

# Indications for ICD Therapy

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Girish V. Nair, MD

The Care Group

# Objectives

- To define sudden cardiac arrest (SCA)
- To describe indications for implantable cardioverter defibrillator (ICD) implantation

# Sudden Cardiac Arrest

## Definition

- An electrical disorder of the heart when a rapid rhythm suddenly originates in the ventricles resulting in impaired blood flow to vital organs
- Often requires an electrical shock to restore normal rhythm
- Not a heart attack (“a plumbing problem”)

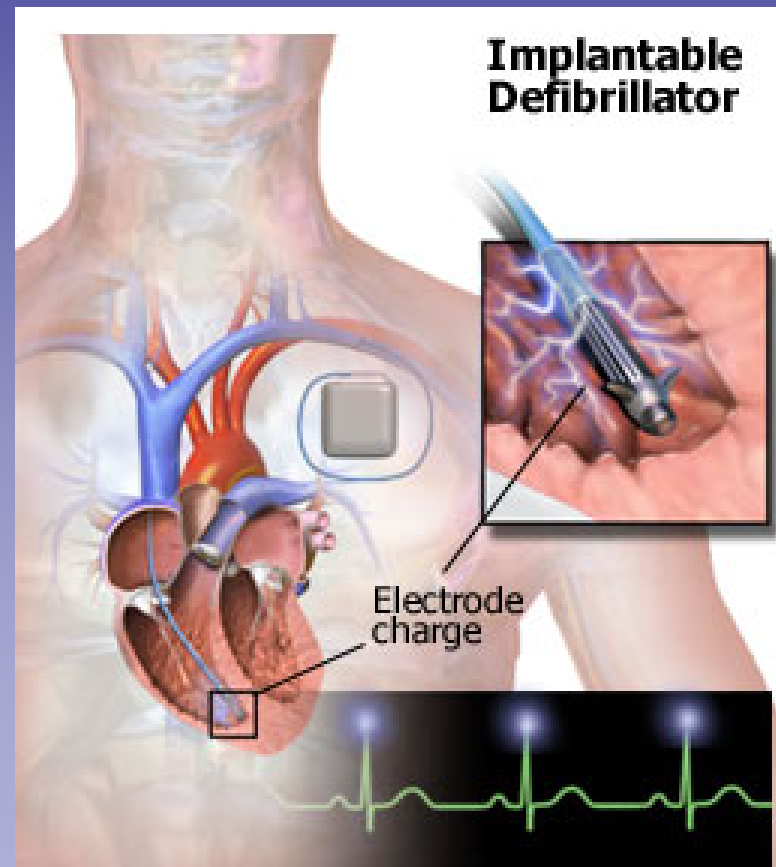
# Epidemiology

- SCA accounts for 325, 000 deaths/year
  - Kills 1 person every 2 minutes
  - 95% die before reaching hospital or receiving medical attention

