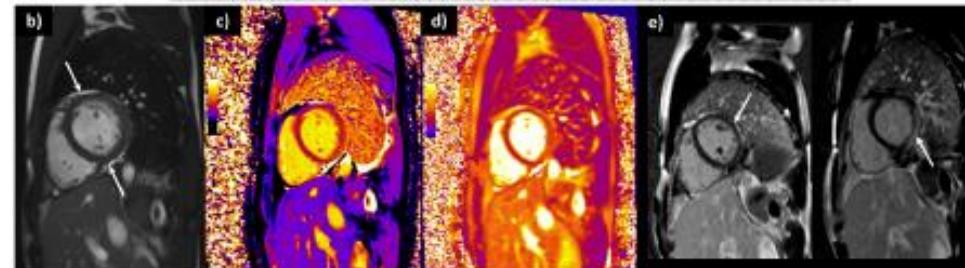
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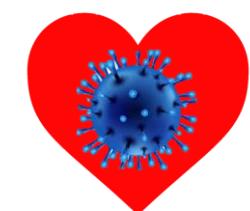
JACC 2022;S0735-1097(22)00306-0.



Post-COVID

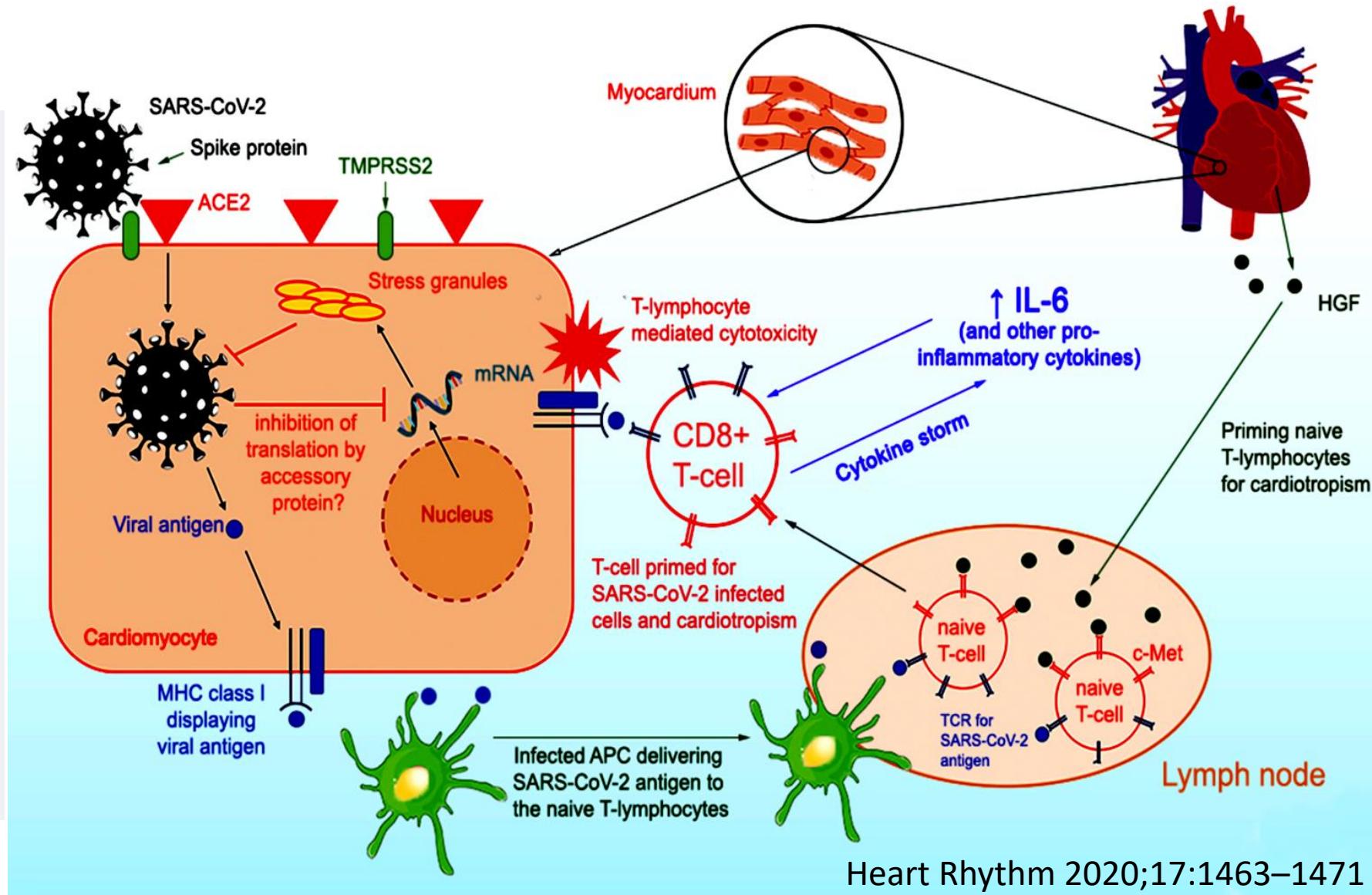
4500



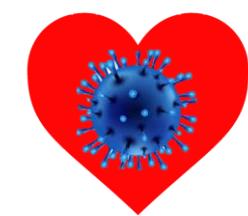


Etiopatogenia

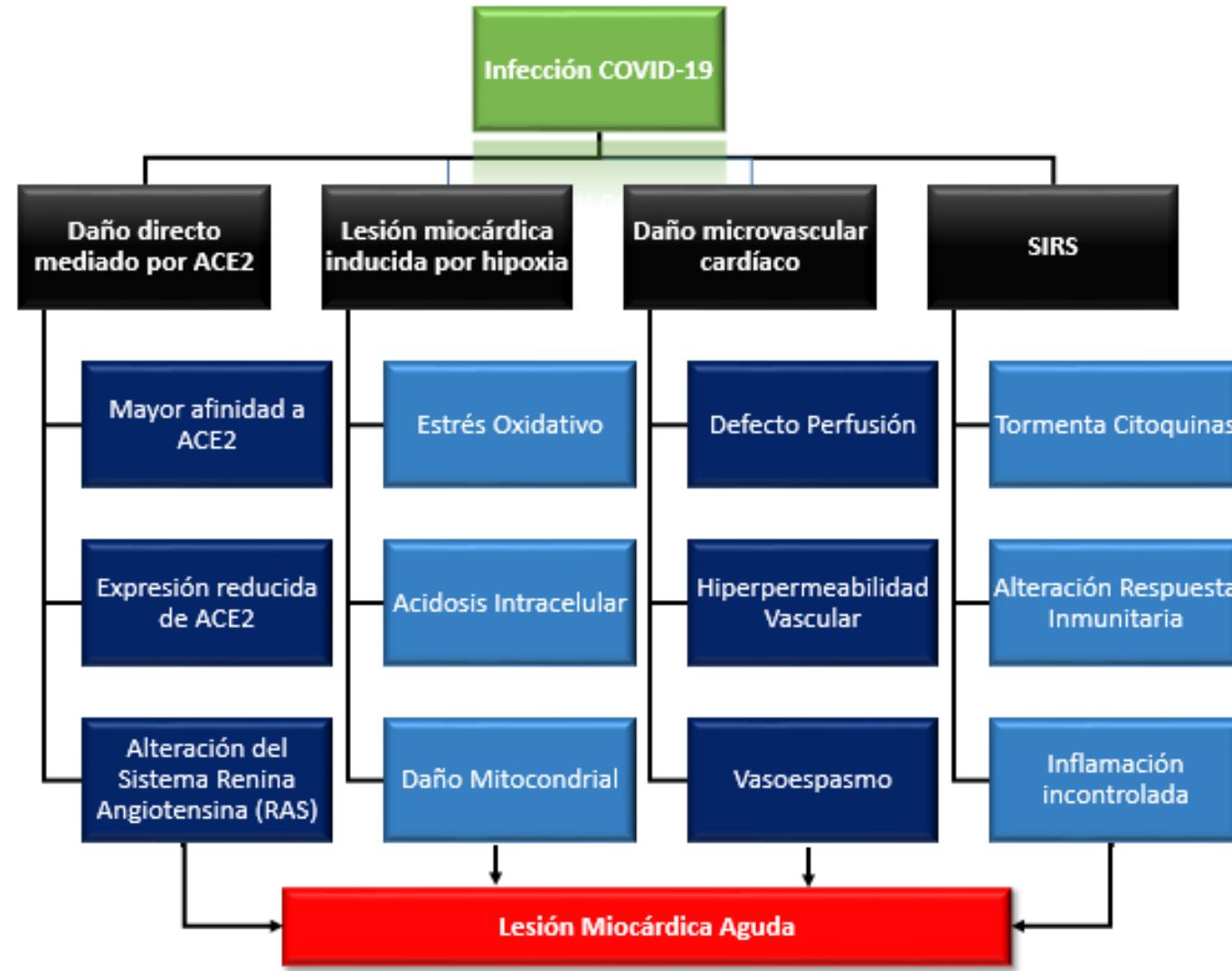
- The pathobiology of coronavirus infection involves SARS-CoV-2 binding to the host angiotensin-converting enzyme 2 (ACE2) receptor to mediate entry into cells. ACE2 is expressed in the lungs, heart and vessels.
- CVD associated with COVID-19 likely involves dysregulation of the ACE/ACE2 system due to SARS-CoV-2 infection and due to comorbidities, such as hypertension.
- SARS-CoV-2 directly infects human cardiomyocytes (native and induced pluripotent stem cell-derived) in an ACE2- and cathepsin-dependent manner. These effects can be inhibited by the antiviral drug remdesivir.
- CVD comorbidity in COVID-19 may be either primary or secondary due to acute lung injury, leading to increased cardiac workload (particularly relevant in HF).
- Other molecules such as neuropilin-1 can facilitate SARS-CoV-2 cell entry and infectivity, although significance of this process for CVD is unclear.
- A cytokine storm, originating from an imbalance of T-cell activation with dysregulated release of interleukin (IL)-6, IL-17, and other cytokines, may contribute to CVD in COVID-19. IL-6 targeting is being tested therapeutically.
- Immune system activation along with immunometabolism alterations may result in plaque instability, contributing to the development of acute coronary events.



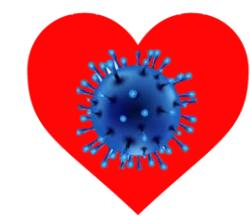
Heart Rhythm 2020;17:1463–1471



Etiopatogenia



https://twitter.com/Cardio_delaGuia/status/1240584448241

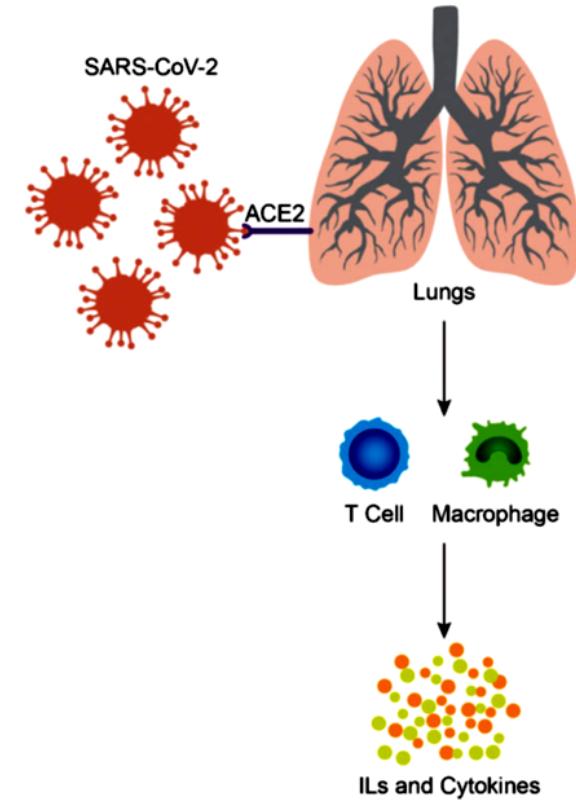
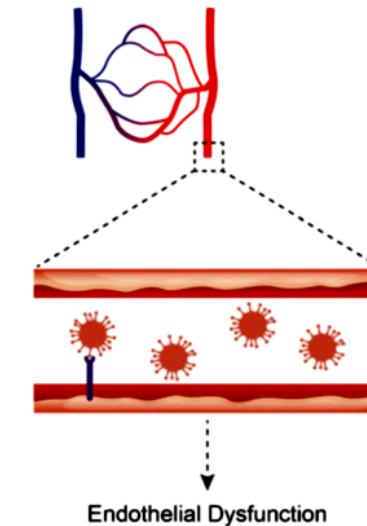
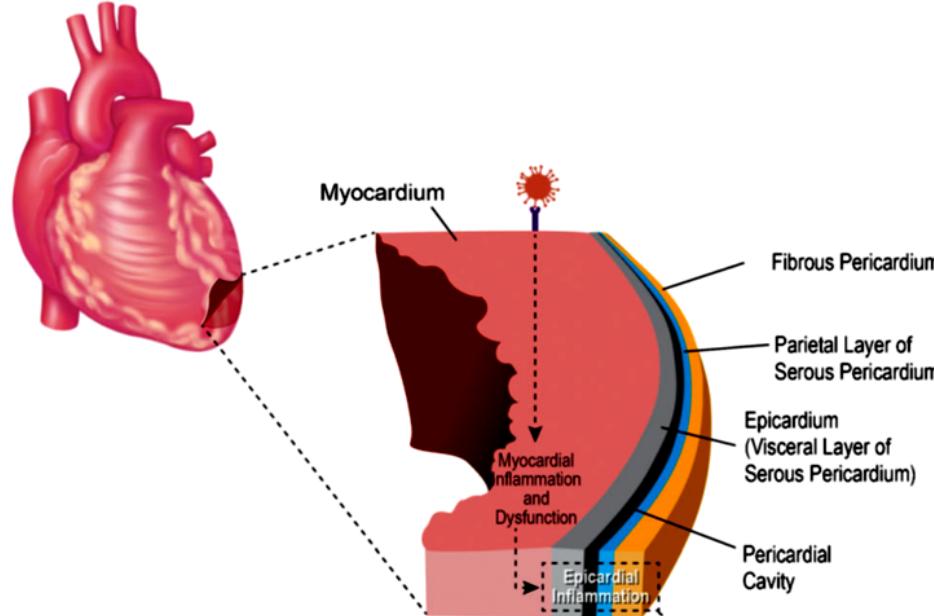


