CMH et sport un jour ? CMH et sport toujours ?

Margaux RIMBAUD
CHU Montpellier
Service Cardiologie et Physiologie clinique

Conflits d’intérêts

Aucun

Profil

Homme

23 ans

Ancien triathlète pole France

Course à pied 12h par semaine

Compétition

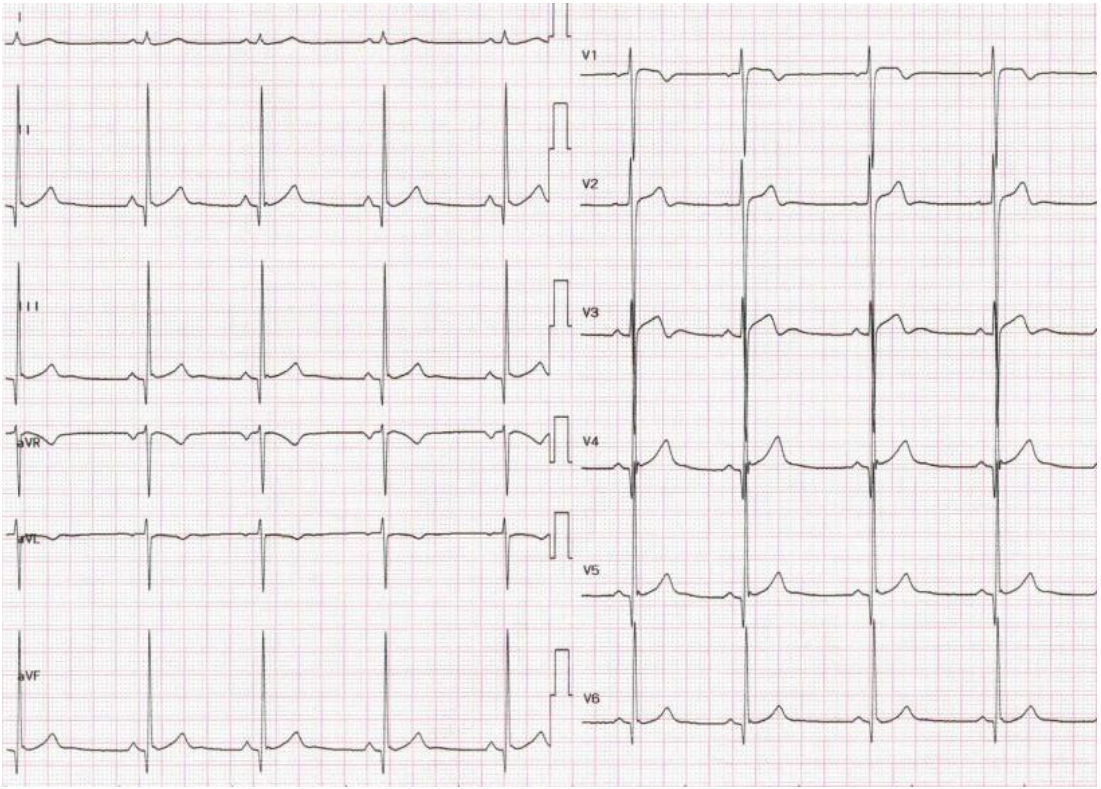
Asymptomatique

Consultation aux urgences

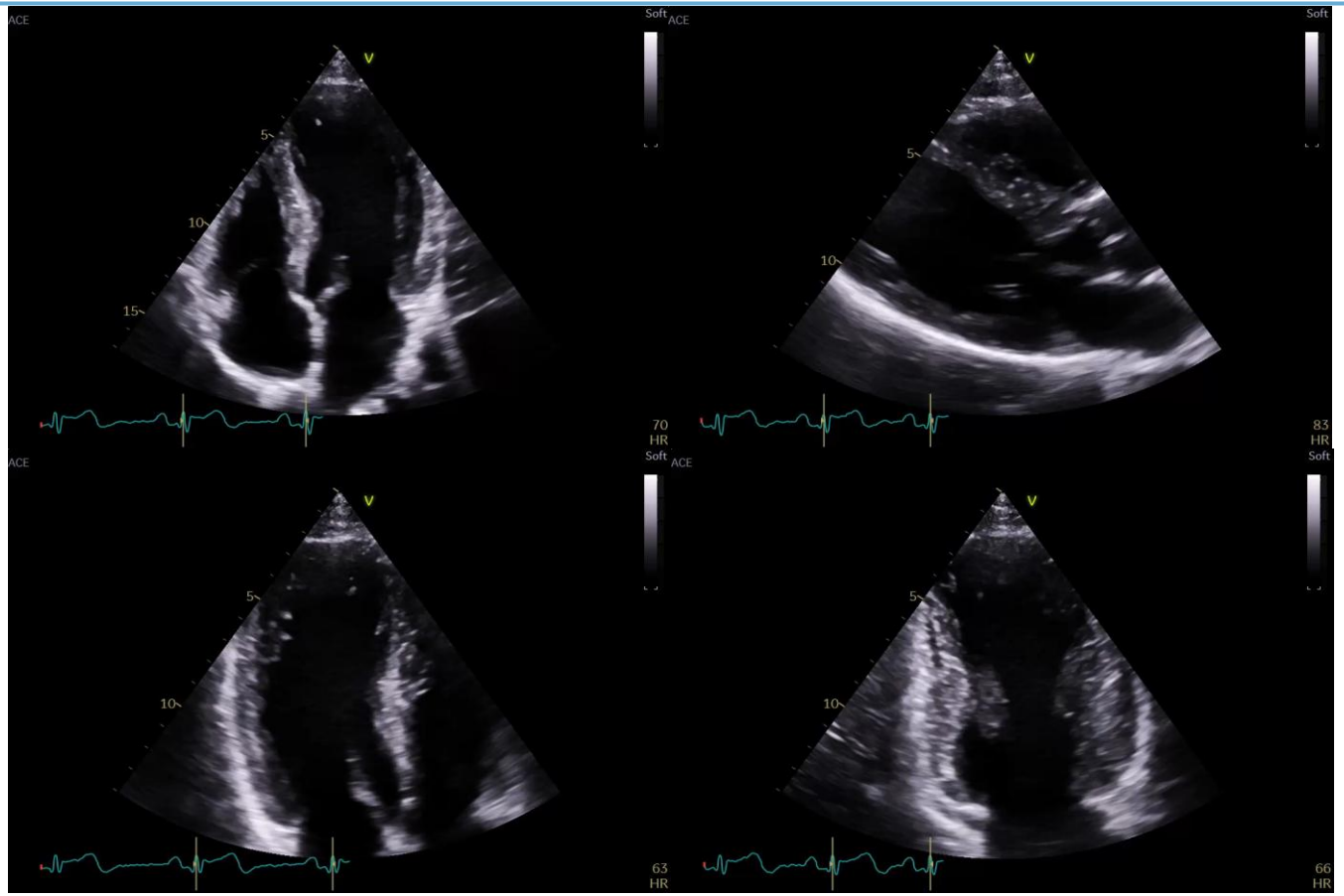
Douleur thoracique