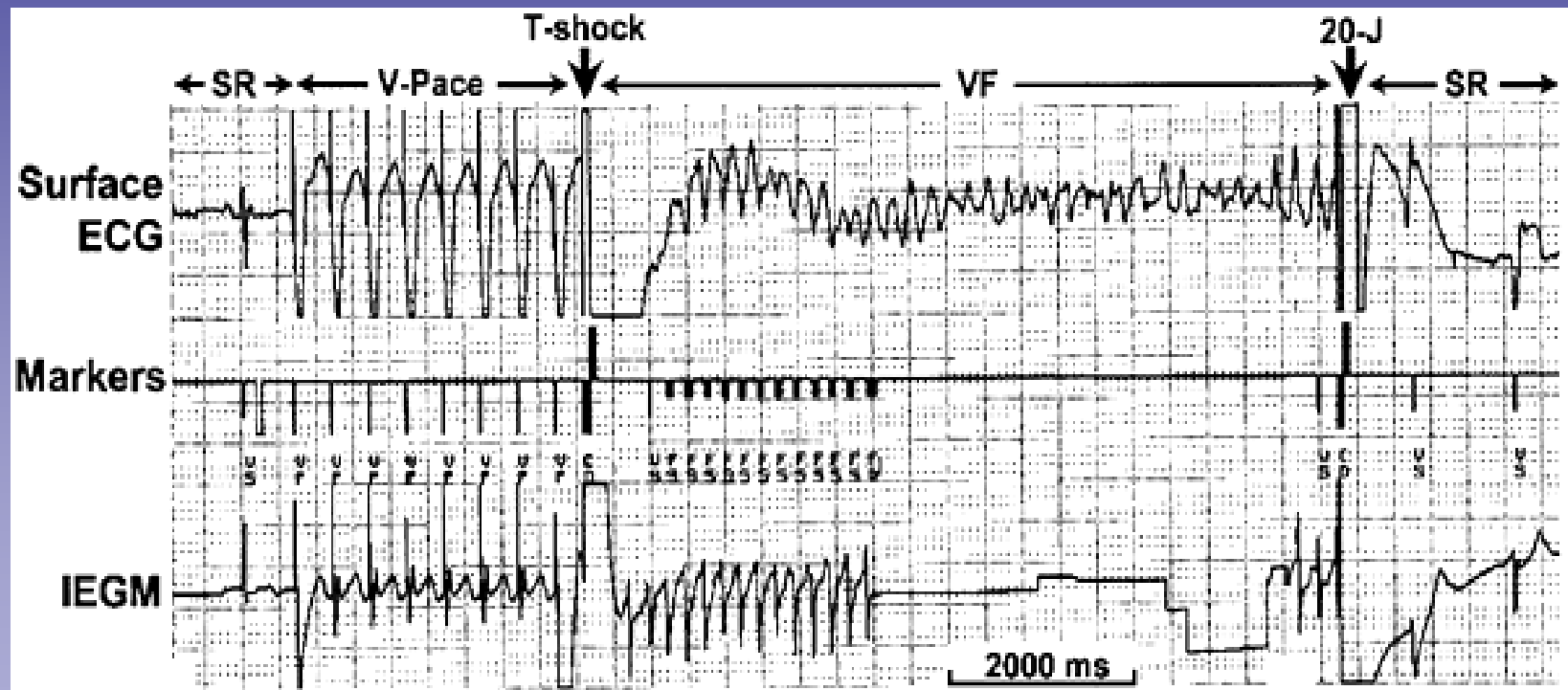
# ICD

## (Implantable Cardioverter Defibrillator)

- Primary Goal
  - Prevent sudden cardiac arrest by detecting and terminating life threatening arrhythmias - VT/VF
  - Shock delivery
  - Anti-tachycardia pacing
- Additional Features
  - Include backup pacing
  - Electrogram storage



# ICD Therapies



Who should receive an ICD?

# Secondary Prevention

- Individuals who have survived SCA or sustained VT without significant neurological impairment
- SCA not due to a reversible cause
- Robust data from trials demonstrating significant benefit of ICD implant
  - 50% relative risk reduction - arrhythmic death
  - 25% relative risk reduction - all cause mortality