Etiopatogenia

Epicardial Inflammation

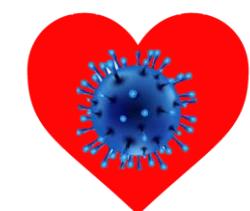
Microvascular Dysfunction

Systemic Inflammation

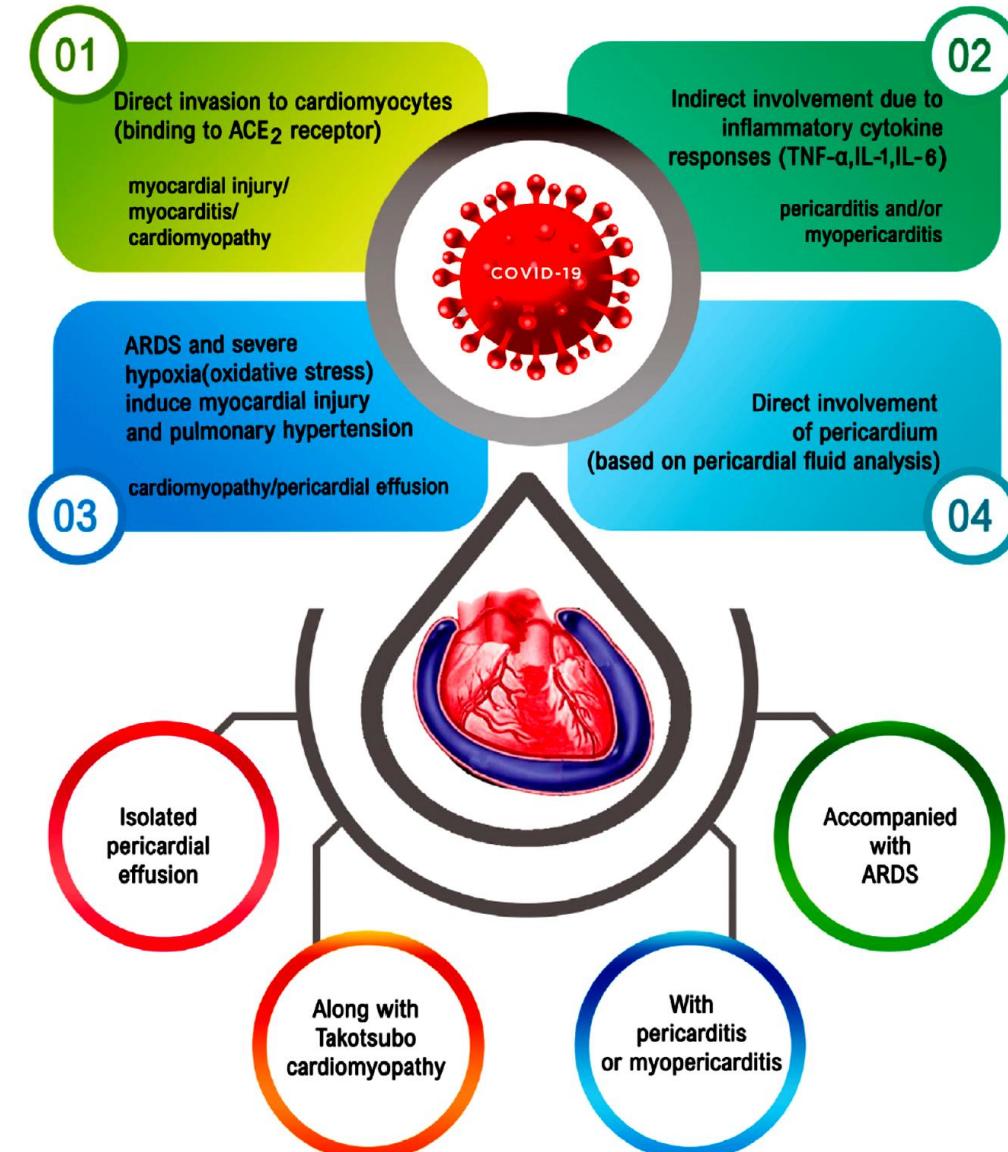
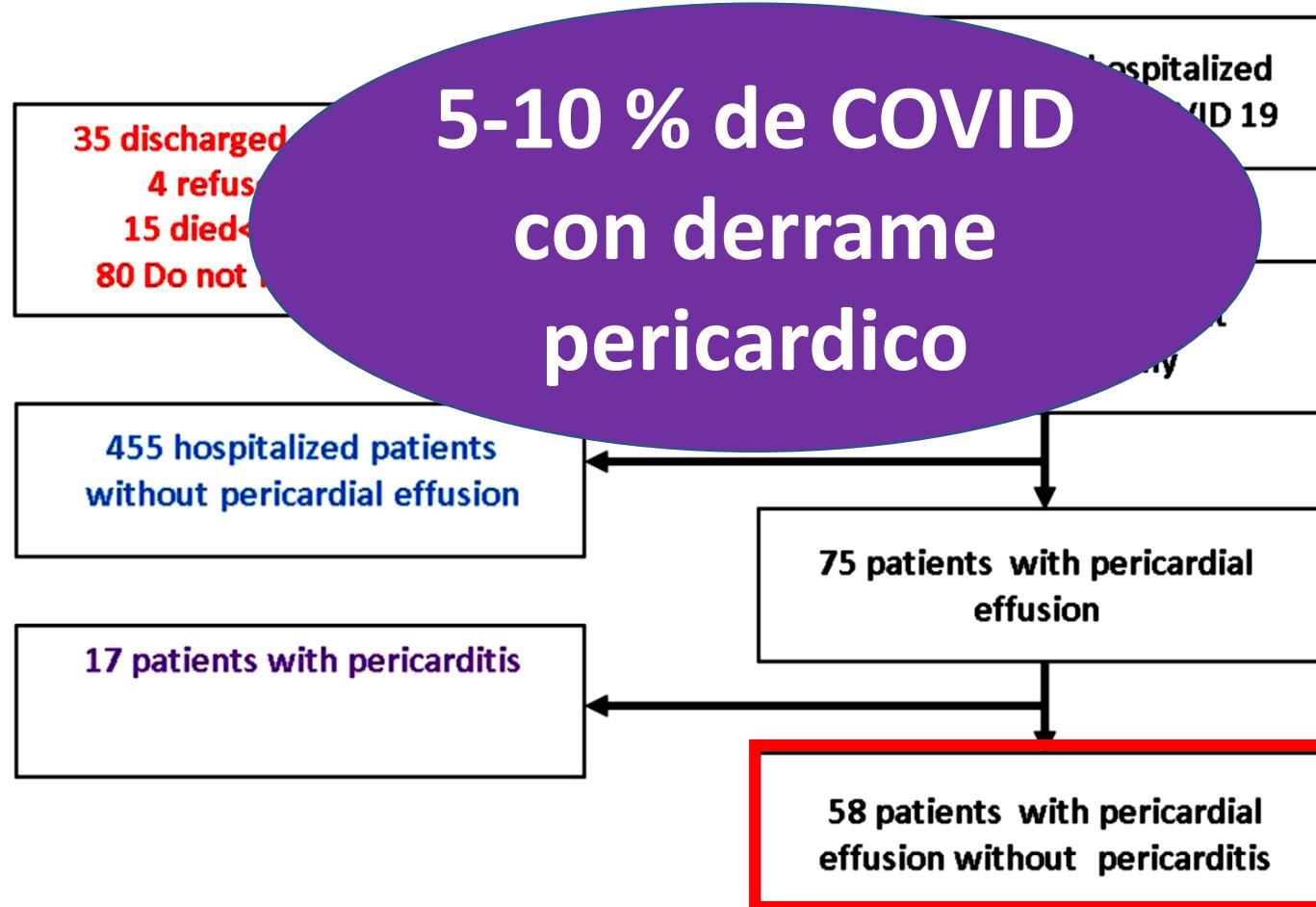


Pericarditis

Curr Cardiol Rep. 2021 Jun 3;23(7):90.

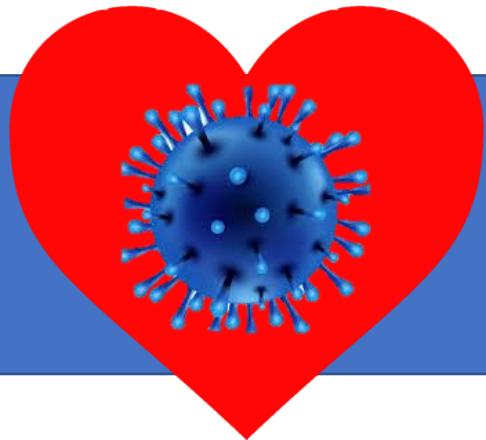


Etiopatogenia

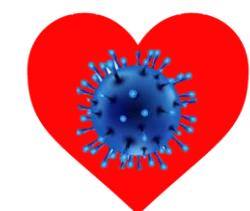


Curr Probl Cardiol 2021;00:100933

J Am Heart Assoc. 2022;10:e024363.



DIAGNÓSTICO



Definición

Definite myocarditis

Cardiac symptoms

(eg, chest pain, dyspnea, palpitations, syncope...)

Elevated cTn

Abnormal electrocardiographic

(eg, diffuse T-wave inversion, ST elevation without reciprocal ST-segment depression, prolongation of the QRS complex duration)

Echocardiographic

(eg, LV wall motion abnormalities, often noted in a noncoronary distribution)

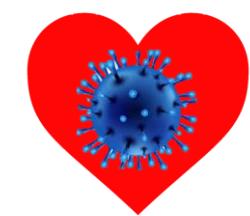
CMR

(eg, nonischemic LGE pattern with prolonged native T1 and T2 relaxation times)

Biopsy

(eg, inflammatory myocardial infiltrates associated with myocyte degeneration/necrosis)

* Flow-limiting coronary artery disease would have been excluded in men older than 50 years and women older than 55 years



Definición

Definite myocarditis

Cardiac symptoms

(eg, chest pain, dyspnea, palpitations, syncope...)

Elevated cTn

Probable myocarditis

Abnormal electrocardiographic

(eg, diffuse T-wave inversion, ST elevation without reciprocal ST-segment depression, prolongation of the QRS complex duration)

Echocardiographic

(eg, LV wall motion abnormalities, often noted in a noncoronary distribution)

Possible myocarditis

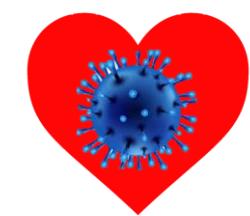
CMR

(eg, nonischemic cardiomyopathy with prolonged myocardial and T2 relaxation times)

Biopsy

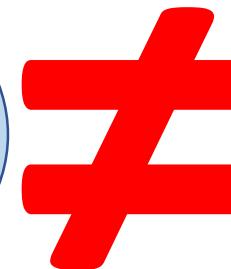
(eg, inflammatory infiltrates associated with myocyte degeneration and necrosis)

* Flow-limiting coronary artery disease would have been excluded in men older than 50 years and women older than 55 years



Definición

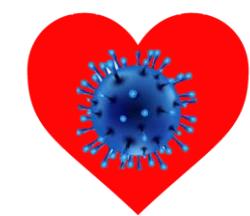
AFFECTACIÓN
MIOCÁRDICA



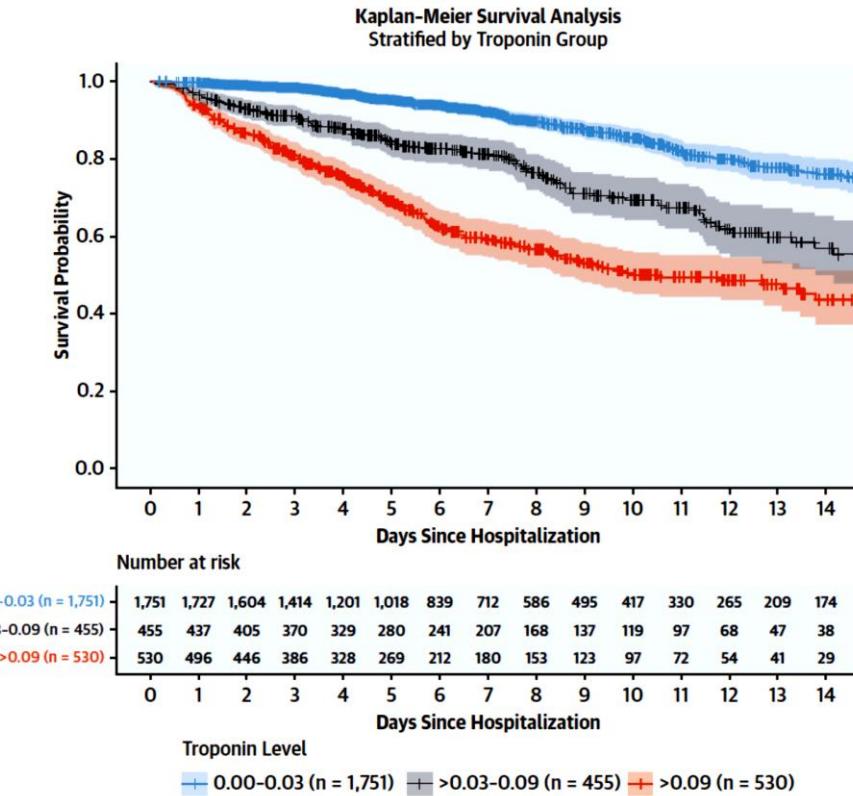
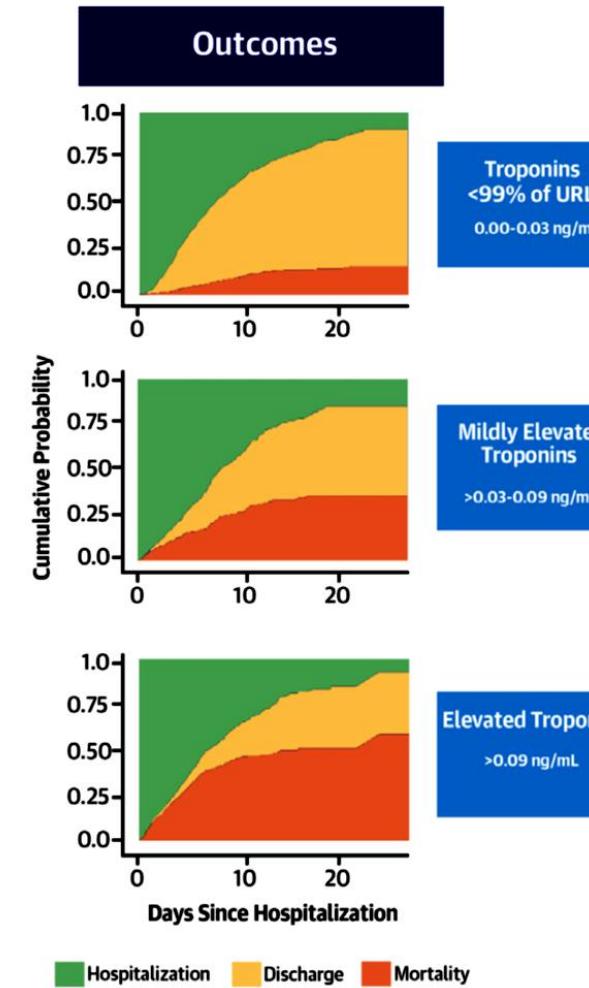
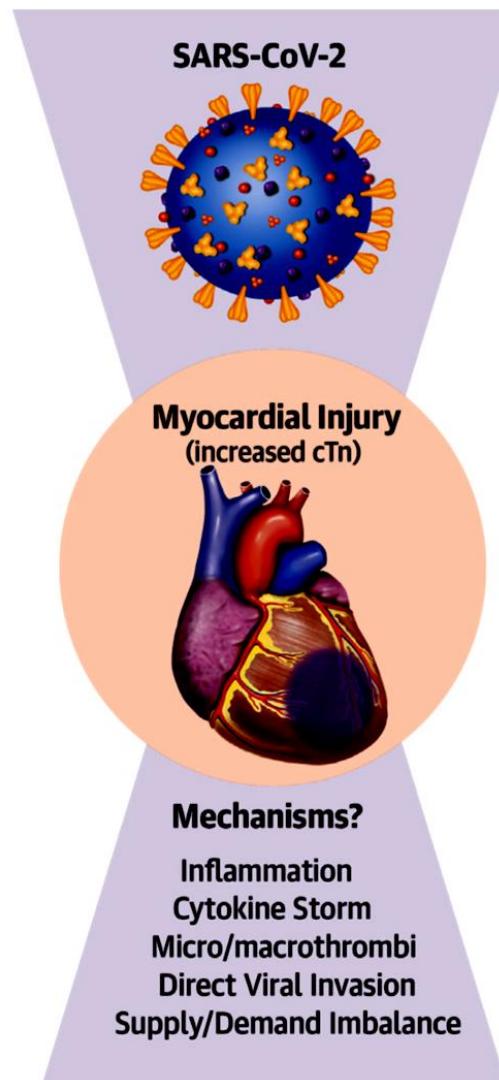
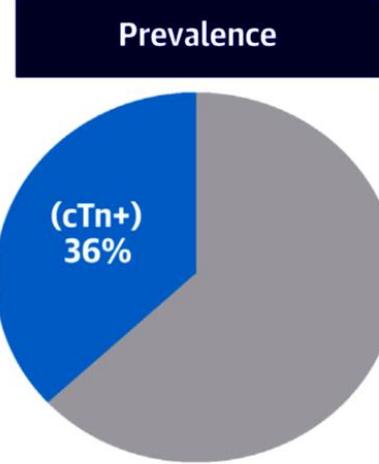
MIOCARDI
TIS



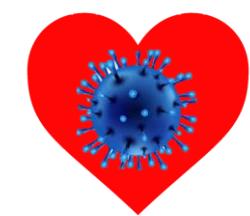
DAÑO
MIOCÁRDICO



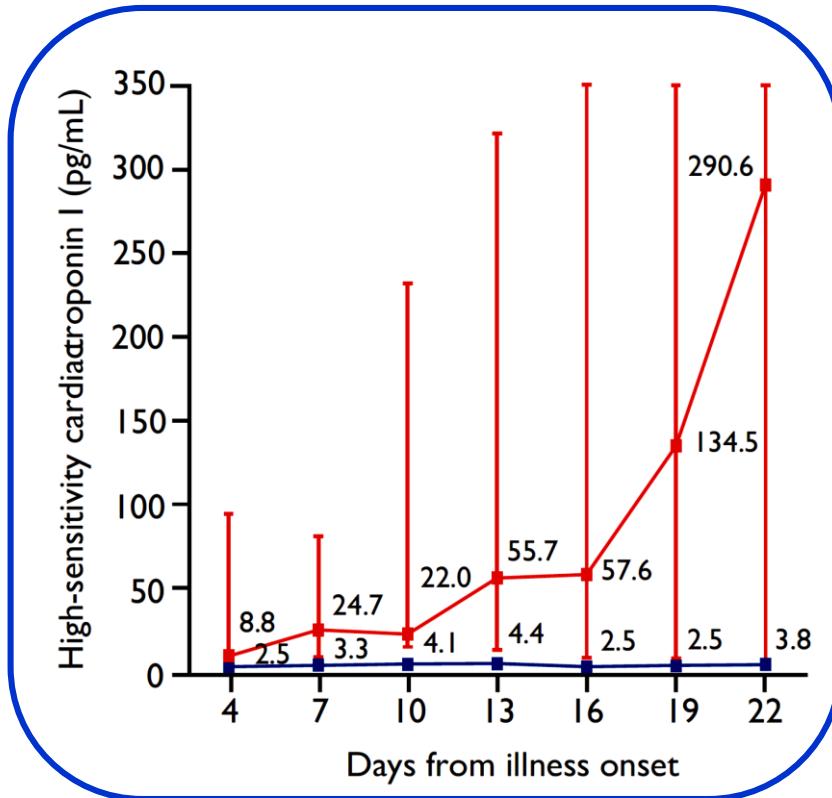
Miocarditis vs daño miocárdico: valor de la troponina



