# FUNG HEALTHCARE LEADERSHIP SUMMIT 2016

## Leadership & Innovation in Healthcare

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# Live Better Electrically

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# Live Better Electrically

So, what exactly does that mean?

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# Live Better Elec

# Live Better Electrically


EURO SHOP

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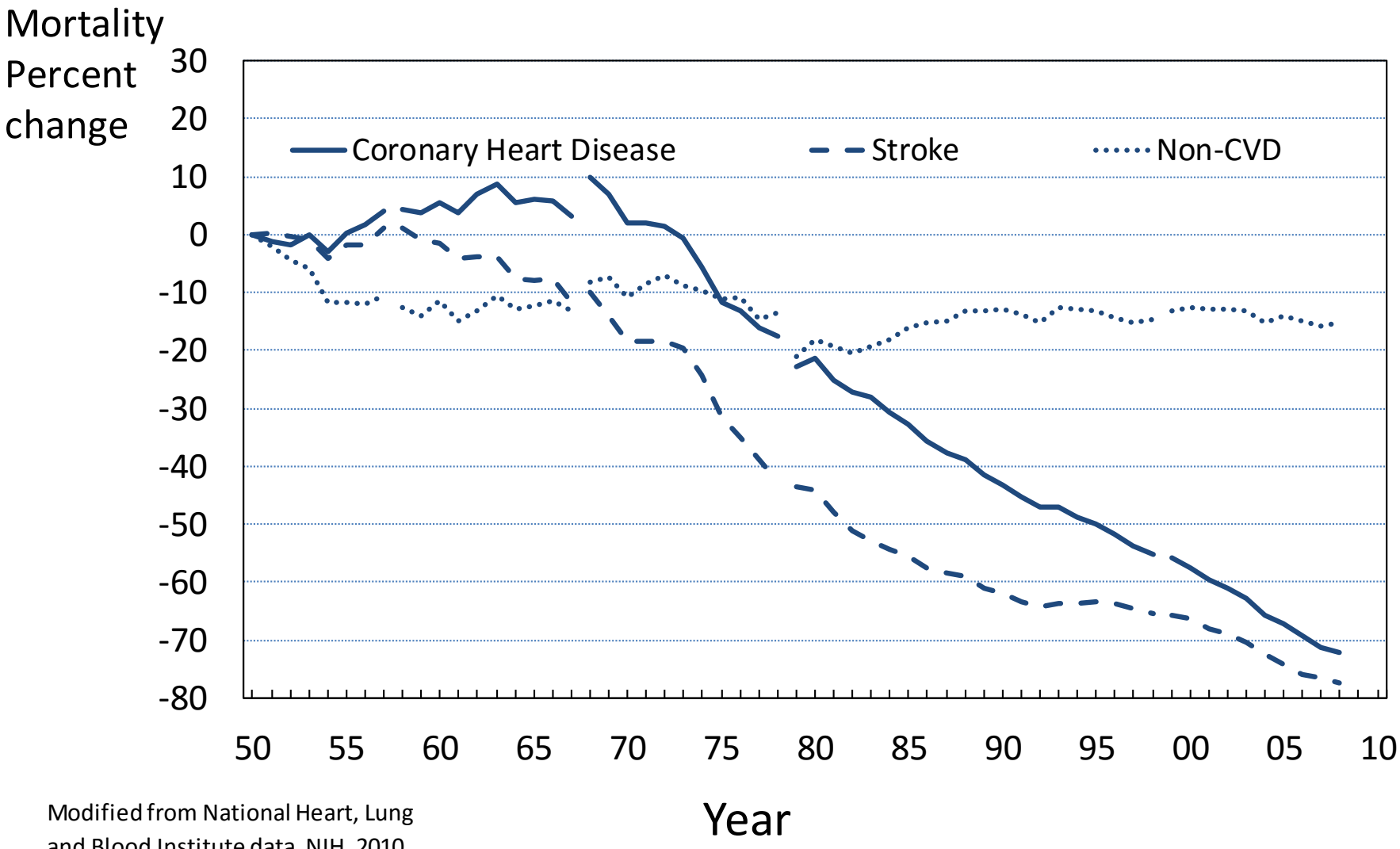
# Live Better Electrically

## Cardiac Electrophysiology

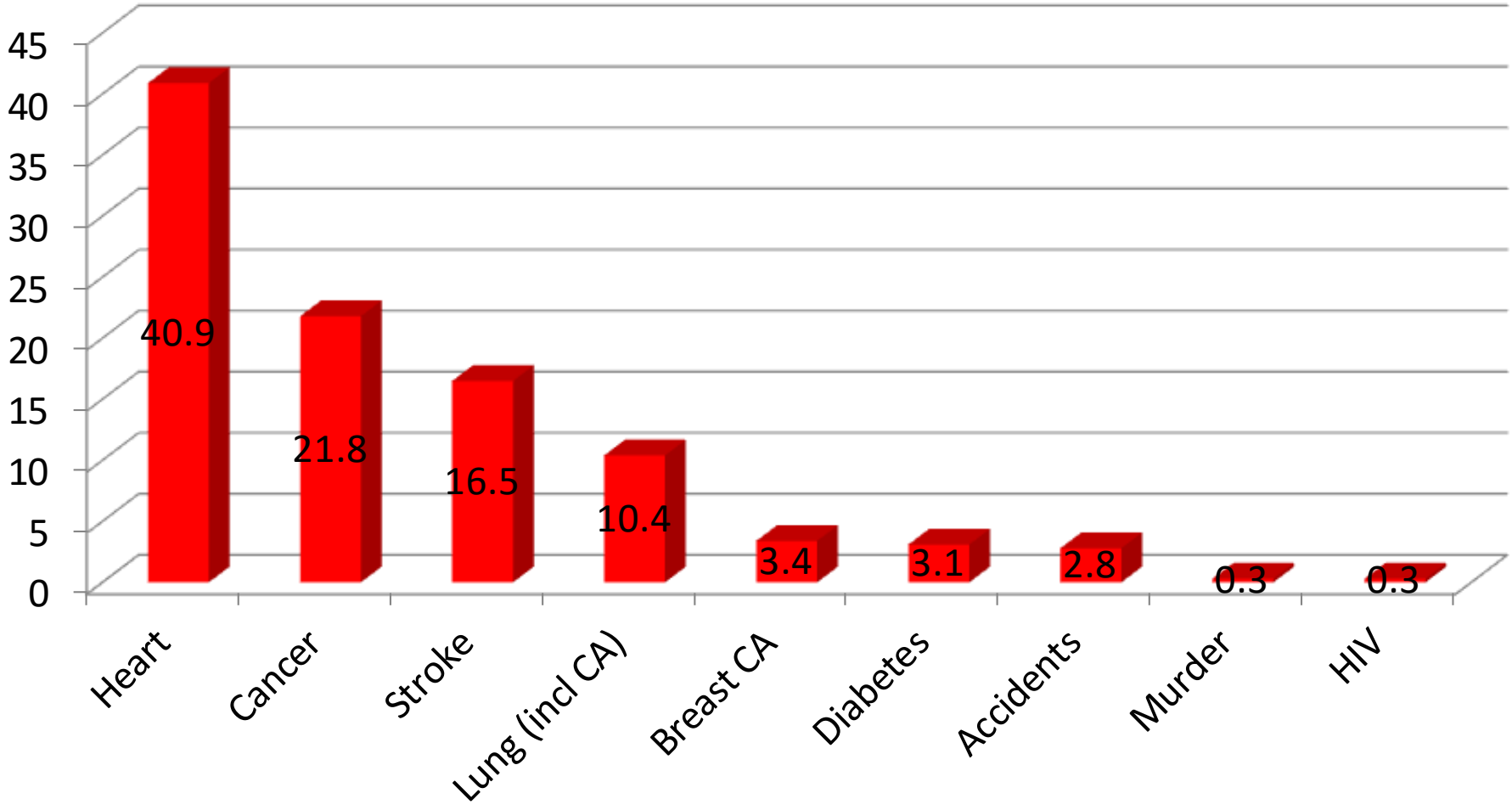
(a specialty of cardiology that deals just with heart rhythm disorders)

# In the past half-century, we have made huge advances in heart disease




Modified from National Heart, Lung and Blood Institute data, NIH, 2010.

# Heart Disease Still #1 Cause of Death in U.S.



# 4 reasons why heart disease mortality remains #1

- Obesity caus
- Cigarette sm
- Aging popula
- Genetics


THE ROANOKE TIMES
Monday, September 20, 2004

STEPHANIE KLEIN-DAVIS | The Roanoke Times

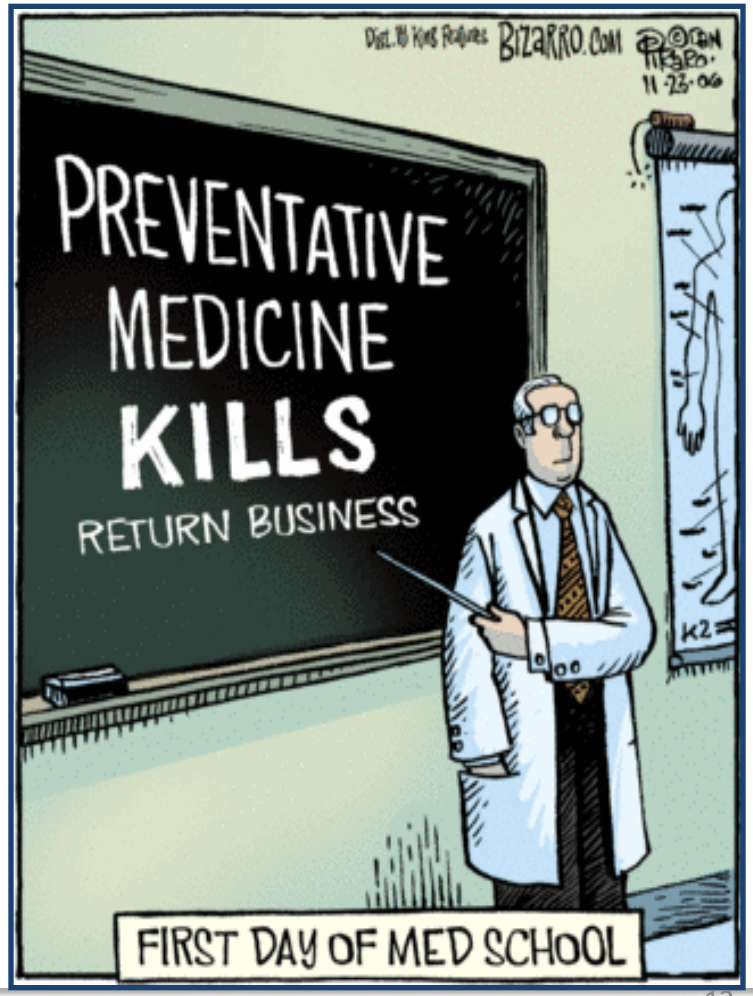
Mellisa Williamson, 35, a Bullitt Avenue resident, worries about the effect on her unborn child from the sound of jackhammers.

# 4 reasons why heart disease mortality is *improving*

- Diet, exercise

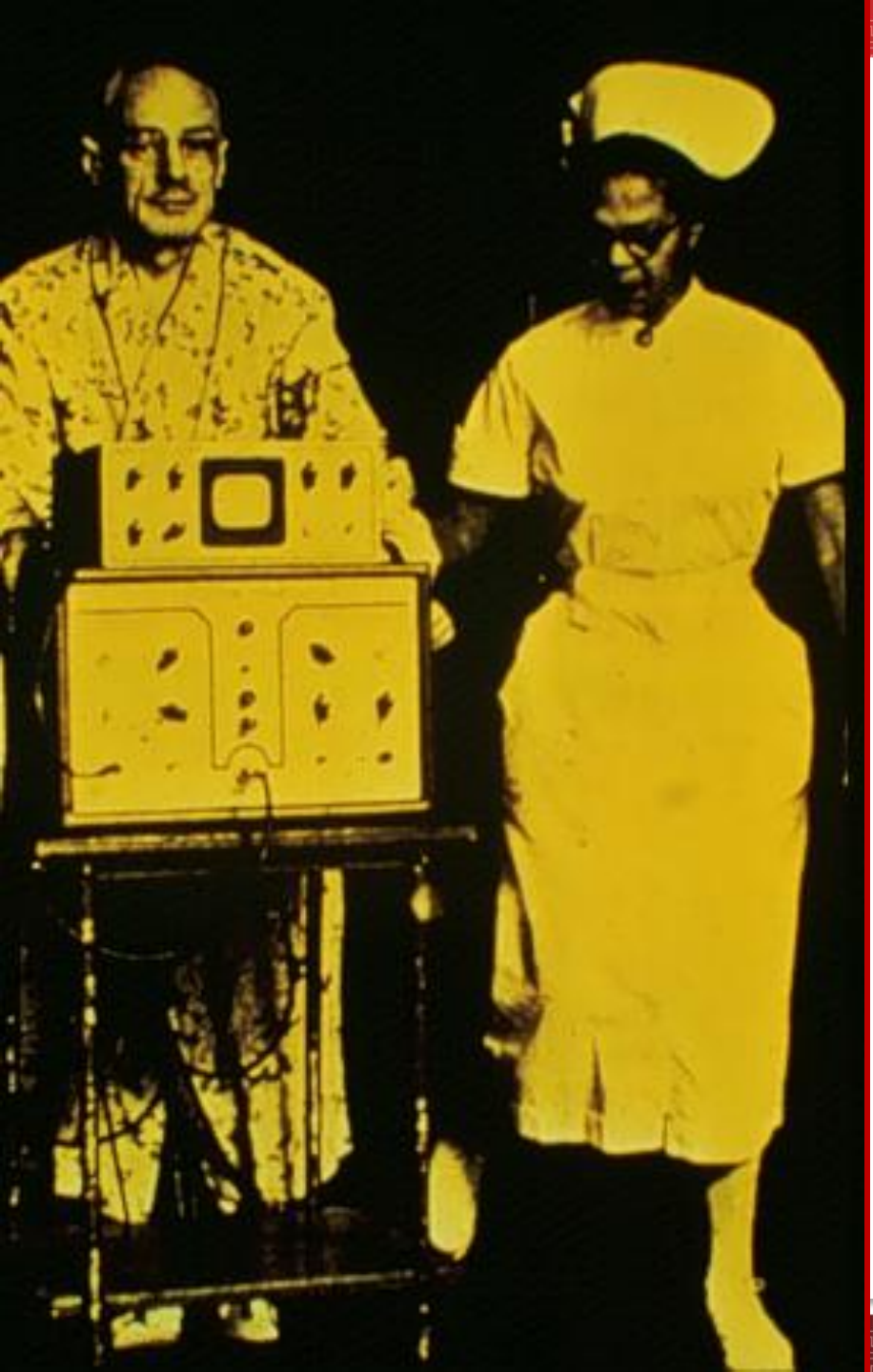
# 4 reasons why heart disease mortality is *improving*

