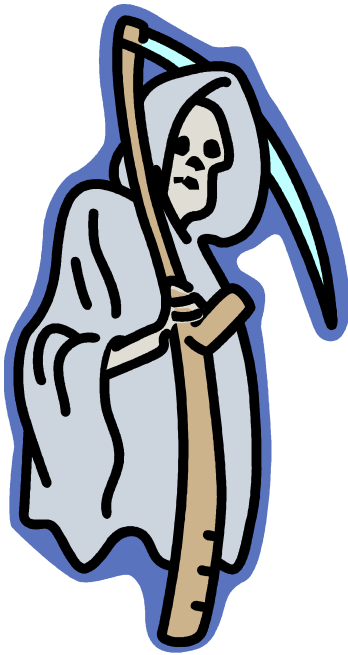




# Sudden Death

Doç. Dr Mustafa KARACA  
Katip Çelebi Üniversitesi  
Atatürk Eğitim Hastanesi Kardiyoloji  
Kliniği

# High Risk Arrhythmias



Death



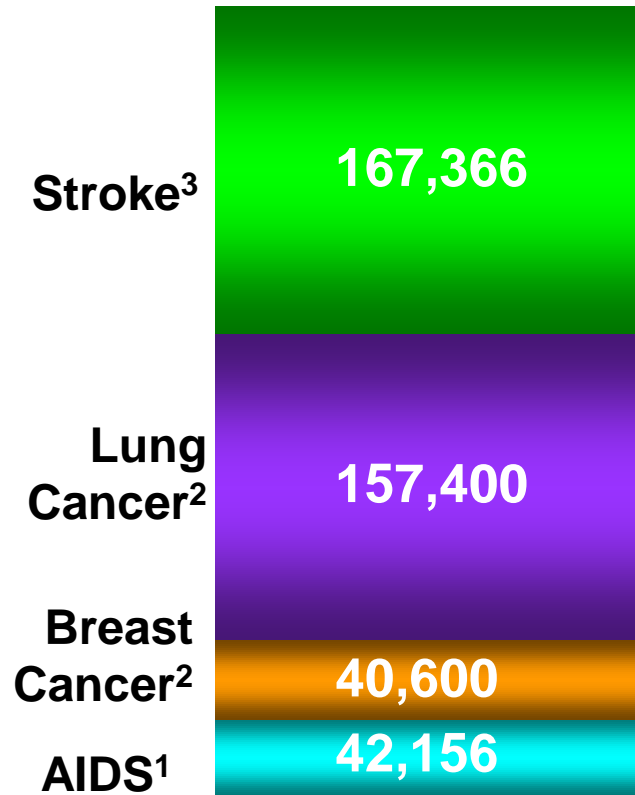
# High Risk Arrhythmias

Sudden Cardiac Death (SCD)

# Pathophysiology

- Clinical scenario where a person experiences a loss of consciousness, usually due to a **ventricular tachyarrhythmia** or **severe bradycardia** and **asystole**; when a rhythm is not restored, results in death.
- Time and mode of death are unexpected.
- Occurs within minutes of onset of symptoms.

# Magnitude of SCA in the US



**SCA claims  
more lives  
each year than  
these other  
diseases  
combined**

**450,000  
SCA<sup>4</sup>**

**#1 Killer in the  
U.S.**

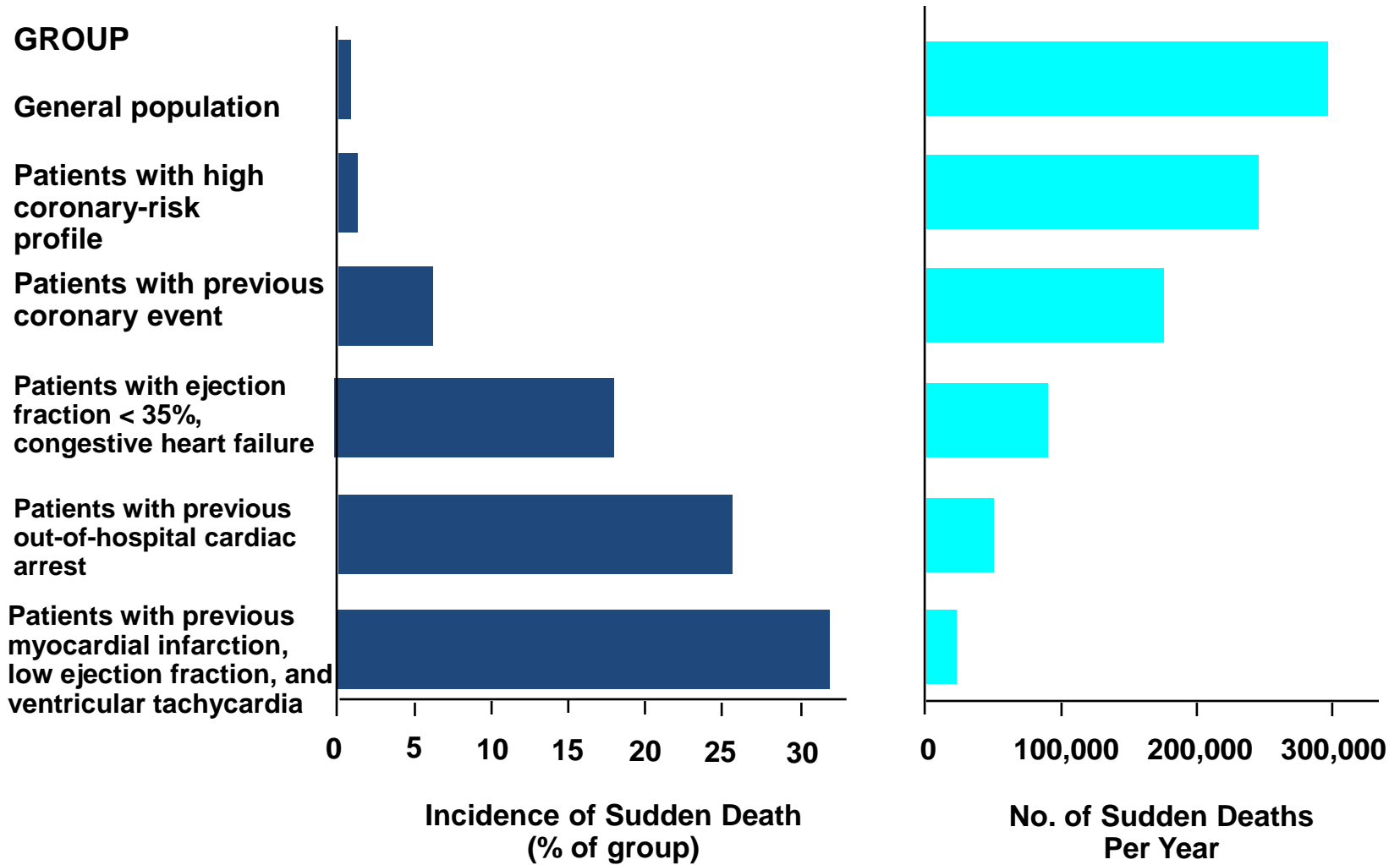
<sup>1</sup> U.S. Census Bureau, *Statistical Abstract of the United States: 2001*.

<sup>2</sup> American Cancer Society, Inc., *Surveillance Research, Cancer Facts and Figures 2001*.

<sup>3</sup> *2002 Heart and Stroke Statistical Update*, American Heart Association.

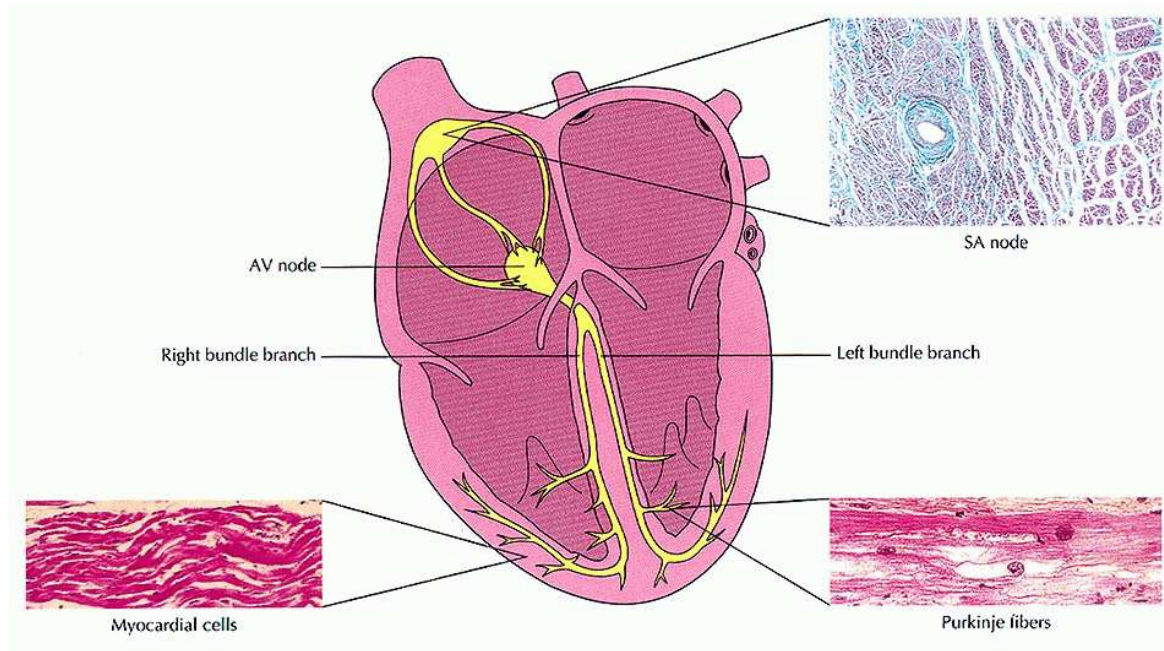
<sup>4</sup> *Circulation*. 2001;104:2158-2163.

# Incidence of SCD in Specific Populations and Annual SCD Numbers



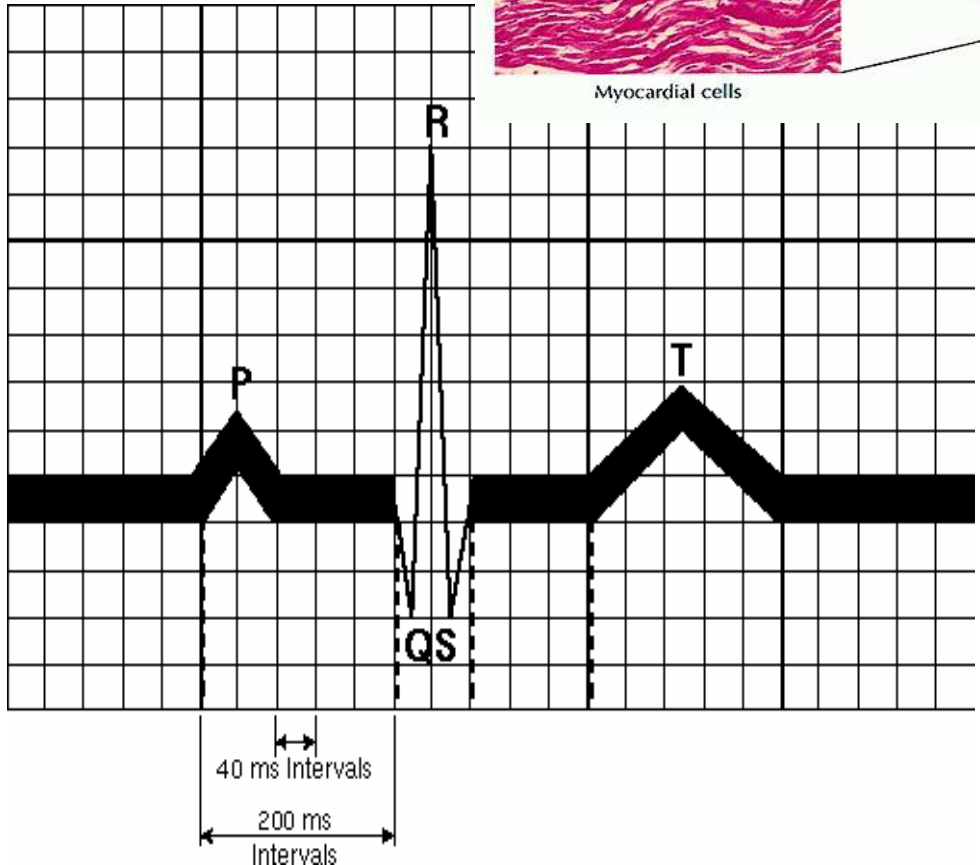
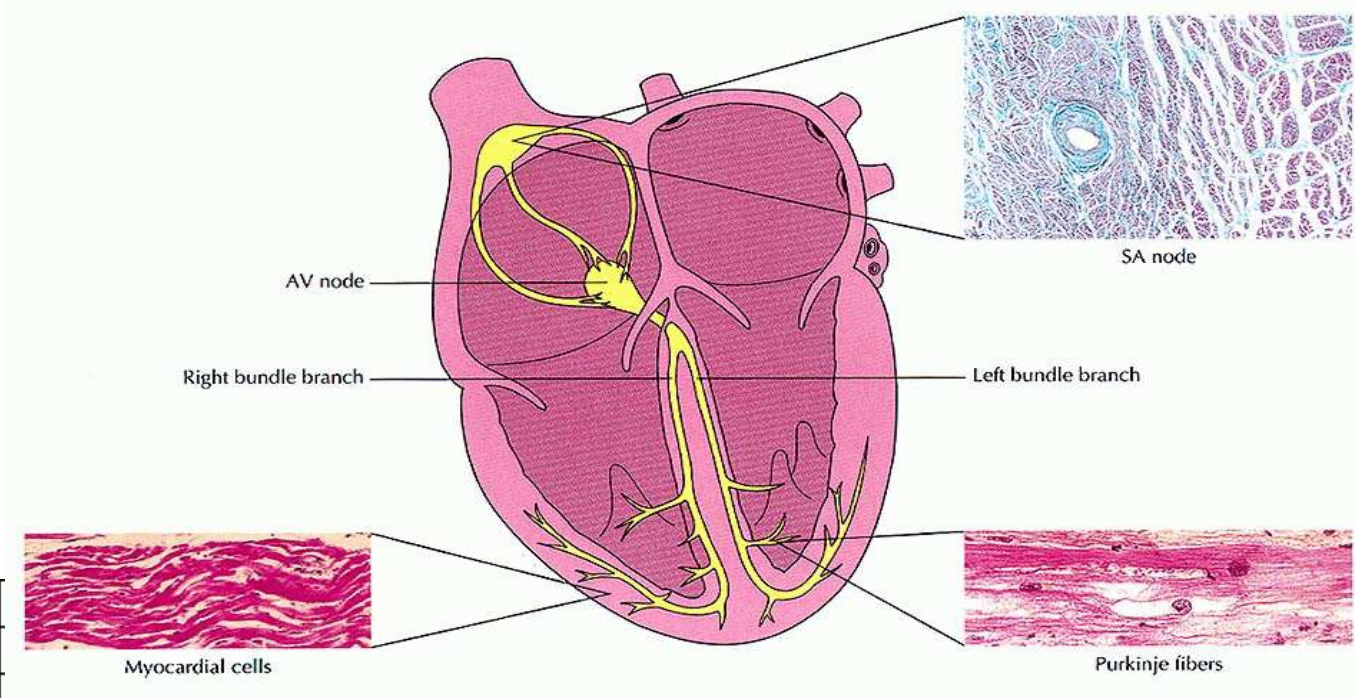
# Number one

- **Coronary Heart Disease** is the dominant cause of both sudden or nonsudden death in USA
- Prospective studies demonstrate that about **50 percent of all coronary heart disease deaths are sudden** and unexpected

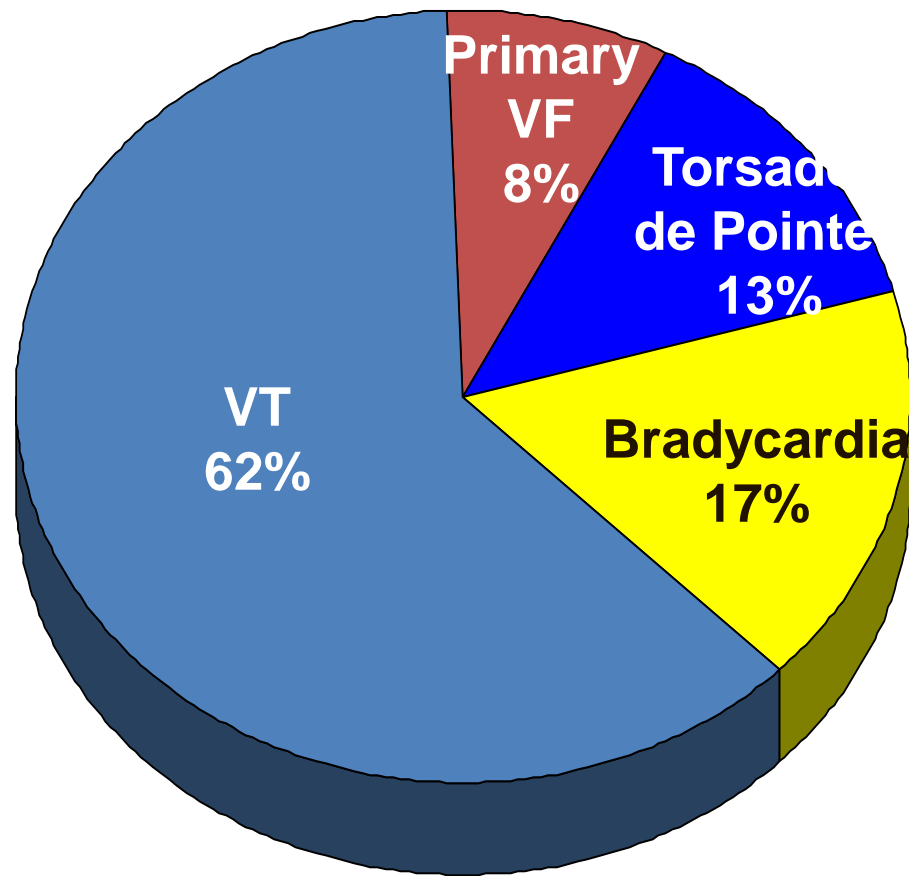


- Conduction lines
- Pacemaker rates

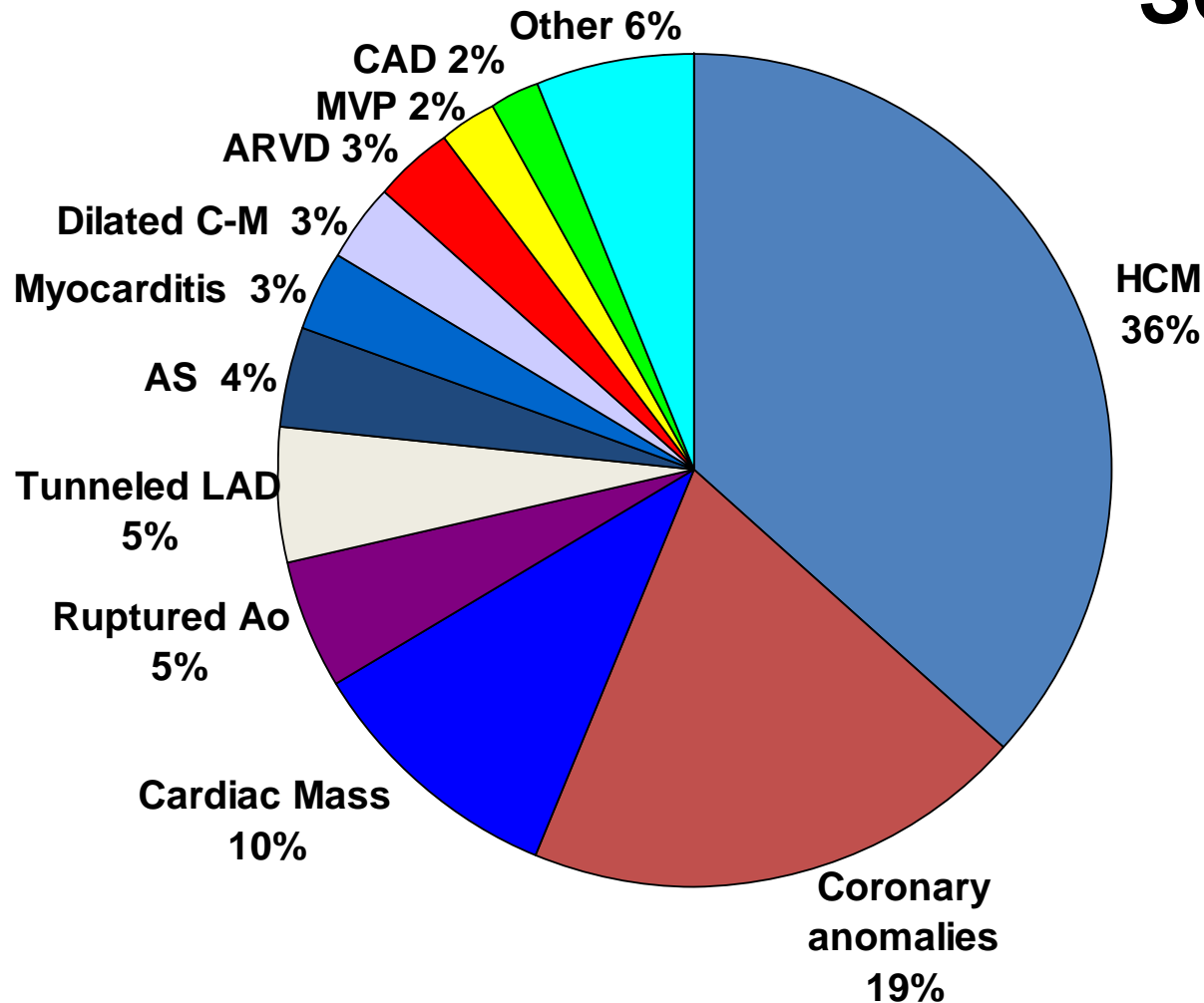




# Underlying Arrhythmia of Sudden Death



# SCD Profiles



Sudden death in young competitive athletes.  
Clinical, demographic, and pathological  
profiles.

**Cardiac Output = HEART RATE x Stroke volume**

**Heart Rate** ↓ }  
**Heart Rate** ↑ } **CO** ↓

**Low coronary perfusion**  
**Need more myocardial O<sub>2</sub>**



**Ischemia** } **CO getting lower**

# Arrhythmia

- Hemodynamic Instability Arrhythmia
  - CV for Tachycardia
  - Pacemaker for bradycardia
- Hemodynamic Stabil Arrhythmia
  - You have time, don't worry about

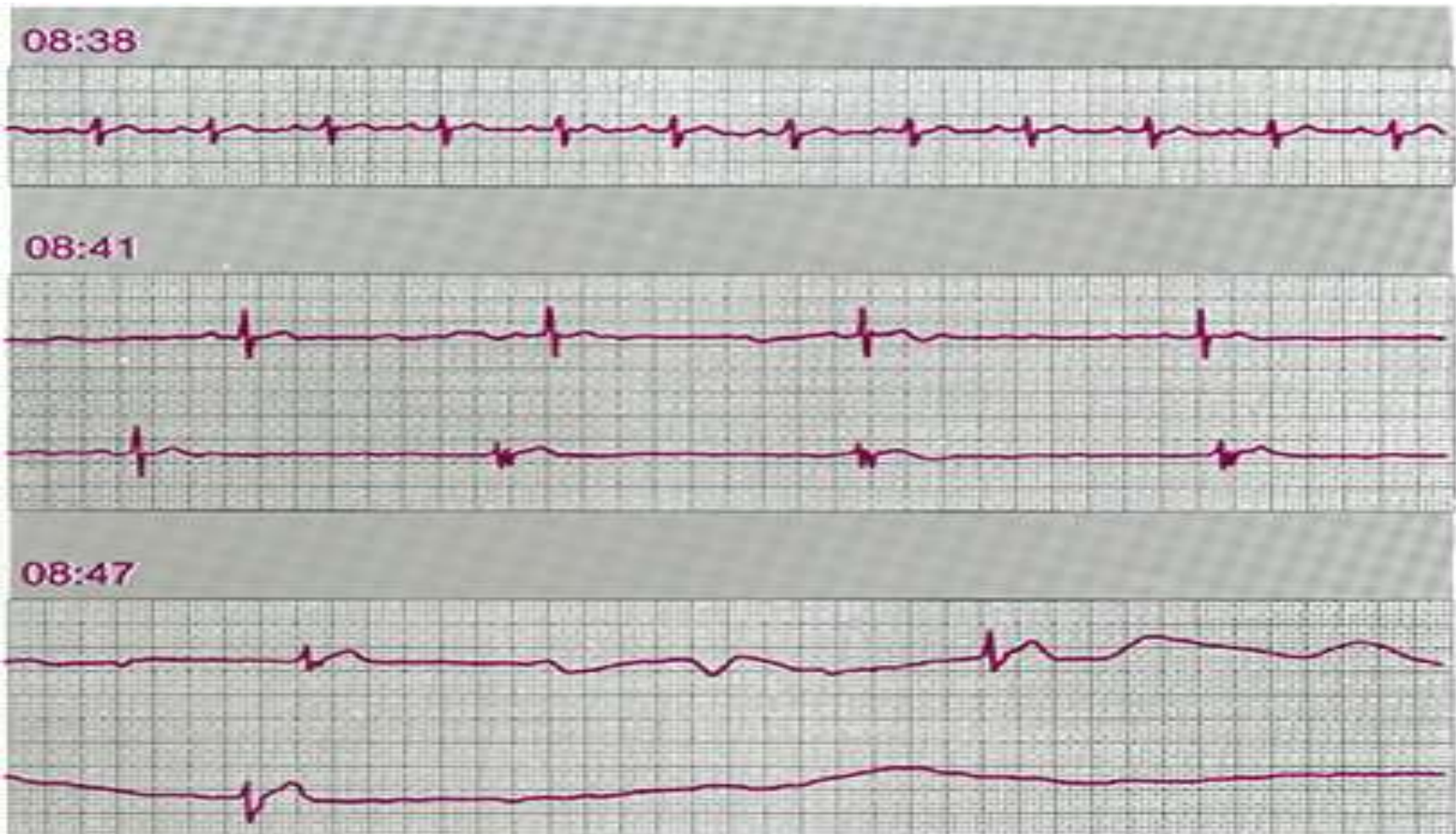
# Asystole , Cardiac arrest

- Myocardial infarction
- Pulmonary embolism
- Aortic dissection
- Pericardial tamponade
- Pneumothorax



# Bradycardia Definition

- ✓ Bradycardia is a slower than normal heart rate
- ✓ Bradycardia can be a serious problem if the heart doesn't pump enough oxygen-rich blood to the body
- ✓ In general, two types of problems result in bradycardias: disorders of the sinoatrial node (SA node), and disorders of the atrioventricular node (AV node).