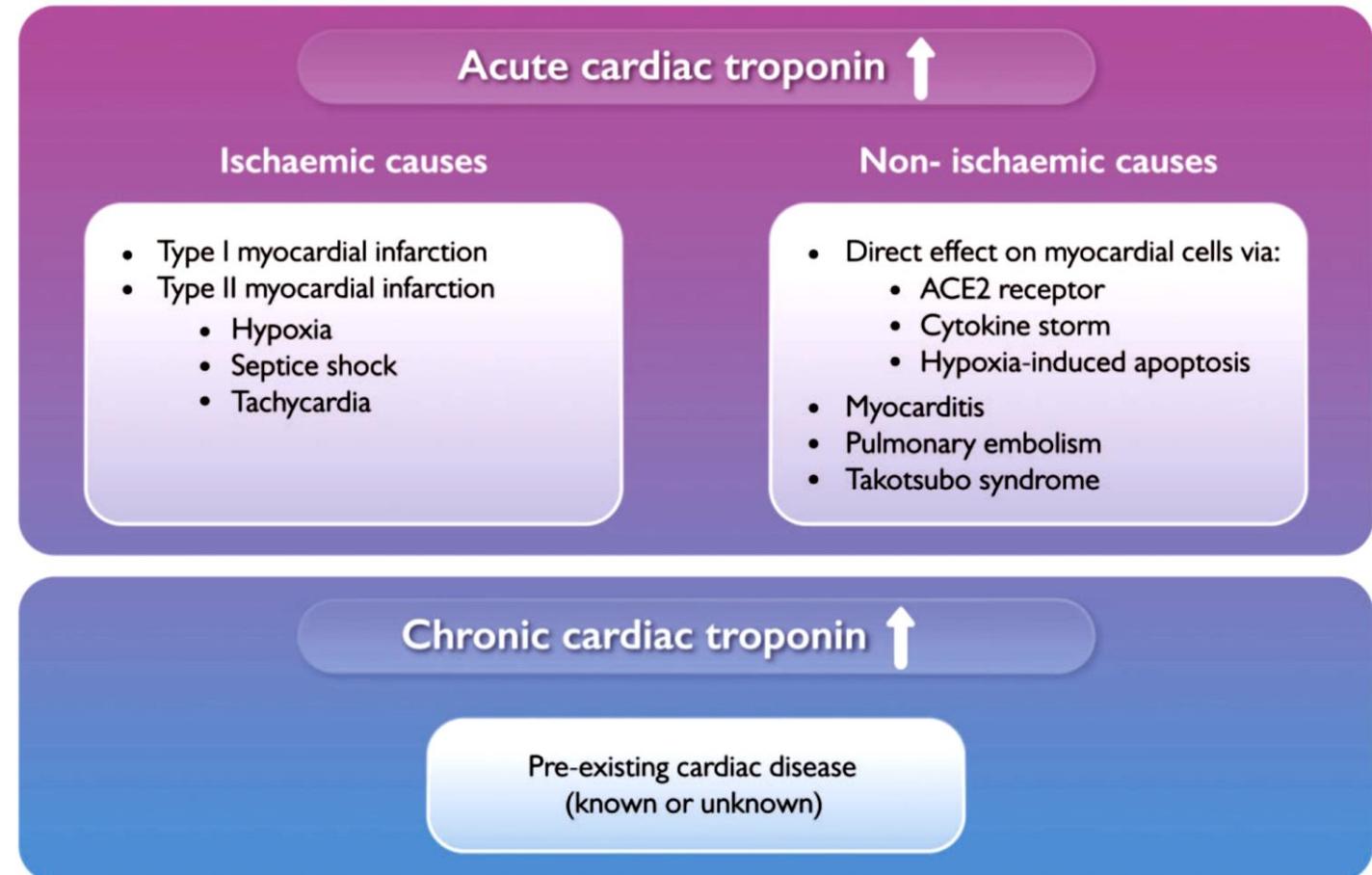
J Am Coll Cardiol. 2020;76(5):533



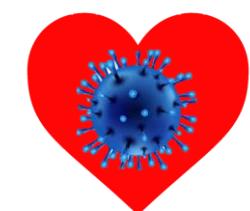
Miocarditis vs daño miocárdico: valor de la troponina



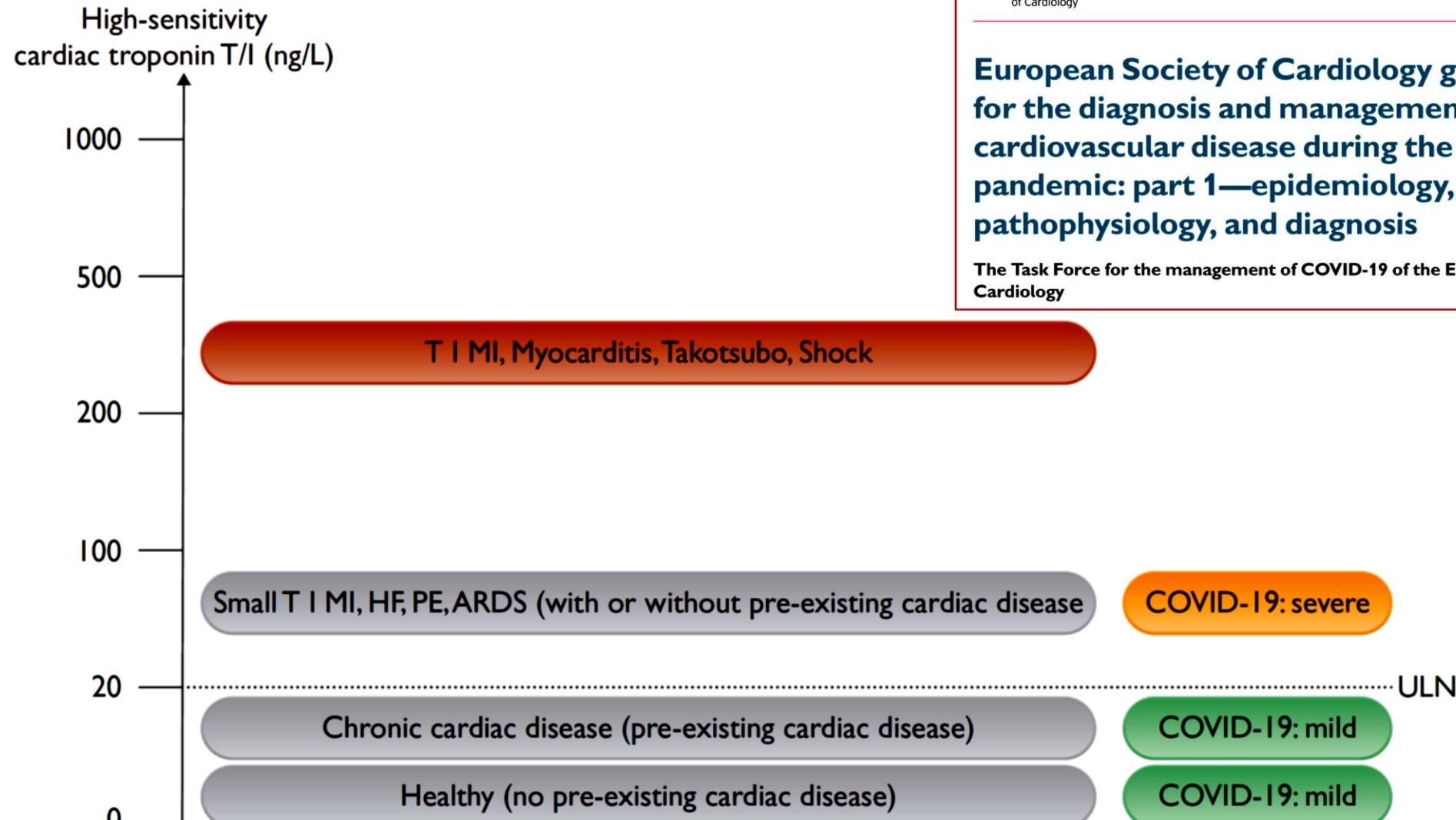
Lancet 2020;395:1054–1062



European Heart Journal (2022) 43, 1033–1058



Miocarditis vs daño miocárdico: valor de la troponina

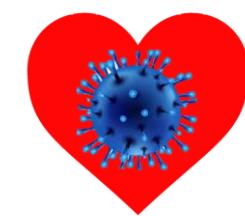


European Heart Journal (2022) **43**, 1033–1058
European Society of Cardiology <https://doi.org/10.1093/eurheartj/ehab696>

SPECIAL ARTICLE

European Society of Cardiology guidance for the diagnosis and management of cardiovascular disease during the COVID-19 pandemic: part 1—epidemiology, pathophysiology, and diagnosis

The Task Force for the management of COVID-19 of the European Society of Cardiology



Miocarditis vs afectación miocárdica: valor de las pruebas de imagen

Circulation

Circulation. 2020;142:342-353

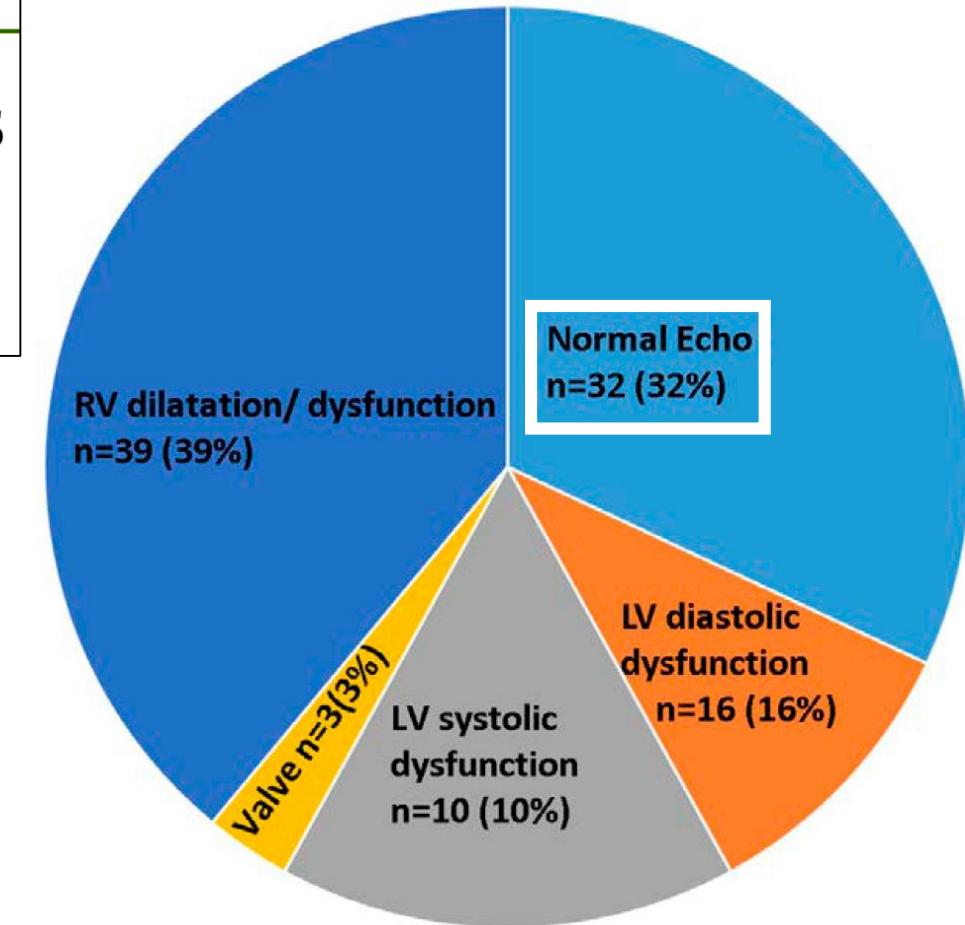
ORIGINAL RESEARCH ARTICLE

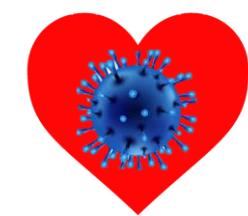
Spectrum of Cardiac Manifestations in COVID-19

A Systematic Echocardiographic Study

One hundred consecutive patients diagnosed with COVID-19 infection underwent complete echocardiographic evaluation within 24 hours of admission

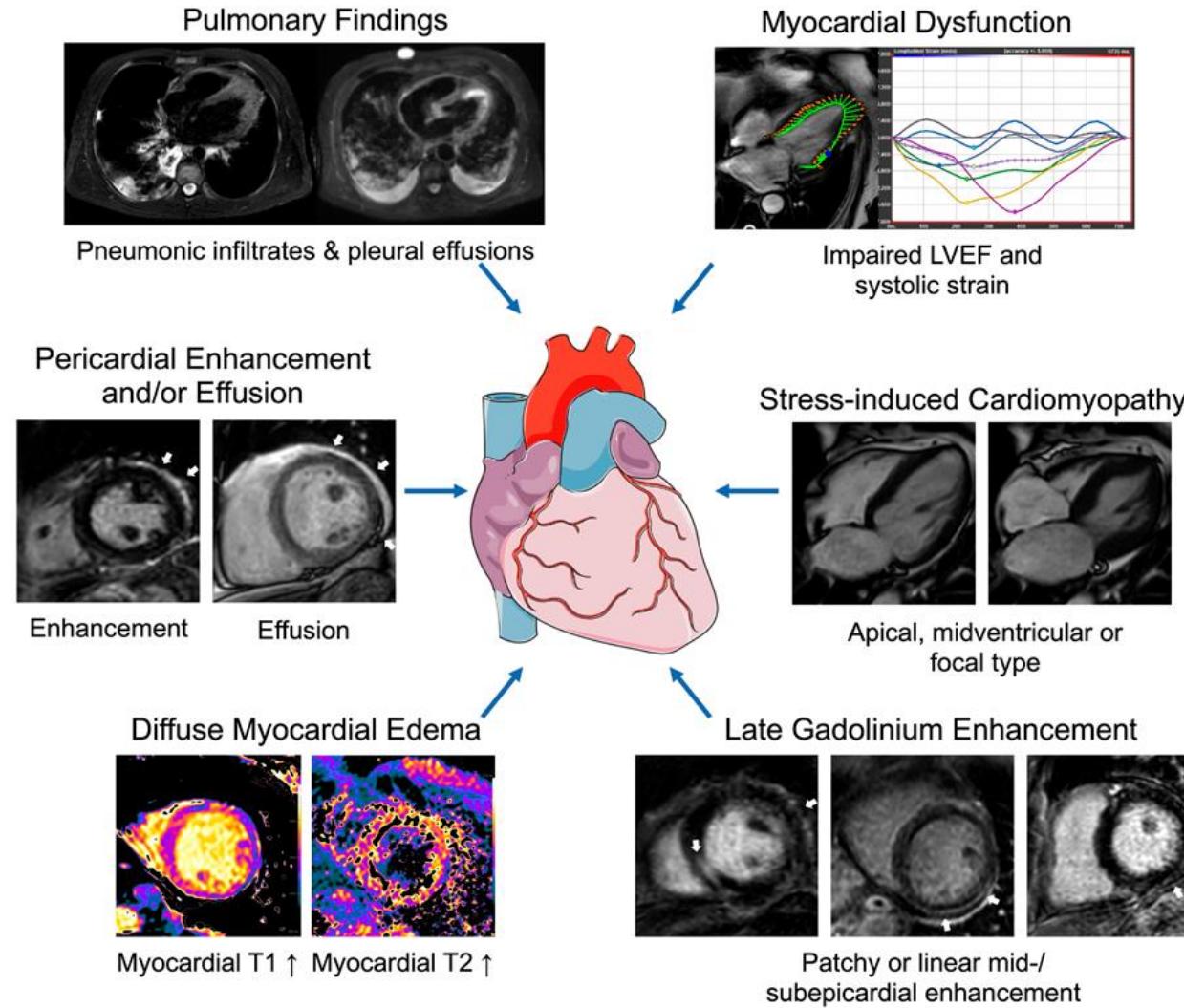
Advanced age, male sex, underlying CV disease, obesity, DM, hypertension, immunosuppression, and severe systemic disease

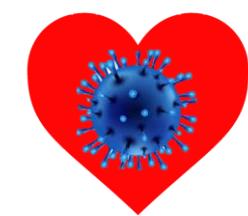




Miocarditis vs afectación miocárdica: valor de las pruebas de imagen

Cardiac MRI Findings in Suspected Acute COVID-19 Myocarditis





Miocarditis vs afectación miocárdica: valor de las pruebas de imagen

JAMA Cardiology | Original Investigation

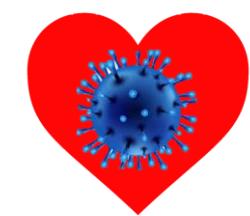
JAMA Cardiol. 2020;5(11):1265-1273. doi:10.1001/jamacardio.2020.3557

Published online July 27, 2020. Corrected on August 25, 2020.

Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19)

Valentina O. Puntmann, MD, PhD; M. Ludovica Carerj, MD; Imke Wieters, MD; Masia Fahim; Christophe Arendt, MD; Jedrzej Hoffmann, MD; Anastasia Shchendrygina, MD, PhD; Felicitas Escher, MD; Mariuca Vasa-Nicotera, MD; Andreas M. Zeiher, MD; Maria Vehreschild, MD; Eike Nagel, MD

CONCLUSIONS AND RELEVANCE In this study of a cohort of German patients recently recovered from COVID-19 infection, CMR revealed cardiac involvement in 78 patients (78%) and ongoing myocardial inflammation in 60 patients (60%), independent of preexisting conditions, severity and overall course of the acute illness, and time from the original diagnosis. These findings indicate the need for ongoing investigation of the long-term cardiovascular consequences of COVID-19.



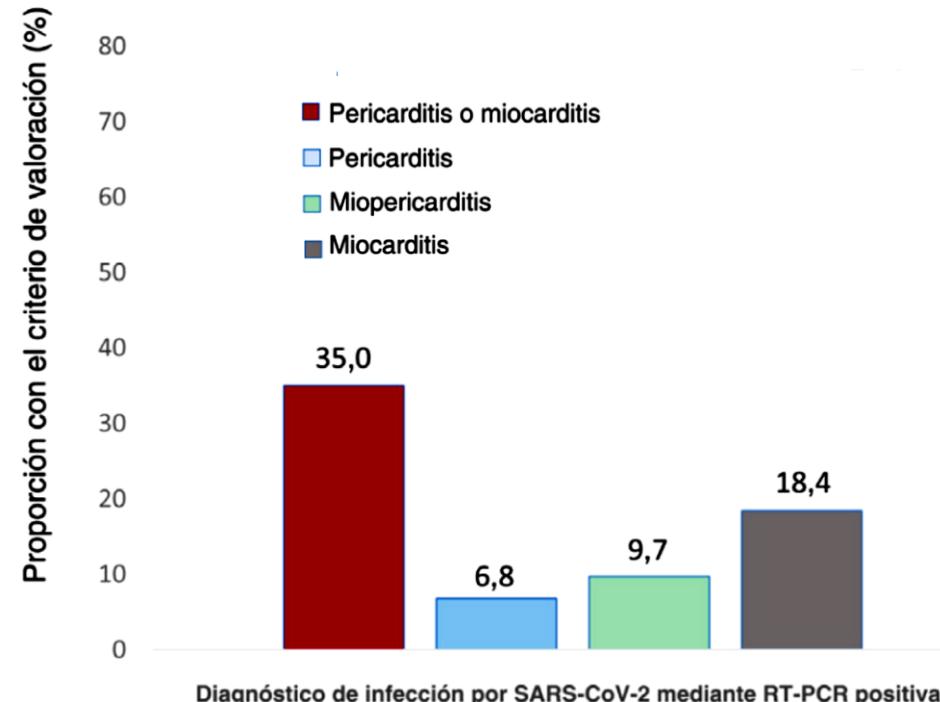
Miocarditis vs afectación miocárdica: valor de las pruebas de imagen

Rev Esp Cardiol. 2022;xx(x):xxx-xxx

Artículo original

Afección pericárdica y miocárdica tras infección por SARS-CoV-2: estudio descriptivo transversal en trabajadores sanitarios

Rocío Eiros^{a,b,c}, Manuel Barreiro-Pérez^{a,b,c}, Ana Martín-García^{a,b,c,d}, Julia Almeida^{c,d,e,f,g}, Eduardo Villacorta^{a,b,c,d}, Alba Pérez-Pons^{c,e,f,g}, Soraya Merchán^{a,b,c}, Alba Torres-Valle^{c,e,f,g}, Clara Sánchez-Pablo^{a,b,c}, David González-Calle^{a,b,c}, Oihane Pérez-Escurza^{c,e,f,g}, Inés Toranzo^{a,c}, Elena Díaz-Peláez^{a,b,c}, Blanca Fuentes-Herrero^{c,e,f,g}, Laura Macías-Álvarez^{a,b,c}, Guillermo Oliva-Ariza^{c,e,f,g}, Quentin Lecrevisse^{c,e,f,g}, Rafael Fluxa^{c,d,e,f,g}, José L. Bravo-Grande^{c,h}, Alberto Orfao^{c,d,e,f,g} y Pedro L. Sánchez^{a,b,c,d,*}, en representación de los investigadores CCC (cardiac COVID-19 healthcare workers)[△]



La mediana de edad 52 (41-57) años, 71,9% mujeres

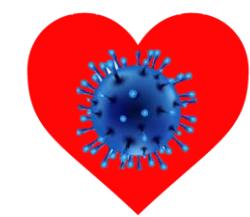
**16,5% con neumonía por COVID-19
Evaluación (10,4 [9,3-11,0] semanas después de COVID**

**41,7% presentaba dolor torácico/disnea/palpitaciones
49,6% alteraciones electrocardiográficas
7,9% elevación de NT-proBNP
0,7% elevación de troponina**

La sospecha clínica de pericarditis se asoció con un elevado número de células T citotóxicas y recuento de eosinófilos

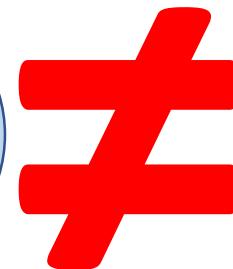
Los participantes con sospecha clínica de miopericarditis o miocarditis tenían recuentos de neutrófilos, células natural killer y células plasmáticas más bajos



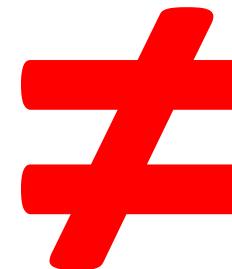


Miocarditis vs afectación miocárdica vs daño miocárdico

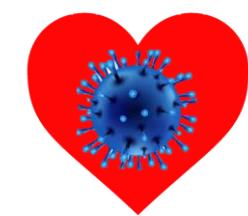
AFFECTACIÓN
MIOCÁRDICA



**MIOCARDI
TIS**



DAÑO
MIOCÁRDICO



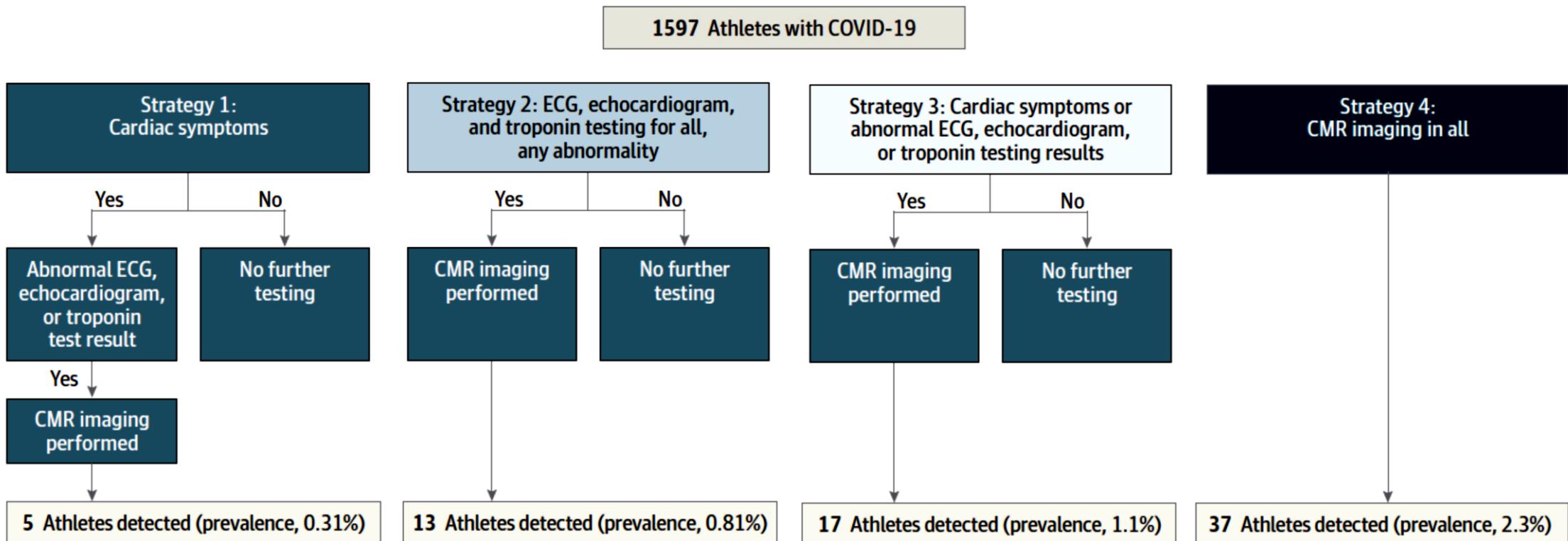
Miocarditis vs afectación miocárdica: valor de las pruebas de imagen

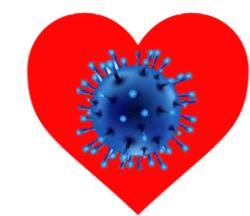
JAMA Cardiology | Original Investigation

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; Saurabh Rajpal, MBBS, MD; Joel T. Greenshields, MS; Geoffrey L. Rosenthal, MD; Eugene H. Chung, MD; Michael Terrin, MD; Jean Jeudy, MD; Scott E. Mattson, DO; Ian H. Law, MD; James Borchers, MD; Richard Kovacs, MD; Jeffrey Kovan, DO; Sami F. Rifat, MD; Jennifer Albrecht, PhD; Ana I. Bento, PhD; Lonnie Albers, MD; David Bernhardt, MD; Carly Day, MD; Suzanne Hecht, MD; Andrew Hipskind, MD; Jeffrey Mjaanes, MD; David Olson, MD; Yvette L. Rooks, MD; Emily C. Somers, PhD; Matthew S. Tong, DO; Jeffrey Wisinski, DO; Jason Womack, MD; Carrie Espeneko, PhD; Christopher J. Kratochvil, MD; Lawrence D. Rink, MD; for the Big Ten COVID-19 Cardiac Registry Investigators

JAMA Cardiol. 2021;6(9):1078-1087





Miocarditis vs afectación miocárdica vs daño miocárdico

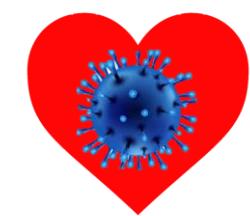


Center for Disease Control & Prevention
www.cdc.gov

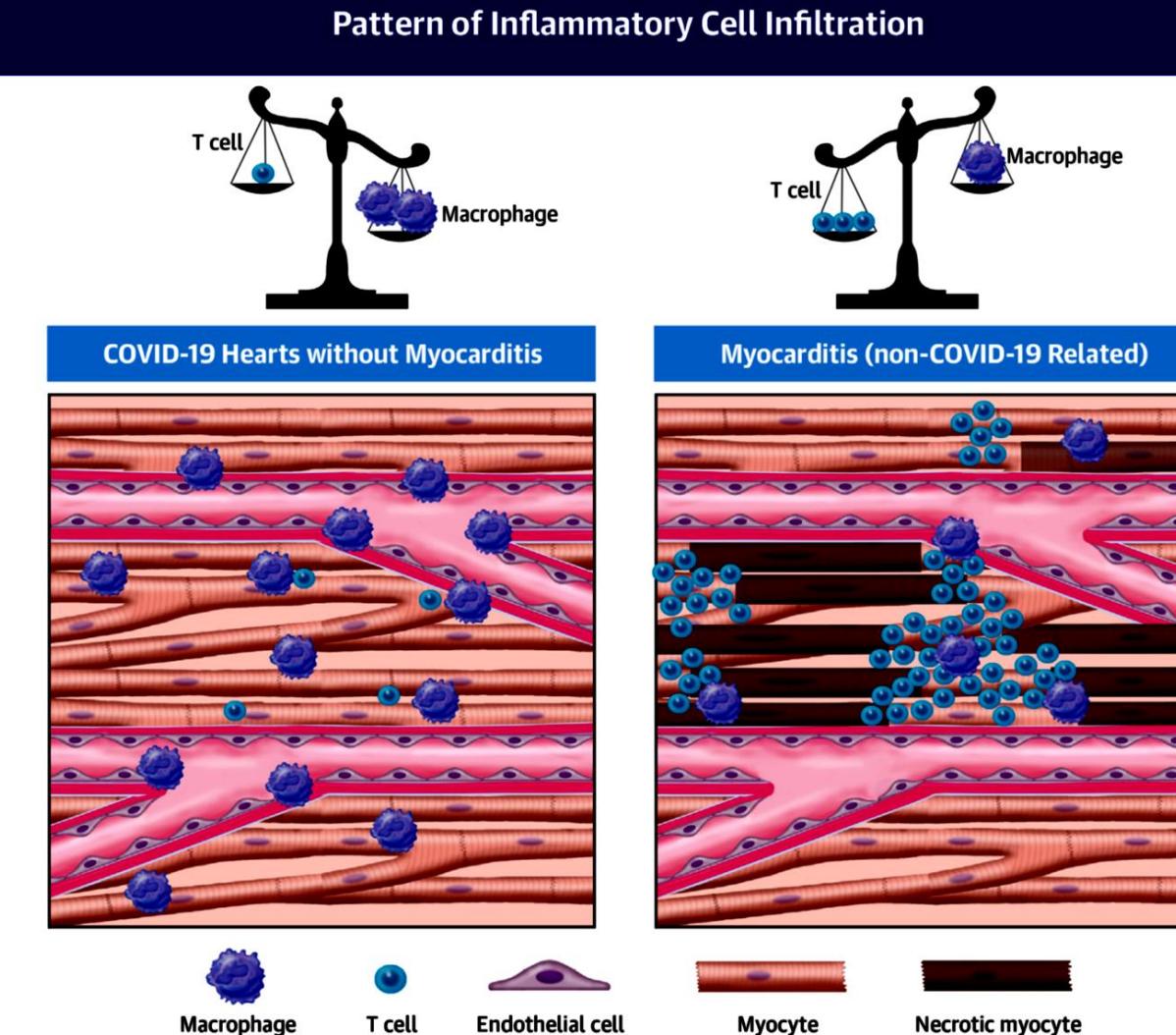
CDC Working Case Definitions

Acute Myocarditis		Acute Pericarditis
Probable Case	Confirmed Case	Probable Case
<ul style="list-style-type: none">• Presence of ≥ 1 new or worsening of the following clinical symptoms<ul style="list-style-type: none">• chest pain/ pressure/ discomfort• dyspnea/shortness of breath• palpitations• syncope• AND ≥ 1 new finding of<ul style="list-style-type: none">• elevated troponin above upper limit of normal• abnormal ECG or rhythm monitoring findings consistent with myocarditis*• abnormal cardiac function or wall motion abnormalities on echocardiogram• cardiac MRI findings consistent with myocarditis †• AND no other identifiable cause of the symptoms and findings	<ul style="list-style-type: none">• Presence of ≥ 1 new or worsening of the following clinical symptoms<ul style="list-style-type: none">• chest pain/ pressure/ discomfort• dyspnea/shortness of breath• palpitations• syncope• AND<ul style="list-style-type: none">• histopathologic confirmation of myocarditis ‡• OR• elevated troponin above upper limit of normal AND cardiac MRI findings consistent with myocarditis†• AND no other identifiable cause of the symptoms and findings	<ul style="list-style-type: none">• Presence of ≥ 2 new or worsening of the following clinical symptoms<ul style="list-style-type: none">• acute chest pain (typically described as pain made worse by lying down, deep inspiration, cough, and relieved by sitting up or leaning forward, although other types of chest pain may occur) §• pericarditis rub on exam• new ST-elevation or PR-depression on ECG• new or worsening pericardial effusion on echocardiogram or MRI• Autopsy cases may be classified as pericarditis on basis of meeting histopathologic criteria of the pericardium

Circulation. 2021;144:471–484

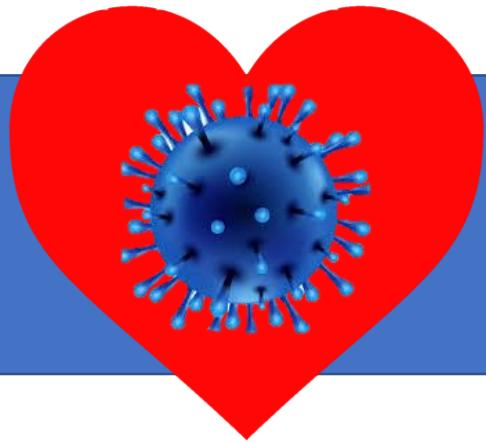


Miocarditis por COVID: Valor de la biopsia

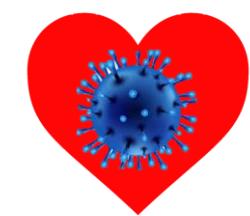


Endomyocardial biopsy should be considered in those with clinical deterioration, particularly if heart block or ventricular arrhythmias are present and obstructive CAD has been excluded

