An Exercise Plan for HCM patients

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HCM Director
Atlantic Health System/Morristown Med Center

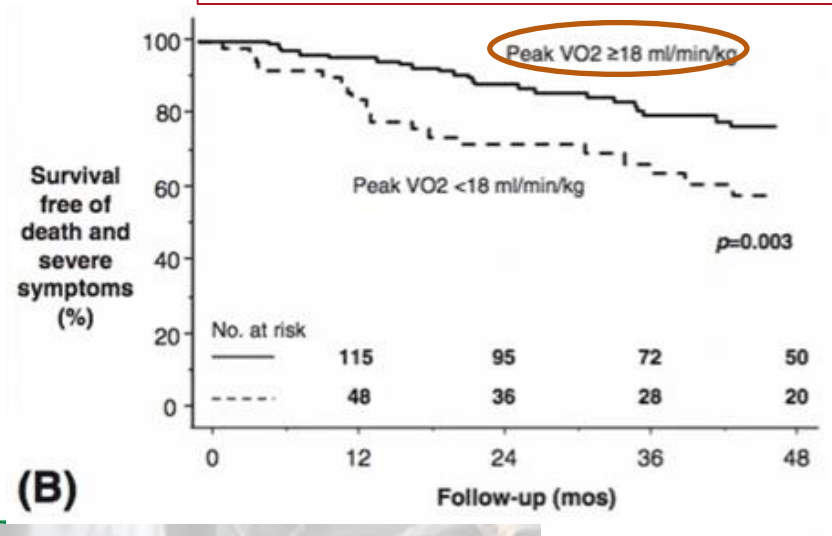

Your Prescription for Health
Exercise is Medicine™
www.ExerciseIsMedicine.org

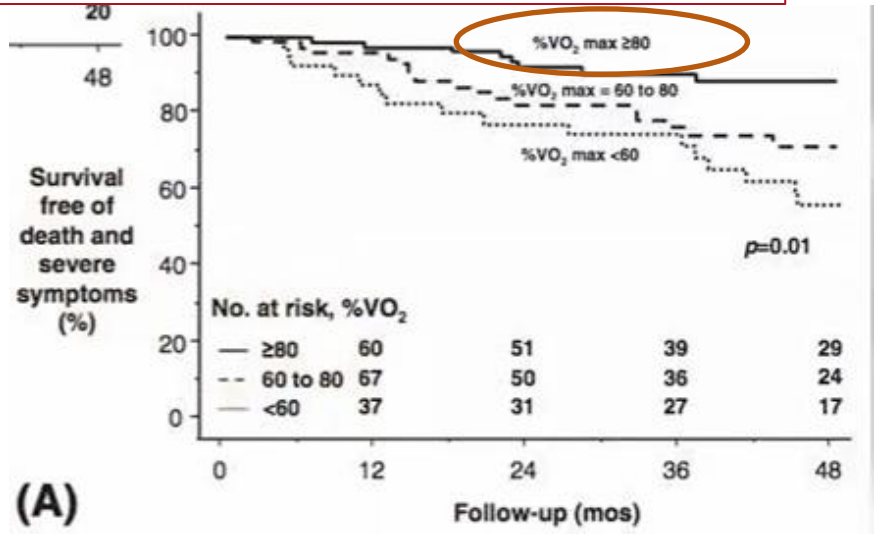
In HCM too!

Physical Activity Among HCM Patients

In clinical practice, the message of physical activity has been confusing

Fitness is Associated with prolonged survival and free from HF in those with HCM

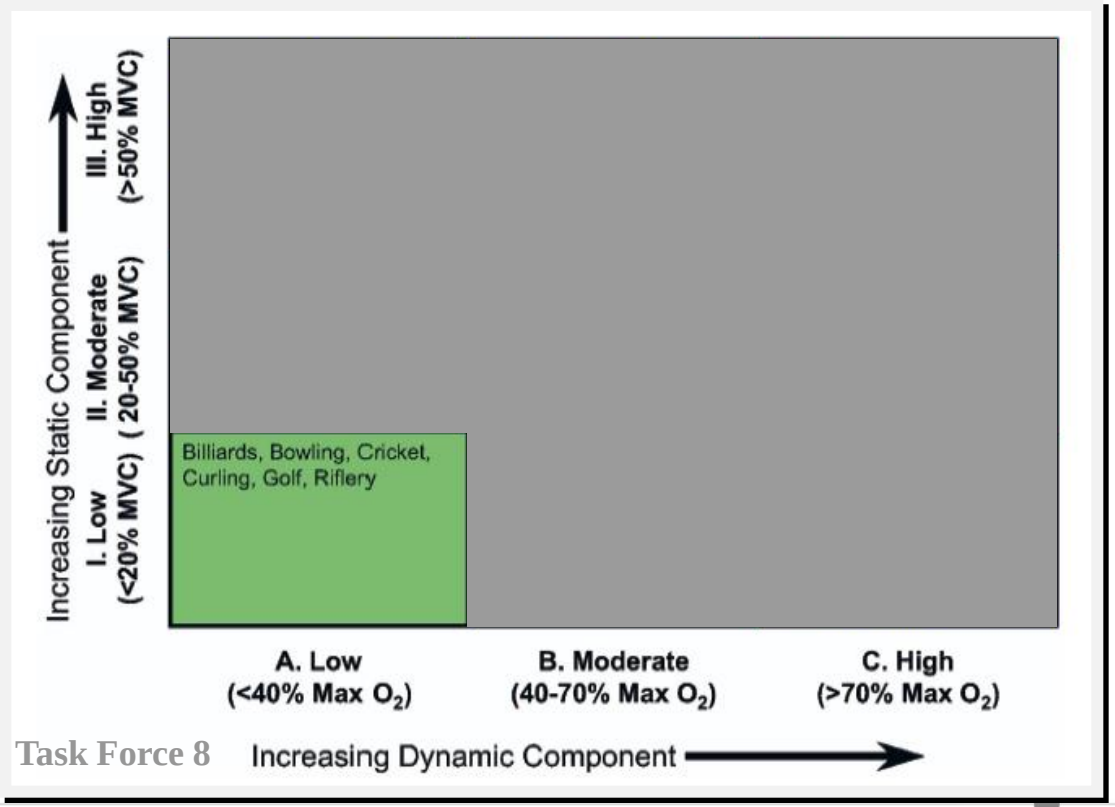




Sorajja, Ommen et al. Am J Cardiol, 2012
N=182 HOCM from Mayo Clinic

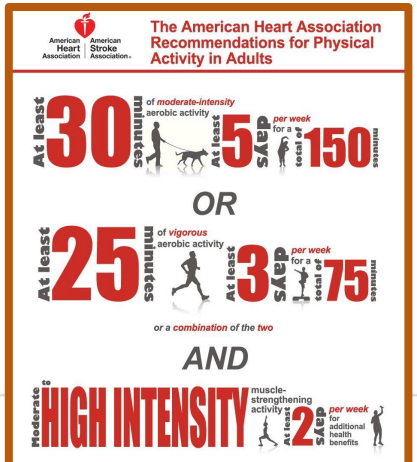
Physical Activity Among HCM Patients

In clinical practice, the message of physical activity has been confusing



Physical Activity Among HCM Patients

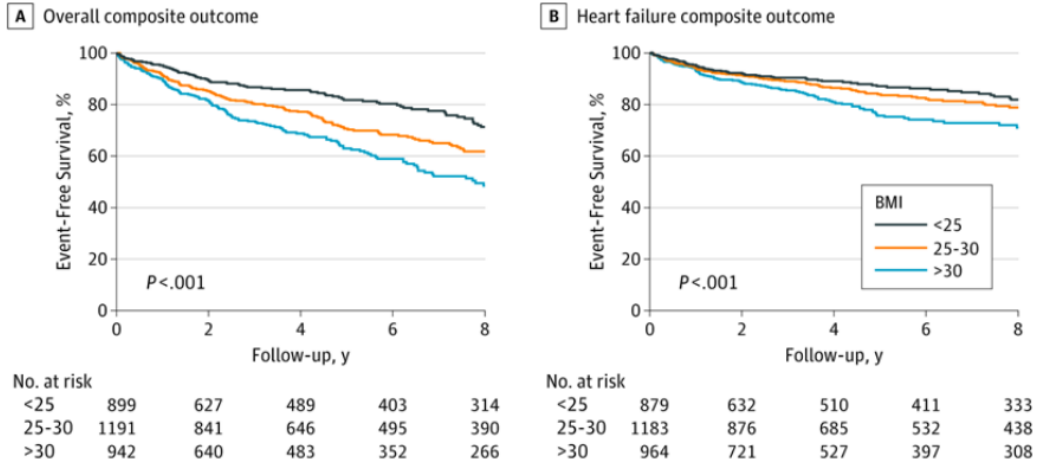
- HCM patients are less active than the general U.S. population
- 60% believe exercise restrictions negatively impact well-being
- >50% fail to meet minimum guidelines for physical activity



Association of Obesity With Adverse Long-term Outcomes in Hypertrophic Cardiomyopathy

- 3282 patients, 2019 (61.5%) were male. Mean age 47yrs.
  - –1280 patients in the preobesity group (39.0%),
  - –1040 patients in the obesity group (31.7%).