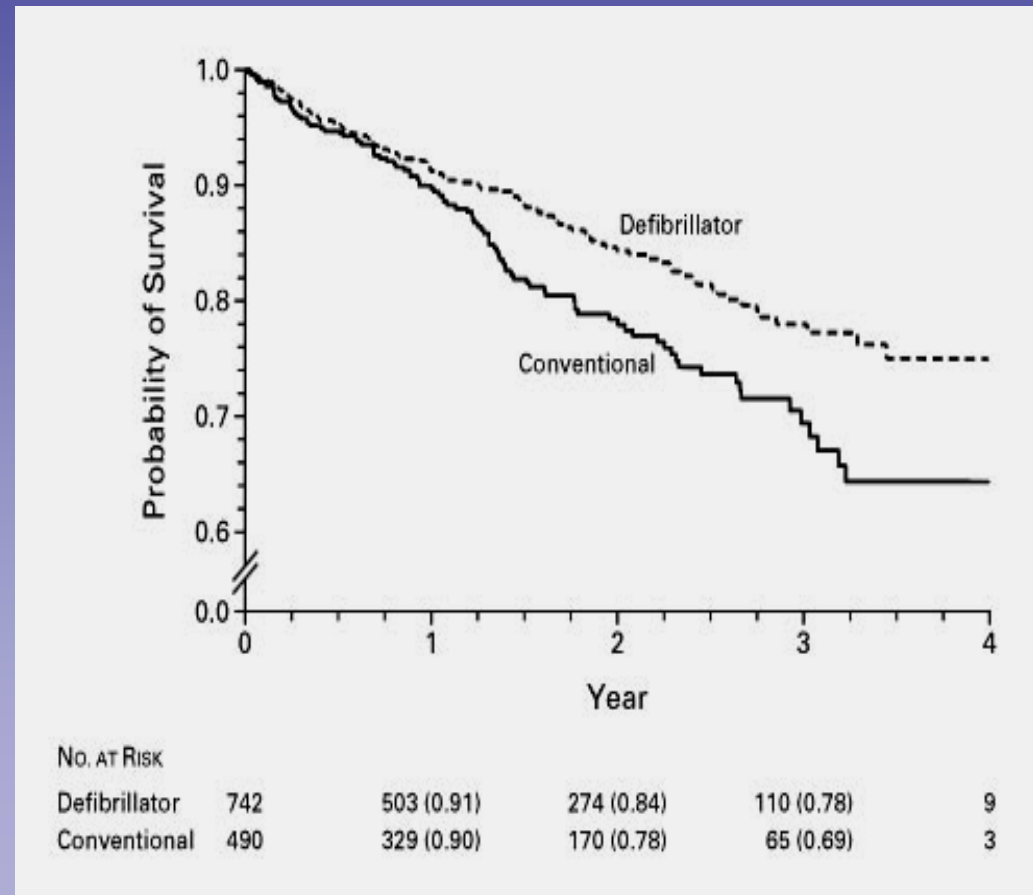
# Primary Prevention

Ischemic Cardiomyopathy

# MADIT-II

Moss AJ. N Engl J Med 2002

- Ischemic CM
- LVEF  $\leq 30\%$
- All-cause mortality
  - Yr 4, 31%  $\downarrow$  with ICD
  - Yr 8, 37%  $\downarrow$  with ICD
- Number Needed to Treat with ICD to save one life:
  - Yr 4: 17
  - Yr 8: 6

