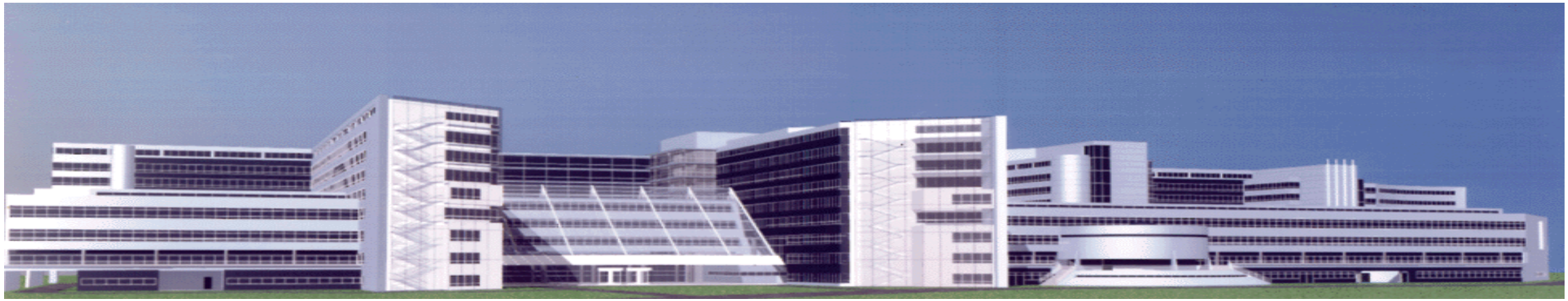

Mort Subite

Une Meilleure Compréhension pour une Meilleure Prévention

Eloi Marijon

Université de Paris – HEGP

Amicale des Cardiologues de la Côte d'Azur (ACCA06), Nice
07/01/2020

Sudden Cardiac Death

A Mode of Death

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Sudden Cardiac Death

A Mode of Death

general population. A case of *established SCD* is an unexpected death without obvious extracardiac cause, occurring with a rapid witnessed collapse, or if unwitnessed, occurring within 1 hour after the onset of symptoms. A *probable SCD* is an unexpected death without obvious extracardiac cause that occurred within the previous 24 hours. In any situation, the death should not occur in the setting of a prior terminal condition, such as a malignancy that is not in remission or end-stage chronic obstructive lung disease.