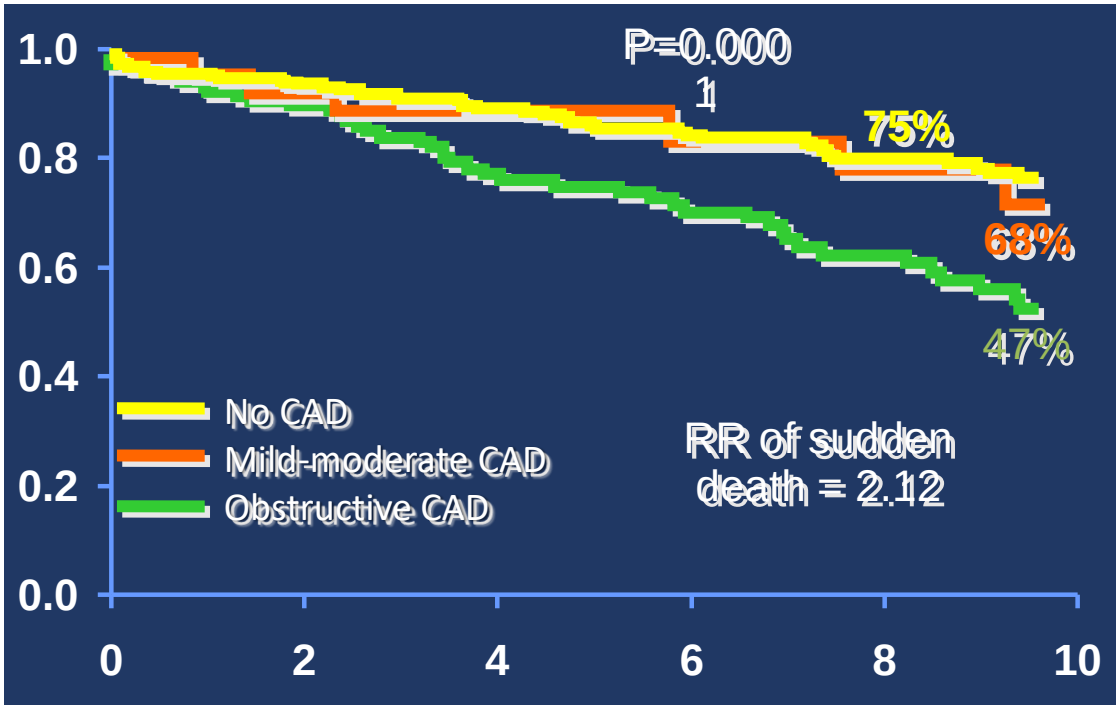
Figure 2. Kaplan-Meier Analysis of the Overall Composite and Heart Failure Composite Outcomes



Association of Obesity With Adverse Long-term Outcomes in Hypertrophic Cardiomyopathy

- 3282 patients, 2019 (61.5%) were male. Mean age 47yrs.
  - –1280 patients in the preobesity group (39.0%),
  - –1040 patients in the obesity group (31.7%).
  - –Patients with obesity were more symptomatic.
  - –At follow-up, obesity was independently associated with the HCM-related adverse outcomes, heart failure and AFIB
  - –Irrespective of age, sex, left atrium diameter, obstruction, and genetic status.

CAD & HCM has a poor prognosis



Sorajja et al: Circulation, 2003

Benefits of Exercise in HCM

Improved exercise tolerance, increased V02 max.[1-2]

Psycho-social benefits and improved health-related quality of life.[4]

Overall health benefits (weight loss, improved metabolic profile, longevity).

Potential for improved LV remodeling, increase in LV and RV end diastolic volume, improved diastolic function.[3]

1. Saberi et al. JAMA. 2017;317:1349-57.
2. Klempfner et al. Eur J Prev Cardiol. 2015;1:13-19.
3. Sheikh et al. Circ Cardiovasc Imaging. 2015:8:e003454.
4. Sweeting et al. Am J Cardiol. 2018;122:866-71.

Exercise in HCM

The Randomized Exploratory Study of Exercise Training in Hypertrophic Cardiomyopathy (RESET-HCM)

JAMA | Preliminary Communication

Effect of Moderate-Intensity Exercise Training on Peak Oxygen Consumption in Patients With Hypertrophic Cardiomyopathy

A Randomized Clinical Trial 2017

Sara Saberi, MD, MS; Matthew Wheeler, MD, PhD; Jennifer Bragg-Gresham, MS, PhD; Whitney Hornsby, PhD; Prachi P. Agarwal, MD, MS; Anil Attili, MD; Maryann Concannon, MSW; Annika M. Dries, BA; Yael Shmargad, BS; Heidi Salisbury, RN, MSN, CNS; Suwen Kumar, MBBS; Jonathan J. Herrera, MS; Jonathan Myers, PhD; Adam S. Helms, MD, MS; Euan A. Ashley, FRCP, DPhil; Sharlene M. Day, MD

- 136 patients with HCM; **mean age 50.4 years**
- Randomly assigned to **16 weeks of moderate-intensity exercise training** or usual activity
- Moderate-intensity exercise resulted in a significant but **small increase in exercise capacity** (+1.35 mL/kg/min)
- **No adverse events** (sustained ventricular arrhythmia, SCA, appropriate defibrillator shock, or death) in either group

EXERCISE IN GENETIC CARDIOVASCULAR DISEASE
(LIVE-HCM)

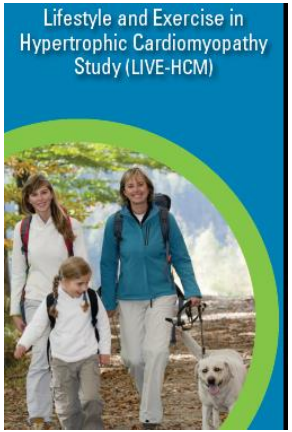
Aim 1: Incidence **arrhythmic events** over 3 years
Comparison moderate or vigorous exercisers vs sedentary

Aim 2: **Quality of life**
Comparison moderate or vigorous exercisers vs sedentary

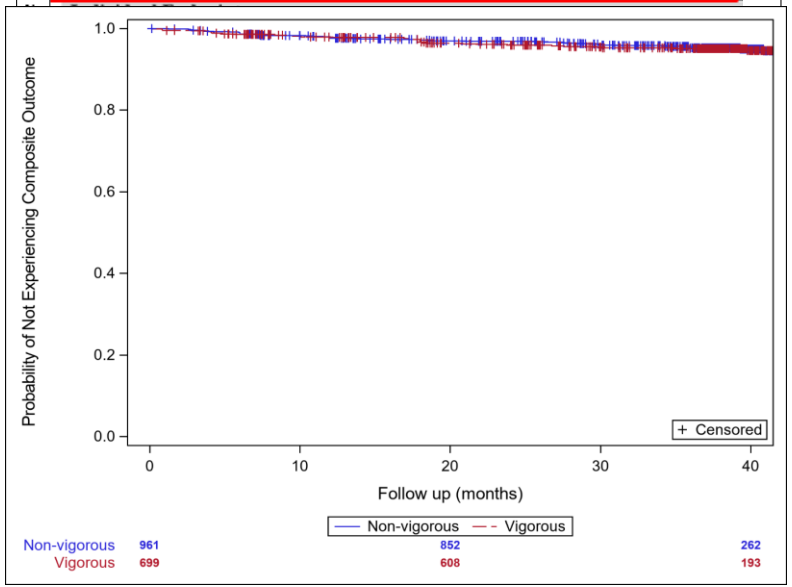
Age 8-60 years, with OR without ICD
Any level exercise

3 years of follow up

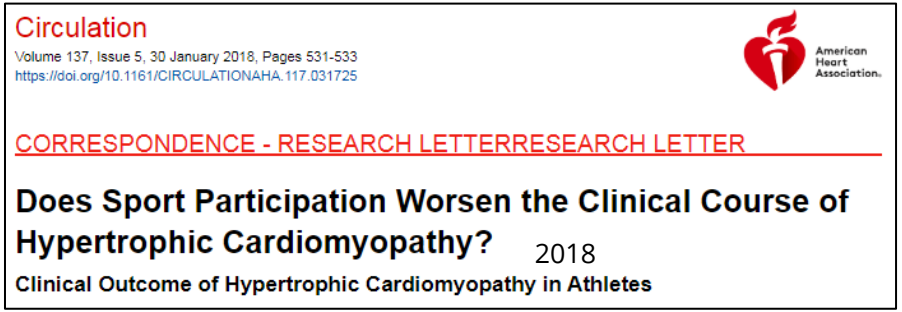
NIH R01 HL125918-01



	Non-Vigorous	Vigorous	Total	P
	N=961	N=699	N=1660	
TOTAL composite endpoint				
N	44	33	77	
Rate per 1,000 person-year	15.3	15.9	15.6	
(95% CI)	(11.4, 20.5)	(11.3, 22.4)	(12.5, 19.6)	



Athletes with HCM

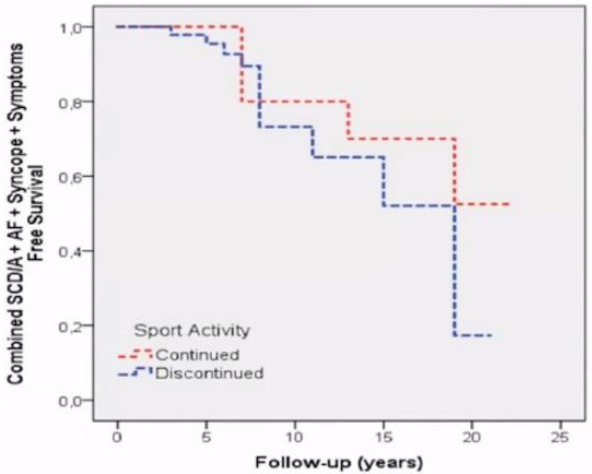


- 35 athletes with HCM; mean age 32
- 33 (94%) white
- 31 (88%) low risk by ESC risk score
- Mean observation 9 years
- 1 SCA occurred (amateur tennis player while walking)
- **No difference in the incidence of symptoms or events among patients who stopped or continued sport competitions**

HCM in Athletes

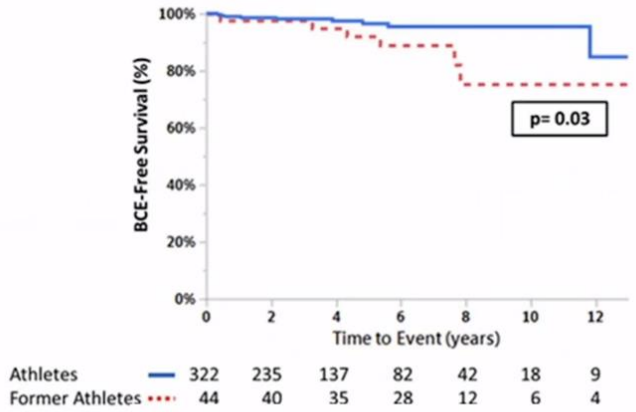
No increase in arrhythmic events for athletes who continue to play versus those who have stopped

88 athletes with HCM
61 stopped, 27 continued



Pelliccia et al., British Medical Journal 2020

366 athletes (23 with HCM)
44 stopped, 322 continued



Turkowski et al. Circulation. 2018

AHA/ACC CLINICAL PRACTICE GUIDELINE

2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

COR	LOE	RECOMMENDATIONS
1	B-NR	1. For most patients with HCM, mild- to moderate-intensity recreational* exercise is beneficial to improve cardiorespiratory fitness, physical functioning, and quality of life, and for their overall health in keeping with physical activity guidelines for the general population (1-3).
1	C-EO	2. For athletes with HCM, a comprehensive evaluation and shared discussion of potential risks of sports participation by an expert provider is recommended (4).
2a	C-EO	3. For most patients with HCM, participation in low-intensity competitive sports is reasonable (5,6).