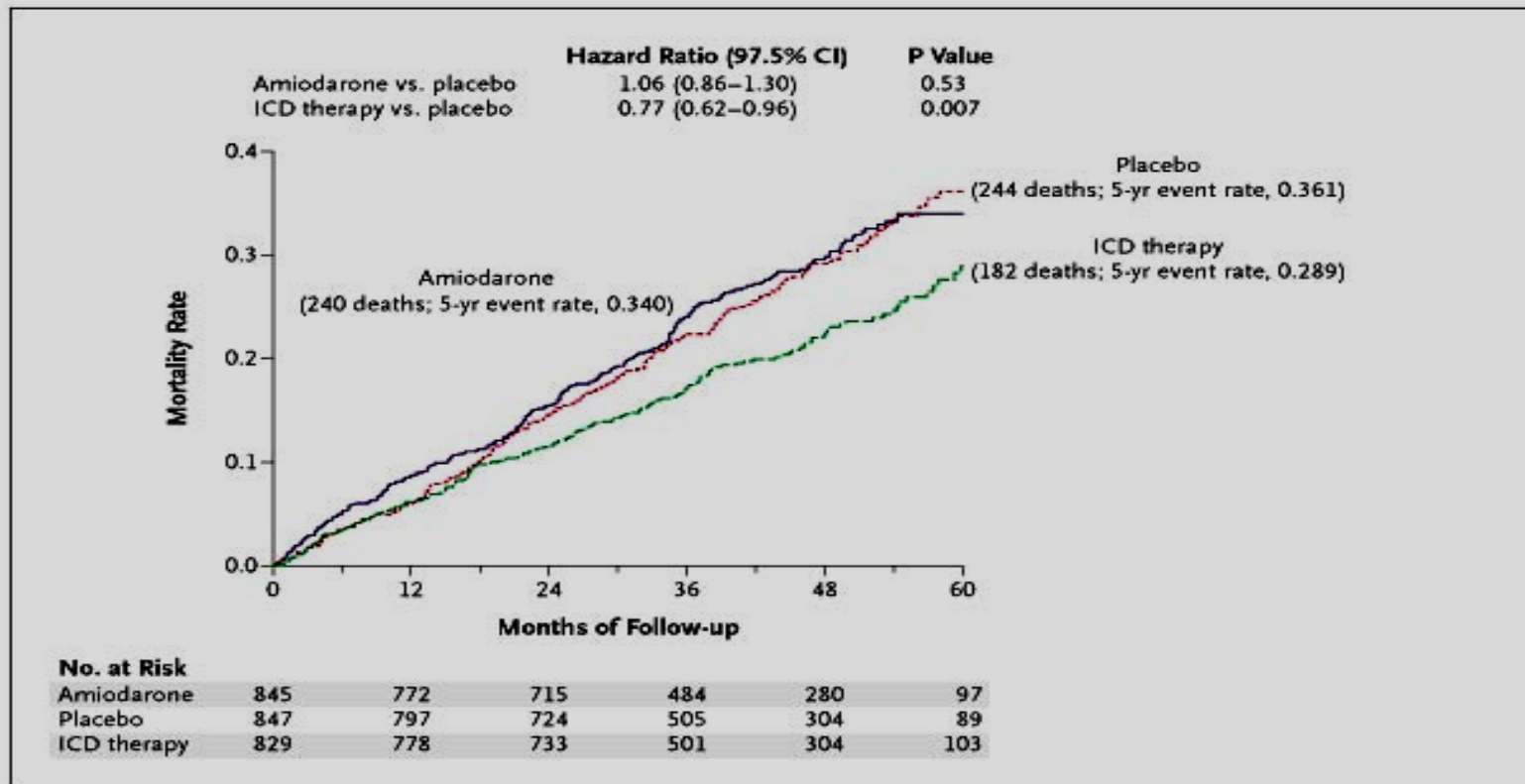


# Primary Prevention

Non-ischemic cardiomyopathy

# SCD-HeFT

Bardy GH. N Engl J Med 2005



# Primary Prevention

How soon?

# DINAMIT

Hohnloser SH. N Engl J Med 2004

- 6-40 days post acute MI
- No PCI/CABG
- LVEF  $\leq 35\%$
- Abnormal heart rate variability by holter monitoring
- No difference in all-cause mortality
  - ICD 7.5%
  - Non-ICD 6.9%, p=0.66
- Decreased arrhythmic death
  - ICD 1.5%
  - Non-ICD 3.5%, p=0.009
- Increased non-arrhythmic death
  - ICD 6.1%
  - Non-ICD 3.5%, p=0.016