- Diet, exercise
- Statins
- Stents



# 4 reasons why heart disease mortality is *improving*

- Diet, exercise
- Statins
- Stents
- Defibrillators



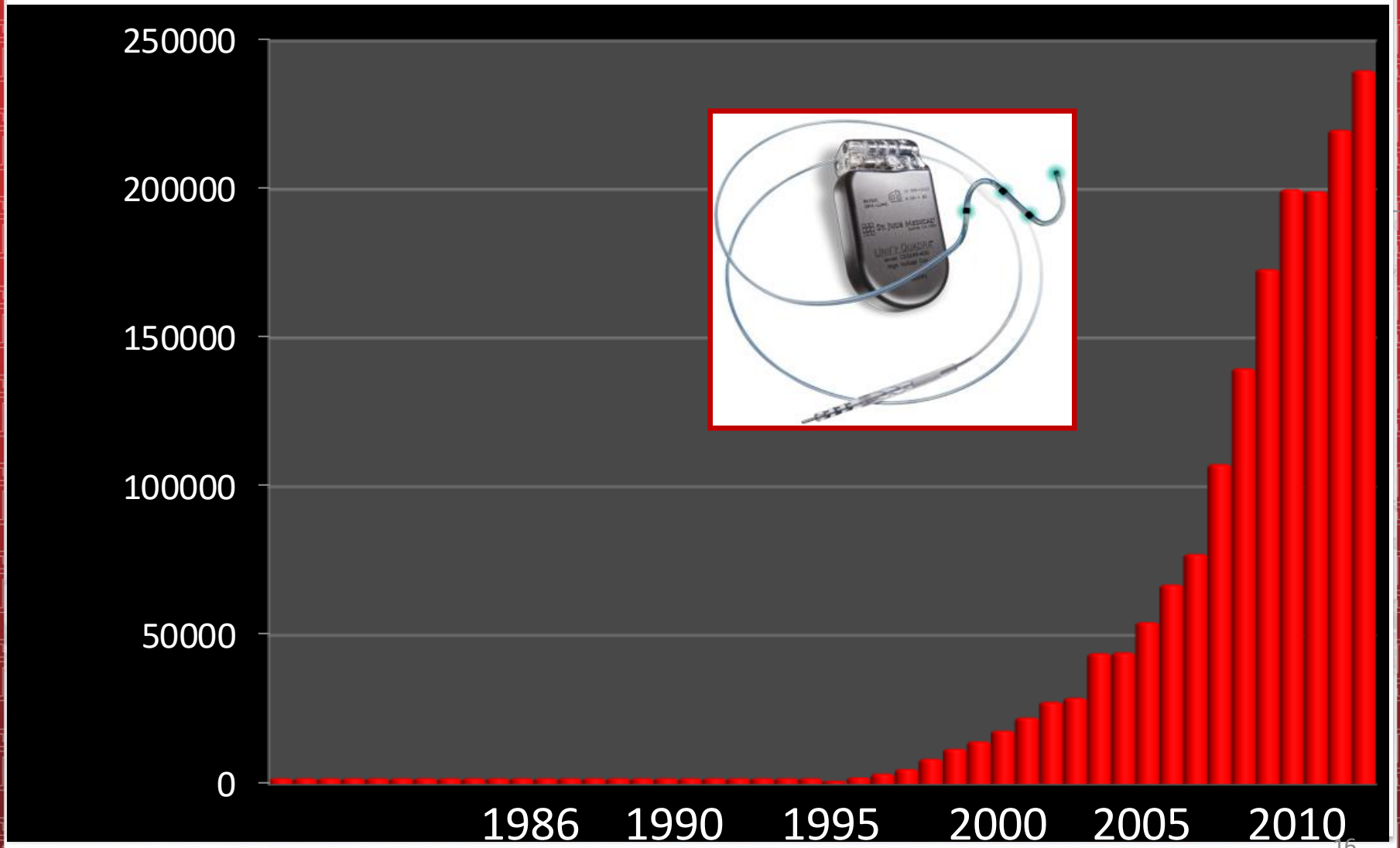
# Cardiac Implanted Electrical Devices (CIEDs)

- Pacemakers
- Defibrillators (ICD)

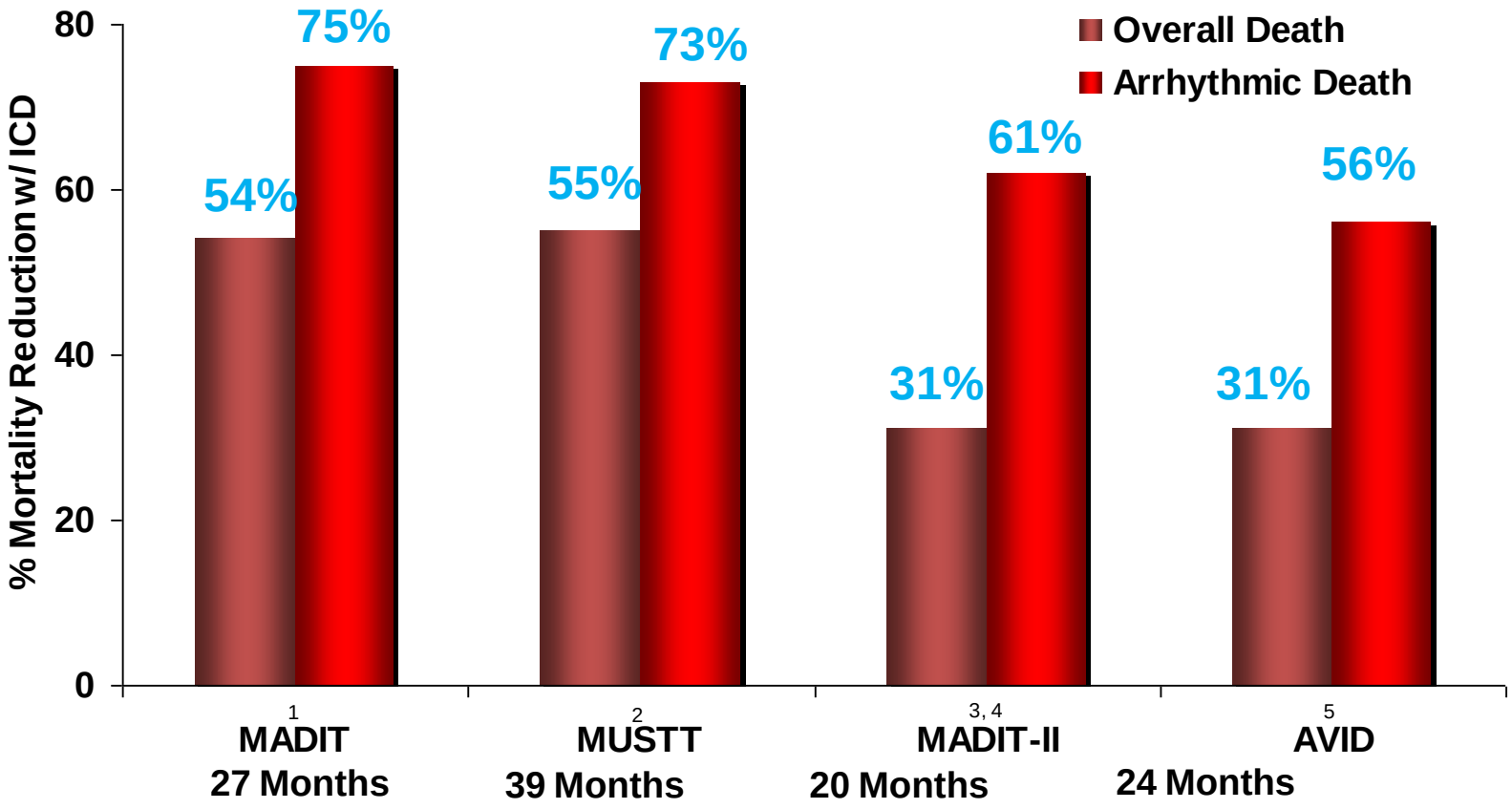
One Inch

**Over 50 years of progress**

# 30 Years of ICD Implants by Year
## 1986-2016



# Mortality Benefits in All ICD Trials





[1] Moss AJ. *N Engl J Med*. 1996;335:1933-40.
[2] Buxton AE. *N Engl J Med.* 1999;341:1882-90.
[3] Moss AF. *N Engl J Med.* 2002;346:877-83.
[4] Moss AJ. Presented before ACC 51st Annual Scientific Sessions, Late Breaking Clinical Trials, March 19, 2002.
[5] The AVID Investigators. *N Engl J Med*. 1997;337:1576-83.

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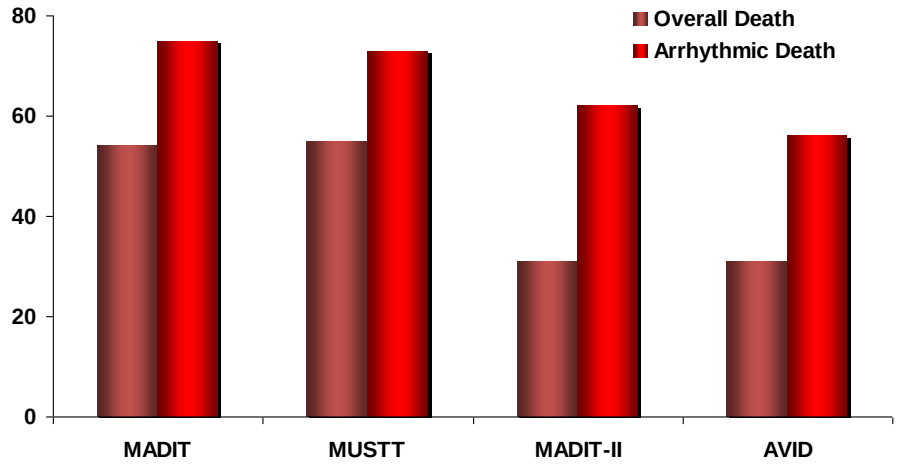
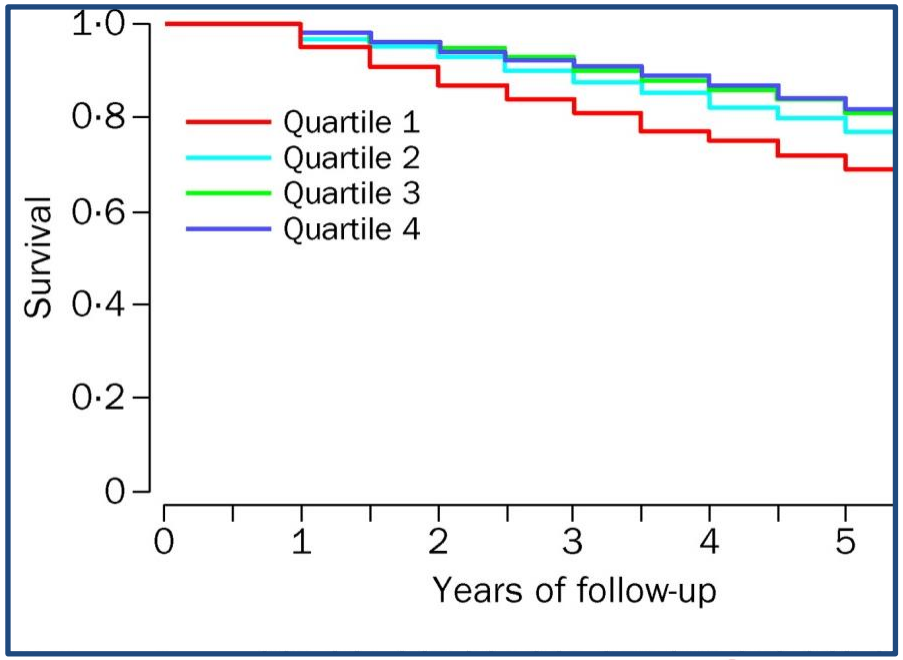
# If Implanted Defibrillators are so great, shouldn't we all get one?



# To prevent heart disease, which is more important to know

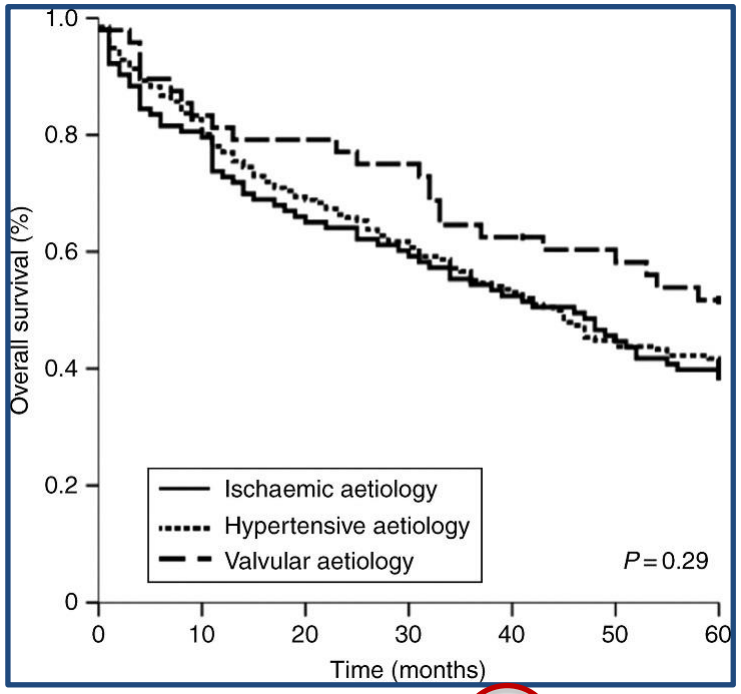
## Cholesterol?

## Ejection fraction?




Elevated cholesterol, mortality 19% at 5 years

Schatz I et al. The Lancet 2001;358:351

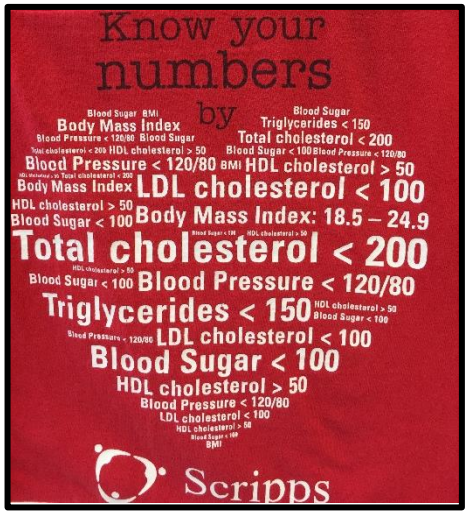


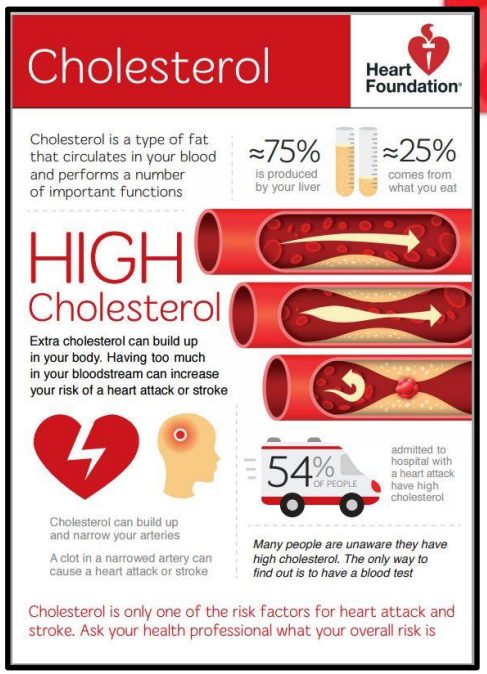

Reduced EF, mortality 46% at 5 years, regardless of etiology

Tribouilloy C et al. Eur Heart J 2007;554:339.

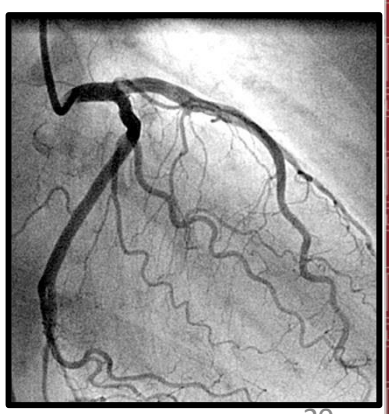
# With the advent of statin therapy and angioplasty, marketing focused on cholesterol

AHA/ACC and industry partnership



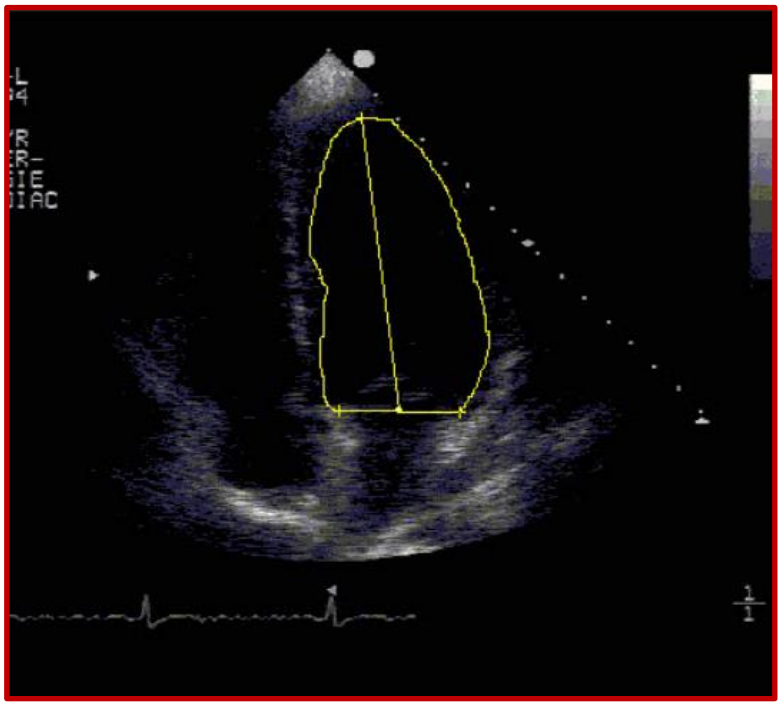


# EF = Ejection Fraction

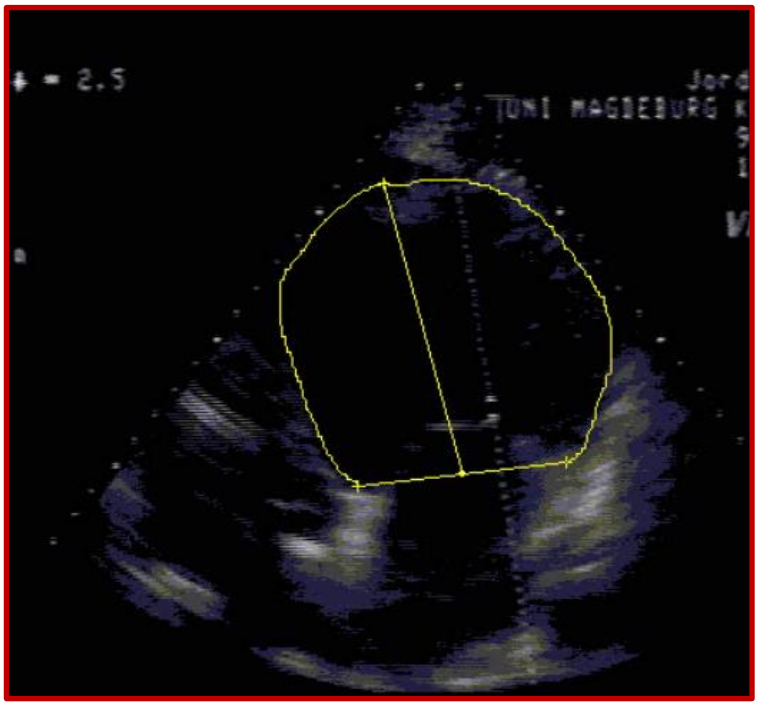
the percentage of blood pumped out with each heartbeat