Ommen et al. Circulation. 2020 and 2024;142:e

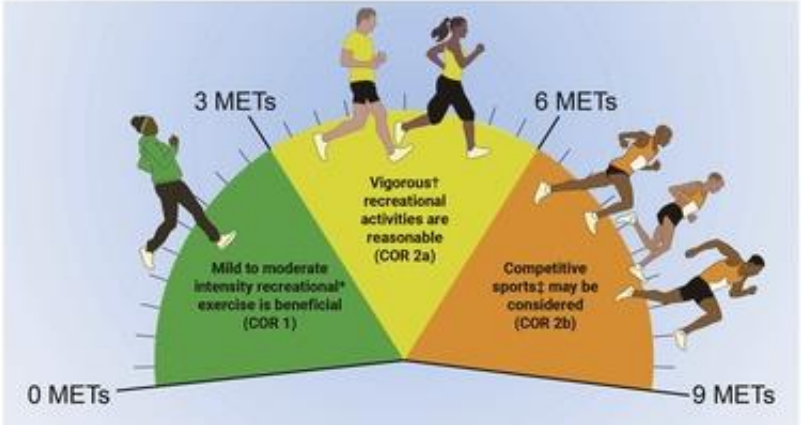
Recommendation Table 31 — Exercise recommendations for patients with cardiomyopathy

Recommendations	Class[a]	Level[b]
All cardiomyopathies		
Regular low- to moderate-intensity exercise is recommended in all able individuals with cardiomyopathy.	I	C
An individualized risk assessment for exercise prescription is recommended in all patients with cardiomyopathy.	I	C

ESC European Society of Cardiology

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

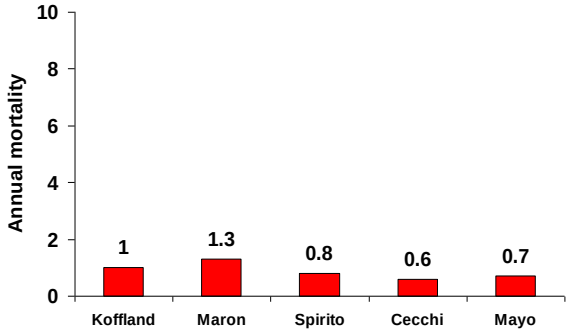
CENTRAL ILLUSTRATION: 2024 AHA/ACC/Multisociety HCM Guideline



Coylewright CT, et al. J Am Coll Cardiol. 2024;83(23):2406-2410.

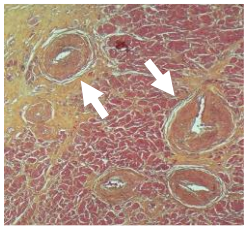
Clinical Dilemma

Low Annual Mortality Overall

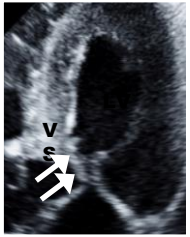


HCM

Disorganized Architecture



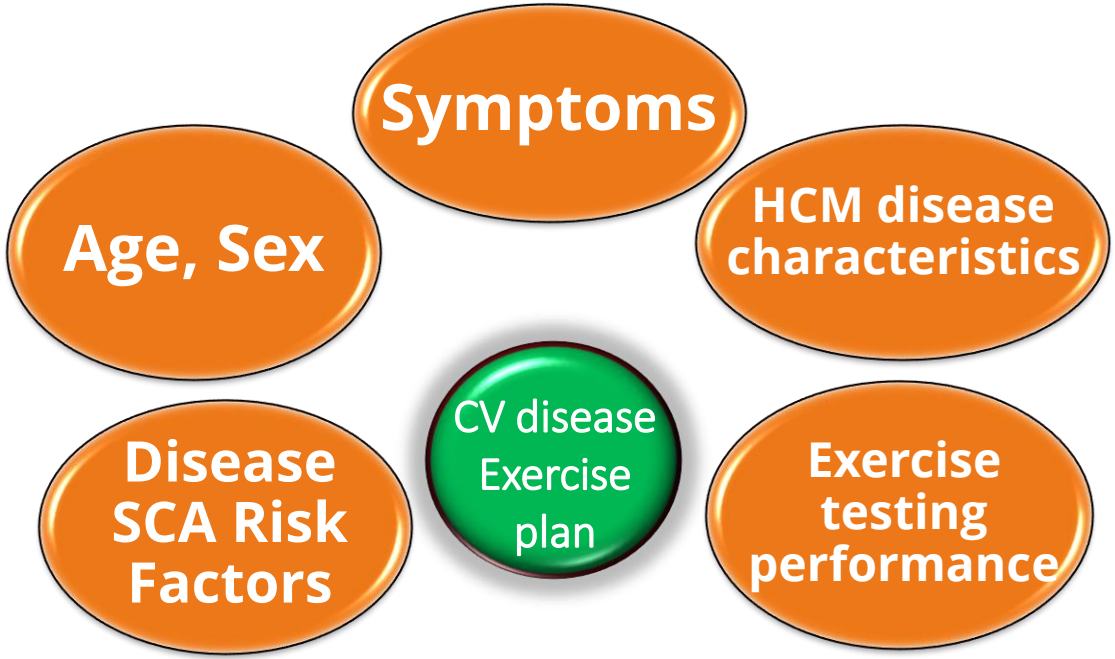
Myocardial Ischemia



↑ LV Systolic Pressure

Myocardial Scar

Arrhythmic Risk


Symptoms
Age, Sex
HCM disease characteristics
CV disease Exercise plan
Disease SCA Risk Factors
Exercise testing performance

Clinical Risk Factors for HCM Sudden Cardiac Arrest

Family history of sudden death from HCM
Massive LVH (>30mm)
Unexplained syncope
HCM w/ LV systolic dysfunction (EF <50%)
LV apical aneurysm
Extensive LGE on CMR
NSVT on ambulatory monitor

JAMA Cardiology | Original Investigation

Enhanced American College of Cardiology/American Heart Association Strategy for Prevention of Sudden Cardiac Death in High-Risk Patients With Hypertrophic Cardiomyopathy

Martin S. Maron, MD; Ethan J. Rowin, MD; Benjamin S. Wessler, MD; Paula J. Mooney, RN; Amber Fatima, MD; Parth Patel, MD; Benjamin C. Koethe, MPH; Mikhail Romashko, MD; Mark S. Link, MD; Barry J. Maron, MD

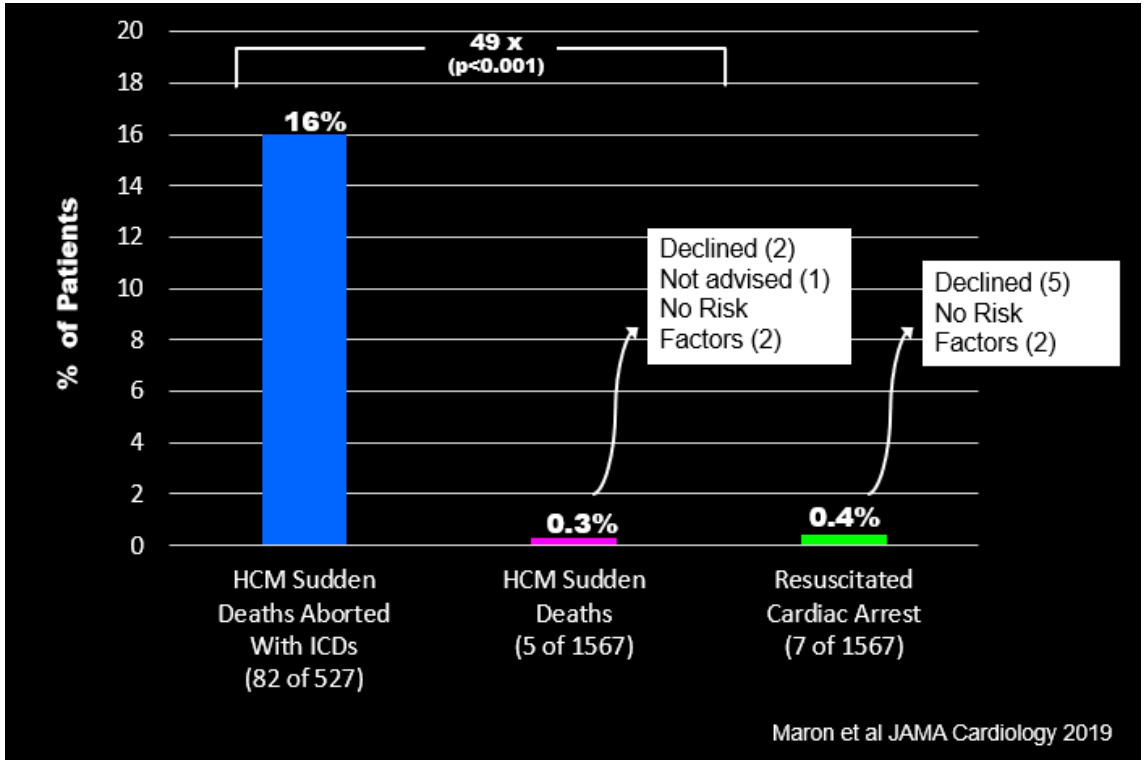
2019

- 2094 patients with HCM. Observational data. Single center
- Mean follow-up 4.7 years
- 12 of 1567 (0.8%) had SCA
- 527 received primary prevention ICDs
- Very low annual mortality. 99% survival without ICD
- 16% experienced device therapy–terminated VT/VF;
- 20 patients w/ ICD interventions -> 85% had LGE

Risk stratification and prevention model averted nearly all SCD

Enhanced ACC/AHA clinical risk factor strategy for predicting SCD events was 95% sensitive

Impact of US Guidelines For Risk Stratification in 2094 HCM patients



Sudden Cardiac Death Risk in Hypertrophic Cardiomyopathy
Wither Our Cognitive Miser

Steve R. Ommen, MD

of risk tolerance. In the end, the guideline models are not intended nor should they be used to make the final decision to implant an ICD. No cutoff value applies to every patient with HCM. It is the patient's risk tolerance/aversion, stemming from that consultation, that informs the final decision of whether to pursue an ICD. The consultation is not easy and is not the preference of the cognitive miser; the shared decision-making consultation is the domain of healers.

indications.[1] One can infer that expert clinical experience and/or discussions accounting for patient preferences affected the final treatment pathway chosen. The cognitive miser did not dictate the clinical decisions.