J Am Coll Cardiol. 2021;77(3):314-25



PRONÓSTICO



Miocarditis por COVID: Incidencia y Pronóstico según severidad

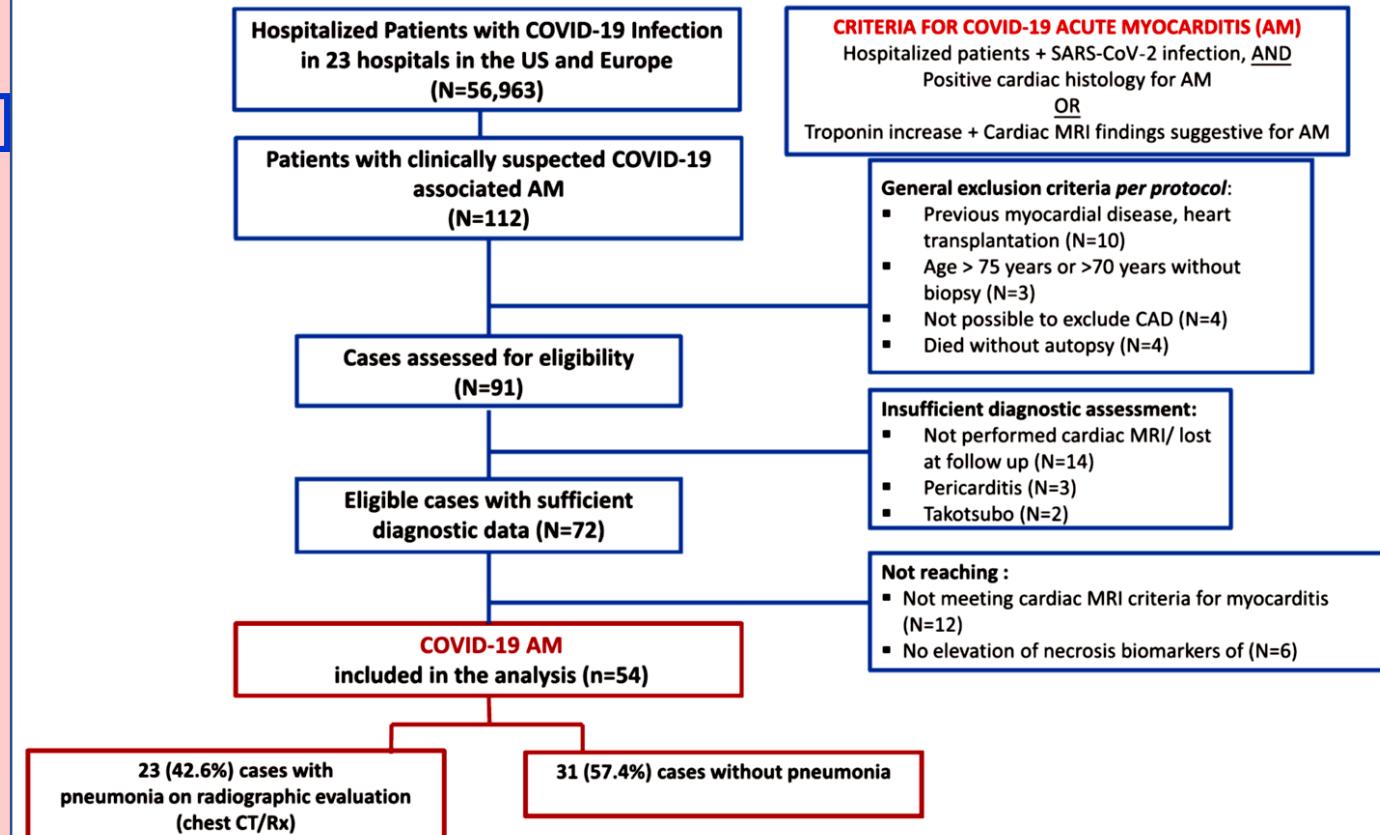
ORIGINAL RESEARCH ARTICLE



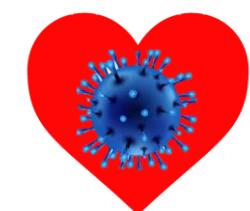
Prevalence, Characteristics, and Outcomes of COVID-19–Associated Acute Myocarditis

What Is New?

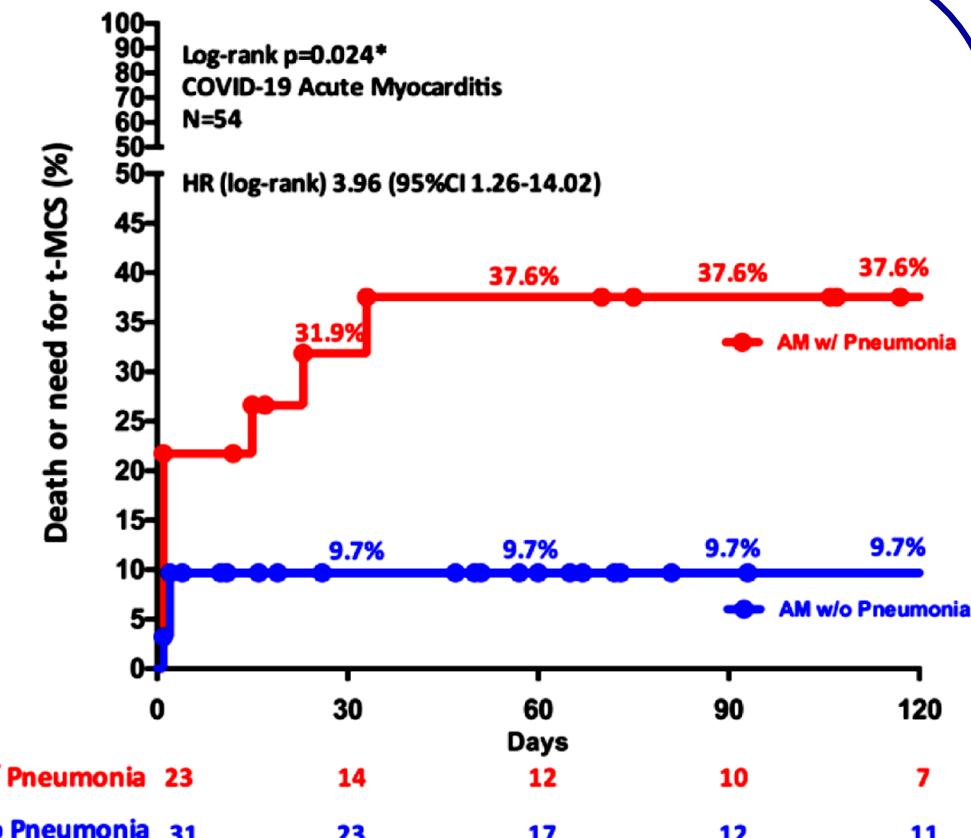
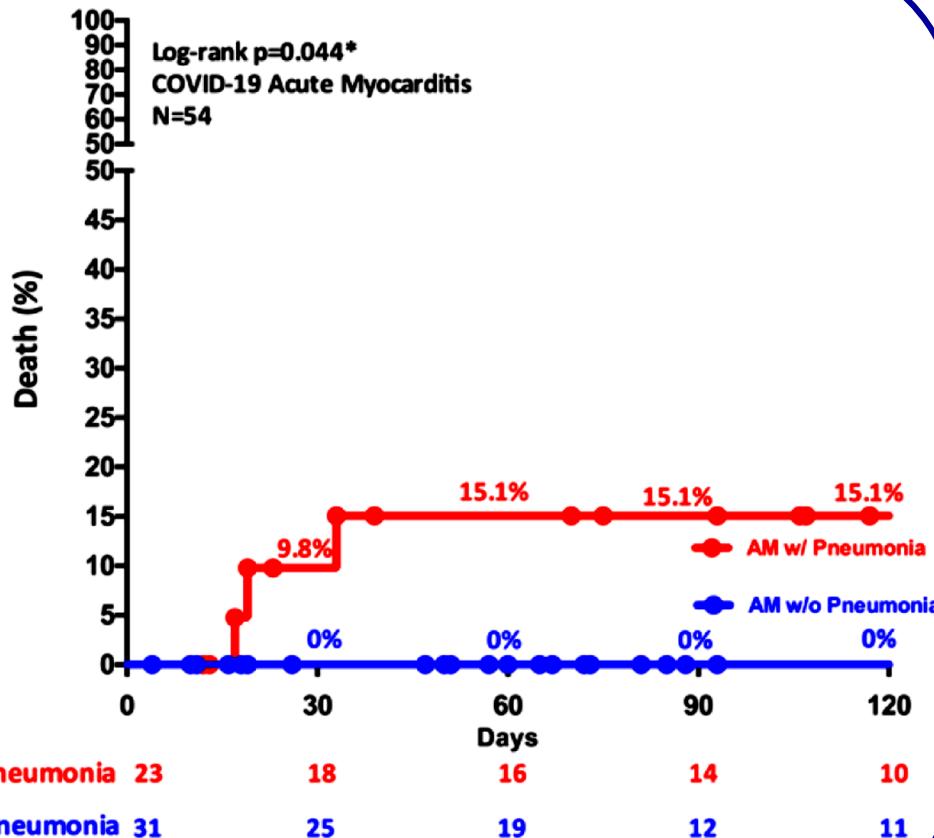
- Estimation of definite/probable acute myocarditis prevalence among patients with COVID-19 is **2.4** per 1000 hospitalizations.
- Thirty-nine percent** of patients with COVID-19 acute myocarditis had a fulminant presentation requiring inotropic support or temporary mechanical circulatory support, and 70.4% were admitted to the intensive care unit.
- Mortality or temporary mechanical circulatory support during the hospitalization was **20.4%**. At 120 days, among patients with COVID-19 acute myocarditis, estimated mortality was 6.6%.
- Among patients with COVID-19 acute myocarditis, those with concurrent pneumonia compared with those without pneumonia had a mortality of 15.1% versus 0% ($P=0.044$), respectively.



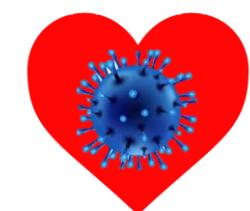
Circulation. 2022;145:1123–1139



Miocarditis por COVID: Incidencia y Pronóstico según severidad



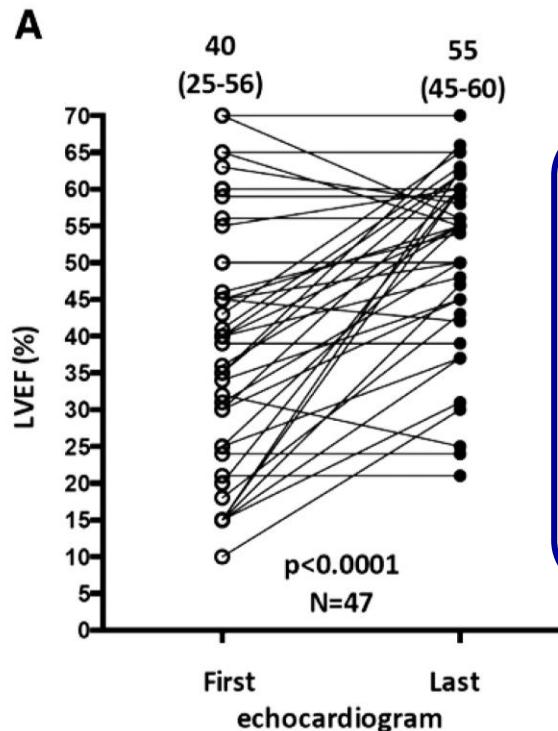
Circulation. 2022;145:1123-1139



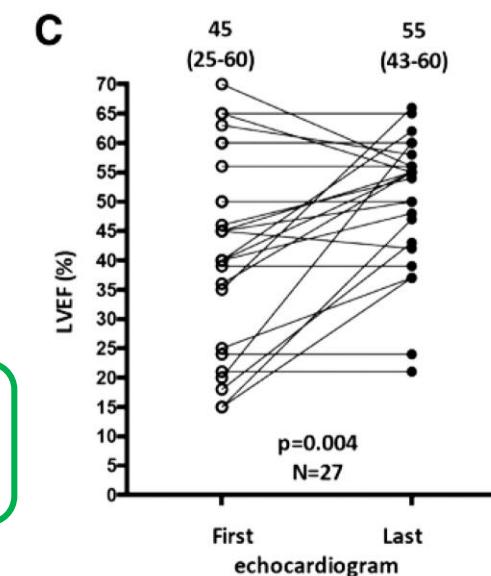
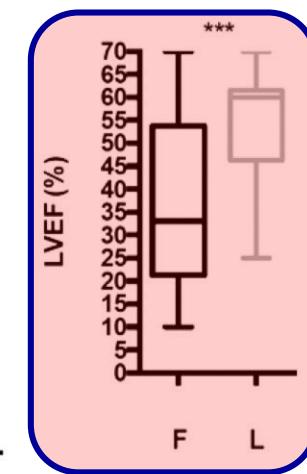
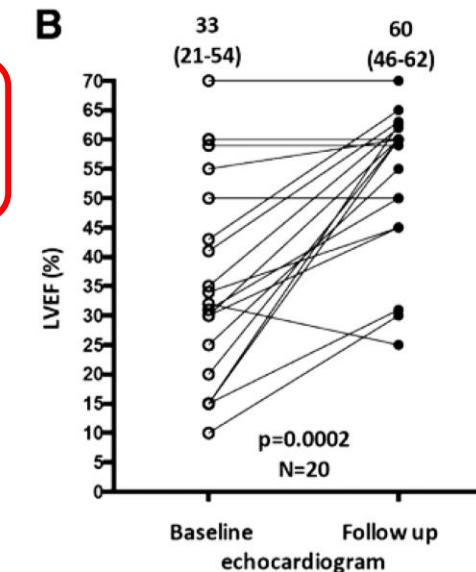
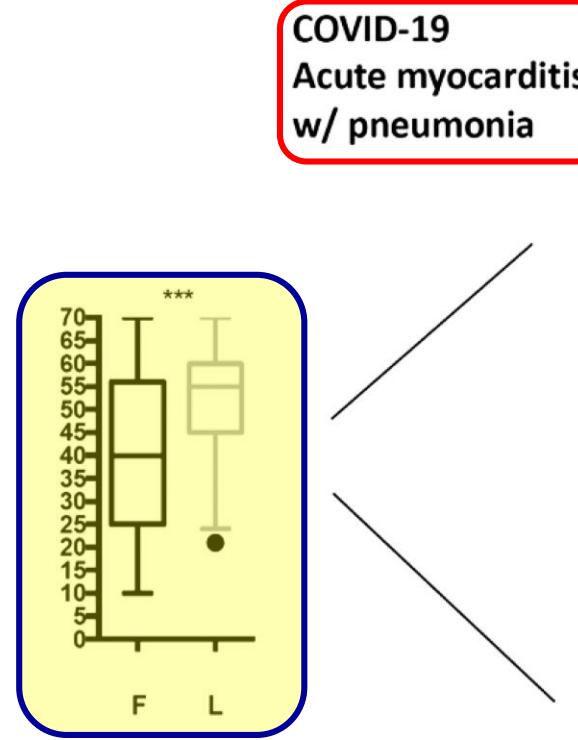
Miocarditis por COVID: Incidencia y Pronóstico según severidad