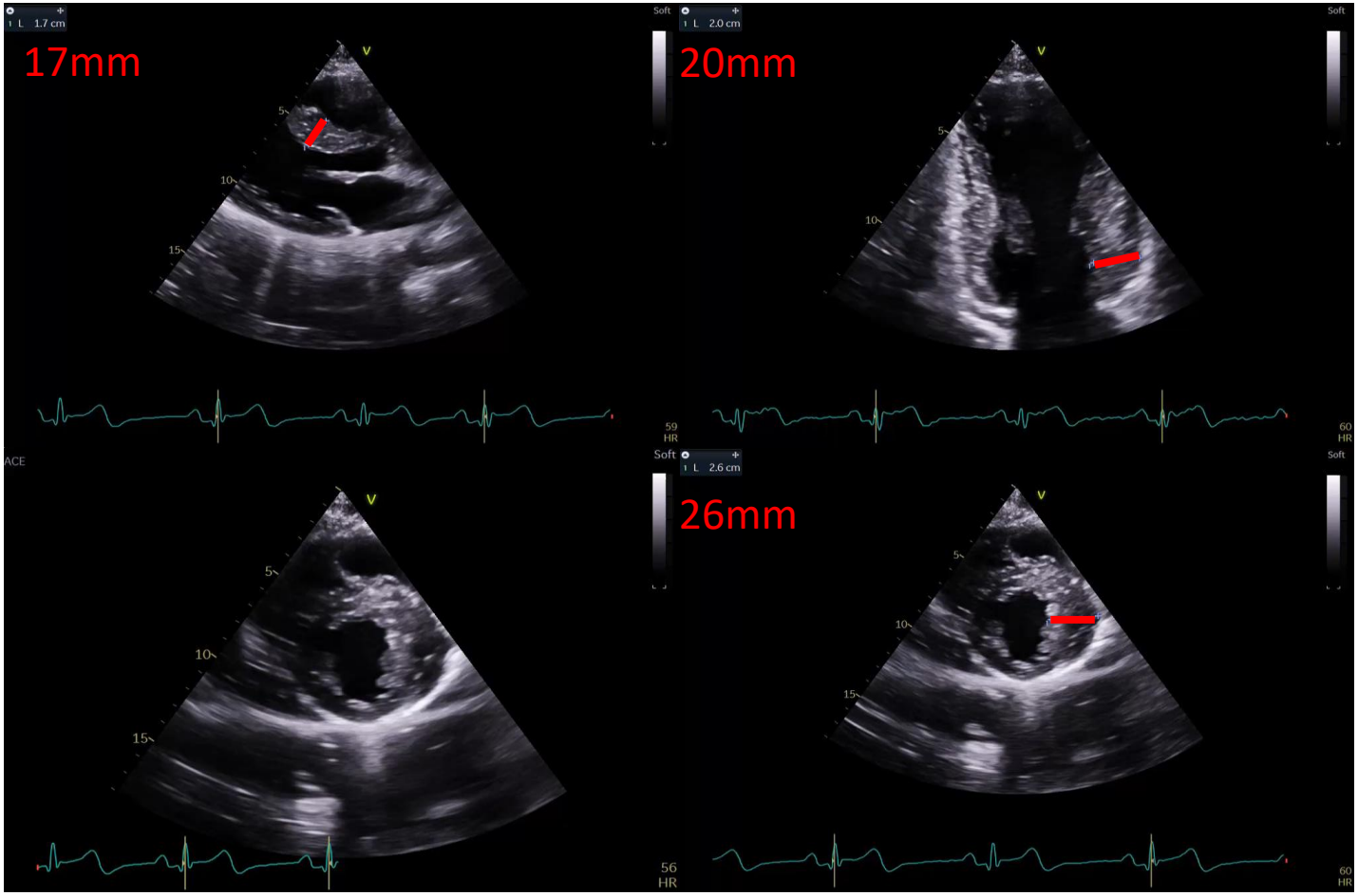
Troponine 240ng/L (N<14ng/L)

Nt proBNP 323 pg/ml (N<300pg/ml)



Echographie transthoracique





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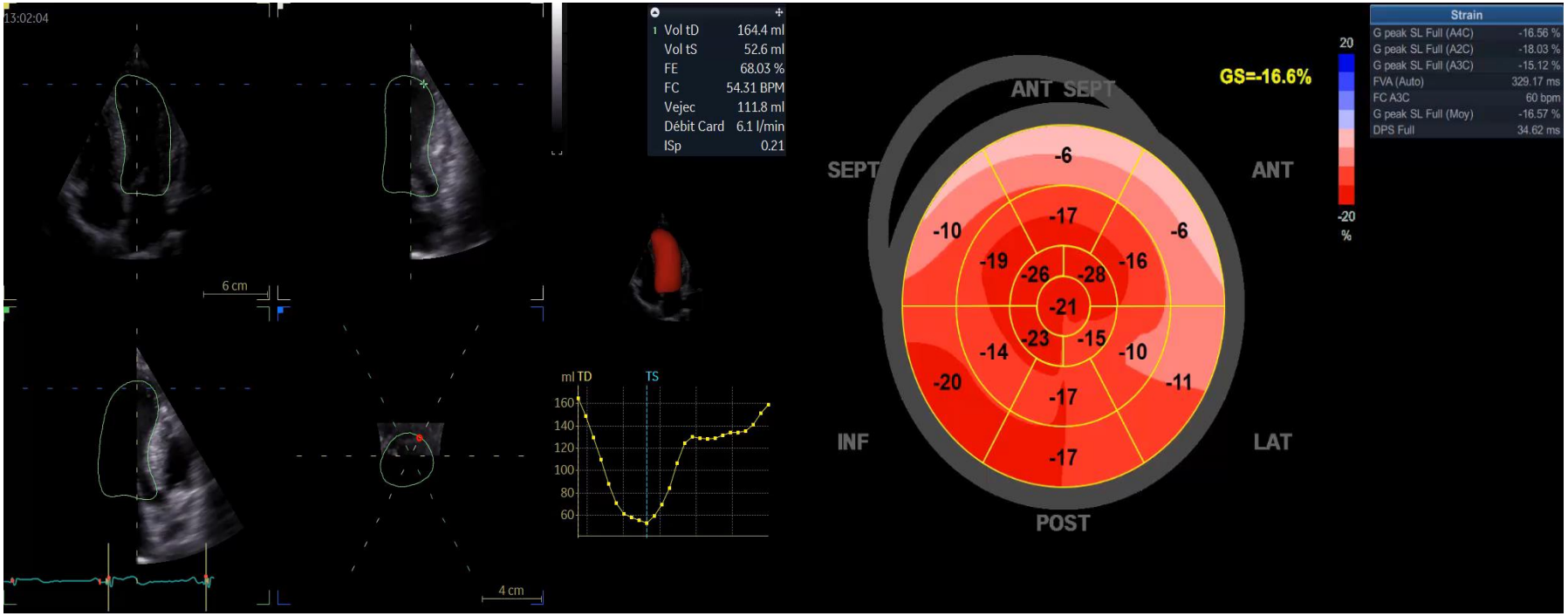

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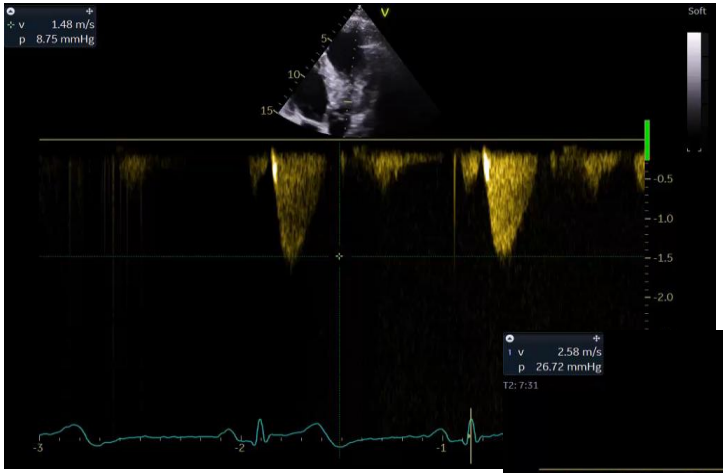
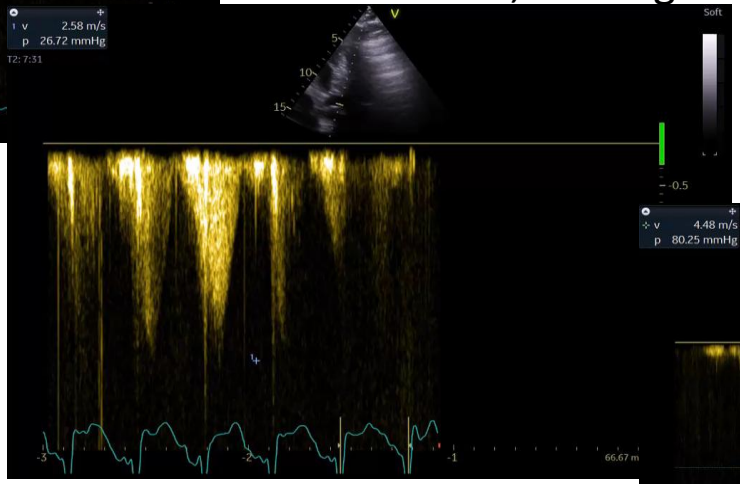
Repos
8,75mmHg