JAMA Cardiology July 2019 Volume 4, Number 7

Shared Decision-Making

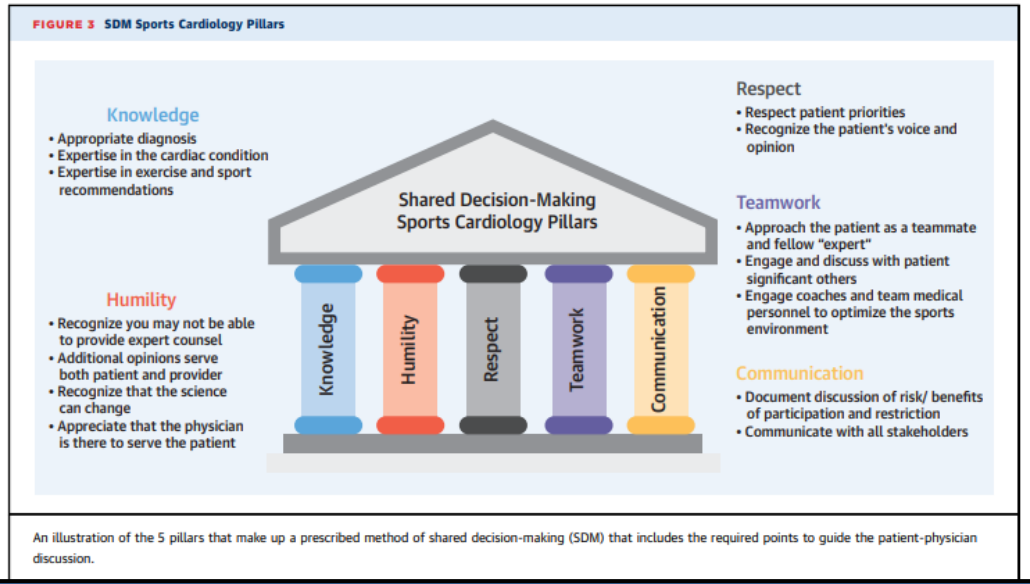
SHARED DECISION-MAKING

Recommendation for Shared Decision-Making
Referenced studies that support the recommendation are summarized in Online Data Supplement 1.

COR	LOE	Recommendation
1	B-NR	1. For patients with HCM or at risk for HCM, shared decision-making is recommended in developing a plan of care (including but not limited to decisions regarding genetic evaluation, activity, lifestyle, and therapy choices) that includes a full disclosure of the risks, benefits, and anticipated outcomes of all options, as well the opportunity for the patient to express their goals and concerns.[1-6]

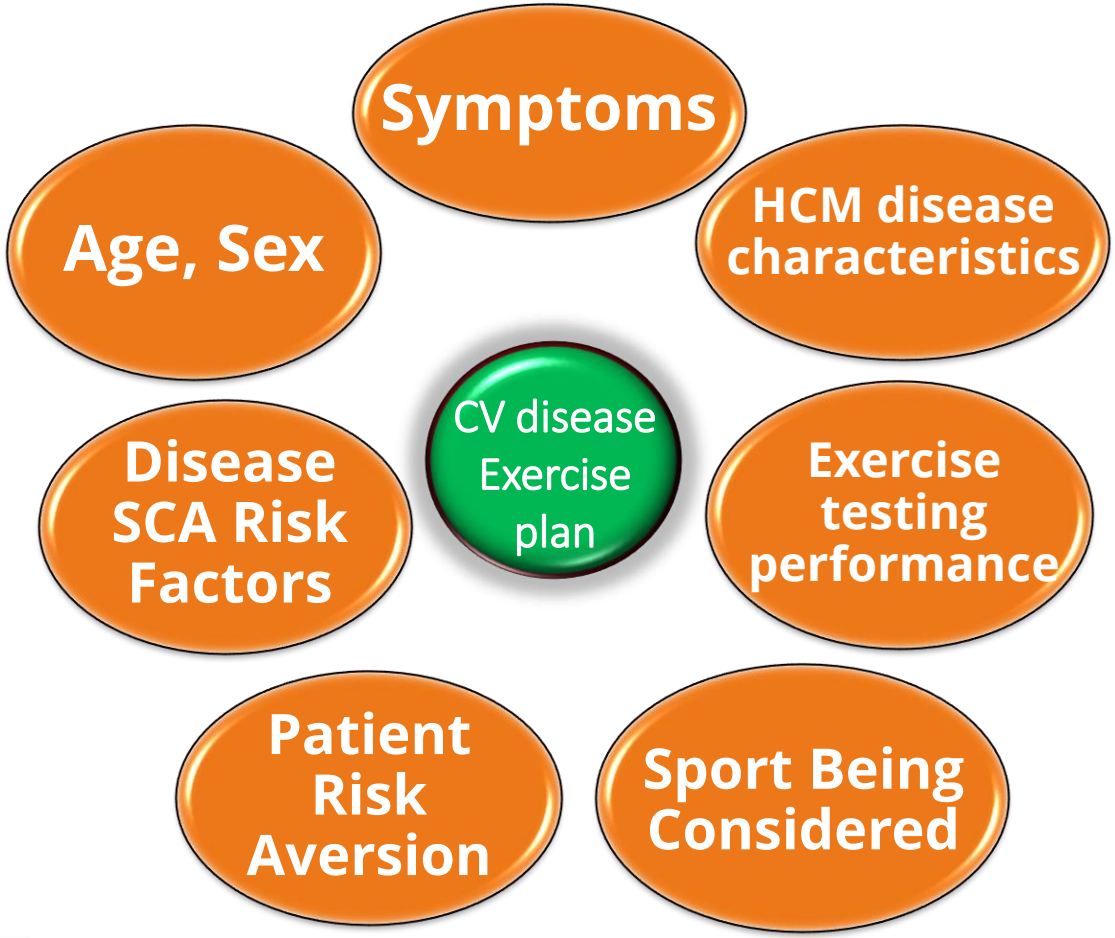
Ommen SR, et al. *Circulation.* 2020;142

