Exercise Guidelines in Cardiomyopathy

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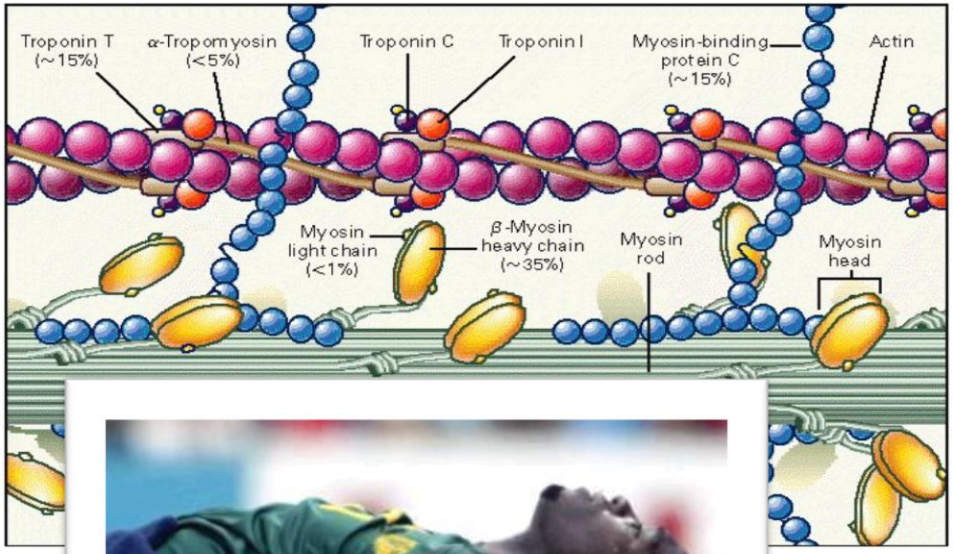
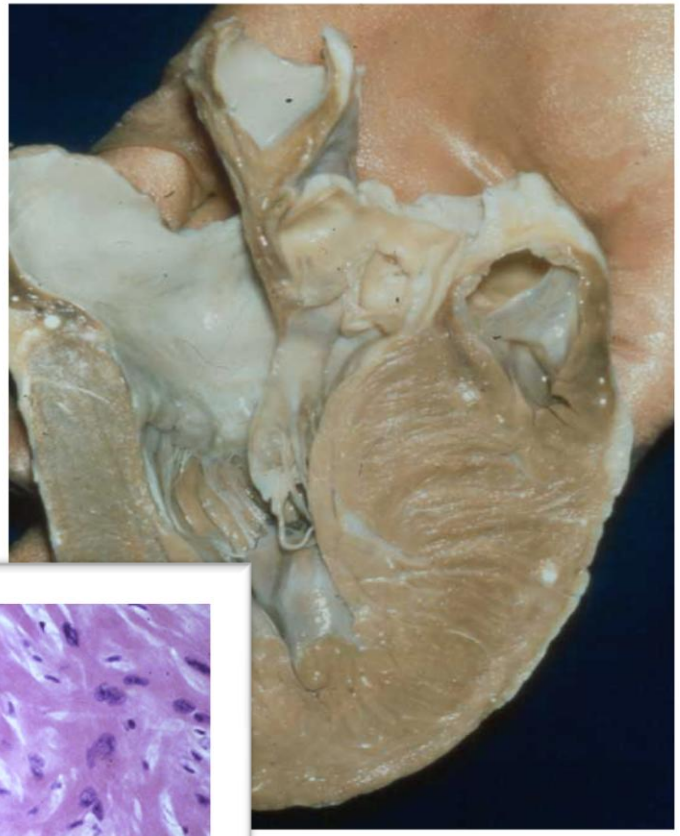
Conflict of Interest Declared