- Sinus arrest/pause



# AV conduction block

1. Degree AV block

2. Degree AV blok

Mobitz Tip 1 Wenckebach

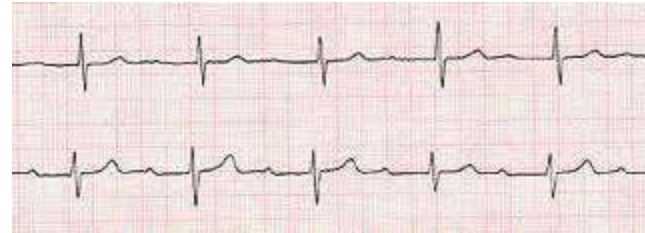
Mobitz Tip 2

3. Degree AV blok

AVCB

# 1. degree AV block

- 1. degree AV blok
- PR prolantion
- PR>200 msn

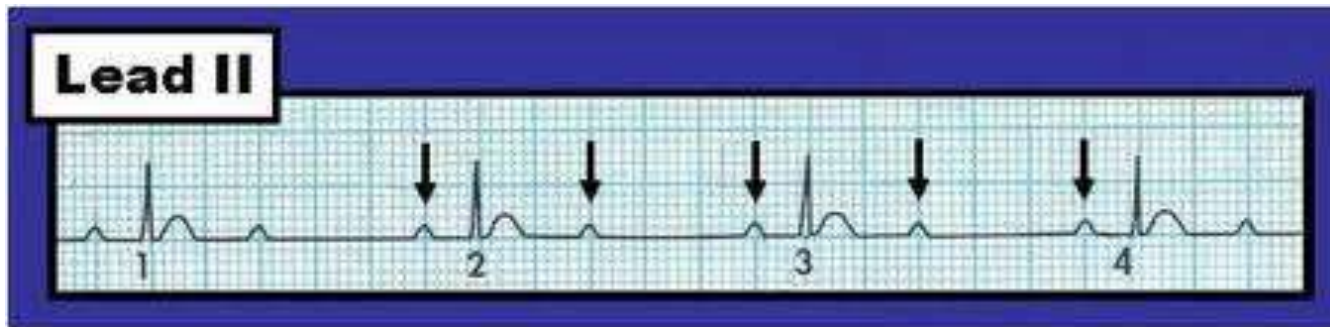


# Mobitz Tip 1

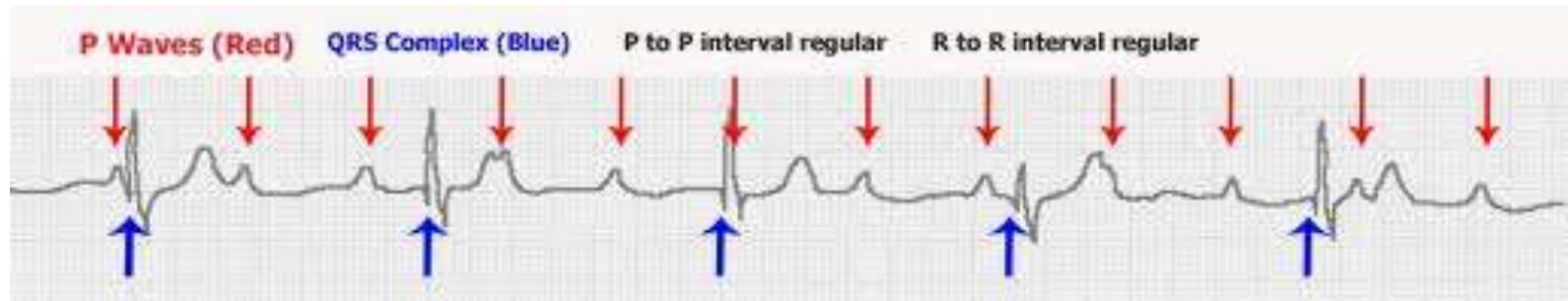
## Wenckebach type 2nd degree block



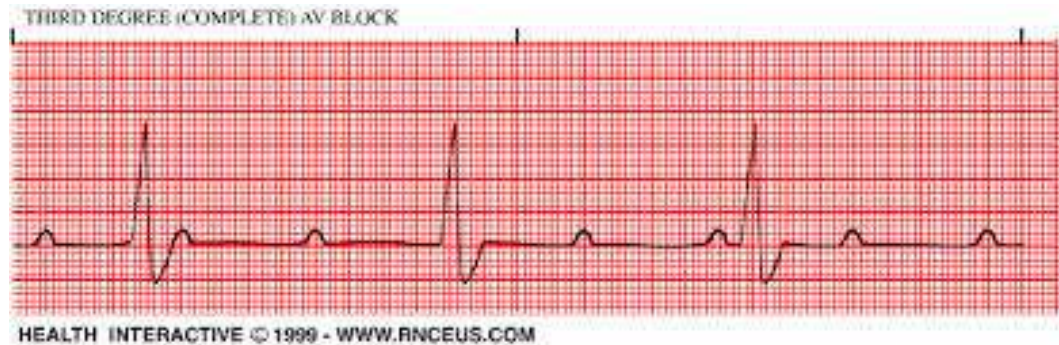
# Mobitz Tip 2



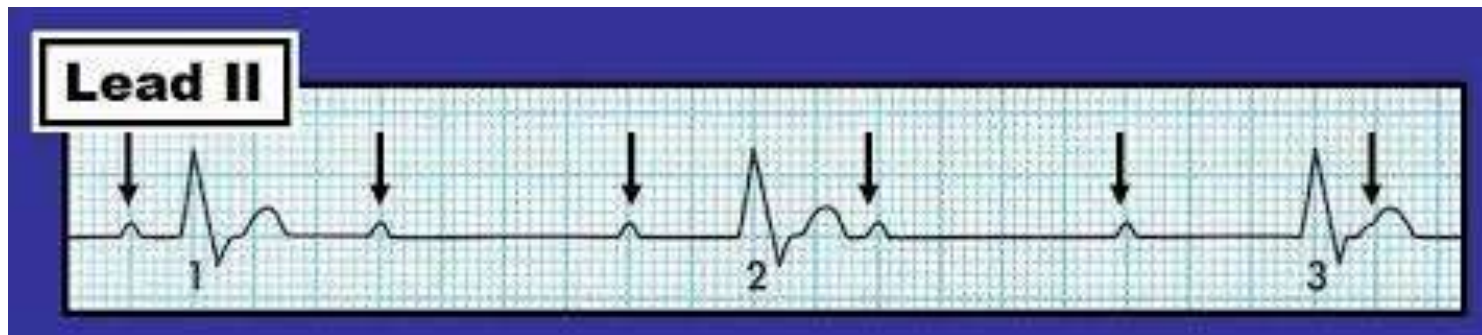
# AVCB



# AVCB



# AVCB



# AVCB

✓ **Congenital**

✓ **Acquired**

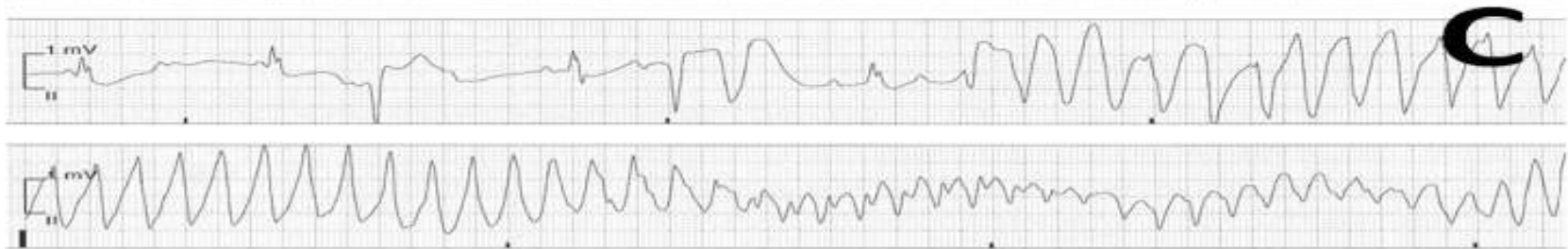
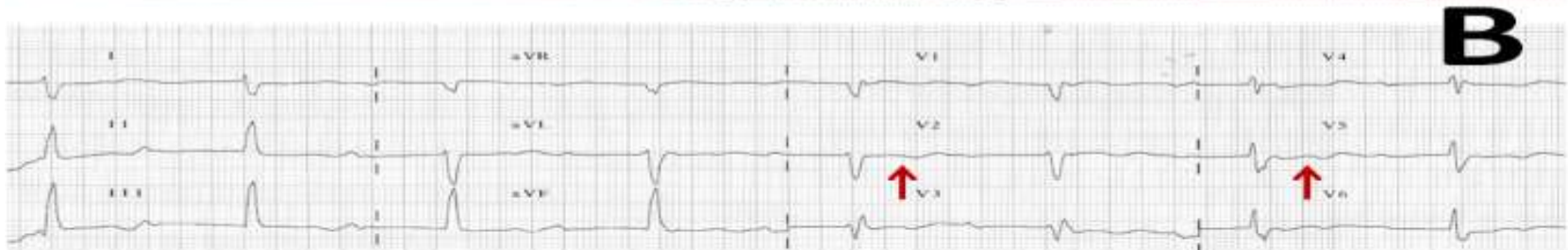
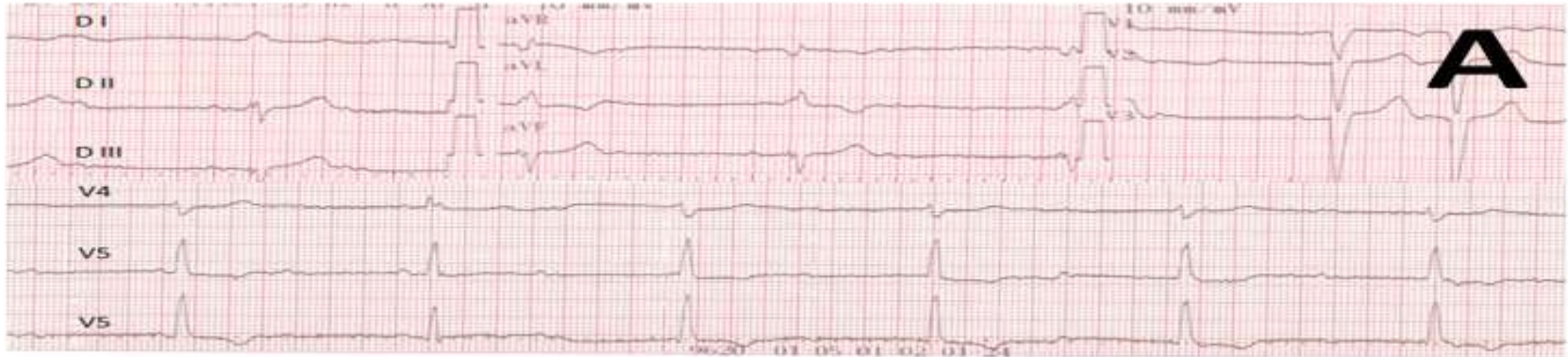
- **Ischemic**
- **Postoperative**
- **Degenerative**
- **Myocarditis**
- **Cardiomyopathies**
- **Myocardial tumors**
- **Infective endocarditis (myocardial abscesses)**



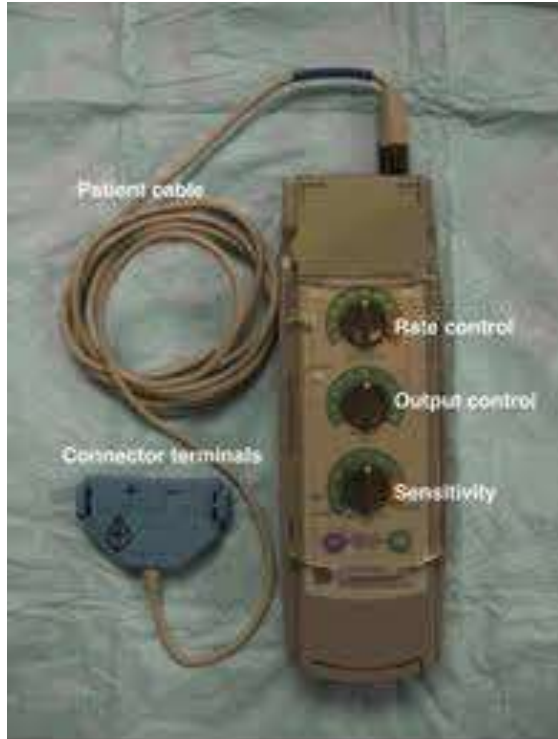
# AVCB Sings

- ✓ **No sings**
- ✓ **Heart Failure**
- ✓ **Agitations**
- ✓ **Presyncope/syncope (Adams-Stokes)**
- ✓ **Suden Cardiac Death**
- ✓ **Exercise intolerance**
- ✓ **Severe bradycardia and asistole can dejenerete VF and they must treat promptly**

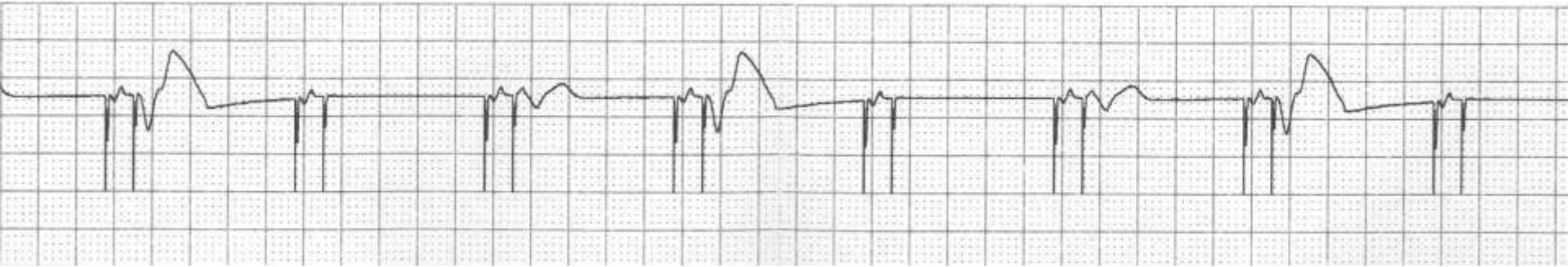
# AVCB



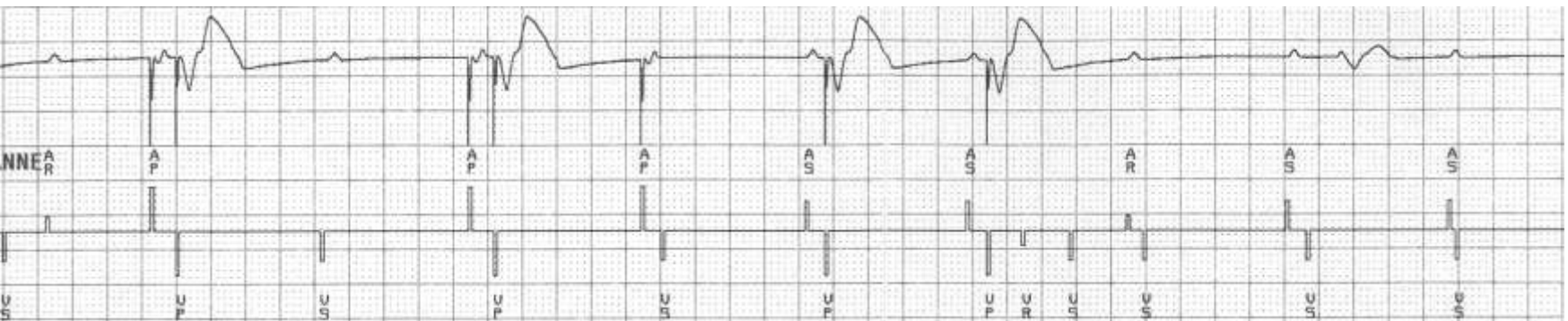
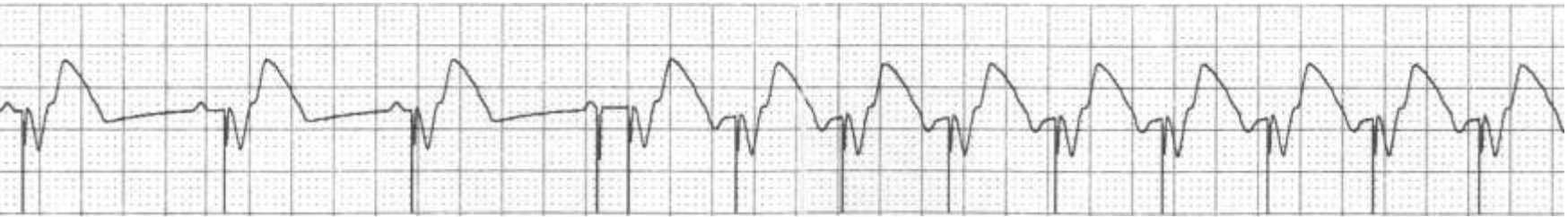
# External Pacemaker



# Pacemaker dysfunction



# Pacemaker dysfunction



# TACHYCARDIA

**Tachycardia** is a heart rate that exceeds the normal range

**Check pulse ?**

**Any proof for circulation ?**

**Perfusion is enough?**

**Tachycardia signs ?**

# Sinus tachycardia

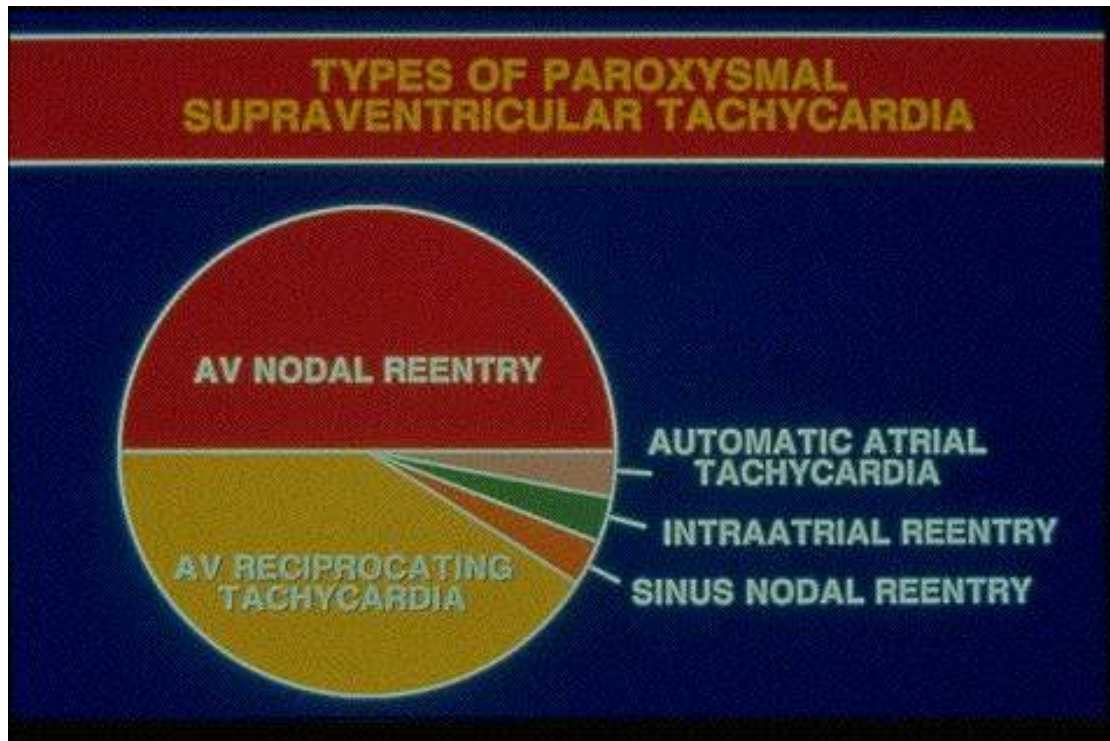
- Sinus tachycardia is often asymptomatic, although the patient may complain of a rapid heartbeat. However, problems can occur in patients with organic heart disease.
  - **Heart Failure**
  - **Hypoxia,**
  - **Hypovolemia,**
  - **Hypertermia,**
  - **Anemia**
  - **Hyperthyroidism**
  - **Pain or stress**
  - **Toxins, pills**
- Sinus tachycardia is a sign not a arrhythmia

# *Supraventricular tachycardia*

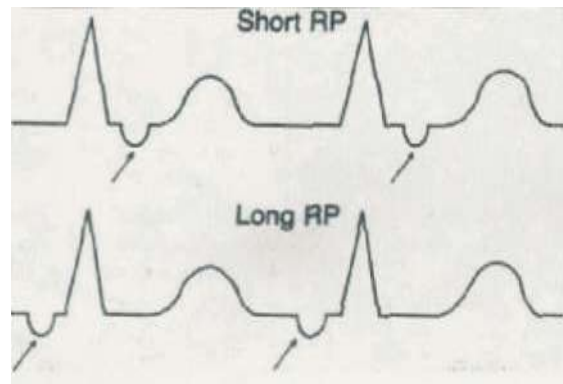
- This is a type tachycardia that originates from above the ventricles, such as the atria
- **Narrow QRS tachycardia QRS  $\leq$  100 msn**
- **Genellikle mortal değil ancak morbiditeleri yüksek**
- **EPS and ablation therapy is curable**
- **Emergency service doctors must know easily and threat fast beacuse these tachycardia very comman in ER**



# SVT



# SVT



# AVNRT

( Atrioventricular Nodal Reentrant Tachycardia )

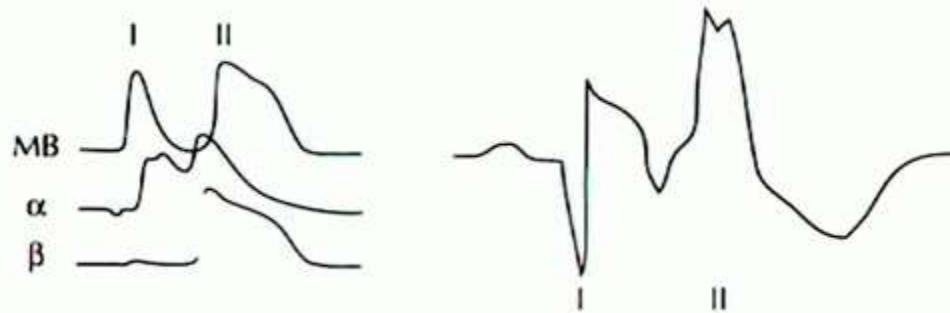
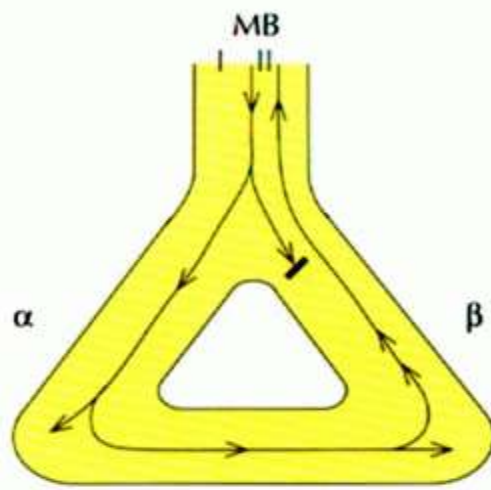
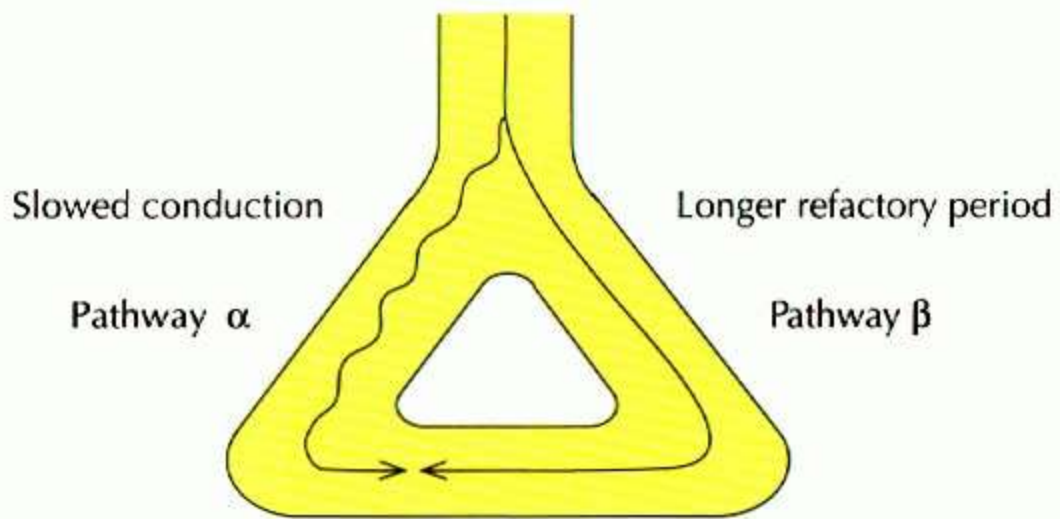
–Common AVNRT

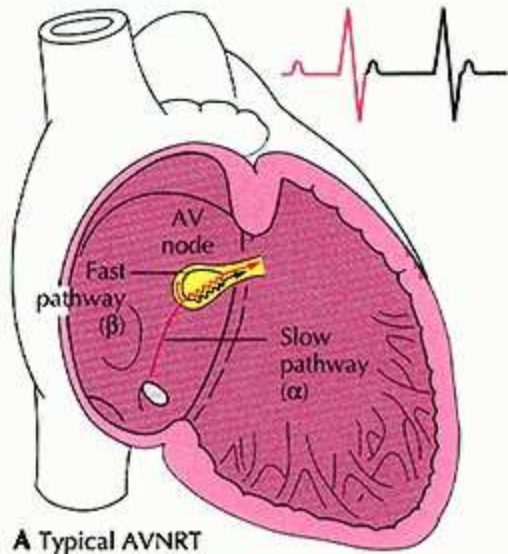
–Uncommon AVNRT

- Sudden onset and stop

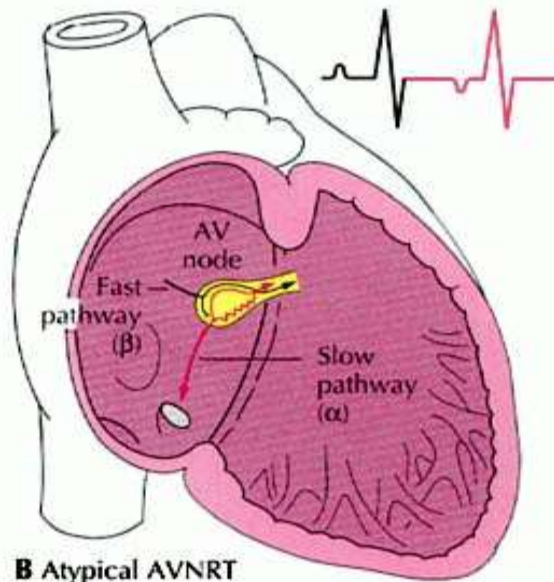
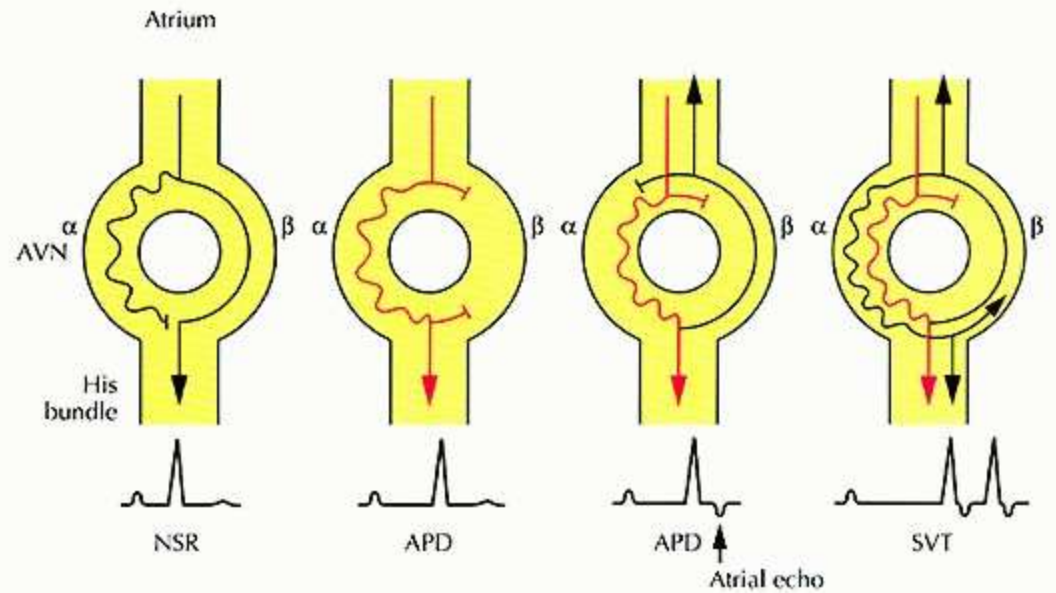
- Narrow QRS

- 150-250/bpm regular

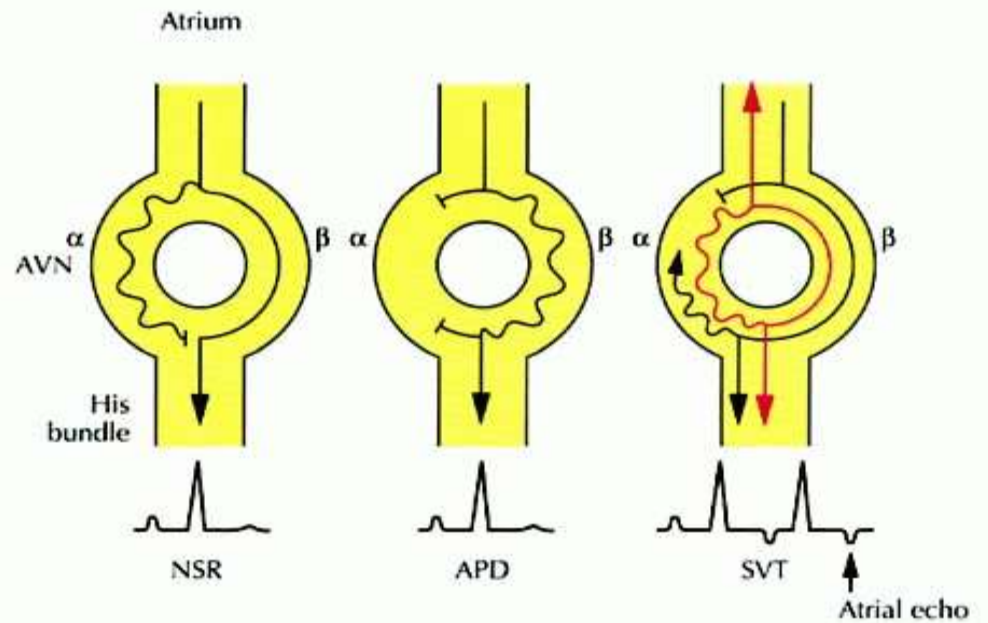




**A Typical AVNRT**



**B Atypical AVNRT**



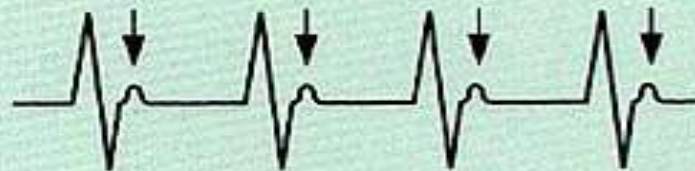
**ECG pattern**

**Associated condition**



Typical AVNRT

P "buried" in QRS



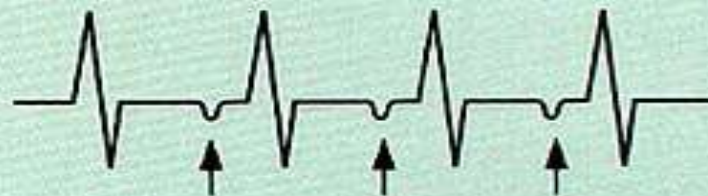
Typical AVNRT

P at tail-end of QRS



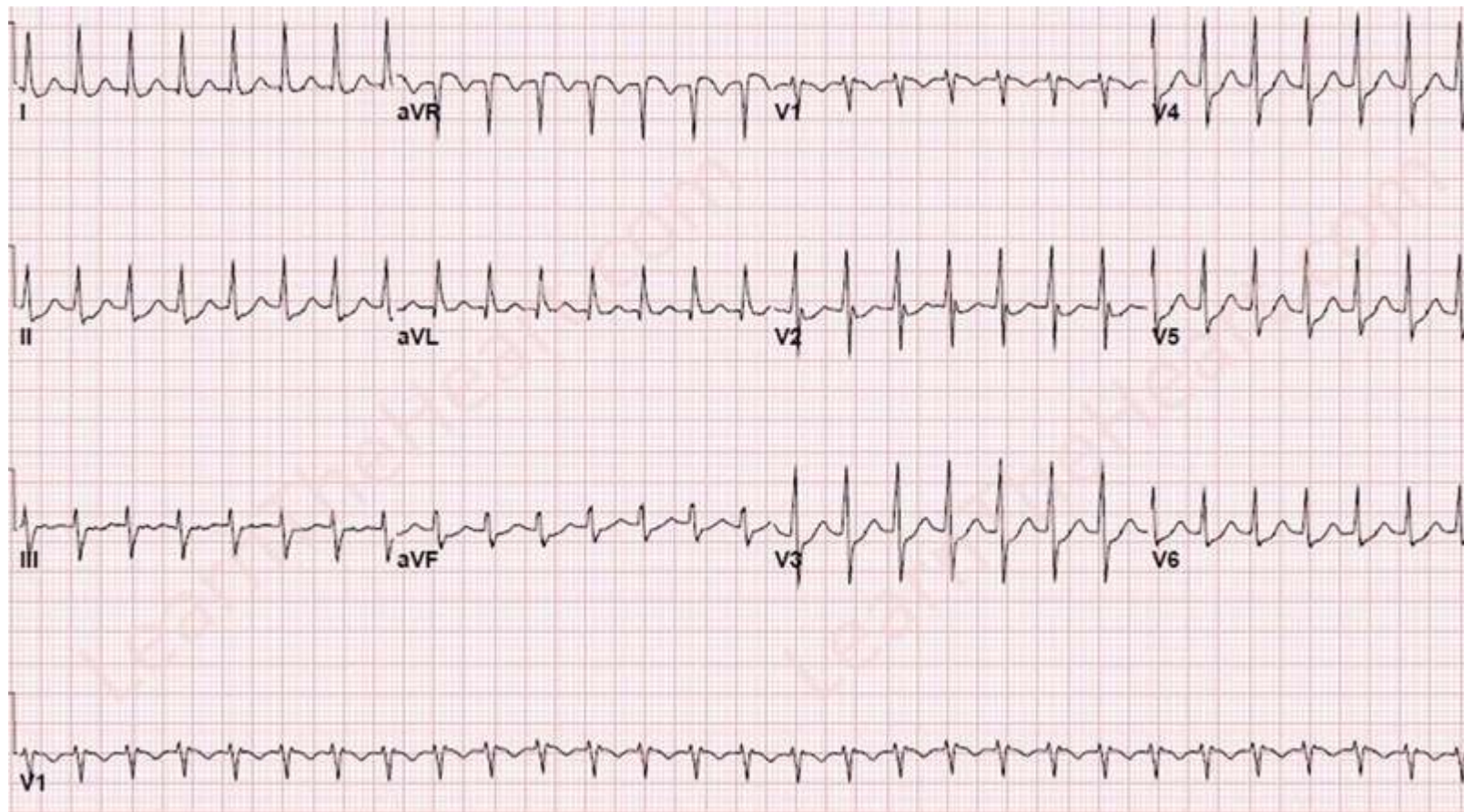
Accessory pathway:  
mediated tachycardia

P in ST segment (short RP)

