

# Impact of ICD Therapy on Mortality in HCMP

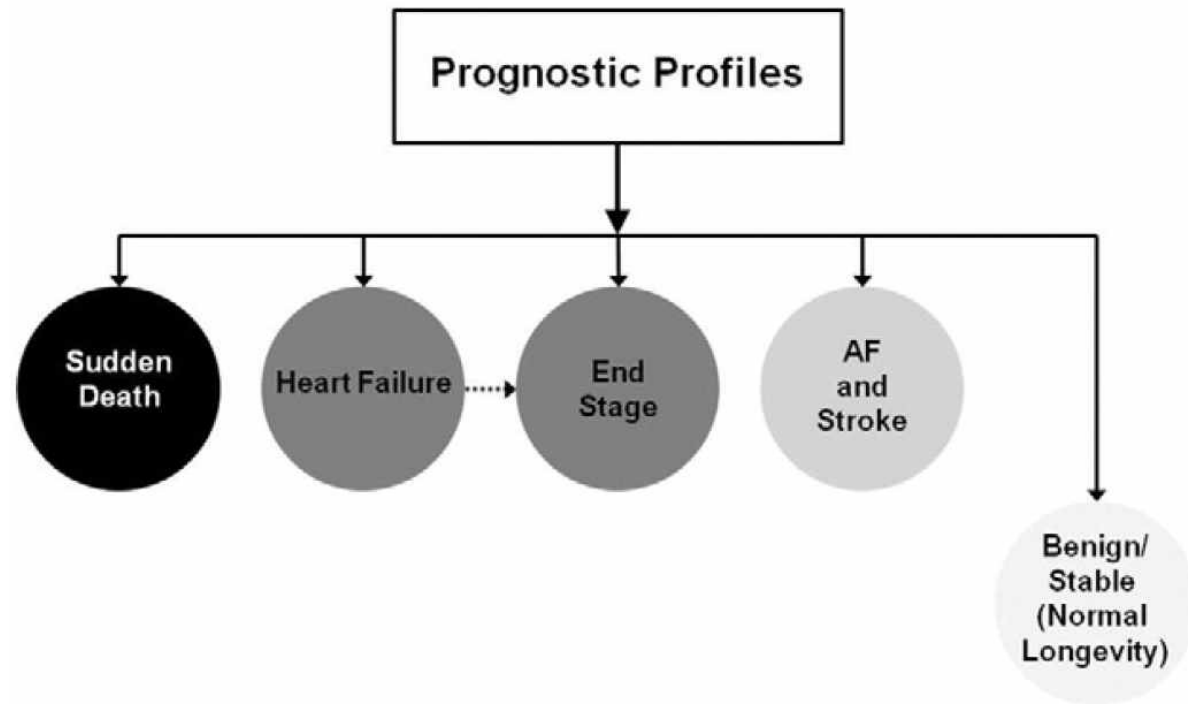
가톨릭의대 서울성모병원 순환기내과

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# 1. Risk of sudden cardiac death



# Epidemiology of SCD

- 20,000 / yr in South Korea
  - even only out of hospital
  - 41 / 100,000 person
  - 1 / 30 minutes
  