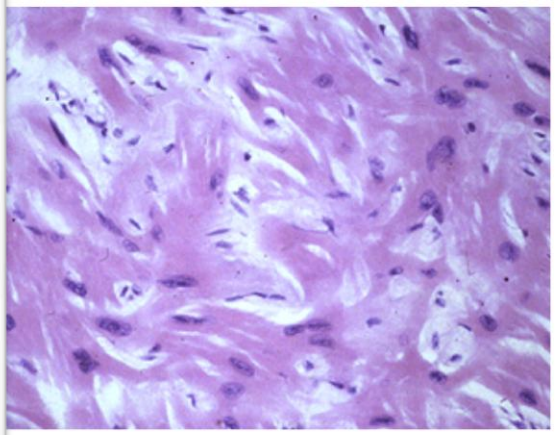
None

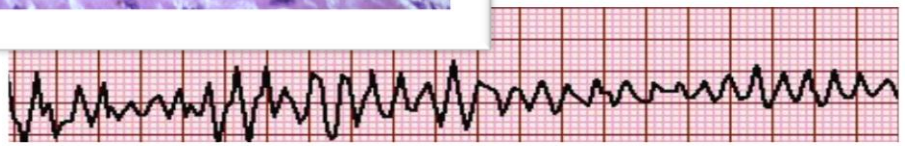
St George's
University of London

Hypertrophic Cardiomyopathy

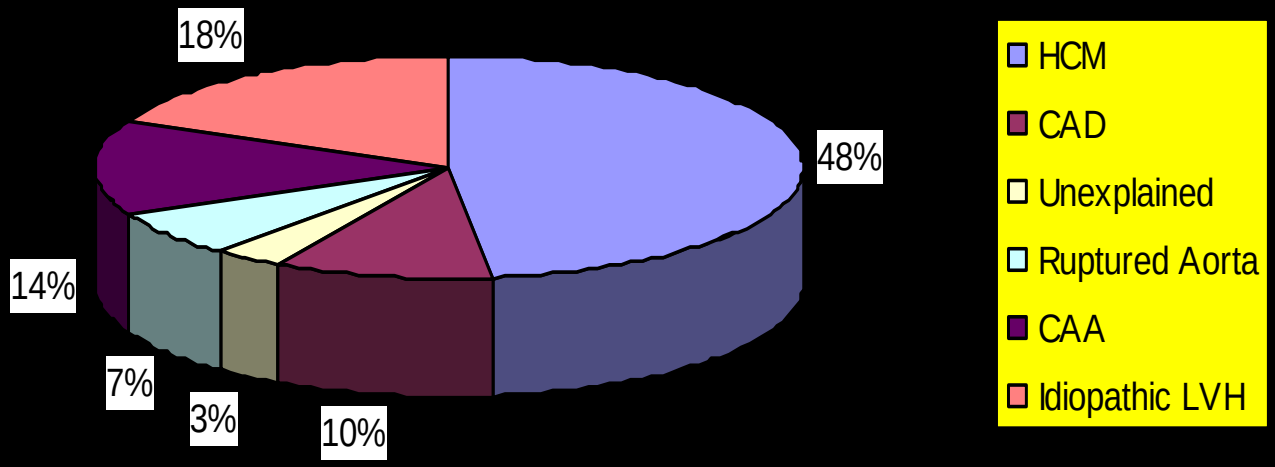








Causes of Sudden Cardiac Death in Athletes in Relation to Age



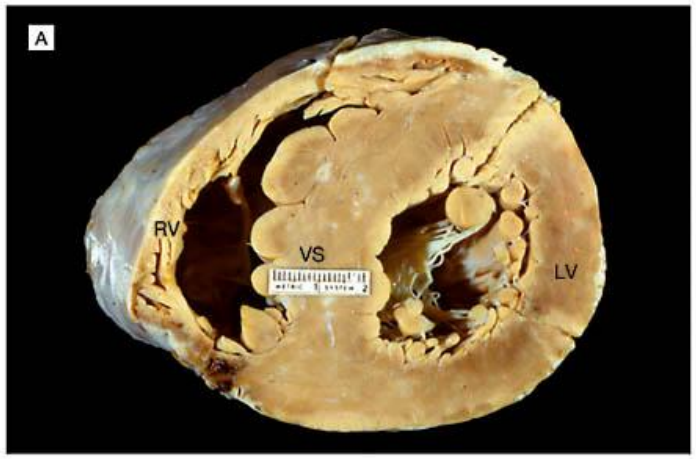
Exercise Related Deaths in HCM

90% occur during or immediately after exercise

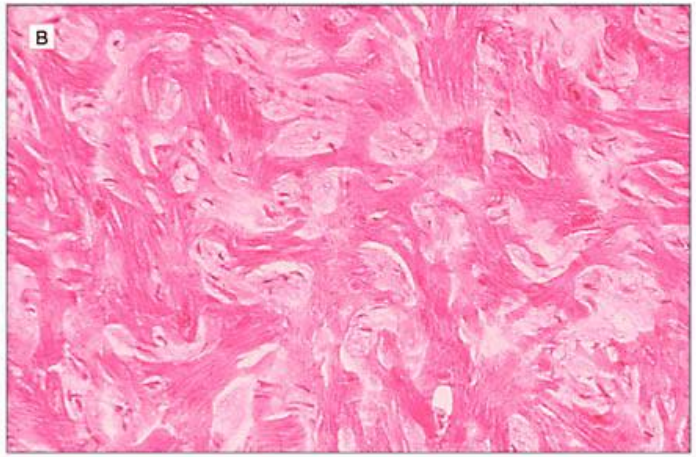
Soccer and basketball

Males > Females 9:1

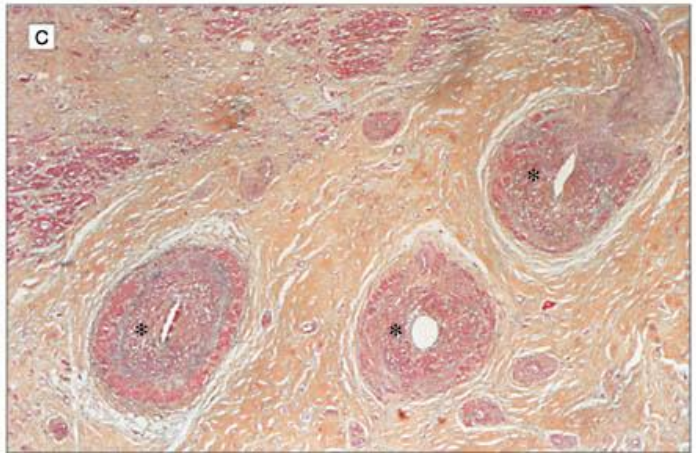
Blacks > Whites 7:1



LVH with non-dilated LV cavity



Myocardial disarray



Small Vessel Disease

Prevalence of HCM

General Population	0.2%
Competitive athletes	0.07%
Elite National athletes	0.03%

Abstinence from strenous exertion is essential to minimise the risk of sudden cardiac death