Fishman et al. Circulation 2010

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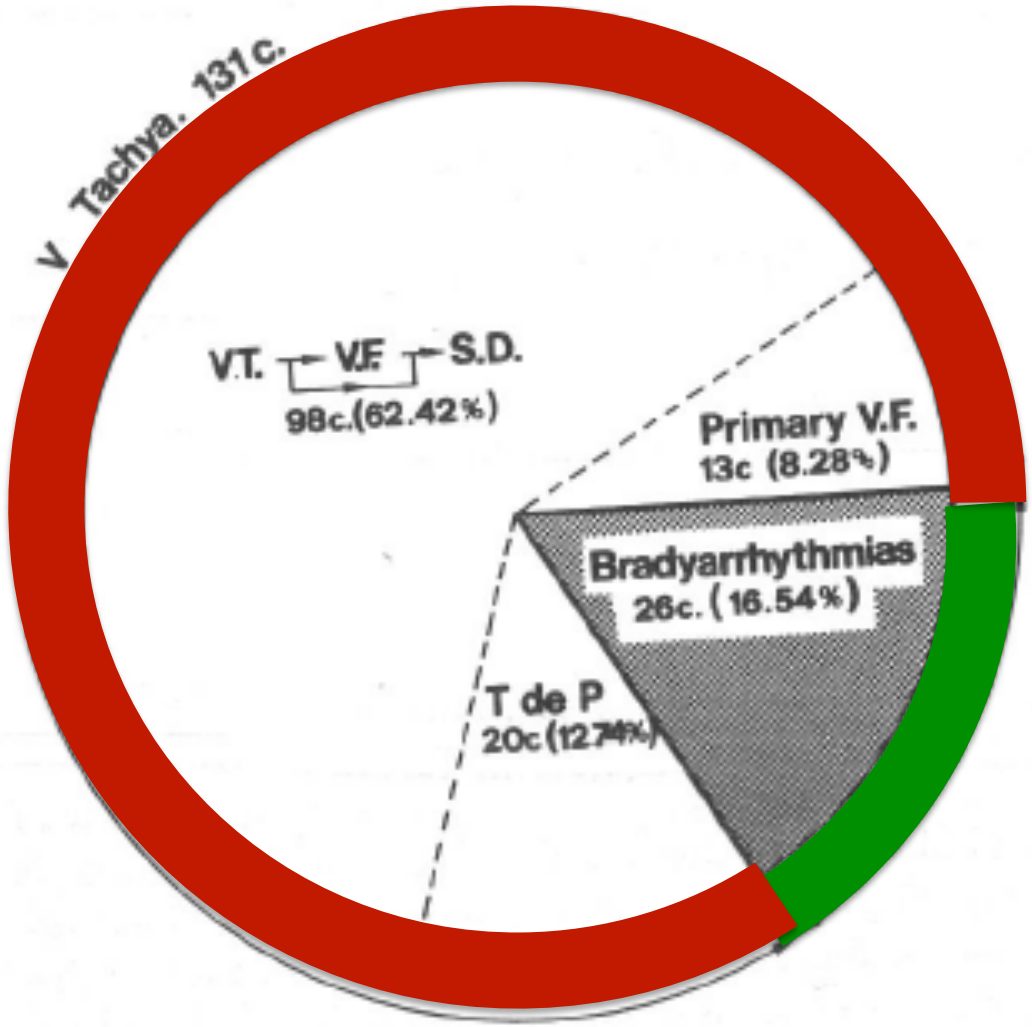
Primary Cardiac Rhythm

CURRICULUM IN CARDIOLOGY

AHJ American Heart Journal

Ambulatory sudden cardiac death: Mechanisms of production of fatal arrhythmia on the basis of data from 157 cases

Antonio Bayés de Luna, MD,* Philippe Coumel, MD,** and
Jean François Leclercq, MD.** *Barcelona, Spain, and Paris, France*



Bayes de Luna et al. Am Heart J 1989

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PARCC

Paris-SDEC Registry

Paris Sudden Death Expertise Center Registry

Université de Paris

Inserm

SAMU DE FRANCE

PREFECTURE DE POLICE

ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS

Paris Cardiovascular research Center PARCC HEGP

Paris-SDEC Registry

Paris Sudden Death Expertise Center Registry

Since May 15, 2011

6.7 millions inhabitants

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Inserm

SAMU DE FRANCE

PREFECTURE DE POLICE

ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS

Paris Cardiovascular research Center PARCC

H E G P

Paris-SDEC Registry

Since May 15, 2011

Inserm
CépiDc
Centre d'épidémiologie sur les causes médicales de décès

SÉCURITÉ SOCIALE
L'Assurance Maladie
Caisse Nationale

Université de Paris

Paris Cardiovascular research Center
PARCC
H E G P

Paris-SDEC Registry

Arrêt Cardiaque Extra-Hospitaliers
n = 31584

Mort Subite
n = 25929

Réanimation
n = 5884
(23%)

Sortis Vivants
n = 1446 (6%)