- 250,000 ~ 300,000 / yr in US
  - 53 / 100,000 person

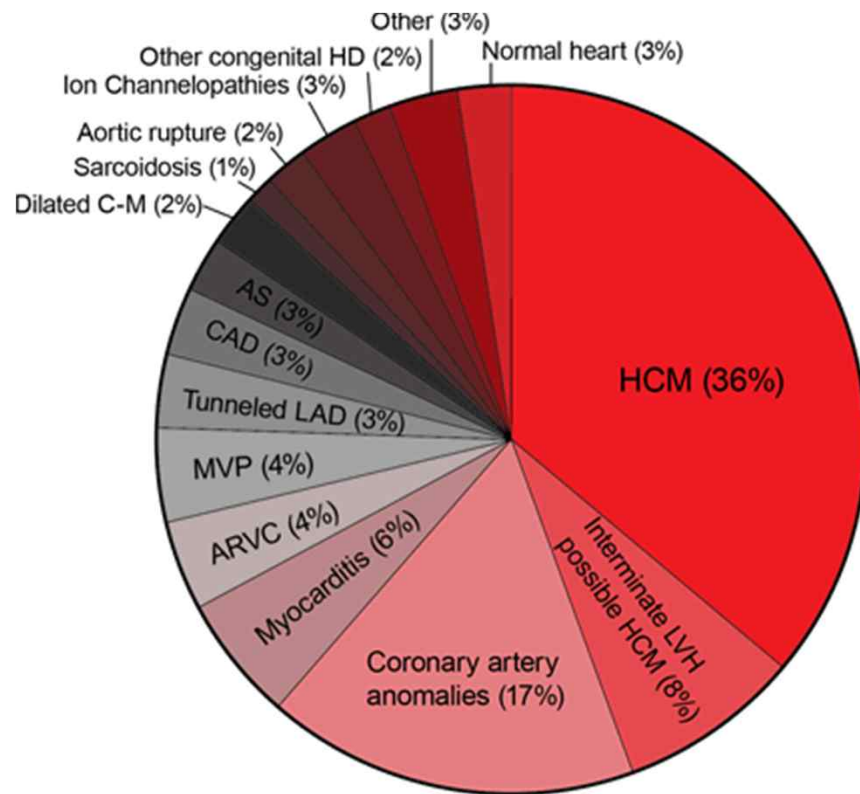


# Associated conditions

- Structural heart disease (= ventricular substrate)
  - ICMP, DCMP, **HCMP**, ARVD, sarcoidosis, surgical scar...
- Inherited primary arrhythmia syndrome
  - Long/Short QT syndrome, Brugada syndrome, Early repolarization syndrome, Catecholaminergic polymorphic VT, Idiopathic ventricular fibrillation



# Sudden death in young athletes



# Hypertrophic cardiomyopathy

- 1/500 in general population, family history in more than half
- Most common cause of SCD in young (esp. athlete)



# ICD indication for primary prevention

## AHA/ACC 2017 Class IIa

- Syncope within 6m
- Family history of SCD
- LV wall thickness  $\geq 30\text{mm}$
- NS VT or BP drop during exercise
  - $< 30\text{yr}$ , Scar on MR, LVOT obstruction, syncope  $> 5\text{yr}$ , LV aneurysm,  $\text{EF} < 50\%$

## ESC 2015 Class IIa

- $\geq 6\%$  by Risk-SCD calculator

**HCM Risk-SCD Calculator**

Age: 30 Years (Age at evaluation)

Maximum LV wall thickness: 18 mm (Transthoracic Echocardiographic measurement)

Left atrial size: 45 mm (Left atrial diameter determined by M-Mode or 2D echocardiography in the parasternal long axis plane at time of evaluation)

Max LVOT gradient: 25 mmHg (The maximum LV outflow gradient determined at rest and with Valsalva provocation (irrespective of concurrent medical treatment) using pulsed and continuous wave Doppler from the apical three and five chamber views. Peak outflow tract gradients should be determined using the modified Bernoulli equation:  $\text{Gradient} = 4V^2$ , where V is the peak aortic outflow velocity)

Family History of SCD:  No  Yes (History of sudden cardiac death in 1 or more first degree relatives under 40 years of age or SCD in a first degree relative with confirmed HCM at any age (post or ante-mortem diagnosis).)

Non-sustained VT:  No  Yes (3 consecutive ventricular beats at a rate of 120 beats per minute and  $< 30\text{s}$  in duration on Holter monitoring (minimum duration 24 hours) at or prior to evaluation.)

Unexplained syncope:  No  Yes (History of unexplained syncope at or prior to evaluation.)

