

---

# THE APPROACH TO THE PATIENT WITH VENTRICULAR DYSRHYTHMIA

---

W. Jeremy Mahlow, MD, FACC

Cardiac Electrophysiologist, UT Medical Center at Knoxville

---

---

# HOW YOU ARE GOING TO DIE

---

W. Jeremy Mahlow, MD, FACC

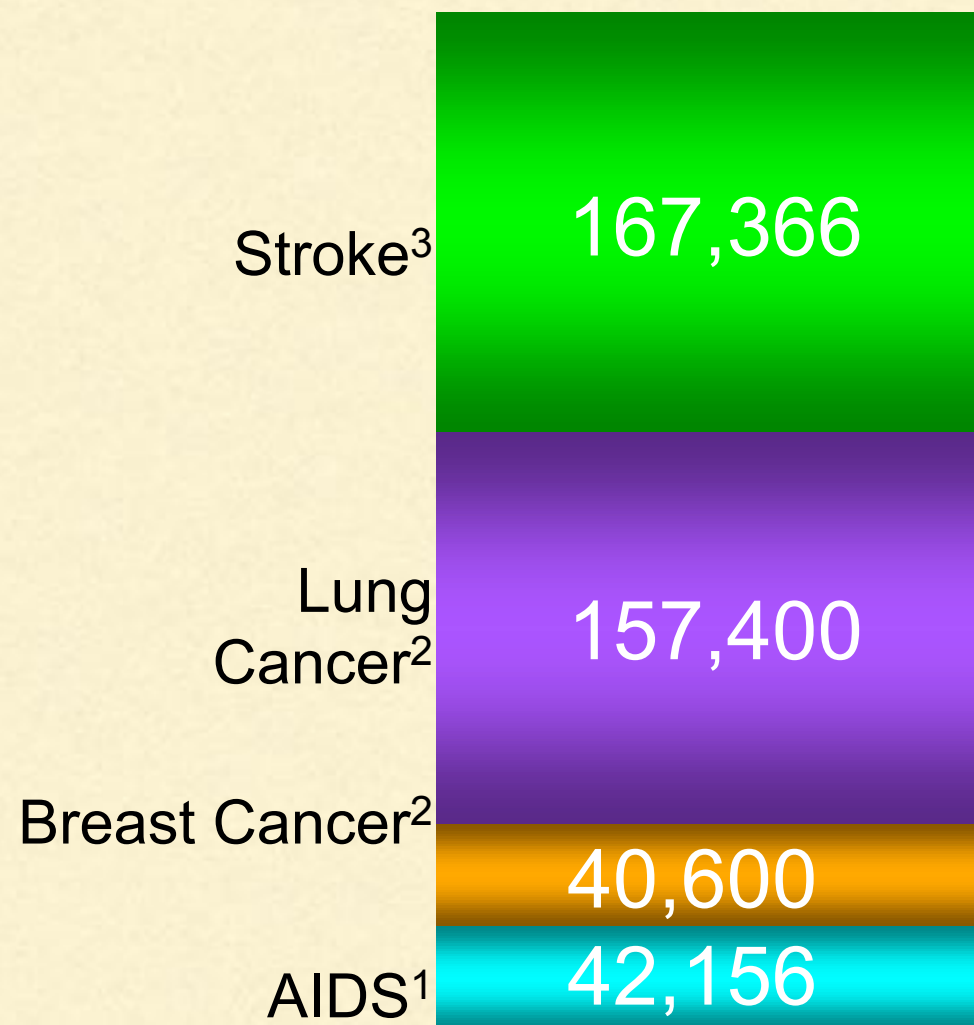
Cardiac Electrophysiologist, UT Medical Center at Knoxville

---

---

# EPIDEMIIOLOGY

---



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.



---

# NOMENCLATURE

---

- Premature Ventricular Contraction
  - Complex Ectopy
  - Non-sustained Ventricular Tachycardia:  $\geq 3$  beats
  - Sustained Ventricular Tachycardia
    - 30 seconds or unstable
  - Monomorphic, Polymorphic
-