Pertinent Issues

Strong association between exercise and SCD

Heterogeneous Disorder

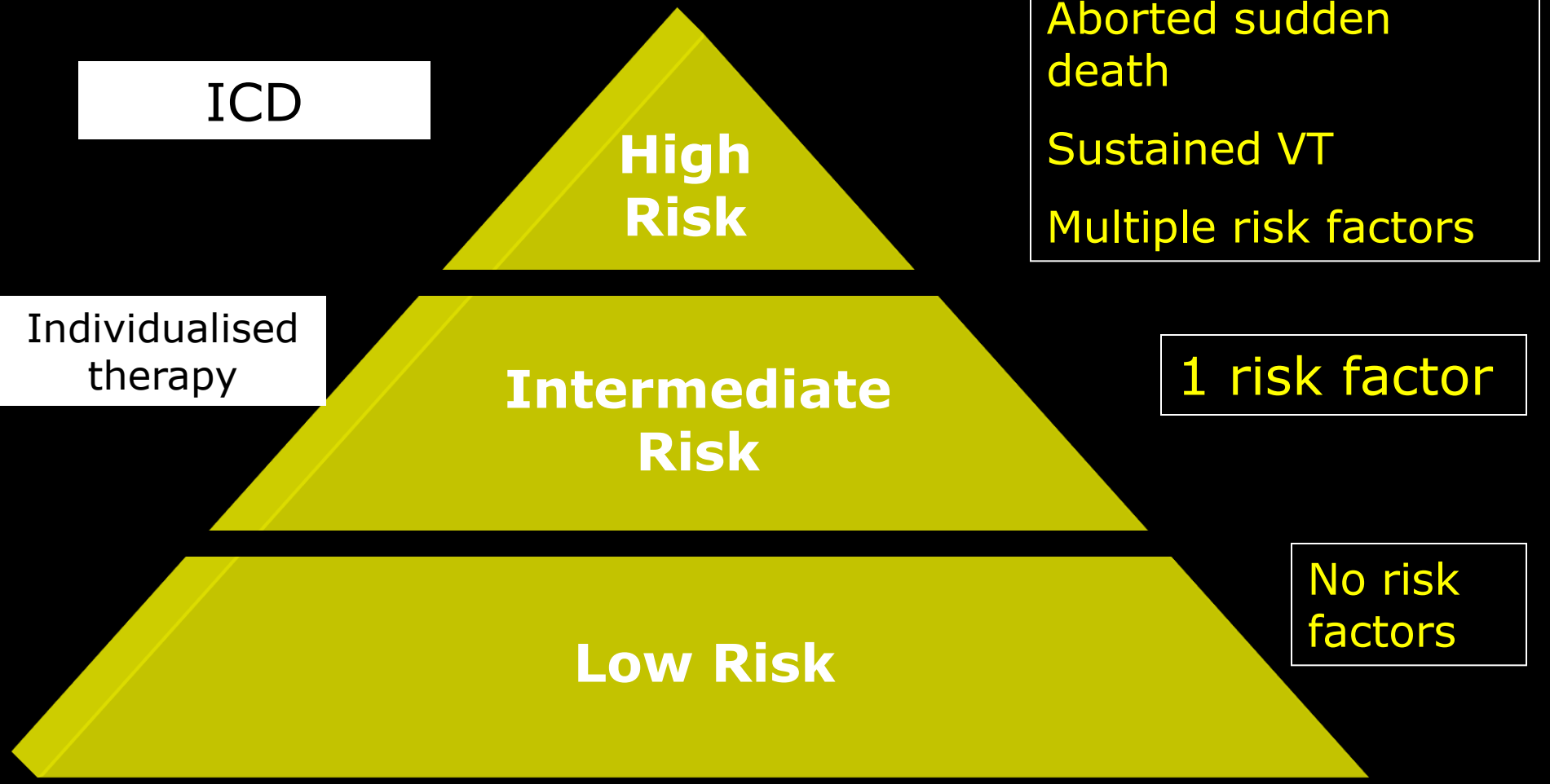
Incomplete Penetrance

Gene testing may be inconclusive or misleading

Mild morphology

Risk stratification based on laboratory tests

Risk Pyramid in HCM



Potential triggers for Sudden Death

Supraventricular arrhythmias

Myocardial ischaemia

LVOT obstruction

Abnormal Vascular Responses

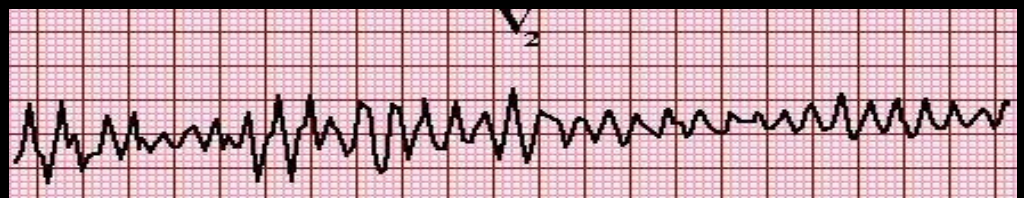
Dehydration

Adrenergic surges

Unstable Electrophysiological Substrate

Electrolyte imbalance

Acid/base disturbance



Exercise Guidelines in HCM

Conservative

Homogeneous

Encompass all preventable deaths

Guidelines

Bethesda (AHA)