Risk of SCD at 5 years (%): 2.8

ESC recommendation: ICD generally not indicated \*\*

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Risk of SCD at 5 years (%): 4.4

ESC recommendation: ICD may be considered

## 2. Apical vs. Asymmetric





# **2011 ACCF/AHA Guideline for the Diagnosis and Treatment of Hypertrophic Cardiomyopathy: Executive Summary : A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines**

Writing Committee Members, Bernard J. Gersh, Barry J. Maron, Robert O. Bonow, Joseph A. Dearani, Michael A. Fifer, Mark S. Link, Srihari S. Naidu, Rick A. Nishimura, Steve R. Ommen, Harry Rakowski, Christine E. Seidman, Jeffrey A. Towbin, James E. Udelson and Clyde W. Yancy

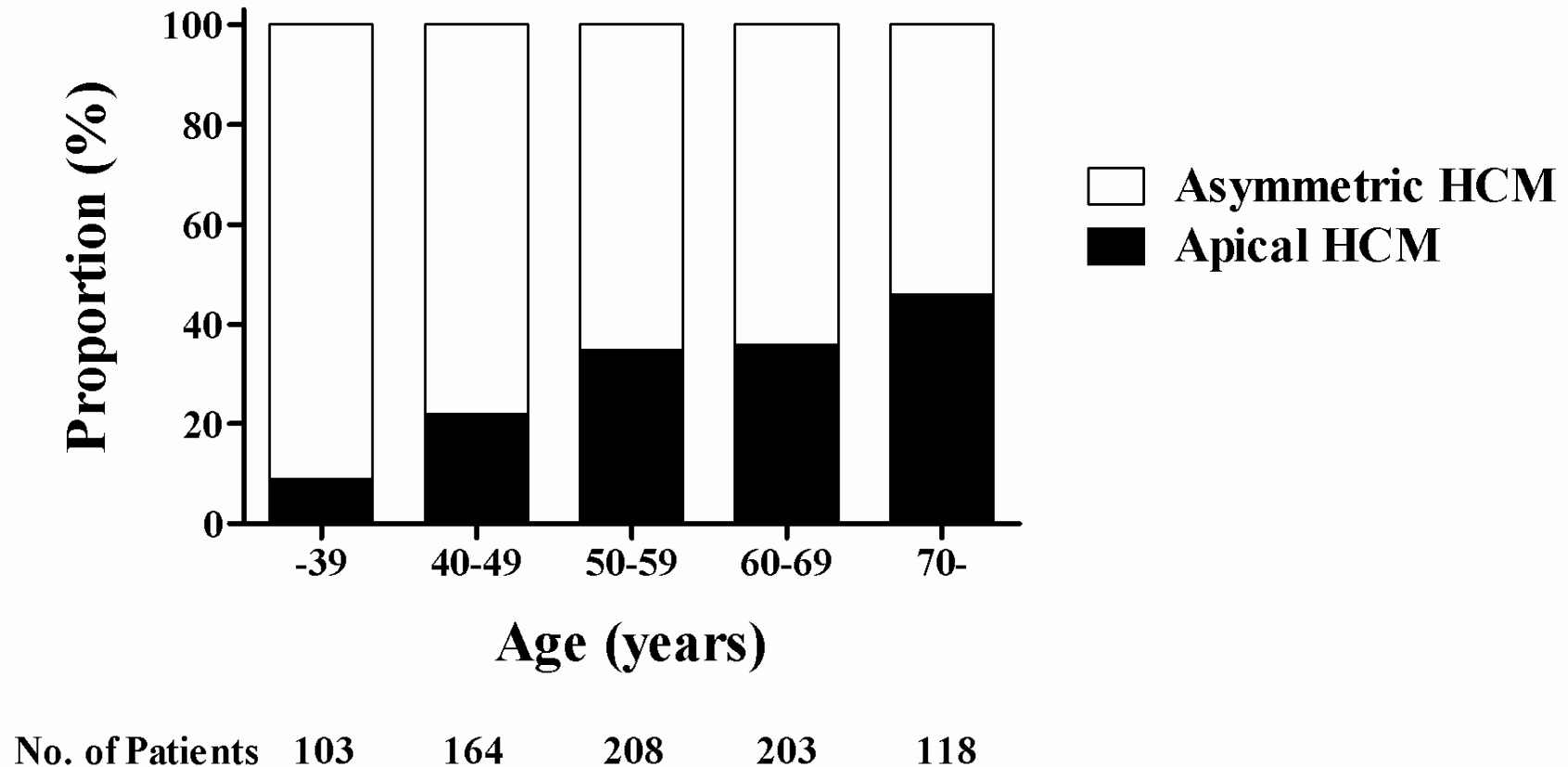
- **HCMP guideline (31 pages) 중,  
apical HCMP 가 언급된 부분은 ?**