Normal echo



EF = 65%

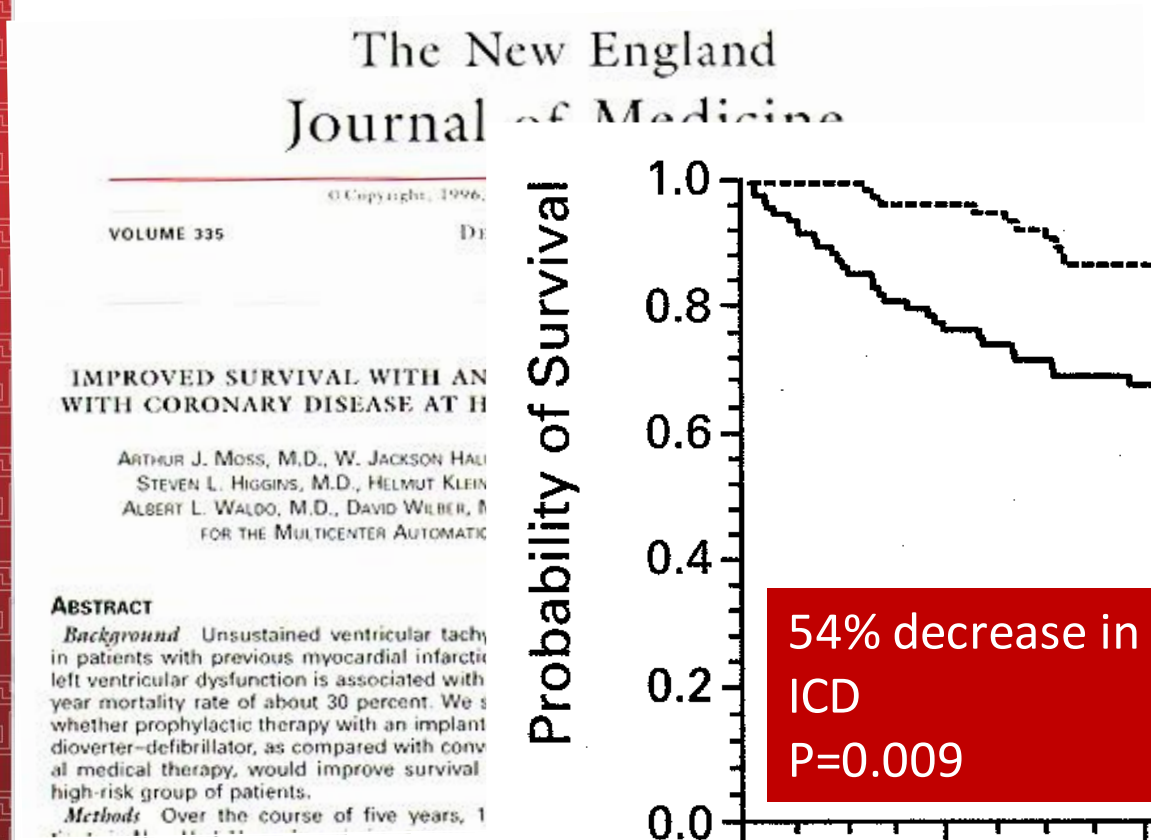
Low EF
(Cardiomyopathy)



EF = 15%

# MADIT

## Multicenter Automatic Defibrillator Implantation Trial



The New England Journal of Medicine

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VOLUME 335

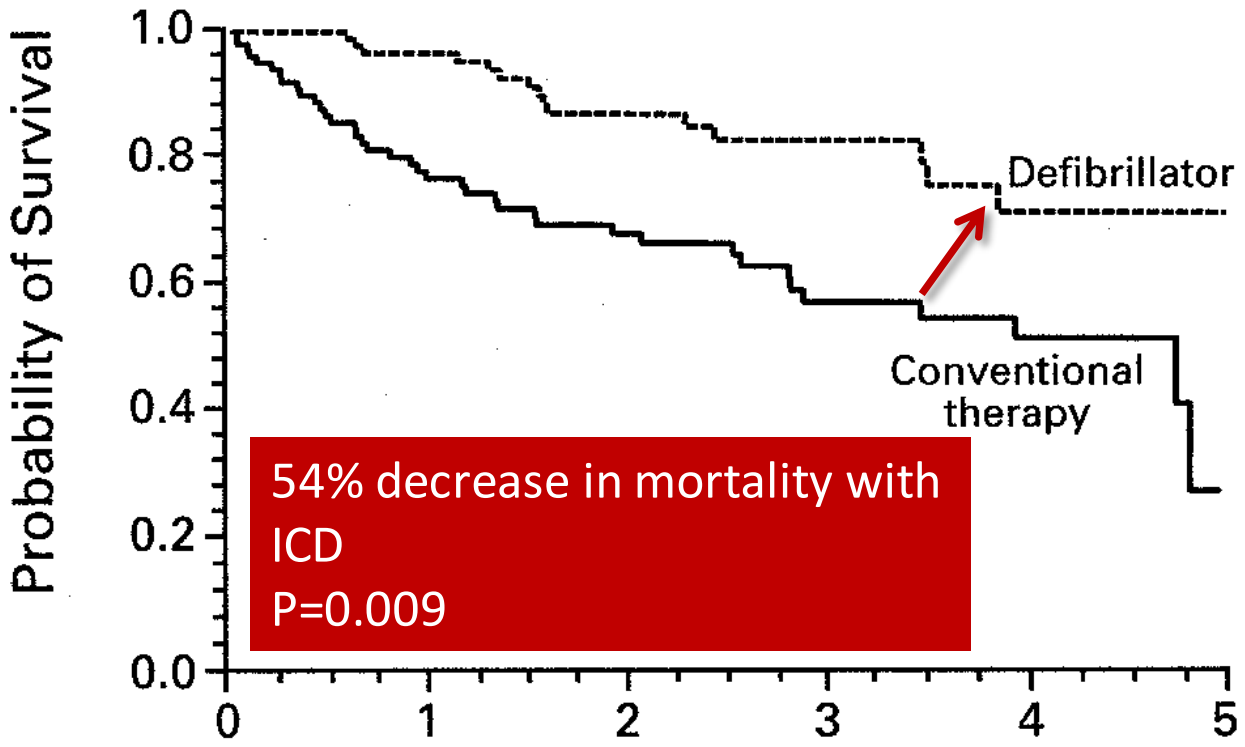
IMPROVED SURVIVAL WITH AN
WITH CORONARY DISEASE AT H

ARTHUR J. MOSS, M.D., W. JACKSON HALL
STEVEN L. HIGGINS, M.D., HELMUT KLEIN
ALBERT L. WALDO, M.D., DAVID WILBER,
FOR THE MULTICENTER AUTOMATIC

ABSTRACT

*Background* Unsustained ventricular tachy
in patients with previous myocardial infarcti
left ventricular dysfunction is associated with
year mortality rate of about 30 percent. We s
whether prophylactic therapy with an implant
dioverter–defibrillator, as compared with conv
al medical therapy, would improve survival
high-risk group of patients.

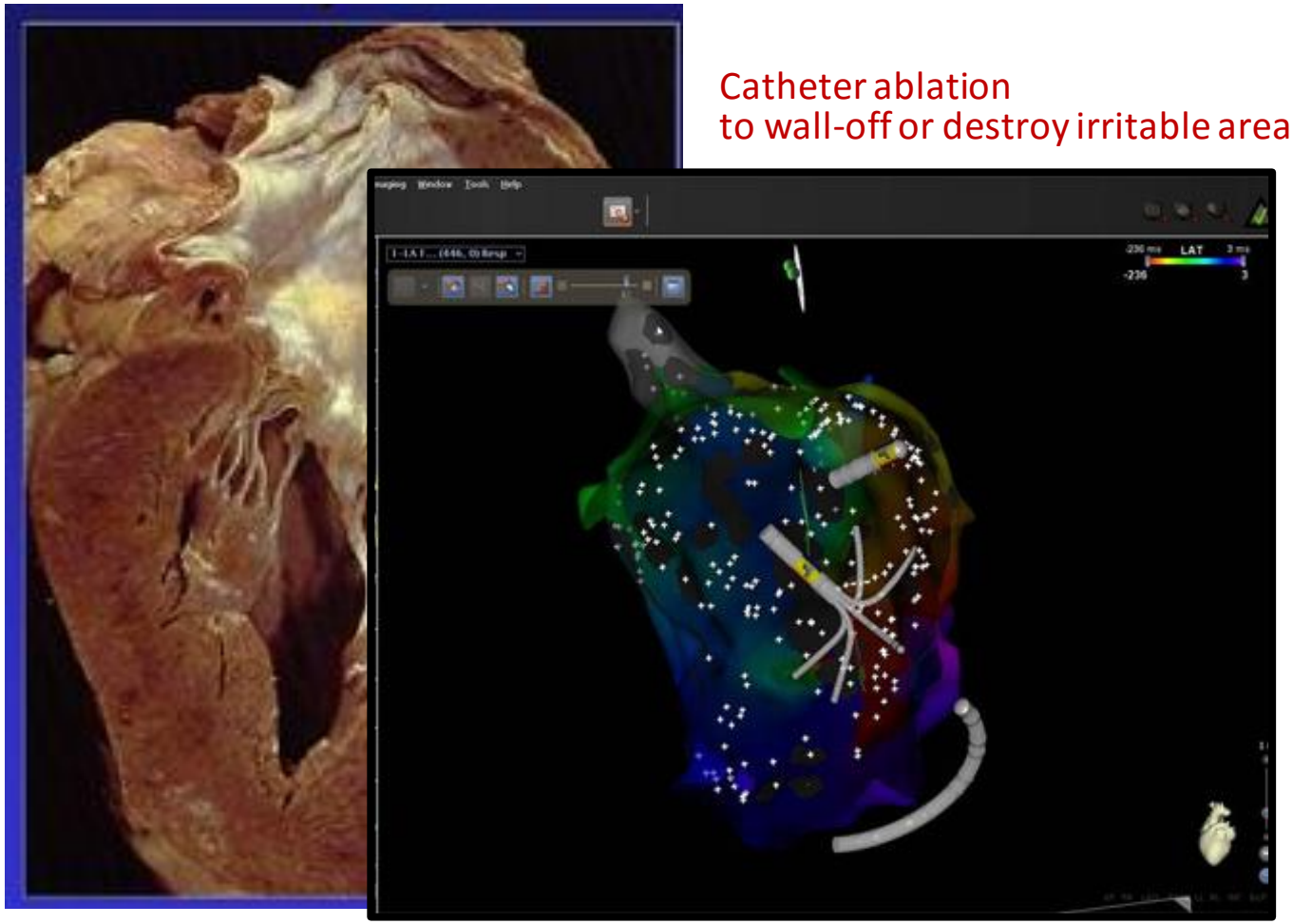
*Methods* Over the course of five years, 1