European Society of Cardiology

Individuals with Unequivocal HCM or High Probability of HCM

Bethesda Guidelines (American)

Participation in class 1A sport (low intensity and low dynamic)

ESC Guidelines

No competitive sports if symptoms or any risk factors for sudden death. Recreational sport only.

Class IA sport (low intensity and low dynamic) in those with no symptoms or risk factors

Sports Permitted in Most Individuals with Cardiomyopathy

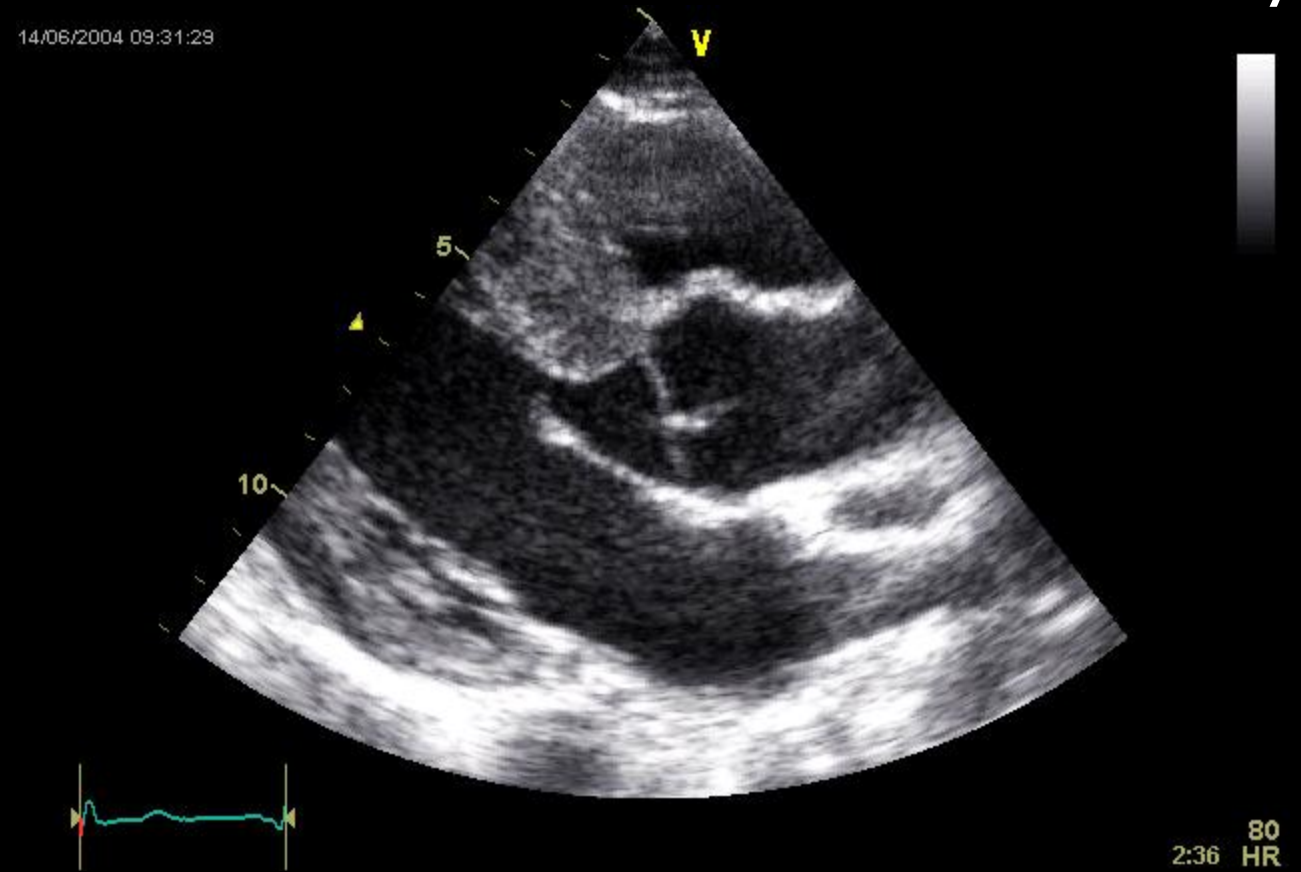
LEISURE ACTIVITY	COMPETITIVE ACTIVITY
Stationary bicycle	Golf
Bowling	Archery
Brisk walking	Bowling
Golfing	Cricket
Moderate hiking	
Skating	
Tennis (doubles)	
Treadmill	
Low-intensity weights	