---

# PATHOPHYSIOLOGY

---

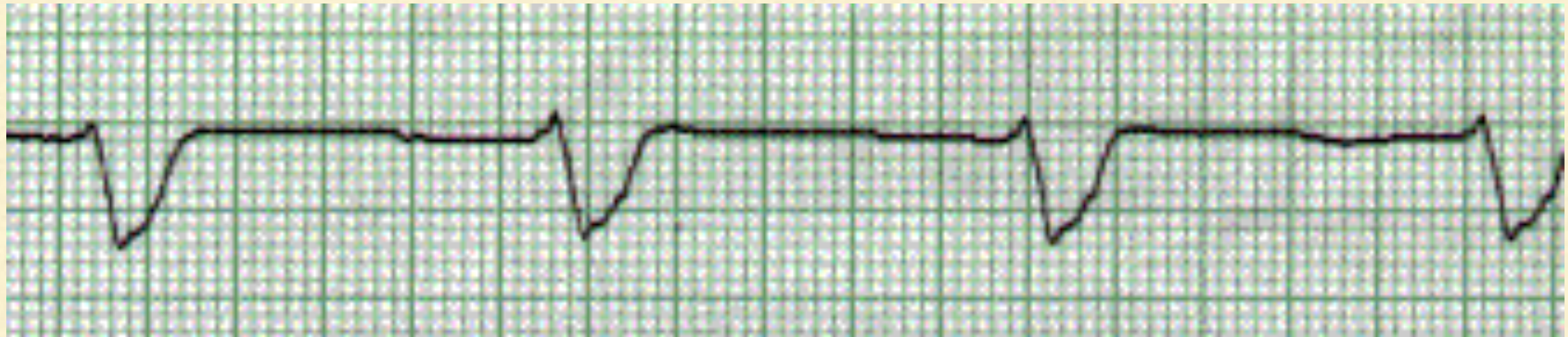
---

# MECHANISMS OF ARRHYTHMIA

---

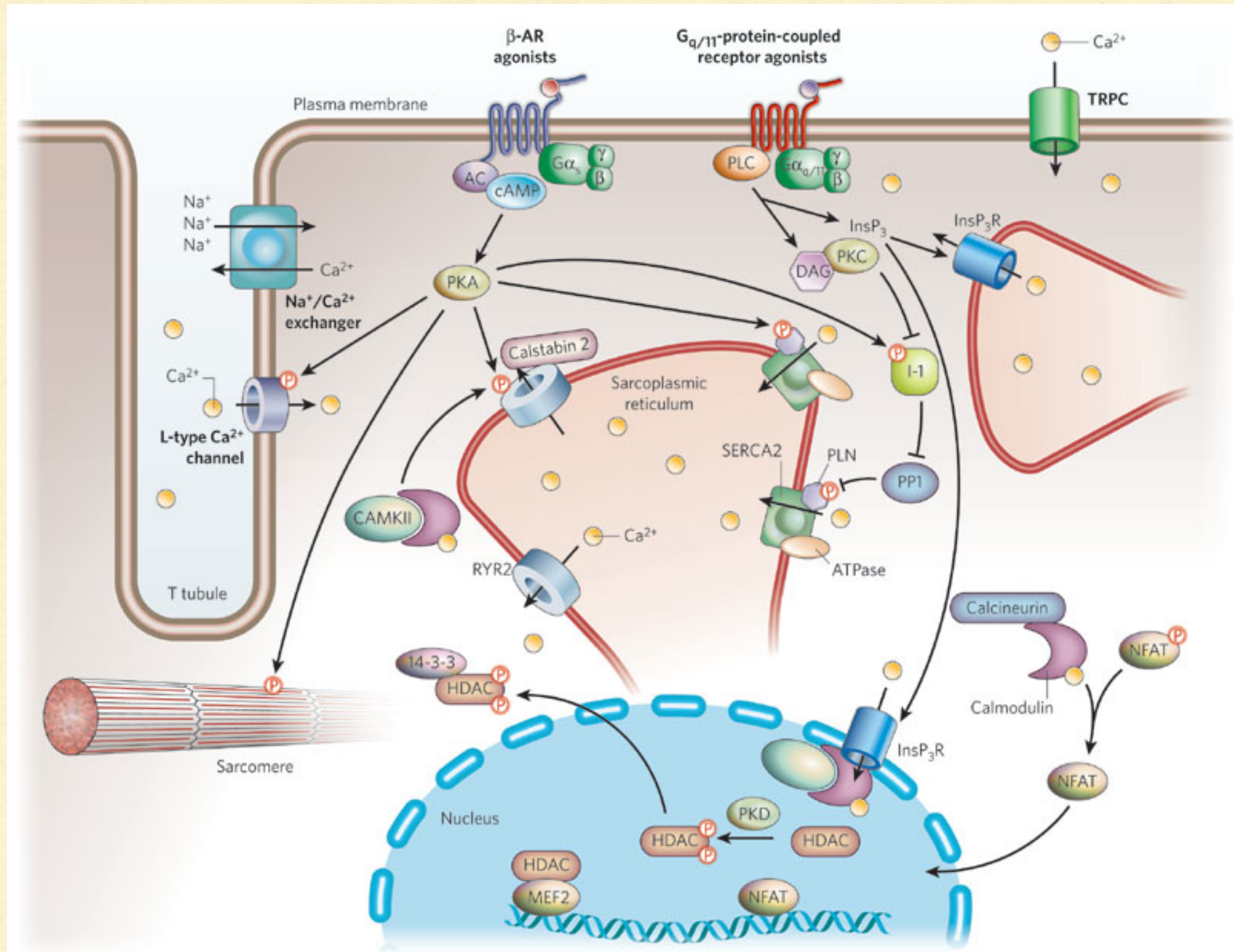
- ABNORMAL AUTOMATICITY
  - TRIGGERED ACTIVITY
  - REENTRY
-



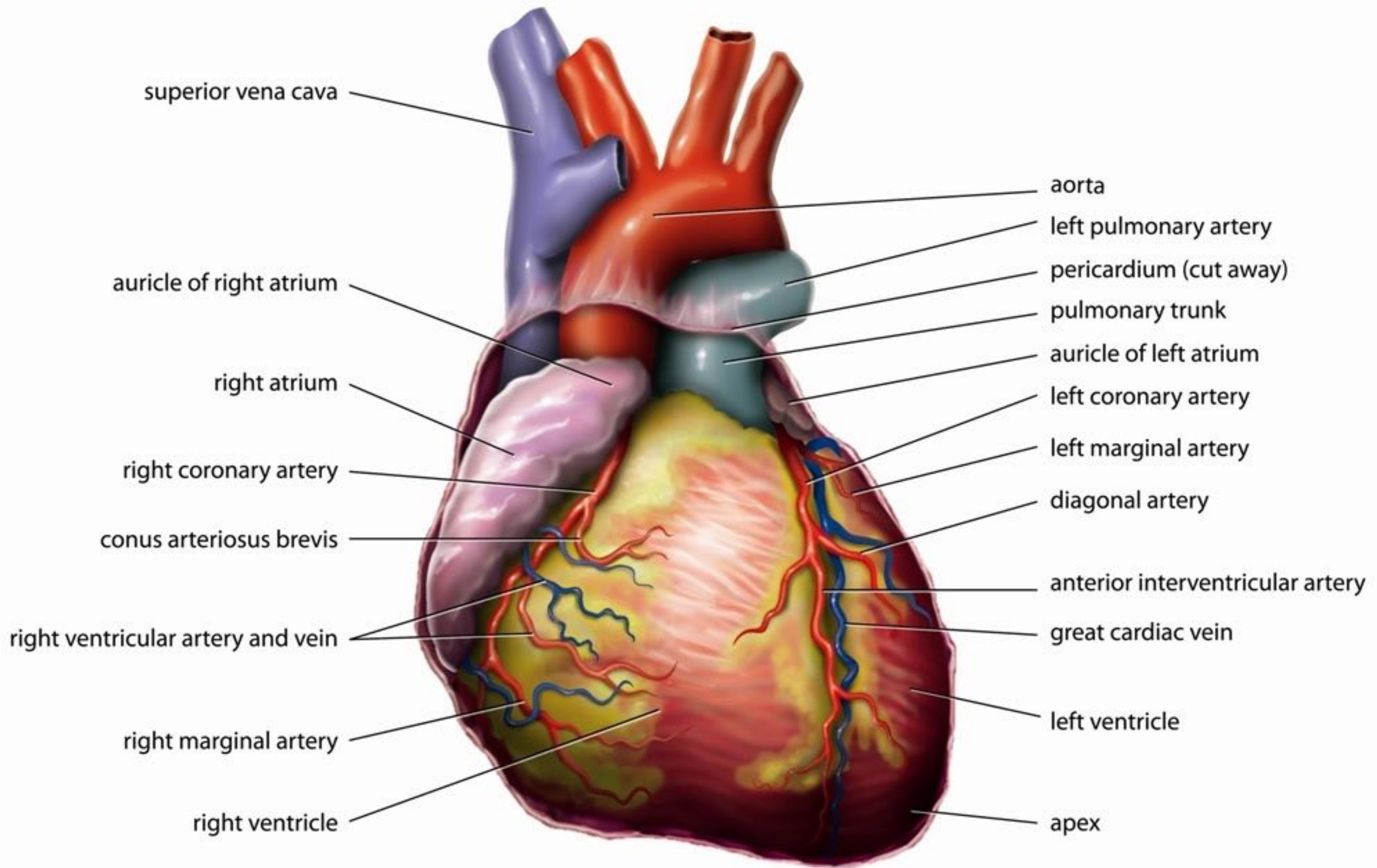












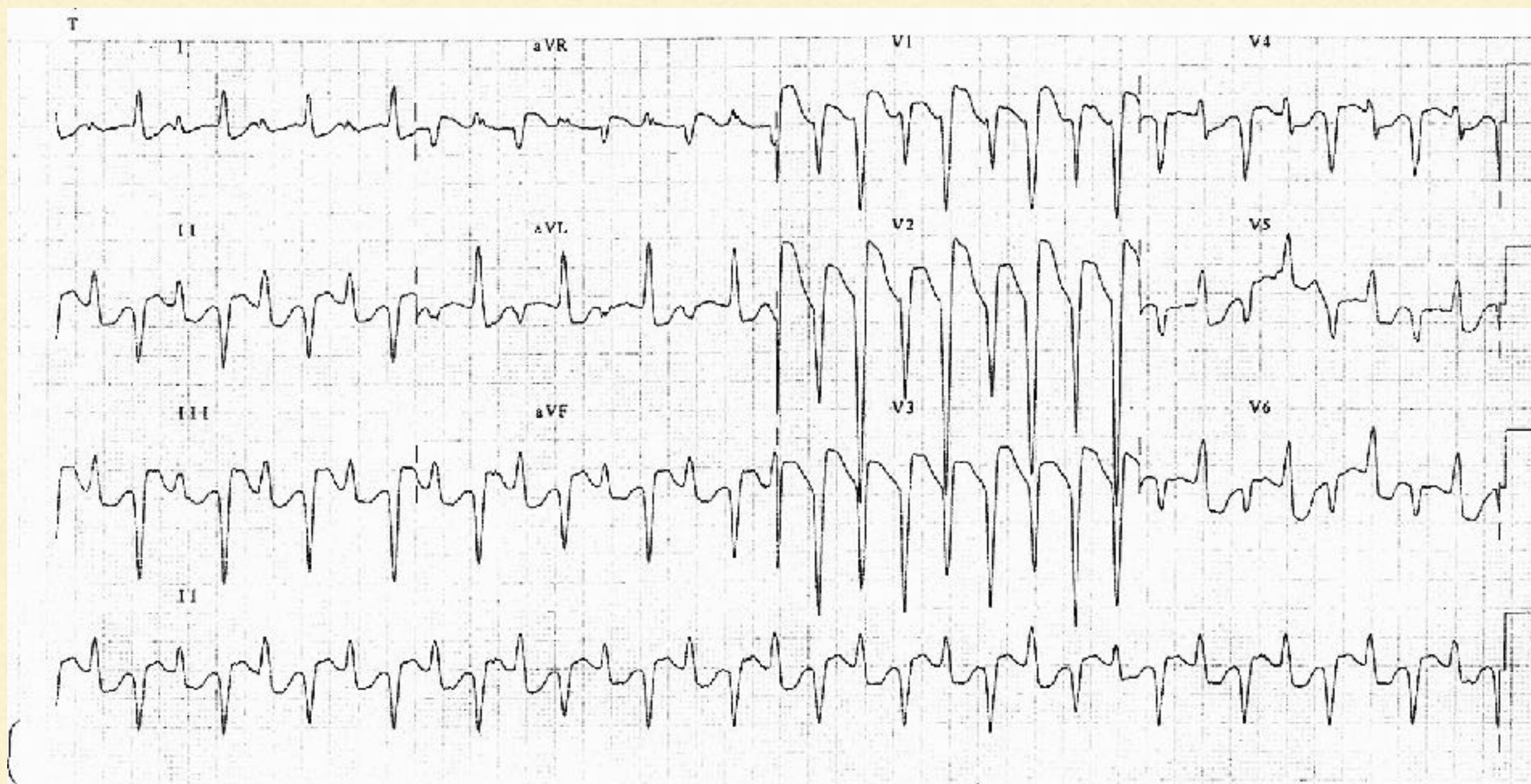


---

# ARE PVC'S INNOCENT?

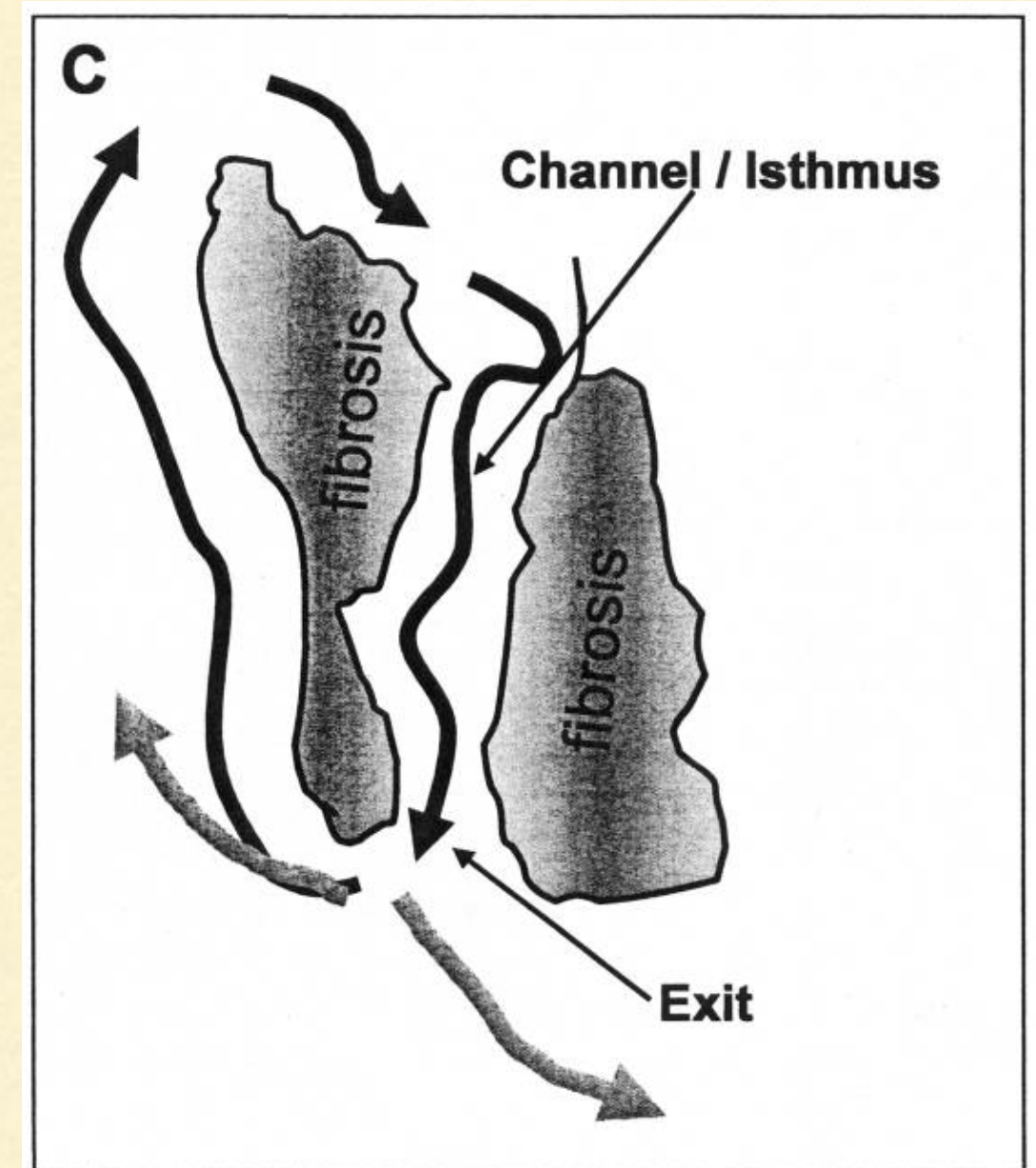
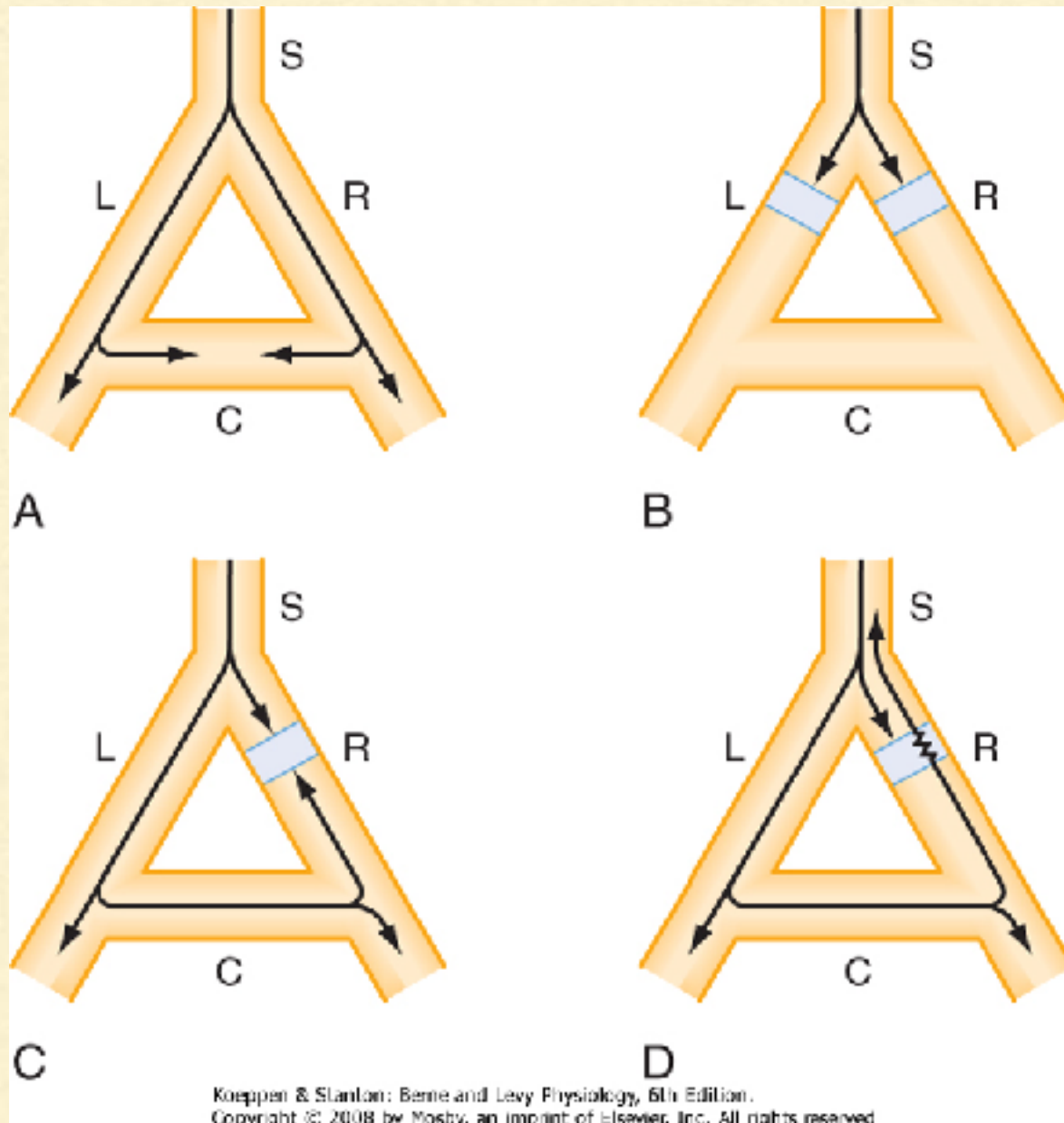
---

- Consider the underlying etiology: sepsis, shock, ischemia, electrolytes
  - Complex ectopy is associated with sudden cardiac death
  - $\geq 10,000$  PVC's per day is associated with cardiomyopathy
  - Catecholaminergic Polymorphic VT, ARVC, other cardiomyopathies
-