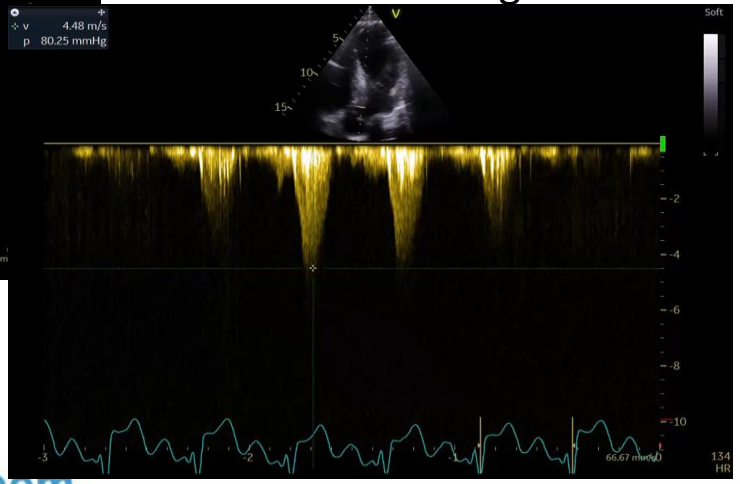
Echo d'effort
Pmax 240W
Fcmax 183 bpm

Effort
26,7mmHg

Récupération
80mmHg







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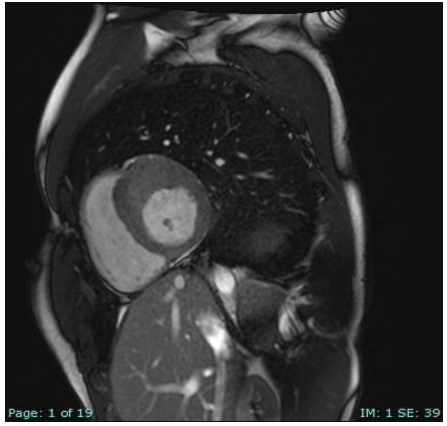
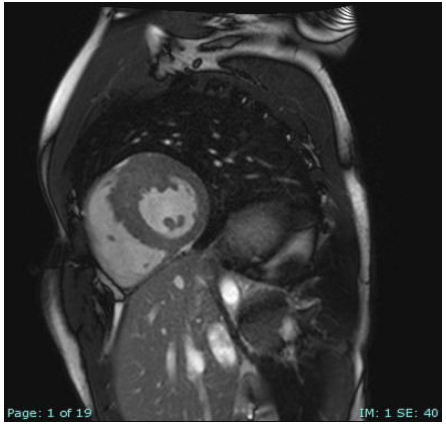
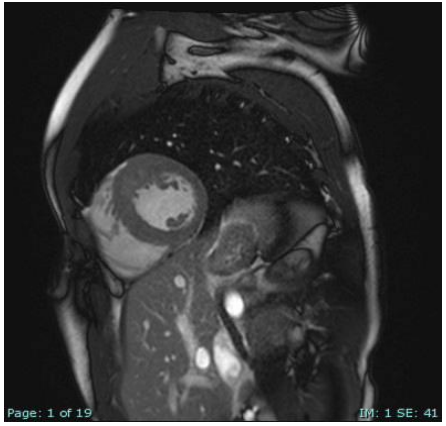
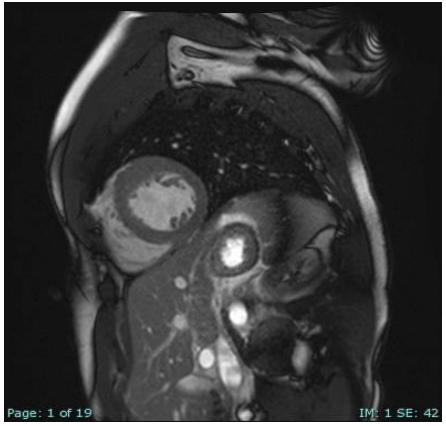
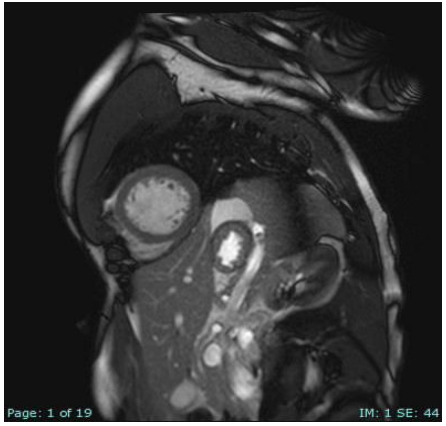
IRM CARDIAQUE