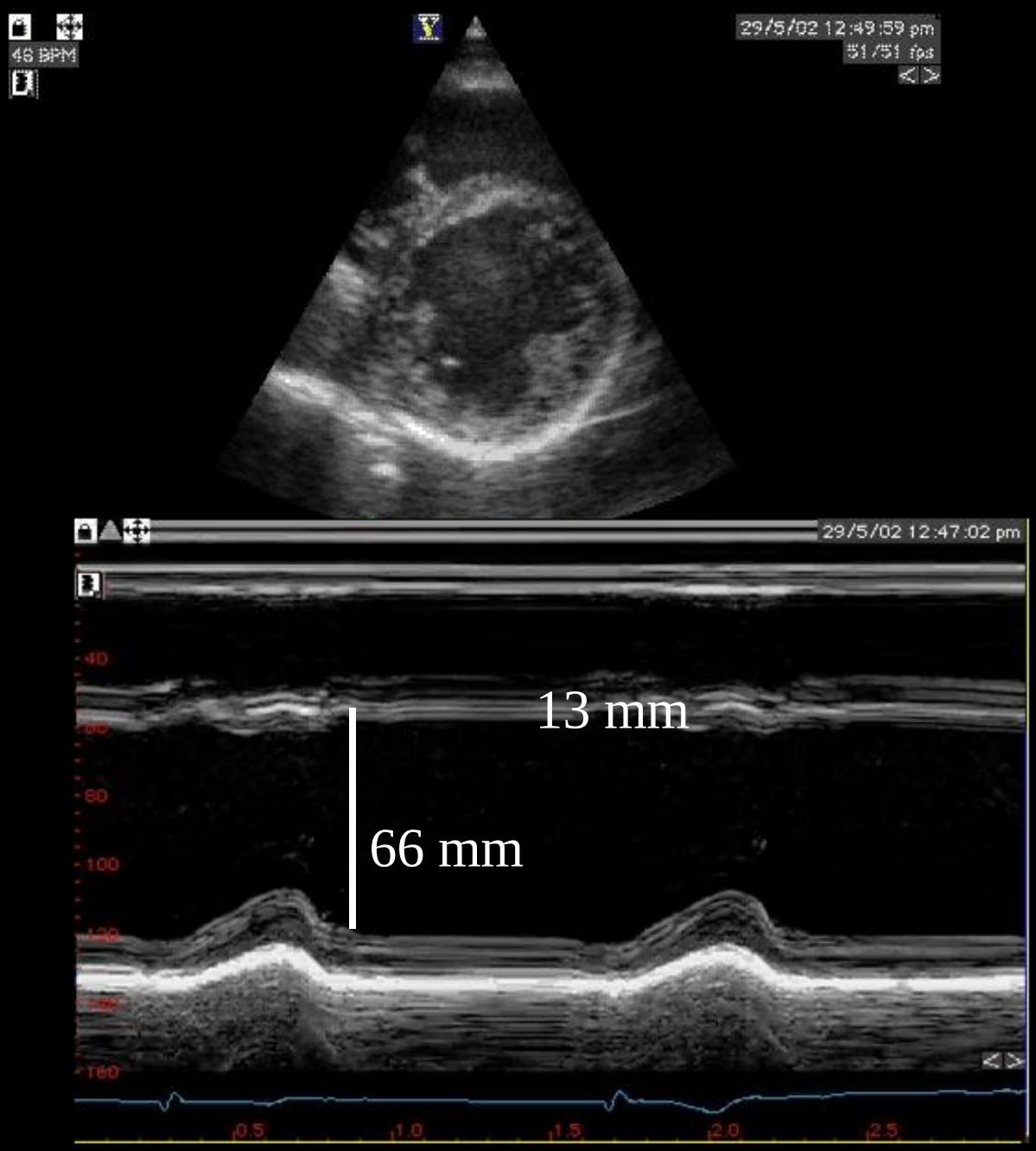
Implications of the Guidelines in Athletic Individuals