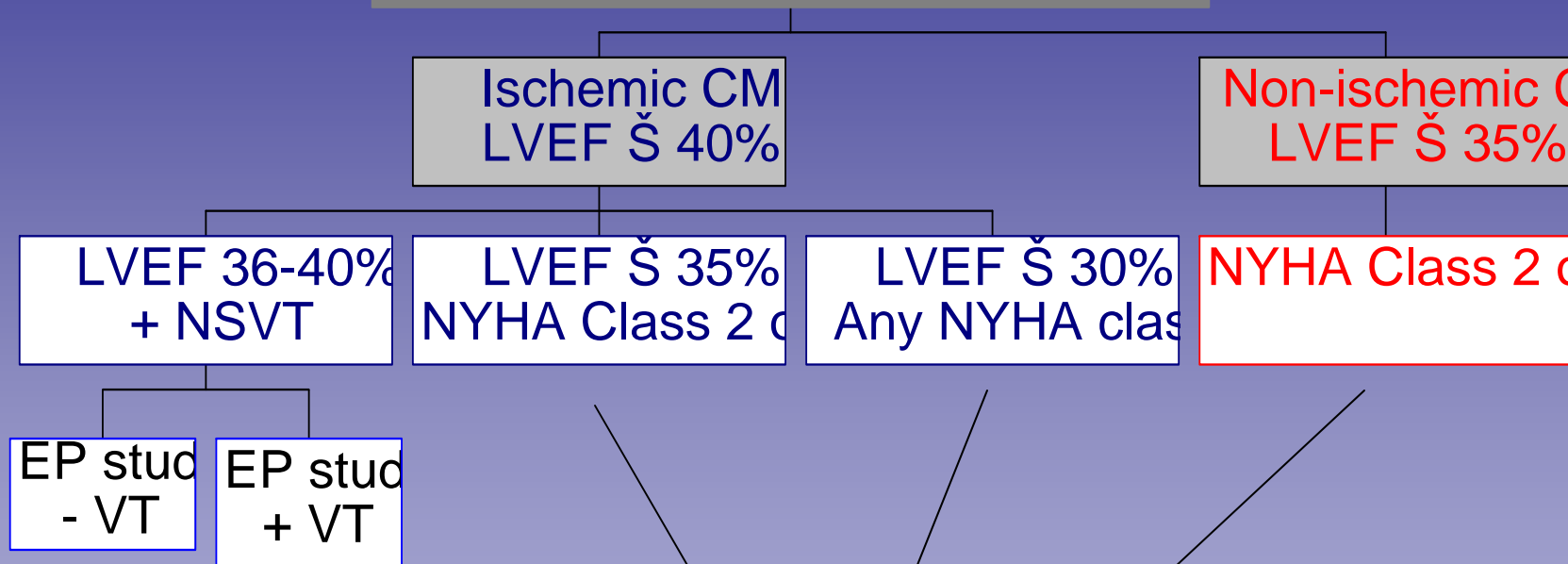
# Timing of Primary Prevention ICDs

## How long to wait?

- Check LVEF on optimal medical therapy
  - Post MI - non-revascularized = 40 days
  - Following coronary revascularization (CABG or angioplasty/stent) = 90 days
  - Non-ischemic cardiomyopathy = 3 to 9 months

# Primary Prevention ICD Indications

## Dilated Cardiomyopathy\*



\*  
*Optimal CHF therapy*  
*Expected survival > 1 year*

**ICD**

# Other Indications

- Syncope & inducible sustained VT
- Long QT (syncope/VT despite  $\beta$ blockers)
- Hypertrophic CM ( $\geq 1$  RF)
- Arrhythmogenic RV CM ( $\geq 1$  RF)
- Brugada Syndrome
- Idiopathic VF (not idiopathic VT)
- Catecholaminergic Polymorphic VT