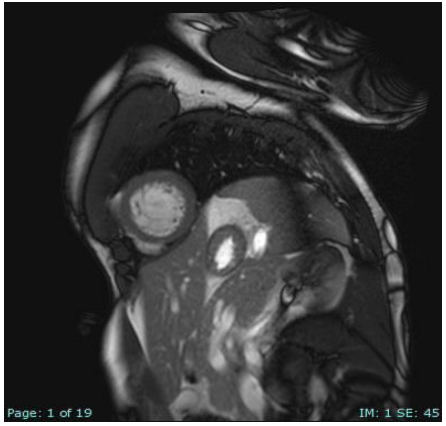


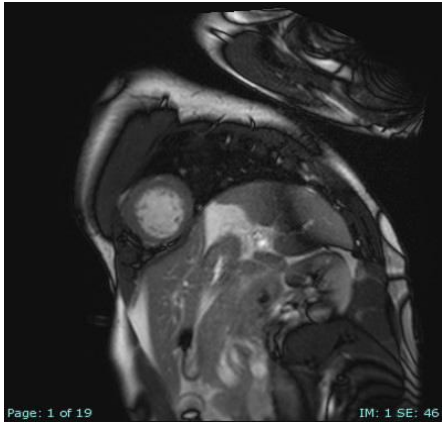


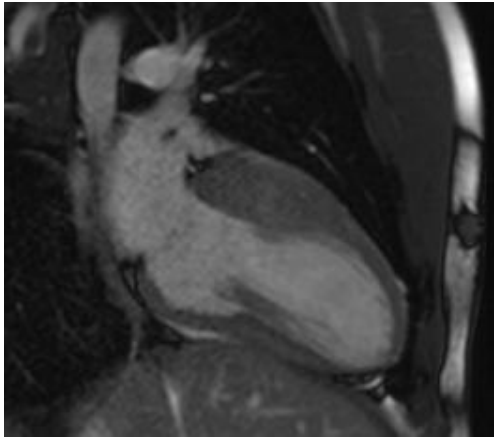


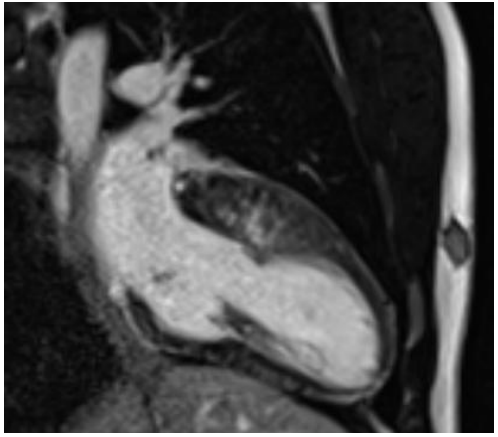


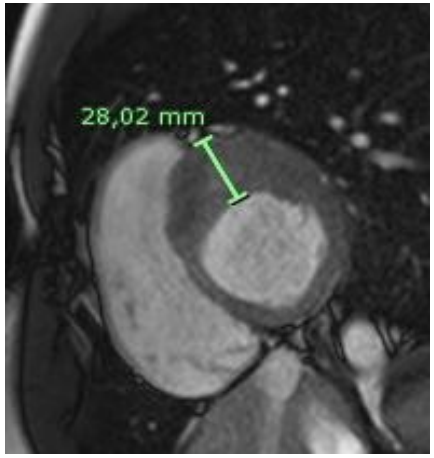


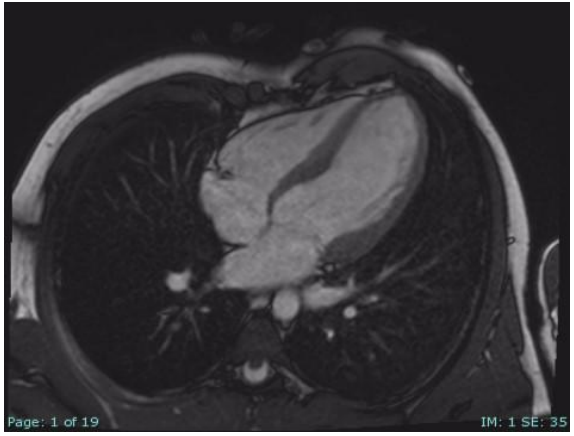


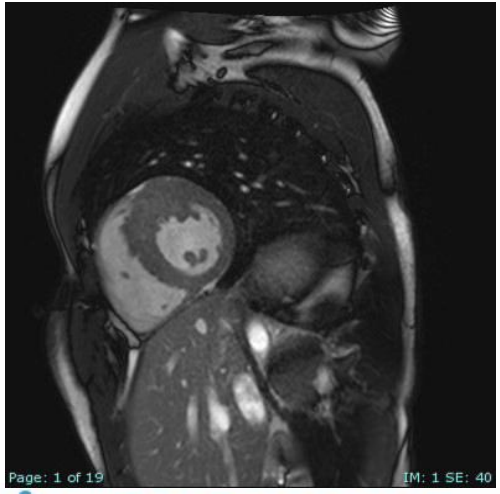


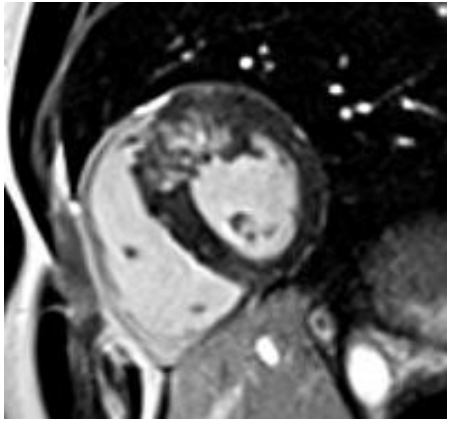












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Au total : CMH avec importante fibrose sans obstruction significative de repos ou d’effort

Explorations complémentaires

Contrôle de la biologie : Nt pro BNP 800

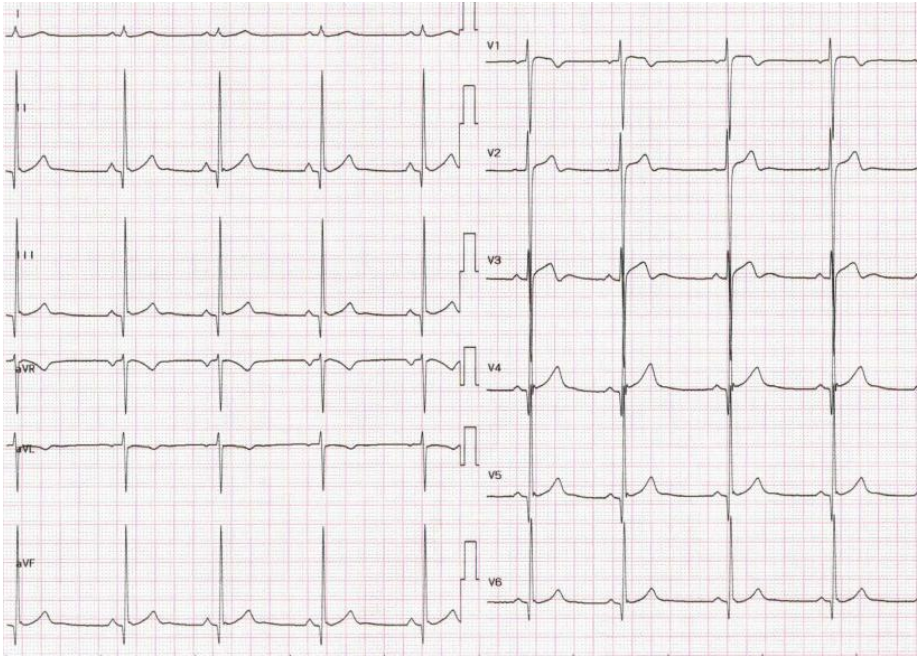
Test d'effort : pas d'arythmie

Holter ECG en situation d'entrainement : RAS

Dépistage apparenté : mère et père RAS, sœur en cours

Génétique en cours

Efficacité du dépistage ECG ?



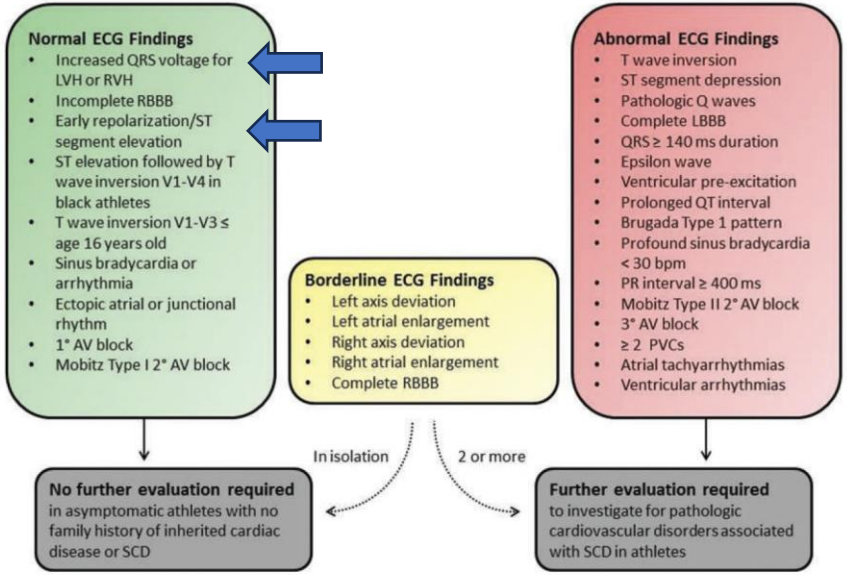


Figure 1 International consensus standards for ECG interpretation in athletes. AV, atrioventricular; LBBB, left bundle branch block; LVH, left ventricular hypertrophy; PVC, premature ventricular contraction; RBBB, right bundle branch block; RVH, right ventricular hypertrophy; SCD, sudden cardiac death.