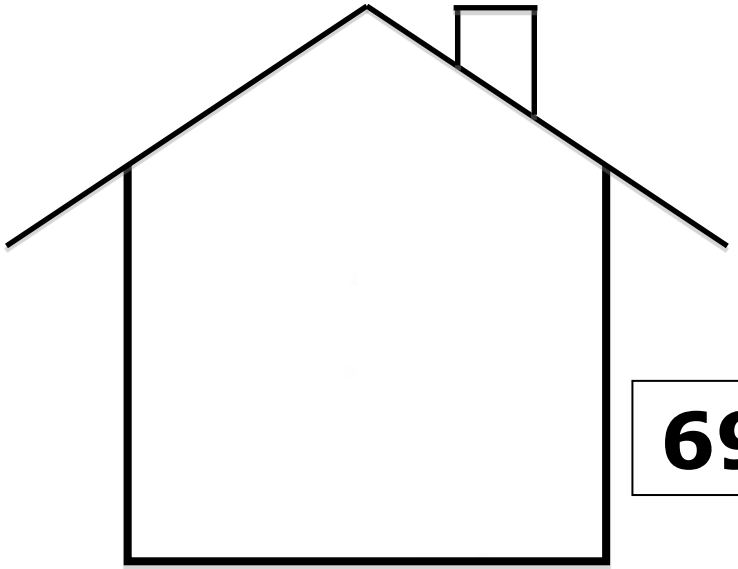
Paris-SDEC Data from May 15 2011 to Apr 30 2019 ***(8-Yr dataset)***

Paris-SDEC Registry

70 %

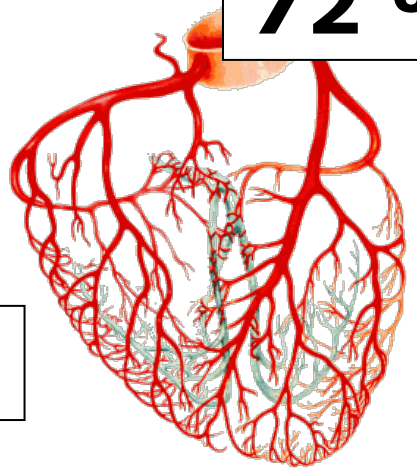
65 yo

45 %



69 %

72 %



72 %

26 %

3%

Paris-SDEC Data from May 15 2011 to Apr 30 2019 *(8-Yr dataset)*

Paris-SDEC Registry

Out-of-Hospital Cardiac Arrest
n = 31584

75% Missing

ICU
n = 5884 (23%)

Discharge Alive
n = 1446 (6%)

Paris-SDEC Data from May 15 2011 to Apr 30 2019 ***(8-Yr dataset)***

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- ***Case#8664_dataset***
- **SCA Oct. 7, 2013, 14:13, Ivry-sur-Seine**
- **DOB 02/01/1973**
- **No immediate CPR**
- **No flow 5 min, low flow 7 min**
- **Non shockable rhythm**
- **Dead 15:52**

SNIIRAM DataSet
Paris-CEMS 2011-2016
25 Millions of lines…

- Mr 8664, Hx PCI on Sept. 2, 2013
- Ordonnance du 05/09/2013
  - BISOPROLOL 1,25 mg
  - KARDEGIC 75 mg
  - CLOPIDOGREL 75 mg
  - CRESTOR 5 mg
  - PERINDOPRIL 8 mg
  - ESOMEPRAZOLE 20 mg
  - ZOLPIDEM