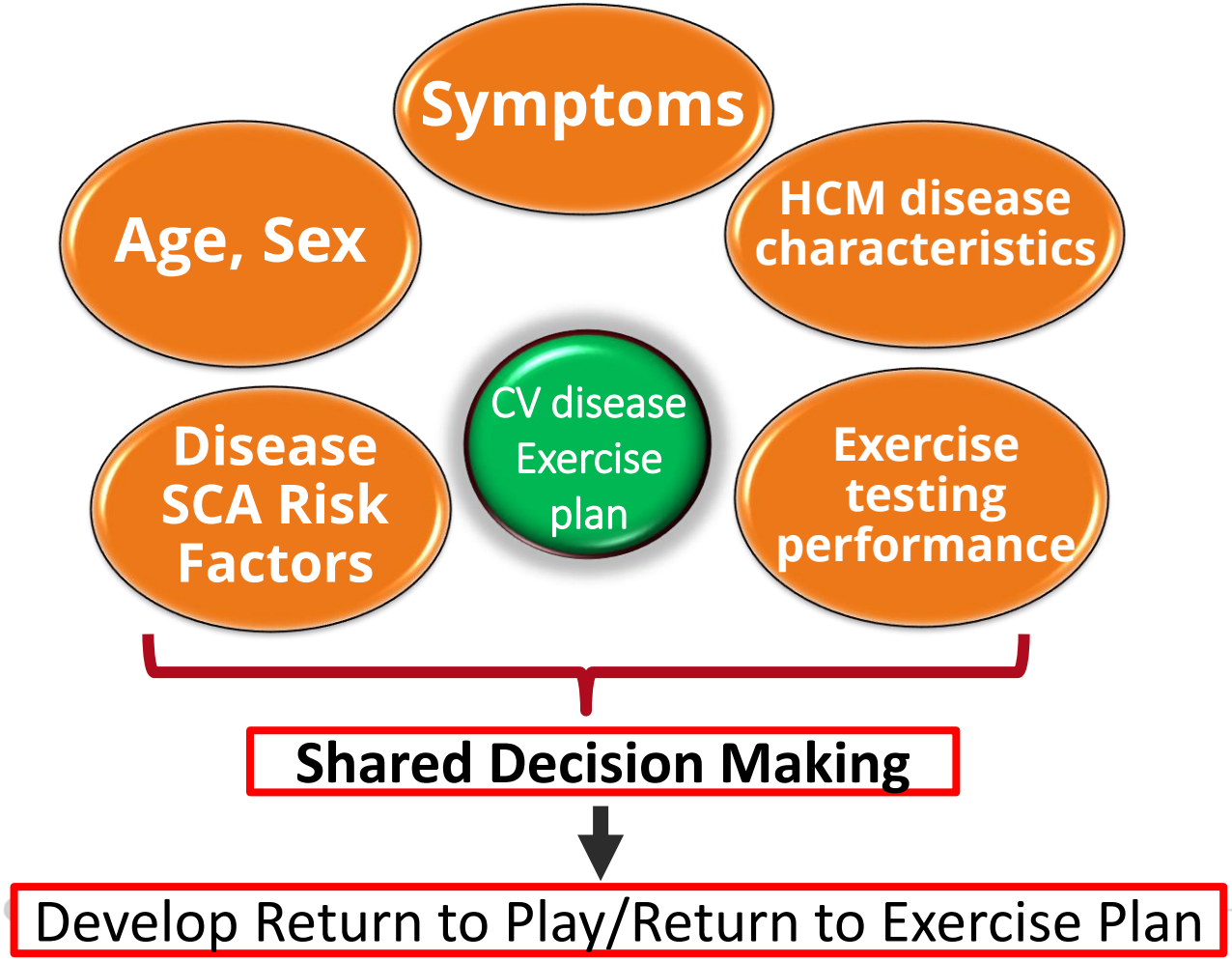
SDM in Sports Cardiology

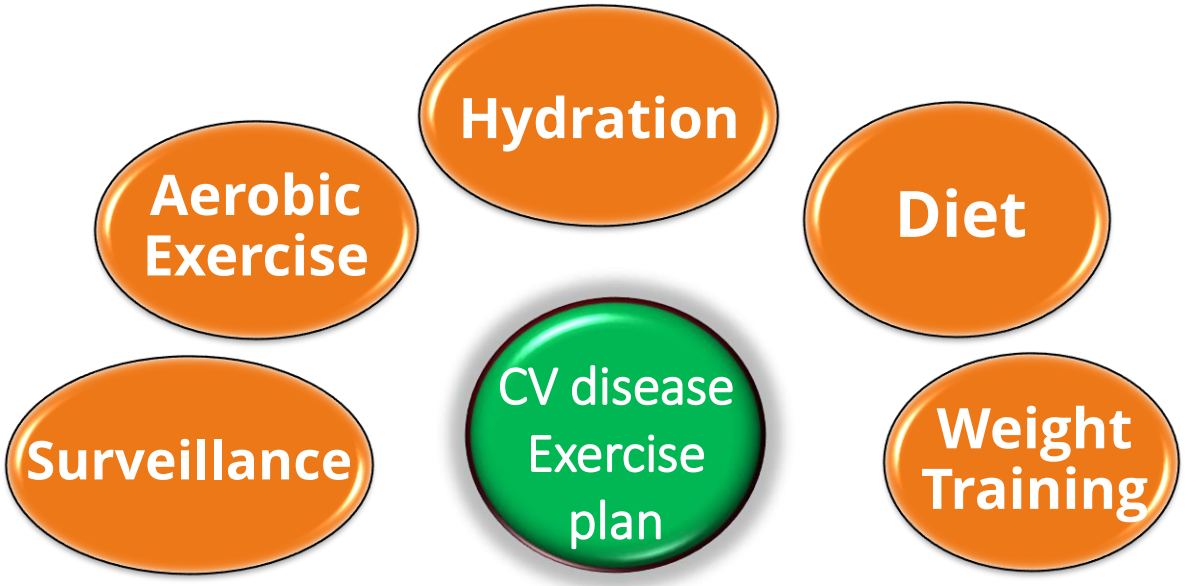


Is the right provider having the discussion?

M Martinez JACC OCT 2021


Symptoms
Age, Sex
HCM disease characteristics
CV disease Exercise plan
Disease SCA Risk Factors
Exercise testing performance
Patient Risk Aversion
Sport Being Considered


Symptoms
Age, Sex
HCM disease characteristics
CV disease Exercise plan
Disease SCA Risk Factors
Exercise testing performance
Shared Decision Making
Develop Return to Play/Return to Exercise Plan


Hydration
Aerobic Exercise
Diet
CV disease Exercise plan
Surveillance
Weight Training

Key components to writing a cardiovascular exercise Rx following the "F.I.T.T." model:

FREQUENCY

5 days per week of moderate exercise or 3 days per week of vigorous exercise or a combination of the two

INTENSITY

Light: 30-39% of HRR. THR _____ to _____.
<3.0 METs (Ex: Walking slowly, cooking, light housework[2], you can talk or sing)

Moderate: 40-59% of HRR. THR _____ to _____.
3.0 to <6.0 METs (Ex: Brisk walking (2.4-4 mph), biking (5-9 mph), active yoga, recreational swimming[2], you are a little short of breath, sweating and have trouble talking unless in short sentences)

Vigorous: >60-89% of HRR. THR _____ to _____.
≥6.0 METs (Ex: Jogging/running, biking (>10 mph), singles tennis, swimming laps[2], cannot talk)

Heart Rate Reserve (HRR)=
HRmax – HRrest = _____ - _____ = _____

HRmax = 220 – age = 220 - _____ = _____

Target HR (THR) = (HRR x %intensity) + HRrest =
(_____ x _____) + _____= _____

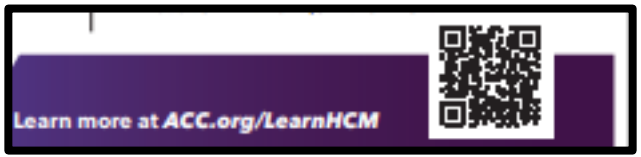
TIME

150 min/week of moderate-intensity or 75 min/week of vigorous-intensity or a combination

100+ minutes/week

TYPE

Continuous, regular and purposeful exercise involving major muscle groups (see examples under Light, Moderate, and Vigorous)



Just move your body!
Mild to Moderate exercise for all

Exercise Prescription for all

Get a Dog!

Owning a dog = large, health improving effect!!

22 min additional time spent walking, 95%CI (12, 34)

2760 additional steps per day, 95%CI (1667, 3991)

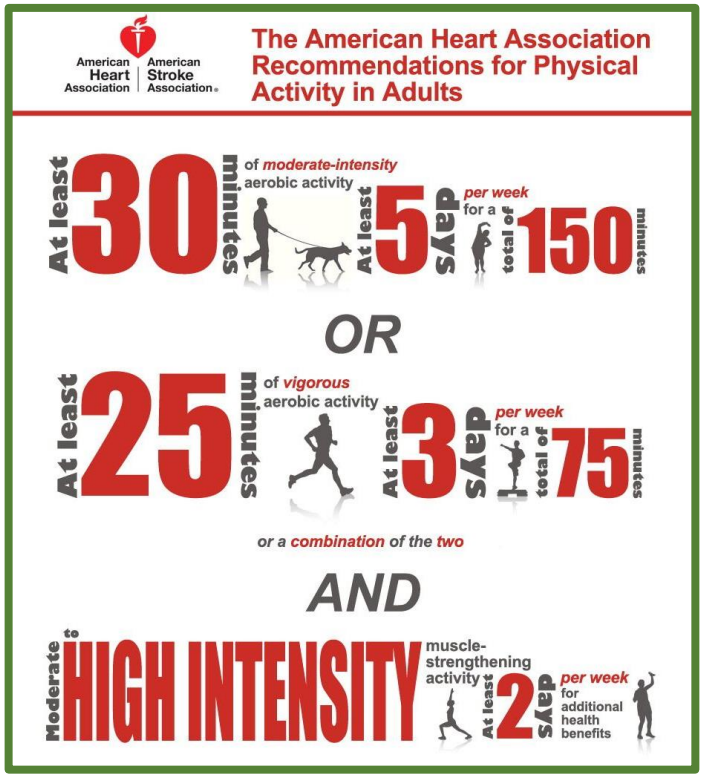
Dall et al. *BMC Public Health*BMC series – open, inclusive and trusted2017**17**:496
DOI: 10.1186/s12889-017-4422-5
https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-017-4422-5

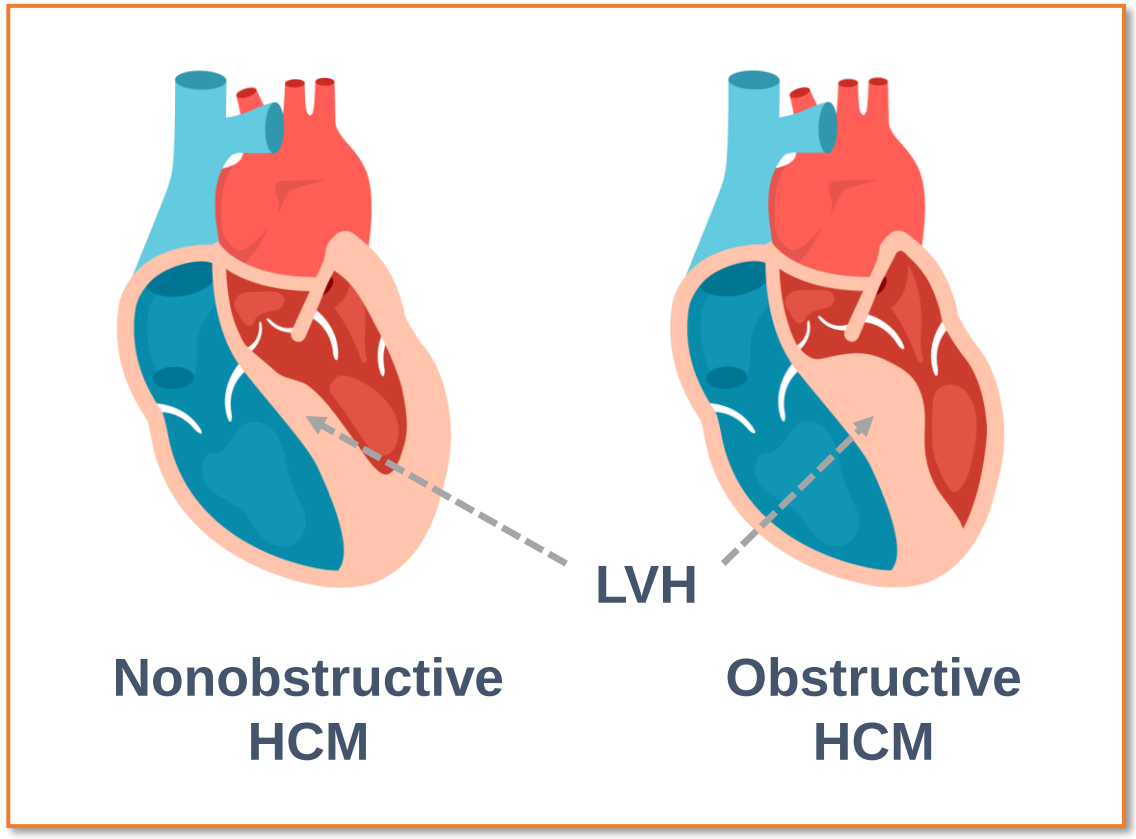
- 1-2 days a week
- No true maximum weight
  - Max repetitions - >12 per muscle group
  - Toning, fitness, cross training
  - Avoid sustained Valsalva

    -->“grunting”, “swinging or bouncing the weights”