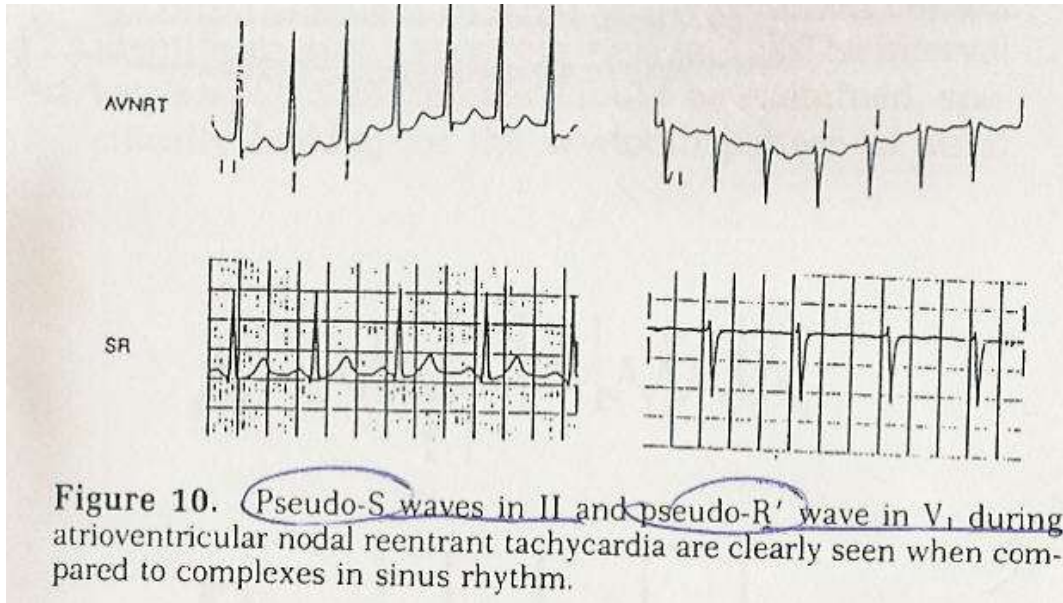


Atypical AVNRT  
Slow accessory pathway:  
mediated tachycardia  
Atrial tachycardia

P "distant" from QRS (long RP)

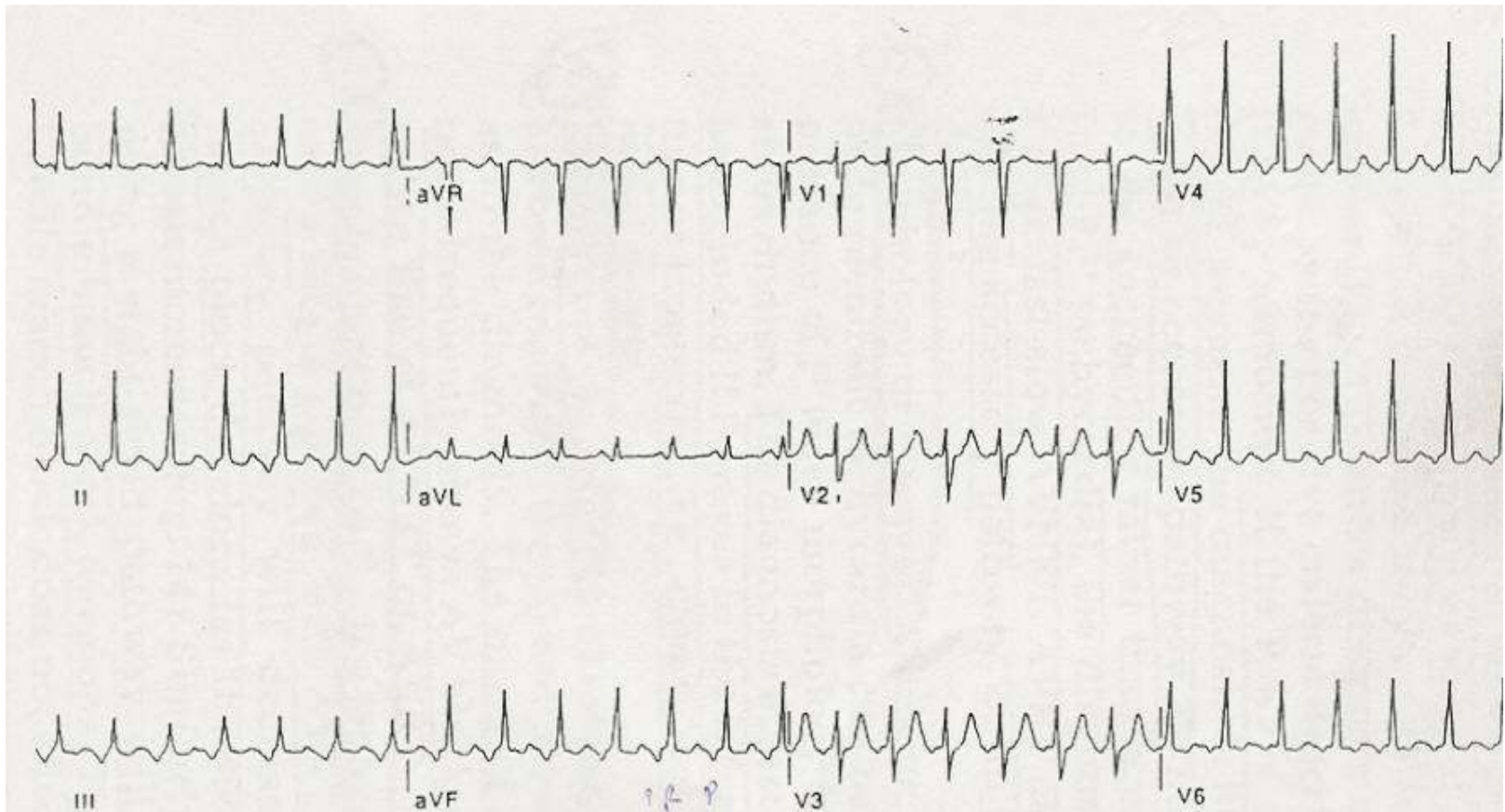


# AVNRT





# AVNRT



**Figure 11.** Atypical "fast-slow" atrioventricular nodal retrograde tachycardia (AVNRT). P waves are negative in the inferior leads, confirming origin in the AV nodal region. Atrioventricular reentrant tachycardia (AVRT) using a septal accessory connection cannot be excluded on the basis of this ECG, however.

# AVRT

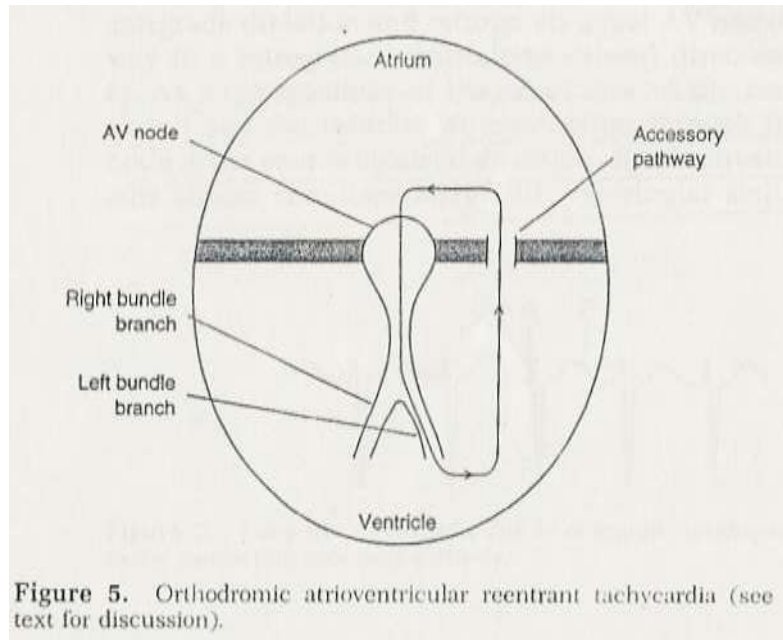
( [Atrioventricular reentrant tachycardia](#) )

## ■ Ortodromik AVRT:

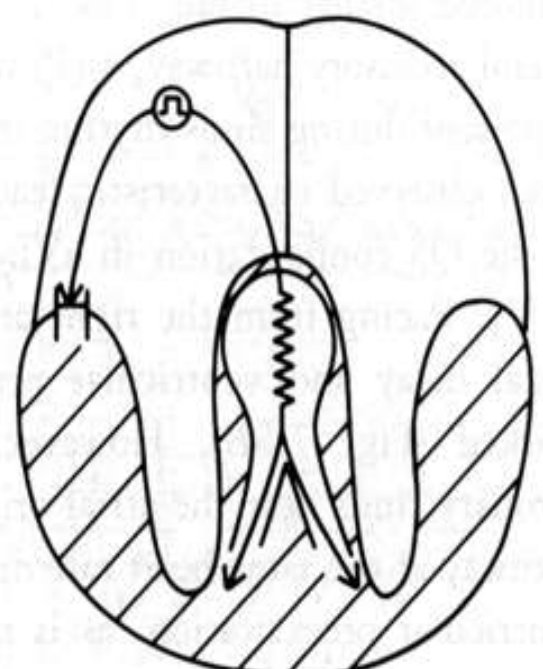
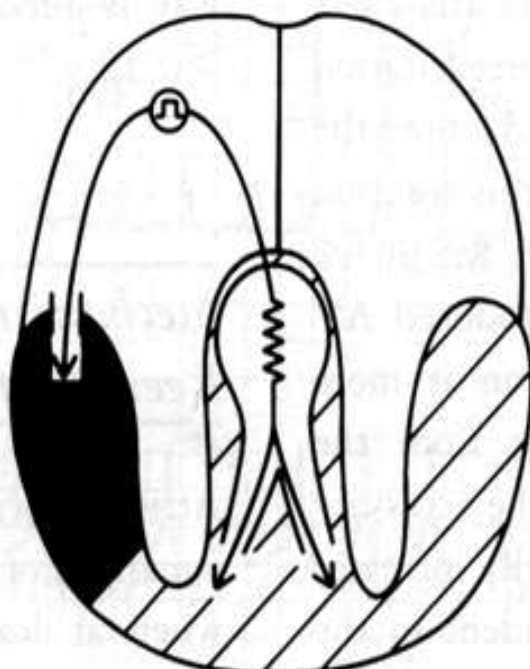
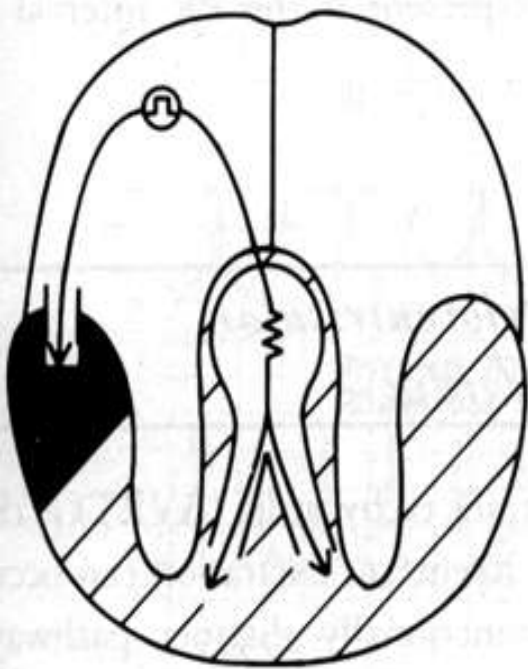
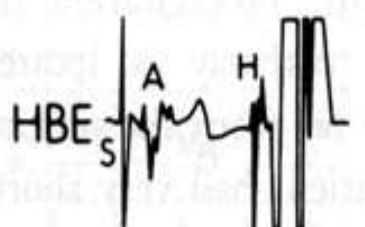
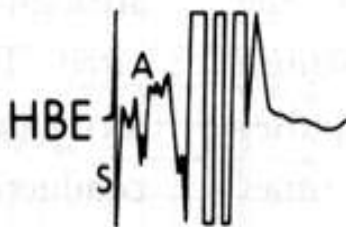
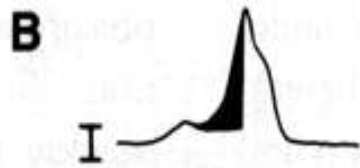
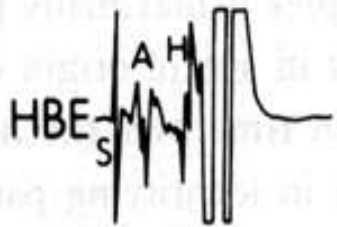
- Antegrad geçiş AV nod
- Retrograd geçiş aksesuar yol
- **Dar QRS**

## ■ Antidromik AVRT:

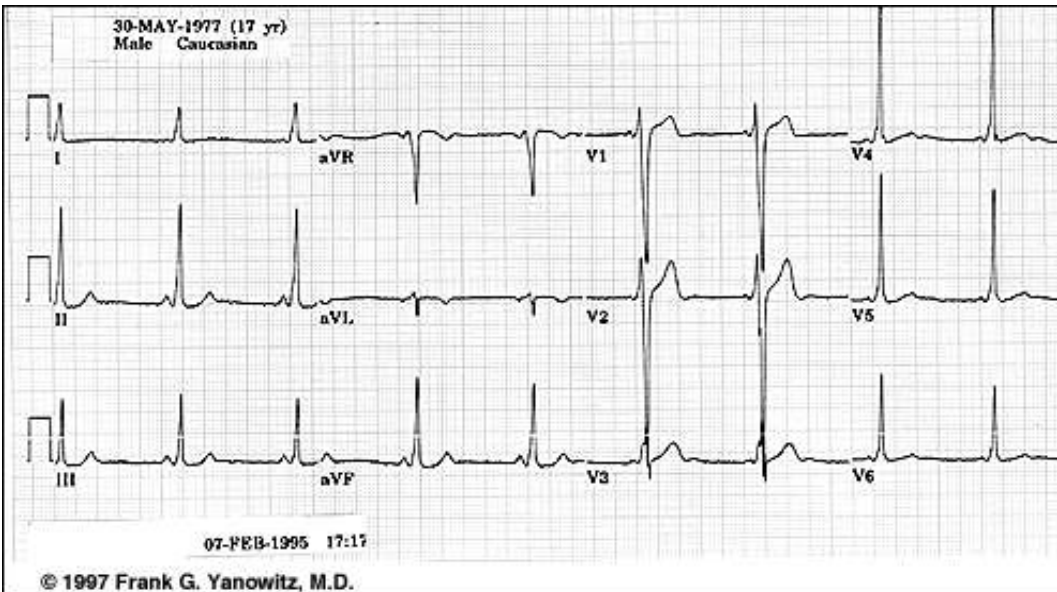
- Antegrad geçiş aksesuar yol
- Retrograd geçiş AV nod
- **Geniş QRS**



**Figure 5.** Orthodromic atrioventricular reentrant tachycardia (see text for discussion).



30-MAY-1977 (17 yr)  
Male Caucasian



07-FEB-1995 17:17

© 1997 Frank G. Yanowitz, M.D.

# Case 1

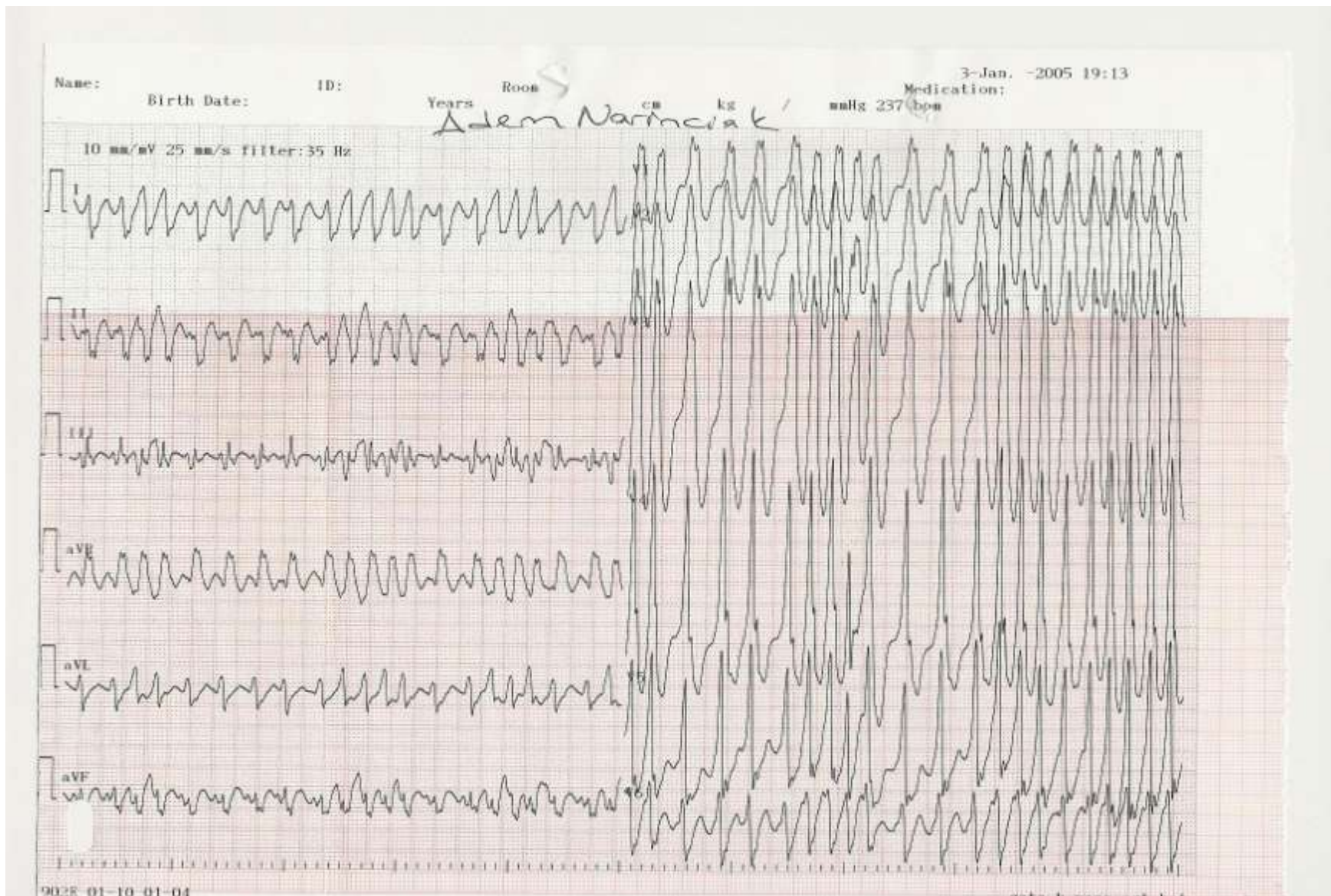
A.N.33 y, Male

Chief Complaint : Palpitations ,Dizziness

History:

- No cardiac history
- Sudden onset palpitations
- Blackout , 40 min later after onset palpitations
- When ER TA:80/50 mmHg HR:230/pm

# ECG in ER



# GELİŞ EKG

Name: Adem Narinçik  
Birth Date:

ID:

Years

Room:

Name:

Birth Date:

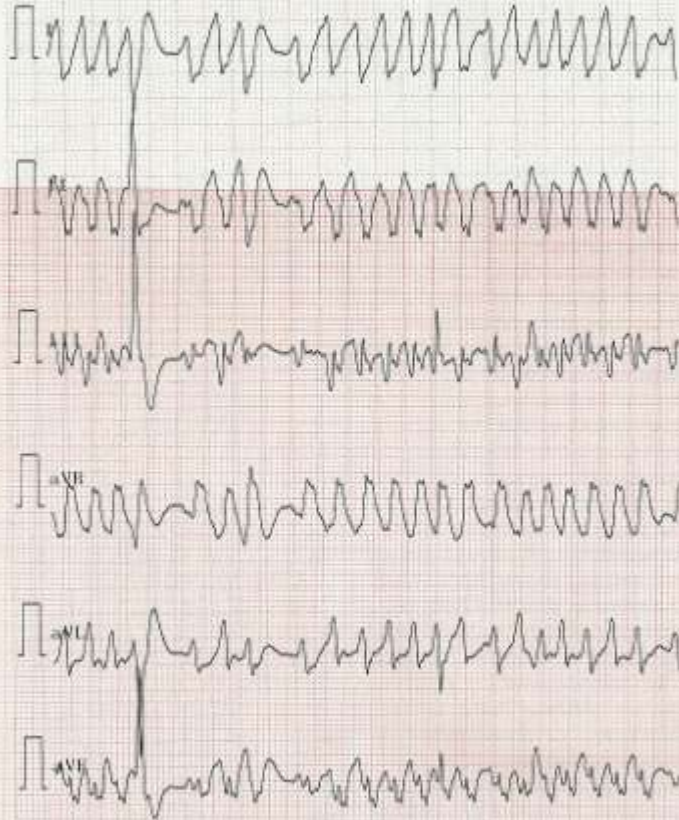
ID:

Years

Room:

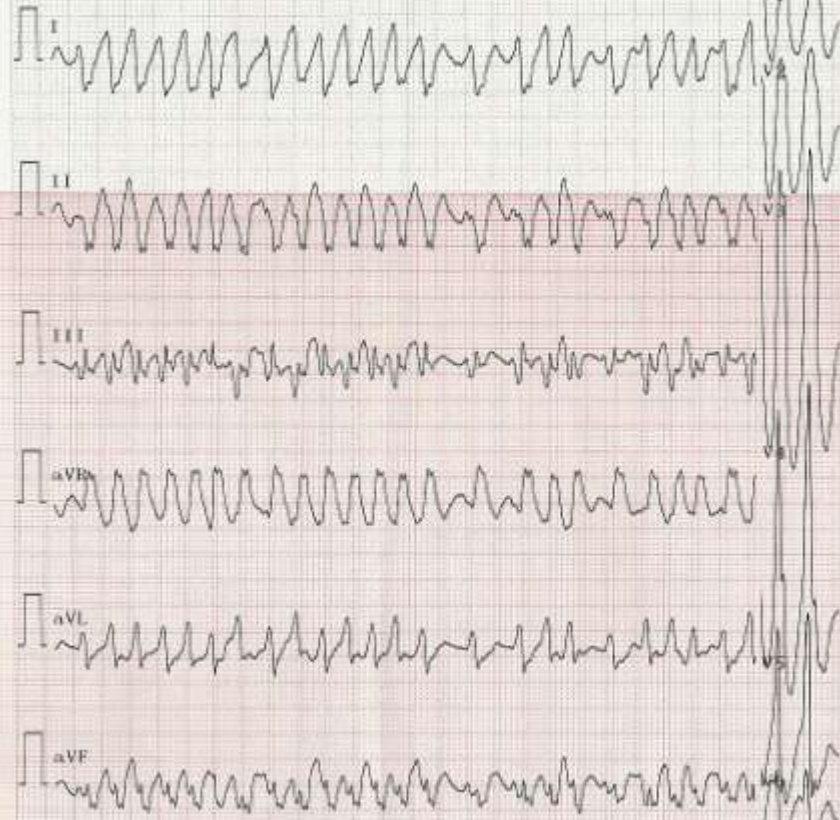
cm

10 mm/mV 25 mm/s filter:35 Hz



902E 01-10 01-04

10 mm/mV 25 mm/s filter:35 Hz



902E 01-10 01-04



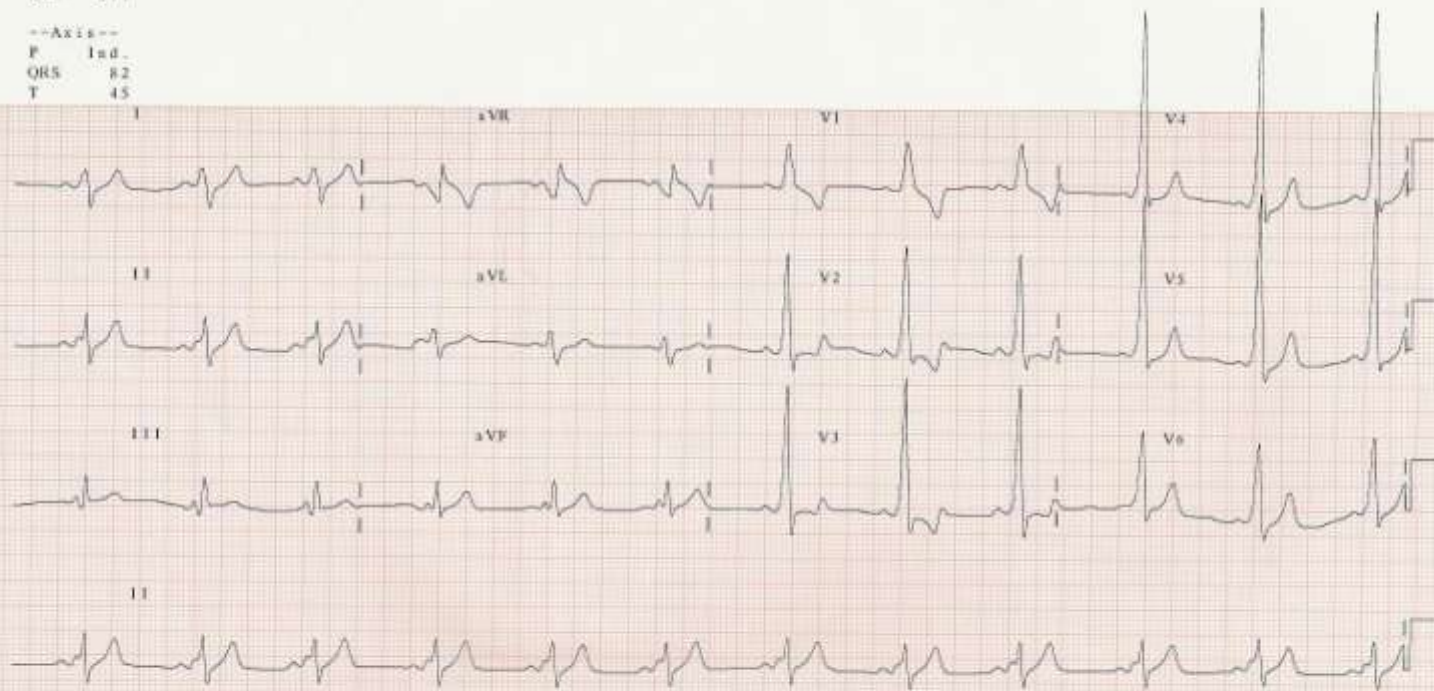
03-Jan-2005 20:03:26

Hewlett-Packard PageWriter 200

Adam Norstrik

Rate 78  
PR 129  
QRSD 136  
QT 381  
QTc 411

--Axis--  
P Ind.  
QRS 82  
T 45



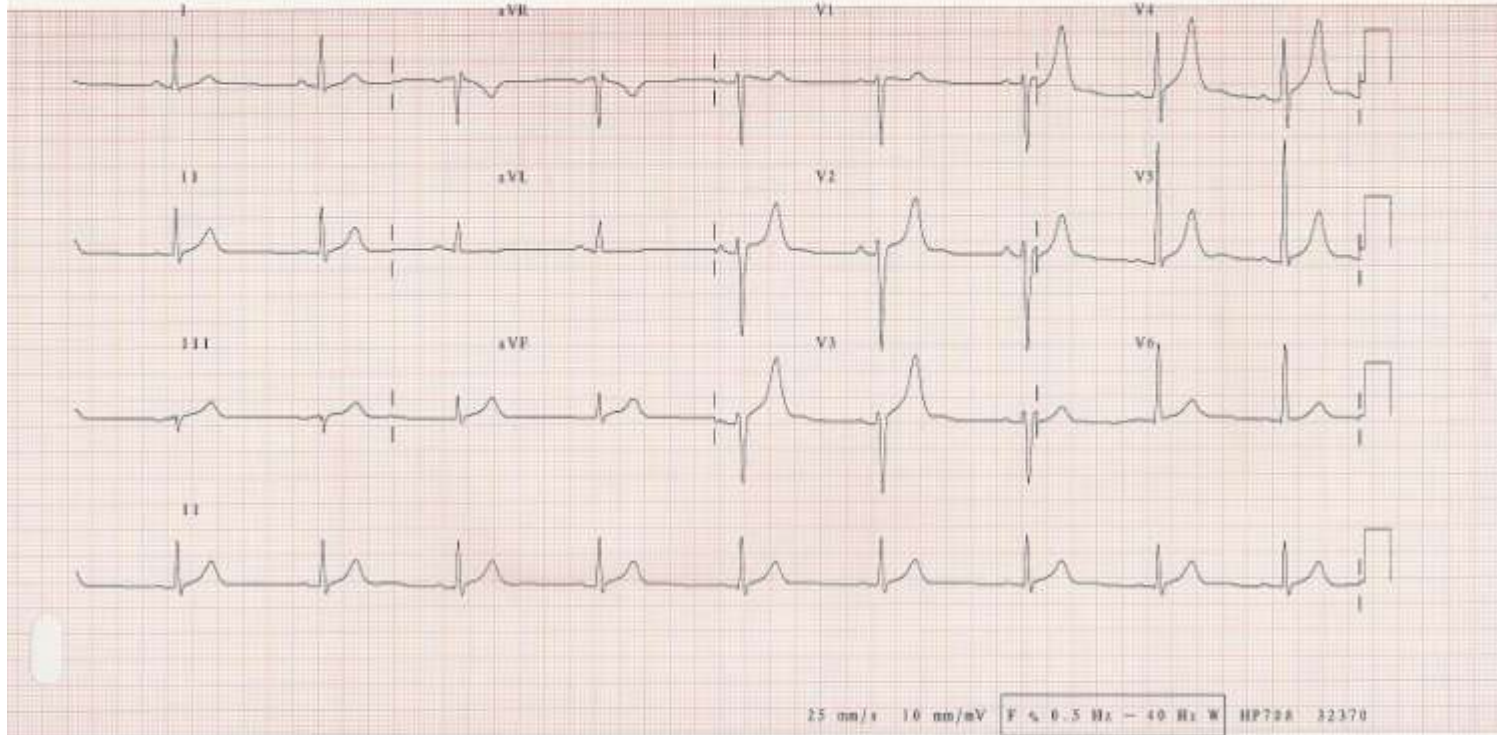
25 mm/s 10 mm/mV P 0.5 Hz - 40 Hz W HP708 32298

After 50 J DC Synchronized Cardioversion

Adem Norcinok

Rate 55  
PR 150  
QRSD 91  
QT 411  
QTc 393

--Axis--  
P -10  
QRS 20  
T 64



After Ablation

# Ventricular Arrhythmias

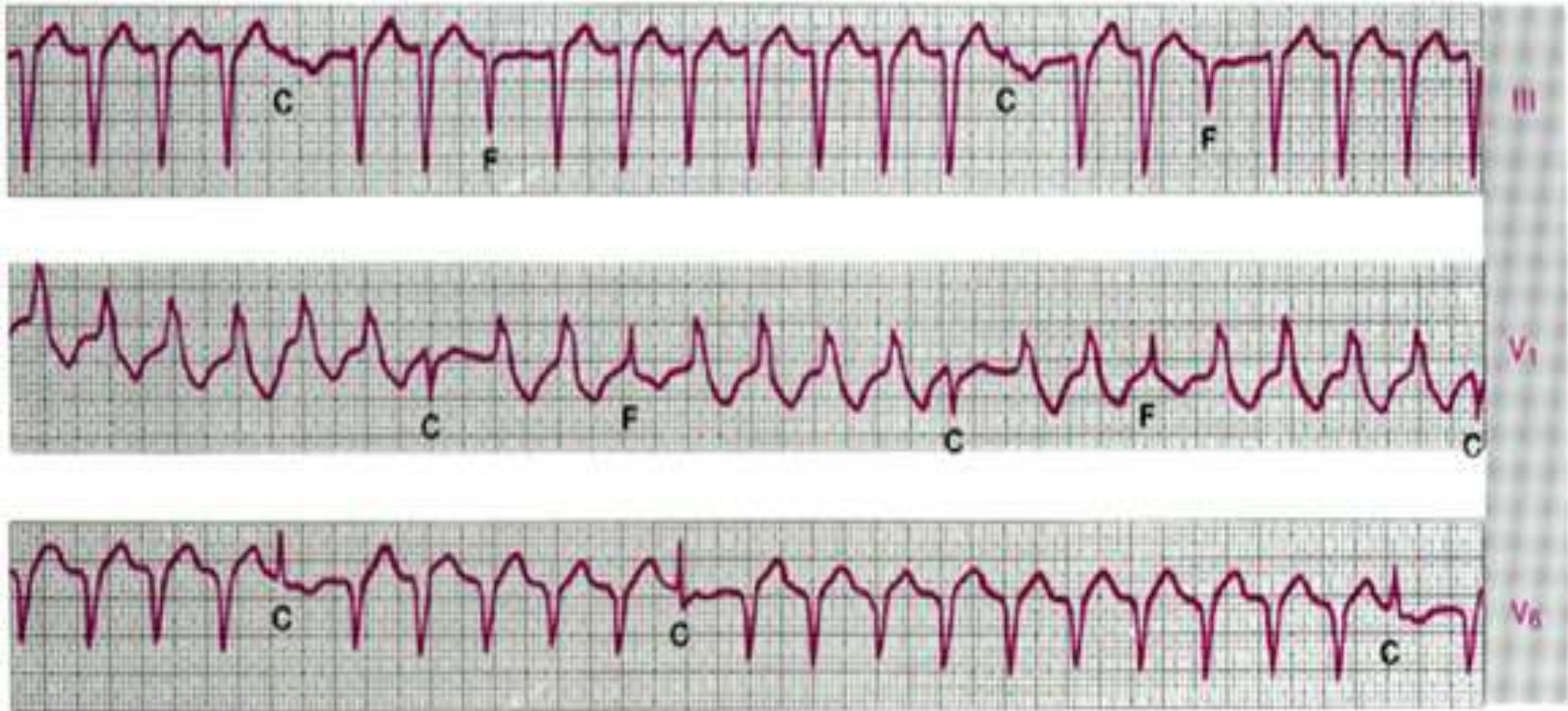
- Premature Ventricular Contractions
- Ventricular Tachycardia
- Accelerated ventricular escape rhythm
- Ventricular flutter
- Ventricular Fibrillation

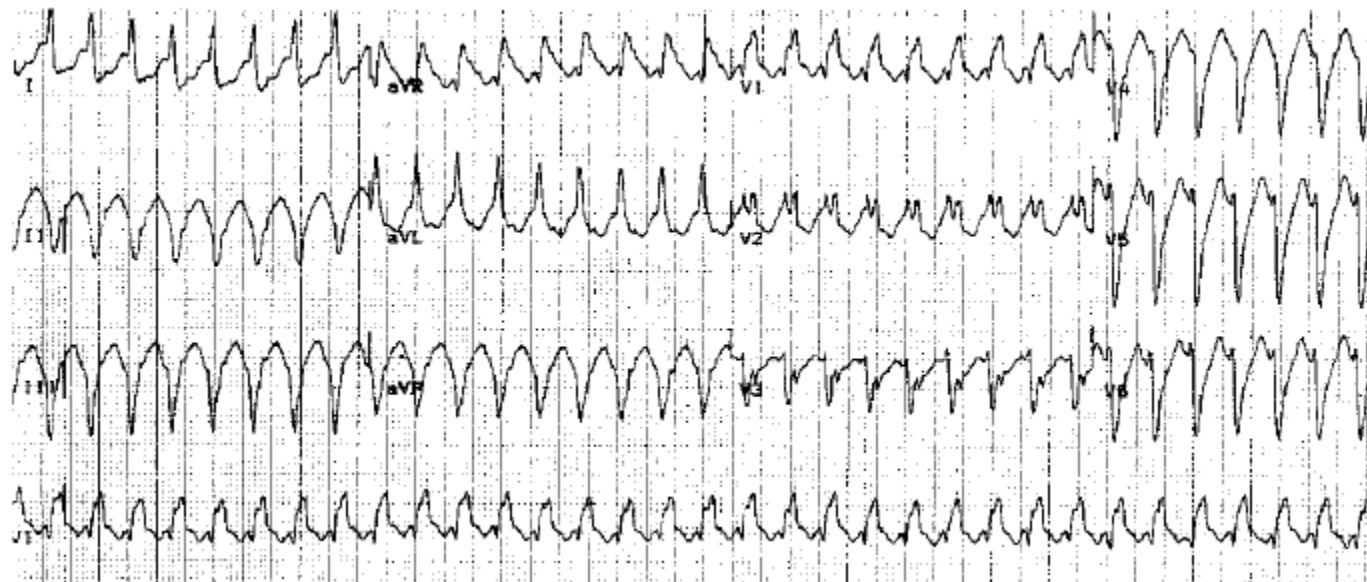
# Wide QRS complex tachycardia: ECG differential diagnosis.