4. TTE combined with the injection of an intravenous contrast agent is reasonable if the diagnosis of apical HCM or apical infarction or severity of hypertrophy is in doubt, particularly when other

1. CMR imaging is reasonable in patients with HCM to define apical hypertrophy and/or aneurysm if echocardiography is inconclusive.<sup>73,75</sup> (*Level of Evidence: B*)

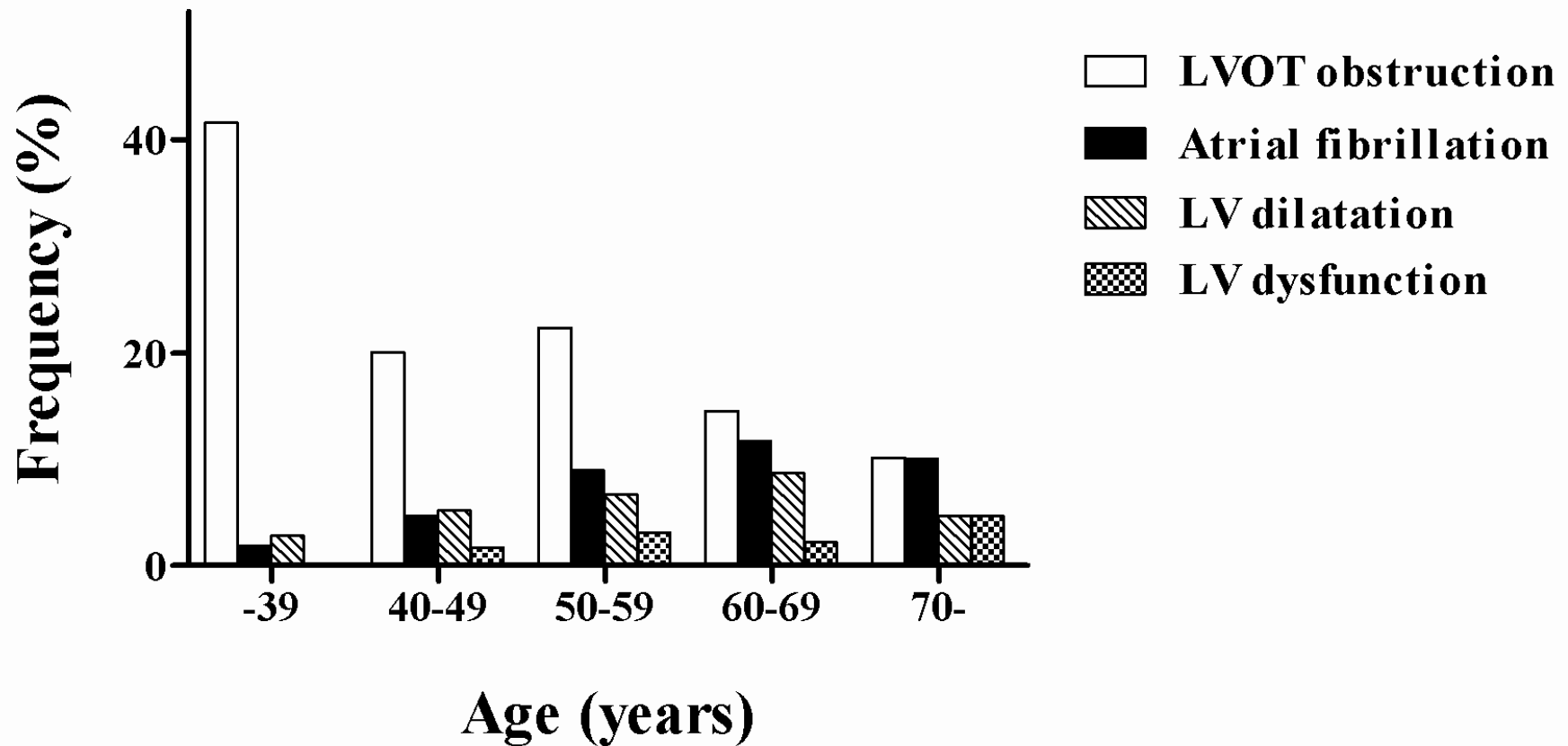


# Age at the diagnosis

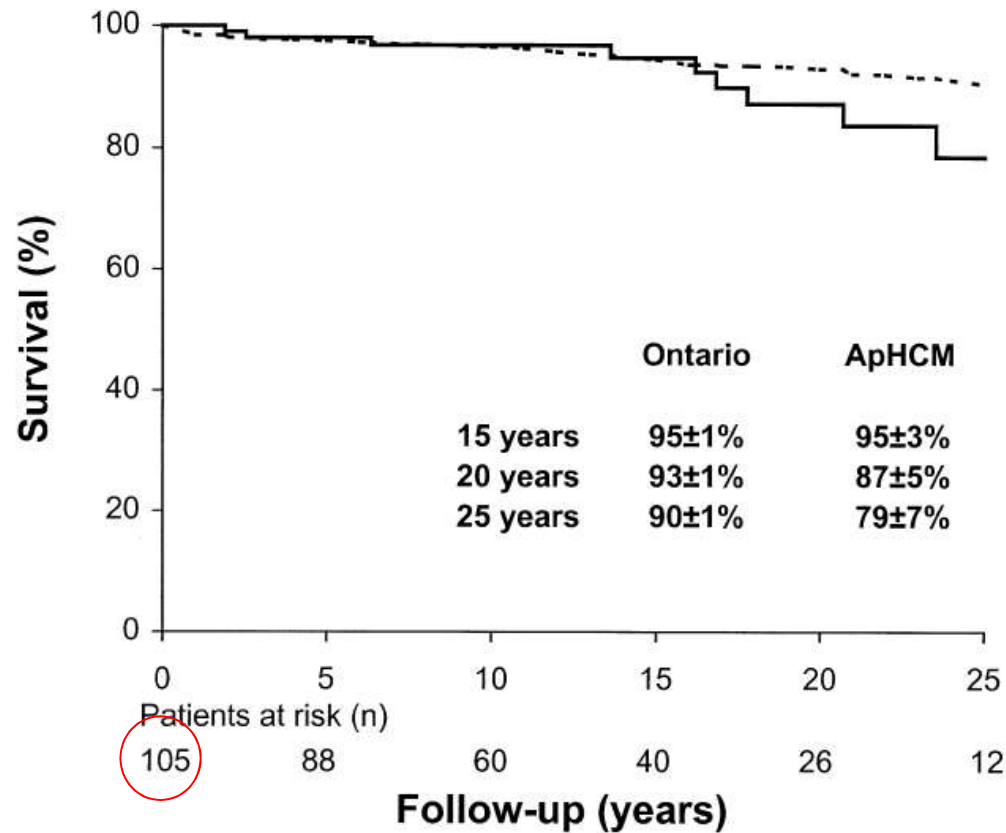


Kim et al. *Int Heart J*. 2013