Aerobic Exercise

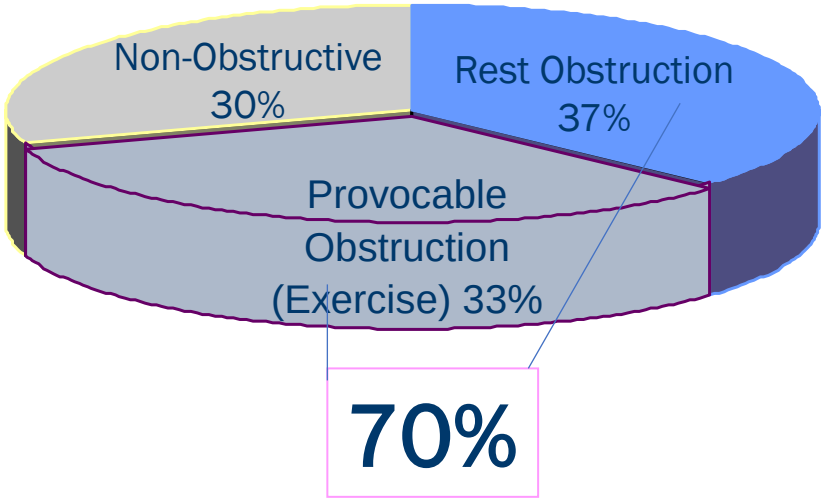
Weight Training

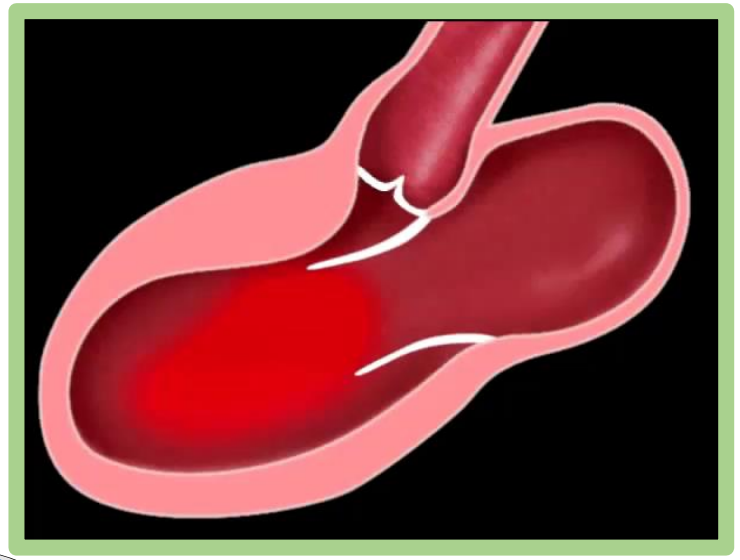



LVH
Nonobstructive HCM
Obstructive HCM

Prevalence of LV Outflow Obstruction

(based on rest and exercise gradients)





Obstruction
SAM / MR

- **Chest Pain or Pressure**
- **Dyspnea**
- **Fatigue Dizziness**

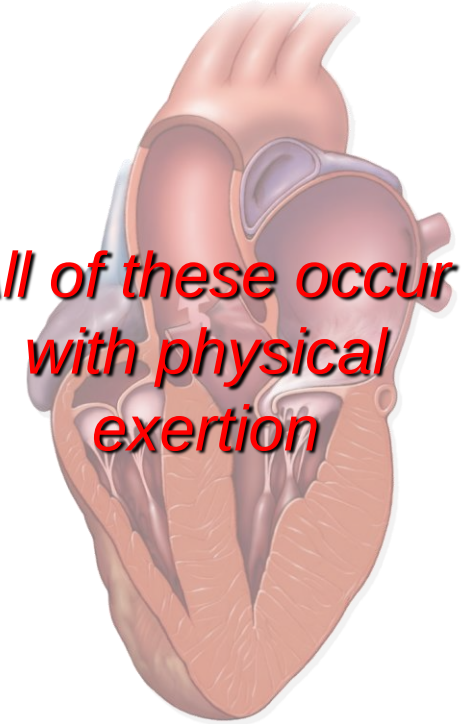
Pathophysiology of HCM Symptoms

Obstruction gets worse if…

More Vigorous Contraction

Decreased Resistance

Decreased Volume



All of these occur with physical exertion

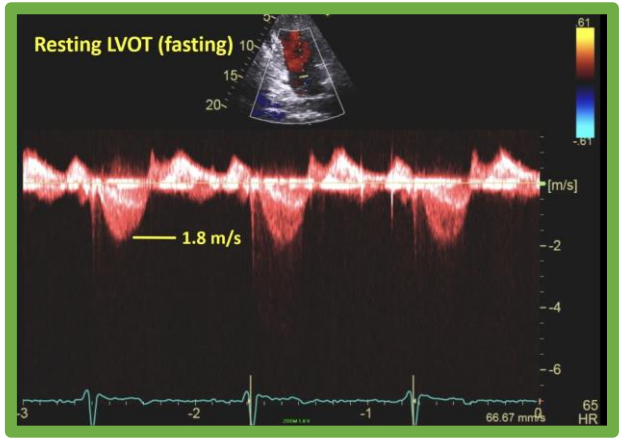
Hydration

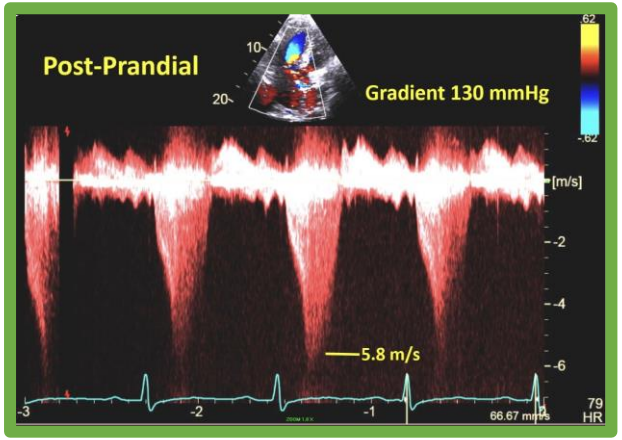
Diet

Am J Cardiol. 2010 Nov 1;106(9):1313-6. doi: 10.1016/j.amjcard.2010.06.061. Epub 2010 Sep 9.

Drink more, and eat less: advice in obstructive hypertrophic cardiomyopathy

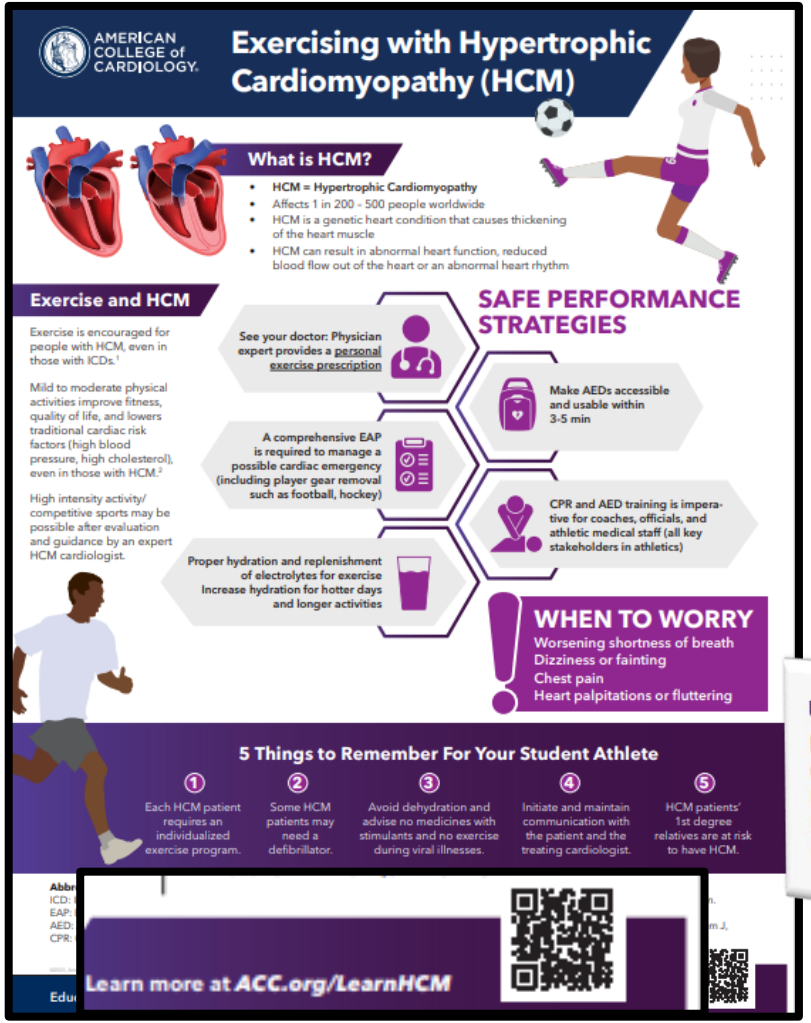
Mayank M Kansal [1], Farouk Mookadam, A Jamil Tajik





Diet

- Lean body mass is better
- Watch your calories –weight/weight loss
- Sleep and exercise for weight management.



ACC.org/LearnHCM

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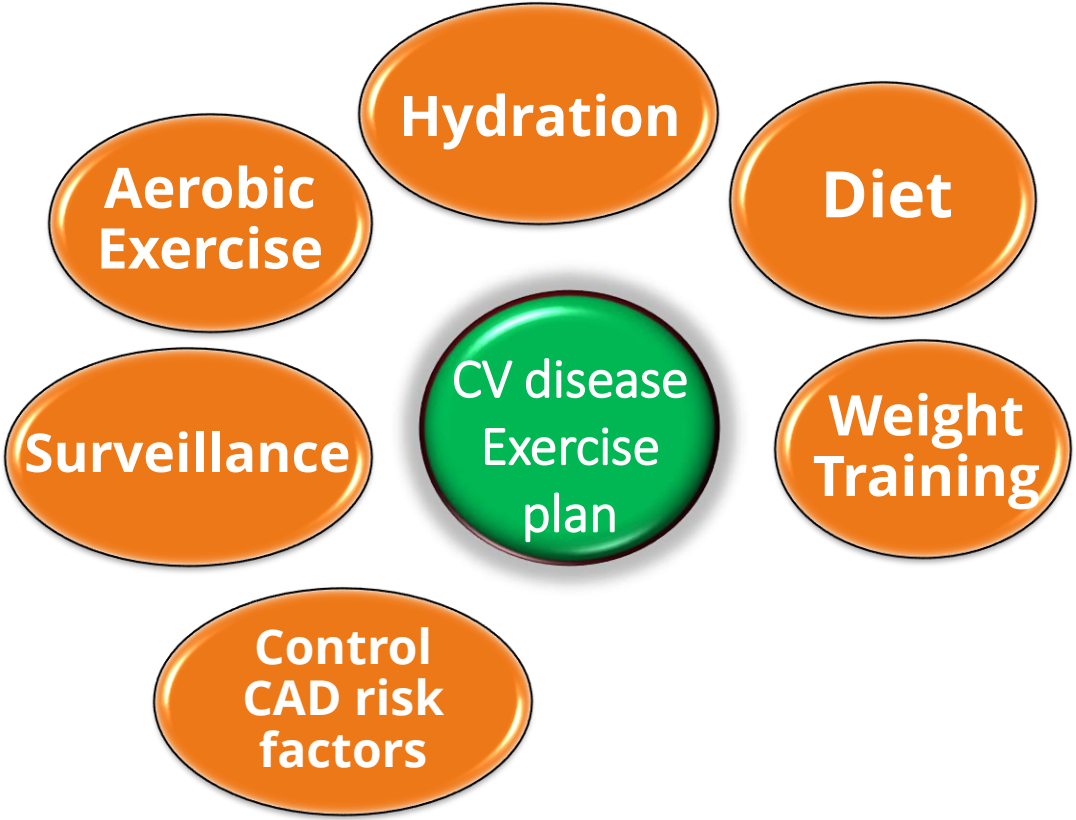
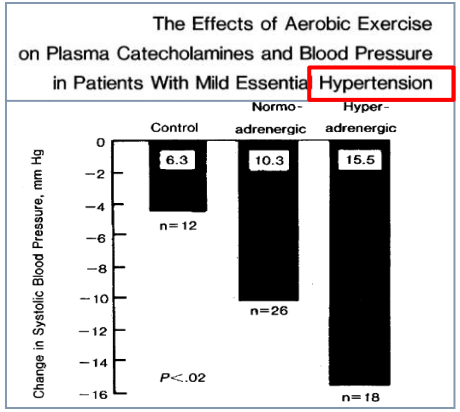
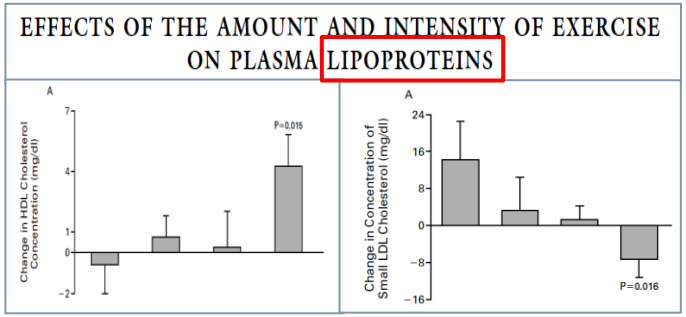