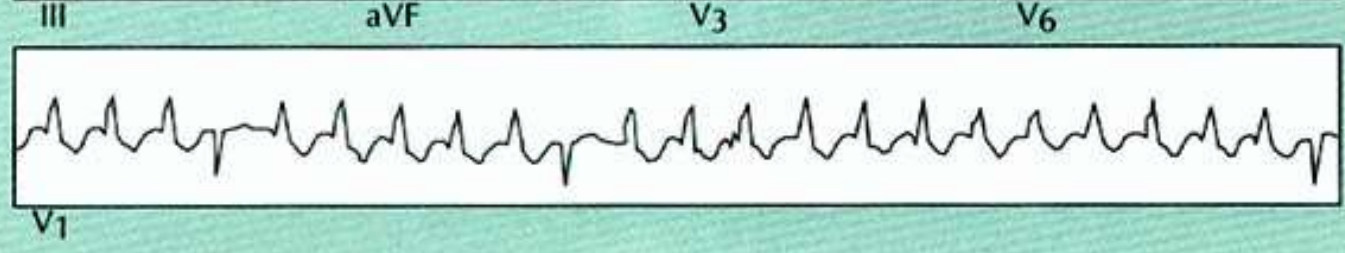
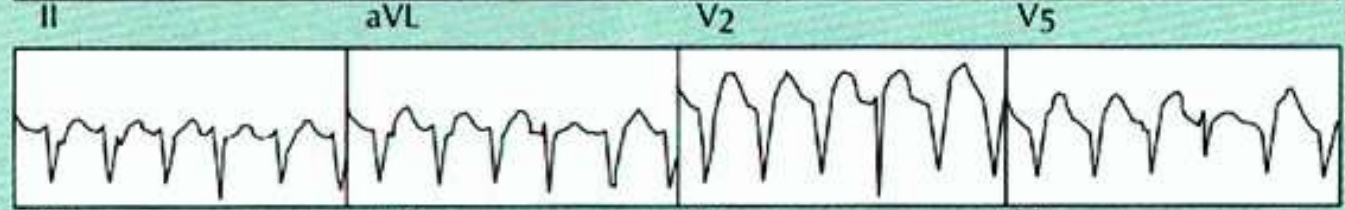
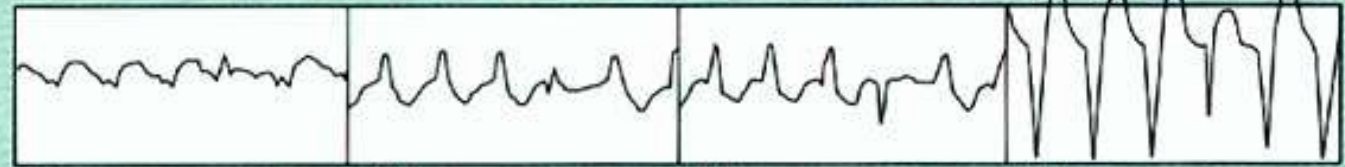
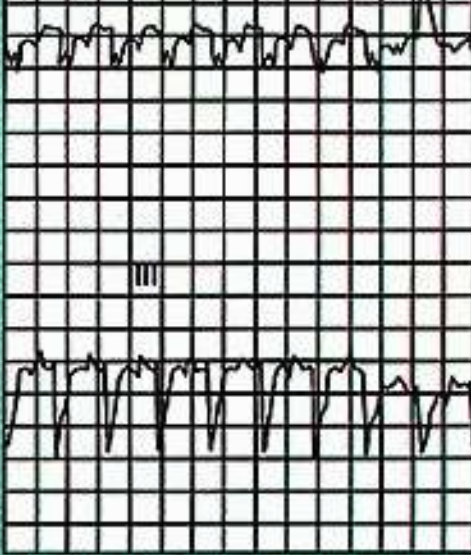
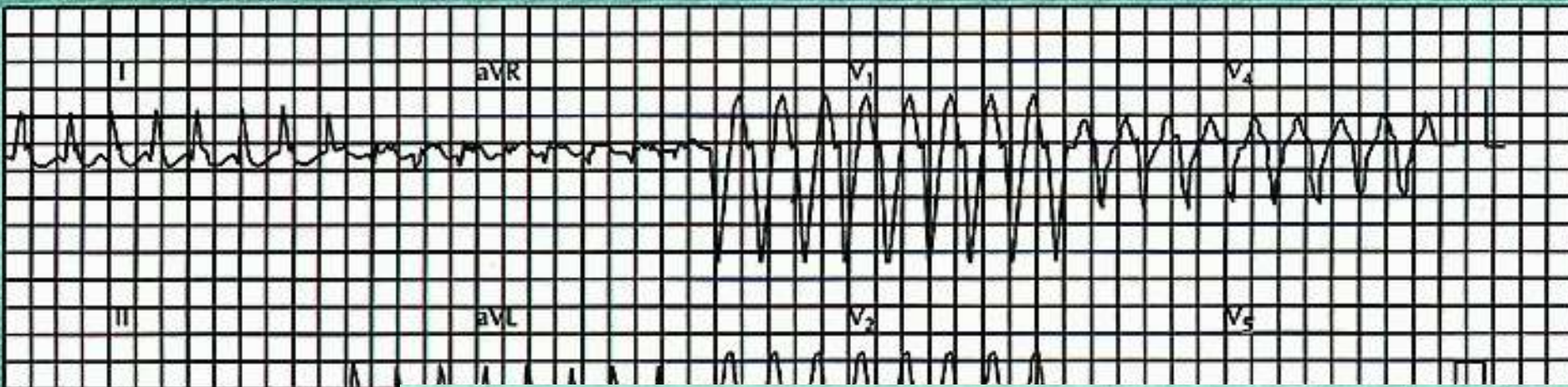
- **Supraventricular tachycardia**
- Vagal tone effect on tachycardia
- R-P <100msn
- V<sub>1</sub> RSR pattern
- **Ventricular**
- fusion beat
- capture beats
- QRS >140 msn
- Left axis deviation
- Specific ECG morphology

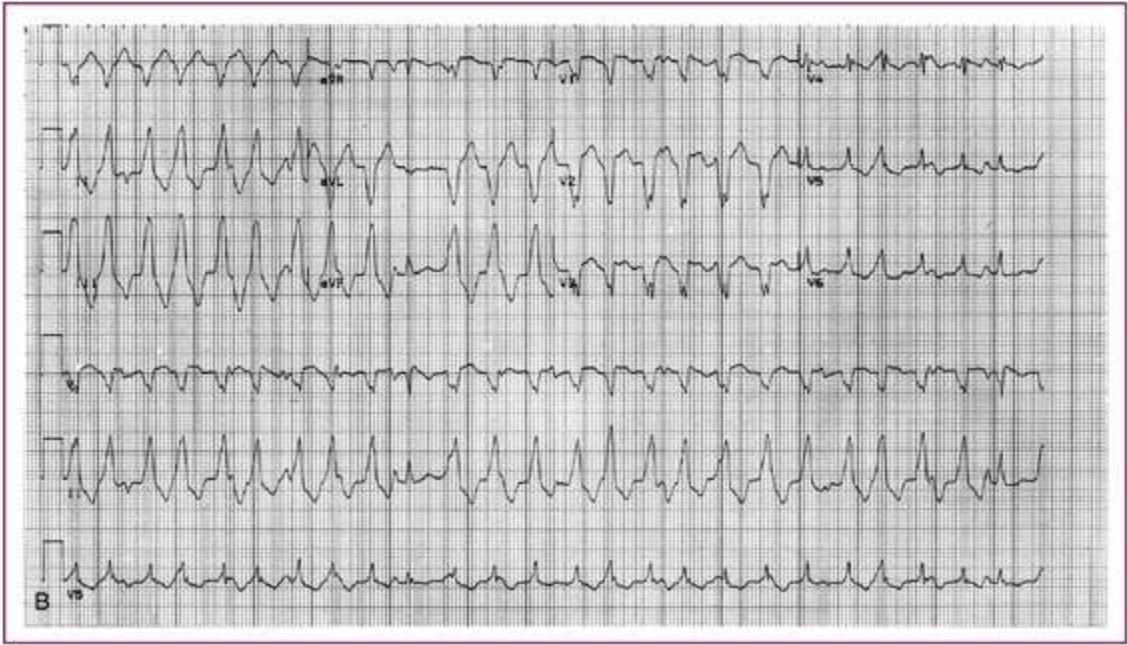
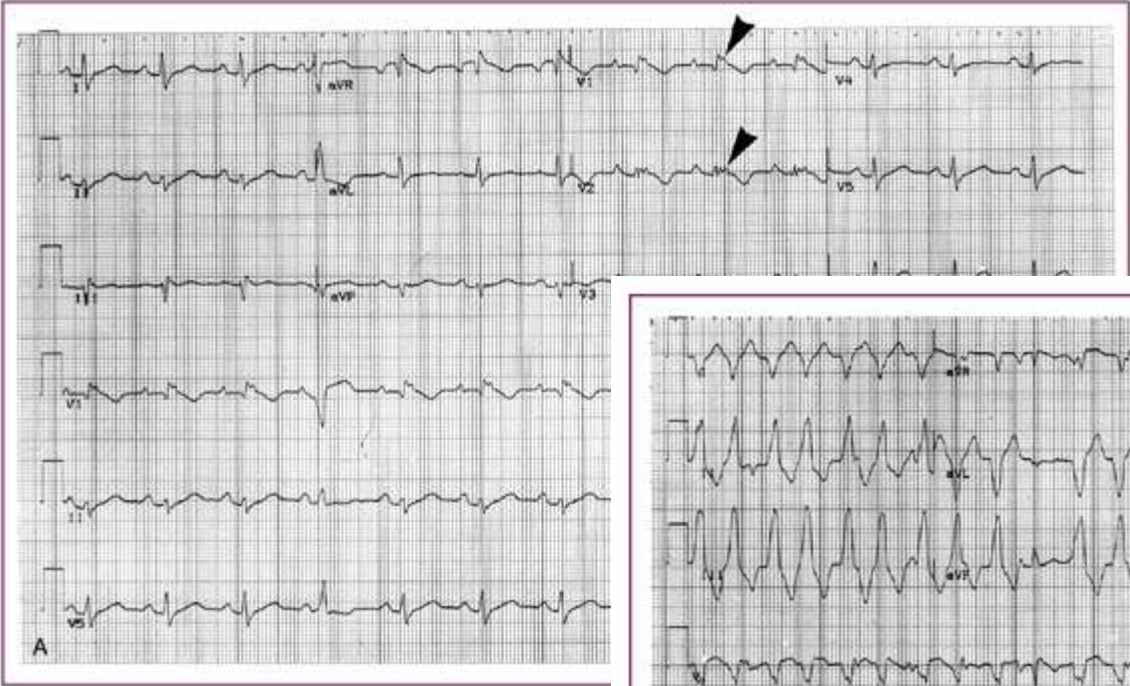
# ■ Ventricular Tachycardia

- QRS >0,12 sn
- Reguler
- Rate 70-250/pm



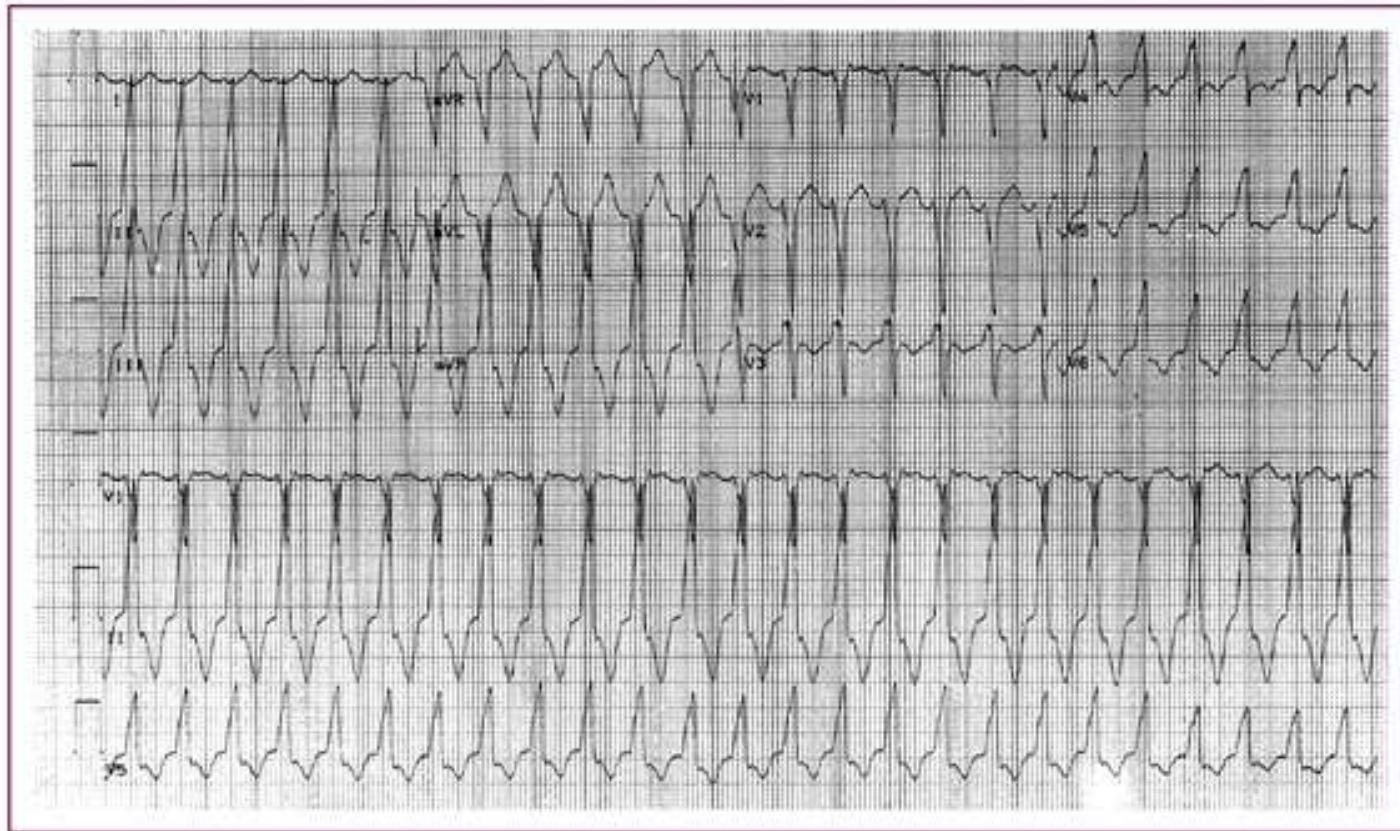




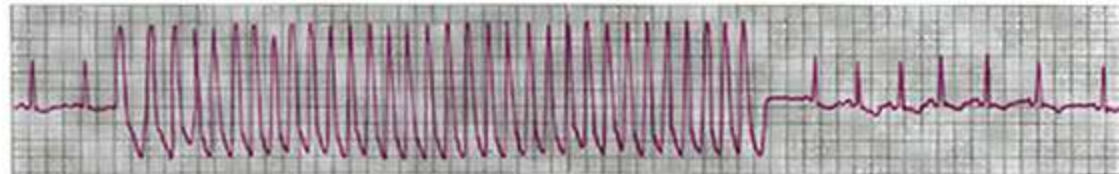




## RVOT – VT

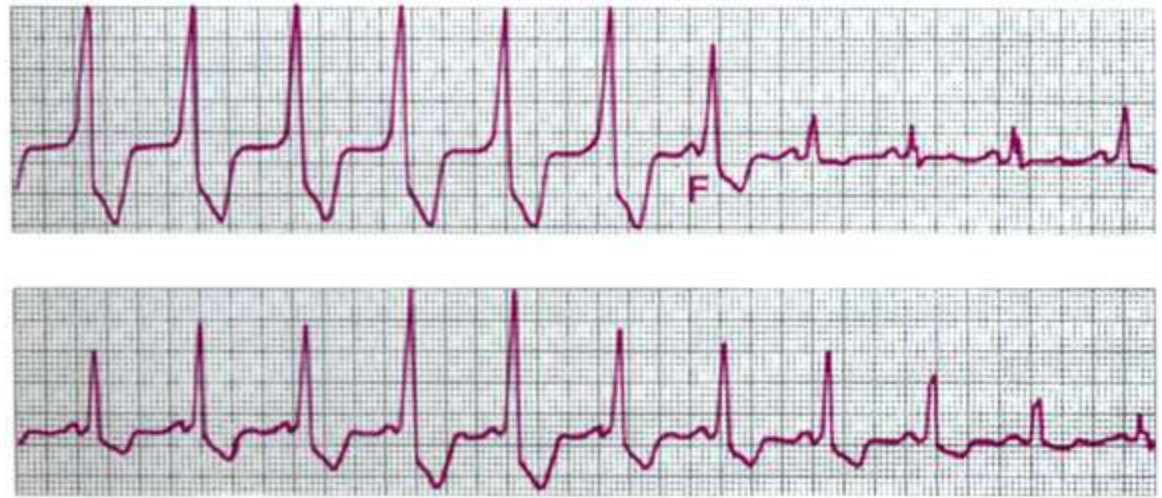


## Repetitive Monomorphic Ventricular Tachycardia



# ■ Accelerated ventricular escape rhythm

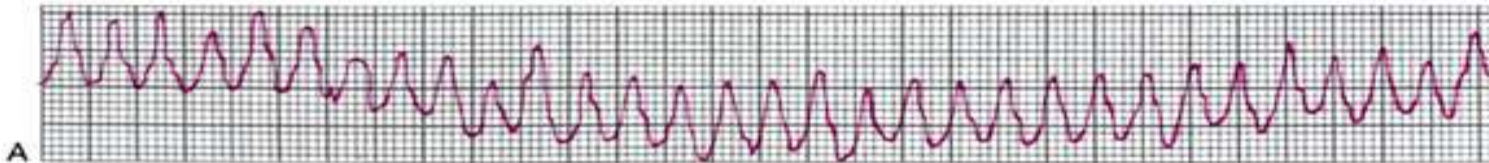
- Rate 60-110/pm
- Post MI reperfusion arrhythmia
- igoxin intoxication



## ■ Ventricular flutter / fibrillation

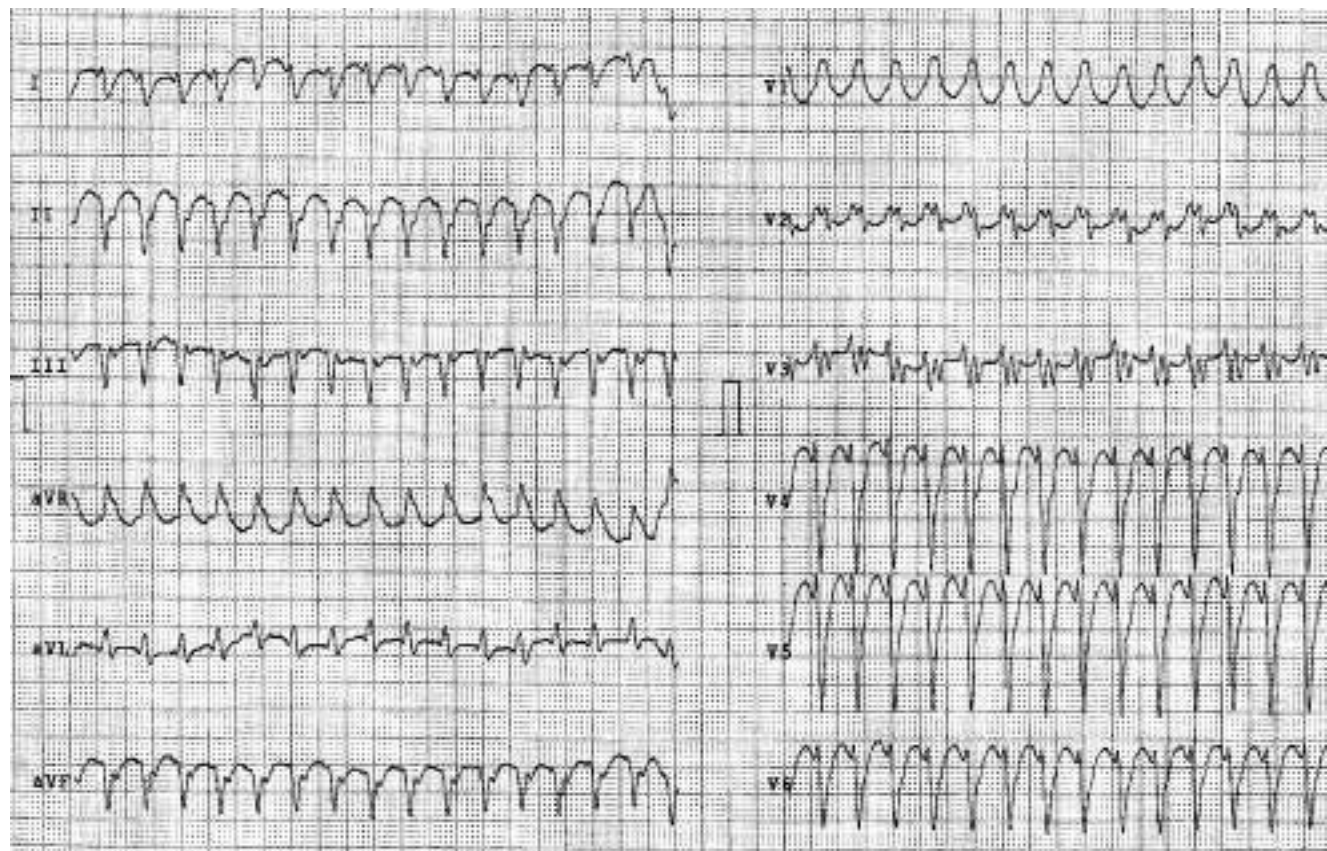
- Irregular

- Rate 150-300 /pm

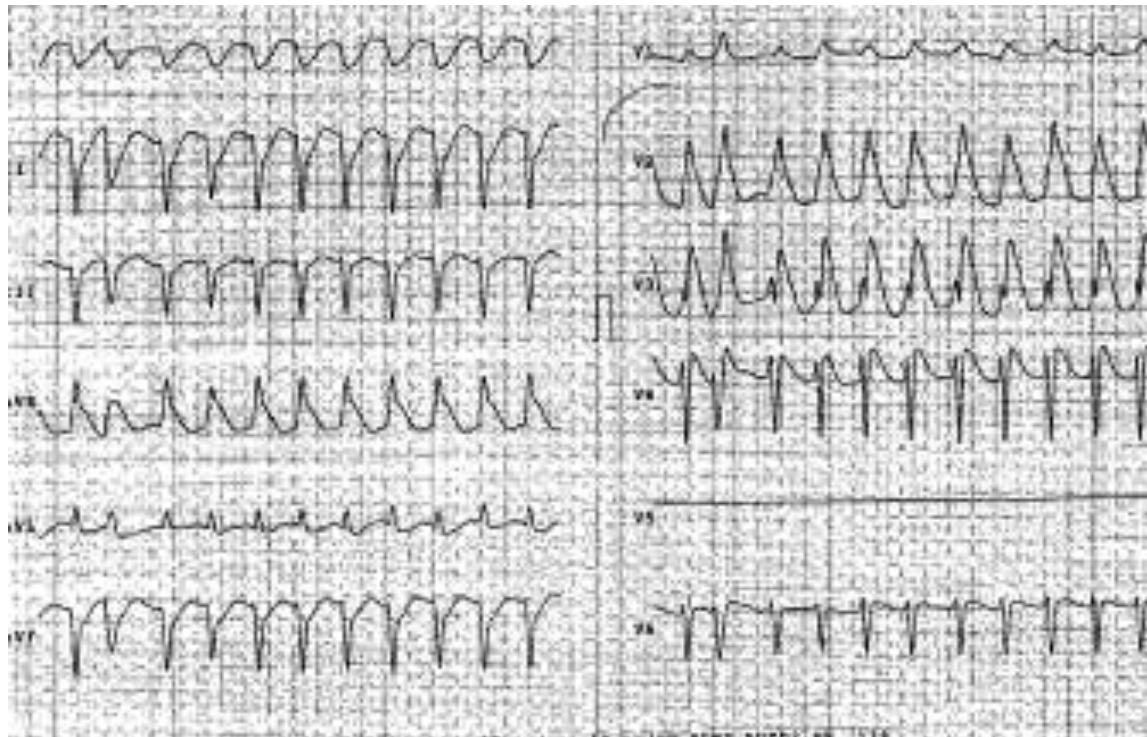


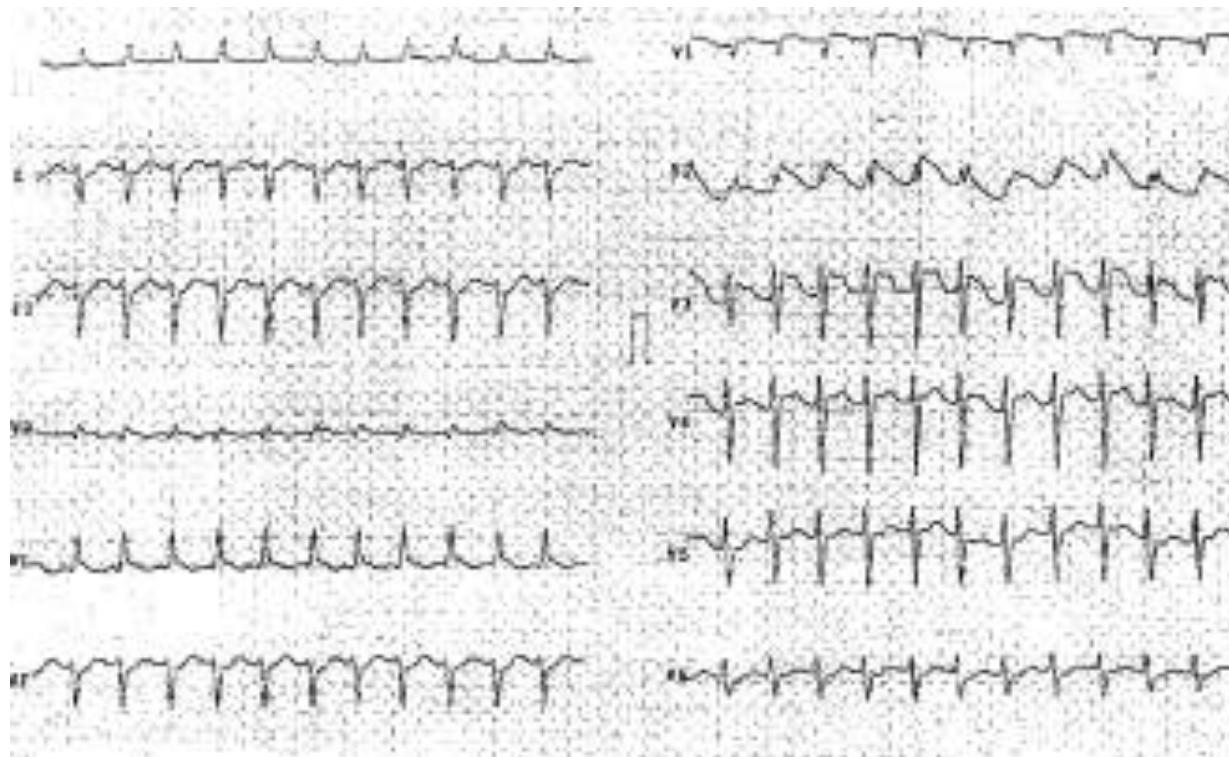
## Case 2

- 55 y
- Palpitations, cough, sputum, fever (39,3 c)
- Weakness, fainting
- ER admit
- TA 70/40 mmHg
- Pneumonia
- No structural heart disease