# LV chamber and AF



# Is Apical HCM benign?

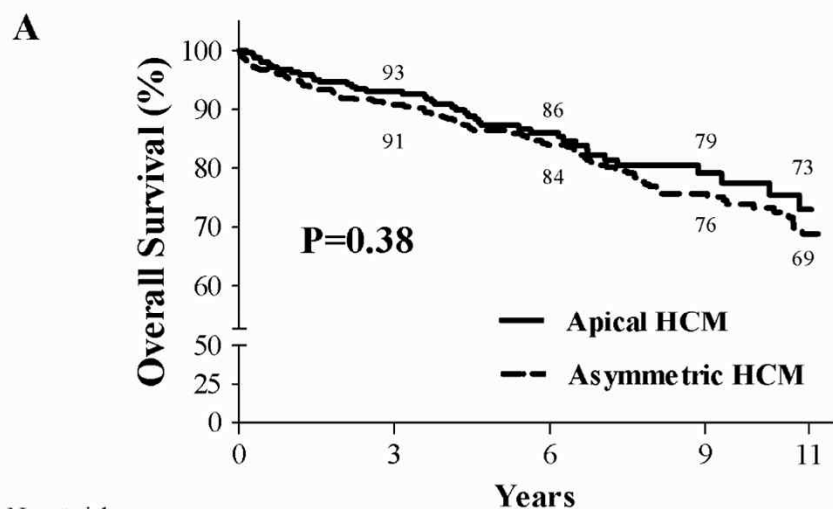


**Table 1.** Baseline Characteristics of the Study Population

Men/women	78/27
Age at presentation (yrs)	41.4 ± 14.5

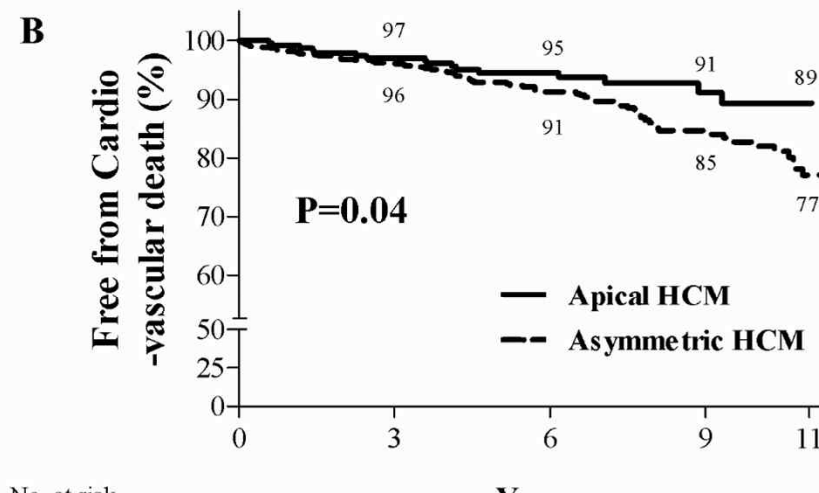
Eriksson et al. *JACC* 2002

# Unadjusted Survival Rates



No. at risk	0	3	6	9	11
Apical HCM	243	227	130	56	24
Asymmetric HCM	552	502	322	149	69

All-cause death



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CV death

Kim et al. *Int Heart J.* 2013

# Adjusted hazard ratios, vs. apical HCM

Analysis	All-cause death				Cardiovascular death			
	Hazard ratio	95% CI		P value	Hazard ratio	95% CI		P value
		Lower	Upper			Lower	Upper	
Univariate Cox Model	1.17	0.82	1.66	0.38	1.76	1.02	3.03	0.04
Multivariate Cox Model	1.73	1.21	2.47	0.003	2.54	1.45	4.45	0.001
Inverse-probability-of-treatment weighting	1.44	0.99	2.09	0.05	1.92	1.08	3.42	0.03
Propensity Score Matching	1.57	1.00	2.46	0.05	2.04	1.08	3.89	0.03

Kim et al. *Int Heart J*. 2013