Hydration
Aerobic Exercise
Diet
CV disease Exercise plan
Surveillance
Weight Training
Control CAD risk factors

Exercise modifies CV Risk Factors

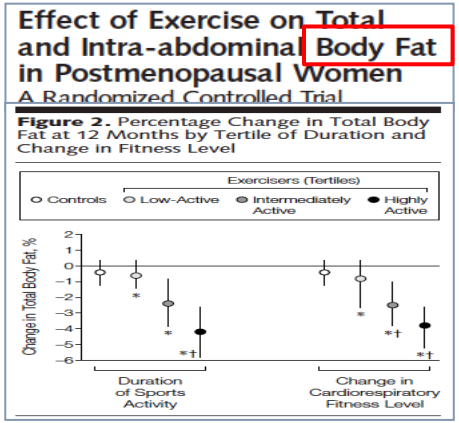
JAMA 1985



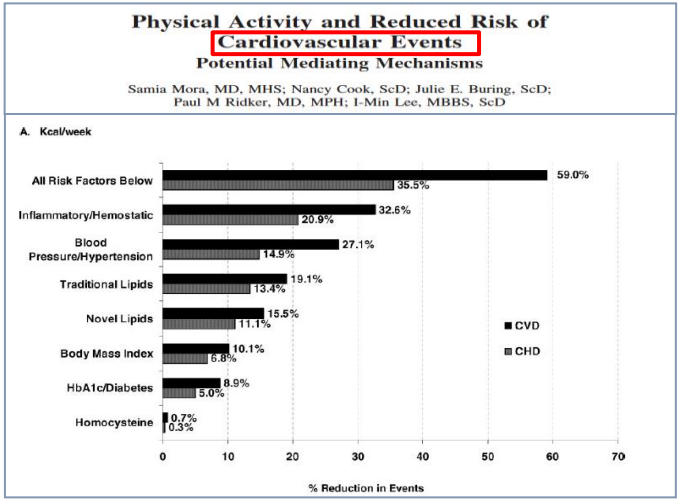
NEJM 2002



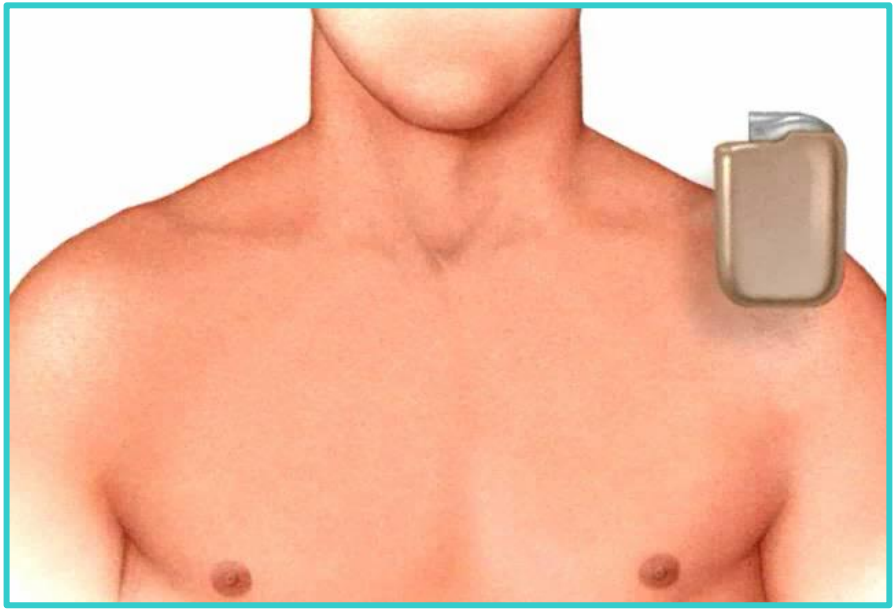
JAMA 2003



Circulation 2007



What if you have an ICD?



Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association.

Safety of Sports for Athletes With Implantable Cardioverter-Defibrillators : Results of a Prospective, Multinational Registry

Rachel Lampert, Brian Olshansky, Hein Heidbuchel, Christine Lawless, Elizabeth Saarel, Michael Ackerman, Hugh Calkins, N.A. Mark Estes, Mark S. Link, Barry J. Maron, Frank Marcus, Melvin Scheinman, Bruce L. Wilkoff, Douglas P. Zipes, Charles I. Berul, Alan Cheng, [illegible]

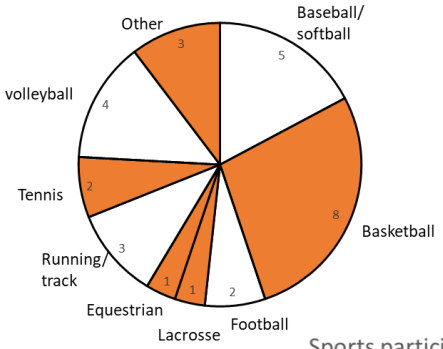
RESEARCH LETTER

Safety of Sports for Athletes With Implantable Cardioverter-Defibrillators

Long-Term Results of a Prospective Multinational Registry

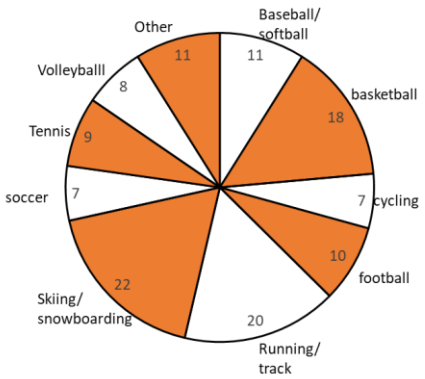
Circulation. 2017;135:00–00. DOI: 10.1161/CIRCULATIONAHA.117.027828

Sports Participation: Varsity/traveling team athletes



ICD SPORTS REGISTRY

Sports participation: All athletes



440 subjects with 44 month follow-up

RESULTS: PRIMARY ENDPOINTS

- **Tachyarrhythmic death or externally resuscitated tachyarrhythmia during or after sports: 0**
- **Injury due to arrhythmia or shock during sports: 0**

AHA/ACC CLINICAL PRACTICE GUIDELINE

AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

COR	LOE	RECOMMENDATIONS
1	B-NR	1. For most patients with HCM, mild- to moderate-intensity recreational* exercise is beneficial to improve cardiorespiratory fitness, physical functioning, and quality of life, and for their overall health in keeping with physical activity guidelines for the general population (1-3).
1	C-EO	2. For athletes with HCM, a comprehensive evaluation and shared discussion of potential risks of sports participation by an expert provider is recommended (4).
2a	C-EO	3. For most patients with HCM, participation in low-intensity competitive sports is reasonable (5,6).
2b	C-LD	5. For patients with HCM, participation in high-intensity recreational activities or moderate- to high-intensity competitive sports activities may be considered after a comprehensive evaluation and shared discussion, repeated annually with an expert provider who conveys that the risk of sudden death and ICD shocks may be increased, and with the understanding that eligibility decisions for competitive sports participation often involve third parties (e.g., team physicians, consultants, and other institutional leadership) acting on behalf of the schools or teams (4,7-11).