1. Diagnosis of HCM in athletes
2. Isolated ECG abnormalities outside the context of a family history of HCM
3. Gene positive/phenotype negative individuals participating in regular sports
4. Individuals with ICD and individuals with therapeutic abolition of LV outflow gradient

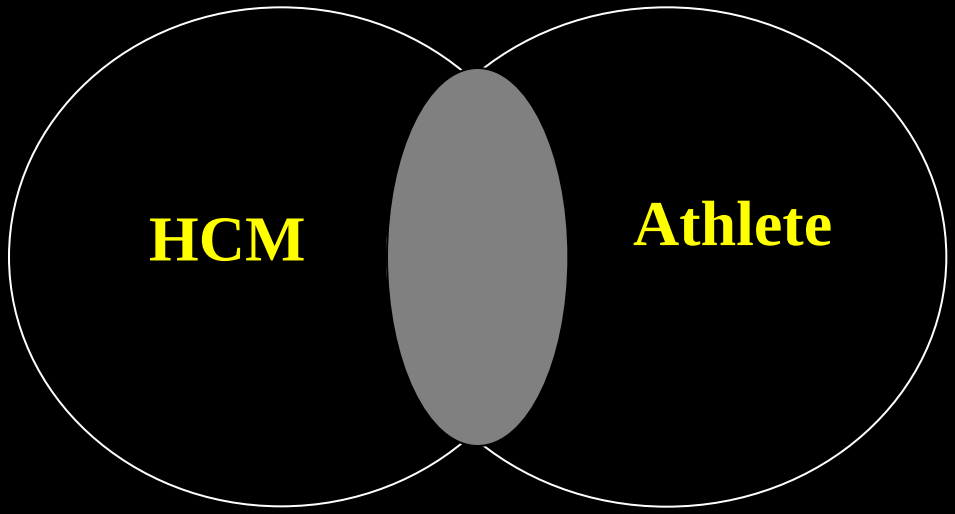
Diagnosis of HCM is Based on Echocardiography

Left ventricular Hypertrophy (≥ 13 mm in adults and > 11 mm in adolescents) in association with a non-dilated LV cavity




46 BPM
29/5/02 12:49:59 pm
51/51 fps
29/5/02 12:47:02 pm
13 mm
66 mm
40
80
100
160
0.5
1.0
1.5
2.0
2.5

Athlete's Heart or HCM in Athlete with LVH ≥ 13 mm



+	Bizarre patterns of LVH	_
_	LV cavity > 54 mm	+
+	LA > 50 mm	_
+	LV outflow obstruction	_
+	Impaired diastolic function	_
-	Isolated Sokolow-Lyon LVH	+
+	ST depression/Deep T wave inversion	_
+	Female gender	_
_	Absence of HCM in first degree rels	+
_	Peak VO2 > 50 ml/kg/min	+