# Why do people with low EF die suddenly?

Reentrant Ventricular Tachycardia around scar

# Why do people with low EF die suddenly?




Catheter ablation
to wall-off or destroy irritable area

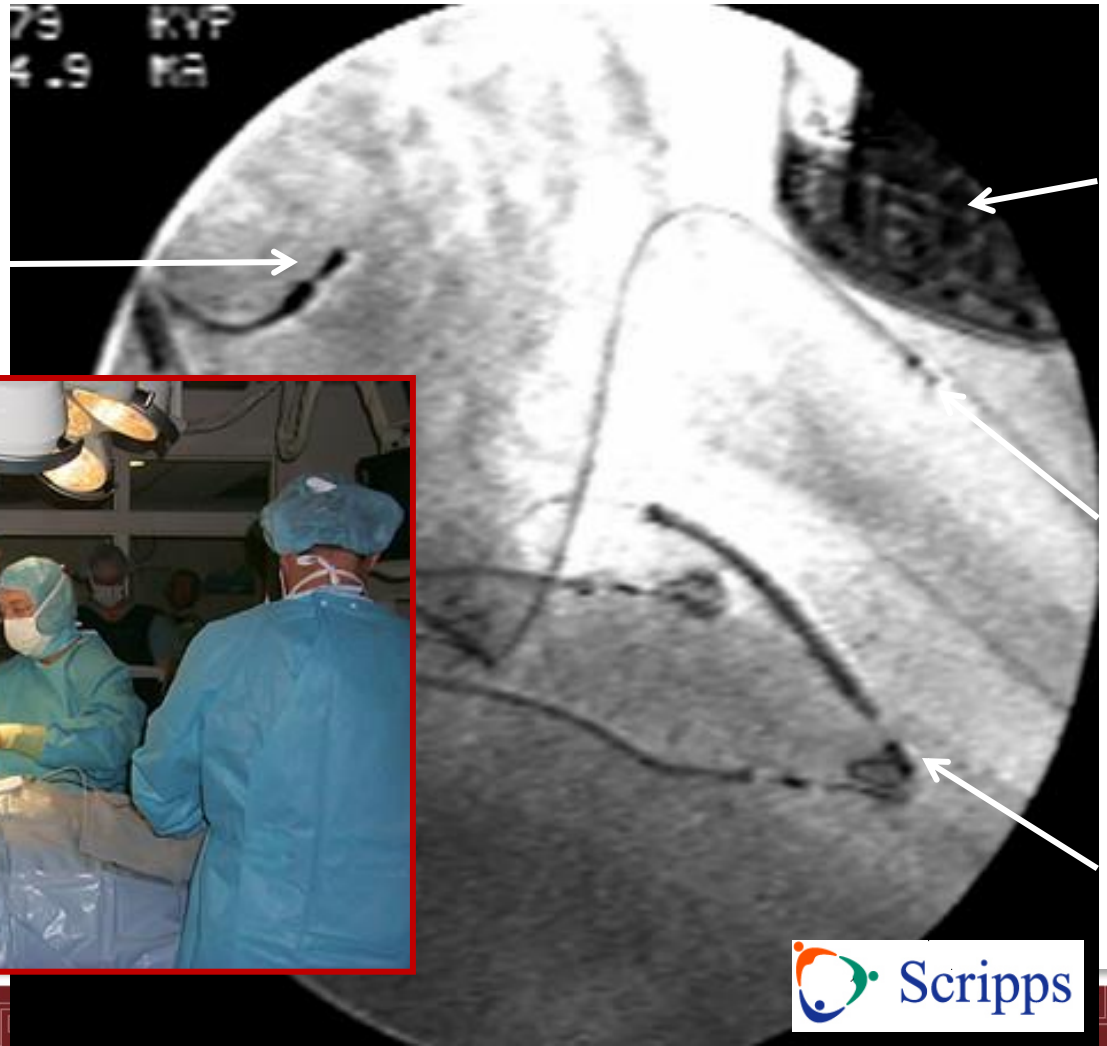
# The Latest in Device Therapy

## *Cardiac Resynchronization Therapy*

## *CRT*

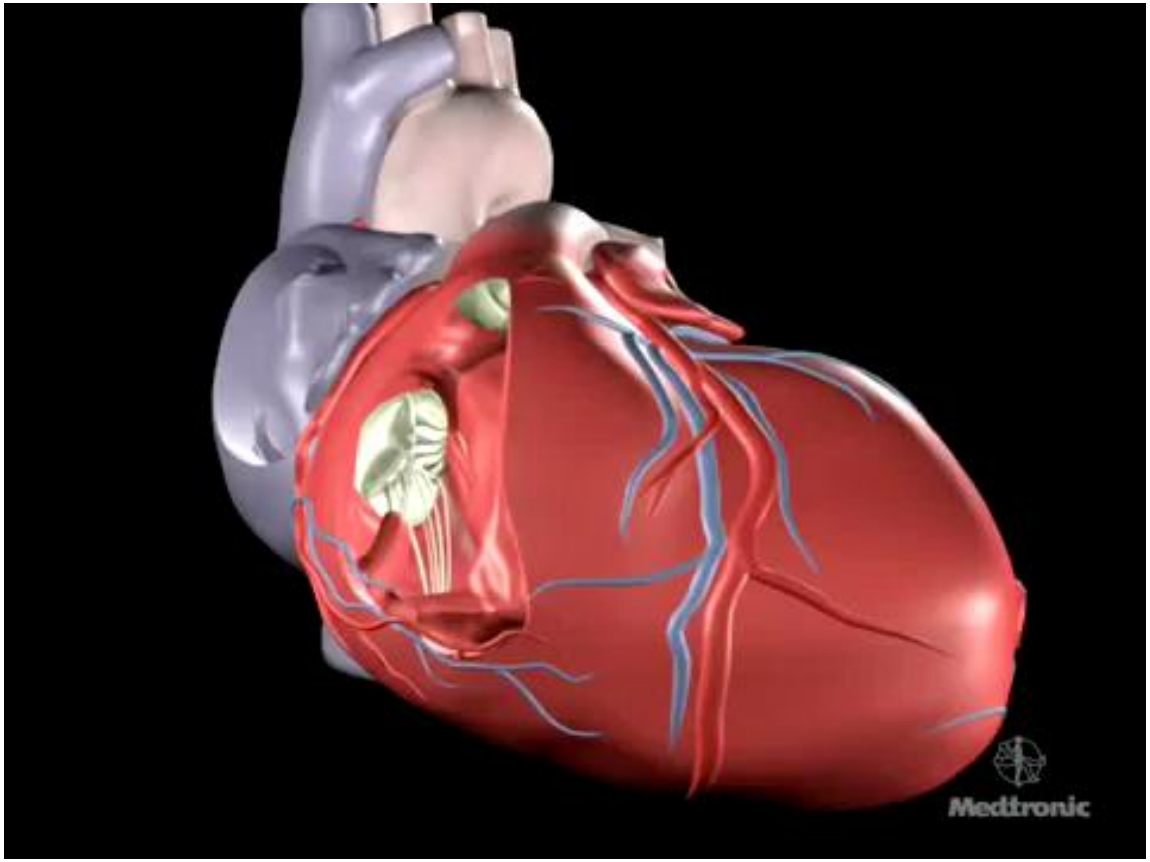

# Next: without open heart surgery
# *Transvenous* biventricular pacing

2nd Patient in World at Scripps, 2002




Scripps

# Cardiac Resynchronization Therapy
## Technique for Transvenous Approach



# Cardiac Resynchronization Therapy (CRT)

## Works with pacemaker or defibrillator

# Cardiac Resynchronization Therapy (CRT)

## Works with pacemaker or defibrillator

In selected patients, CRT:

- Improves EF an average of 5%, some back to normal
- Improves activity an average of 1 NYHA class
- Decreases mortality, even with just the pacemaker version

So why don't we all get a "bivent" device?

Only works if low EF *and* wide QRS (bundle branch block)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# Cardiac Resynchronization Therapy for the Treatment of Heart Failure in Patients With Intraventricular Conduction Delay and Malignant Ventricular Tachyarrhythmias

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*La Jolla and San Francisco, California; Columbus, Ohio; Milwaukee, Wisconsin; Davenport, Iowa; Lancaster and Hershey, Pennsylvania; Durham, North Carolina; and St. Paul, Minnesota*

**OBJECTIVES** This study was conducted to assess the safety and effectiveness of cardiac resynchronization therapy (CRT) when combined with an implantable cardioverter defibrillator (ICD).

**BACKGROUND** Long-term outcome of CRT was measured in patients with symptomatic heart failure (HF), intraventricular conduction delay, and malignant ventricular tachyarrhythmias (ventricular tachycardia/ventricular fibrillation [VT/VF]) requiring therapy from an ICD.

**METHODS** Patients (n = 490) were implanted with a device capable of providing both CRT and ICD therapy and randomized to CRT (n = 245) or control (no CRT, n = 245) for up to six months. The primary end point was progression of HF, defined as all-cause mortality, hospitalization for HF, and VT/VF requiring device intervention. Secondary end points included peak oxygen consumption ($VO_2$), 6-min walk (6 MW), New York Heart Association (NYHA) class, quality of life (QOL), and echocardiographic analysis.

**RESULTS** A 15% reduction in HF progression was observed, but this was statistically insignificant ($p = 0.35$). The CRT, however, significantly improved peak $VO_2$ (0.8 ml/kg/min vs. 0.0 ml/kg/min, $p = 0.030$) and 6 MW (35 m vs. 15 m, $p = 0.043$). Changes in NYHA class ($p = 0.10$) and QOL ($p = 0.40$) were not statistically significant. The CRT demonstrated significant reductions in ventricular dimensions (left ventricular internal diameter in diastole $= -3.4$ mm vs. $-0.3$ mm, $p < 0.001$ and left ventricular internal diameter in systole $= -4.0$ mm vs. $-0.7$ mm, $p < 0.001$) and improvement in left ventricular ejection fraction (5.1% vs. 2.8%, $p = 0.020$). A subgroup of patients with advanced HF (NYHA class III/IV) consistently demonstrated improvement across all functional status end points.

**CONCLUSIONS** The CRT improved functional status in patients indicated for an ICD who also have symptomatic HF and intraventricular conduction delay. (J Am Coll Cardiol 2003;42: 1454–9) © 2003 by the American College of Cardiology Foundation

Heart failure (HF) is a syndrome that affects an estimated five million Americans, with 400,000 to 700,000 new cases annually (1). Frequently, life-threatening ventricular arrhythmias may also accompany this condition (2). Heart failure may be compounded in patients with intraventricular

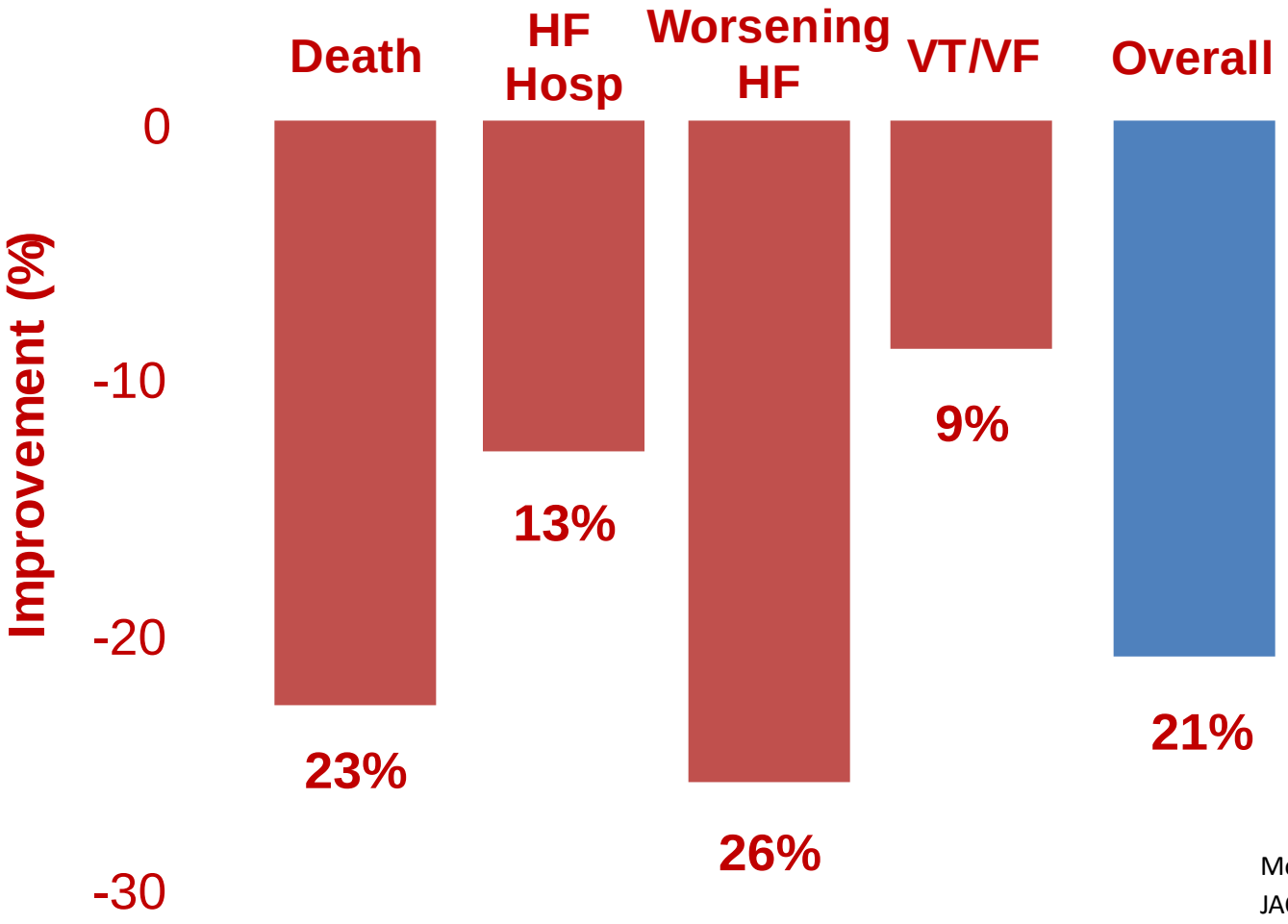
See page 1460

indications and specific therapy for HF, the term "cardiac resynchronization therapy" (CRT) will be used to describe the therapy provided by these implanted systems.

Published studies suggest that short-term improvements in hemodynamics (5,6) and long-term improvements in functional status are possible with CRT (7–9). Previously published studies have been restricted to patients with symptomatic HF but without conventional indications for an

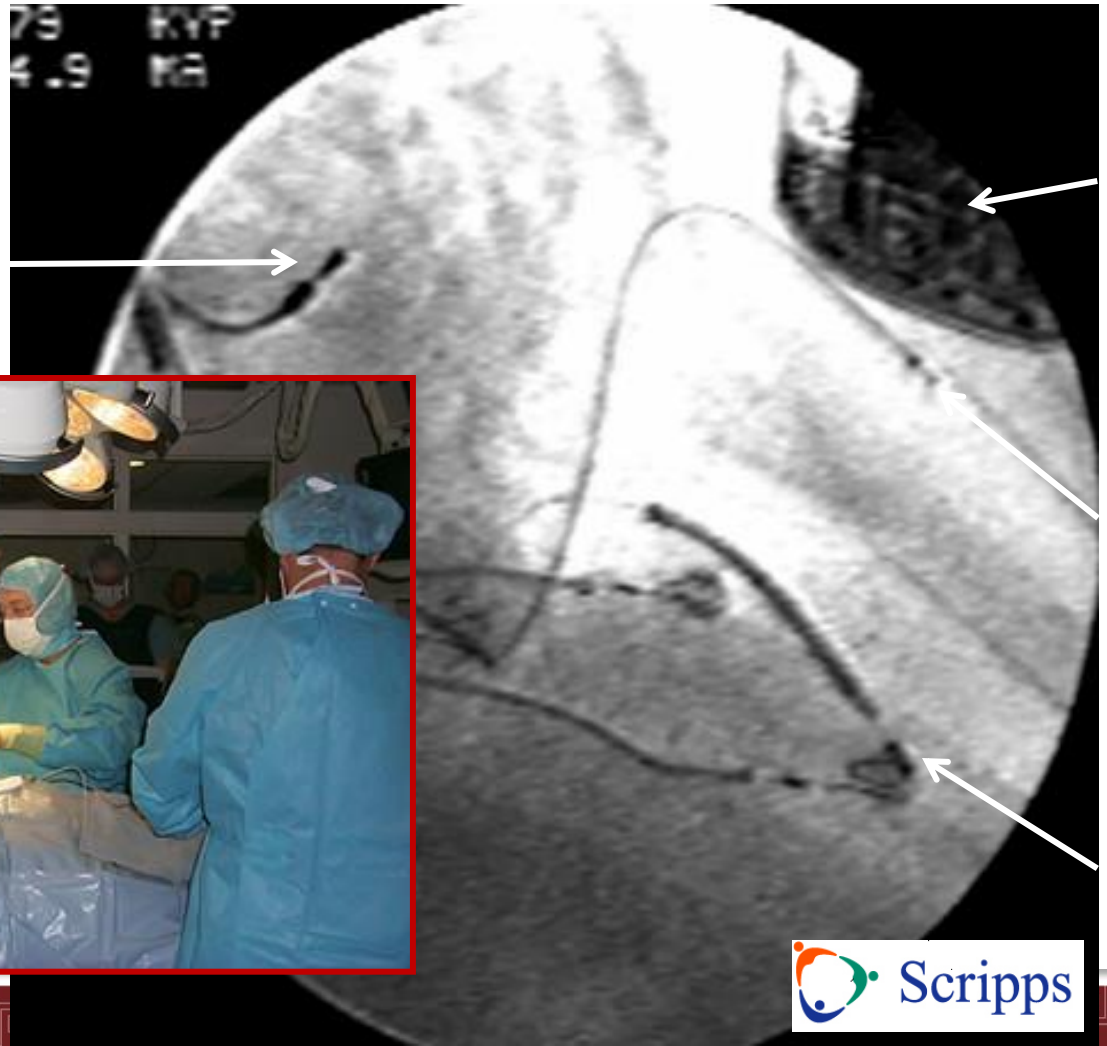
# Contak CD Trial Results

## Primary Endpoint
## HF Progression Index




Modified from Higgins et al. JACC 2003:42:1454-1459.

# So, who should get this new technology?




Scripps

# So, who should get this new technology?

## INDICATIONS

**Pacemaker**

Slow heart rate with symptoms
(pulse below 30 or 3 second or more pause)

**Biventricular Pacemaker** (cardiac resynchronization therapy)

Above plus EF below 50 (normal 55-70) and plus wide EKG complex (over 120 msec)

**Implantable defibrillator**

EF below 35%, that's it!

**Biventricular Defibrillator** (Lexus)

Above plus wide EKG QRS complex (over 120 msec)

# Cardiology Simplified


DICK CHENEY has no heartbeat. That might sound like the punch line to a political joke

1978 1st of 5 heart attacks, beginning at age 37

1988 Quadruple bypass surgery after 3rd heart attack

2001 (March) At least his 8th cardiac cath and stent

2001 (June) First ICD

# Cardiology Simplified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1988 Quadruple bypass surgery after 3rd heart attack

2001 (March) At least his 8th cardiac cath and stent

2001 (June) First ICD

2007 ICD upgraded to biventricular device (with WiFi feature disabled)

2010 Artificial heart pump inserted, called LVAD (Left Ventricular Assist Device)

2012 Heart transplant, removing old heart, stents, ICD and leads


"We implant this behind your left ear and you won't even know it's there."