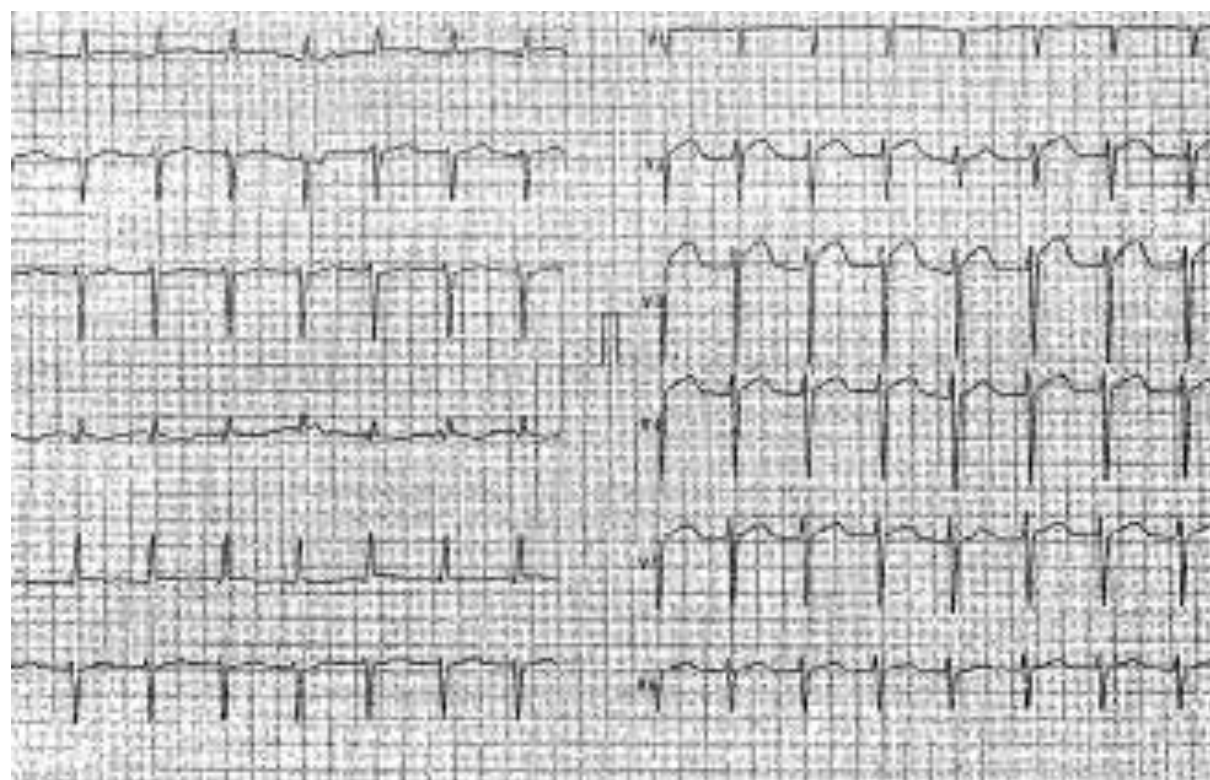


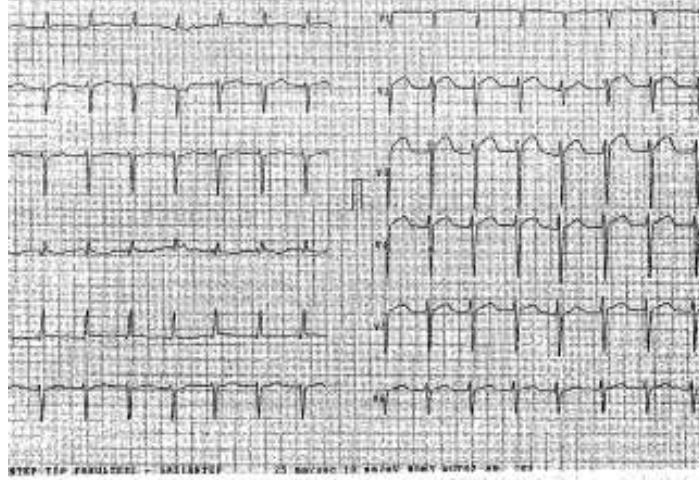
## IV antipyretic, [cold application](#)



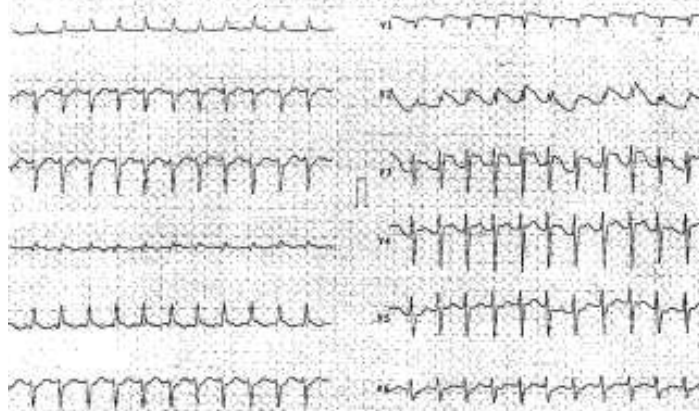




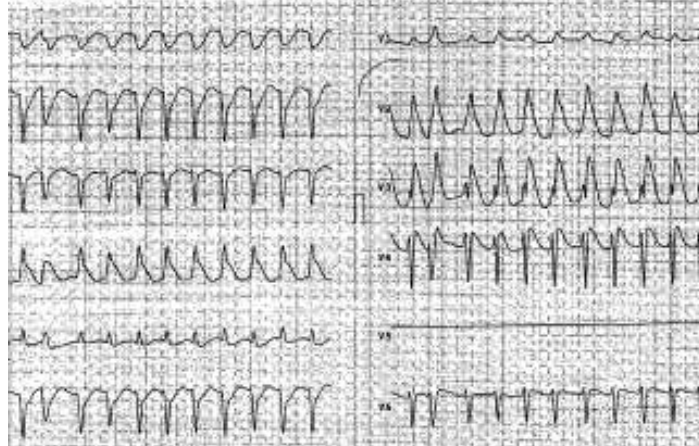




PAPER 100 PARALLEL - CALIBER 25 mm/sec 20 mV/10 mm/5 sec



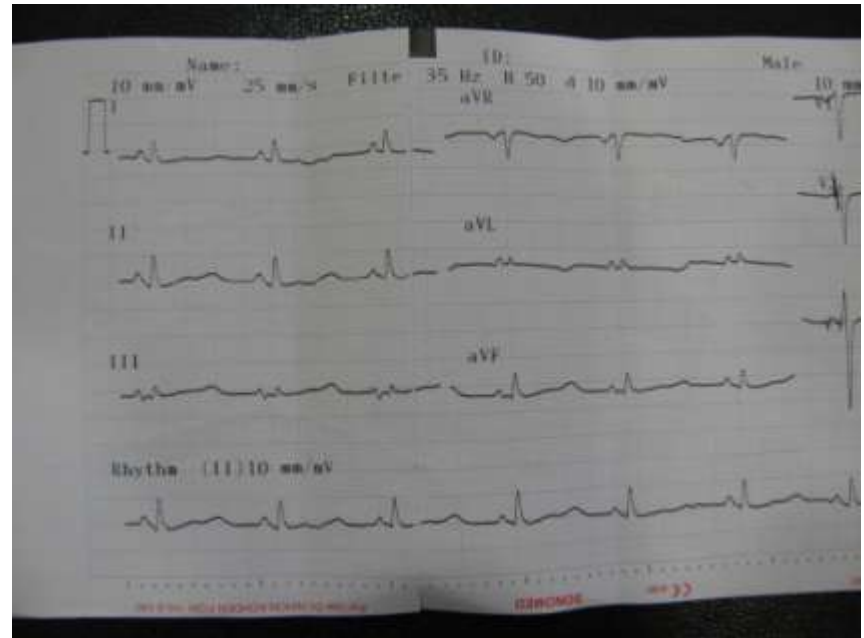
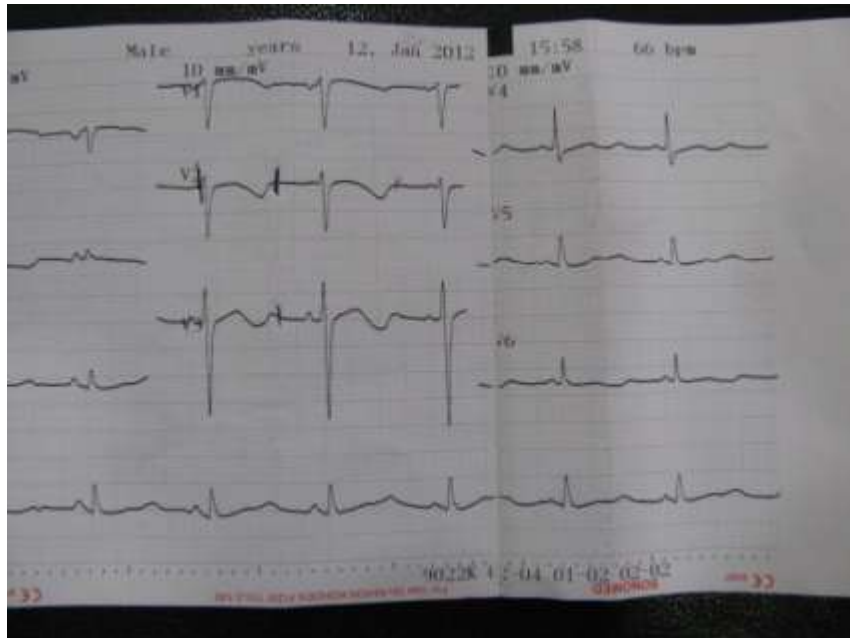
PAPER 100 PARALLEL - CALIBER 25 mm/sec 20 mV/10 mm/5 sec

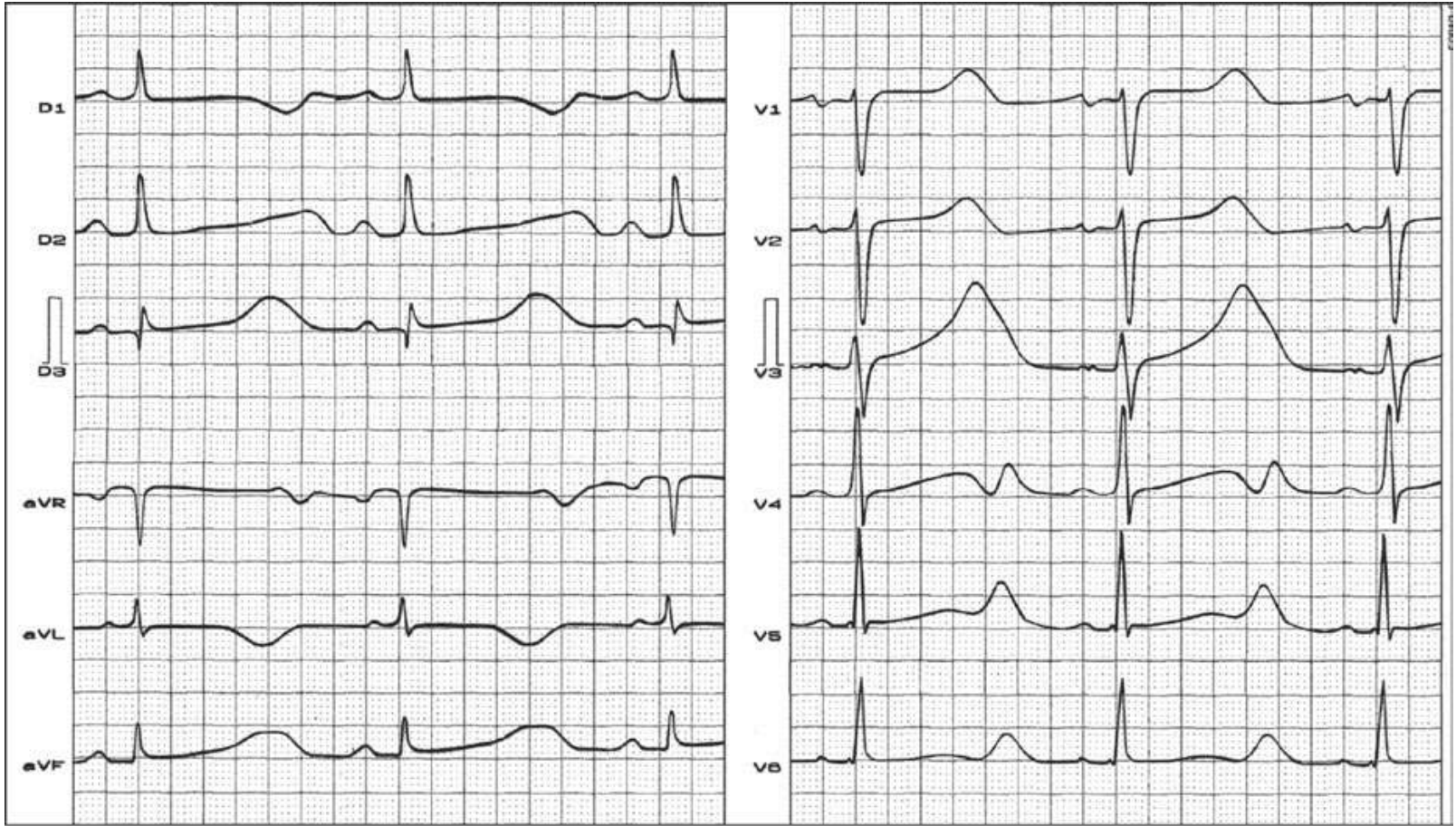


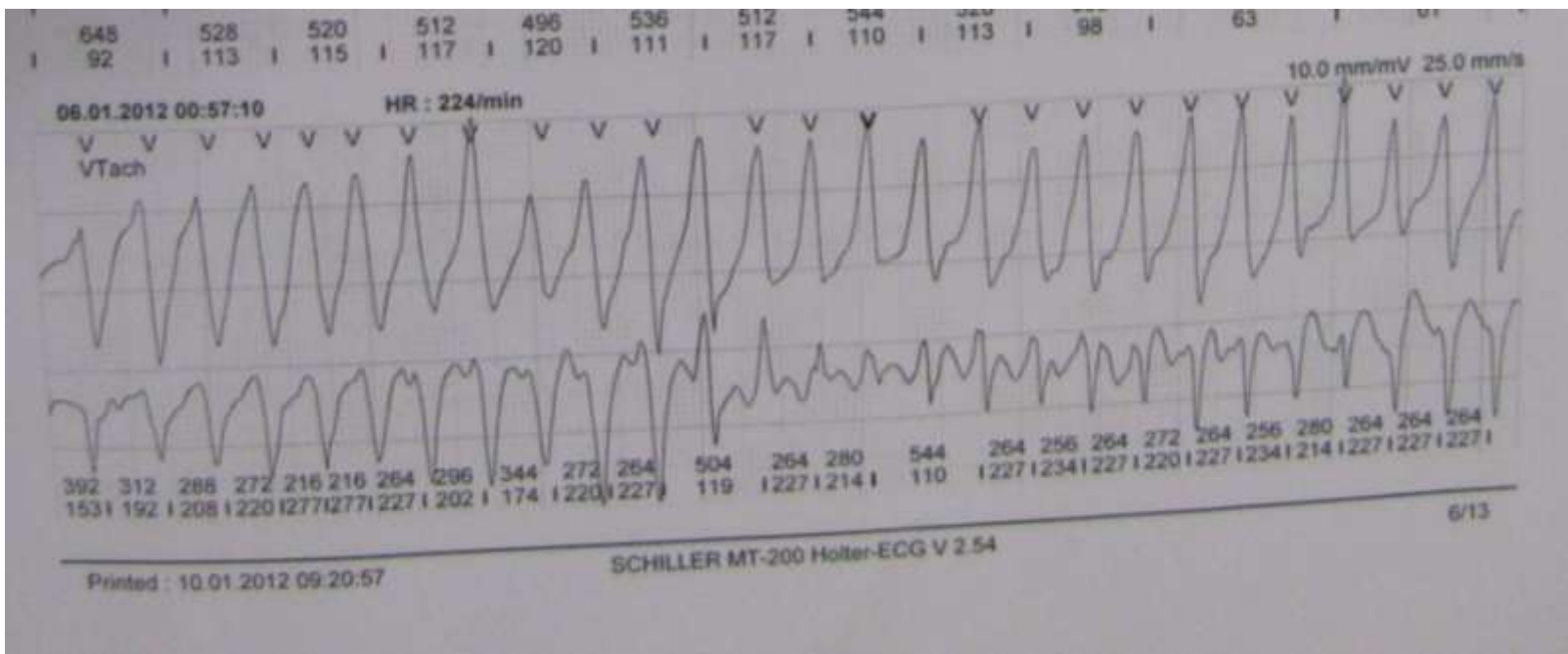
# Case 3

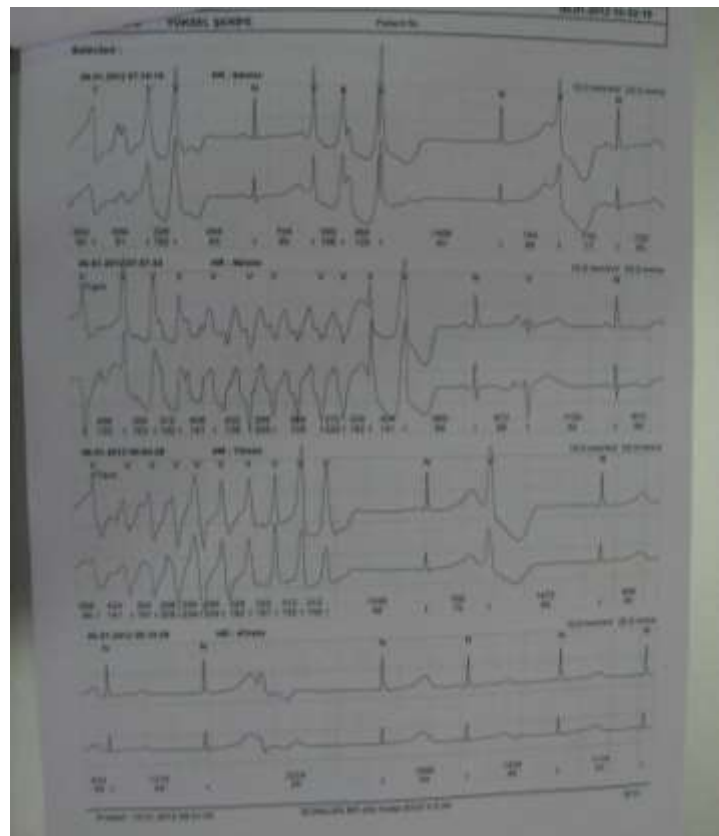
- 66 y female, sudden loss of consciousness one hour before
- ER everything is normal, TA 120/70  
Nb:60/pm
- Clonic tonic movements when she had syncope
- Neurology , starts anticonvulsant medications
- But she is still has syncope

# Syncope etiology?









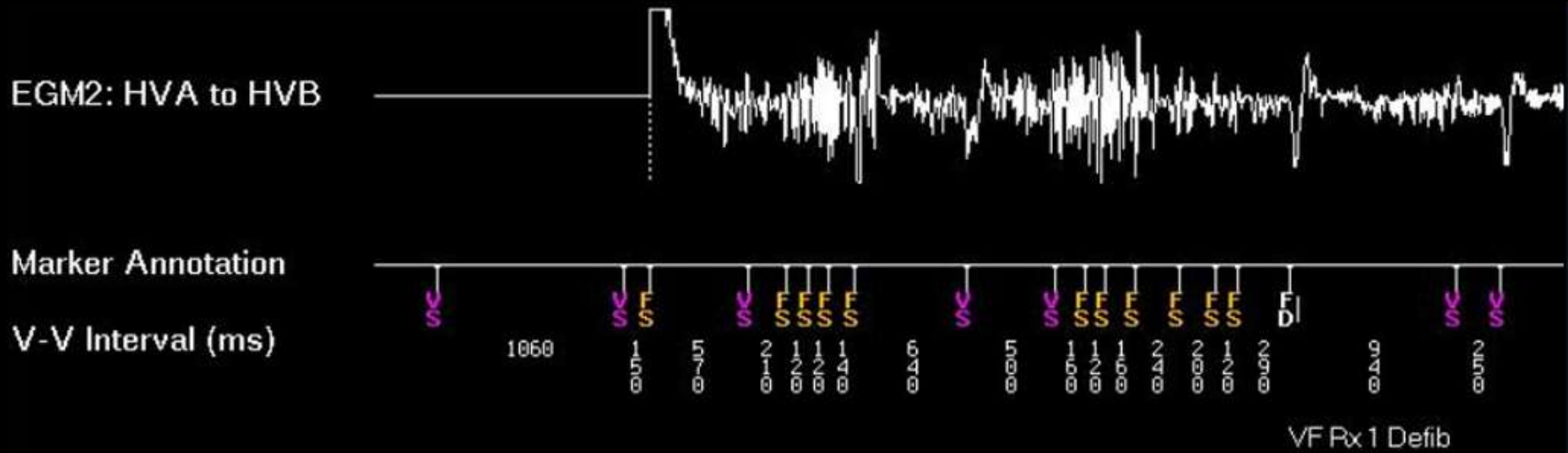
# ICD implantasyonu



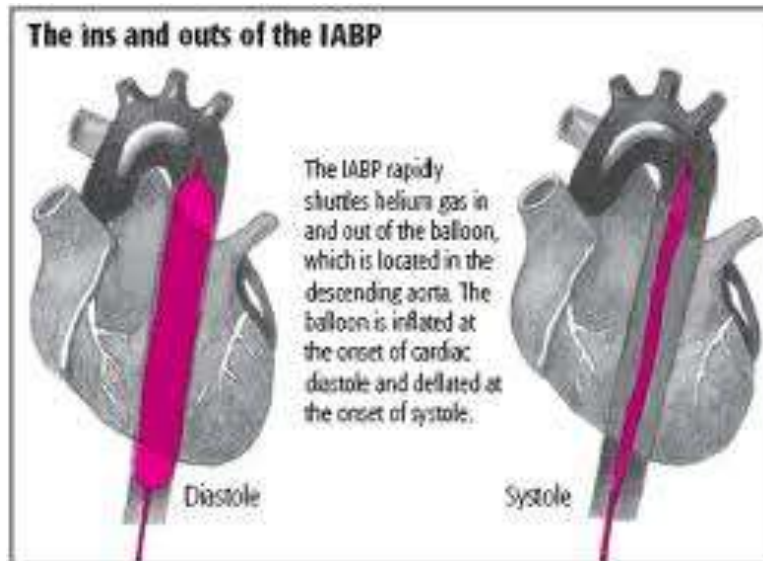


Moreover, in patients with heart problems, **syncope** may be a warning sign that sudden cardiac arrest is about to occur.

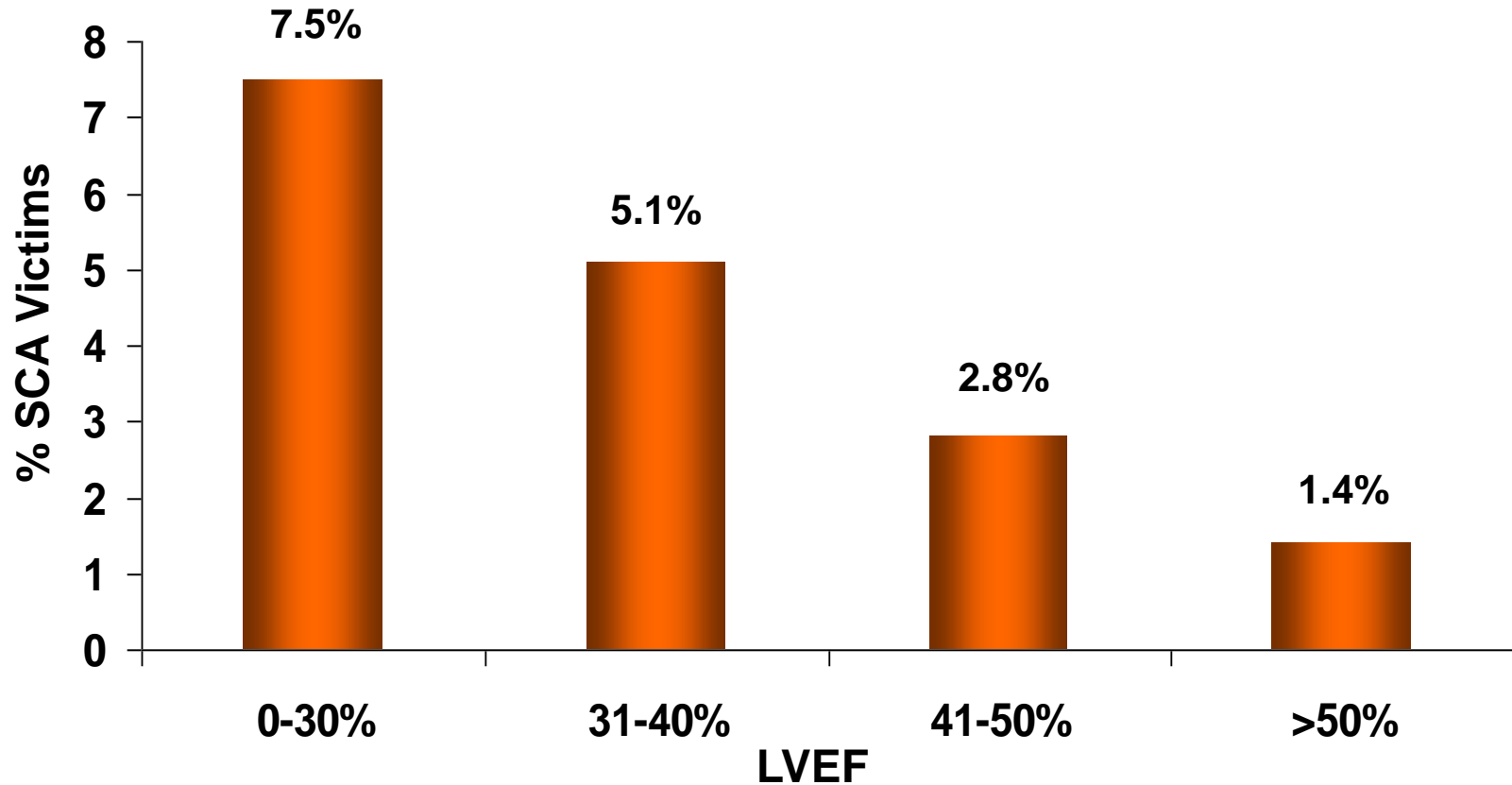
# ICD yanlış şok



# Intraaortik balon



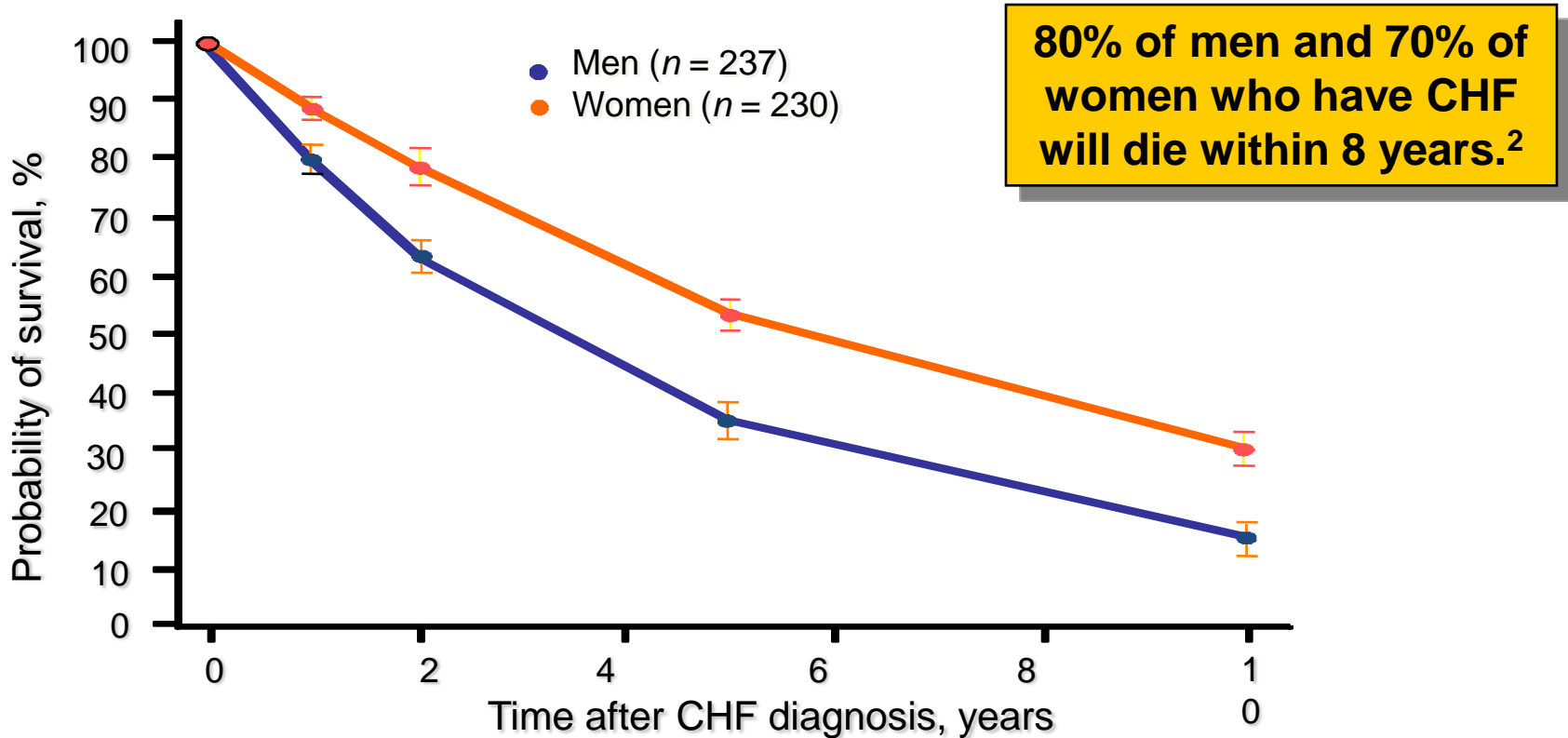
# LVEF and SCA Incidence



In people diagnosed with CHF,  
sudden cardiac death occurs at  
**6-9 times**  
the rate of the general population.<sup>1</sup>

<sup>1</sup> American Heart Association. *Heart and Stroke Statistical –2003 Update*. Dallas, Tex.: American Heart Association: 2002.