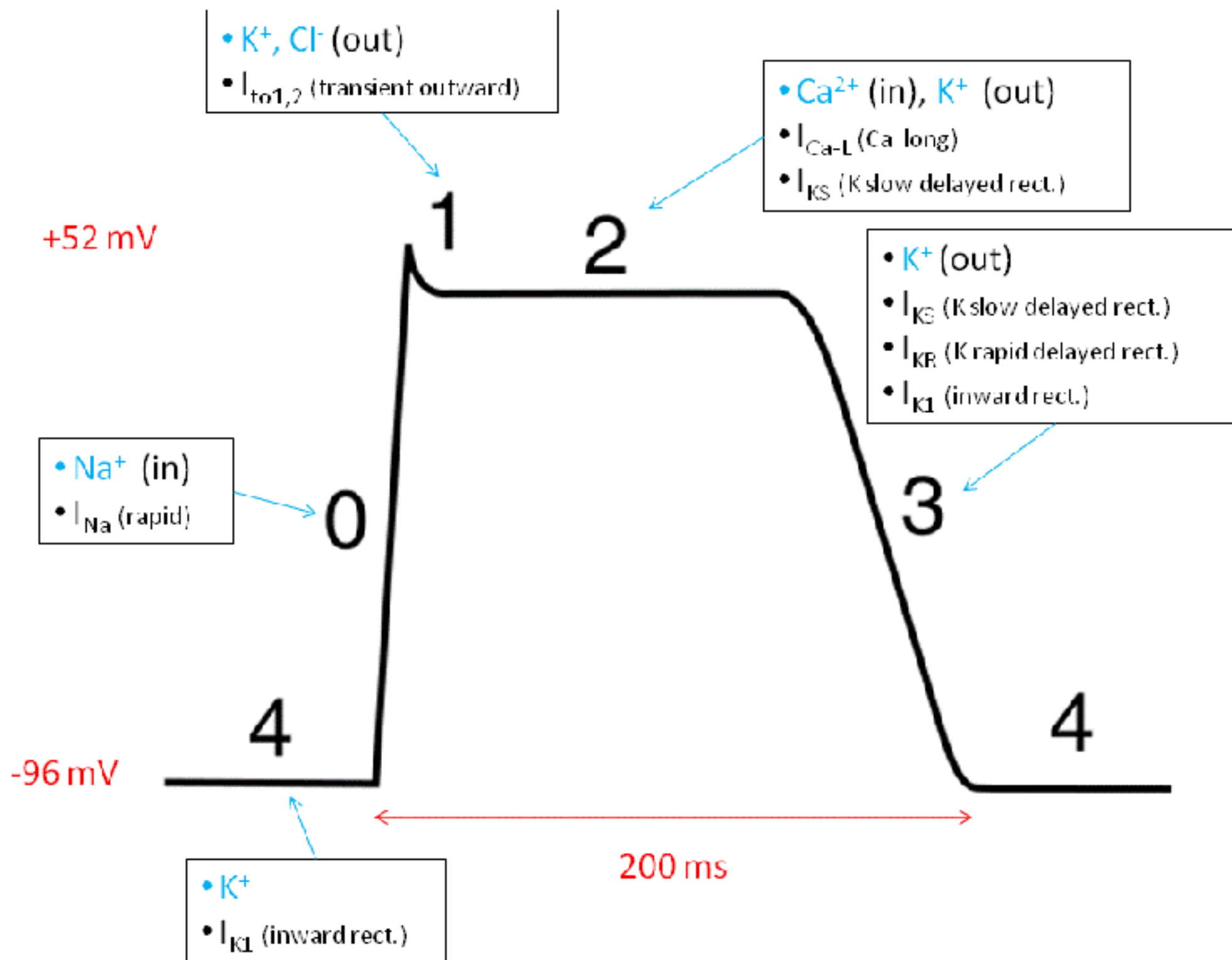




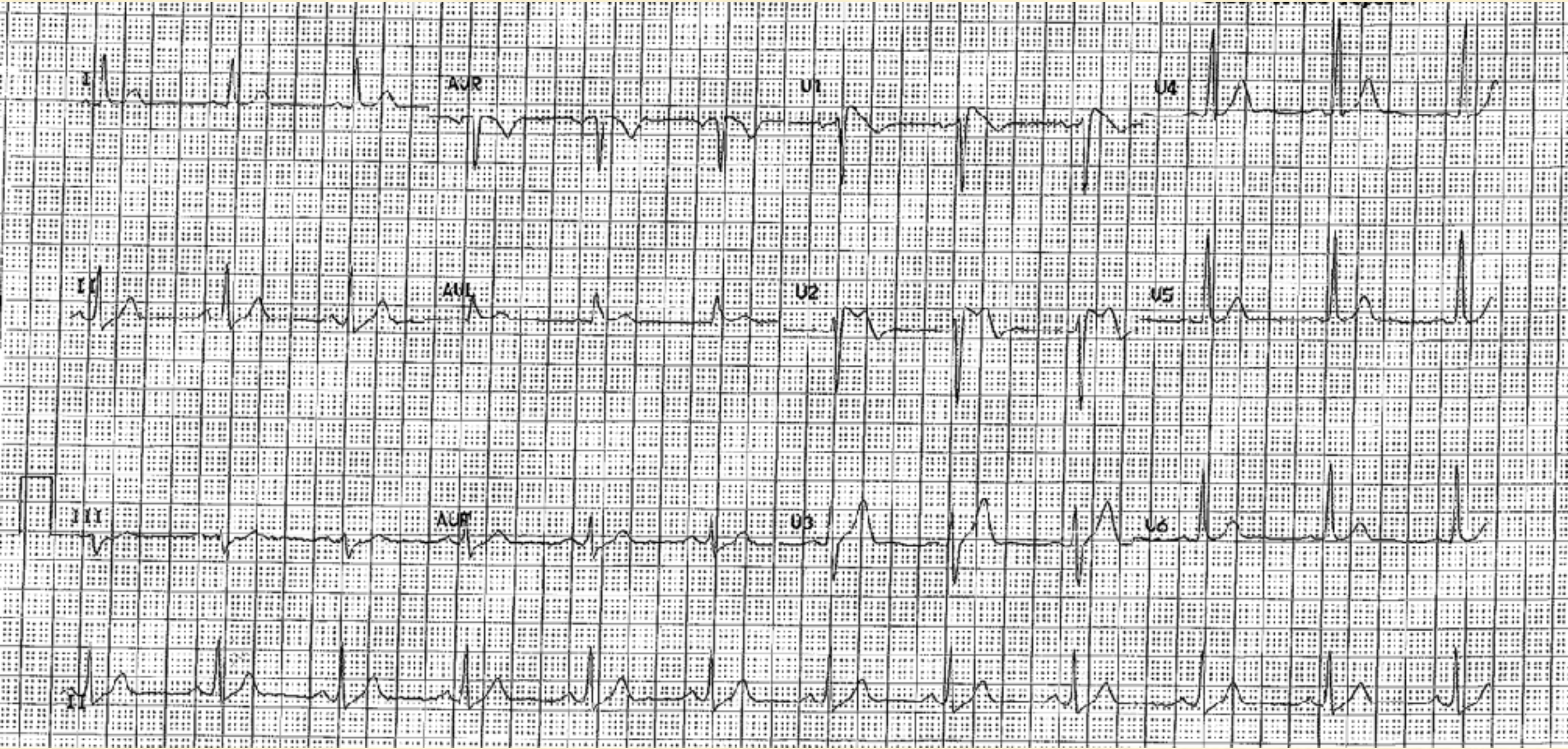
# REENTRY



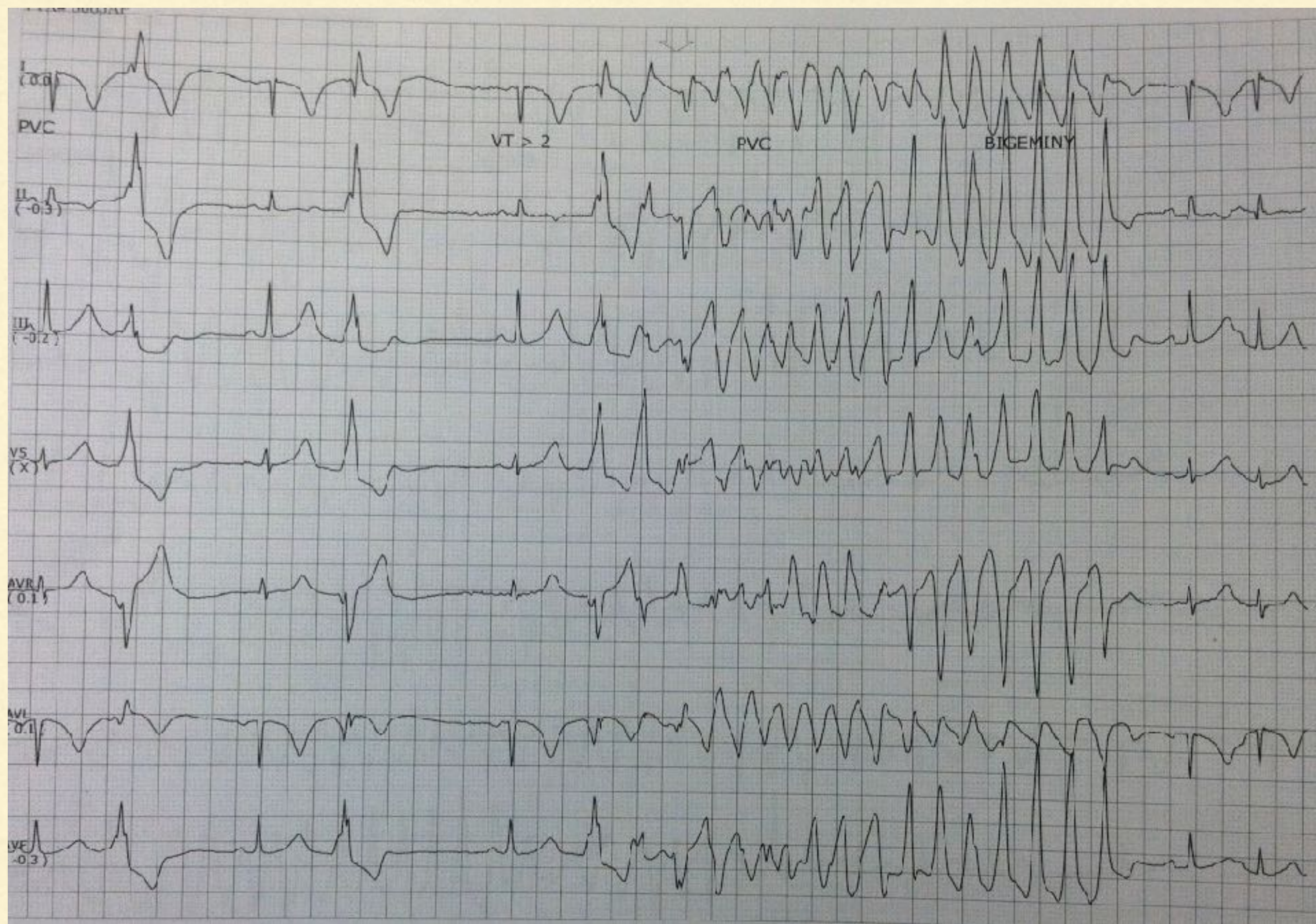














---

# TORSADES DE POINTES- MANAGEMENT

---

- Magnesium, Potassium
  - Increase heart rate
    - Beta agonist
    - Pacing
  - Stop the offending agent
-



---

# DIAGNOSIS

---

---

# VT IS:

---

- FAST
- WIDE



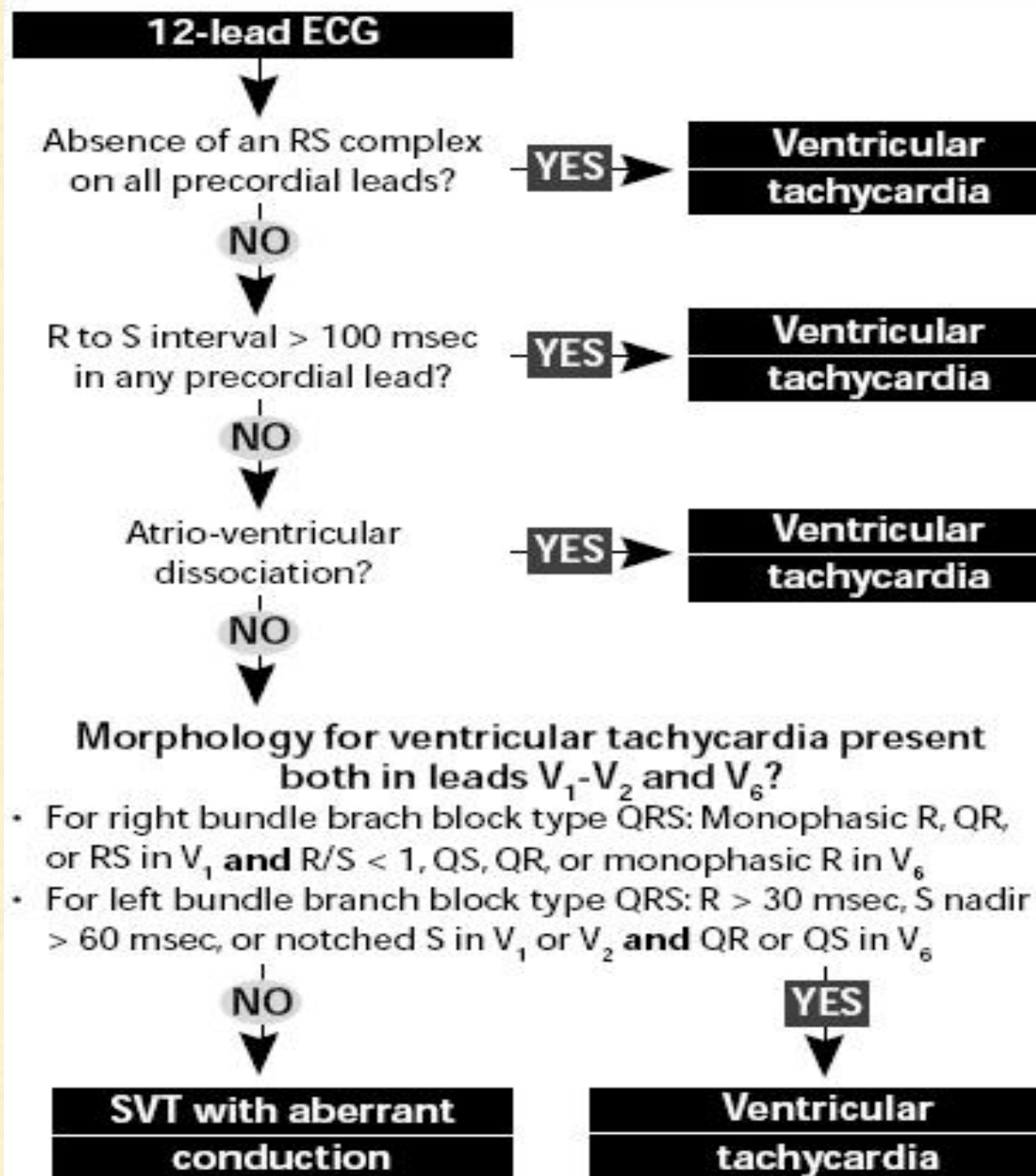
---

# VENTRICULAR TACHYCARDIA IS:

---

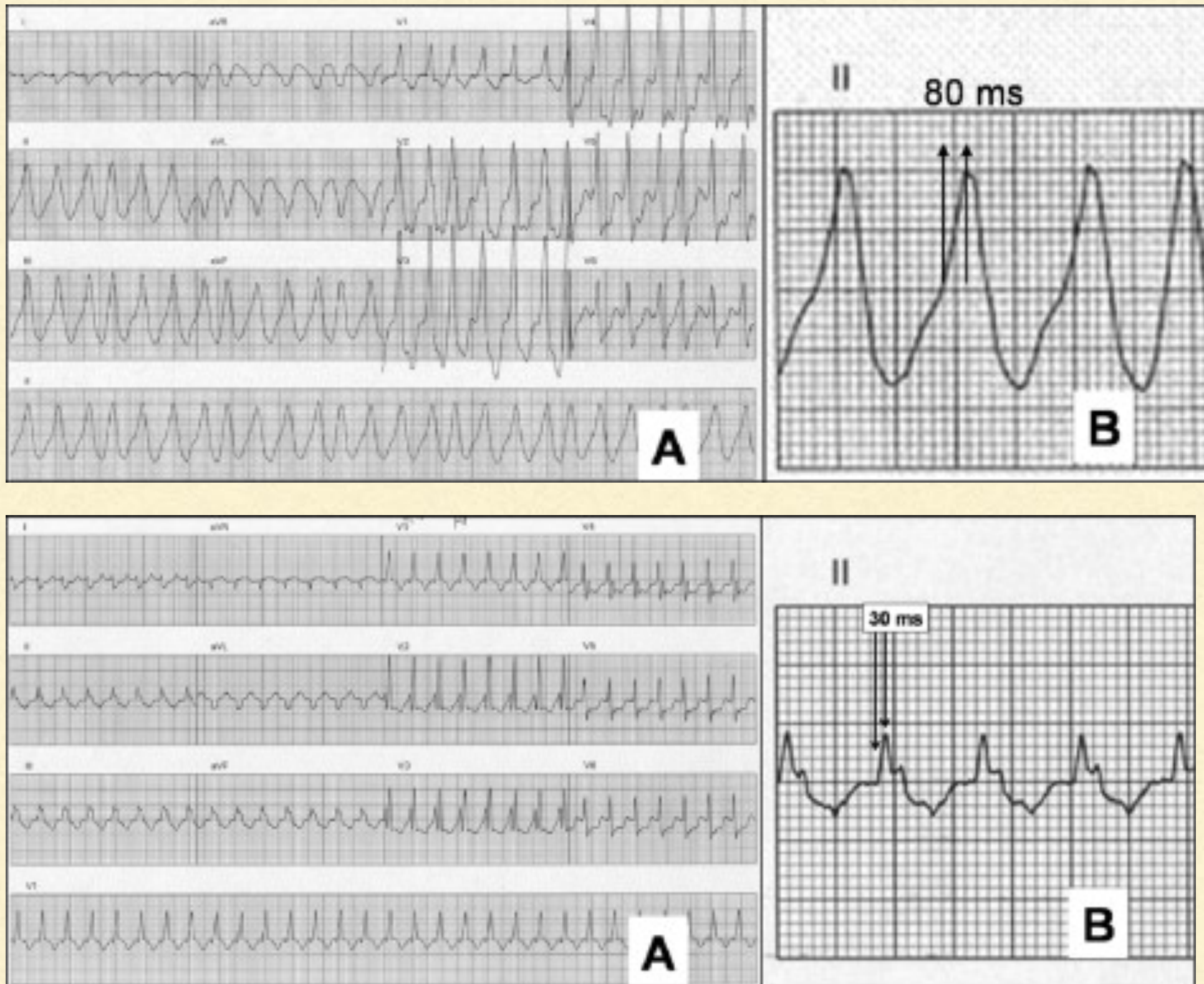
- FAST
  - WIDE
  - HISTORY OF MI/ LOW EF
-

**Figure 11. The Brugada Algorithm.**



Source: Brugada P, Brugada J, Mont L, et al. A new approach to the differential diagnosis of a regular tachycardia with a wide QRS complex. *Circulation* 1991 May;83(5):1649-1659.