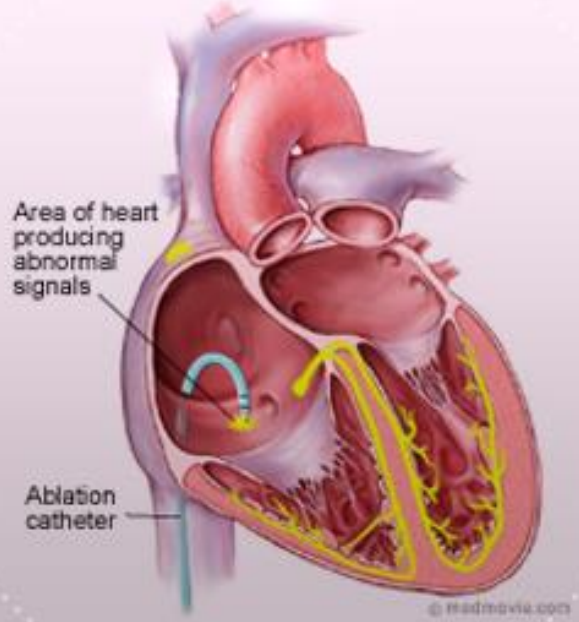
# Live Better Electrically
# Current Trends in EP

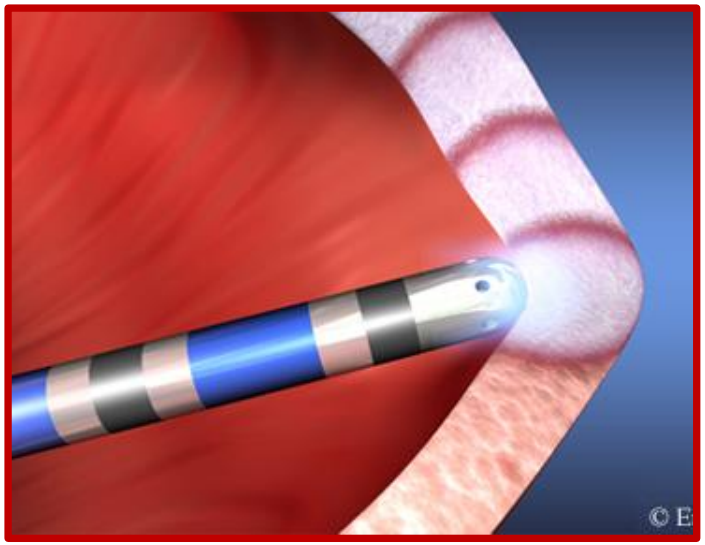
(EP = ElectroPhysiology = heart rhythm management)

2 Basic EP procedures to help you:

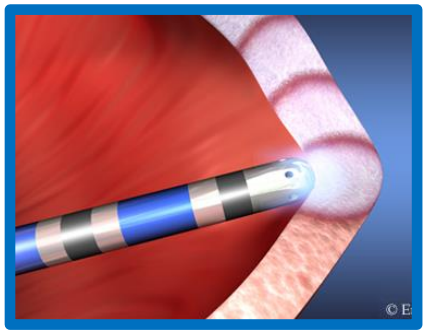
- Devices (pacemakers, defibrillators)
- Ablation (catheter based treatment)

# Radio Frequency Catheter Ablation



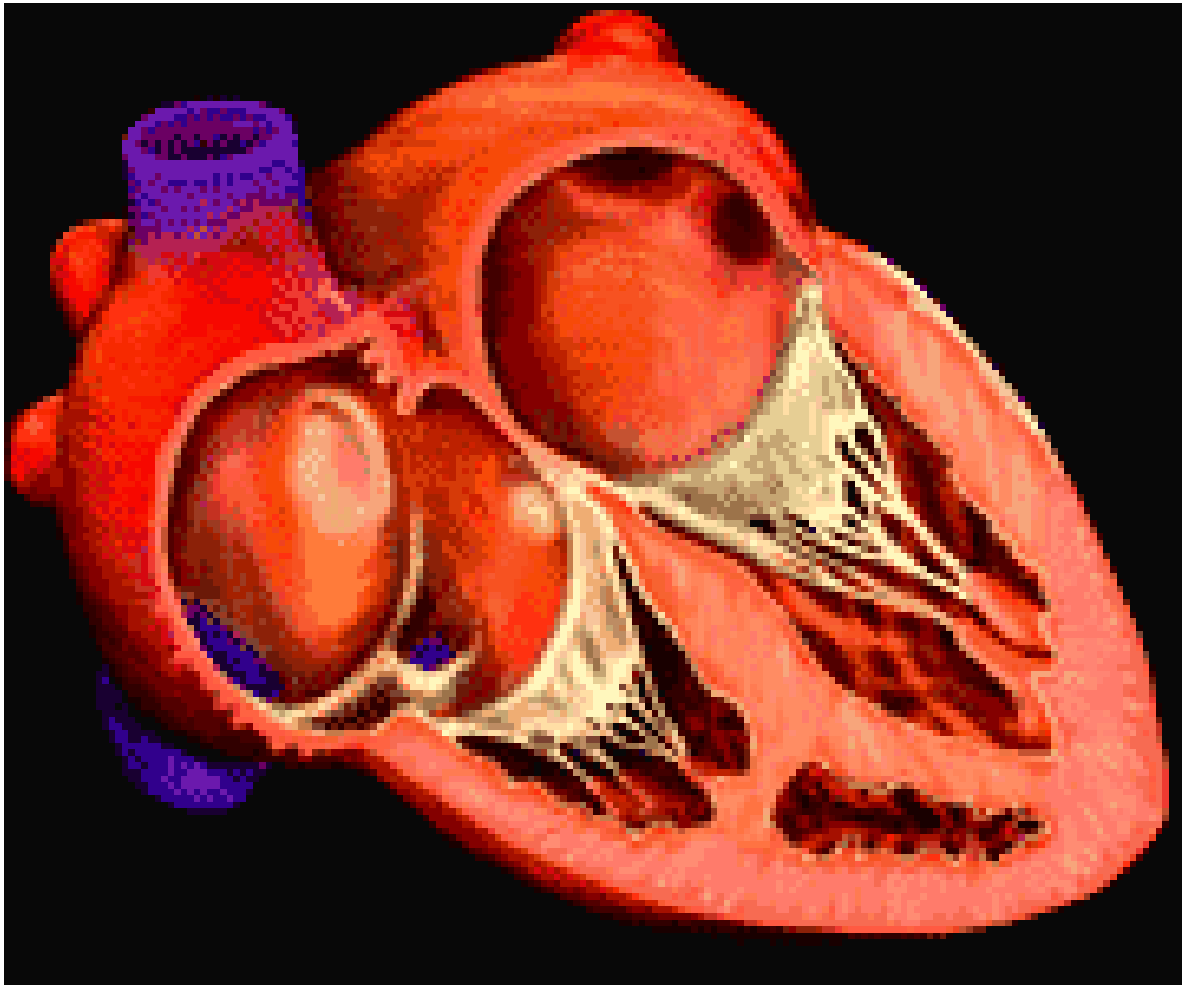



# Arrhythmias Treated With Ablation



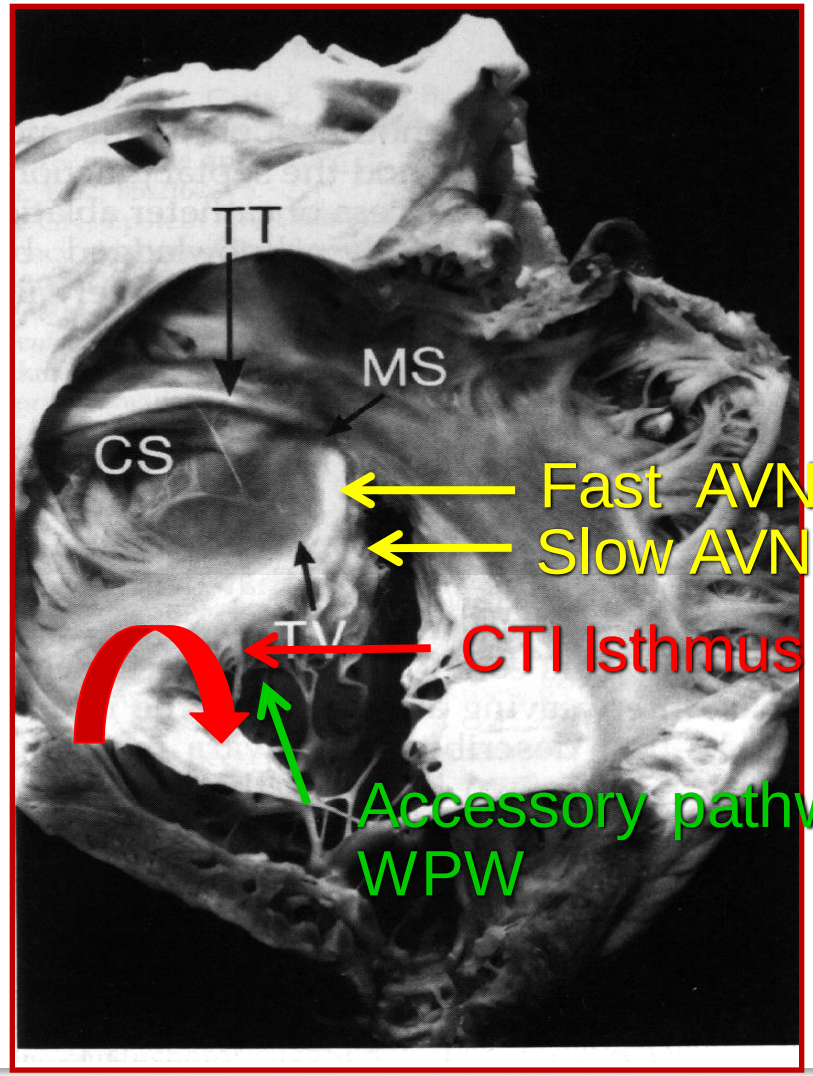
| | Approximate Success Rate |
|---|---|
| • SVT (supraventricular tach) | 95% |
| • Atrial flutter | 95% |
| • WPW | 95% |
| • Some ventricular tachycardias | 90% |
| • Atrial Fibrillation (AF) | 60% |

# The Normal Heartbeat



# The "Soul" of the Heart

## Where most arrhythmias begin



# A person's life changed forever in one heartbeat

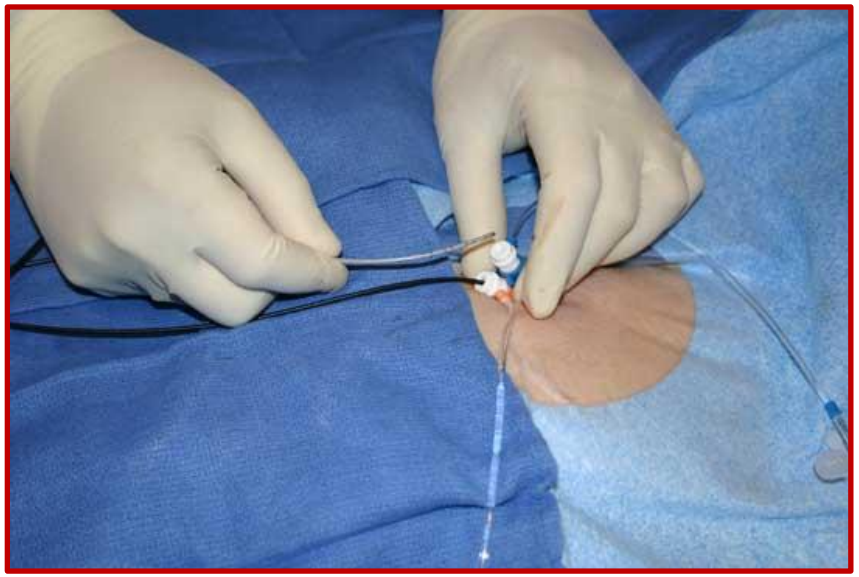
Delta wave of WPW

No delta wave; Patient cured


RF Ablation, 40 watts, first attempt, left lateral pathway

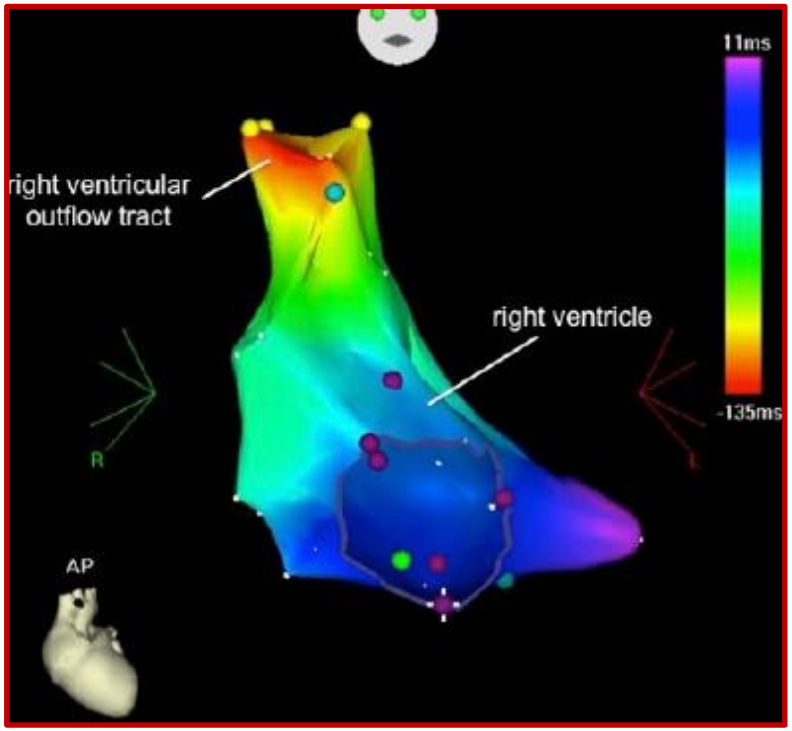
# How To Do An Ablation in 3 Easy Steps

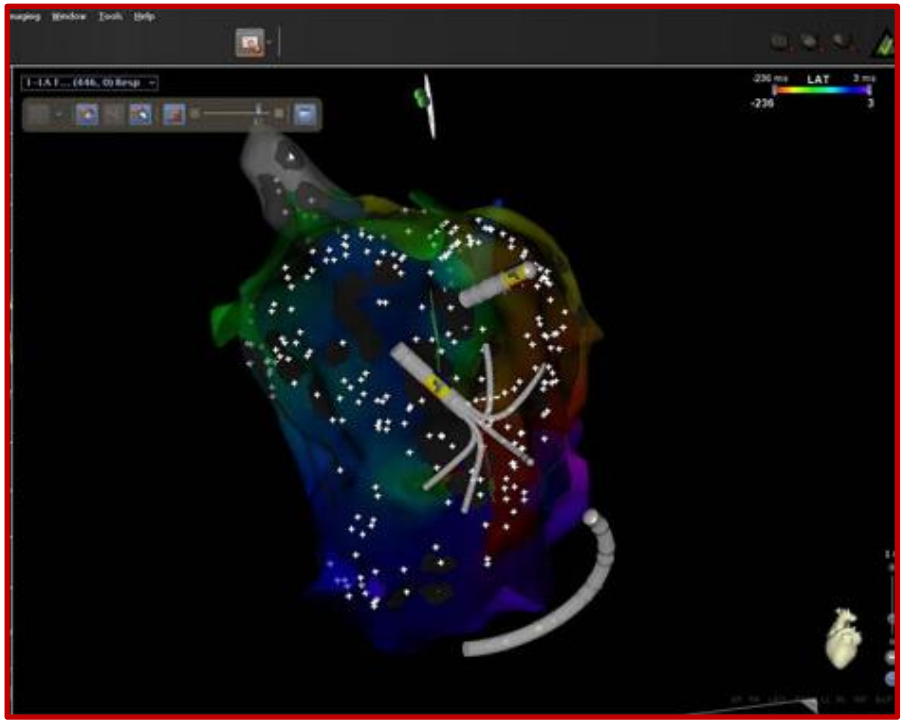
## Step 1. Find an EP doc to put in catheters



# How To Do An Ablation in 3 Easy Steps

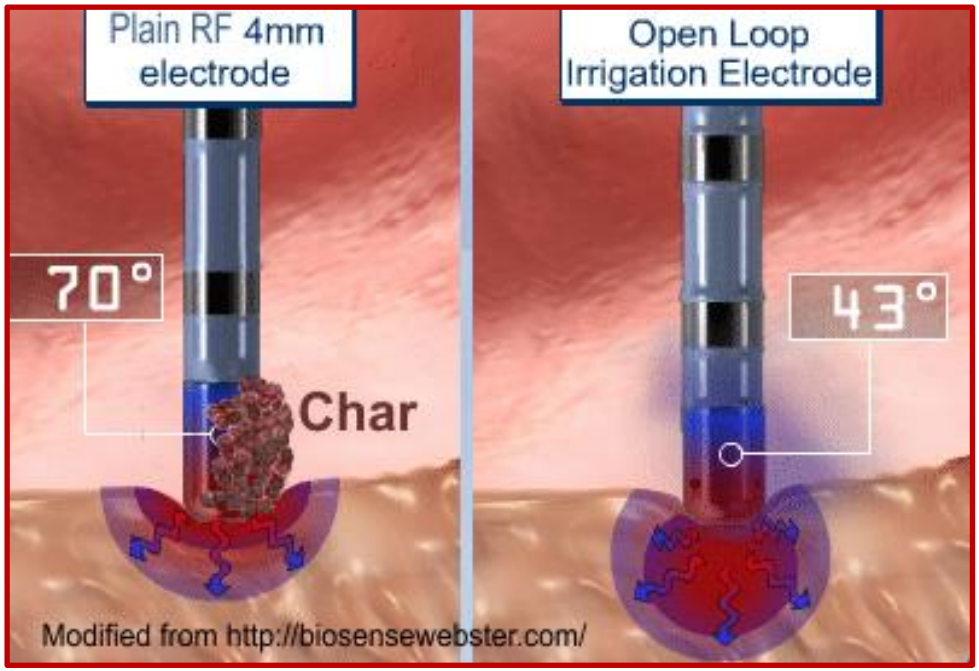
## Step 2. Reproduce and map the arrhythmia