Drezner JA, *et al*. *Br J Sports Med* 2017;**51**:704–731. doi:10.1136/bjsports-2016-097331 705

CMH :
environ 10% ECG FN

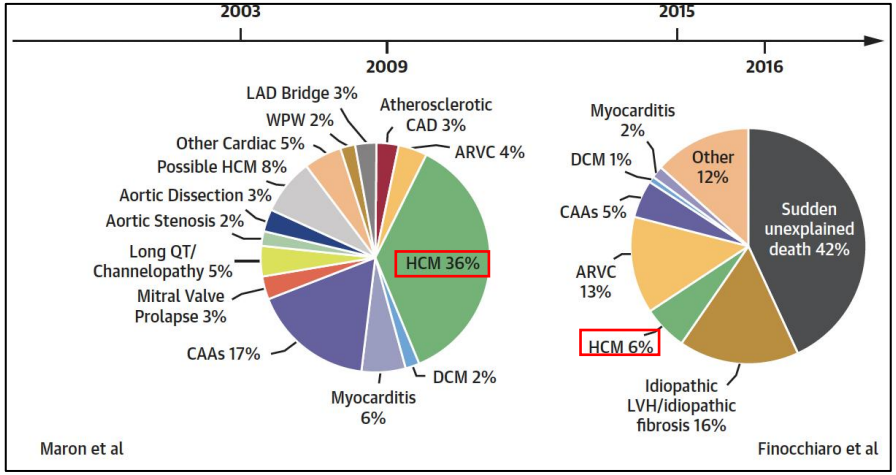
Dores et al. Int J Cardiol 2023

www.forumeuropeen.com

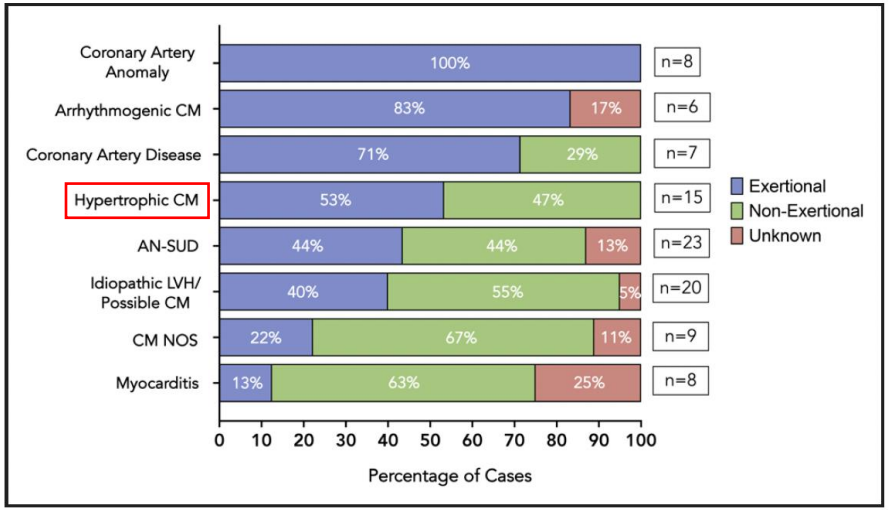
Deux questions :

- Indication du DAI ?
- Quelle activité physique ?

Mort subite chez l'athlète jeune



Finocchiaro et al. JACC 2024



Petek et al. Sudden Cardiac Death in National Collegiate. Athletic Association Athletes: A 20-Year Study. Circulation. 2023

Indication du DAI ?

AHA HCM SCD Calculator

Hypertrophic Cardiomyopathy - Sudden Cardiac Death Risk Calculator

Age: 23 years

MLVWT: 26 mm

LA Size: 28 mm

Max LVOT Gradient: 80 mmHg

FH SCD	○ No ○ Yes
NSVT	○ No ○ Yes
Unexplained Syncope	○ No ○ Yes
EF ≤ 50%	○ No ○ Yes
Apical Aneurysm	○ No ○ Yes
Extensive LGE	○ No ● Yes

Risk of SCD at 5 years(%)

3.31 (*Nota bene*: This estimate may not be accurate in the setting of Extensive LGE)

Recommendation

Based on the SCD risk factors present, this patient has a Class 2B indication for an ICD (may be considered)

HCM risk score à 3,31% (faible risque)
Mais fibrose extensive

Apres décision médical partagée →
Implantation d'un DAI SC

ESC European Society of Cardiology

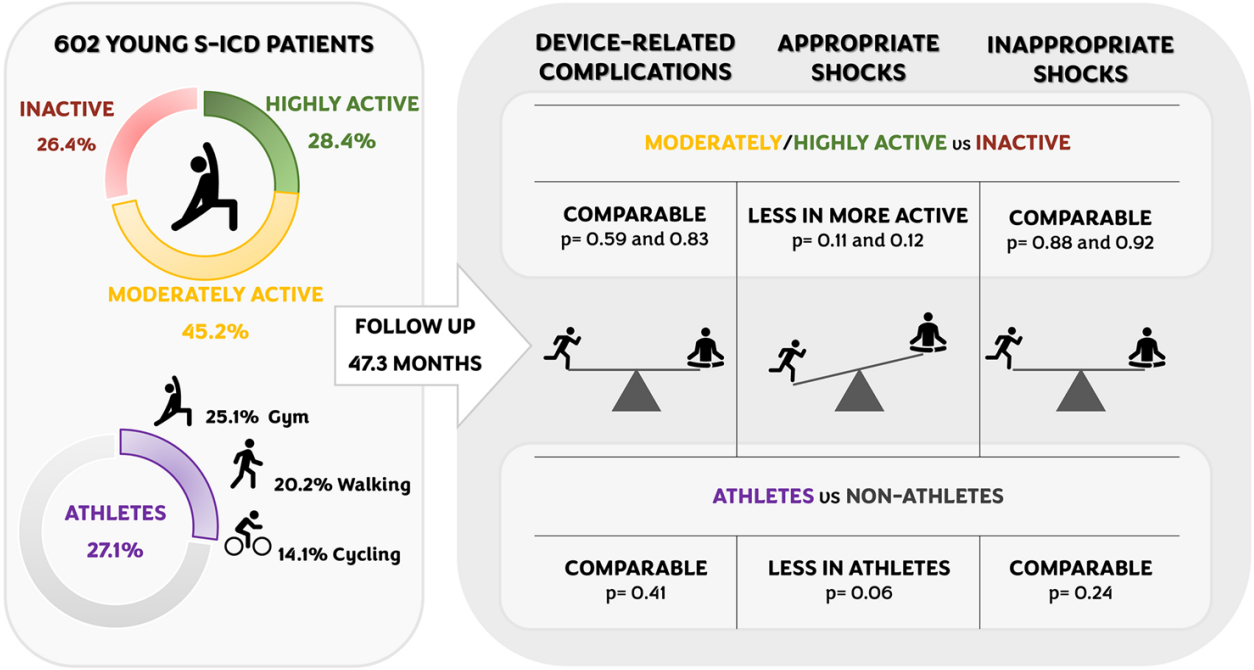
European Heart Journal (2023) **44**, 3503–3626
https://doi.org/10.1093/eurheartj/ehad194

ESC GUIDELINES

2023 ESC Guidelines for the management of cardiomyopathies

- **FE < 50%**
- **Extensive LGE (>15%) on CMR**
- ***Anévrysme apical, variants géné***

Retour au sport avec un DAI ?



Pas de surrisque de complications et de chocs pour les porteurs de DAI pratiquant une activité physique.

Pietro Francia. Circulation: Arrhythmia and Electrophysiology. Subcutaneous Implantable Defibrillators in Young Patients: Arrhythmias, Complications, and Physical Activity 2025

Que disent les recommandations ?