R-wave peak time at DII: A new criterion for differentiating between wide complex QRS tachycardias.  
Pava et al. Heart Rhythm Volume 7, Issue 7 , Pages 922-926, July 2010

---

# THE ELECTROPHYSIOLOGIST'S APPROACH

---



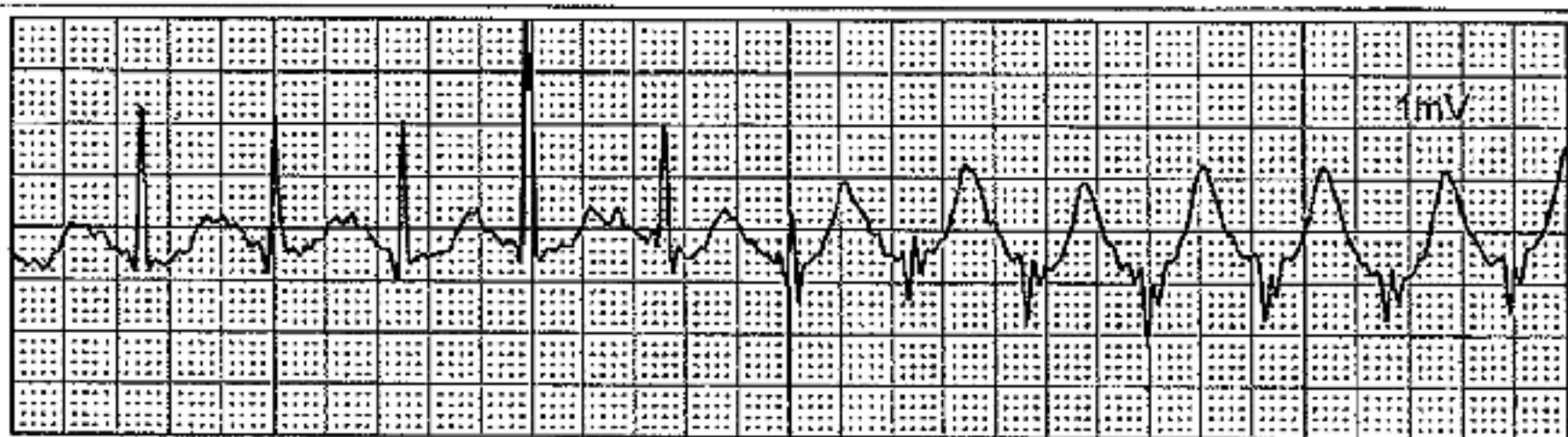
---

# DIFFERENTIAL OF WIDE COMPLEX TACHYCARDIA

---

- VT
  - PRE-EXCITED TACHYCARDIA (WPW SYNDROME)
  - ABERRANCY
-





118

NuStep

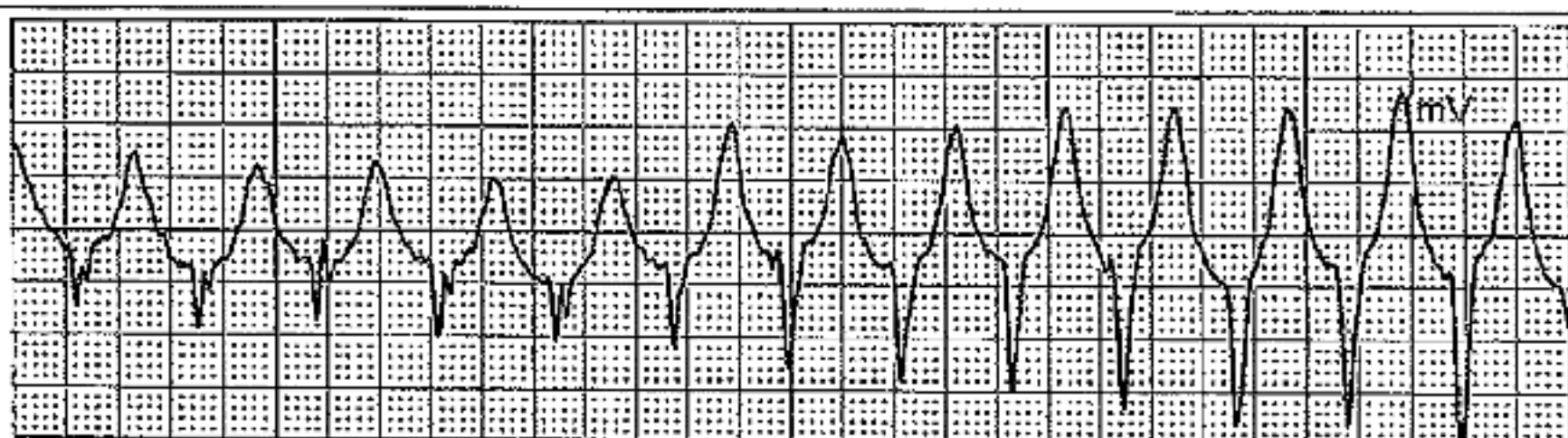
2 METs

30Watts@3

Elapsed Time: 39:39 Strip: 11

BP: NA

Session 1; 04/22/2014



136

NuStep

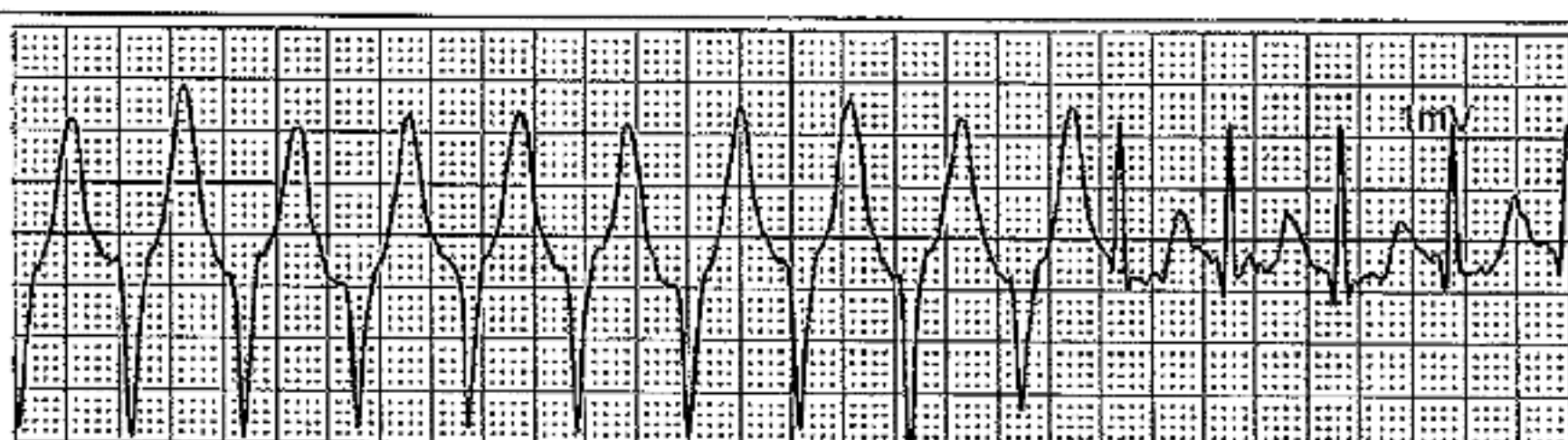
2 METs

30Watts@3

Elapsed Time: 39:45 Strip: 12

BP: NA

Session 1; 04/22/2014



139

NuStep

2 METs

30Watts@3

Elapsed Time: 39:51 Strip: 13

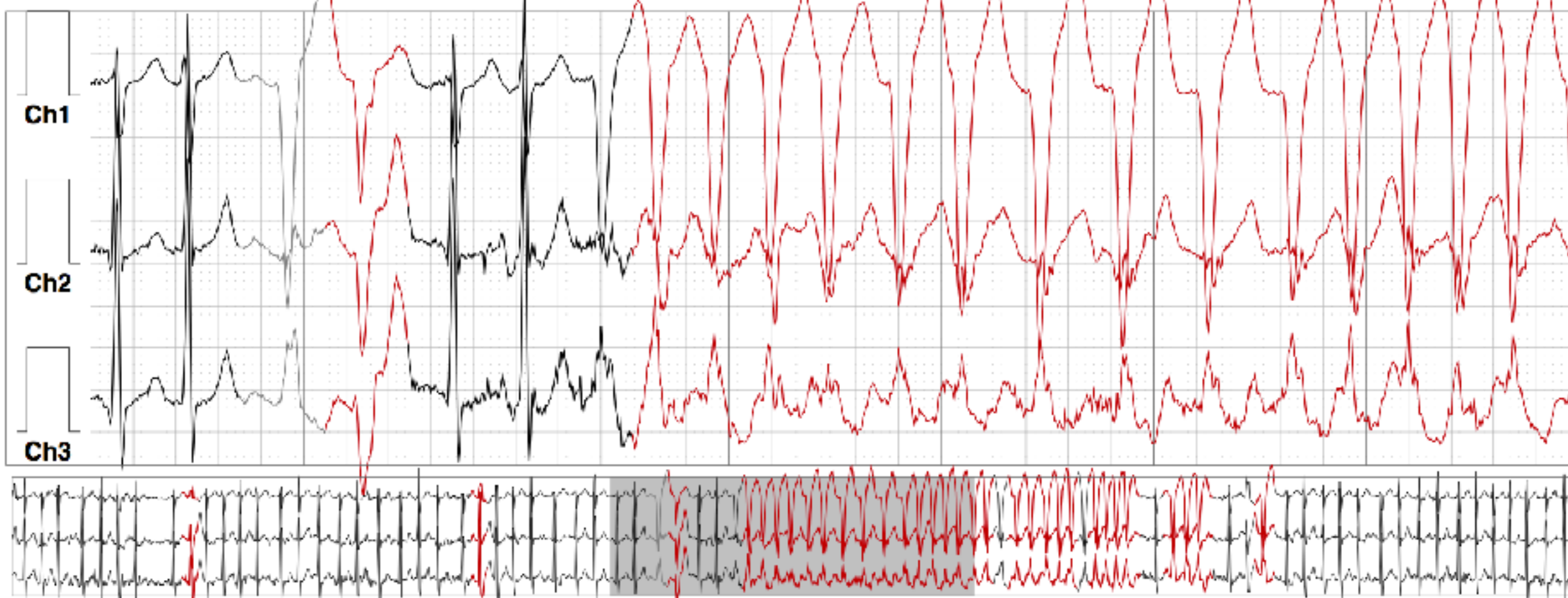
BP: NA

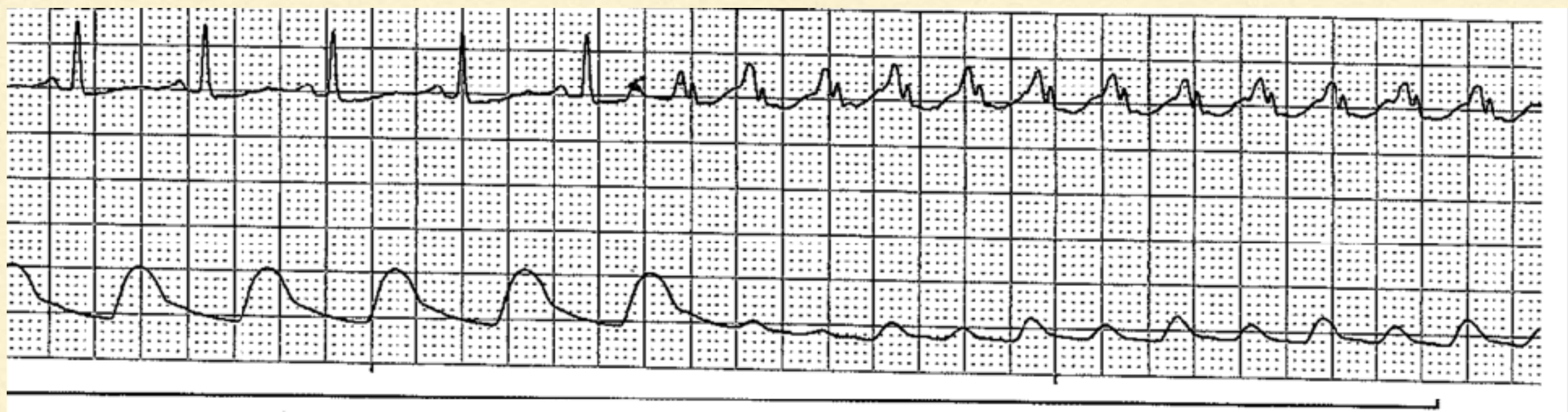
Session 1; 04/22/2014



5:24:48 AM 188 BPM Ventricular Run

Strip 6 of 16









---

# TREATMENT

---



---

# MANAGEMENT- STABLE TACHYCARDIA

---

- Think about underlying etiologies: electrolytes, ischemia, hypoxia, hypercarbia, sepsis, shock, medications, baseline ECG
  - Consider pharmacological therapy
    - Amiodarone
    - Lidocaine
    - Procainamide
-

---

# MANAGEMENT- UNSTABLE TACHYCARDIA

---

- “WHEN IN DOUBT, SHOCK IT OUT”
- THEN, CONTINUE MANAGEMENT AS FOR STABLE TACHYCARDIA



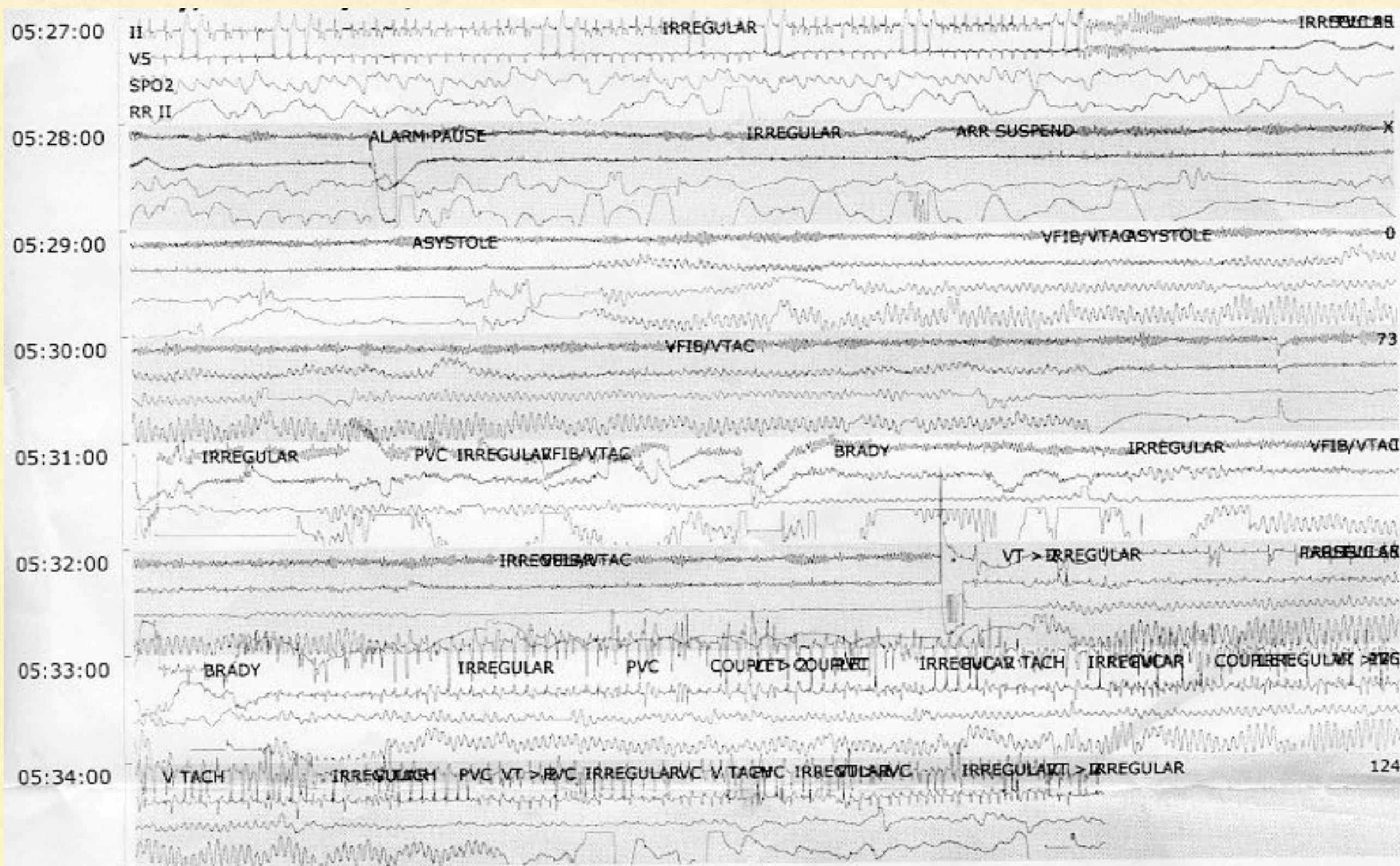


---

Cardiology Consult: “ICD didn’t work.”