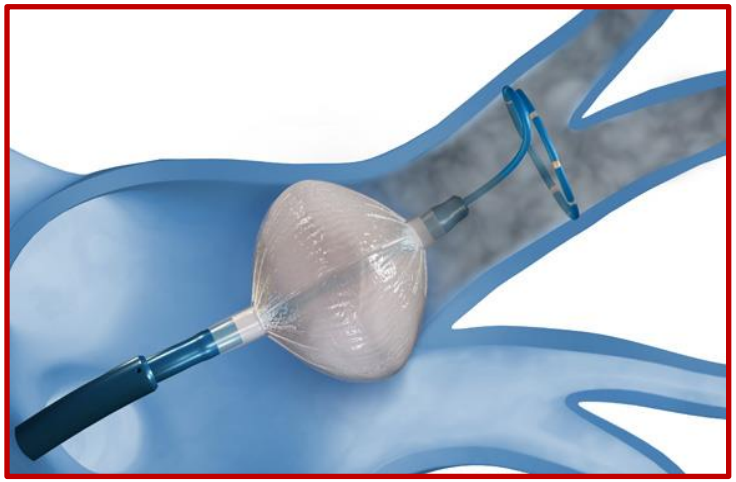



# How To Do An Ablation in 3 Easy Steps

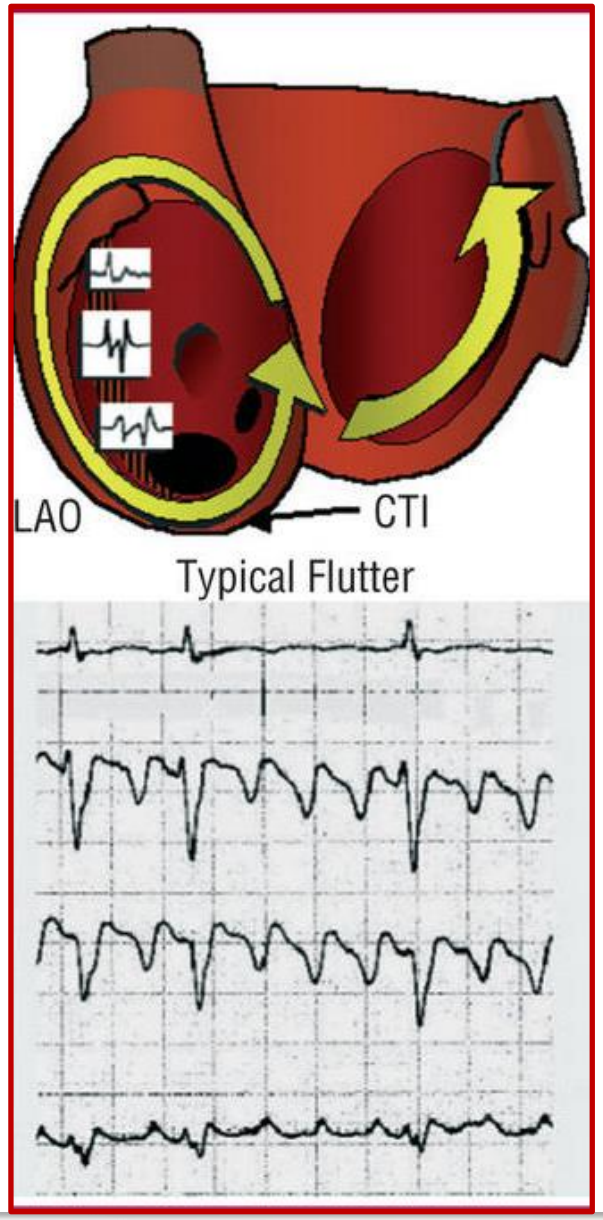
## Step 3. Ablate, ablate, ablate

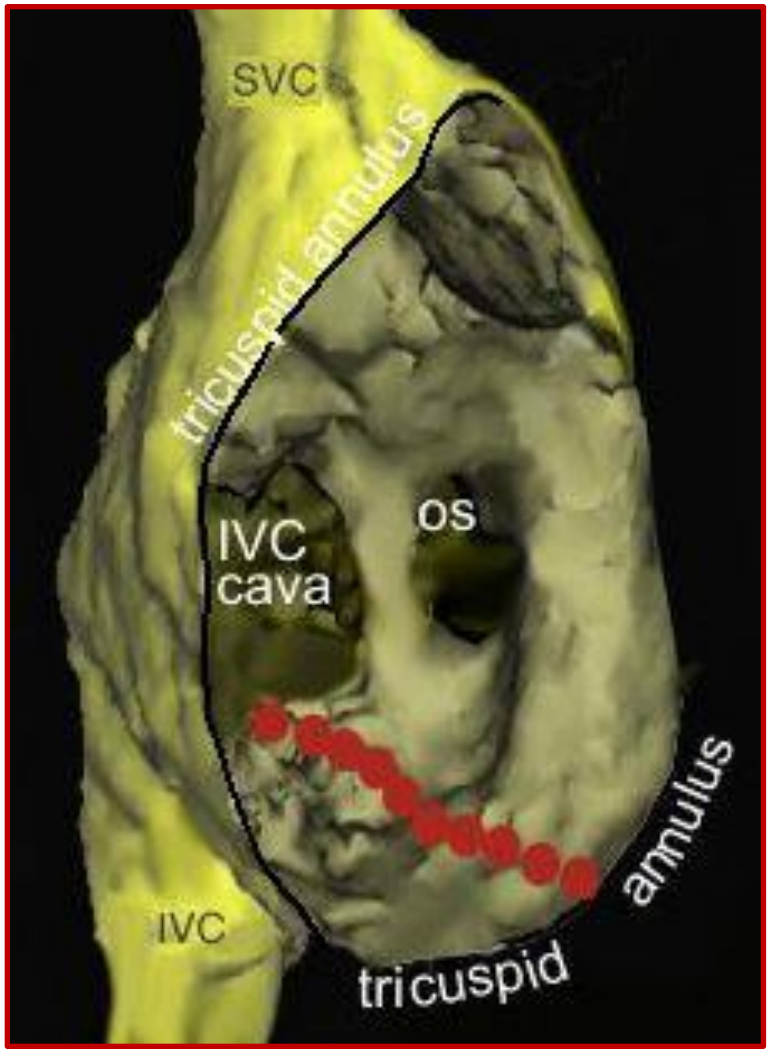



Heat (RF)

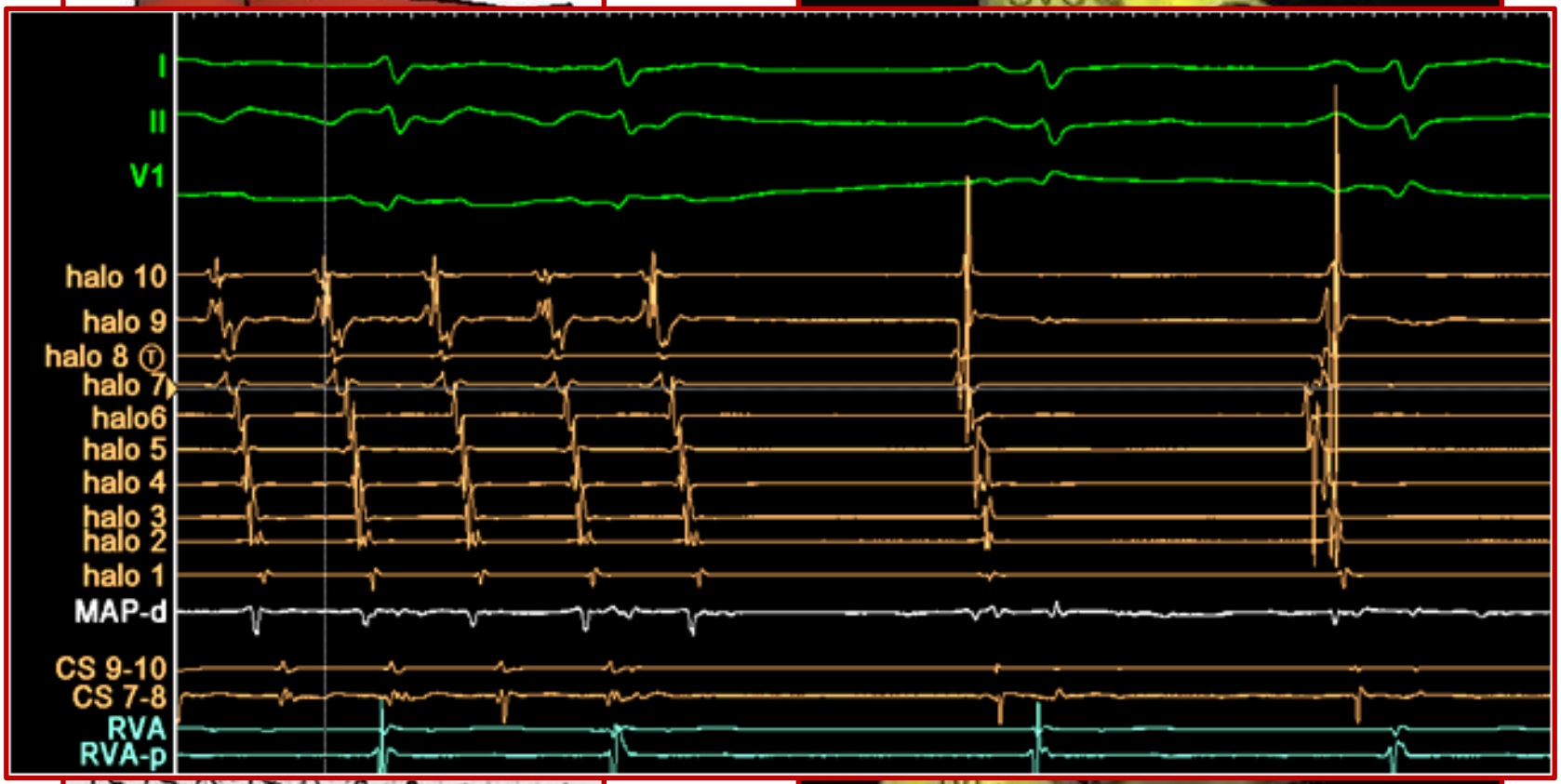


Cold (Cryo)




CTI Line for Atrial Flutter



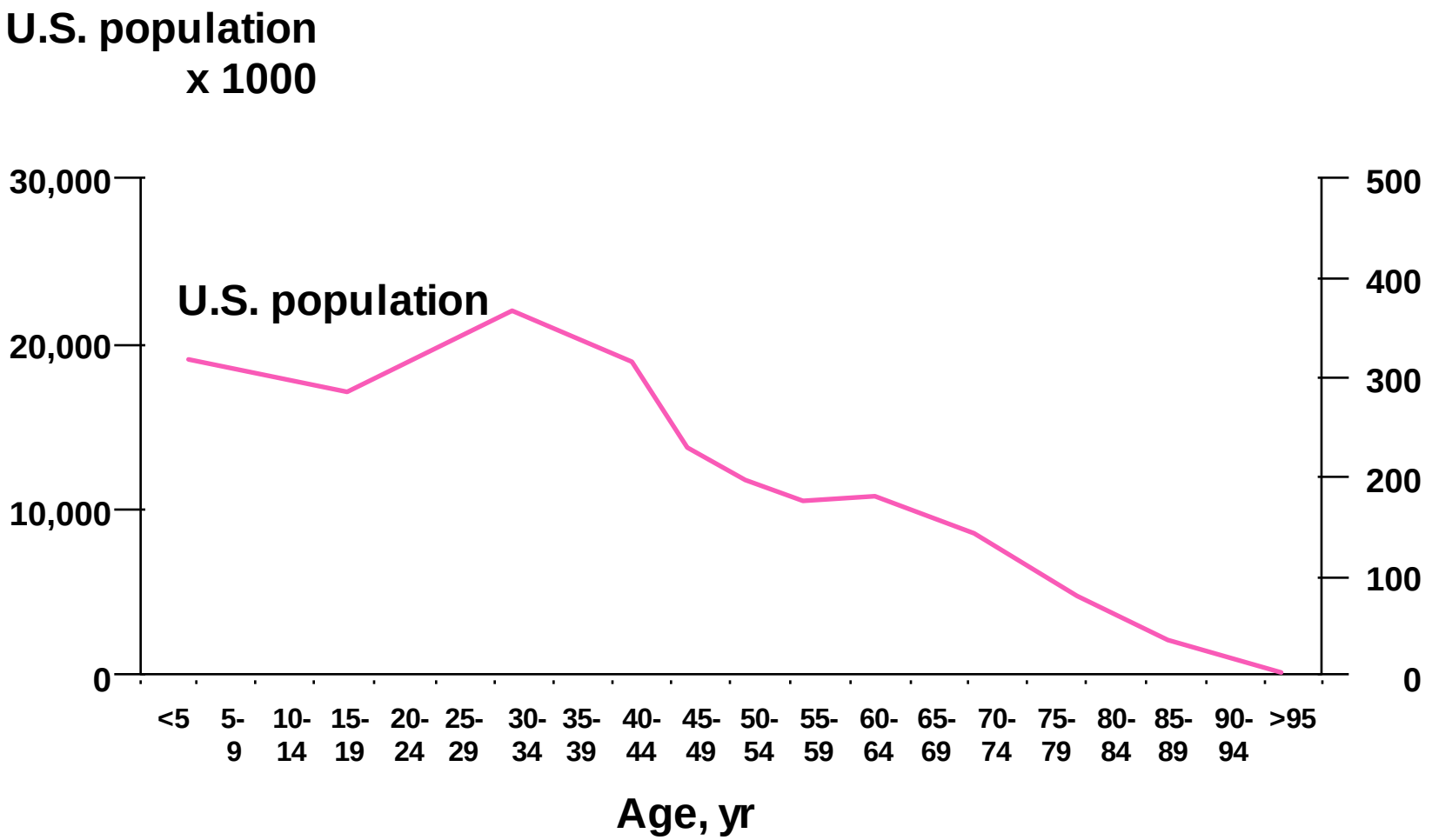






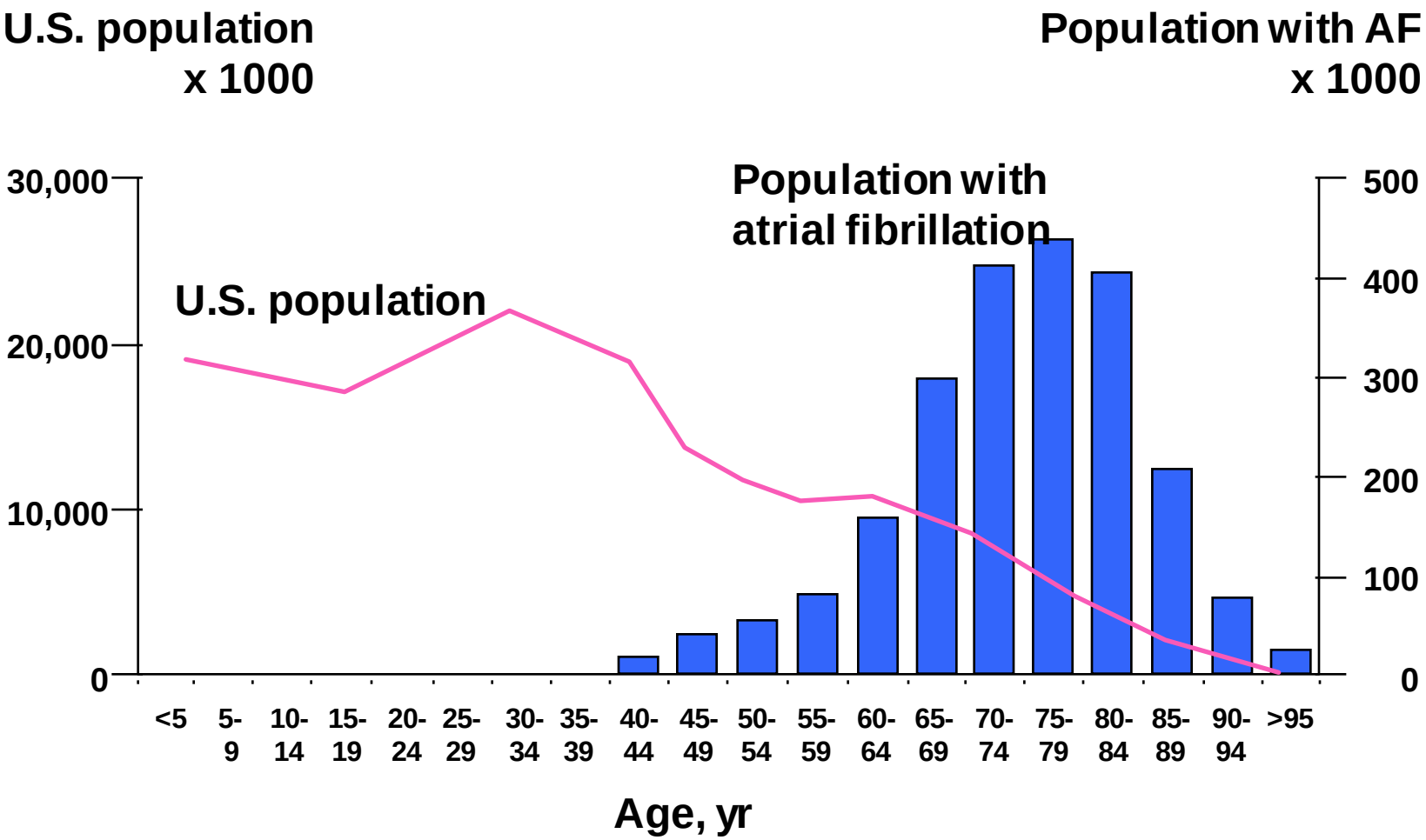
# CTI Line for Atrial Flutter

# Atrial Fibrillation




Adapted from Feinberg WM. Arch Intern Med. 1995;155:469-473.