Guidelines

2020

1. underlying disease

2. PM → sport ok (except collision)

3. Adapt implantation

Recommendations for exercise in individuals with pacemakers and implantable cardioverter defibrillators

Recommendations	Class[a]	Level[b]
It is recommended that individuals with implanted devices with/without resynchronization and underlying disease follow the recommendations pertaining to the underlying disease.[384,425]	I	B
Participation in sports and exercise (except collision sports) should be considered in individuals with pacemaker therapy who do not have pathological substrates for fatal arrhythmias.	IIa	C
Prevention of direct impact to the implanted device by adapting the site of lead and/or device implantation, padding, or restricting direct impact sports should be considered.	IIa	C
Holter recordings and device interrogation during and after resuming sports should be considered to allow appropriate tailoring of rate-responsive pacing parameters, exclusion of myopotential or electromagnetic inhibition, and detection of VAs.	IIa	C
Shared decision making should be considered during decisions relating to continuation of intensive or competitive sports participation in individuals with an ICD, taking into account the effect of sports on the underlying substrate, the fact that intensive sports will trigger more appropriate and inappropriate shocks, the psychological impact of shocks on the athlete/patient, and the potential risk for third parties.	IIa	C
An ICD is not recommended as a substitute for disease-related recommendations when these mandate sports restrictions.	III	C

© ESC 2020

4. Holter, device interrogation during exercise

5. Shared decision

6. NO ICD for sport participation

Que disent les recommandations ?

Guidelines

HRS 2024

ICD

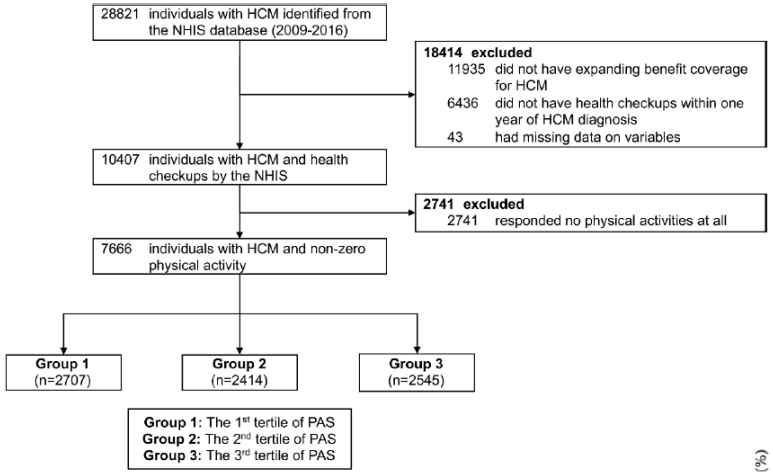
Recommendations for sudden cardiac arrest treatment and implantable cardioverter-defibrillator management in athletes

COR	LOE	Recommendations
2a	B-NR	4. In athletes with an ICD, return to play is reasonable, in the context of shared decision-making that includes underlying disease entity, clinical characteristics, and sport type.
2a	B-NR	5. In athletes who have experienced SCA and are undergoing ICD implant, it is reasonable to consider sport type and disease entity in the decision regarding ICD type and location.[192,195]
2a	C-EO	6. For athletes undergoing ICD implantation who will be returning to play, a waiting period of 4-6 weeks after a new implant or 2 weeks after generator replacement is reasonable.
1	B-NR	7. In athletes who have experienced SCA and have an ICD, ICD detection criteria should be programmed to long duration and a high rate cutoff to prevent unnecessary shocks.[192,193,196,197]
1	A	10. In athletes who have experienced SCA, regular EP follow-up is recommended, including remote monitoring of ICDs (if applicable).[198–200]
1	C-EO	11. In athletes with an ICD who experience an ICD shock, an evaluation of the cause, treatment of the underlying etiology, and confirmation of appropriate device function should be done prior to return to play.

Deux questions :

- Indication du DAI ?
- Quelle activité physique ?

Niveau d'activité physique et mortalité ?



Age moyen: 59 ans

Score activité physique :

Groupe 1 : 1.4 ± 0.6 METs/jour

Groupe 2 : 3.4 ± 0.7

Groupe 3 : 8.4 ± 3.1

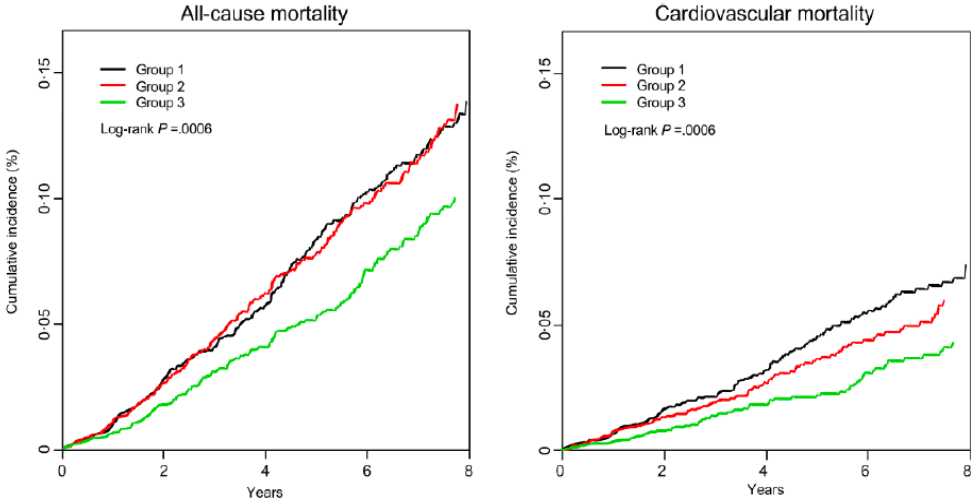
Suivi de 5.3±2.0 années

624 décès (8.1%)

Taux de mortalité toute cause : 9.1%, 8.9%, 6.4% groupes 1, 2 et 3

289 décès d'origine CV (3.8%)

Taux de mortalité CV : 4.7%, 3.8% and 2.7%



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Kwon S, et la. Association of physical activity with all-cause and cardiovascular mortality in 7666 adults with HCM: more physical activity is better. Br J Sports Med. 2020.

Effets bénéfiques de l'activité physique et CMH

↗ Pic de VO2
↗ Fonction diastolique
↘ Symptômes
↗ Qualité de vie
↘ Mortalité
→ Arythmie
→ Gradient

Table 1 Summary of key studies investigating the effect of exercise in patients with HCM

First author	Year	Type of study	Individual characteristics	Exercise programme	Summary of findings
Klempfner[29]	2015	Single-centre study	▶ 20 patients with HCM. ▶ Mean age 62±13 years old. ▶ Symptomatic in NYHA class II or III.	▶ 2× 60 min supervised exercise sessions at an HRR of 85%. ▶ Completed 41±8 hours of aerobic exercise.	▶ Increase in functional capacity of 2.5 METS (pVO_2 8.75 mL/kg/min). ▶ Improvement in NYHA class. ▶ No adverse events.
Saberi[28]	2017	Randomised clinical trial	▶ 67 patients with HCM. ▶ 69 controls with HCM. ▶ Mean age 50.4±13.3 years old. ▶ Asymptomatic.	▶ 16-week home-based exercise programme. ▶ 4–7× 60 min at HRR=70%.	▶ Modest increase in pVO_2 (1.35 mL/kg/min). ▶ Improved quality of life scores. ▶ No adverse events.
Kwon[30]	2020	Clinical observation study	▶ 7666. ▶ Mean age 59.5 years. ▶ Follow-up 5.3±2 years.	▶ Self-reported exercise volume in quartiles. ▶ Low 1.46±0.46 METS/day. ▶ Intermediate 3.4±0.7 METS/day. ▶ High 8.4±3 METS/day.	▶ Reduction in all-cause mortality.

HCM, hypertrophic cardiomyopathy; HRR, heart rate reserve; METS, metabolic equivalents; NYHA, New York Heart Association; pVO_2, peak oxygen consumption.