---

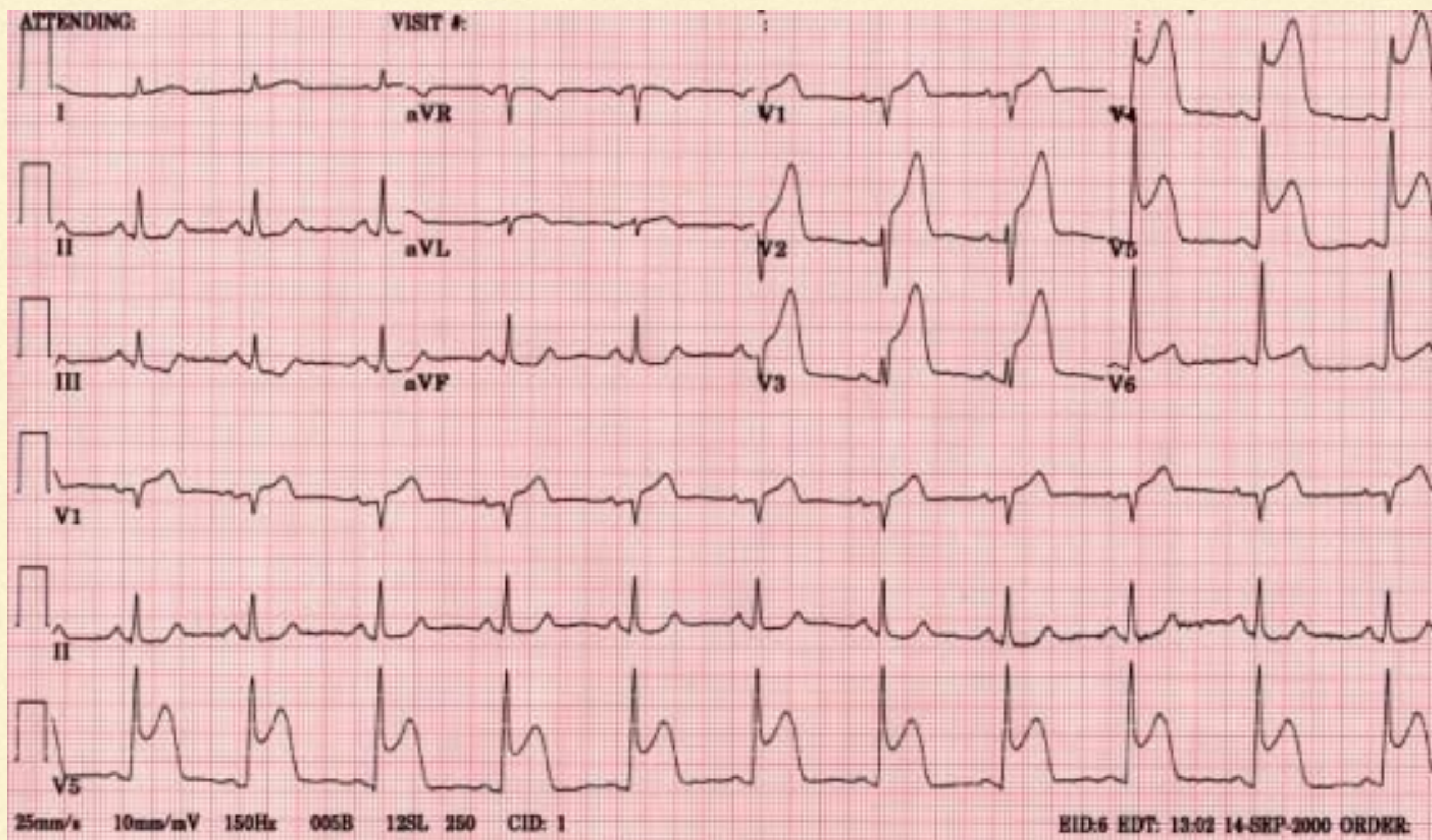




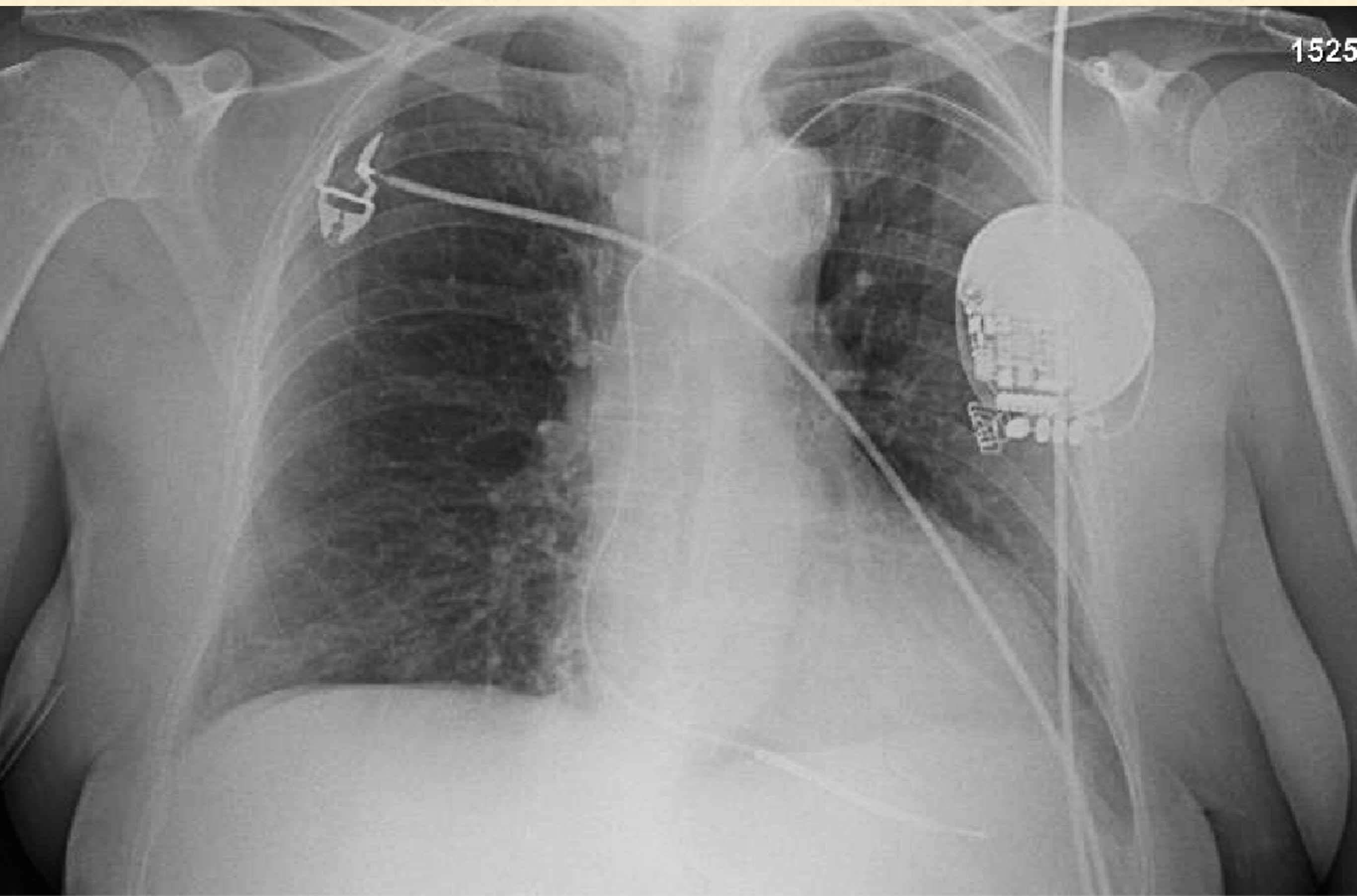










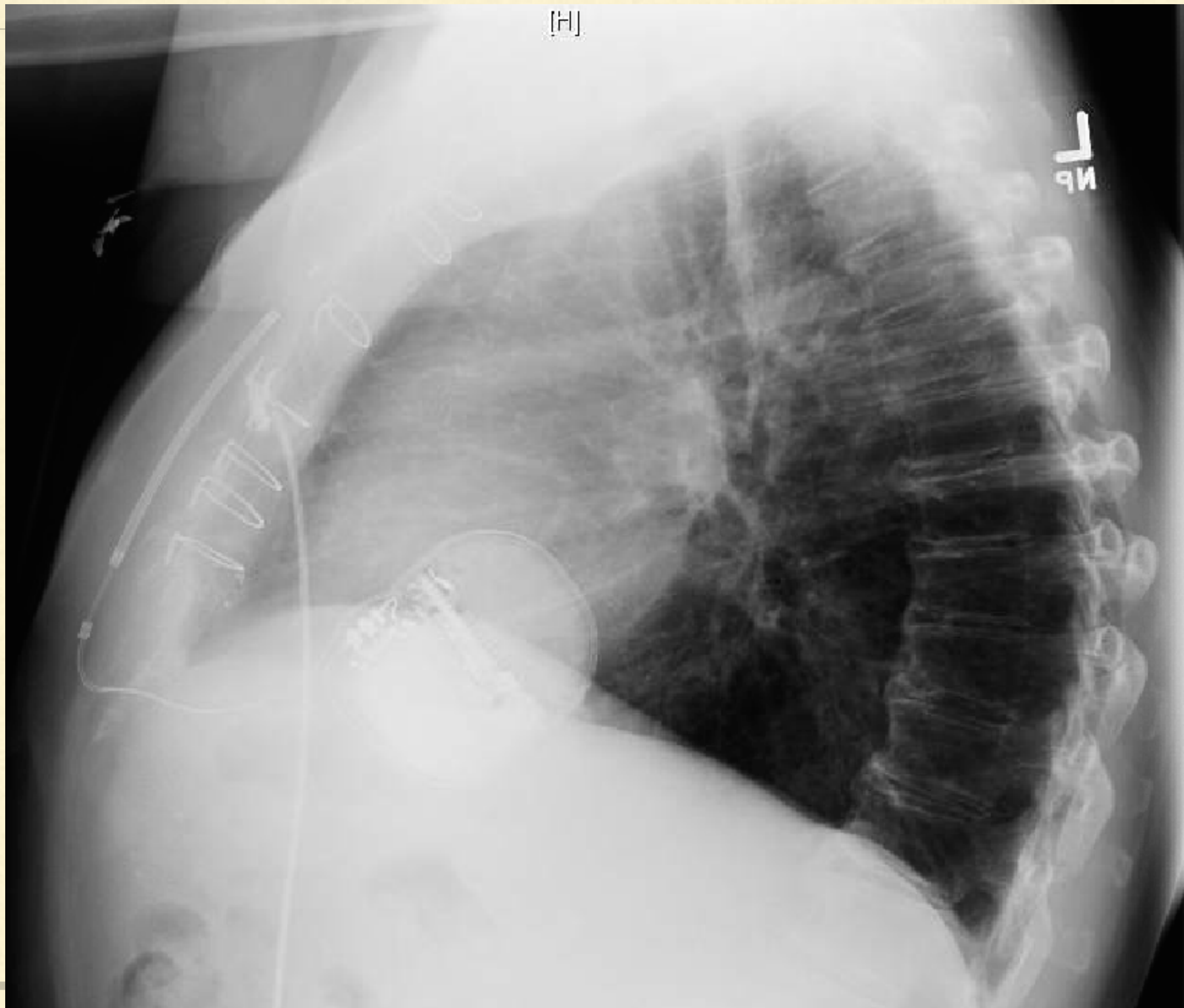






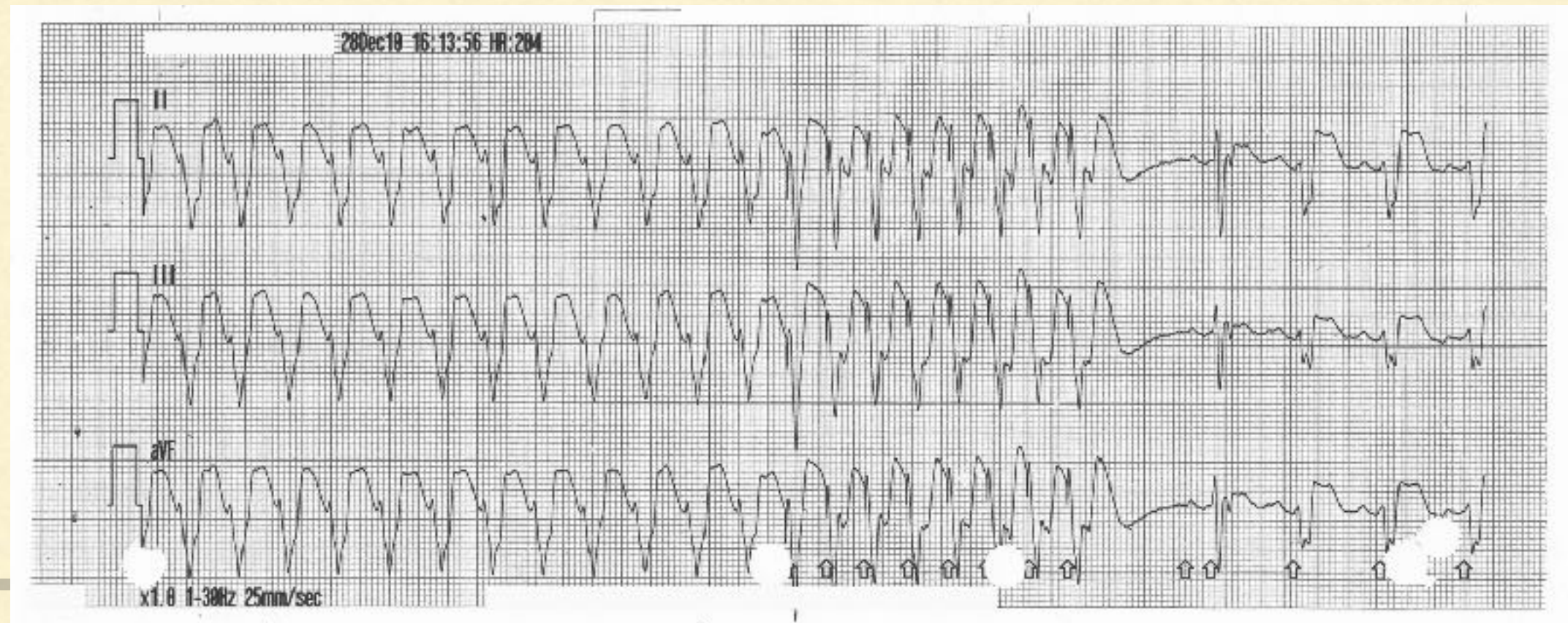
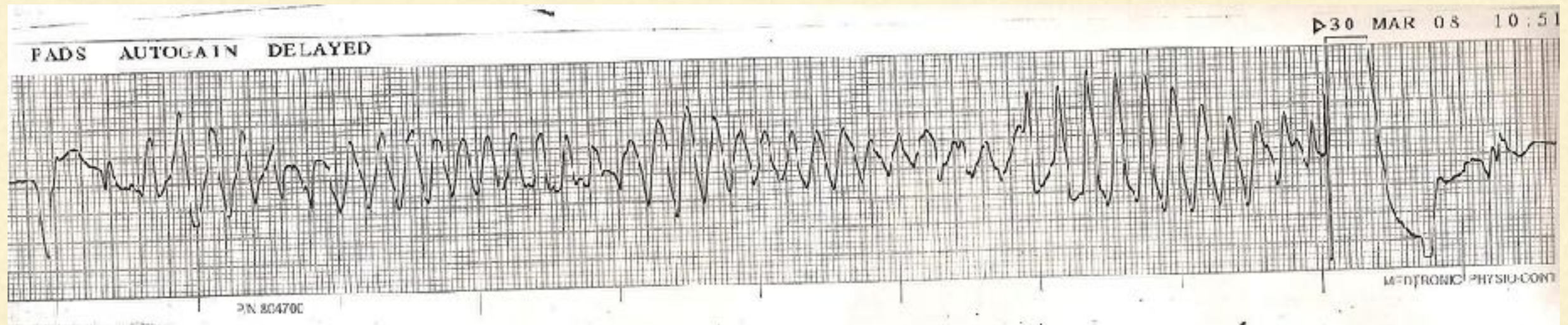
[H]