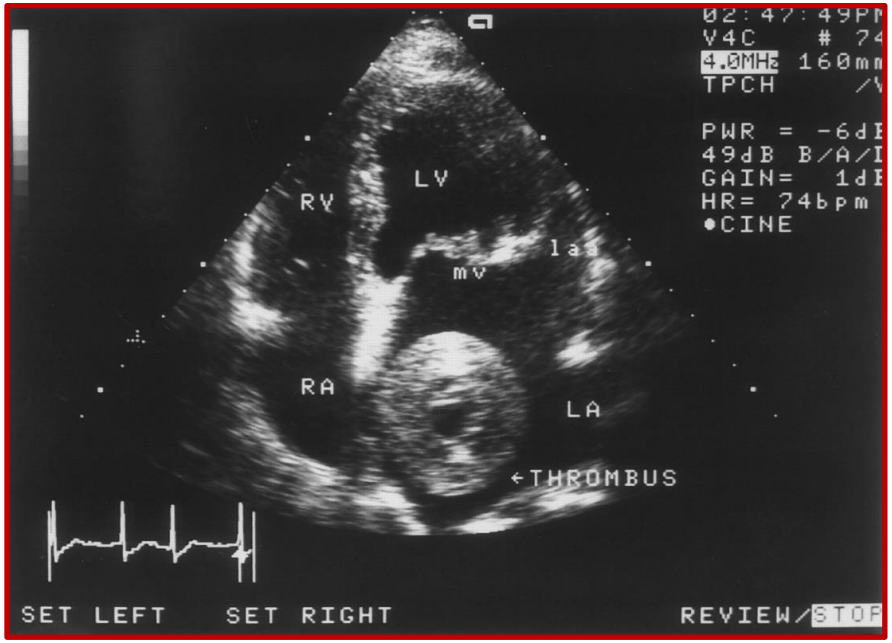
# Atrial Fibrillation




Adapted from Feinberg WM. Arch Intern Med. 1995;155:469-473.

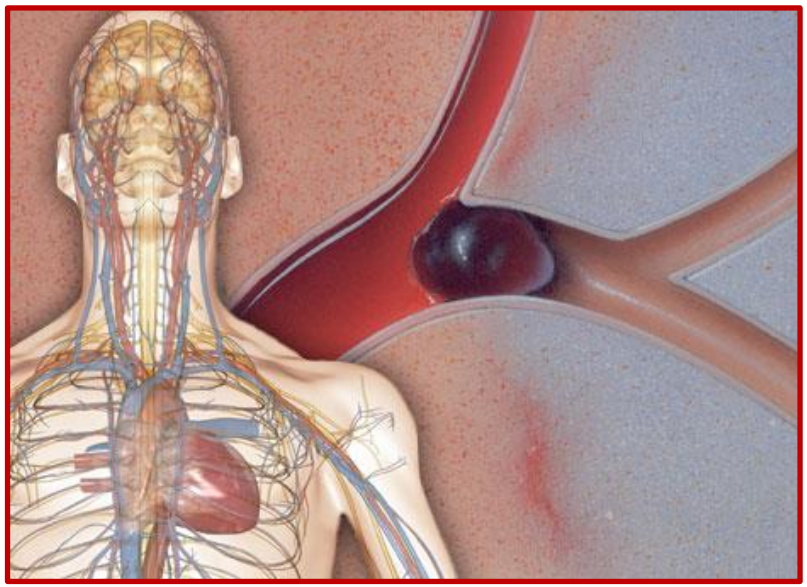
# Why treat AF?

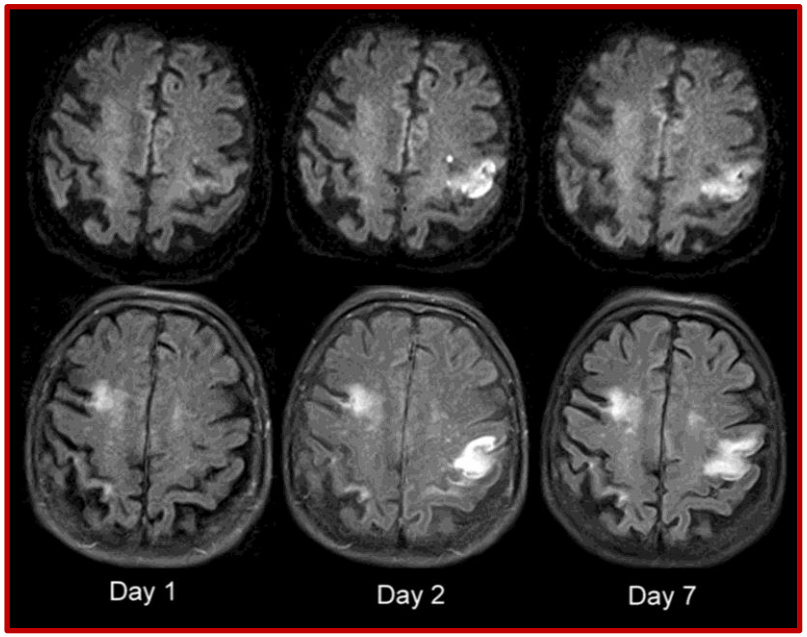
## Thromboembolism – A Devastating Risk




# Why treat AF?

## To Prevent a Stroke!





# Why treat AF?

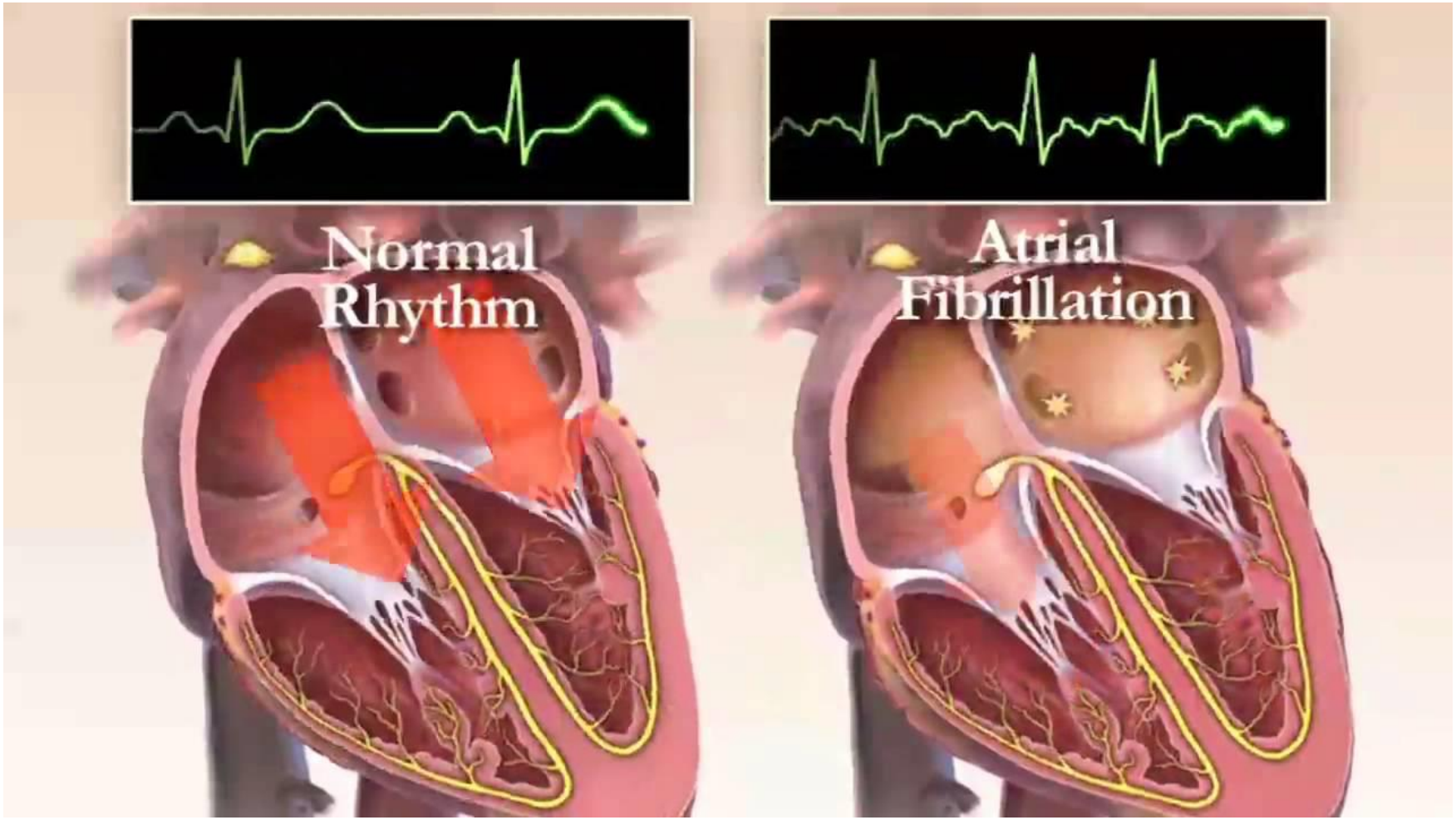
## To Prevent a Stroke!

# What is your risk of stroke with AF?

- The score equals your chance of having a stroke in % per year
- The average person is <1%
- 2 or more points, usually results in recommendation to begin a daily anticoagulant

## CHADSVASc score

| CHADS-VASc Risk | Score |
|---|---|
| Heart Failure or LVEF ≤ 40% | 1 |
| Hypertension | 1 |
| Age ≥ 75 | 1+1 |
| Diabetes | 1 |
| Stroke/TIA/ Thromboembolism | 2 |
| Vascular Disease | 1 |
| Age 65 - 74 | 1 |
| Female | 1 |