LVEF recovery

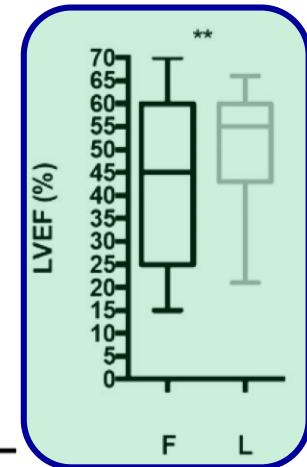
Circulation. 2022;145:1123–1139

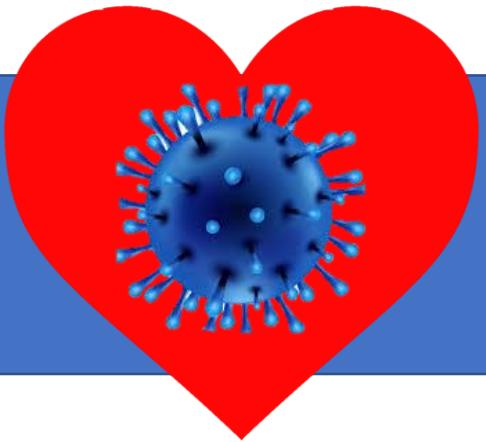


LVEF changes in
Overall COVID-19
Acute myocarditis

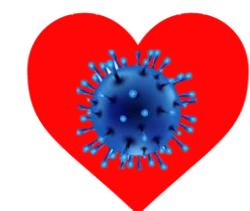


**COVID-19
Acute myocarditis
w/o pneumonia**



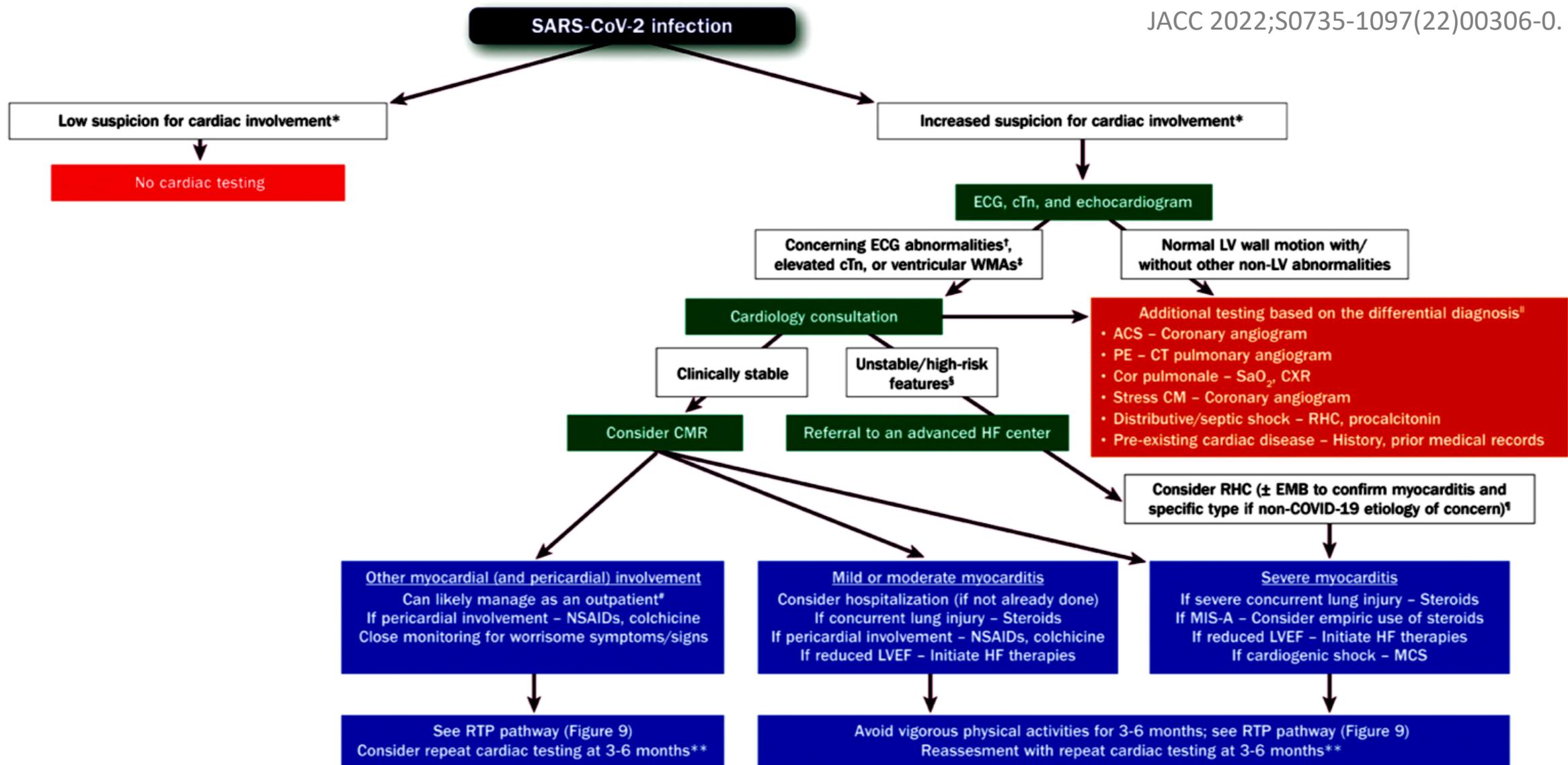


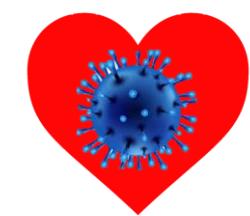
TRATAMIENTO



Miocarditis por COVID: algoritmo de actuación

JACC 2022;S0735-1097(22)00306-0.





Miocarditis por COVID: manejo terapéutico

Treatment of myocarditis in stable patients should be based on standard pathways

related to COVID-19

In those with definite myocarditis that is either mild or moderate in severity, **hospitalization** is recommended (if not already done), ideally at an advanced heart failure center.

For patients with suspected pericardial involvement, treatment with **NSAIDs, colchicine, and/or prednisone** is reasonable.

Use of **intravenous corticosteroids** may be considered in those with suspected or confirmed COVID-19 myocarditis with hemodynamic compromise

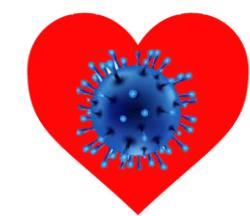
Empiric use of **immunosuppressive therapy** may also be considered in those with biopsy evidence of severe myocardial inflammatory infiltrates or fulminant myocarditis balanced against infection risk

Tocilizumab and favipiravir are currently being tested in randomized trials.

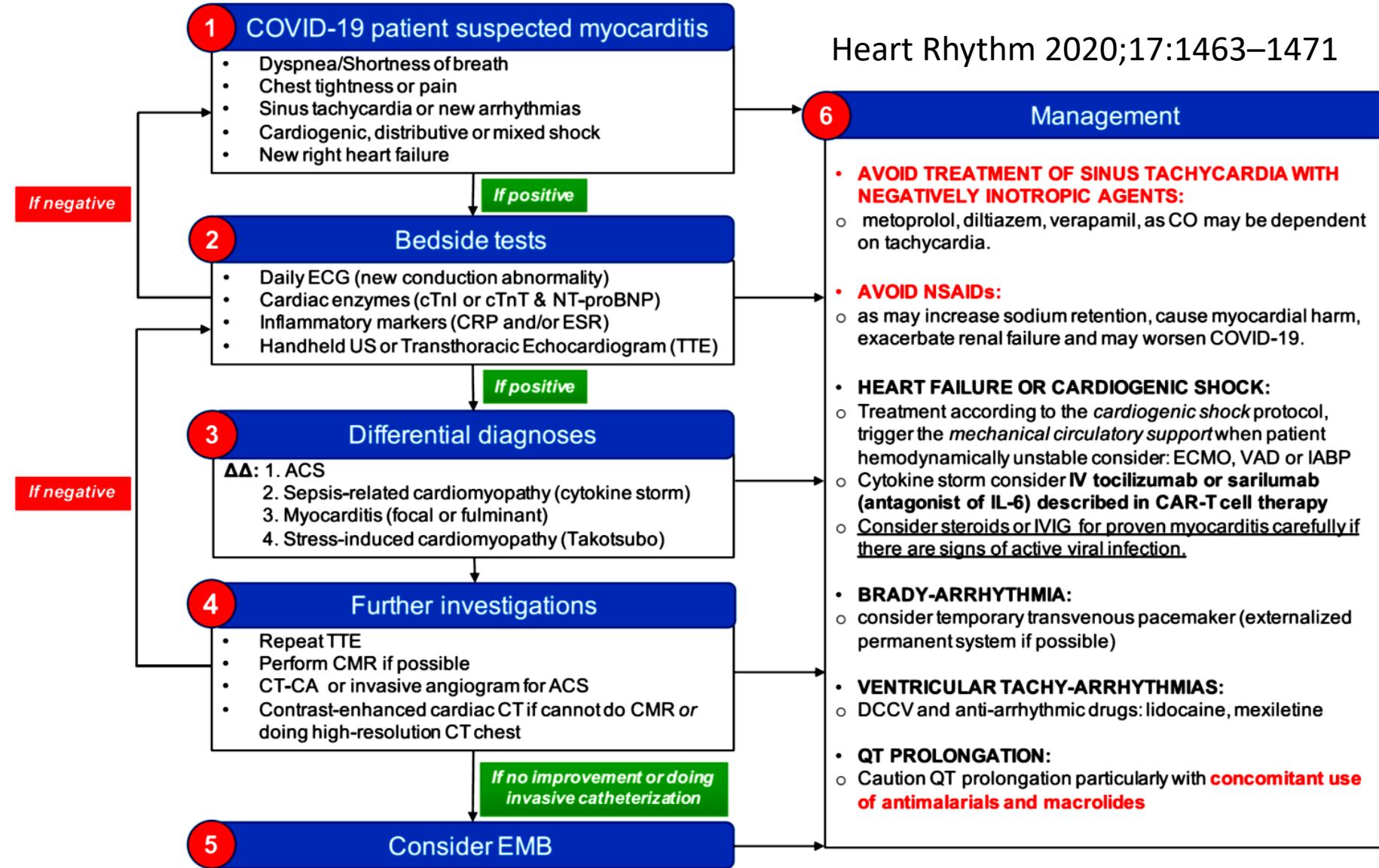
A **low-dose B-blocker** and **RAS inhibitor** may be used in patients with mildly reduced LVEF and stable hemodynamics. However B-blockade can precipitate cardiogenic shock with greater LV dysfunction

Those with a fulminant course (cardiogenic shock, sustained ventricular arrhythmias, and/or advanced AV block) should be managed similar at advanced HF center, **mechanical circulatory support**

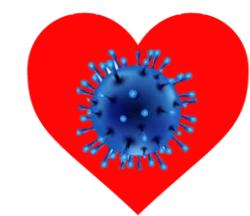
JACC 2022;S0735-1097(22)00306-0.



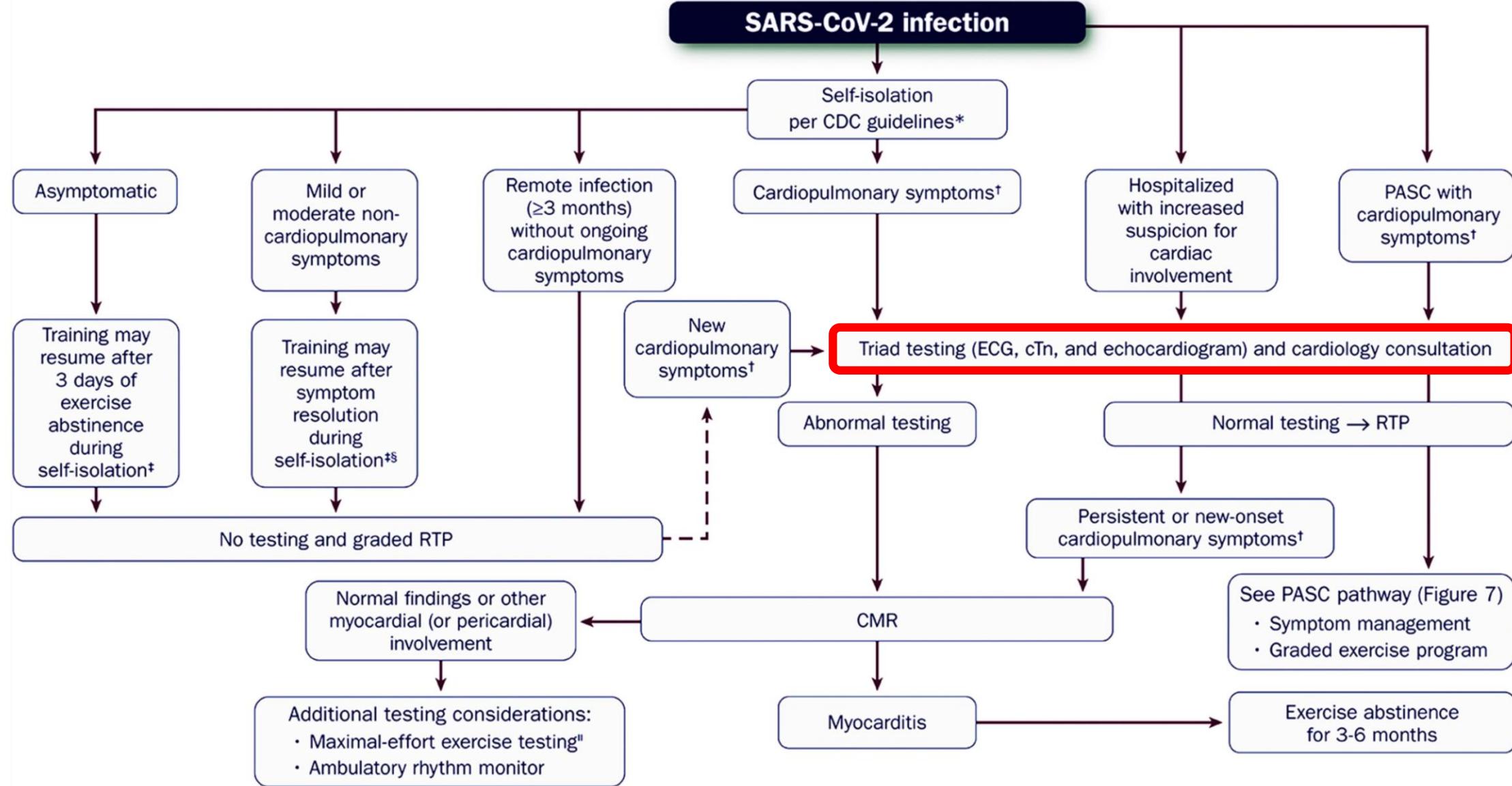
Miocarditis por COVID: manejo terapéutico

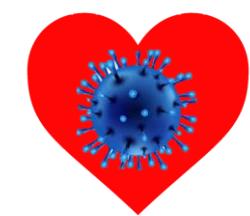


Heart Rhythm 2020;17:1463–1471



Miocarditis por COVID: Implicaciones en deportistas





Pericarditis por COVID: manejo terapéutico

The mainstay for the treatment of acute and recurrent pericarditis: **NSAIDs and colchicine**.

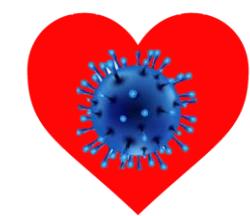
Ibuprofen is linked to an increased expression of ACE2 receptors, but this does not establish any causative link to the severity of symptoms and warrants further investigation

Observational studies on the use of **aspirin** in COVID19 patients have shown conflicting results. Chow et al. reported decreased mortality, ICU admission, and mechanical ventilation, but Sahai et al. found no change in mortality and an increased thrombotic risk in COVID19 patients taking aspirin.

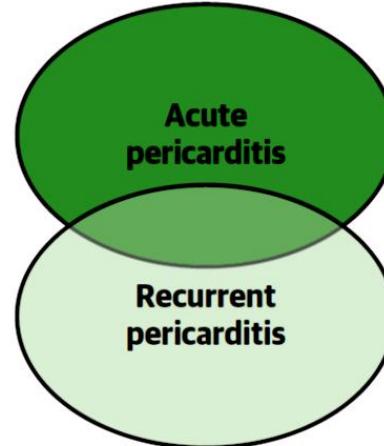
Corticosteroids are used in cases of treatment failure, resistance, or contraindications to first line therapy. Corticosteroids are recommended for severe or complicated COVID19 cases or concomitant disease with specific indications for steroids

IL1 receptor antagonists (anakinra and rilonacept), intravenous immunoglobulins, and azathioprine are recommended in refractory recurrent pericarditis patients

Some additional drugs such as azathioprine and intravenous immunoglobulins are also used in selected refractory cases



Pericarditis por COVID: manejo terapéutico



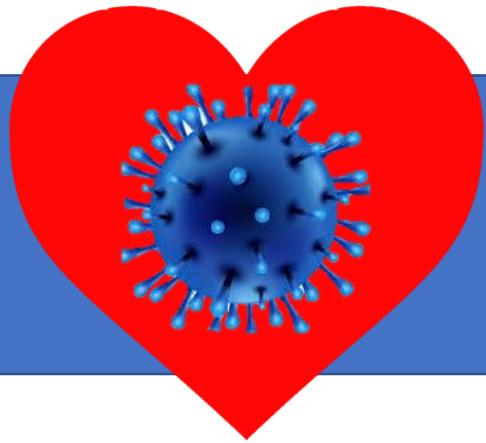
DRUG	DOSE	DURATION
Aspirin	750-1,000 mg every 8 h	1-2 weeks
Ibuprofen	600-800 mg every 8 h	1-2 weeks
Colchicine	0.5-1.2 mg in one or divided doses	3 months
Aspirin	750-1,000 mg every 8 h	Weeks-months
Ibuprofen	600-800 mg every 8 h	Weeks-months
Indomethacin	25-50 mg every 8 h	Weeks-months
Colchicine	0.5-1.2 mg in one or divided doses	At least 6 months
Prednisone	0.2-0.5 mg/kg/daily	Months
Anakinra	1-2 mg/kg/daily up to 100 mg/daily	Months
Rilonacept	320 mg once, then 160 mg weekly	Months
Azathioprine	1 mg/kg/daily up to 2-3 mg/kg/daily	Months
Methotrexate	10-15 mg weekly	Months
MMF	2,000 mg daily	Months
IVIGs	400-500 mg/kg/day	5 days
Pericardiocentesis		
Pericardial window		
Active inflammation	Yes → Anti-inflammatory therapy as first line, pericardectomy for refractory cases No → Pericardectomy	