Table 2 Summary of key studies investigating athletes with HCM

First author	Year	Type of study	Individual characteristics	Exercise programme	Summary of findings
Sheikh[34]	2015	Clinical observational study	▶ 106 asymptomatic athletes competing at regional level or above. ▶ 102 patients with HCM. ▶ Mean age 24.3±6.9 years old.	▶ 81% competing at regional, national or international level.	Compared with patients with HCM, 96% of athletes with HCM exhibited: ▶ Milder LVH (36% confined to the apex). ▶ Large LVEDD. ▶ Superior indices of diastolic function.
Dejgaard[35]	2018	Clinical observational study	▶ 187 asymptomatic patients with HCM (44 athletes). ▶ Mean age 49±16 years old.	▶ >6 METS: vigorous exercise. ▶ >4 hours/week for >6 years (in the athletic range).	Exercise associated with: ▶ Larger LV volumes. ▶ Superior diastolic function. ▶ Larger stroke volume. ▶ No change in LVOT gradient. ▶ No increase in VA.
Pelliccia[36]	2020	Clinical observational study	▶ 88 asymptomatic athletes with HCM. ▶ Median age 31 years. ▶ ESC 5-year SCD risk 2.2%. ▶ Follow-up 7±5 years.	▶ 27 (31%) continued competitive sport. ▶ 61 (69) stopped competitive sport.	▶ No adverse events in the HCM trained athletes. ▶ 2 SCA in the HCM detrained group. ▶ No difference in annual prevalence of new symptoms (1.3%).

ESC, European Society of Cardiology; HCM, hypertrophic cardiomyopathy; LV, left ventricle; LVEDD, left ventricular end-diastolic dimension; LVH, left ventricular hypertrophy; LVOT, left ventricular outflow tract; METS, metabolic equivalents; SCA, sudden cardiac arrest; SCD, sudden cardiac death; VA, ventricular arrhythmia.

Gati S, et al. Exercise prescription in individuals with hypertrophic cardiomyopathy: what clinicians need to know. Heart 2022.

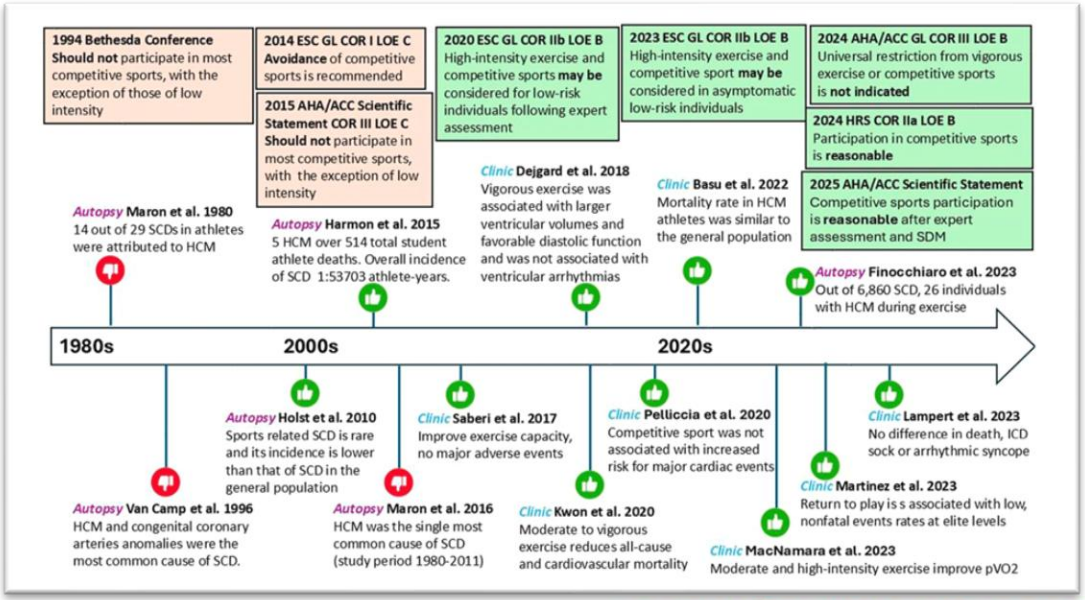
Des recommandations plus permissives

ESC European Society of Cardiology
European Heart Journal (2025) 00, 1–14
https://doi.org/10.1093/eurheartj/ehaf770

STATE OF THE ART REVIEW
Heart failure and cardiomyopathies

Hypertrophic cardiomyopathy: changing the paradigm of exercise prescription and competitive sport participation

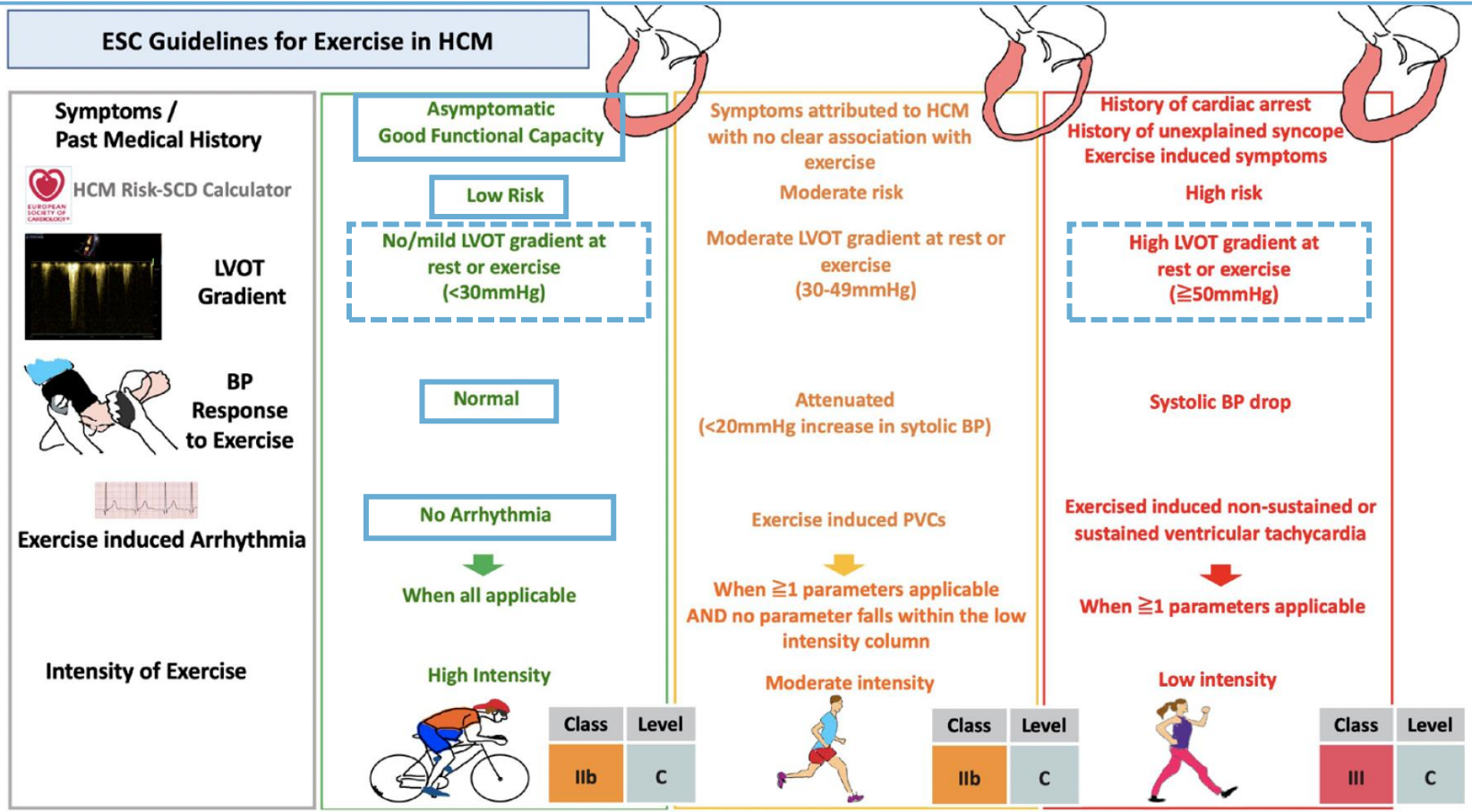
Mattia Zampieri[1,*], Sara Saberi[2], Flavio D'Ascenzi[3], Michael Papadakis[4,5,6], Antonio Pelliccia[7], and Iacopo Olivotto[1,8]



AVANT
CMH = Pas de sport en compétition

DEPUIS 2020
CMH = Stratification du risque pour adapter la pratique

Stratification du risque



Gati S, et al. Exercise prescription in individuals with hypertrophic cardiomyopathy: what clinicians need to know. Heart 2022.