Sécurité Sociale
L'Assurance Maladie
Caisse Nationale

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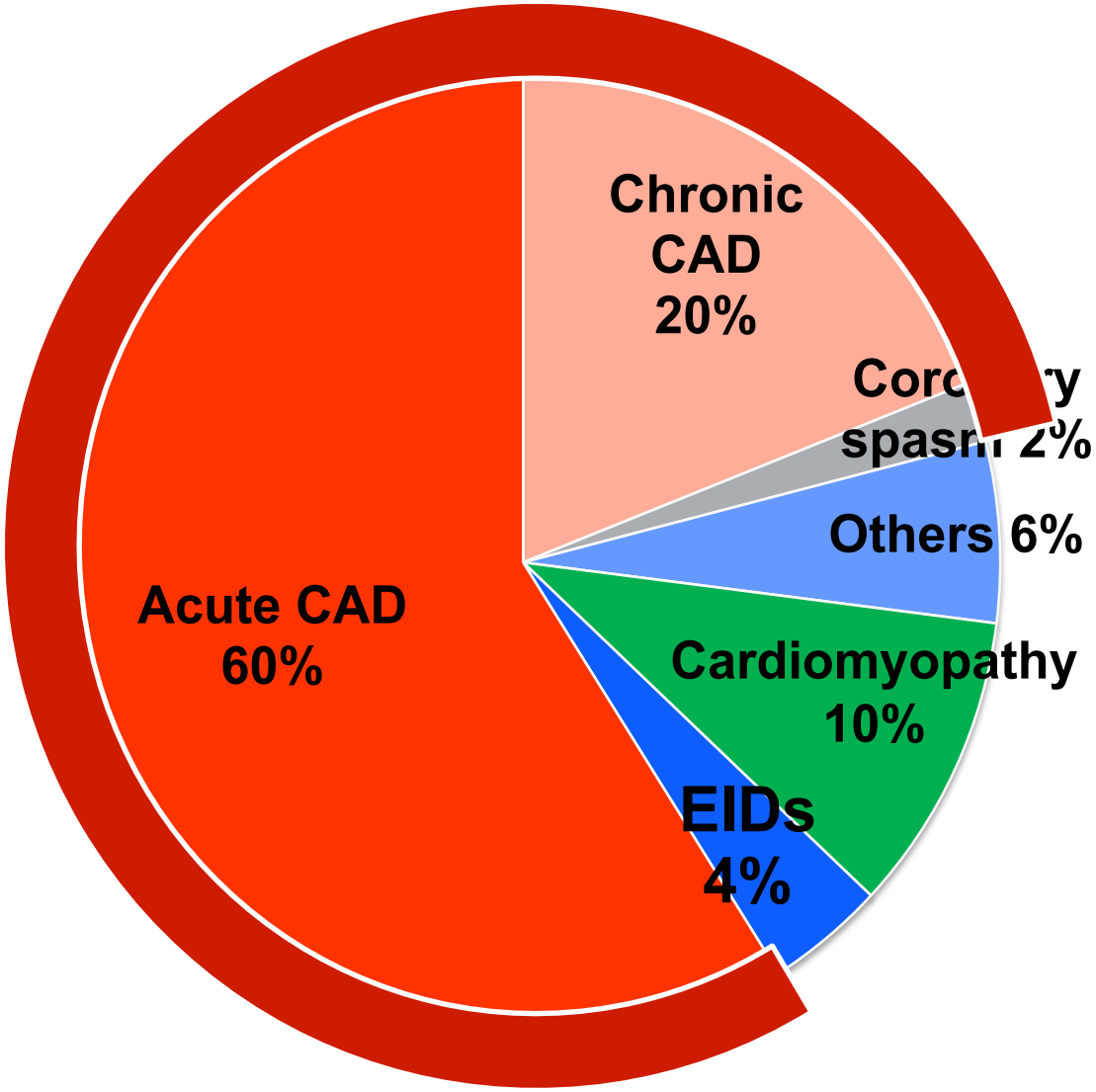
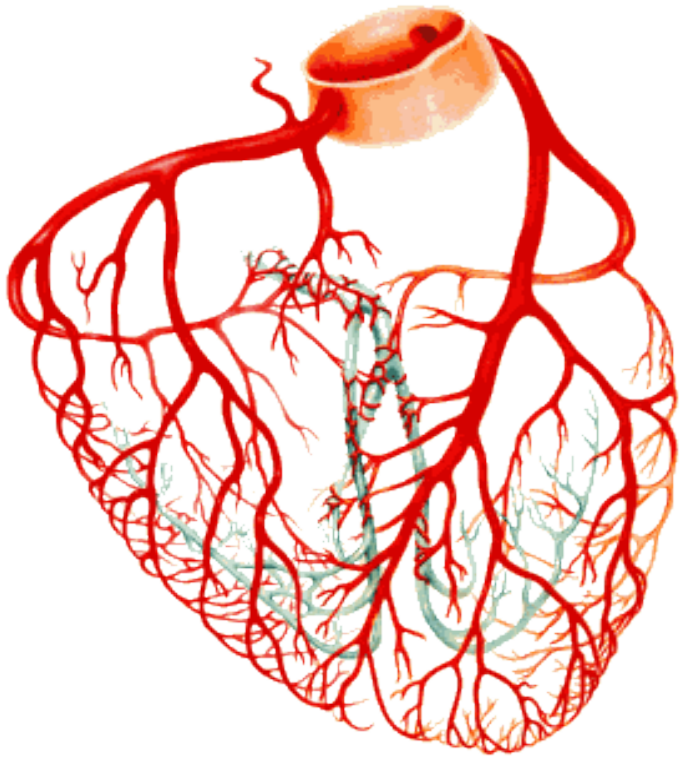
Causes of SCD in the Community