L  
HP





# DEFIBRILLATORS: HOW THEY WORK

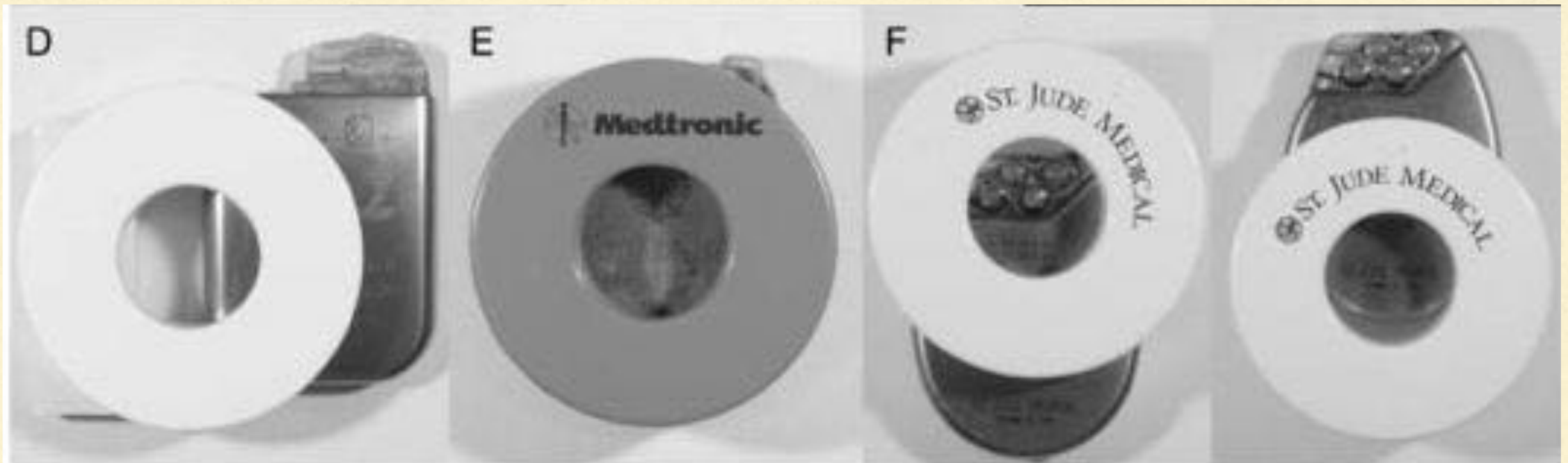




---

# DEFIBRILLATORS: TROUBLESHOOTING

---



---

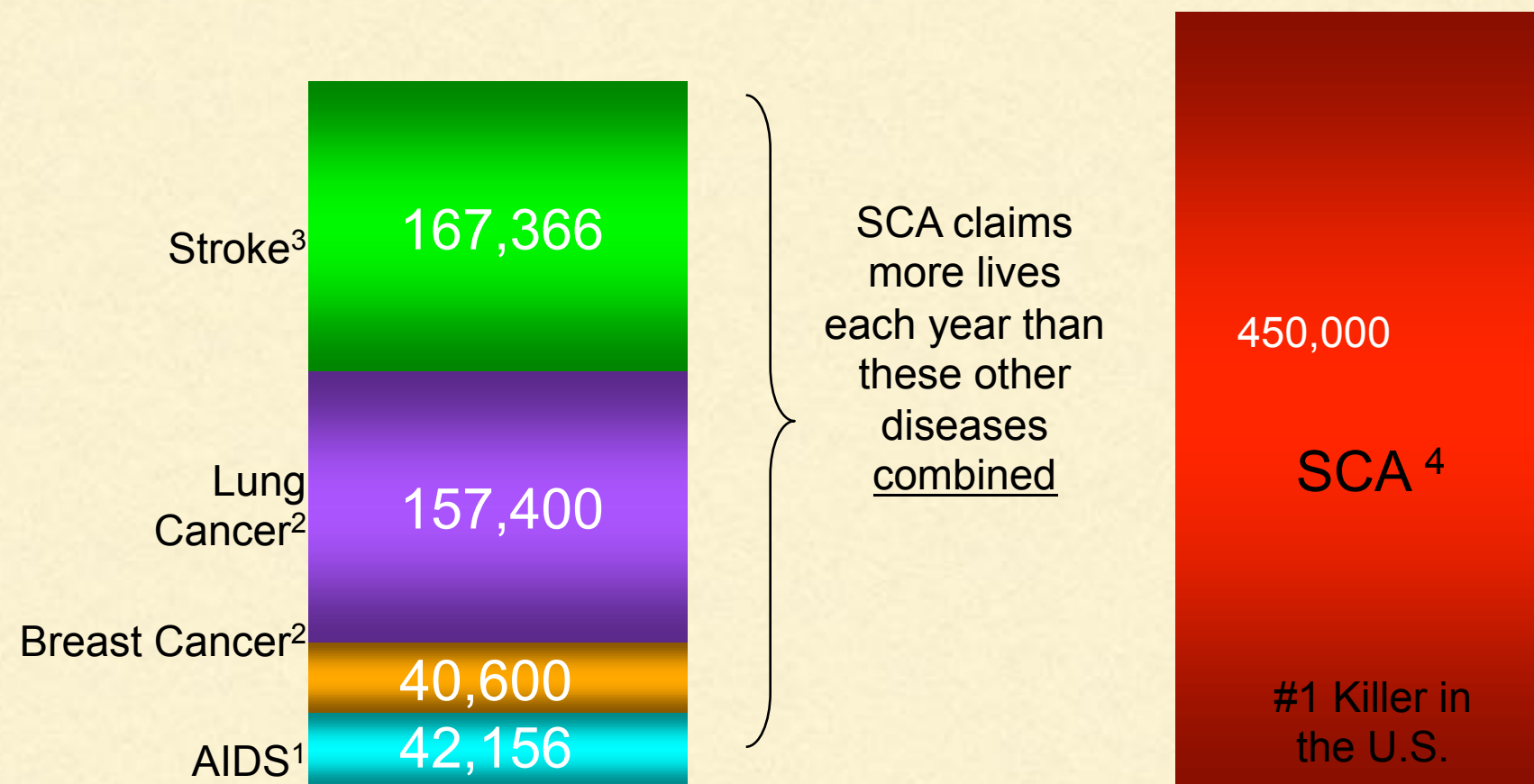
# WHO NEEDS A DEFIBRILLATOR?

---





# WHO NEEDS A DEFIBRILLATOR?



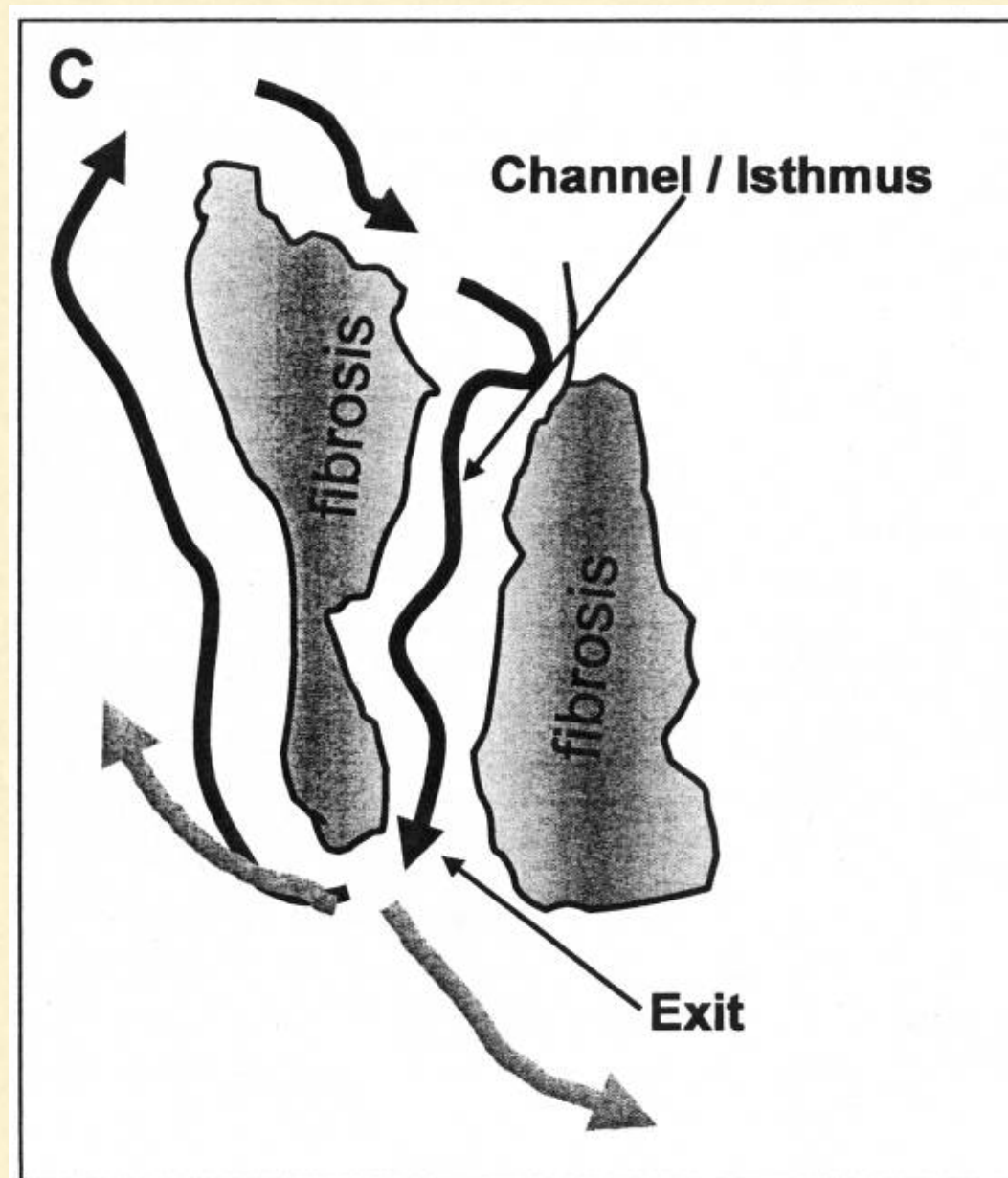
<sup>1</sup> U.S. Census Bureau, *Statistical Abstract of the United States: 2001*.

<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.

# WHO NEEDS A DEFIBRILLATOR?





---

# WHO NEEDS A DEFIBRILLATOR?

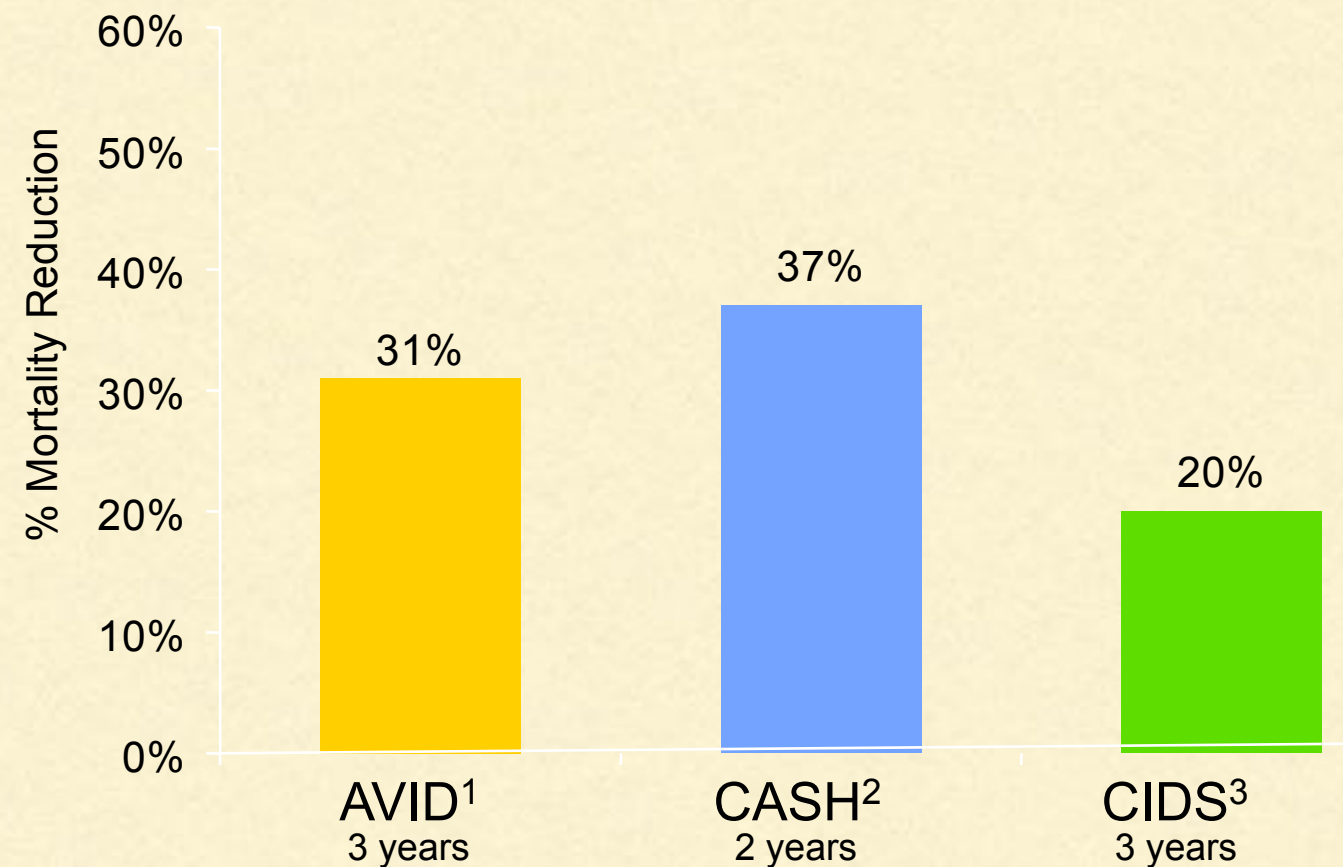
---

- Survivors
  - Syncope
  - Scar
  - Rare situations (Brugada syndrome, ARVC, infiltrative cardiomyopathies, etc.)
-

---

# SURVIVORS/ SECONDARY PREVENTION

---



<sup>1</sup> The AVID Investigators. N Engl J Med. 1997;337:1576-1583.

<sup>2</sup> Kuck K. ACC98 News Online. April, 1998. Press release.

<sup>3</sup> Connolly S. ACC98 News Online. April, 1998. Press release.

<sup>4</sup> Moss AJ. N Engl J Med. 1996;335:1933-1940.