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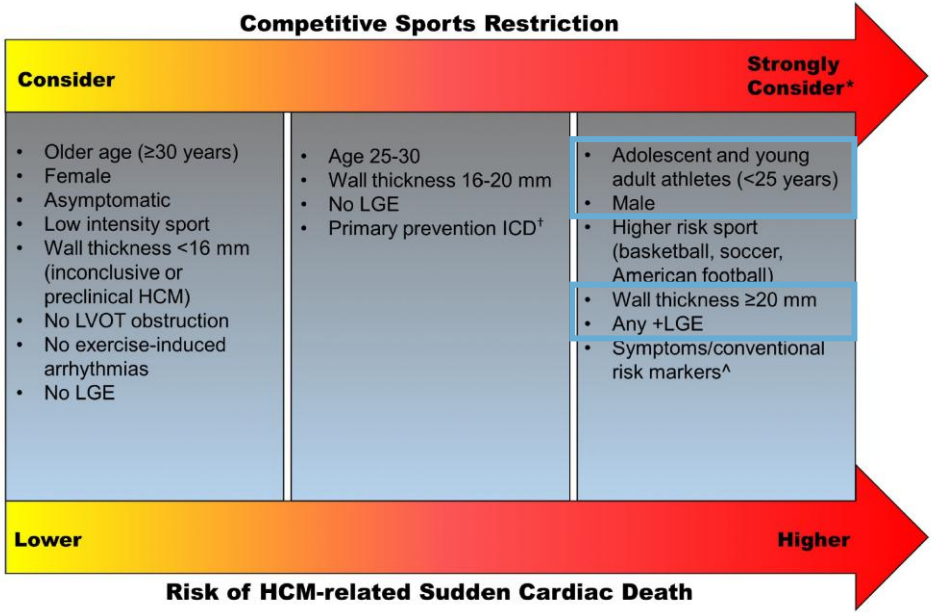
Critères absents mais à prendre en compte ?



Drezner al. Br J Sports Med 2021

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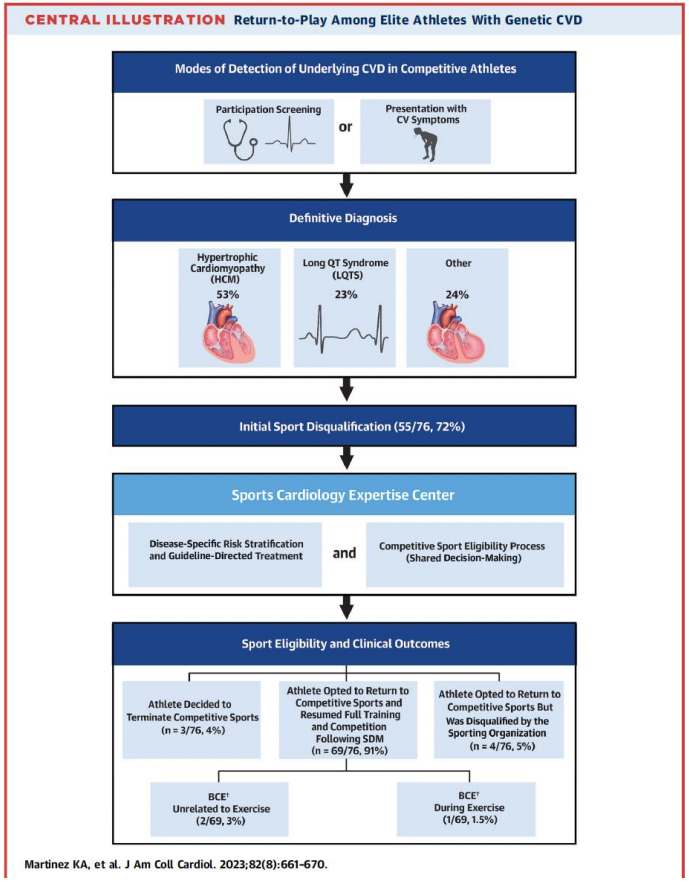
- **FE < 50%**
- **Extensive LGE (>15%) on CMR**
- ***Anévrysme apical, variants géné***

En pratique ?

76 athletes élites
63% asymptomatiques

53% CMH

91% de reprise après expertise cardiologie du sport et decision médicale partagée



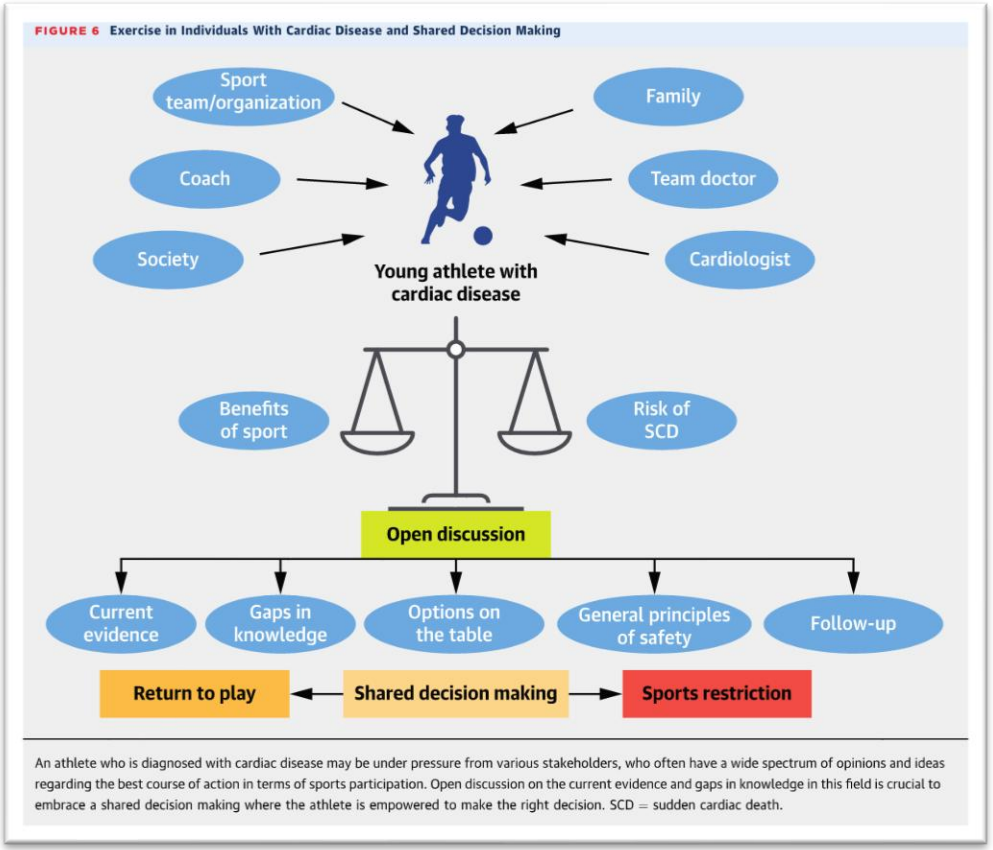
Suivi 7 ± 6 ans
1 évènement pendant sport (QT long)

Return-to-Play for Elite Athletes With Genetic Heart Diseases Predisposing to Sudden Cardiac Death. Martinez et al. JACC 2023.

Conclusion

DAI SC

ACTIVITE PHYSIQUE
FAIBLE à MODEREE



CMH

Sudden Cardiac Death in Young Athletes: JACC State-of-the-Art Review. Finocchiaro et al. J Am Coll Cardiol. 2024