Tamponade

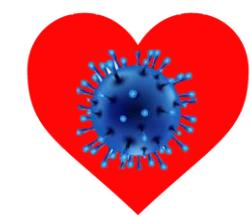
Constrictive pericarditis

J Am Coll Cardiol 2020;75:76-9

Dr. Sergio Raposeiras Roubín

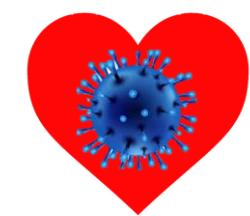


VACUNACIÓN

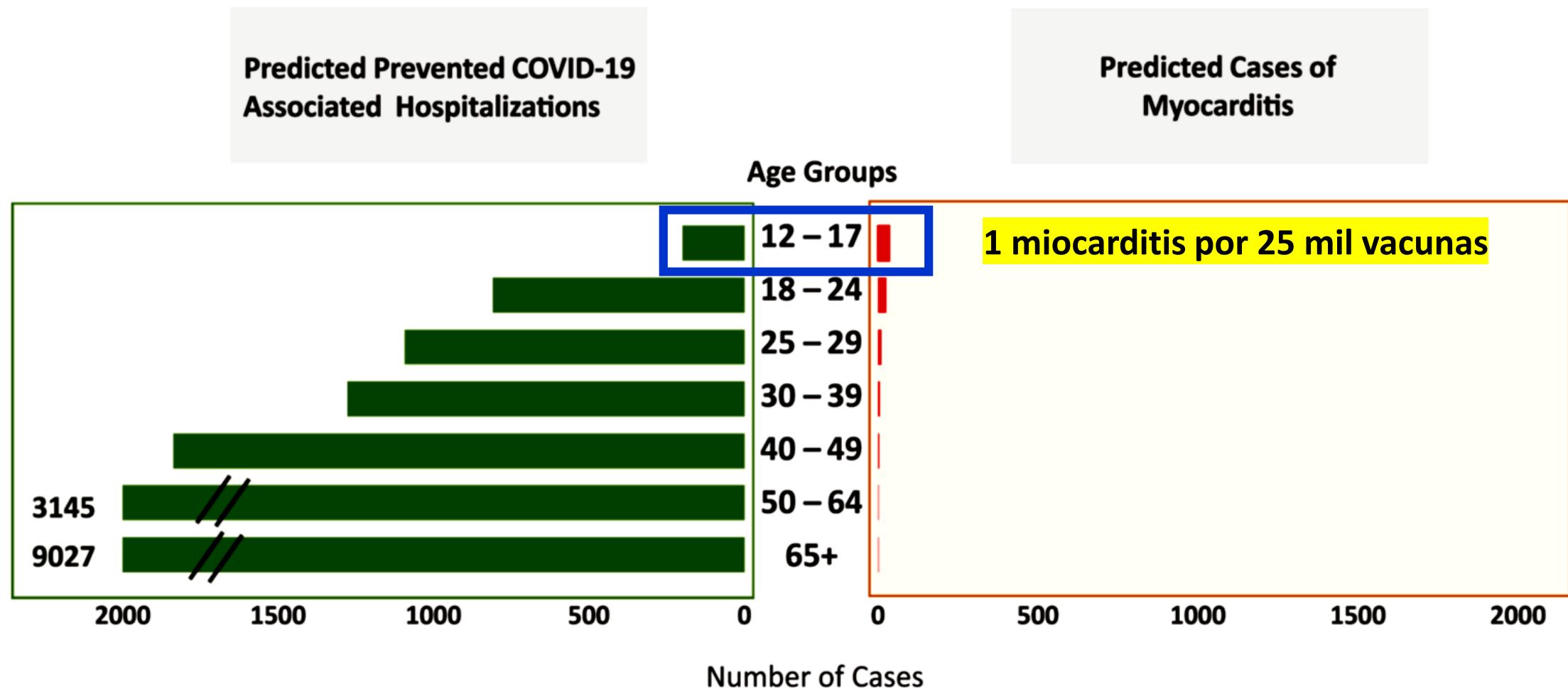


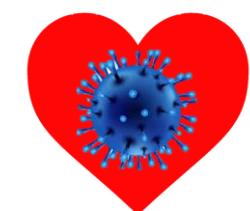
Miocarditis asociada a vacunación por COVID





Miocarditis asociada a vacunación por COVID





Miocarditis asociada a vacunación por COVID

Potential Risk of Myocarditis with COVID-19 Vaccination

	Females	Males
12-17 Years	8-10 myocarditis cases	56-69 myocarditis cases
18-24 Years	4-5 myocarditis cases	45-56 myocarditis cases
24-29 Years	2 myocarditis cases	15-18 myocarditis cases

Circulation. 2021;144:471-484

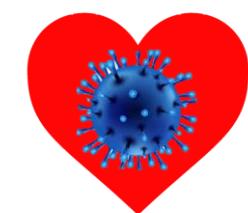


Potential Prevention of COVID-19, Hospitalizations, ICU admissions and Death with COVID-19 Vaccination

	Females	Males
12-17 Years	8500 Covid-19 cases 183 Hospitalizations 38 ICU admissions 1 Death	8500 Covid-19 cases 183 Hospitalizations 38 ICU admissions 1 Death
18-24 Years	14,000 Covid-19 cases 1127 Hospitalizations 93 ICU admissions 13 Deaths	12,000 Covid-19 cases 530 Hospitalizations 127 ICU admissions 3 Deaths
24-29 Years	15,000 Covid-19 cases 1459 Hospitalizations 87 ICU admissions 4 Deaths	15,000 Covid-19 cases 936 Hospitalizations 215 ICU admissions 13 Deaths

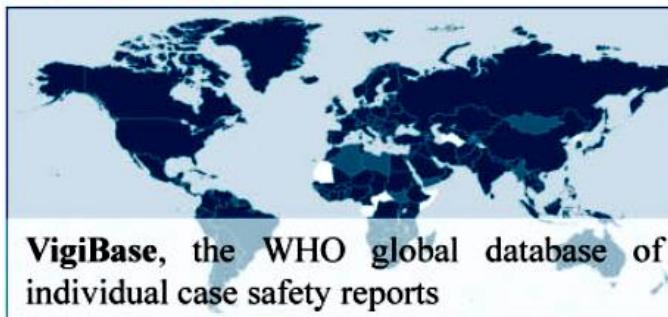
Potential prevention of COVID-19 related myocardial injury, MIS-C, post-acute sequelae SARS-CoV-2 infection

for every million second dose COVID-19 mRNA vaccinations

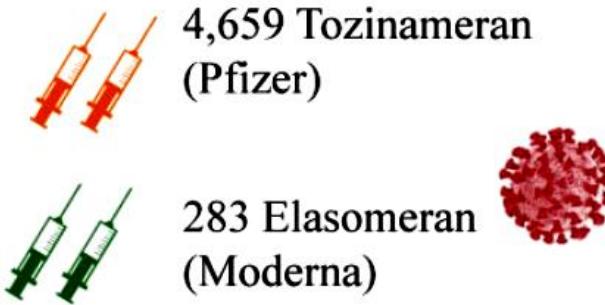


Miocarditis y pericarditis asociada a vacunación por COVID

DATA SOURCES



4,942 adolescents (12-17 years) vaccinated with mRNA COVID19 vaccines



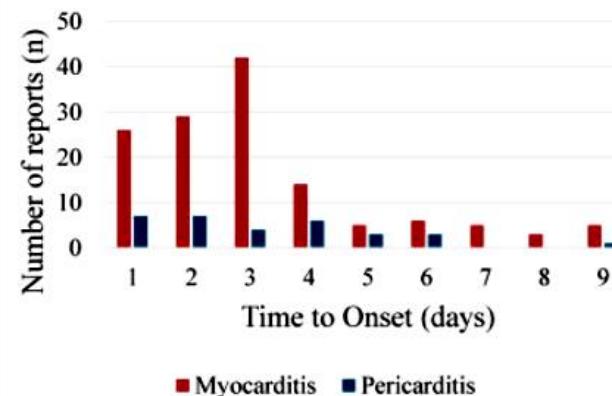
CASE NON-CASE STUDY



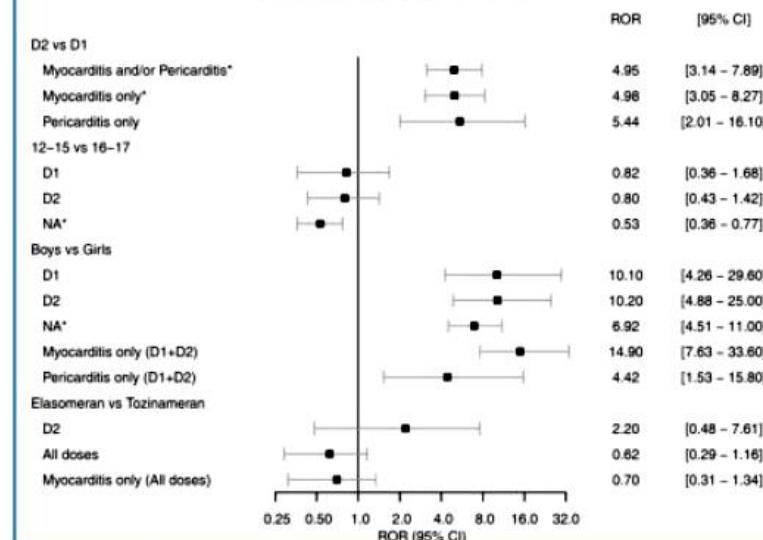
193 Myocarditis
51 Pericarditis

4700 non-cases

Time to Onset of Pericarditis and/or Myocarditis after mRNA COVID-19 vaccines in adolescents

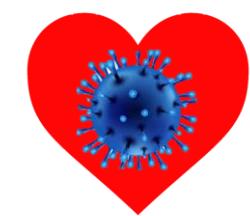


Reporting Odds Ratios (95% CI)



CONCLUSION

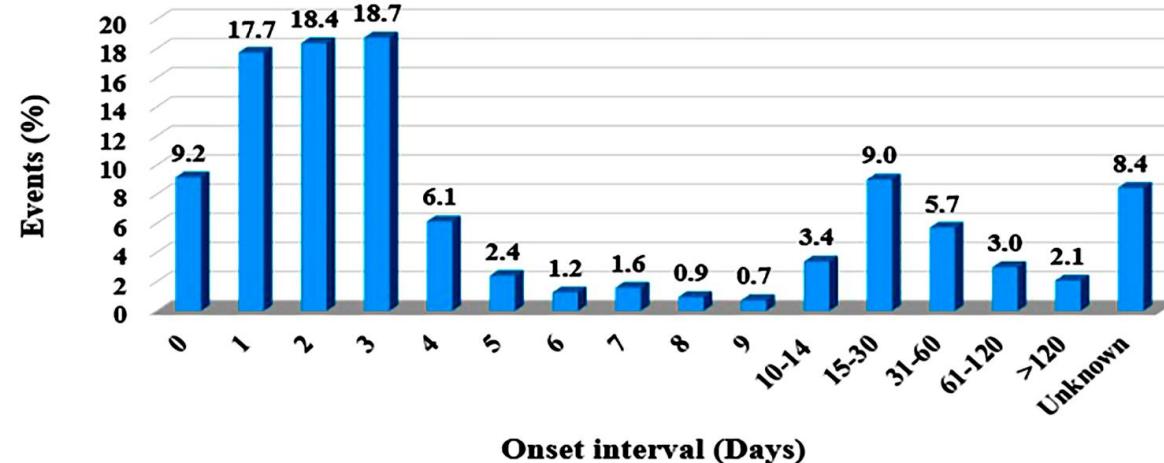
We found that the second dose of vaccine was associated with a **5-fold increase** in the reporting odds of myocarditis and/or pericarditis compared to first dose of vaccine. This risk was **higher in boys particularly for myocarditis**. Our results suggest **no differences according age group and we were unable to find a difference between vaccines (Moderna versus Pfizer)**.



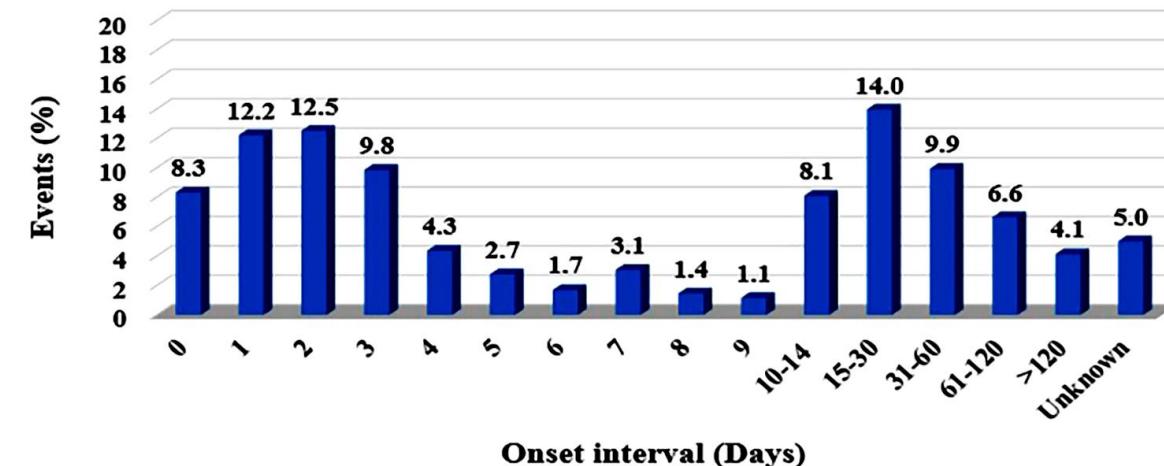
Miocarditis y pericarditis asociada a vacunación por COVID

406,150,000 COVID-19 vaccine doses

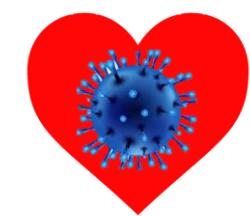
(A) Myocarditis (n=2,016)



(B) Pericarditis (n=1,380)



Int J Cardiol. 2022 Apr 15



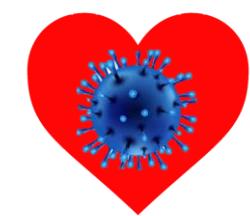
Miocarditis asociada a vacunación por COVID

JAMA Cardiology | Original Investigation

SARS-CoV-2 Vaccination and Myocarditis in a Nordic Cohort Study of 23 Million Residents

Øystein Karlstad, MScPharm, PhD; Petteri Hovi, MD, PhD; Anders Husby, MD, PhD; Tommi Häkkinen, PhD; Randi Marie Selmer, MSc, PhD; Nicklas Pihlström, MSc; Jørgen Vinsløv Hansen, MSc, PhD; Hanna Nohynek, MD, PhD; Nina Gunnes, MSc, PhD; Anders Sundström, BA, PhD; Jan Wohlfahrt, MSc, DMSC; Tuomo A. Nieminen, MSocSc; Maria Grünwald, MSc, PhD; Hanne Løvdal Gulseth, MD, PhD; Anders Hviid, MSc, DMSC; Rickard Ljung, MD, PhD, MPH

Subgroup, exposure ^b	No. of events ^c	Follow-up, 1000 person-years	Crude incidence rate per 1000 person-years of follow-up ^d	IRR (95% CI)	No. of excess events in 28 d per 100 000 vaccinees (95% CI)
Males, ages ≥12 y					
Unvaccinated	520	5340.6	0.097	1 [Reference]	0 [Reference]
AZD1222	6	43.0	0.139	2.39 (1.04 to 5.48)	0.62 (0.00 to 1.24)
AZD1222/AZD1222	≤5	29.2	ND	1.29 (0.31 to 5.33)	0.12 (-0.48 to 0.72)
BNT162b2	70	560.9	0.125	1.40 (1.09 to 1.80)	0.27 (0.09 to 0.46)
BNT162b2/BNT162b2	85	495.0	0.172	2.04 (1.61 to 2.58)	0.67 (0.46 to 0.88)
Pfizer-Moderna	BNT162b2/mRNA-1273	34	23.7	1.433	16.99 (11.51 to 25.07)
	mRNA-1273	13	93.2	0.139	1.45 (0.84 to 2.52)
Moderna-Moderna	mRNA-1273/mRNA-1273	53	72.3	0.733	8.55 (6.40 to 11.41)
					4.97 (3.62 to 6.32)



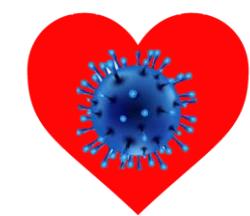
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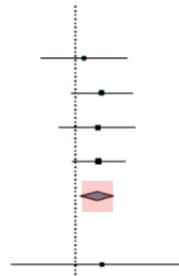
Subgroup, exposure ^b	No. of events ^c	Follow-up, 1000 person-years	Crude incidence rate per 1000 person-years of follow-up ^d	IRR (95% CI)	No. of excess events in 28 d per 100 000 vaccinees (95% CI)
Females, ages ≥12 y					
Unvaccinated	211	4942.2	0.043	1 [Reference]	0 [Reference]
AZD1222	≤5	64.1	ND	1.87 (0.58 to 6.03)	0.17 (-0.13 to 0.46)
AZD1222/AZD1222	≤5	31.6	ND	1.67 (0.40 to 6.97)	0.19 (-0.30 to 0.69)
BNT162b2	35	572.3	0.061	1.46 (1.01 to 2.11)	0.15 (0.02 to 0.28)
BNT162b2/BNT162b2	30	522.7	0.057	1.25 (0.77 to 2.05)	0.09 (-0.09 to 0.26)
Pfizer-Moderna	BNT162b2/mRNA-1273	≤5	19.1	ND	9.62 (3.11 to 29.77) 1.44 (0.02 to 2.87)
	mRNA-1273	≤5	90	ND	1.45 (0.35 to 5.97) 0.05 (-0.13 to 0.23)
Moderna-Moderna	mRNA-1273/mRNA-1273	7	71.6	0.098	2.73 (1.27 to 5.87) 0.48 (0.07 to 0.89)