---



---

# SYNCOPE

---

- Take a careful history and physical
  - Cardiac syncope: sudden, often traumatic, history of CAD
  - NSVT: risk factor
  - Consider EP study
  - ICD is indicated for cardiac syncope and low EF
-

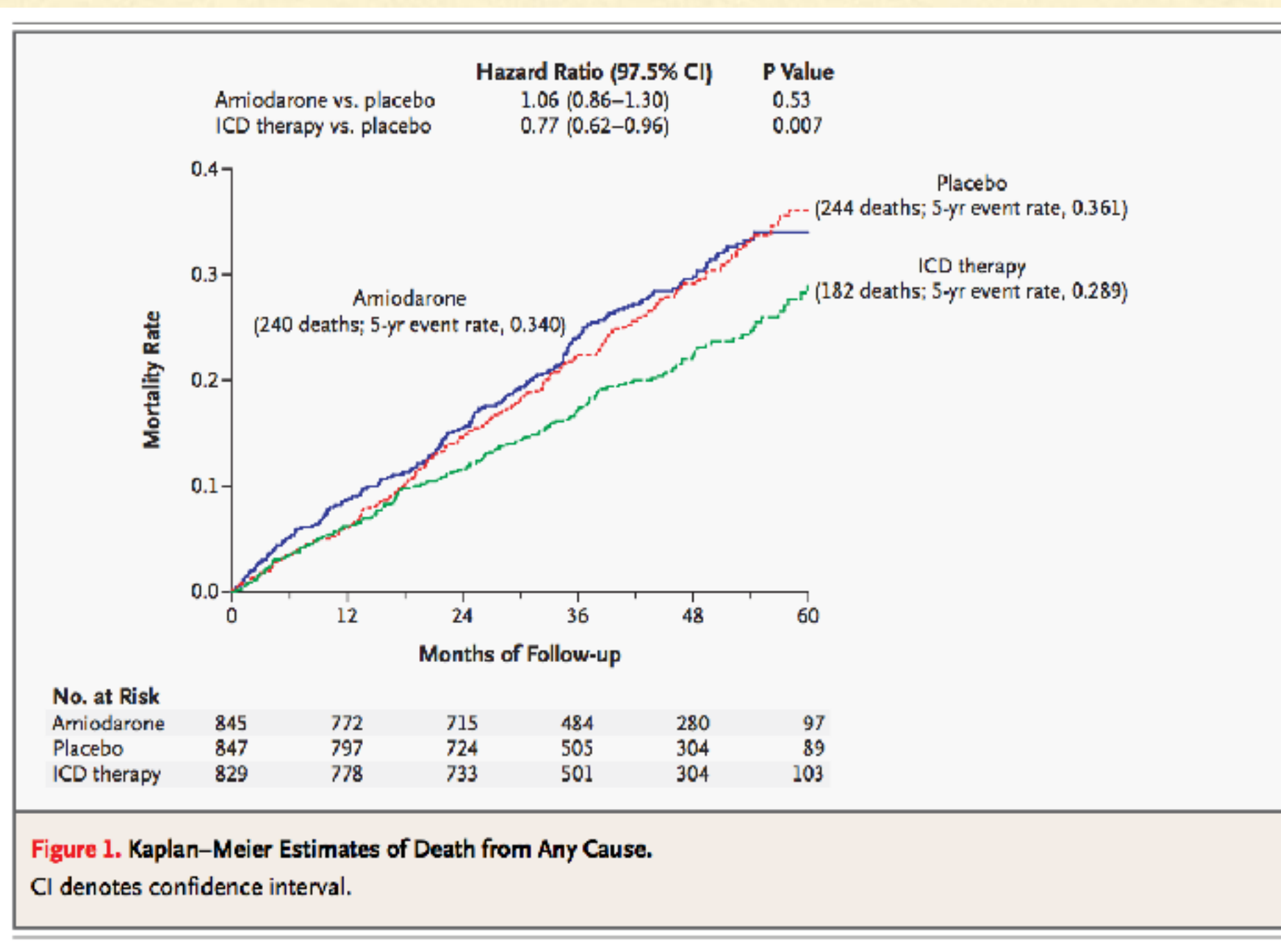
---

# SCAR

---

- $EF \leq 35\%$
  - $EF \leq 40\%$ , NSVT, positive EP study
-





Bardy et al. SCD-HeFT Trial. NEJM 352:3





---

# PRIMARY PREVENTION TRIALS

---

MADIT I  
MUSTT  
MADIT II  
SCD-HeFT  
DINAMIT, IRIS  
CABG Patch  
DEFINITE  
COMPANION

---

---

# WHO SHOULD NOT RECEIVE AN ICD

---

- Class I CHF (unless  $EF \leq 30\%$  with ICM)
  - Patients with a reversible cause
    - Revascularizable, <40 days from infarct, <3 months from revasc.
    - Cardiomyopathy that may improve with medical therapy
      - NICM: EF persistently low despite 3 months of Rx
  - Life expectancy < 1 year; class IV CHF (unless BiV-ICD)
-