# CHF Patients Survival Results<sup>1</sup>



1 Framingham Heart Study (1948 – 1988) in Atlas of Heart Diseases.

2 American Heart Association. *Heart Disease and Stroke Statistics—2003 Update*.

# VA Associated With Cardiomyopathies

---

## Risk Factors for Sudden Cardiac Death in Hypertrophic Cardiomyopathy

### Major Risk Factors

Cardiac arrest (VF)  
Spontaneous sustained VT  
Family history of premature sudden death  
Unexplained syncope  
LV thickness greater than or equal to 30 mm  
Abnormal exercise BP  
Nonsustained spontaneous

### Possible in Individual Patients

AF  
Myocardial ischemia  
LV outflow obstruction  
High-risk mutation  
Intense (competitive) physical exertion

# Sudden Cardiac Death (SCD): Differential Diagnosis

## Structural/Functional

- 1) **Hypertrophic Cardiomyopathy (HCM)\***
- 2) Coronary Artery Anomalies
- 3) **Aortic Rupture/Marfan\***
- 4) **Dilated Cardiomyopathy\***
- 5) Myocarditis
- 6) Left Ventricular Outflow Tract Obstruction
- 7) Mitral Valve Prolapse (MVP)
- 8) **Coronary Artery Atherosclerotic Disease\***
- 9) **Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)\***

## Electrical

- 10) **Long QT Syndrome (LQTS)\***
- 11) Wolff-Parkinson-White Syndrome (WPW)
- 12) **Brugada Syndrome\***
- 13) **Catecholaminergic Ventricular Tachycardia\***
- 14) **Short QT Syndrome \***
- 15) Post-operative Congenital Heart Disease

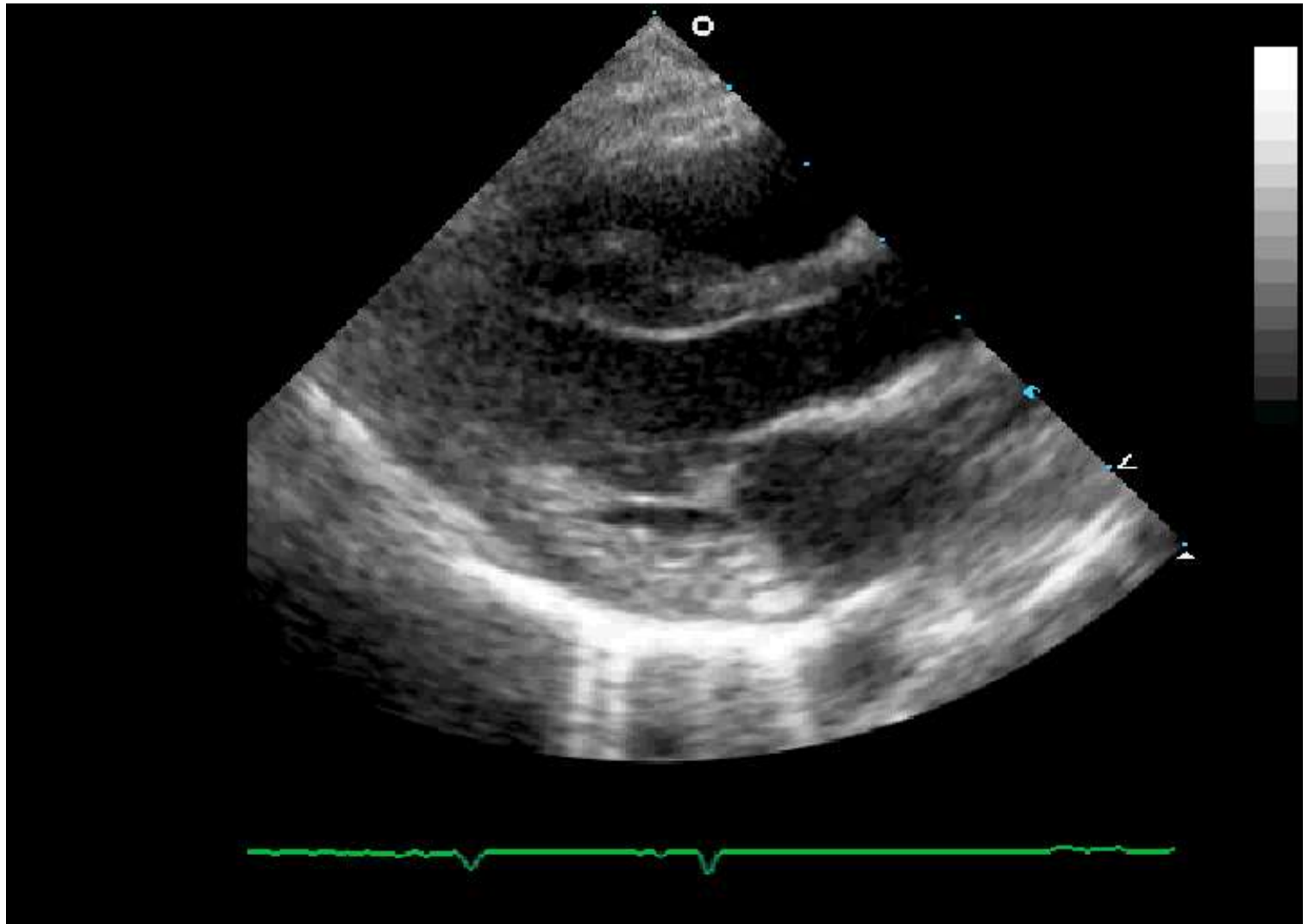
## Other

- 16) Drugs and Stimulants
- 17) **Primary Pulmonary Hypertension\***
- 18) Commotio Cordis

\* **Genetic/Familial**



# Normal Echocardiogram

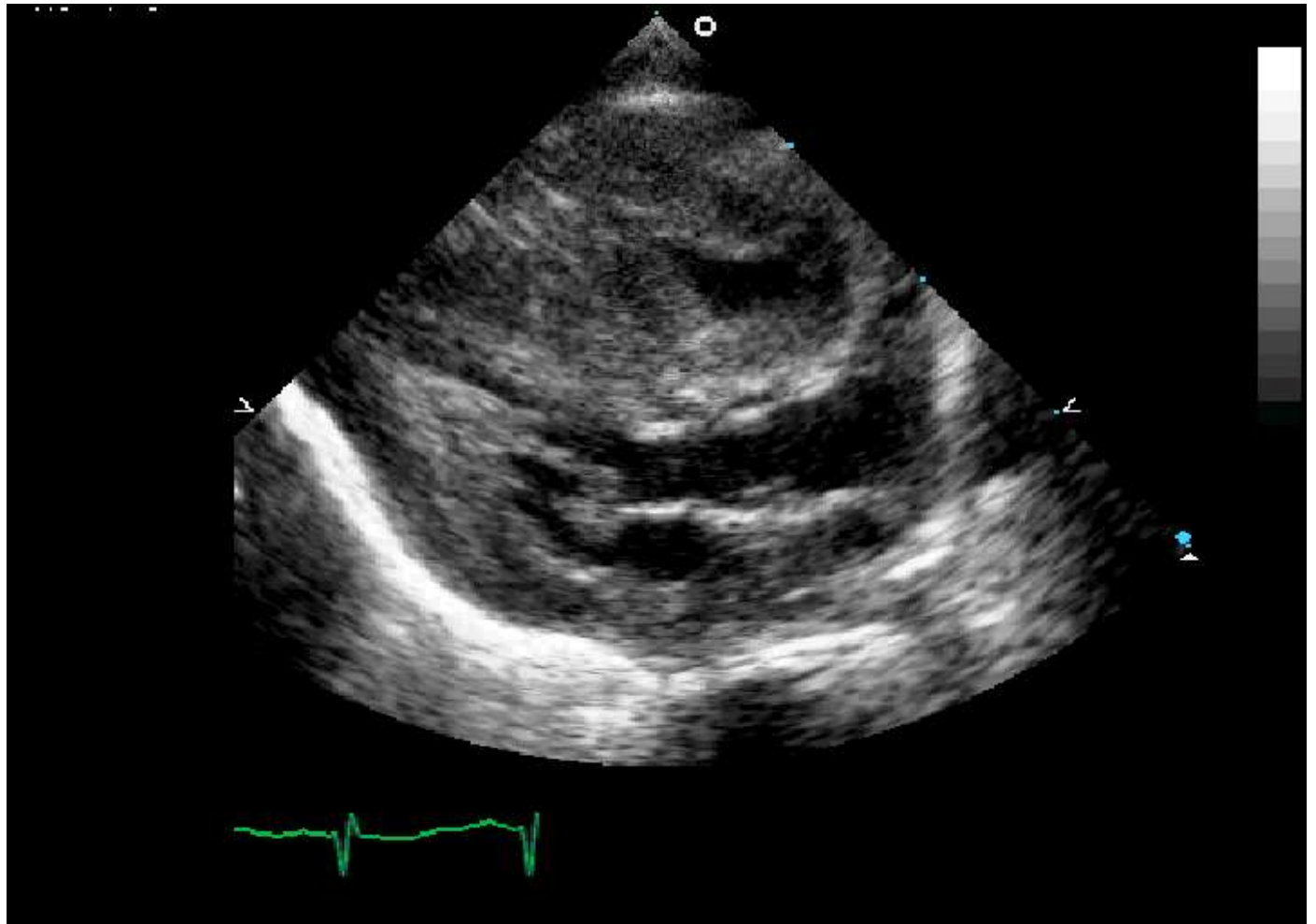


# SCD Differential Diagnosis:

## Structural/Functional

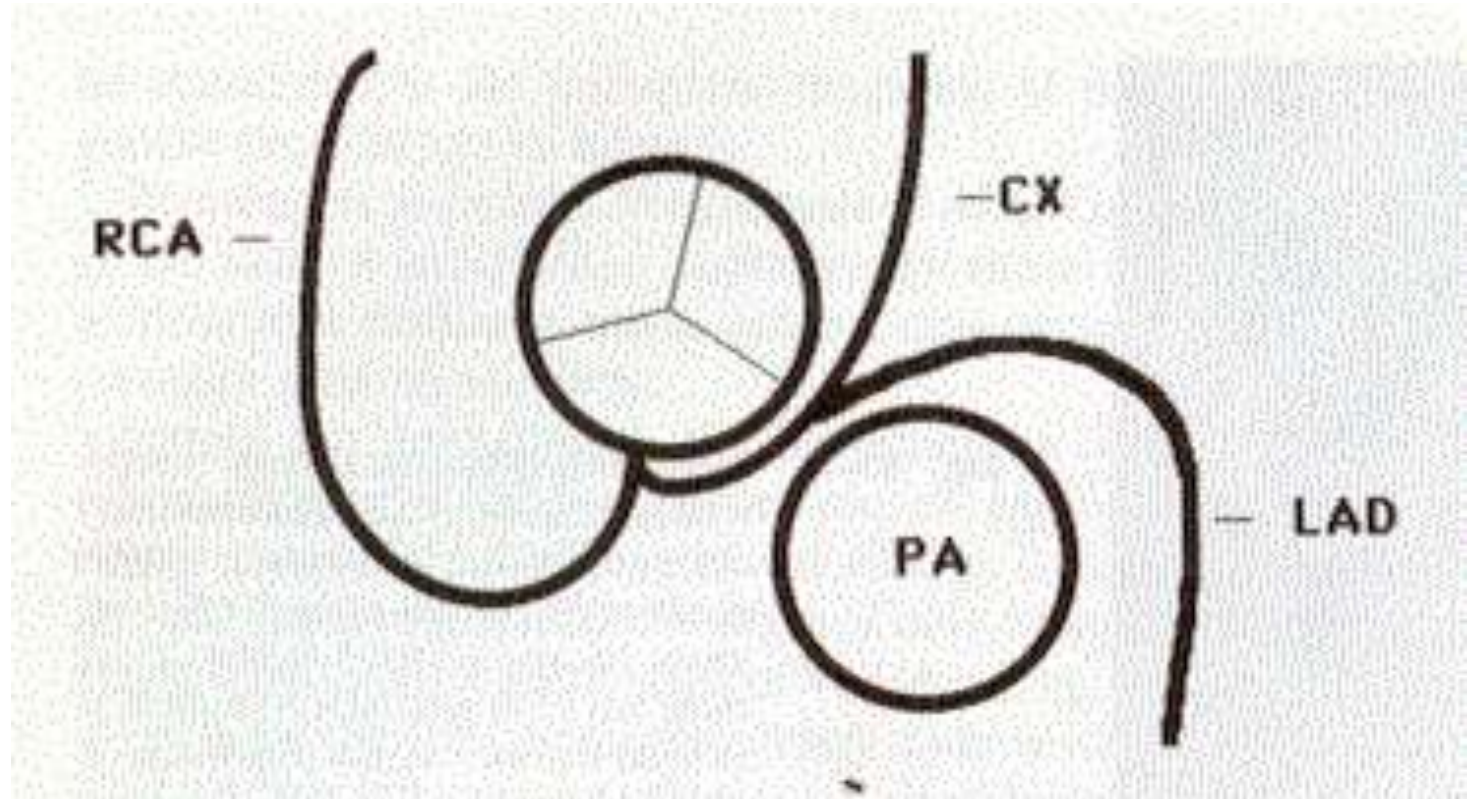
### 1) Hypertrophic Cardiomyopathy:

Thickening of the heart muscle



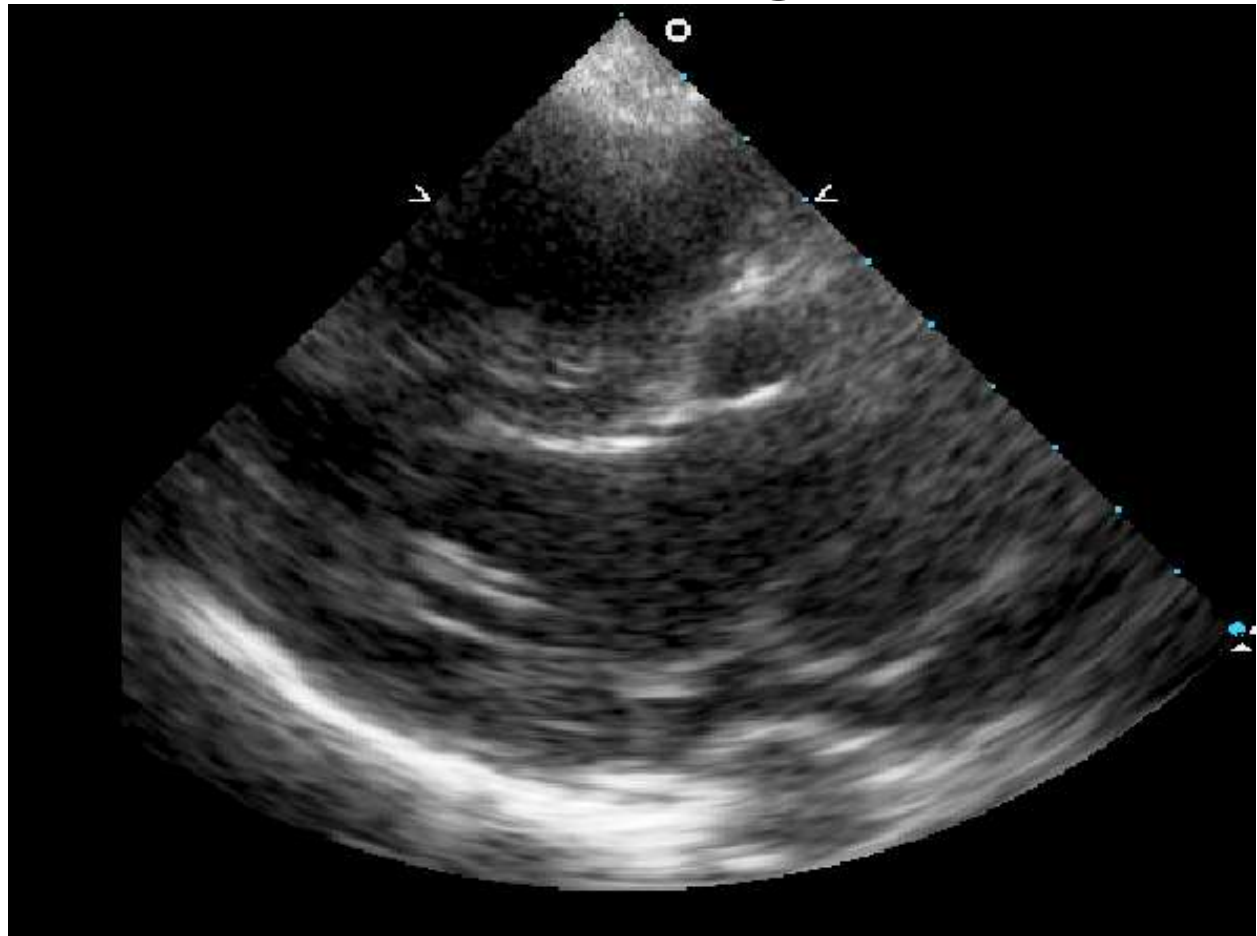
# SCD Differential Diagnosis: Structural/Functional

## 2) Coronary Artery Anomalies: Congenital or Acquired



# SCD Differential Diagnosis: Structural/Functional

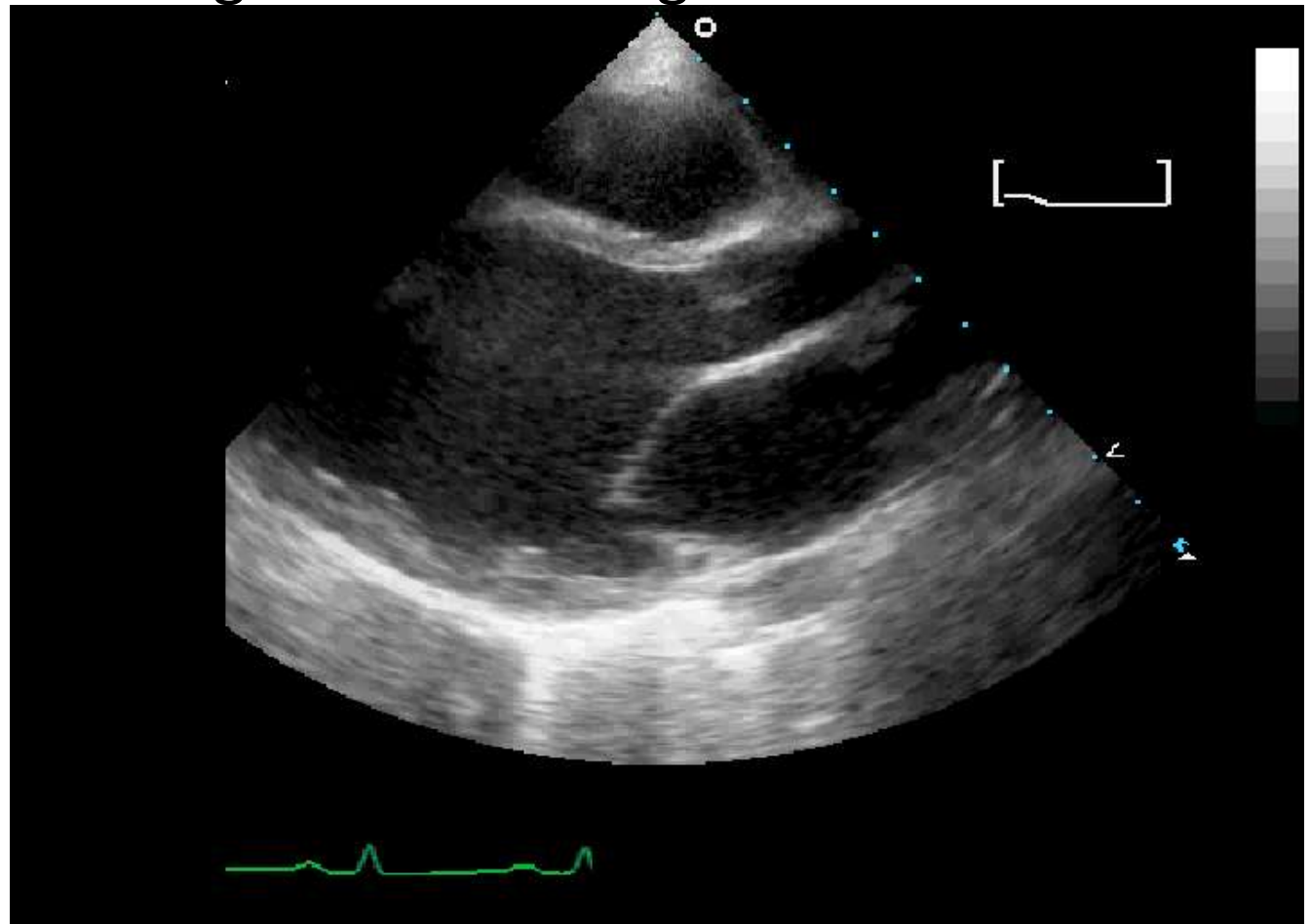
**3) Aortic Rupture/Marfan:**  
Dilatation and thinning of the aorta



# SCD Differential Diagnosis: Structural/Functional

## 4) Dilated Cardiomyopathy:

Thinning and weakening of the heart muscle



# SCD Differential Diagnosis: Structural/Functional

- 5) **Myocarditis**: Inflammation of the heart muscle
- 6) **Left Ventricular Outflow Tract Obstruction**:  
Blockage to the left ventricular outflow
- 7) **Mitral Valve Prolapse (MVP)**: Redundancy of mitral valve
- 8) **Coronary Artery Atherosclerotic Disease**:  
Coronary artery plaque and obstruction
- 9) **Arrhythmogenic Right Ventricular  
Cardiomyopathy (ARVC)**: Fatty infiltration of the right ventricular muscle

# SCD Differential Diagnosis: Primary Electrical

- 10) Long QT Syndrome (LQTS):** Abnormal electrical reactivation (repolarization)
- 11) Wolff-Parkinson-White Syndrome (WPW):** Accessory pathway connecting the upper to lower heart chambers
- 12) Brugada Syndrome:** Ventricular fibrillation 3<sup>rd</sup> or 4<sup>th</sup> decades; rare in children
- 13) Catecholaminergic Ventricular Tachycardia:** Exercise induced tachycardia
- 14) Short QT Syndrome:** Abnormal electrical reactivation (repolarization)

# SCD Differential Diagnosis

## Primary Electrical:

### 15) Post Operative Congenital Heart Disease:

- TGA Senning/Mustard
- Fontan repair
- LV outflow obstruction
- Others

## Other:

**16) Stimulants:** Ephedra, cocaine, etc.

**17) Primary Pulmonary Hypertension (PPH):**

Elevated blood pressure in lung arteries



# SCD Differential Diagnosis

## Primary Electrical:

### 15) Post Operative Congenital Heart Disease:

- TGA Senning/Mustard
- Fontan repair
- LV outflow obstruction
- Others

## Other:

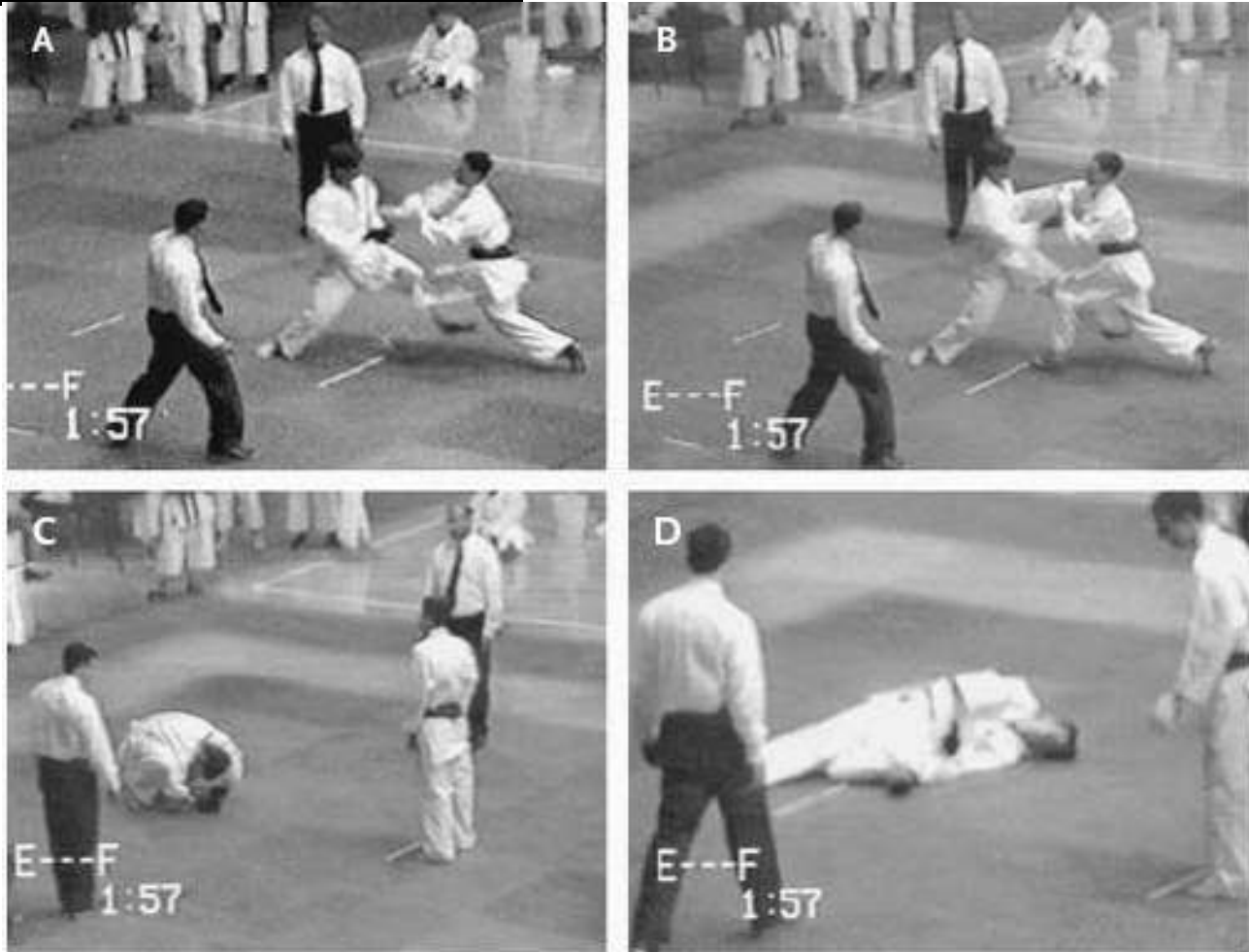
**16) Stimulants:** Ephedra, cocaine, etc.

### **17) Primary Pulmonary Hypertension (PPH):**

Elevated blood pressure in lung arteries

# SCD Differential Diagnosis: Other

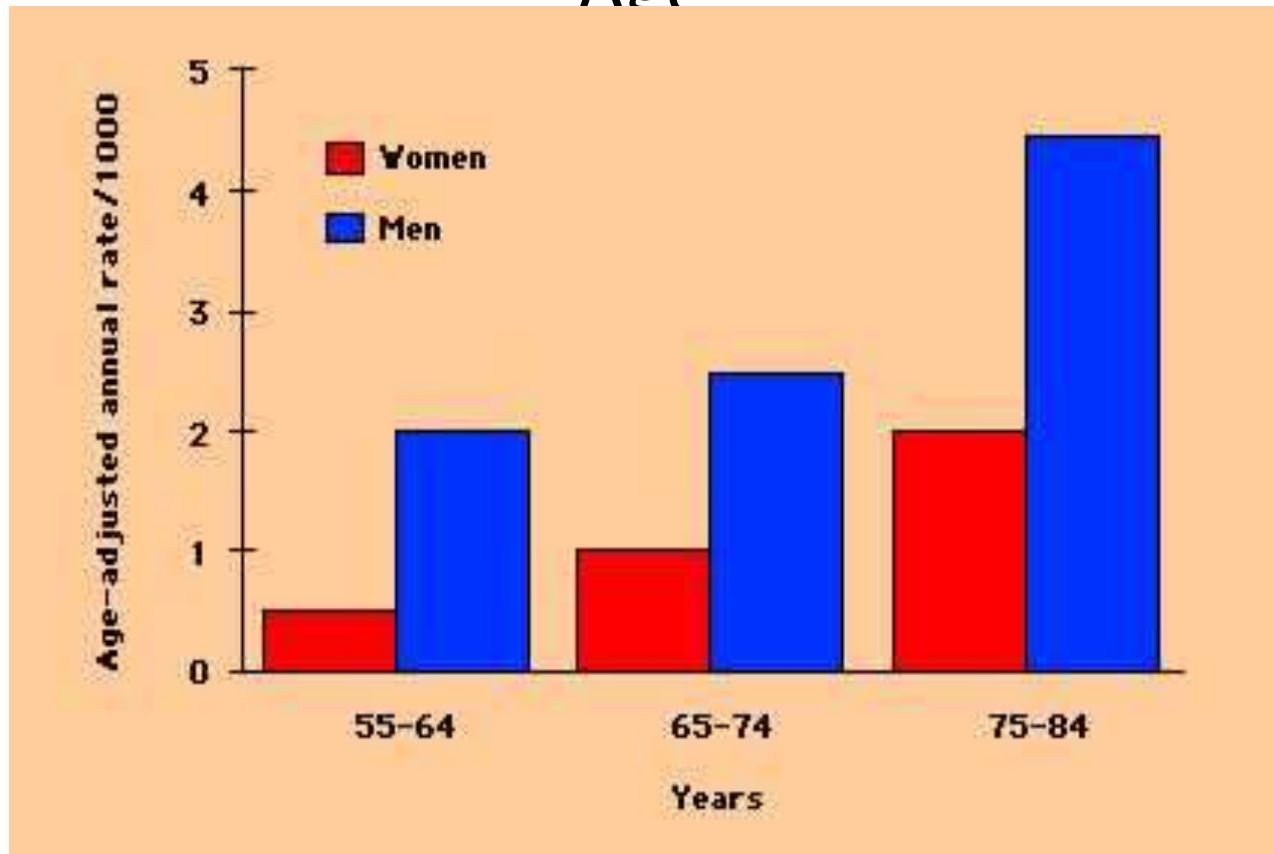
## 18) Commotio Cordis: Blunt blow to the chest



# ARRHYTHMIC MECHANISM OF SUDDEN CARDIAC DEATH

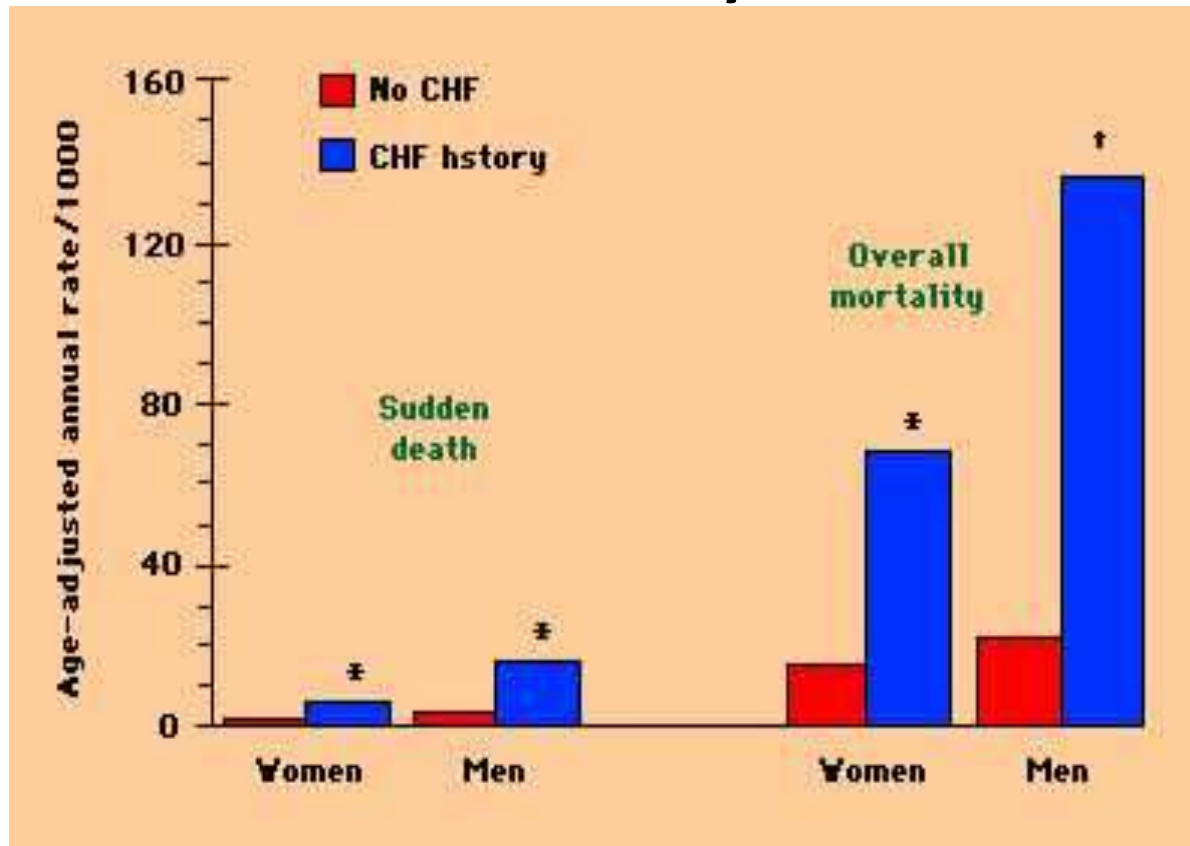
- A bradyarrhythmia or asystole is an important but less common cause of SCD, being observed in only about 10 percent of cases
- A bradyarrhythmia is more often associated with a nonischemic cardiomyopathy

# Incidence of Sudden Death Increases with Age



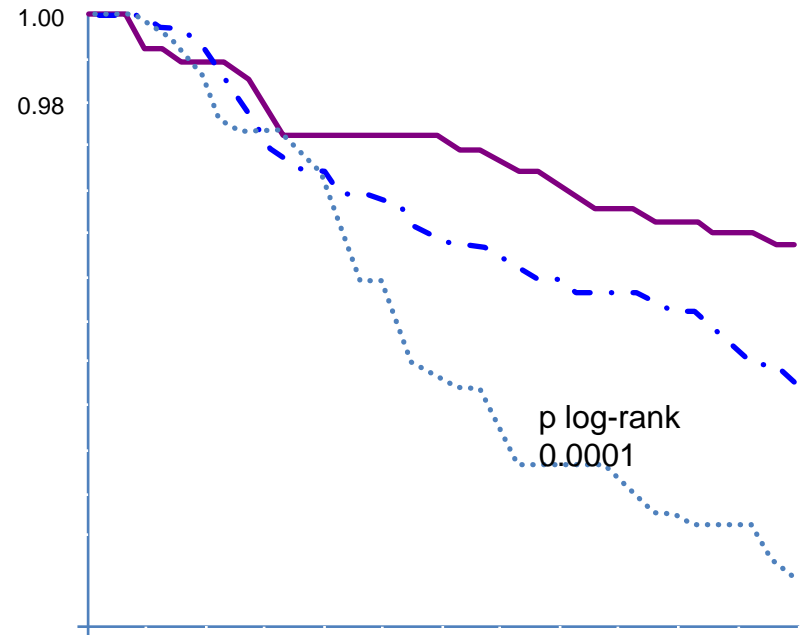
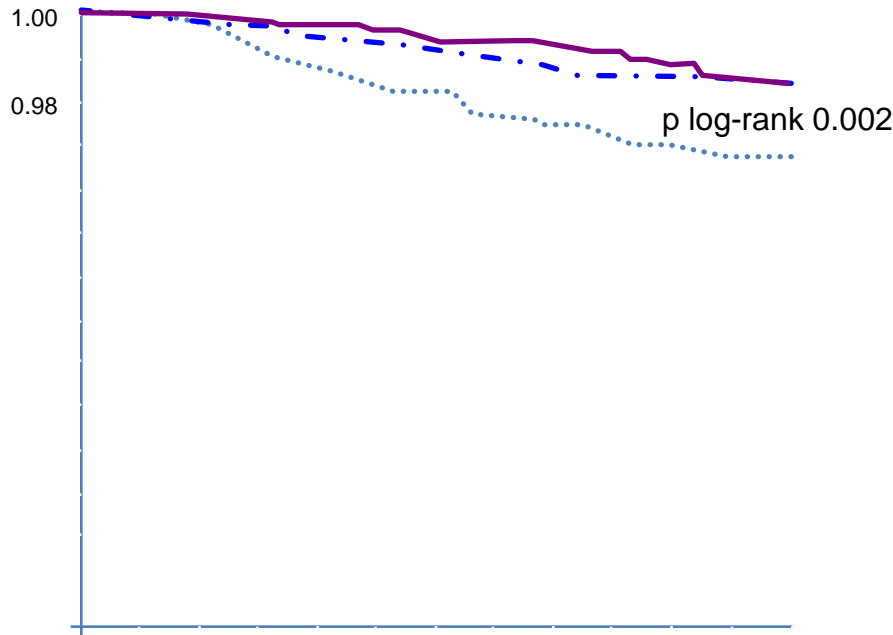
During a 38 years follow-up of subjects in the Framingham Heart Study, the annual incidence of sudden death increased with age in both men and women. However, at each age, the incidence of sudden death is higher in men than women. (Am Heart J 1998; 136:205)

# CHF Predict Increased Sudden Death and Overall Mortality



During a 38 years follow-up of subjects in the Framingham Heart Study, the presence of CHF significantly increased sudden death and overall mortality in both men and women. \*P <0.001.