Gene Positive/Phenotype Negative Individuals

No symptoms

No risk factors for sudden death

Bethesda Guidelines

Can participate in all sports

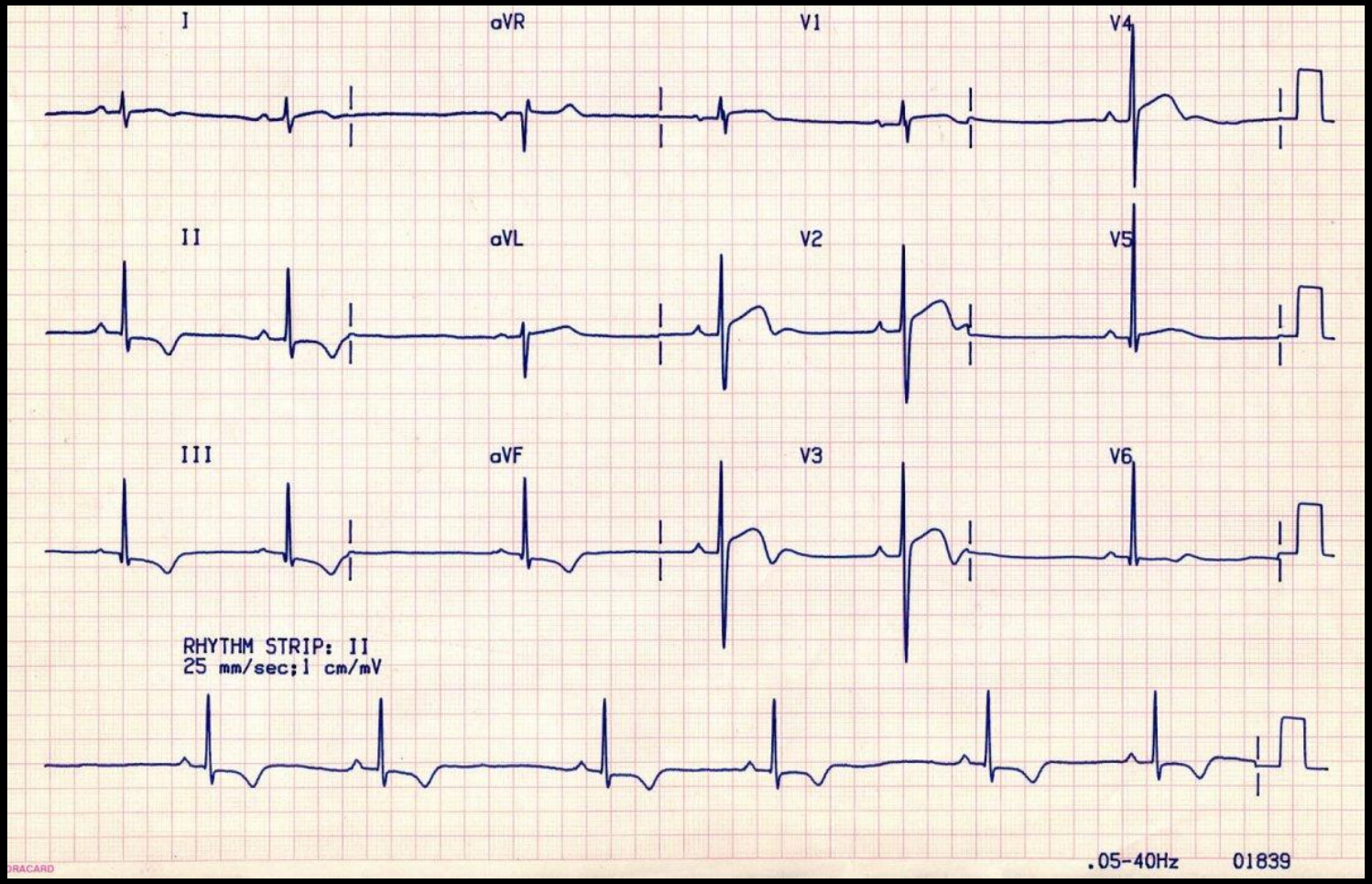
Should have annual follow up to check for HCM phenotype

ESC Guidelines

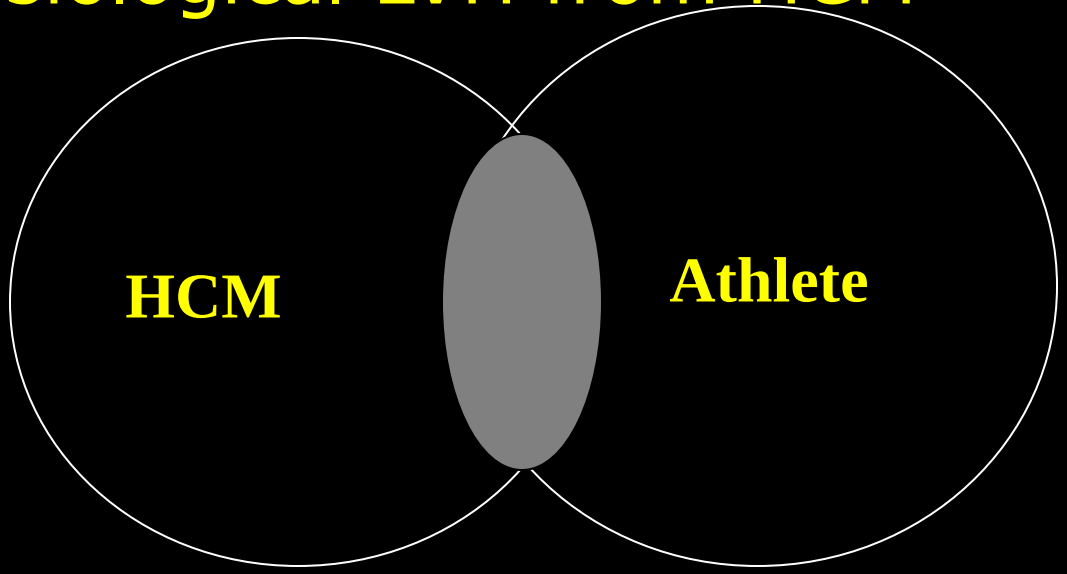
Recreational, non competitive sports only

Annual Evaluation

Isolated ECG Abnormalities in the Absence of LVH



Role of ECG in Differentiating Physiological LVH from HCM



+	Pathological Q waves	-
+	Deep T wave inversions	-
-	Isolated Sokolow-Lyon LVH	+
+	Marked ST segment depression	-
+	Left bundle branch block	-