Volume 142, Issue 25, 22 December 2020; Pages e558-e631

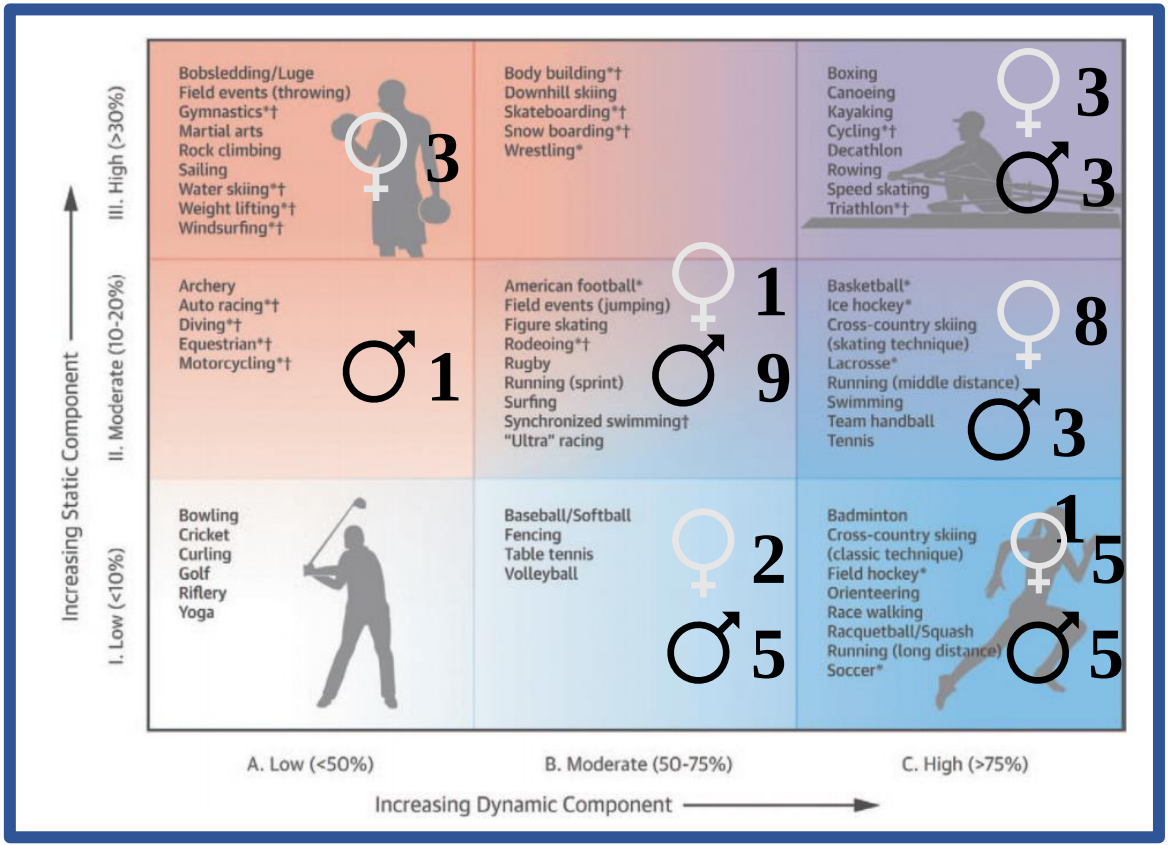
RTP for Elite Level Athletes With Sudden Cardiac Death Predisposing Heart Conditions

Demographics	Total Cohort
Total Number of Athletes	76
Mean Age at Return-to-Play (years)	19.9 ± 5.0
Female (%)	21 (28)
Race (%)	
White	38 (50)
Black	28 (37)
Not Disclosed/Unknown	4 (5)
Other	2 (3)
Asian	1 (1)
Hispanic	1 (1)
Indian	1 (1)
Pacific Islander	1 (1)
Diagnosis (%)	
HCM	40 (53)
LQTS	20 (26)
DCM	5 (7)
Other	5 (7)
ARVC	4 (5)
IVF	2 (3)
Symptomatic Prior to Diagnosis (%)	28 (37)
Syncope	10 (13)
Other	6 (8)
SCA	6 (8)
Irregular Heart Rate / Palpitations	4 (5)
Sustained VT	2 (3)

- 49 (64%) Division I and 27 (36%) professional athletes.
- 55 athletes (72%) were initially disqualified but opted to RTP after comprehensive clinical evaluation and SDM.
- 73 out of 76 athletes (96%) chose to RTP.

K Martinez, MW Martinez in press 2023

Return-to-Play for Elite Athletes With Genetic Heart Diseases Predisposing to Sudden Cardiac Death



K Martinez,, M Martinez JACC 2023

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- 49 (64%) Division I and 27 (36%) professional athletes.
- 55 athletes (72%) were initially disqualified but opted to RTP after comprehensive clinical evaluation and SDM.
- 73 out of 76 athletes (96%) chose to RTP.
- 1 patients (1.3%) had ≥ 1 breakthrough cardiac event (BCE) with exercise, 2 (2.6%) without exercise. NO deaths.

Conclusion:

After careful evaluation by an expert, risk stratification, and SDM, an exercise plan can be put into place for Division I and professional athletes to RTP.

K Martinez, MW Martinez in press 2023

Playing with HCM

- Patient/player autonomy in health care decisions is important
- Absolute risk is difficult to quantify for all
- Risk avoidance/acceptance is individual decision

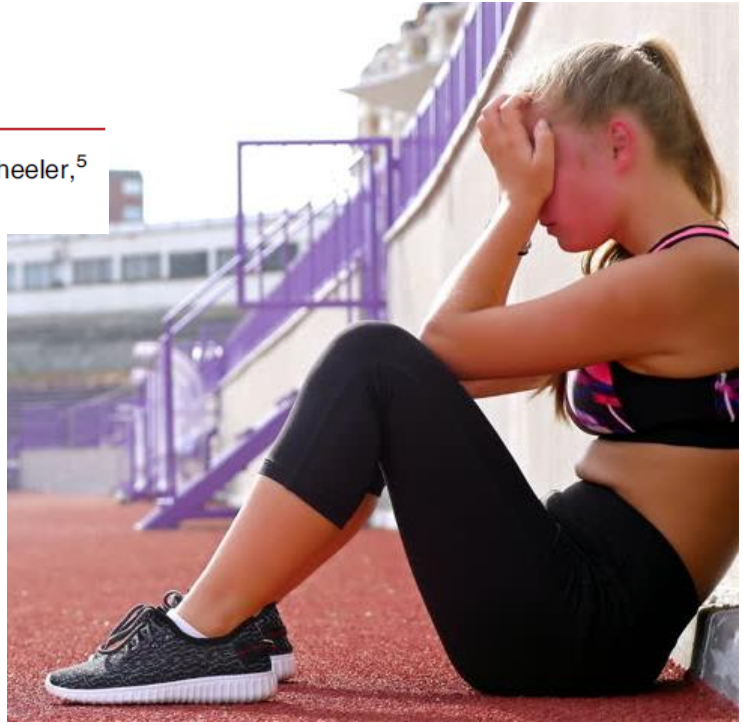
- **Potential harms of disqualification**
  - Loss of self-identity
  - Loss of scholarship/education
  - Loss of income
  - Depression/mental health concerns

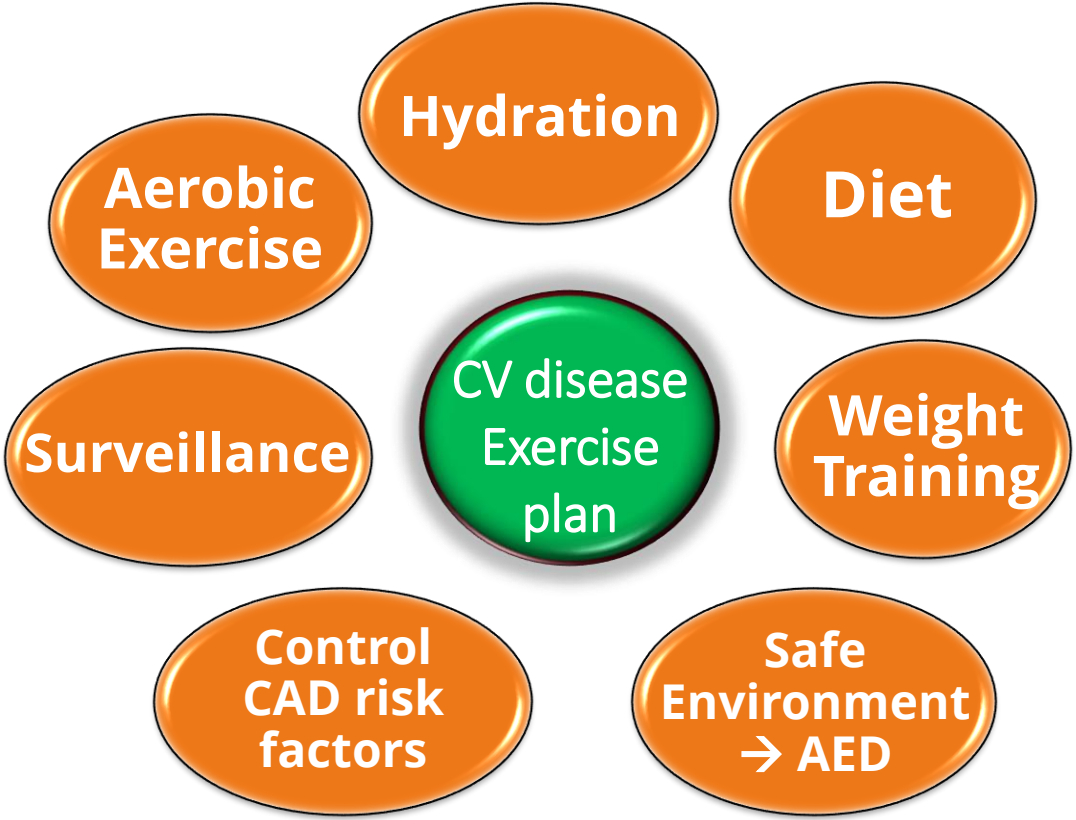
openheart

Exercise restrictions trigger psychological difficulty in active and athletic adults with hypertrophic cardiomyopathy

Rebecca C Luiten,[1] Kelly Ormond,[2] Lisa Post,[3] Irfan M Asif,[4] Matthew T Wheeler,[5] Colleen Caleshu[5]

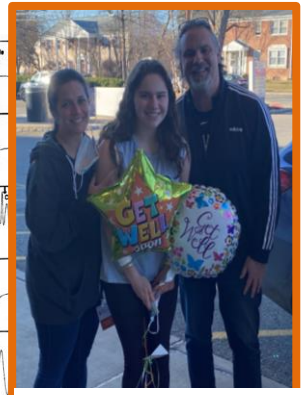
Data reveal that active and athletic adults experience multifaceted, lasting psychological distress in response to being advised to restrict their exercise regimen




Hydration
Aerobic Exercise
Diet
CV disease Exercise plan
Surveillance
Weight Training
Control CAD risk factors
Safe Environment → AED

Patients who stop exercising at still have risk

Low risk → decided to stop sports



With Permission & By Request

Low risk → decided to play

An 18-Year-Old Athlete Almost Dropped Dead, but Friends Saved His Life: 'It's Really a Miracle'

In May, high school wrestler jumped on the treadmill at a teammate's house for a routine workout — and five minutes later, the 18-year-old went into cardiac arrest.

With Permission

Sudden Cardiac Arrest “Drill”

SCA in athletes is largely a survivable event through prompt treatment and access to an AED

Take Home Points

- Exercise in HCM patients is needed and should be discussed with ALL HCM patients
- HCM patients who exercise have a better quality of life and improved outcomes.
- In treatment compliant patients, an exercise plan can be developed, even for elite athletes.
- An individual risk assessment, exercise plan, hydration and safety strategy are required.
- No absolute decisions – ongoing risk assessment is required.

An Exercise Plan for HCM patients

Matthew W. Martinez, MD FACC
Matthew.Martinez@atlantichealth.org

Thank you

@mmartinezheart