# Risk of Sudden Death: Data from GISSI-2 Trial



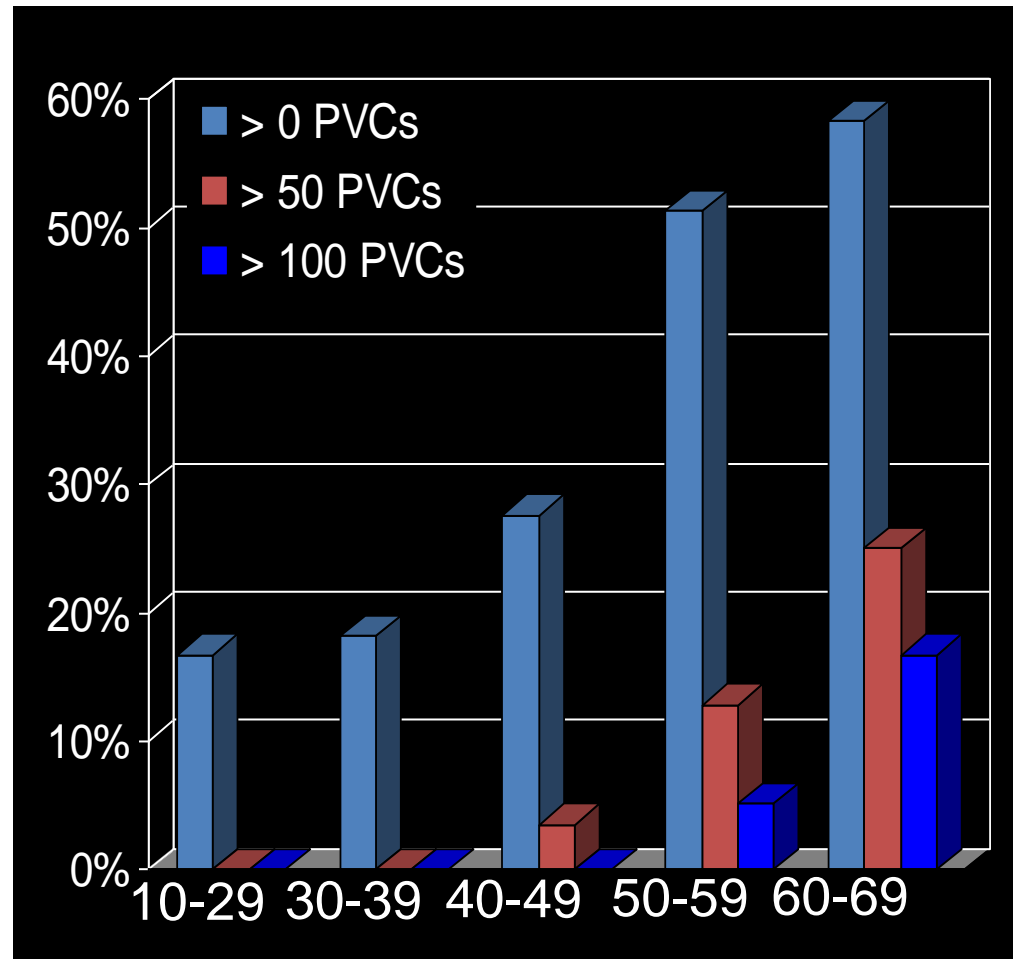
**Patients without  
LV Dysfunction**

- No PVBs
- - - 1-10 PVBs/h
- ..... > 10 PVBs/h

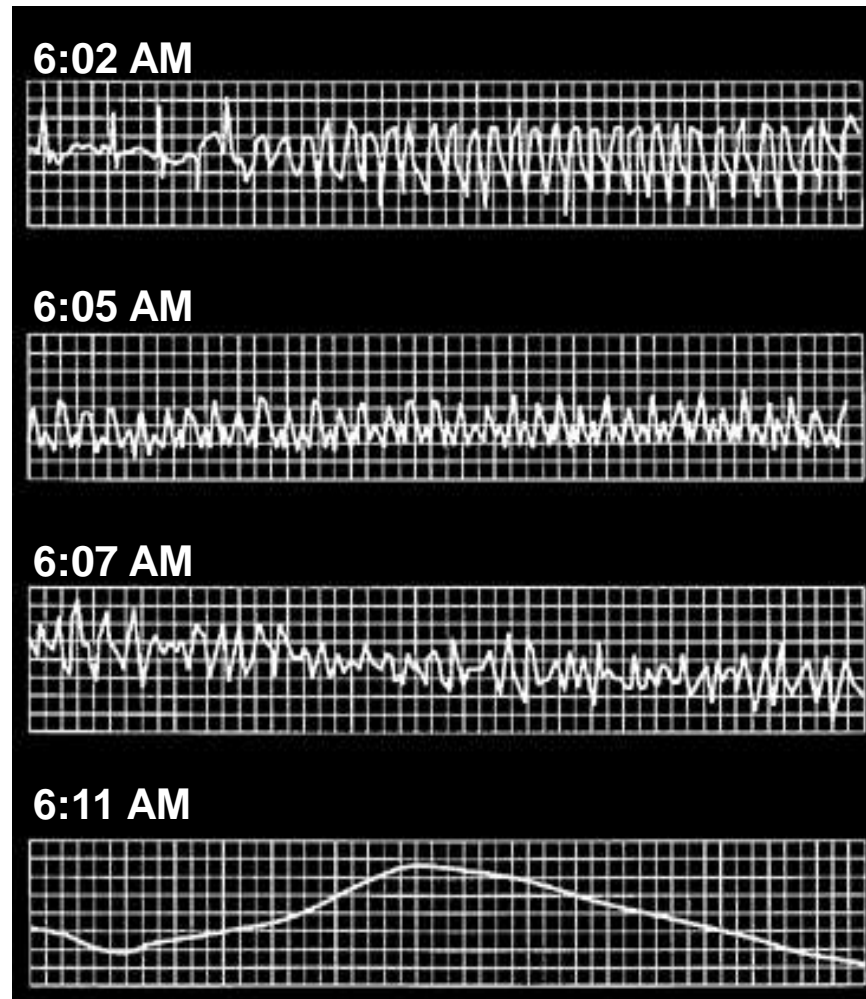
**Patients with  
LV Dysfunction**

# Variability of Ventricular Ectopy with Age

- Effect of age on probability (%) of having more than a given number of PVCs per 24 hours in subjects with normal hearts.



# Rhythm Strip During Episode of Sudden Death



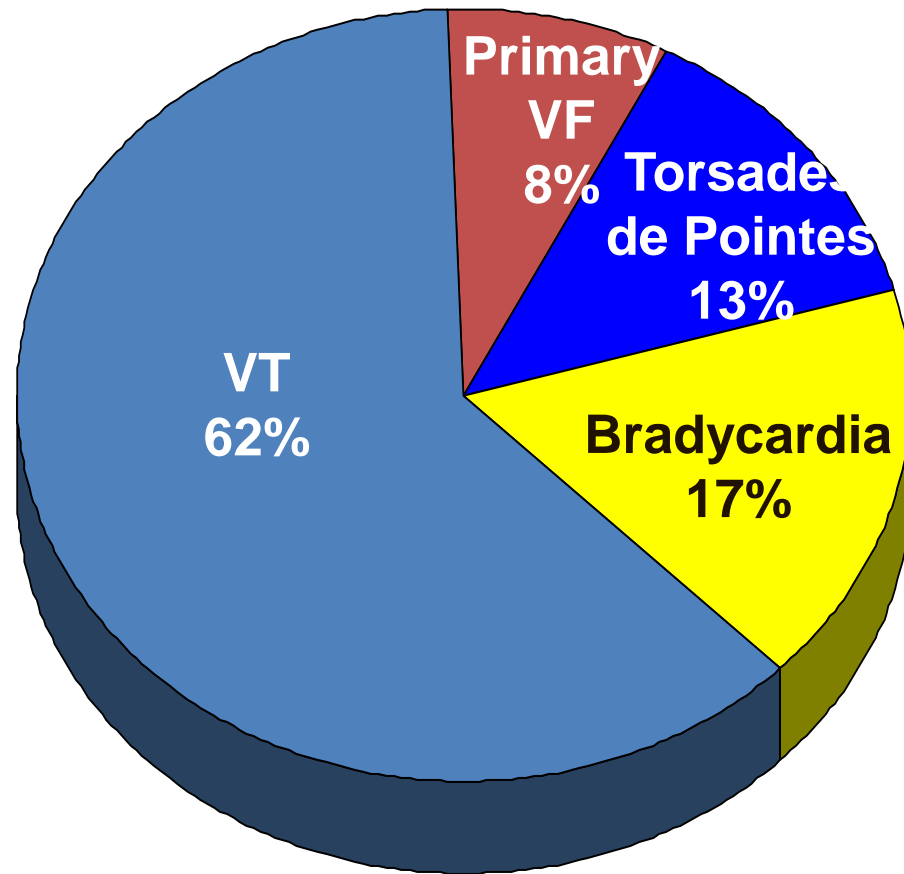
Source: After Josephson, ME



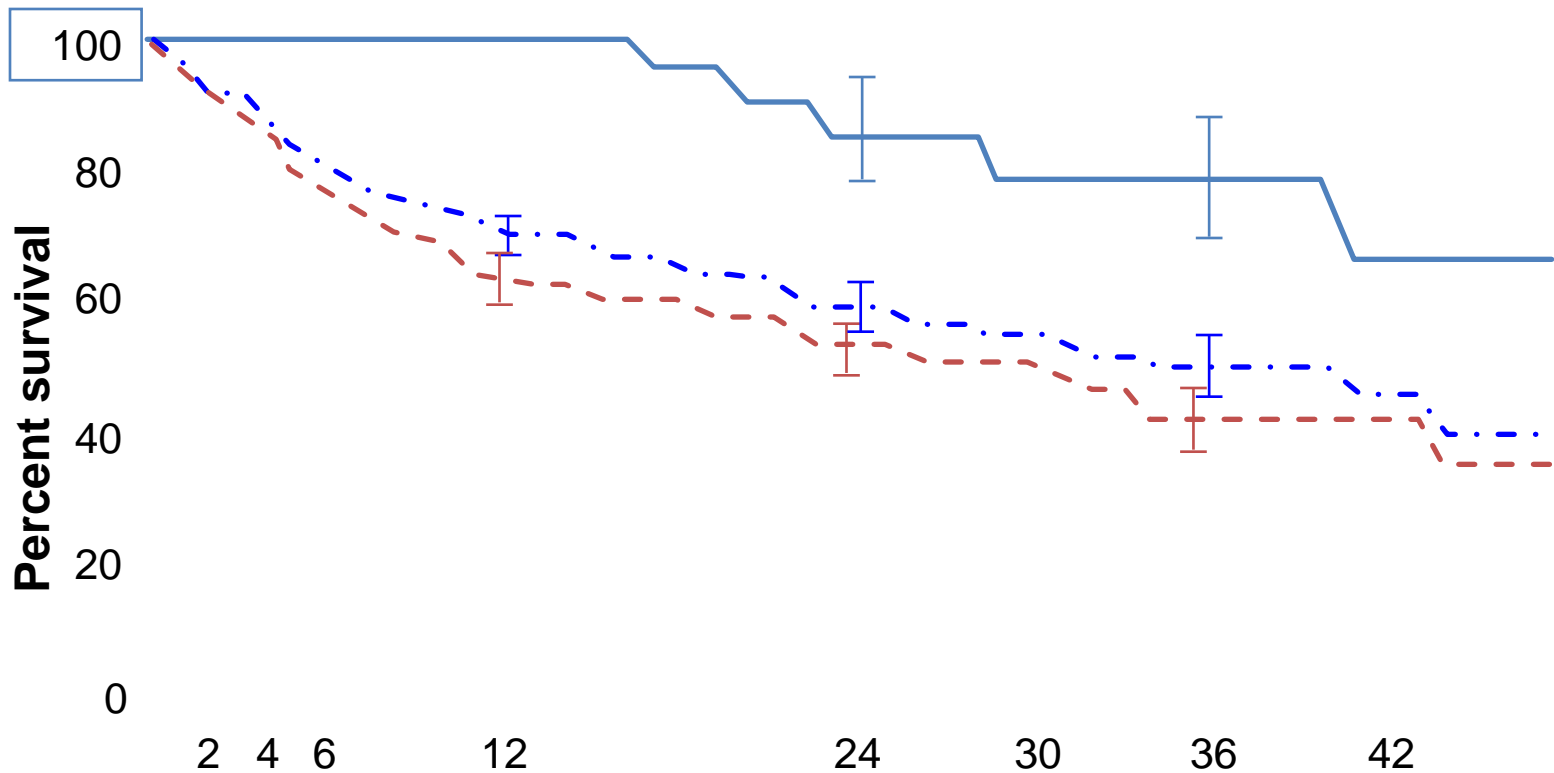
# Sudden Death Syndrome

- Incidence
  - 400,000 - 500,000/year in U.S.
  - Only 2% - 15% reach the hospital
  - Half of these die before discharge
- High recurrence rate

# Underlying Arrhythmia of Sudden Death

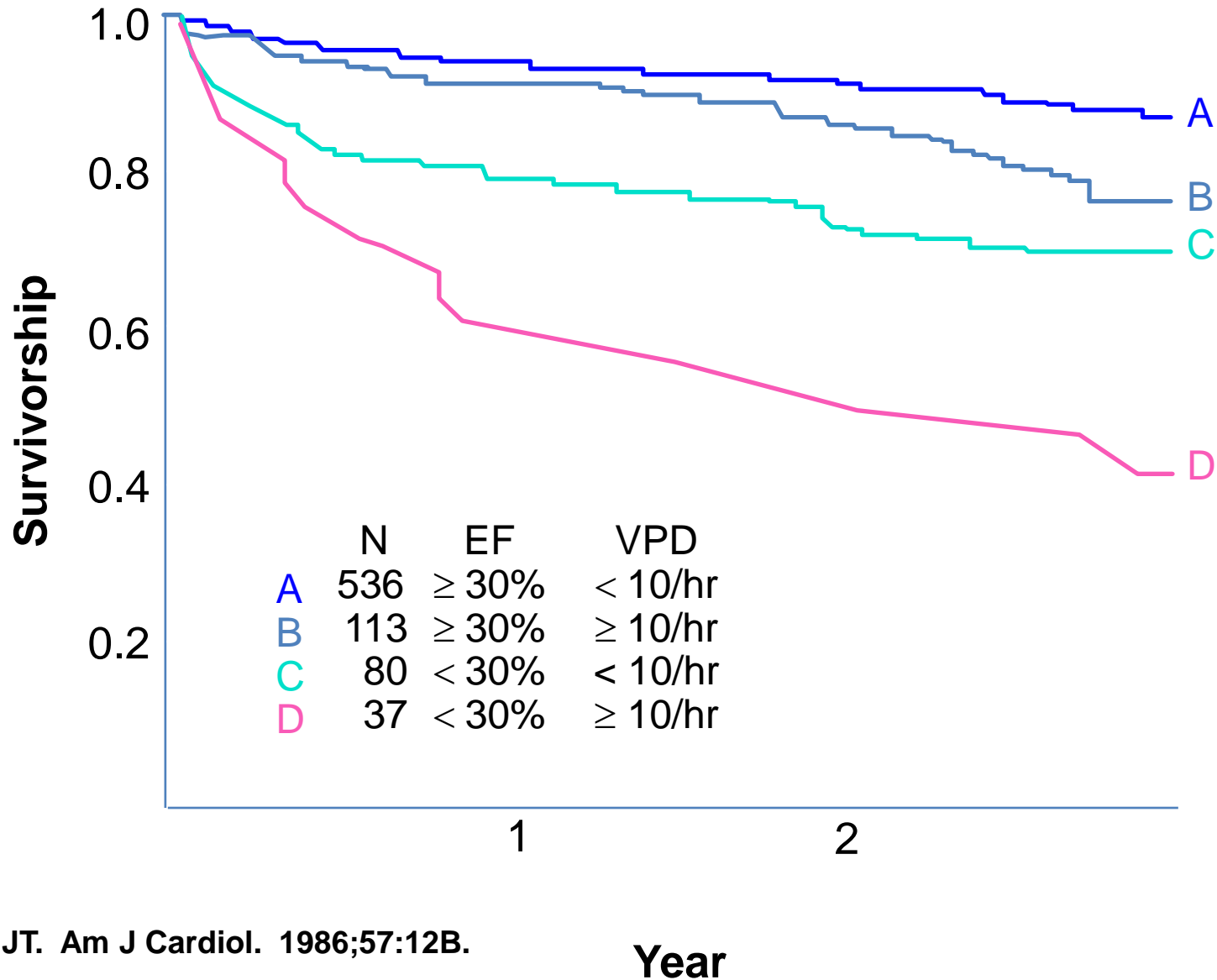


# Proportion of Sudden Death Survivors with Acute MI

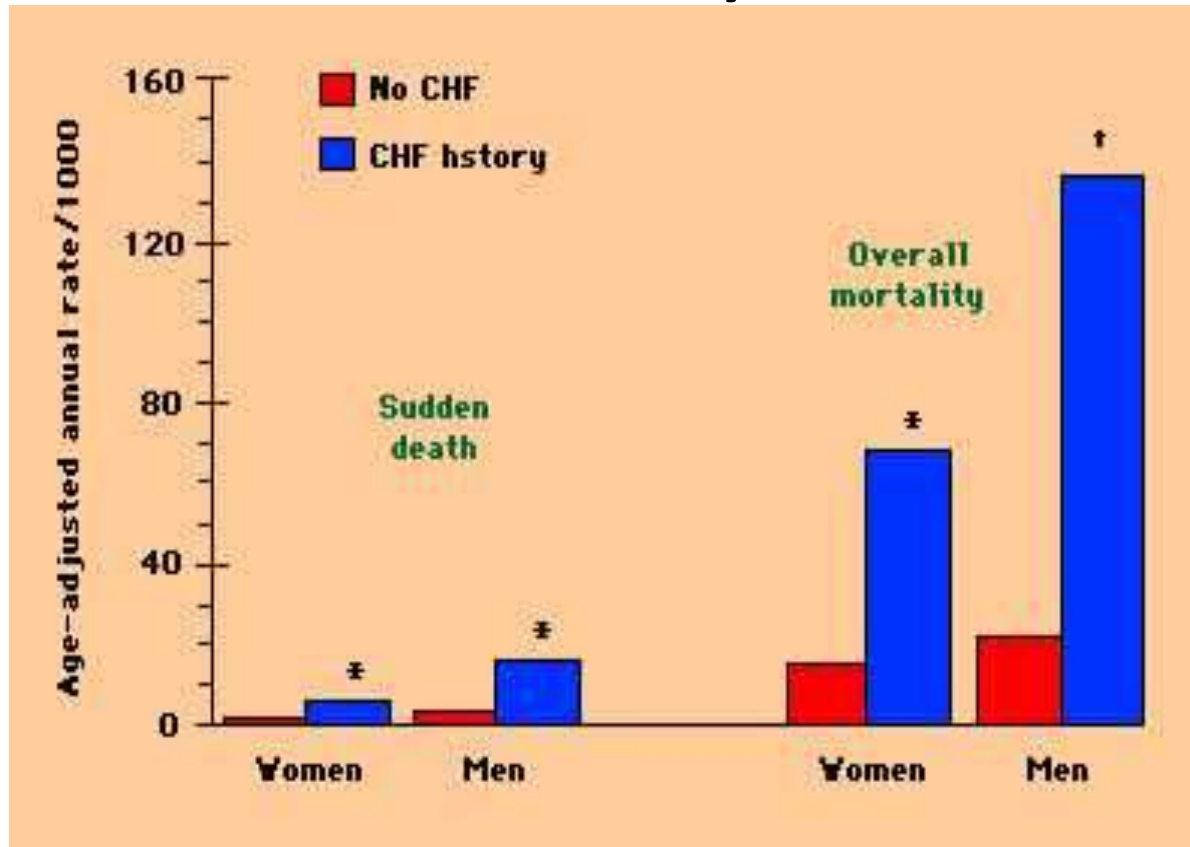


- < 20% of sudden death survivors have an acute MI
- Sudden death associated with acute MI has a better prognosis

# Survival After Acute MI

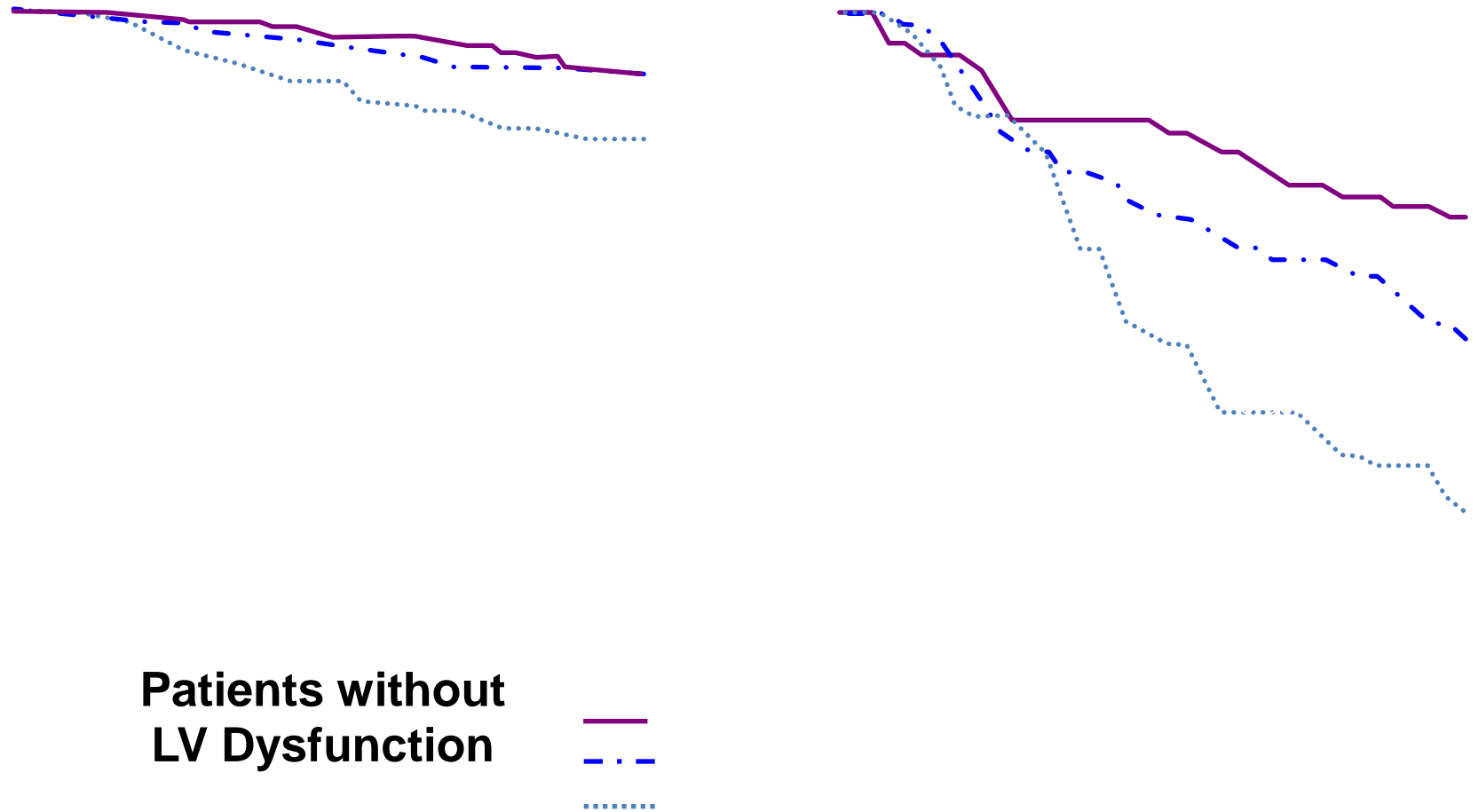


# CHF Predict Increased Sudden Death and Overall Mortality

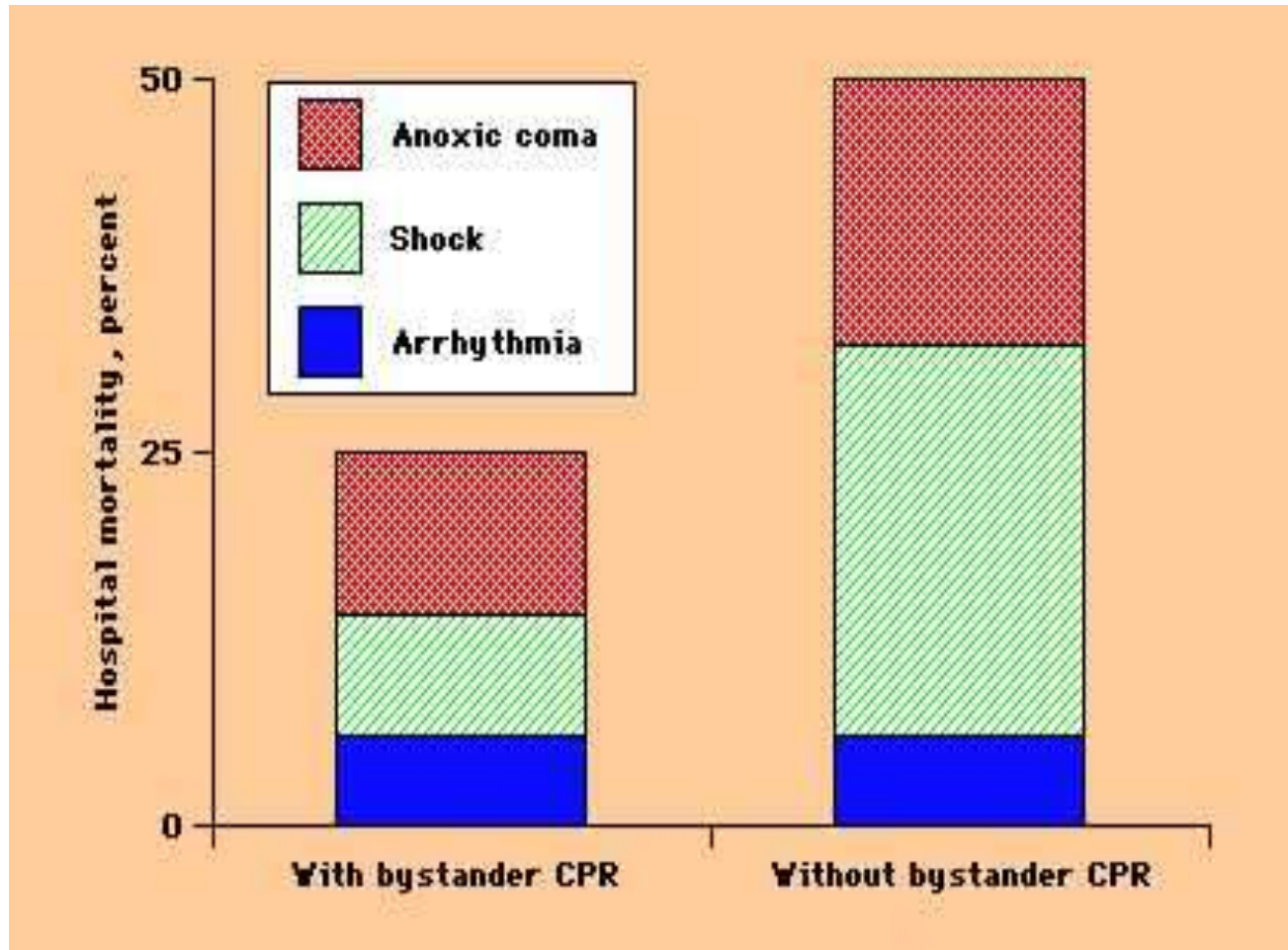


During a 38 years follow-up of subjects in the Framingham Heart Study, the presence of CHF significantly increased sudden death and overall mortality in both men and women. \*P <0.001.