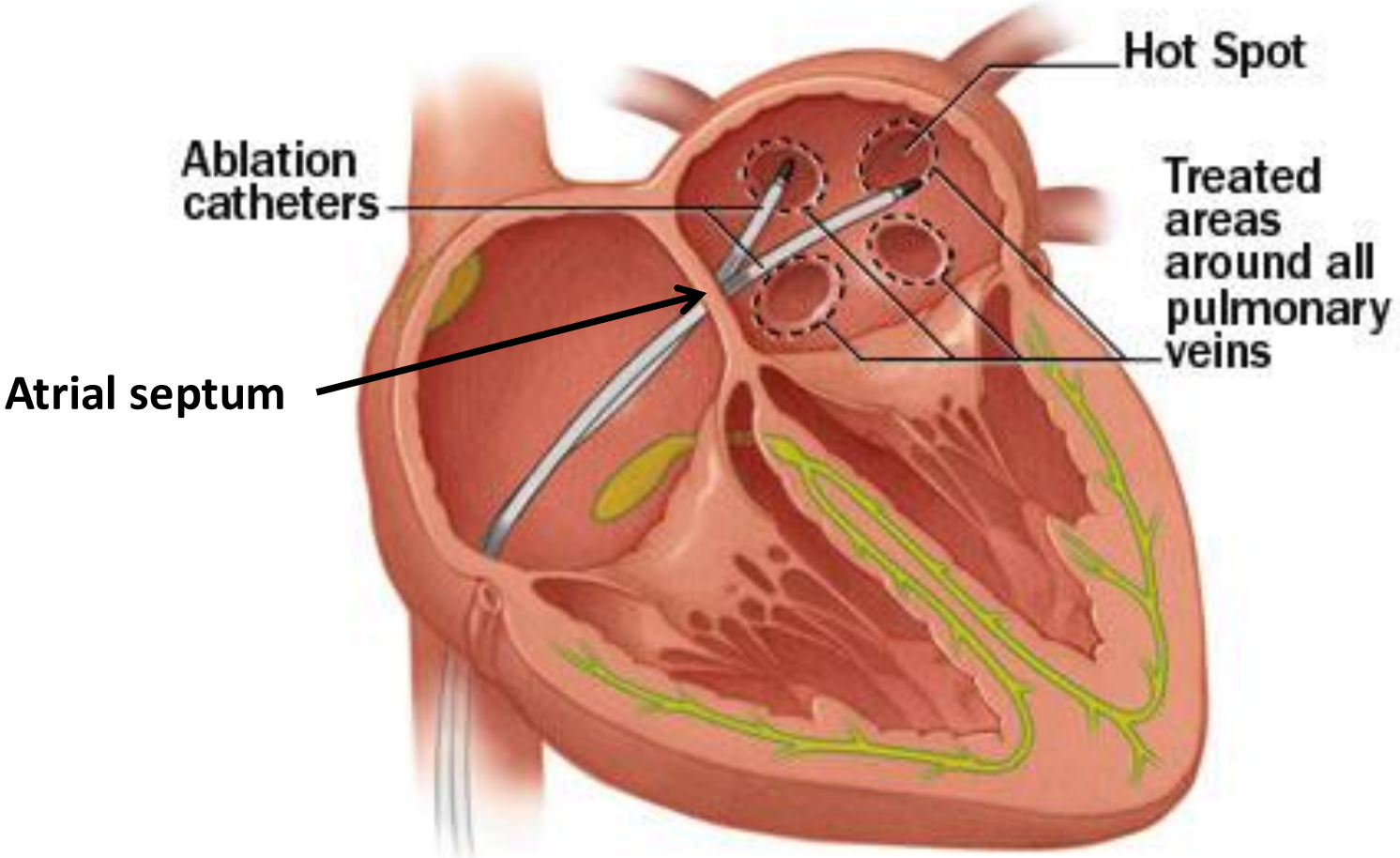

Normal
Rhythm
Atrial
Fibrillation

# How to treat AF?

## Cardioversion on meds

# How to treat AF?

## Catheter Ablation




Ablation and Mapping Catheters for AF

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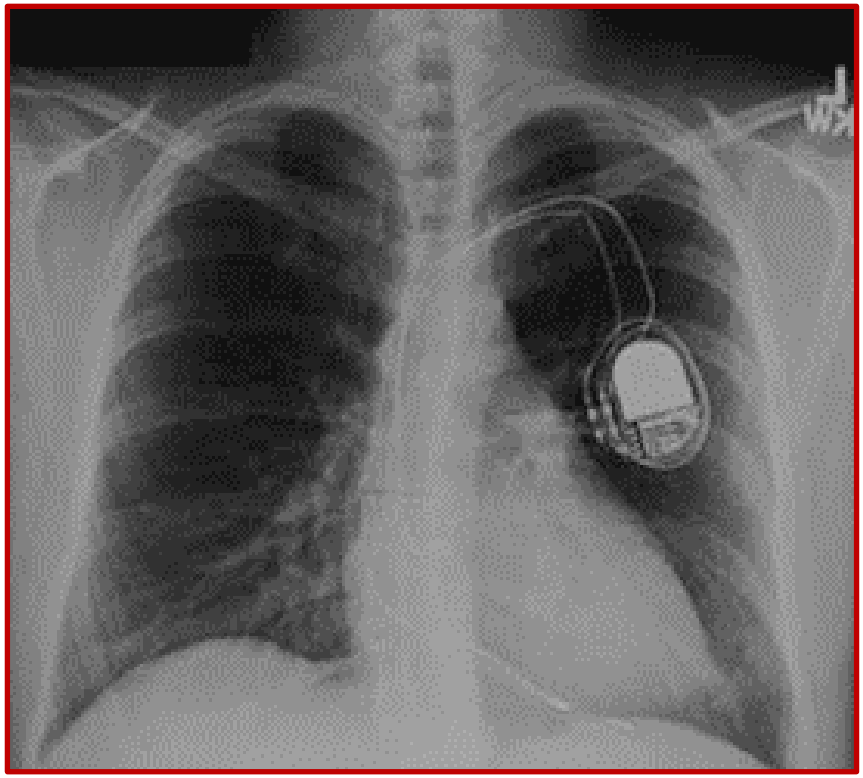
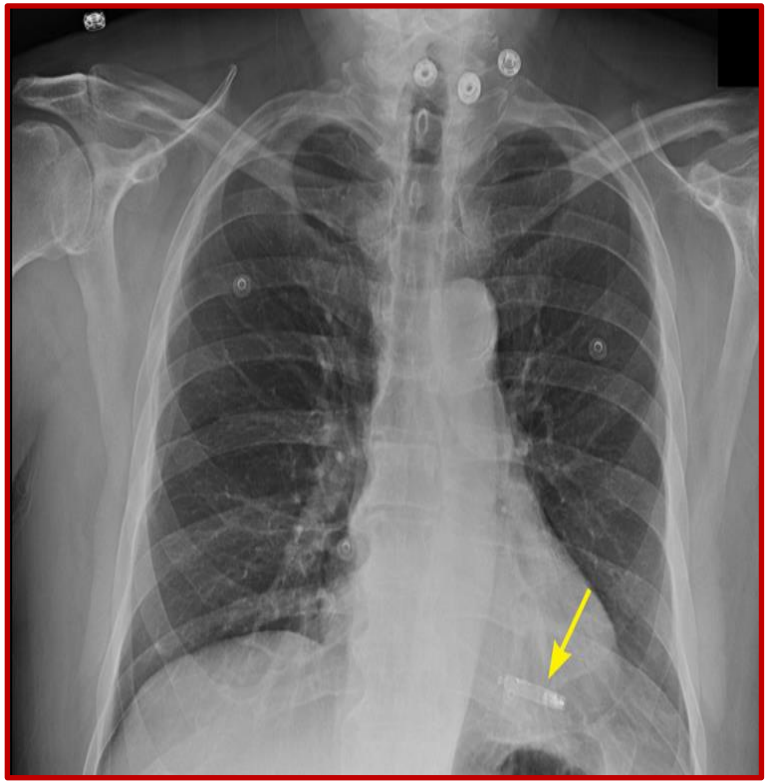
# Live Better Electrically

- Cool New Treatments in EP

# Pacemaker/Defibrillator Advances





Leadless Pacemakers

# Leadless Pacemaker

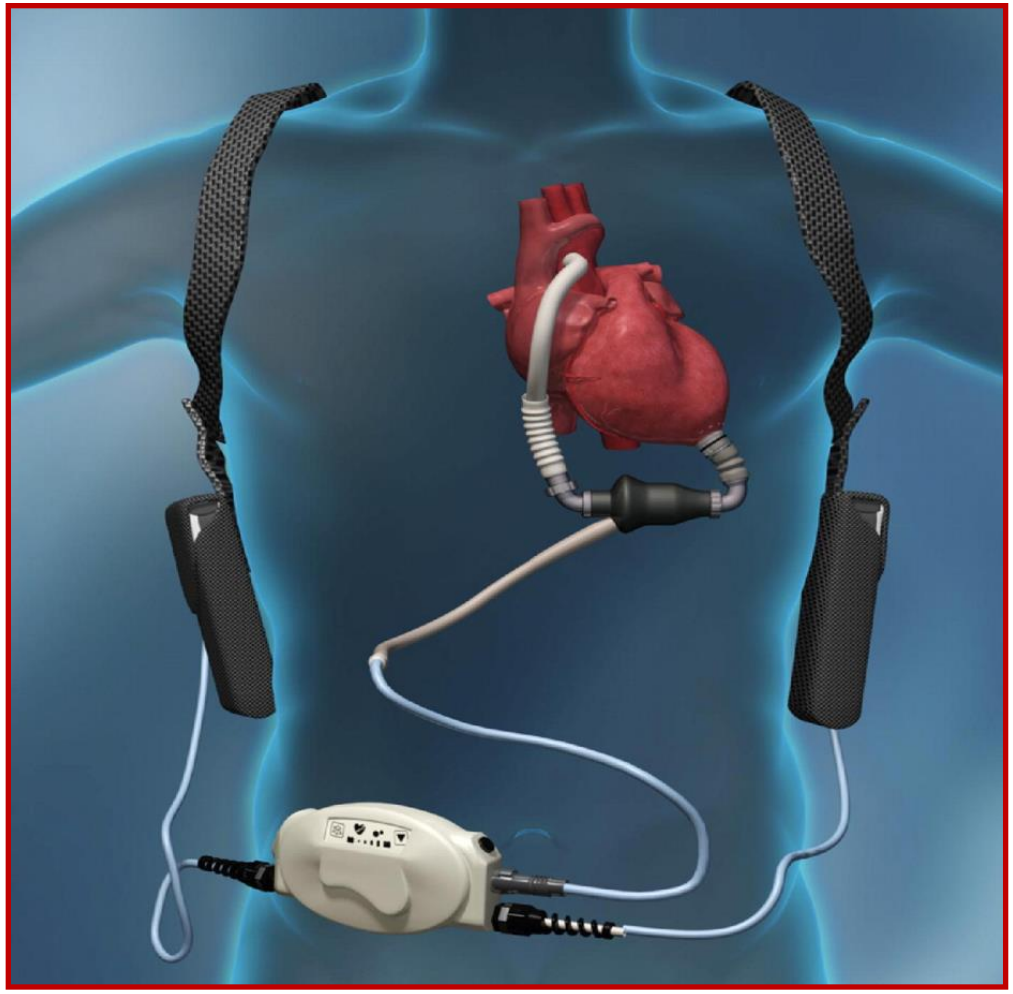
- Single chamber pacemaker
  - Battery lasts 15-25 years
  - No lead or surgical scar

# Robotic assisted ablation procedures

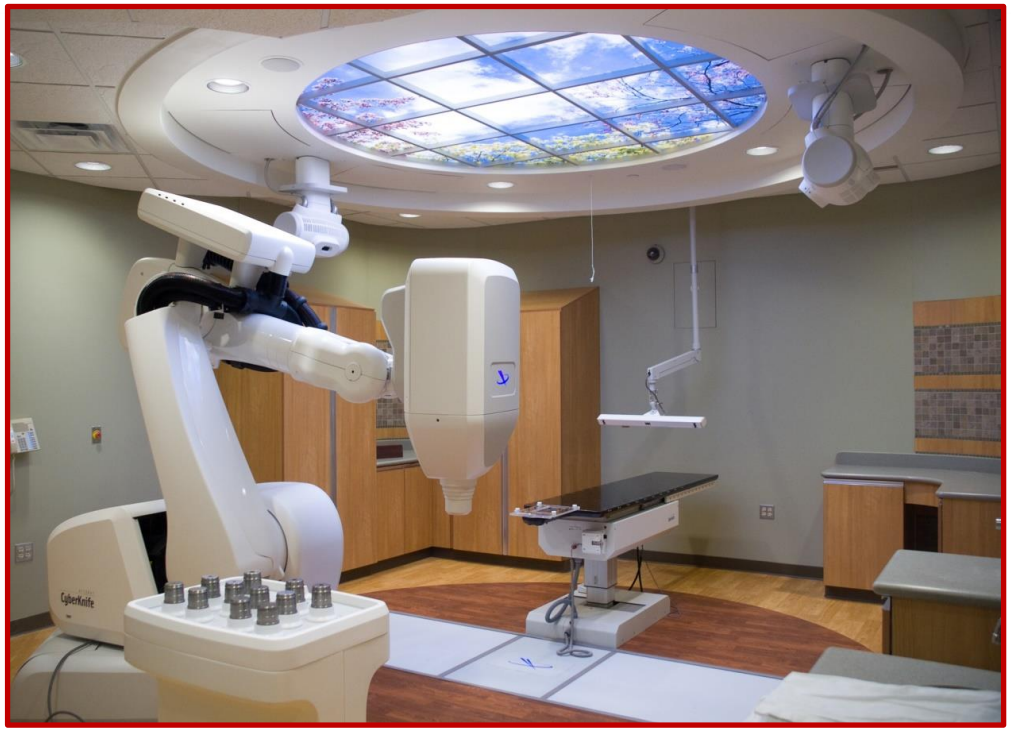
- Here today at Scripps La Jolla, SPCI
- 2 Robots available – Amigo, Hansen

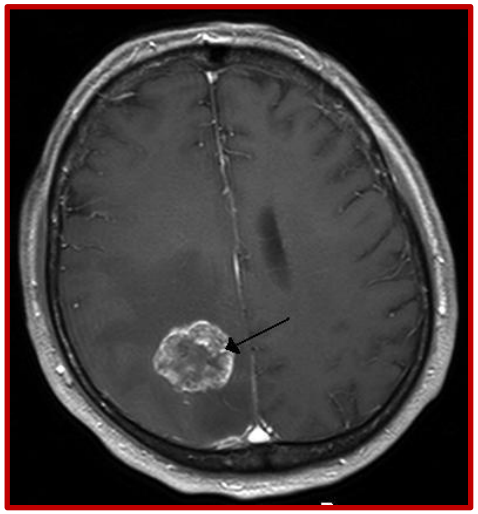
# Artificial Heart, LVAD

(Left Ventricular Assist Device)

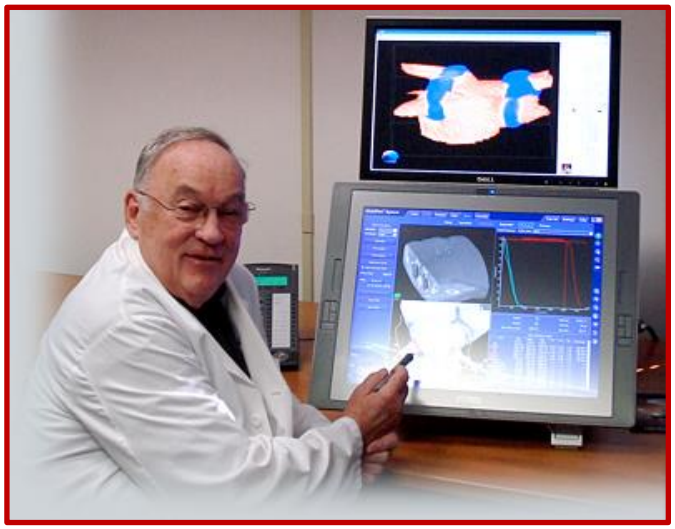



ADVENTURES

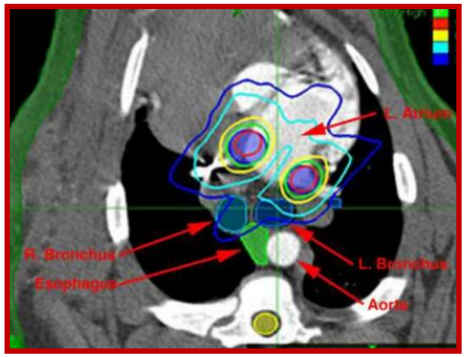


Noninvasive
Cardiac Ablation?



CyberHeart

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# Live Better Electrically

So, what is so great about Scripps?

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Organised by IDSMED




# #19 Nationwide in Cardiology and Heart Surgery again (3rd year in top 20)

# The only SD hospital ever to be top 20

- Reputation score
- Survival
- Patient safety
- High risk patient volume
- Nurse staffing, Magnet recognition
- Advanced technologies
- Key patient services
- Trauma center
- Intensivist staffing

Scripps


San Diego's Best Heart Care
Just Got Better.
Prebys Cardiovascular Institute

# SPCI = Scripps Prebys Cardiovascular Institute

# Scripps Prebys Cardiovascular Institute

*San Diego's first free standing heart hospital*

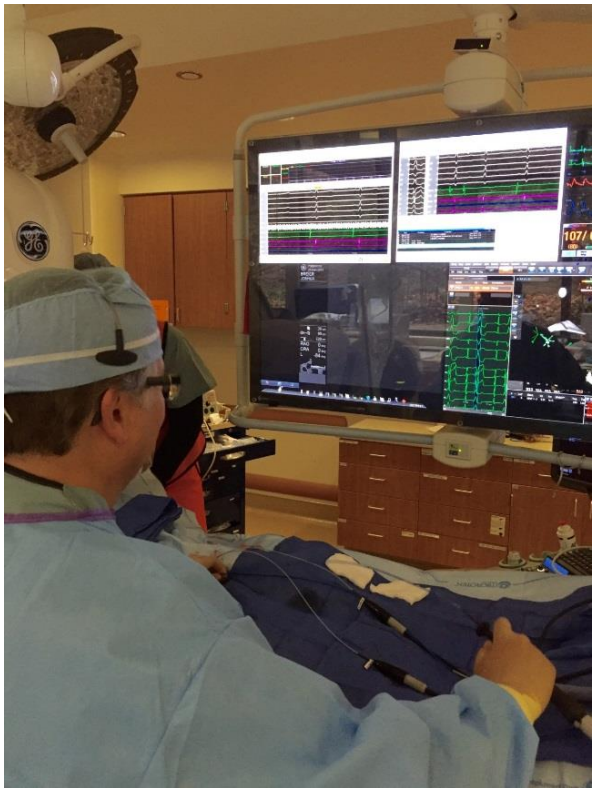
- Completed, opened on SMH-LJ campus, March 2015
- Over 350,000 SF; 8 floors
- 167 cardiac patient rooms (59 CCU)
- New cath labs, EP labs and cardiac operating rooms
- Combined expertise of Scripps-LJ, Scripps Clinic, other Scripps
- New Outpatient AMP opened June 1, 2016
- $610 Million for SPCI/AMP/ER;  Donations:
  - $105 M for SPCI (Prebys +)
  - $20 M for ER & Trauma Center
  - Total of $154 M for cardiac campaign

Scripps


Scripps
Scripps Clinic

# Scripps EP Program

- 6 EP Labs (plus 7 cath labs + 2 hybrid)
  - More EP Labs than anywhere west of the Mississippi
  - Volume = Quality
- Nearly 4000 EP studies a year
- 16 EP docs
- Investigational Trials
- Experienced Staff



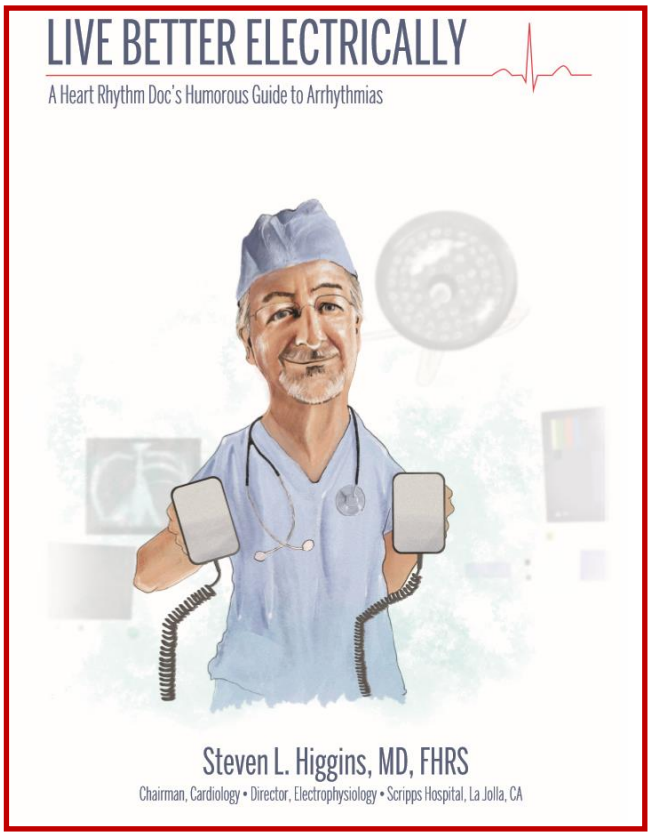
Scripps


Scripps

# Live Better Electrically

To learn more about EP:

Shameless plug for new book




Paperback: Amazon, Barnes & Noble

EPUB: Amazon, iTunes

Website order

www.BookLiveBetterElectrically.com

Fung Summit affiliates use discount "LBE2" to save $5 off cost of $30

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# Live Better Electrically

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## Leadership & Innovation in Healthcare

23 - 24 September 2016 | Grand Hyatt Singapore

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