Miocarditis asociada a vacunación por COVID

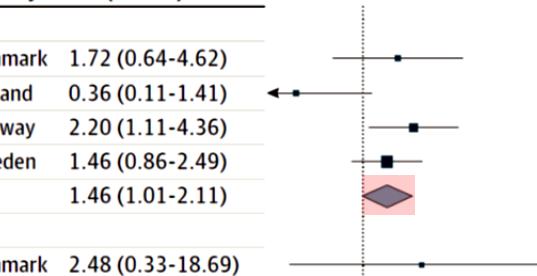
A Males aged ≥12 y

Exposure	Country	IRR (95% CI)
BNT162b2		
Denmark	1.14 (0.59-2.21)	
Finland	1.50 (0.93-2.40)	
Norway	1.41 (0.78-2.54)	
Sweden	1.43 (0.95-2.13)	
Total	1.40 (1.09-1.80)	
mRNA-1273		
Denmark	1.51 (0.37-6.20)	



B Females aged ≥12 y

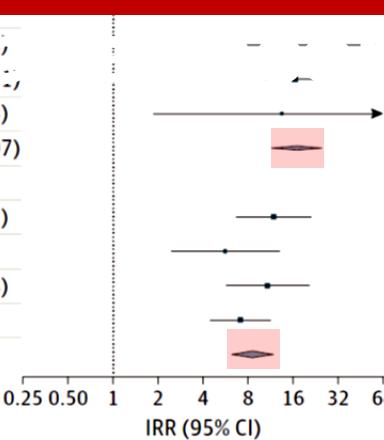
Exposure	Country	IRR (95% CI)
BNT162b2		
Denmark	1.72 (0.64-4.62)	
Finland	0.36 (0.11-1.41)	
Norway	2.20 (1.11-4.36)	
Sweden	1.46 (0.86-2.49)	
Total	1.46 (1.01-2.11)	
mRNA-1273		
Denmark	2.48 (0.33-18.69)	



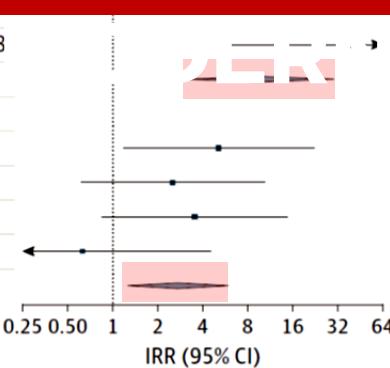
EXCESS EVENTS WITHIN 28 DAYS PER 100,000 VACCINEES

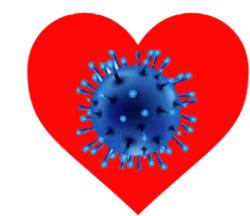
4 to 7 after a second dose of PFIZER

SECOND DOSE, mRNA-1273	
Finland	21.61 (7.11-41.40)
Norway	16.41 (0.54-25.51)
Sweden	13.44 (1.88-95.94)
Total	16.99 (11.51-25.07)
mRNA-1273/mRNA-1273	
Denmark	11.78 (6.65-20.87)
Finland	5.63 (2.47-12.84)
Norway	10.76 (5.71-20.28)
Sweden	7.07 (4.51-11.08)
Total	8.55 (6.40-11.41)



mRNA-1273/mRNA-1273	
Denmark	5.13 (1.18-22.32)
Finland	2.52 (0.61-10.38)
Norway	3.53 (0.85-14.72)
Sweden	0.63 (0.09-4.53)
Total	2.73 (1.27-5.87)



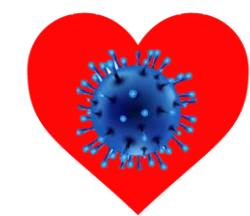


Miocarditis asociada a vacunación por COVID

Summary of case series and case reports (n=61, All hospitalized patients)

- **98% males**, Mean age **26 years**
 - All mRNA vaccines except for one; **89% after 2nd vaccine**
 - 91% have SARS-CoV-2 spike antibody; Time between vaccination and symptom onset = **2.4 days**
 - 11% History of Covid-19; 0% con PCR Covid +.
 - **Chest pain = 100%**; Other symptoms (eg, myalgia, fatigue, fever) = 63%
 - **89% symptoms resolve**
 - Median days to troponin peak after vaccination = 3
 - BNP or NT-proBNP elevation = 61%; CRP elevation = 89%
 - **Abnormal ECG = 87%**
 - Abnormal cardiac MRI = 100%
 - **Abnormal echocardiogram = 39%; LVEF<50% = 15%**
 - Hospitalization Mean 4.6 days
 - Treatment of myocarditis = NSAID and colchicine, steroids, iv immunoglobulin, β- Blocker, ACEI

Circulation. 2021;144:471-484



Miocarditis asociada a vacunación por COVID

Canadian Journal of Cardiology 37 (2021) 1629–1634

Training/Practice Practical Clinical Practice Update

Myocarditis and Pericarditis After COVID-19 mRNA Vaccination: Practical Considerations for Care Providers

Adriana Luk, MD, FRCPC, MSc,^{a,b} Brian Clarke, MD, FRCPC, FACC,^c

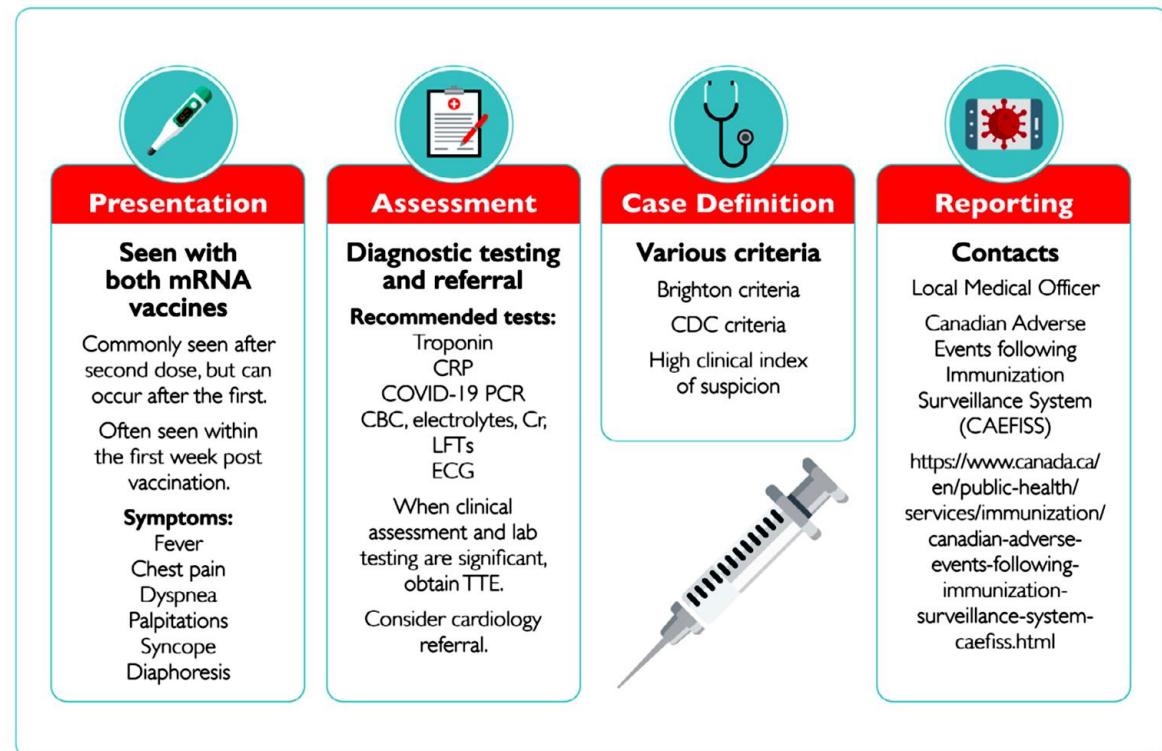
Nagib Dahdah, MD, MBA, FRCPC, FACC,^d Anique Ducharme, MD, FRCPC,^e

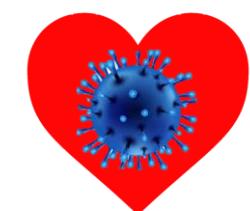
Andrew Krahn, MD,^f Brian McCrindle, MD, MPH,^g Trent Mizzi, BSc, MD, FRCPC,^h

Monika Naus, MHSc, MD, FRCPC, FACPM,ⁱ Jacob A. Udell, MD, MPH, FRCPC,^j

Sean Virani, MD, MSc, MPH, FRCPC, FCCS,^f Shelley Zieroth, MD,^k and

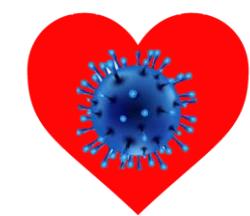
Michael McDonald, MD, FRCPC^a





Miocarditis asociada a vacunación por COVID

- Myocarditis following COVID-19 mRNA vaccination is **rare**.
- The highest observed rates have been in **young male individuals** (aged 12-17 years) **after the second vaccine dose**.
- Presentation is usually early (**within the first week**) after vaccination.
- COVID-19 vaccination is associated with a very **favorable benefit-to risk ratio for all age and sex groups** evaluated thus far.
- Most myocarditis/pericarditis cases reported have been **mild and self-limited**.



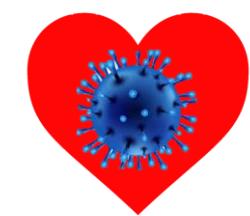
Miocarditis asociada a vacunación por COVID



Vacunación tras miocarditis asociada a vacuna

- For patients with myocarditis/pericarditis temporally associated with the first dose of COVID-19 mRNA vaccination, available evidence is currently insufficient to support any clinical practice recommendations. **Questions remain as to whether these patients should avoid a second vaccination, have further delay between doses, or have a non-mRNA vaccine as a second dose.**
- As a precaution, and in accordance with NACI recommendations, **patients with established myocarditis/pericarditis after the first mRNA vaccination should defer a second dose indefinitely pending further evidence.**





CONCLUSIONES

Los pacientes infectados con SARS-CoV-2 tienen mayor riesgo de **PERICARDITIS** (hasta 1 de cada 100 infectados) y de **MIOCARDITIS** (hasta 5 de cada 100 infectados), con diversas presentaciones clínicas, que van desde **casos leves** (la mayoría) a casos de **miocarditis fulminante** (sobre todo si neumonía asociada).

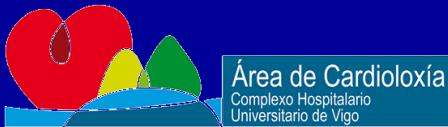
Se debe sospechar pericarditis por COVID-19 en pacientes con **dolor torácico de inicio agudo**, cambios ECG y/o derrame pericárdico. La sospecha de miocarditis por COVID-19 debe plantearse en pacientes con **IC aguda que empeora rápidamente o arritmias cardíacas**, sin trastornos CV preexistentes ni SCA

En pacientes COVID es frecuente la elevación de troponina, la presencia de derrame pericárdico, alteraciones en eco y RM. **El diagnóstico de pericarditis/miocarditis requiere correlación clínica.**

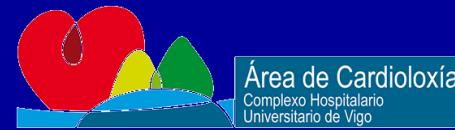
El tratamiento sigue los estándares del tratamiento convencional de la pericarditis/miocarditis. Los **corticoides** están indicados cuando existe afectación respiratoria. Otros fármacos aún no tienen evidencia sólida (Tocilizumab/favipiravir)

La incidencia de **pericarditis/miocarditis tras la vacunación** es 100 veces menor que tras la infección por COVID, y su curso suele ser benigno. Predomina en **hombres < 20 años**. Es claramente superior con la **2ª dosis** de las vacunas de Moderna y Pfizer. El **dolor torácico** es frecuente, con **alteraciones ECG** en la mayoría.

27 de ABRIL de 2022



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Peculiaridades de la MIOPERICARDITIS ASOCIADA al COVID y su VACUNACIÓN

Muchas gracias
por la atención

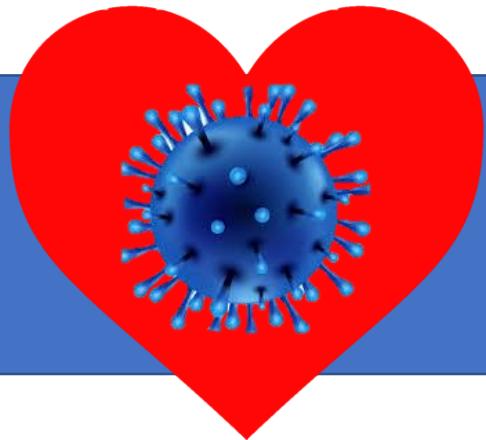


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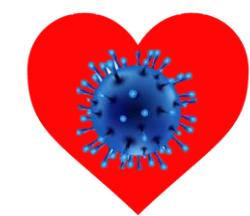
Dr. Sergio Raposeiras Roubín

raposeiras26@hotmail.com

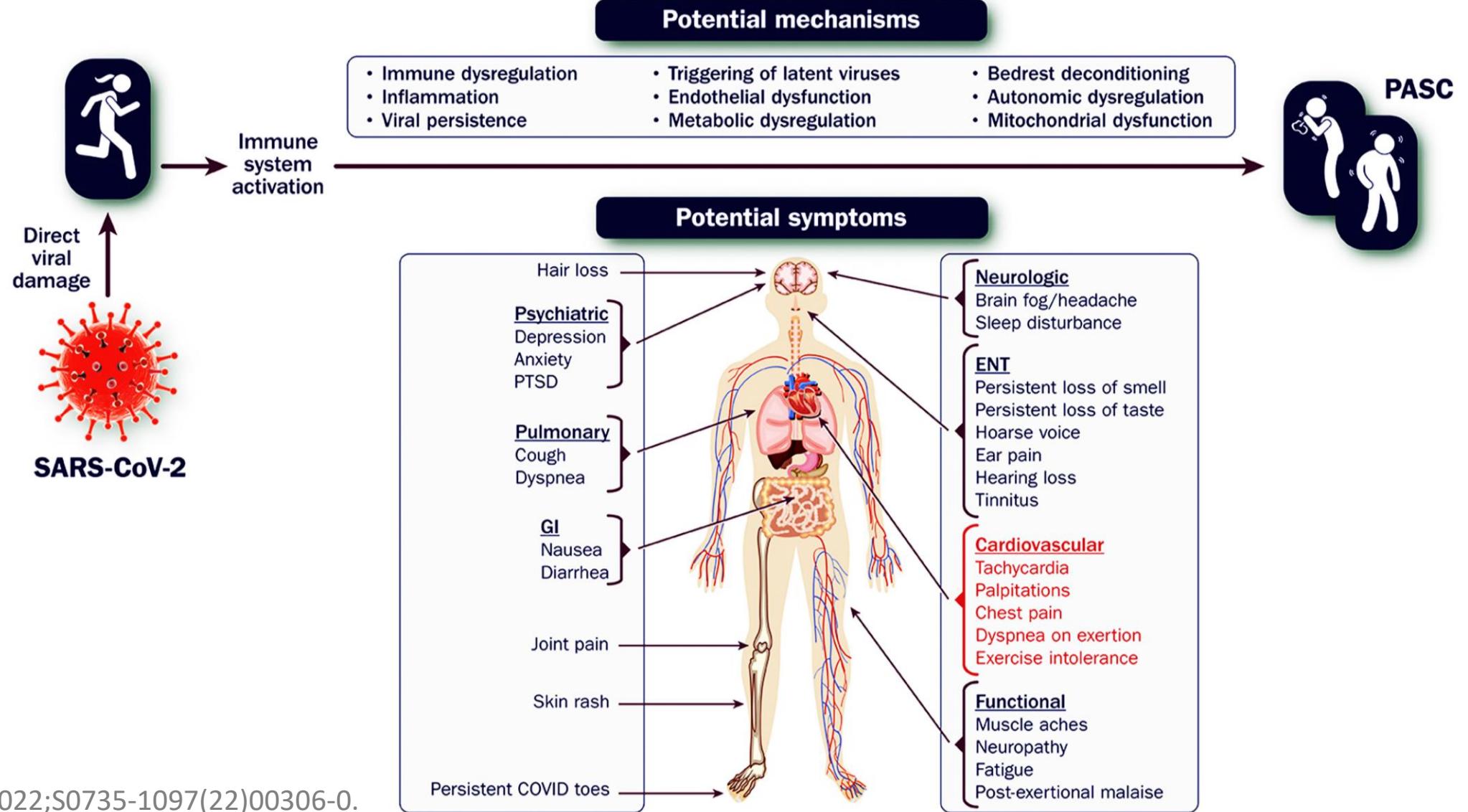
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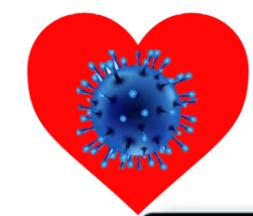
POST-COVID



Implicaciones post-COVID



JACC 2022;S0735-1097(22)00306-0.



Implicaciones post-COVID