# Hypertrophic Cardiomyopathy

## Risk Factors



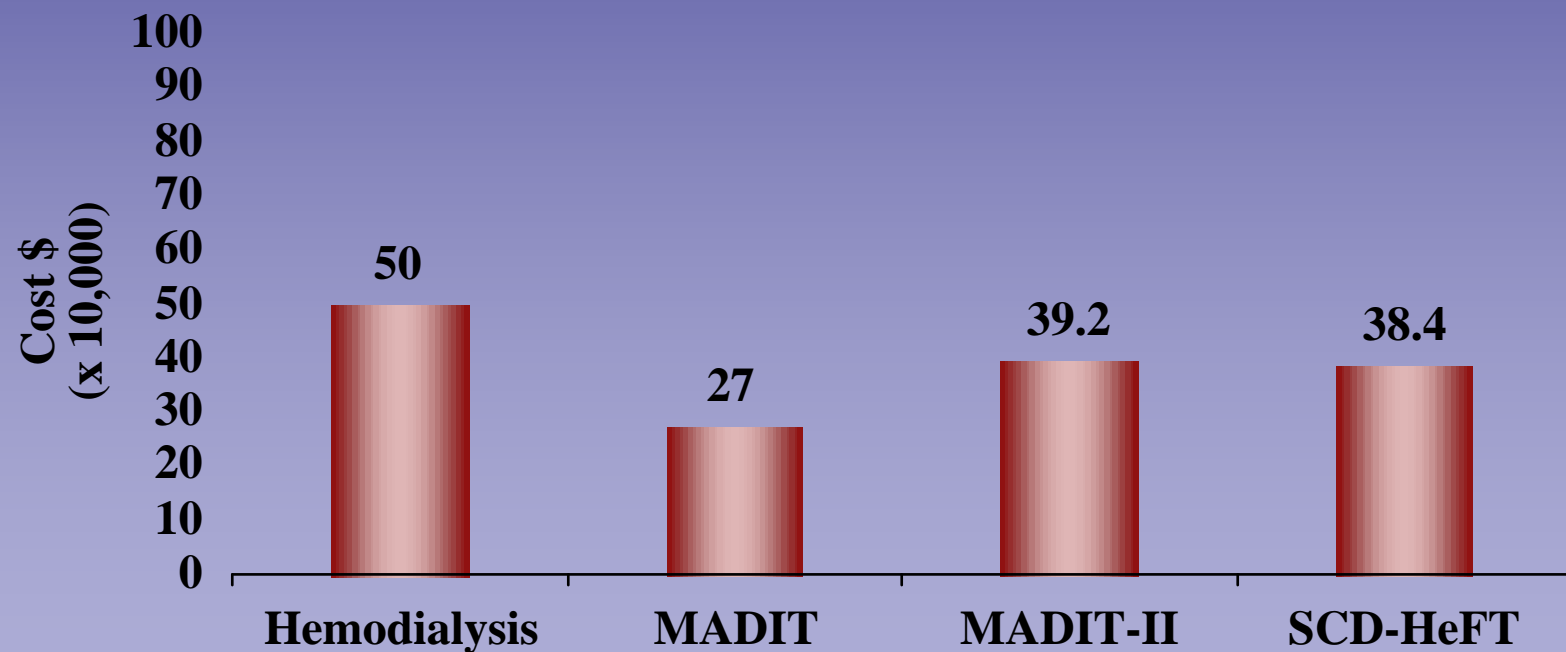
- Cardiac Arrest
- Sustained VT
- Unexplained syncope
- Non-sustained VT
- Family hx of SCA
- Abnormal BP drop with exercise
- Wall thickness  $> 3\text{cm}$

# Contraindications

- Expected survival less than 1 year
- Incessant VT or VF
- Severe psychiatric illness
- Drug refractory class IV CHF not candidates for cardiac resynchronization therapy or transplantation
- VT/VF due to reversible disorder

# Cost-Effectiveness

## Cost for 1 Life Year Saved



# ICD Assessment

- Device Clinic



- Remote Monitoring
  - Merlin
  - Latitude
  - Carelink



# Conclusions

- SCA is an electrical disorder of the heart often due to VT/VF.
- ICDs prevent SCA by terminating VT/VF with an electrical shock or rapid pacing to restore normal rhythm.
- Most patients who survive SCA or sustained VT will need an ICD.
- High risk patients with heart failure due to a low LV ejection fraction ( $< 40\%$ ) on optimal medical therapy and expected survival  $> 1$  year should be considered for prophylactic ICD implantation.