# Risk of Sudden Death: Data from GISSI-2 Trial



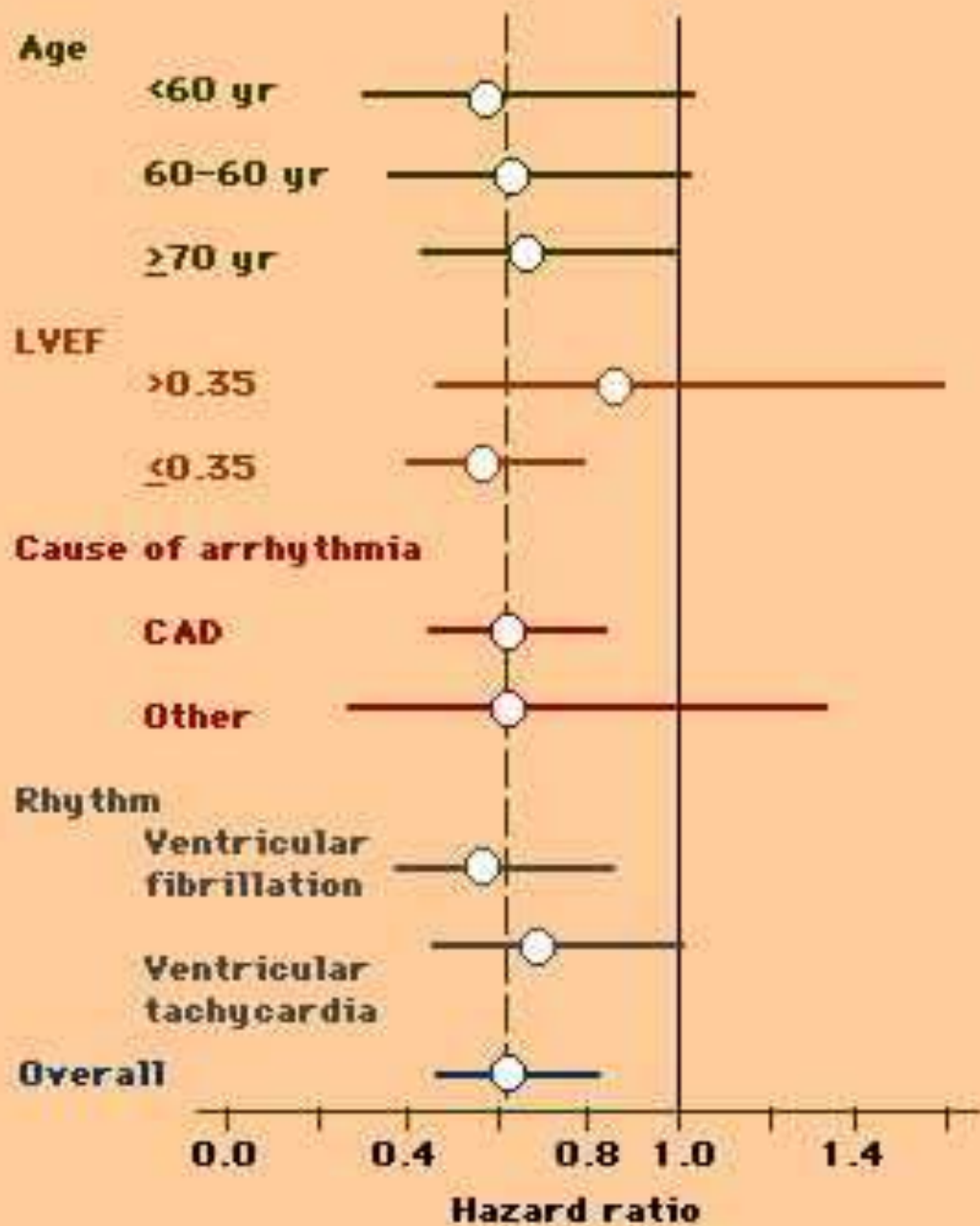
# Bystander-initiated CPR Improves Outcome



# ACUTE THERAPY FOR THE SCD VICTIM

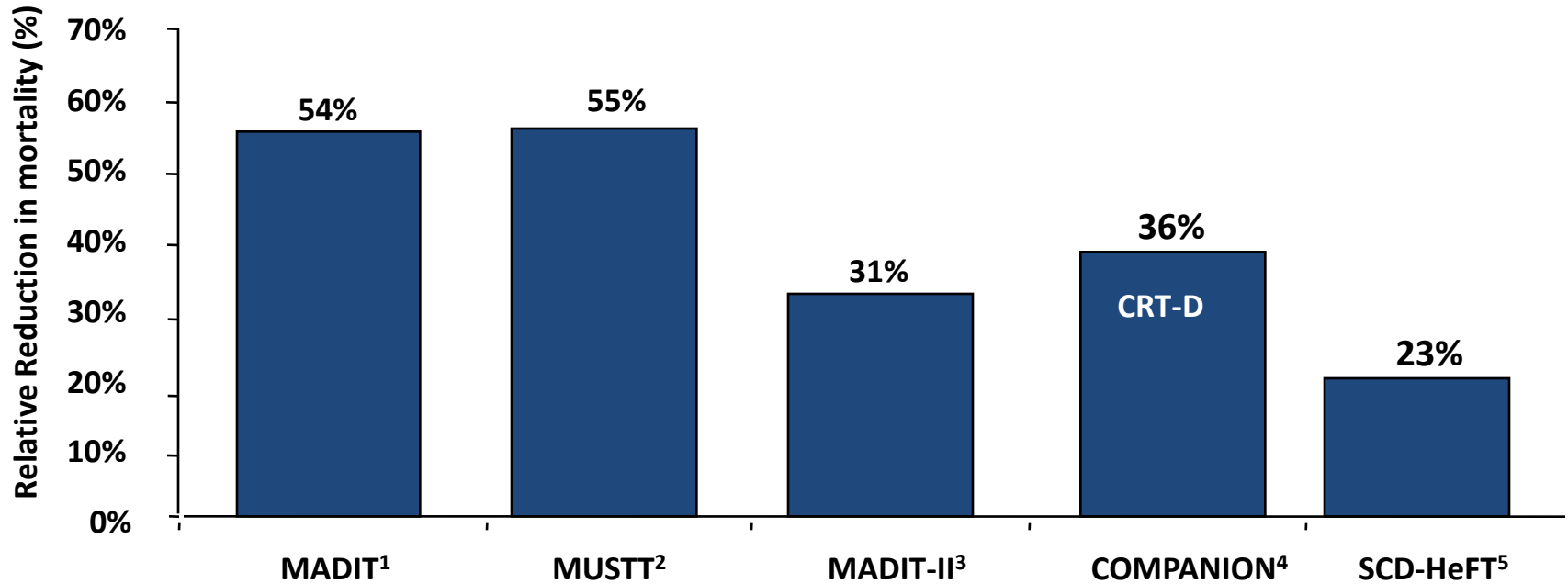
- Intravenous amiodarone
  - The **ARREST trial** (Amiodarone in the Out-of-hospital Resuscitation of Refractory Sustained Ventricular Tachyarrhythmias) randomized 504 patients with a cardiac arrest due to VF or pulseless VT who were not resuscitated after at least three defibrillation shocks to intravenous amiodarone (300 mg) or placebo
  - Survival to hospitalization was greater in the amiodarone group (44 versus 35 percent)
  - Time to therapy with the study drug was an independent predictor of survival to hospital; faster treatment was associated with a better outcome
  - More than 50 percent of patients who survived to discharge had no neurological impairment





**Implantable cardioverter defibrillator reduces mortality in survivors of sudden death** Subset analysis of 1013 survivors of sudden death or hemodynamically significant ventricular tachycardia entered into the AVID trial shows that the hazard ratios for death from any cause with the implantable cardioverter defibrillator, compared with amiodarone, are not significantly different for any of the prespecified subgroups. (Redrawn from The Antiarrhythmics Versus Implantable Defibrillators (AVID) Investigators, N Engl J Med 1997; 337:1576.)

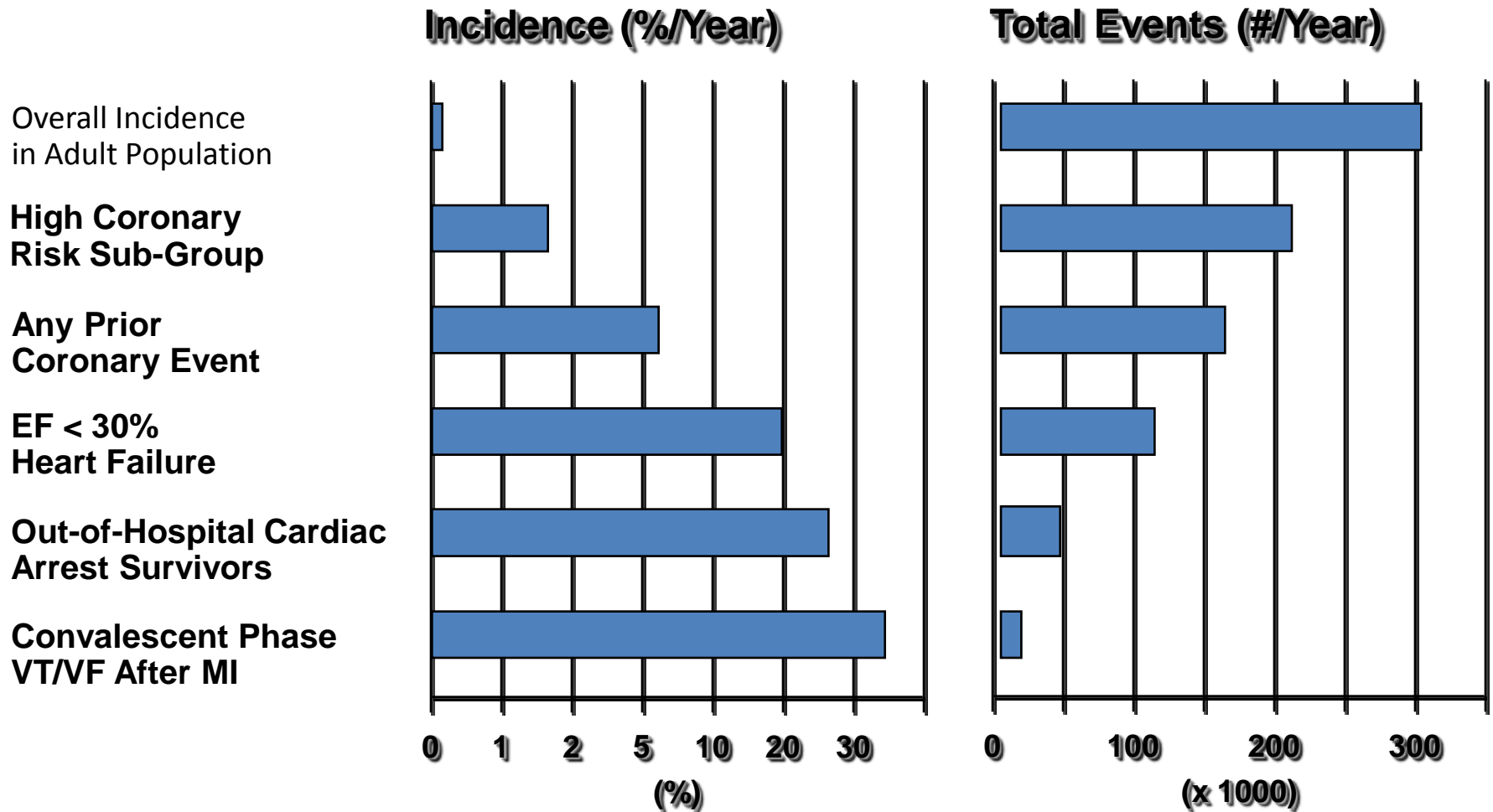
# Reduction In All-cause Mortality with ICDs: Trials Summary



1. Moss AJ, et al. *N Engl J Med.* 1996;335:1933-1940.
2. Buxton AE, et al. *N Engl J Med.* 1999;341:1882-1890.
3. Moss AJ, et al. *N Engl J Med.* 2002;346:877-883.
4. Bristow MR, et al. *N Engl J Med.* 2004;350:2140-2150
5. Bardy GH, et al. *N Engl J Med.* 2005;352:225-237

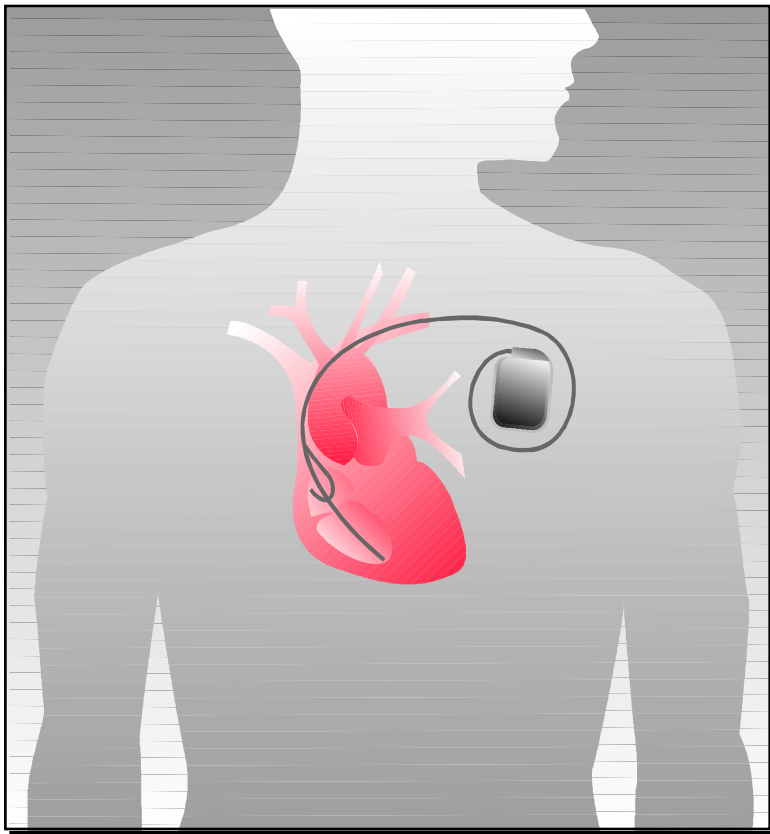
# Sudden Cardiac Death

## Incidence and Total Events



# Implantable Cardioverter Defibrillator

## First-line therapy for patients at risk for SCA



- Small devices, pectoral implant site
- Transvenous, single incision
- Local anesthesia; conscious sedation
- Short hospital stays
- Few complications
- Perioperative mortality < 1%
- Programmable therapy options
- Single- or dual-chamber therapy
- Battery longevity up to 9 years
- 80,000 implants/year (2000 E)<sup>1</sup>

<sup>1</sup>Morgan Stanley Dean Witter. Investors Guide to ICDs. 2000.

# Automated External Defibrillator (AED)



- Automatically analyzes the patient's heart rhythm.
- Determines whether a shock is needed.
- Uses voice and screen prompts to guide the rescuer through the process.

# How an AED “Thinks”

- AED will recommend a shock if it detects:
  - VF or VT
  - No shock is recommended for asystole, bradycardia, heart block, SVTs, NSR, and pulse less electrical activity
- Looks at 2.7 second segments of filtered ECG, checking characteristics such as:
  - Heart rate
  - Amplitude
  - Frequency
  - Shape
  - Slope

# Who is Using AEDs?

- Physicians
- Police Officers
- Fire Fighters
- Lifeguards
- Ski Patrol
- Coaches
- Dentists
- Nurses
- EMTs
- Health Club Employees
- Golf Course Employees
- Flight Attendants
- Security Officers in:
  - Shopping malls
  - Sports arenas
  - Casinos
  - Airports
  - Residential and Commercial Buildings

# AED Training

- Four-hour training courses in CPR and AED are offered by National organizations:
  - **American Heart Association**
  - **National Safety Council**
  - **American Red Cross**

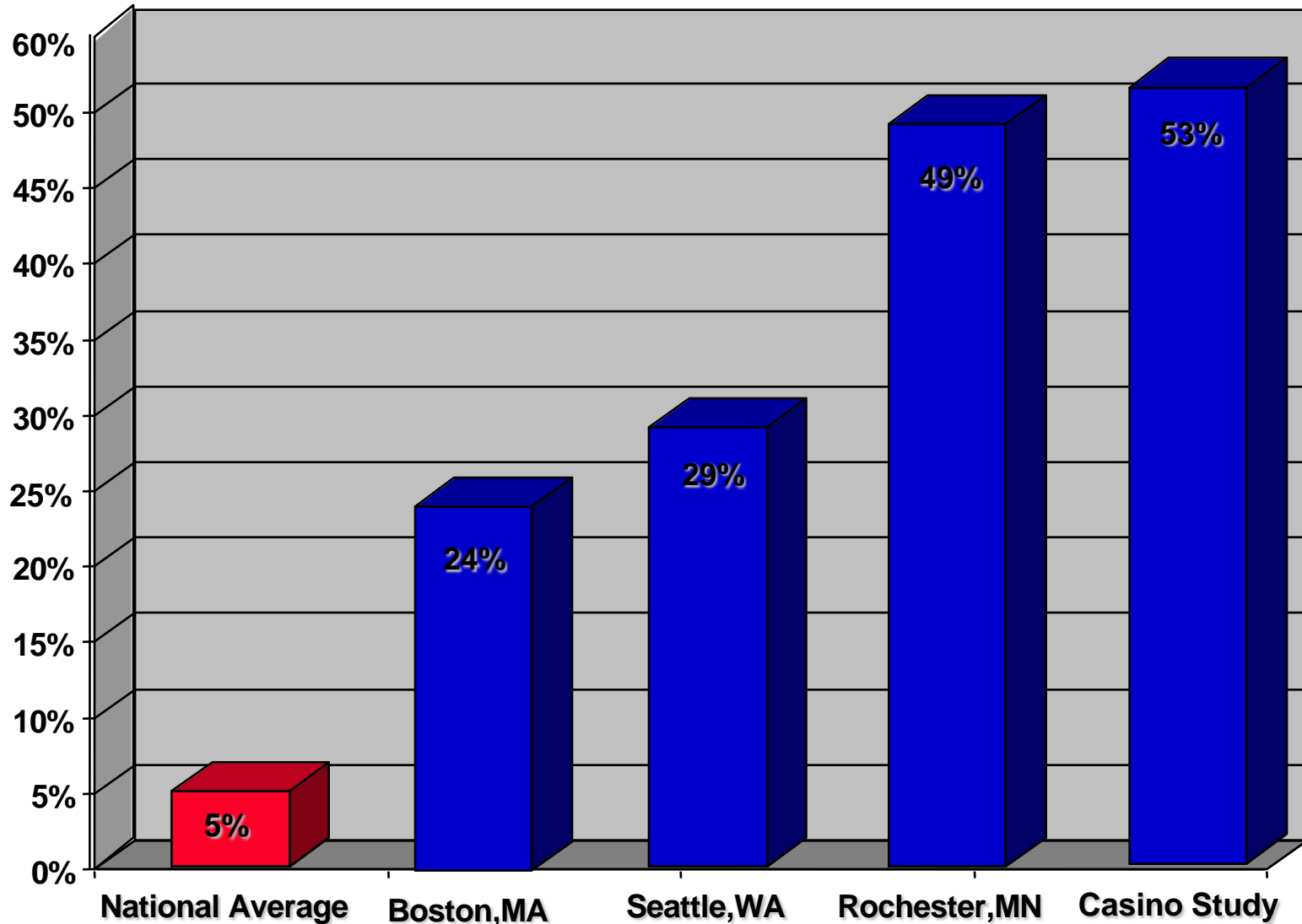


# Public Access Defibrillation

“The American Heart Association supports efforts to provide prompt defibrillation to victims of cardiac arrest. Automated External Defibrillation is one of the most promising methods for achieving rapid defibrillation. Public Access Defibrillation will include laypersons at home, firefighters, police, security personnel, and non-physician care providers in the community.”

From AHA: AED Task Force 1994

# AEDs Improve Survival



White RD. *Ann Emer Med* 1996;28:480-485. Cobb LA. *Circulation* 1992;85:198-102.

Smith SC. *Circulation* 1997;13:1321-1324. Valenzuela TD. *N Engl J Med* 2000;343:1206-1209.

# Conclusions

- Sudden Cardiac Arrest is a leading cause of death in the U.S., striking 250,000 to 350,000 every year.
- Patients with known risk factors for SCA should be referred to an EP for further diagnosis and treatment.
- ICDs have been shown to be 99% effective in preventing SCA and have reduced mortality compared to anti-arrhythmic drug therapy in patients at high risk of SCA
- Preliminary data show that increased access to AEDs improves SCA survival rates; the PAD Trial will compare survival rates in communities with “standard care” to those with access to AEDs

# Assist device

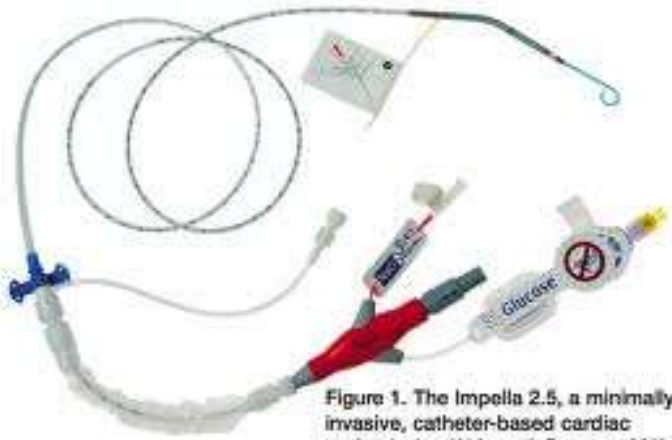
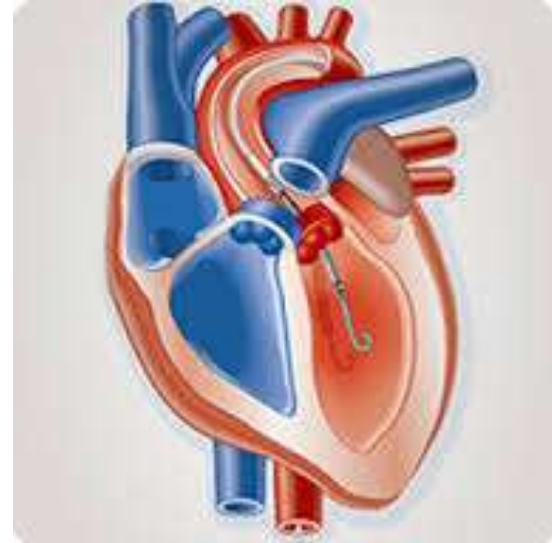
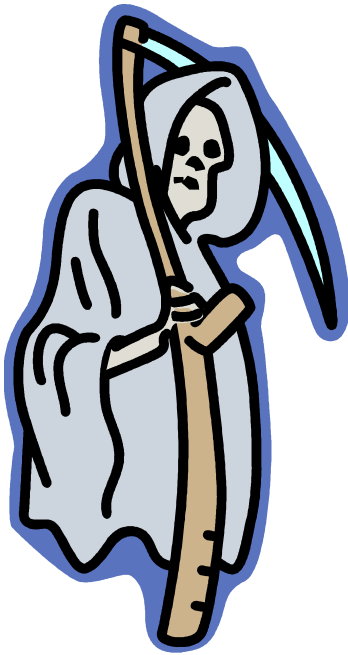


Figure 1. The Impella 2.5, a minimally invasive, catheter-based cardiac assist device (Abiomed, Danvers, MA).



- Teşekkürler

# Effect on Exercise



# Death



# Effect of Exercise

- Acute, especially due vigorous exercise = DEATH
- Chronic exercise decreases risk of CAD, which *should* decrease risk of SCD.
- Recommendations:
  - Aerobic vs. Resistance Exercise
    - Which is safer if you are at risk?

# Precautions

- Individuals who should avoid vigorous exercise:
  - Diagnosed with CAD
  - Positive family history of SCD
  - Diagnosed left ventricular hypertrophy

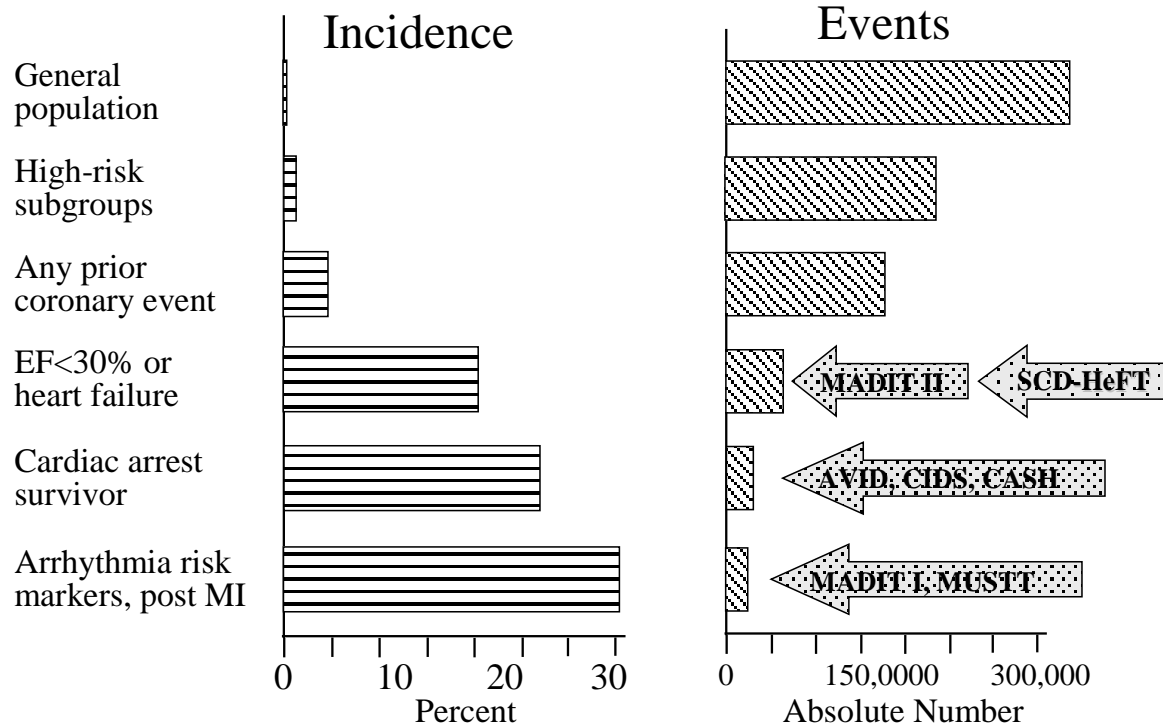


# Recommendations

- Limited due to lack of knowledge of event
- Precautions should be taken when signs & symptoms are evident.
- Diagnostic tests for heart disease:
  - ECG, sonogram, ultrasound
- Additional padding in contact sports to cover chest walls
- AEDs should be present at all sporting events or in all exercise facilities.
  - Use of AED in combination with CPR has a high survival rate if used within 3 minutes of event.

# Epidemiology of VA & SCD

## Incidence of Sudden Cardiac Death



**TEMEL YAŞAM DESTEĞİ  
OKSİJEN, MONİTÖR**

**PERFÜZYONUN  
DEĞERLENDİRİLMESİ**

**KALP ATIM HIZININ  
DEĞERLENDİRİLMESİ**

**RİTİM  
DEĞERLENDİRİLMESİ**

**NABİZ  
KAN BASINCI**

**KALP ATIMI VAR MI ?  
VARSA  
HIZLI MI? YAVAŞ MI?**

**KALP ATIMI SİNÜZAL MI?  
QRS GENİŞ Mİ DAR MI?  
(qrs süresi??)**

ABC'yi değerlendir ve gerekliyse destekle  
O<sub>2</sub> sağla  
Monitör/defibrilatör bağlantısını sağla

Bradikardi ciddi kalp-akciğer bozukluğu yapıyor mu? (düşük perfüzyon, hipotansiyon, solunum güçlüğü, bilinç değişikliği)

**HAYIR**

Gözle  
ABC'yi destekle  
Daha ileri merkeze nakil etmeyi düşün

**EVET**

Oksijenlenme ve solunum desteğine karşın  
kalp hızı <50/dk ve düşük sistemik perfüzyon  
varsa  
Kalp masajı yap

**Epinefrin**

**Atropin**

**Pil uygulamasını düşün**

### Kalp-akciğer canlandırması sırasında

Trakeal entübasyon yap ve damar yolunu aç/kontrol et  
Elektrod ve pil padlerinin pozisyonlarını ve temasını kontrol et  
3-5 dakikada bir epinefrin ver ve epinefrin veya dopamin infüzyonunu düşün

### Olası sebepleri sapt ve tedavi et

Hipoksemi  
Hipotermi  
Kafa travması  
Kalp bloğu  
İlaçlar/toksinler  
MI

**TEMEL YAŞAM DESTEĞİ  
OKSİJEN, MONİTÖR**

**PERFÜZYONUN  
DEĞERLENDİRİLMESİ**

**KALP ATIM HIZININ  
DEĞERLENDİRİLMESİ**

**RİTİM  
DEĞERLENDİRİLMESİ**

**NABİZ  
KAN BASINCI**

**KALP ATIMI VAR MI ?  
VARSA  
HIZLI MI? YAVAŞ MI?**

**KALP ATIMI SİNÜZAL MI?  
QRS GENİŞ Mİ DAR MI?  
(qrs süresi??)**

ABC'yi değerlendir ve gerekliyse destekle  
O<sub>2</sub> sağla  
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**HAYIR**

Gözle  
ABC'yi destekle  
Daha ileri merkeze nakil etmeyi düşün

**EVET**

Oksijenlenme ve solunum desteğine karşın  
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### Olası sebepleri sapt ve tedavi et

Hipoksemi  
Hipotermi  
Kafa travması  
Kalp bloğu  
İlaçlar/toksinler  
MI

# PERFÜZYONU YETERSİZ NABIZLI VT

Nabız var mı ?

**EVET**

Gerekliyse O<sub>2</sub> ve ventilasyonu sağla  
Monitör/defibrilatör bağlantısını sağla

12 kanal EKG  
QRS süresini değerlendir

## Değerlendirme sırasında

- \* O<sub>2</sub> sağla, solunumu destekle
- \* ABC'yi destekle
- \* Monitör/defibrilatör/pil bağlantılarının sağlamlığını denetle
- \* Uzman danışımı için girişimde bulun
- \* Kardiyoversiyon için hazırlık yap

## Olası sebepleri sapt ve tedavi et

- \* Hipoksemi
- \* Hipovolemi
- \* Hipertermi
- \* Hiper/hipokalemi ve diğer metabolik bozukluklar
- \* Tamponad
- \* Pnömotoraks
- \* Toksinler/zehirler/ilaçlar
- \* Tromboembolizm

QRS >120msn

Tasikardiyi değerlendir

**Olası VT**  
Acil kardiyoversiyon

## Diğer ilaçları değerlendir

Amiodaron  
Procainamide  
Lidokain  
**Kardiyoloji**  
**12 kanallı EKG**

# TEMEL YAŞAM DESTEĞİ, OKSİJEN, MONİTÖR

NABIZSIZ

RİTİM (EKG)

DÜZ ÇİZEN EKG

**ASİSTOLİ**

**ADRENALİN**

**KPR**

## KPR süresince

**Uygula / Yeniden Değerlendir:** Trakeal entübasyon ve damar yolunu

**Kontrol Et:** Elektrodların yerini ve bağlantıları, Defibrillatör kaşıklarının pozisyonu ve bağlantıları

**Uygula:** Her 3-5 dakikada Epinefrini tekrar et

**Alternatif İlaçları Göz Önüne Al:** Vazopressörler, Antiaritmikler, Bufferlar (Sodyum bikarbonat gibi...)

## **Olası Nedenleri Belirle ve Tedavi Et**

- Hipoglisemi
- Hipovolemi
- Hipotermi
- Hiper/hipokalemi ve diğer metabolik bozukluklar
- Tamponad
- Tansiyon pnömotoraks
- Toksinler/Zehirler/İlaçlar
- Tromboembolizm





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