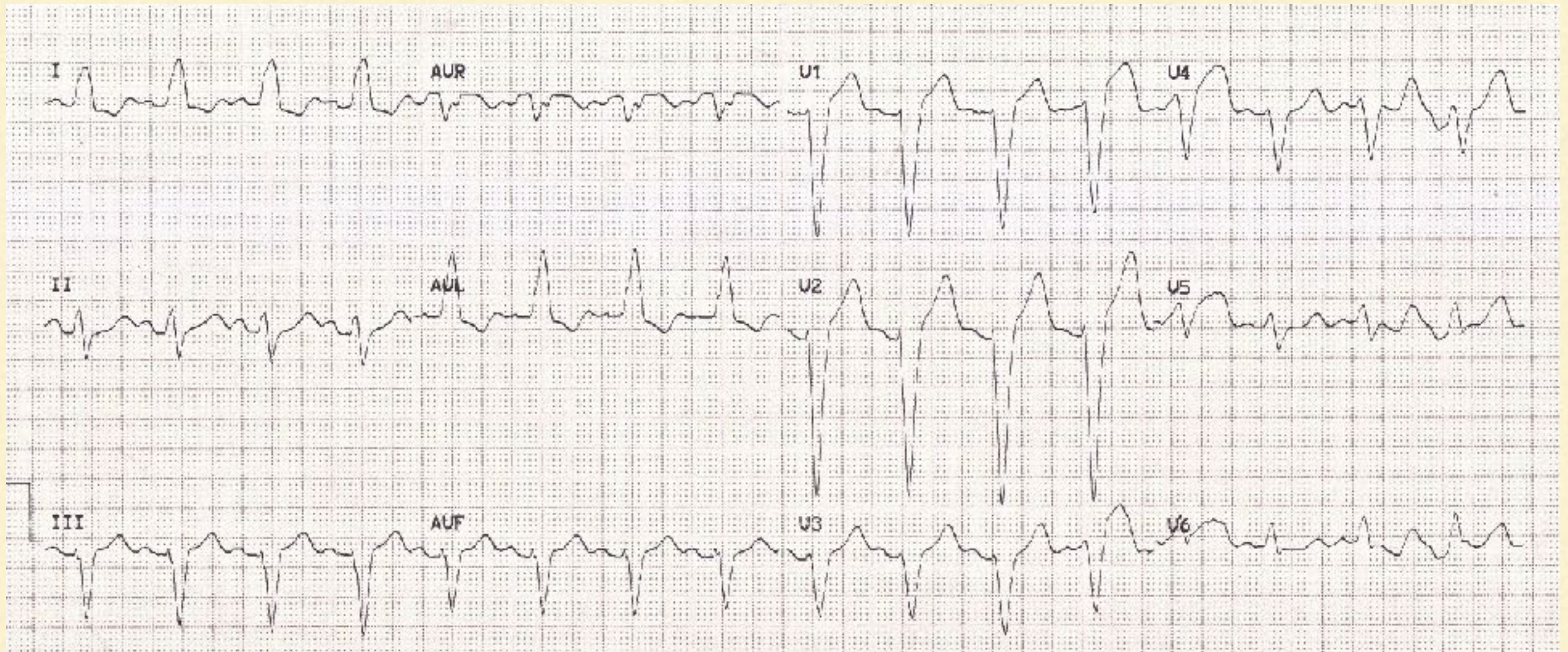


LifeVest

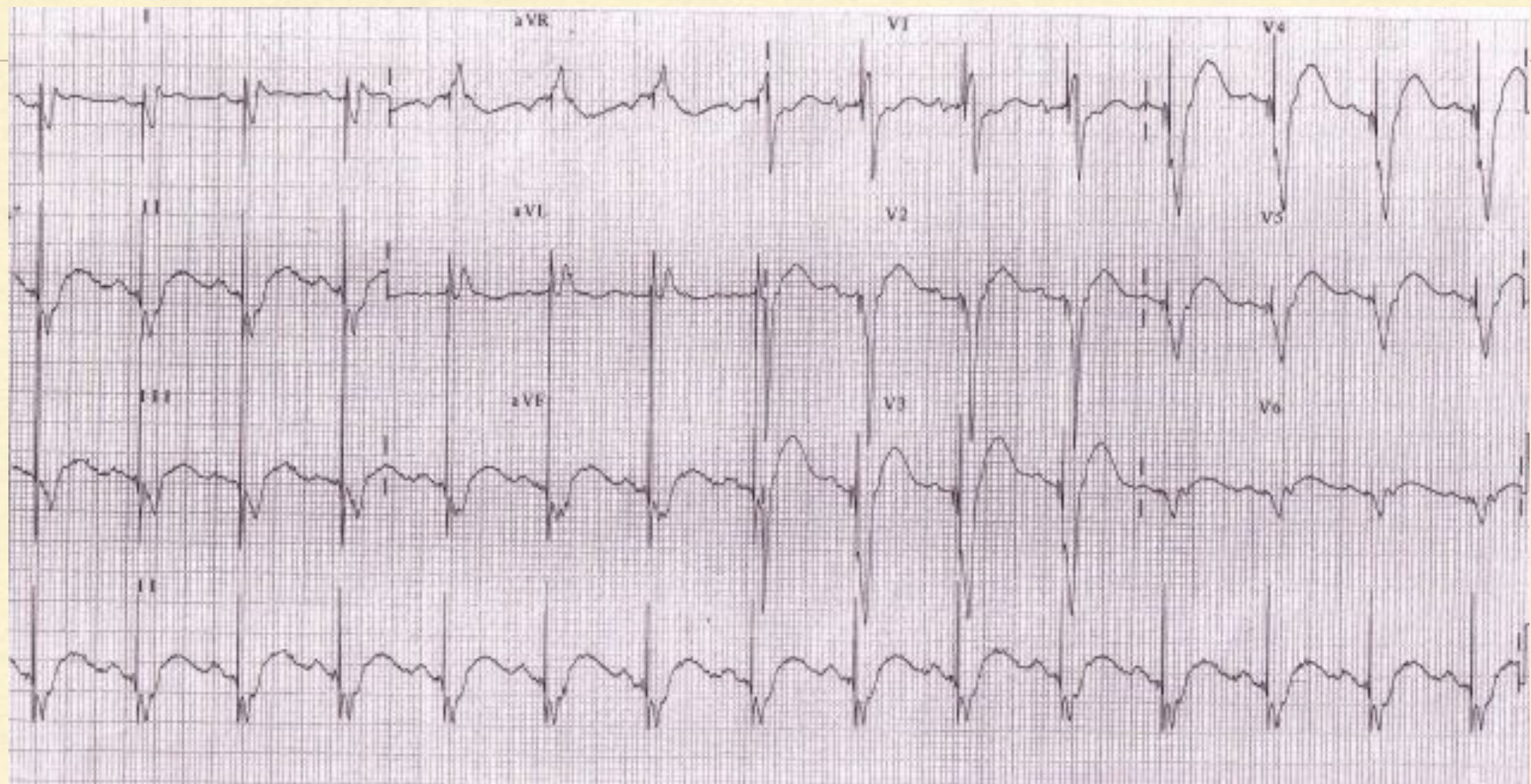




# CARDIAC RESYNCHRONIZATION THERAPY

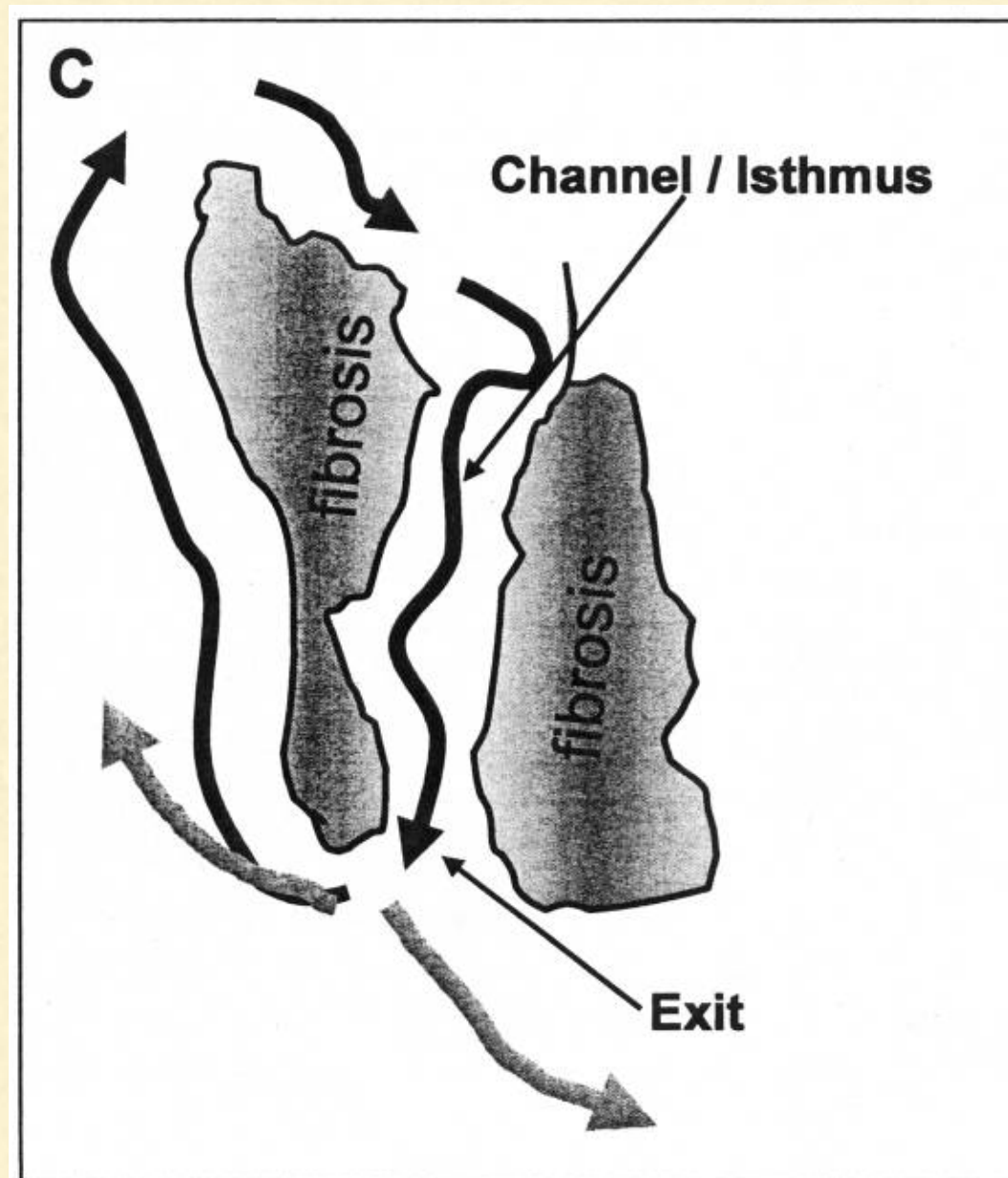






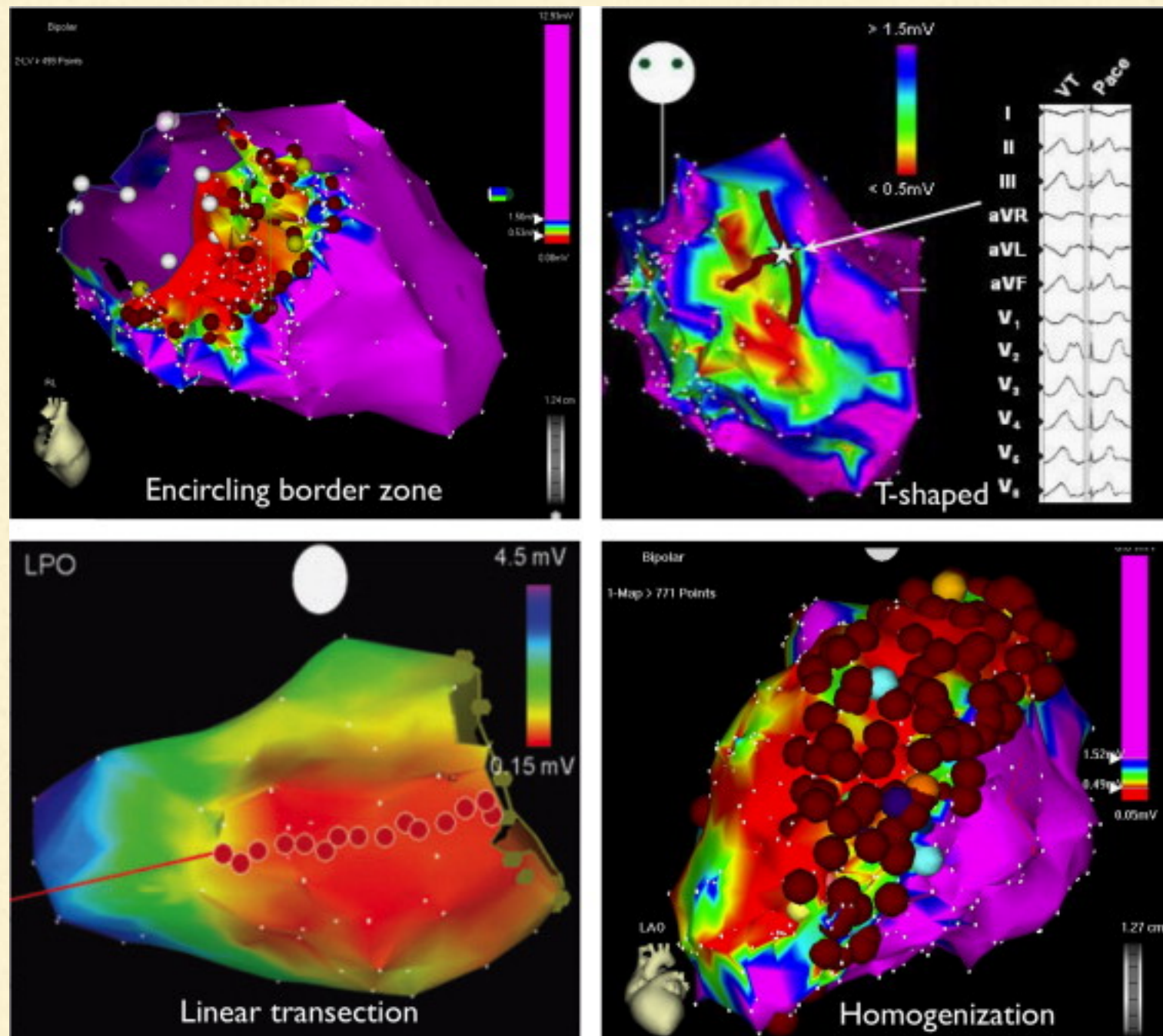


# VT ABLATION

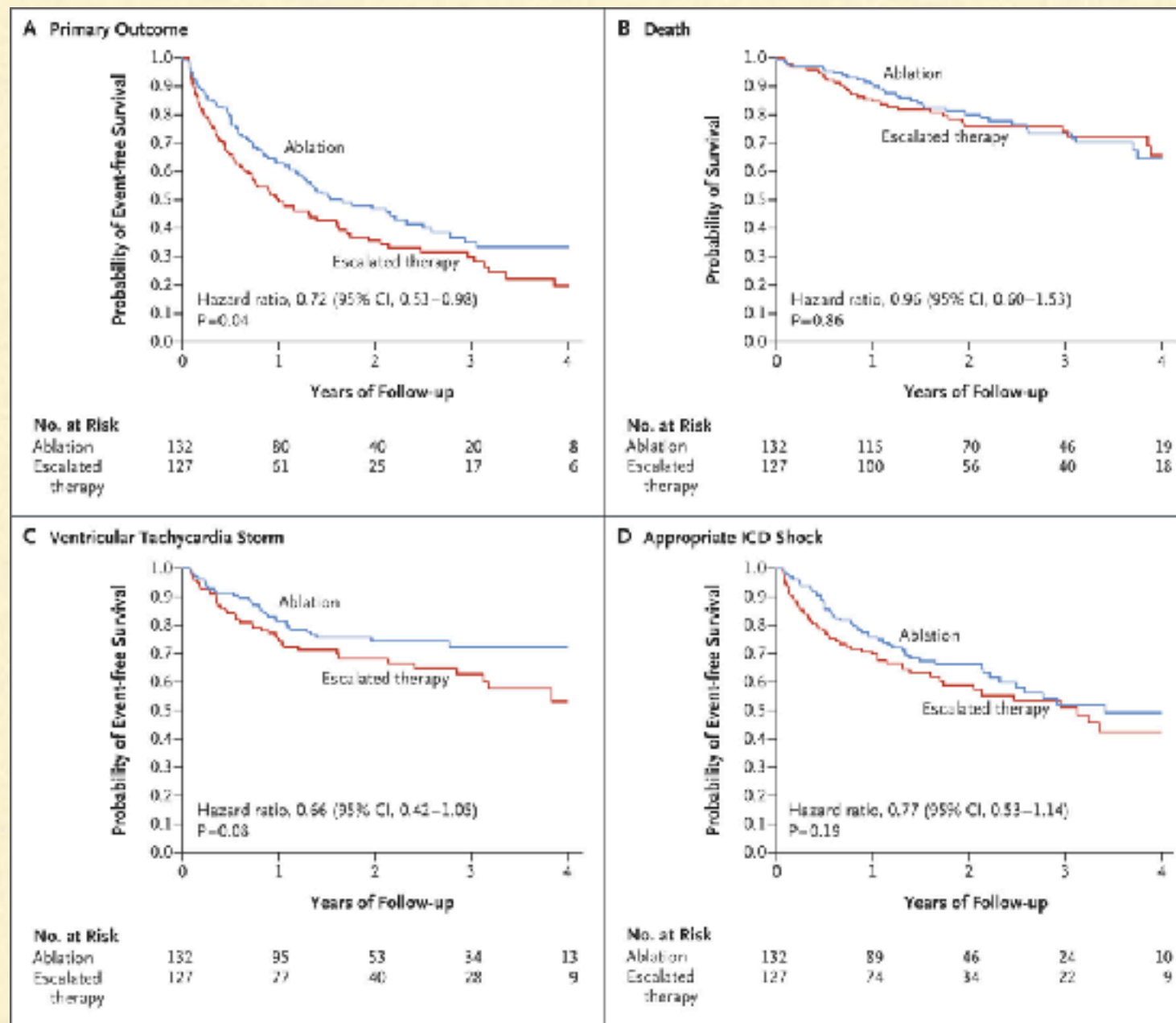




# VT ABLATION

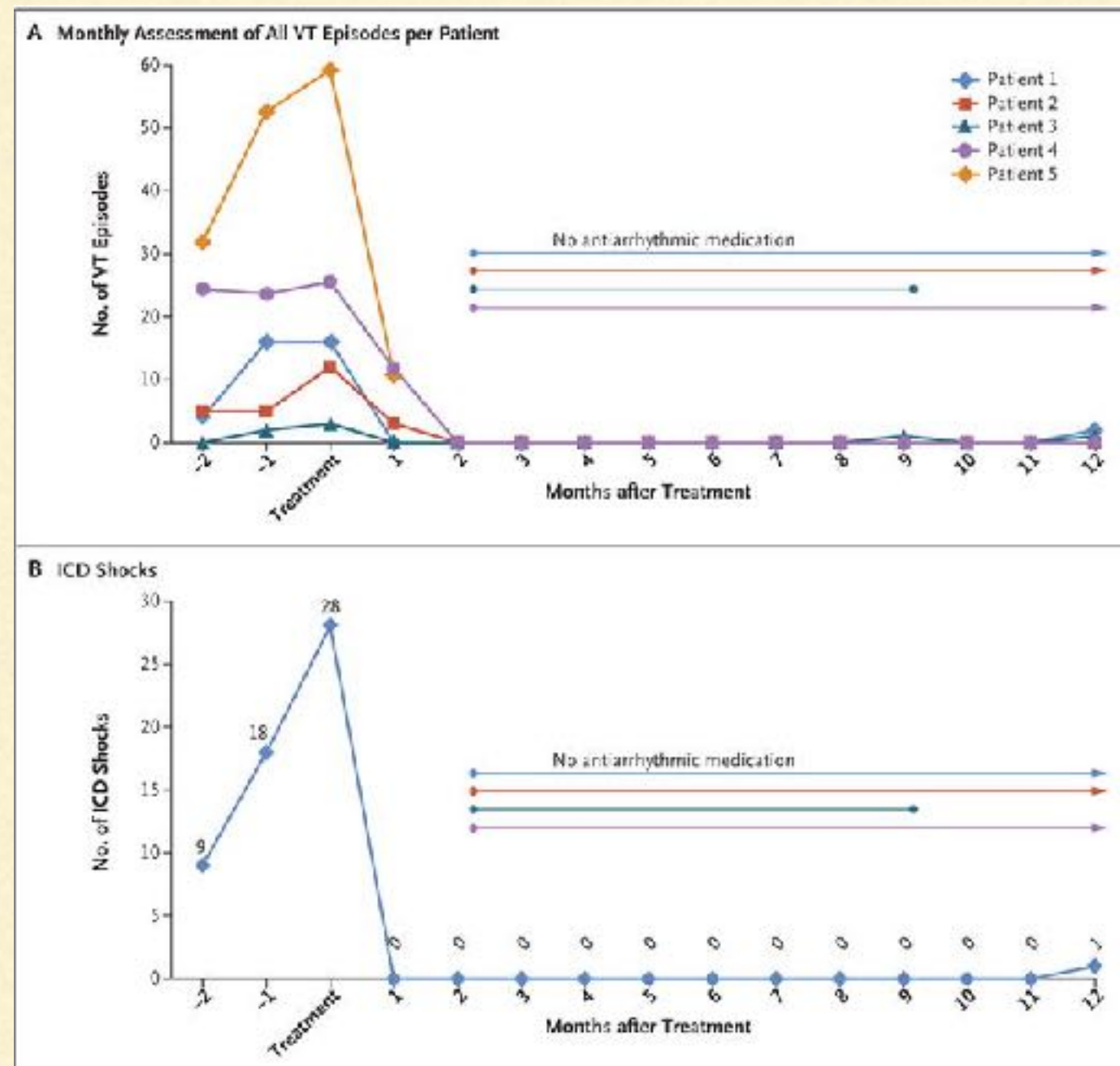


# VT ABLATION

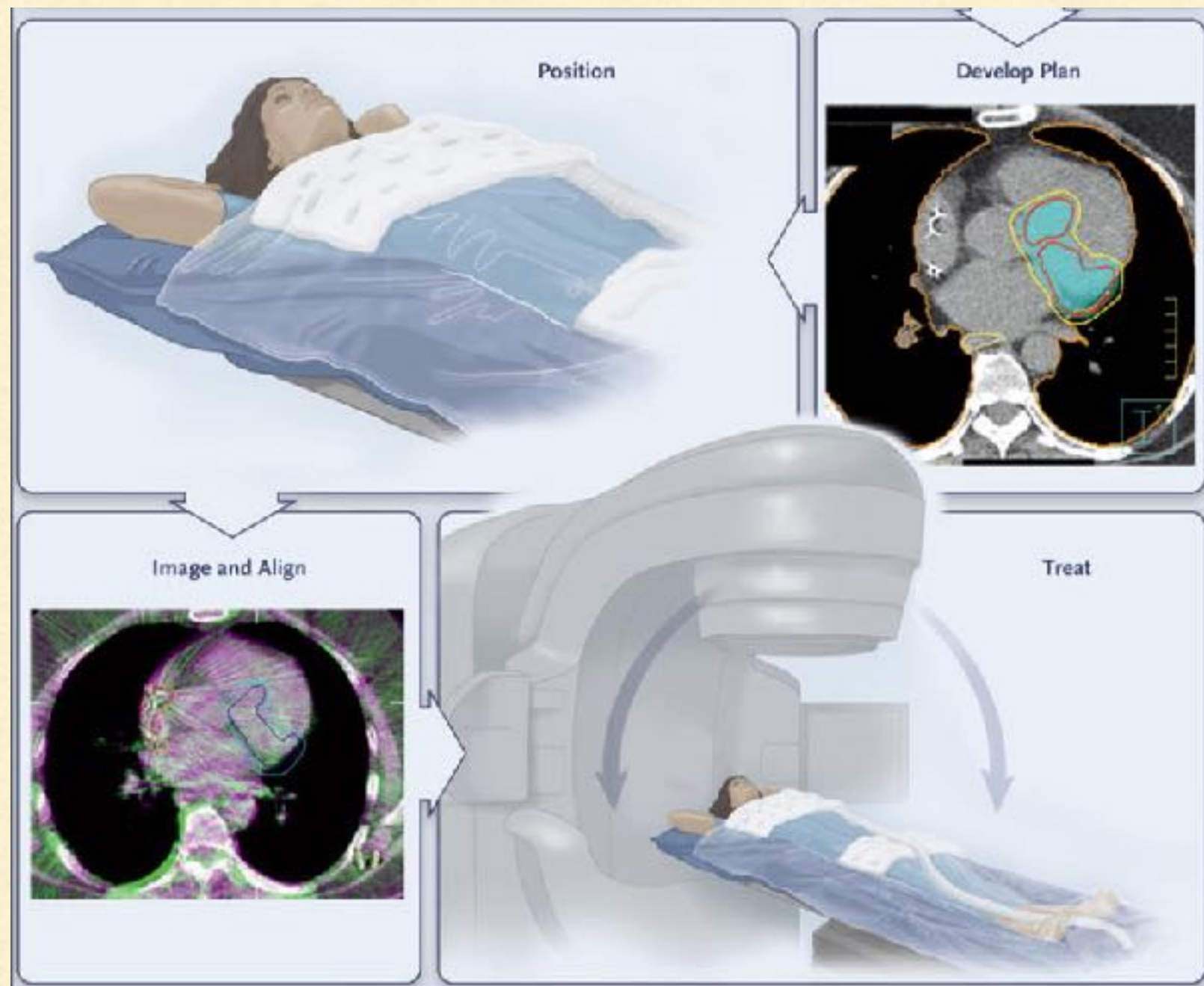




# VT ABLATION



# VT ABLATION





---

# THE END

---