Isolated ECG Abnormalities in the Absence of LVH

Detailed Echocardiographic Assessment

Cardiac MR

Holter Monitor

Cardiopulmonary Exercise Test

Screen first degree relatives for HCM

?Detrain if diagnostic uncertainty persists

Annual review

Isolated ECG Abnormalities in the Absence of LVH

ECHO/Cardiac MR/24 hour ECG,
Cardiopulmonary exercise test

↓

diastolic dysfunction, SAM, LV outflow obstruction, apical LVH

Non sustained ventricular tachycardia

Flat blood pressure response

Peak VO2 < 50 ml/kg/min or > 120% predicted for age

No ↓

Yes → HCM

First degree relatives with HCM

No ↓

Yes → HCM

Continue to compete (annual follow up)

Exercise Guidelines for Athletes with Isolated ECG Abnormalities in the absence of other phenotypic features of HCM or Familial HCM

Bethesda Guidelines

Can participate in all sports

ESC Guidelines

Can participate in all sports

HCM Individuals with ICD

Implantation of an ICD does not change guidelines. Reliability of ICD during sport is unpredictable

Contact sport inhibited and most non contact sport (except class 1A) not recommended

	36th Bethesda	ESC 2005
Definite diagnosis of HCM plus risk factors	Low dynamic and low static sport (class 1A)	No competitive sport
Definite diagnosis of HCM, but with low risk profile or with probable diagnosis	Low dynamic and low static sport (class 1A)	Low dynamic and low static sport (class 1A)
Athlete with positive genotype and negative phenotype	Can participate in all competitive sport	Only recreational, non-competitive sports

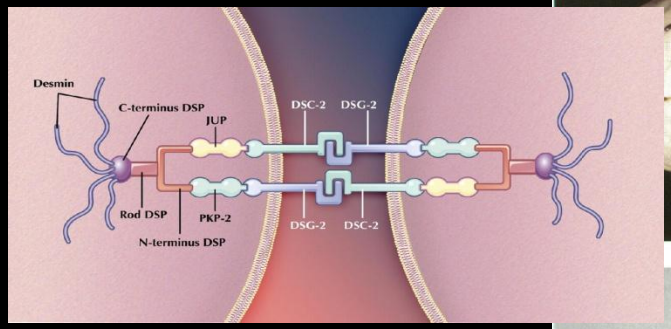
Disparity Between AHA and ESC

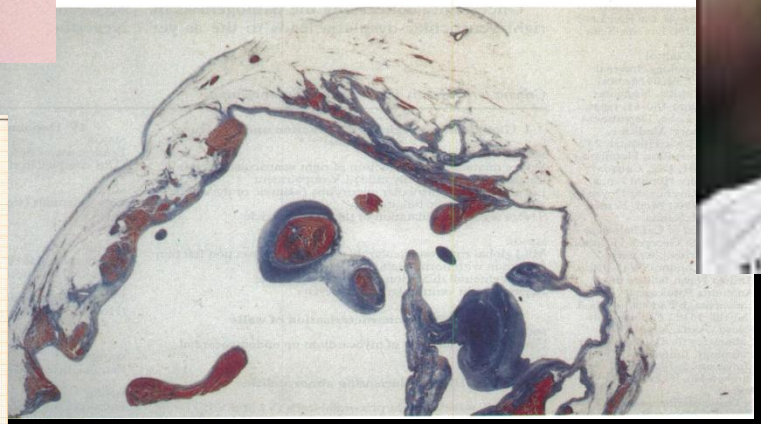
Bethesda guidelines broader; don't take into account risk stratification.

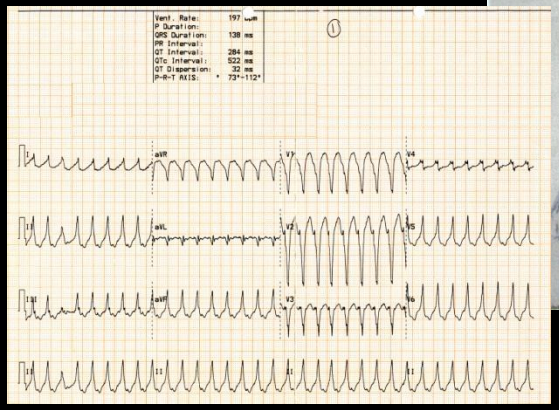
Bethesda more liberal with gene positive phenotype negative individuals

No clear guidelines relating to definition of recreational sport. Recreational non competitive sport can be more strenuous than some competitive class 1a sports

Arrhythmogenic Right Ventricular Cardiomyopathy







Problems with Risk Stratification

Diagnosis is difficult

Incomplete Penetrance

Natural history not fully understood

Individuals with Unequivocal ARVC or High Probability of ARVC

ESC Guidelines

Participation in Class IA sport (low intensity and low dynamic) in most athletes

Bethesda Guidelines (American)

Participation in class 1A sport in all athletes