CAD Represents the Vast Majority





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Why To Get a Diagnosis?

- Specific targeted pharmacological treatment in addition to ICD
- Family screening for early primary prevention among relatives
  - *Family screening may also improve rates of etiologic diagnosis among index cases, because variability in penetrance among gene carriers*

Family Screening

4 Main Scenarios

Index Case

Clear Diagnosis

No/unclear Diagnosis

Non-Inherited

Inherited

Idiopathic VF

No Investigation

Situation#1

Situation#2

Situation#3

Situation#4

+++++

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Pre-Hospital Setting

N Autopsy <1% !!

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ICU Setting

Out-of-Hospital Cardiac Arrest
n = 31584

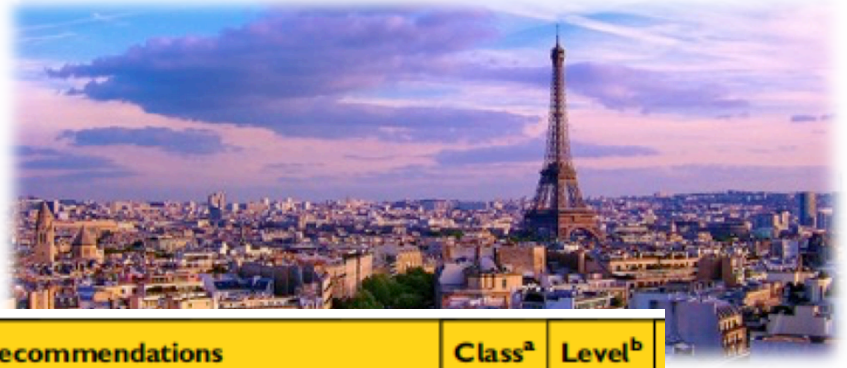
Sudden Death
n = 25929

ICU
n = 5884 (23%)

Discharge Alive
n = 1446 (6%)

Paris-SDEC Data from May 15 2011 to Apr 30 2019 ***(8-Yr dataset)***

ICU Setting



Out-of-Hospital Cardiac Arrest
n = 31584

Sudden Death
n = 25929

Autopsy 3%
DNA 1%
Investigations prior to death 50%

Recommendations	Class[a]	Level[b]
An autopsy is recommended to investigate the causes of sudden death and to define whether SCD is secondary to arrhythmic or non-arrhythmic mechanisms (e.g. rupture of an aortic aneurysm).	I	C
Whenever an autopsy is performed, a standard histological examination of the heart is recommended and it should include mapped labelled blocks of myocardium from representative transverse slices of both ventricles.	I	C
The analysis of blood and other adequately collected body fluids for toxicology and molecular pathology is recommended in all victims of unexplained sudden death.	I	C
Targeted post-mortem genetic analysis of potentially disease-causing genes should be considered in all sudden death victims in whom a specific inheritable channelopathy or cardiomyopathy is suspected.	IIa	C

Paris-SDEC Data from May 15 2011 to Apr 30 2019 ***(8-Yr dataset)***

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Cardiology Setting

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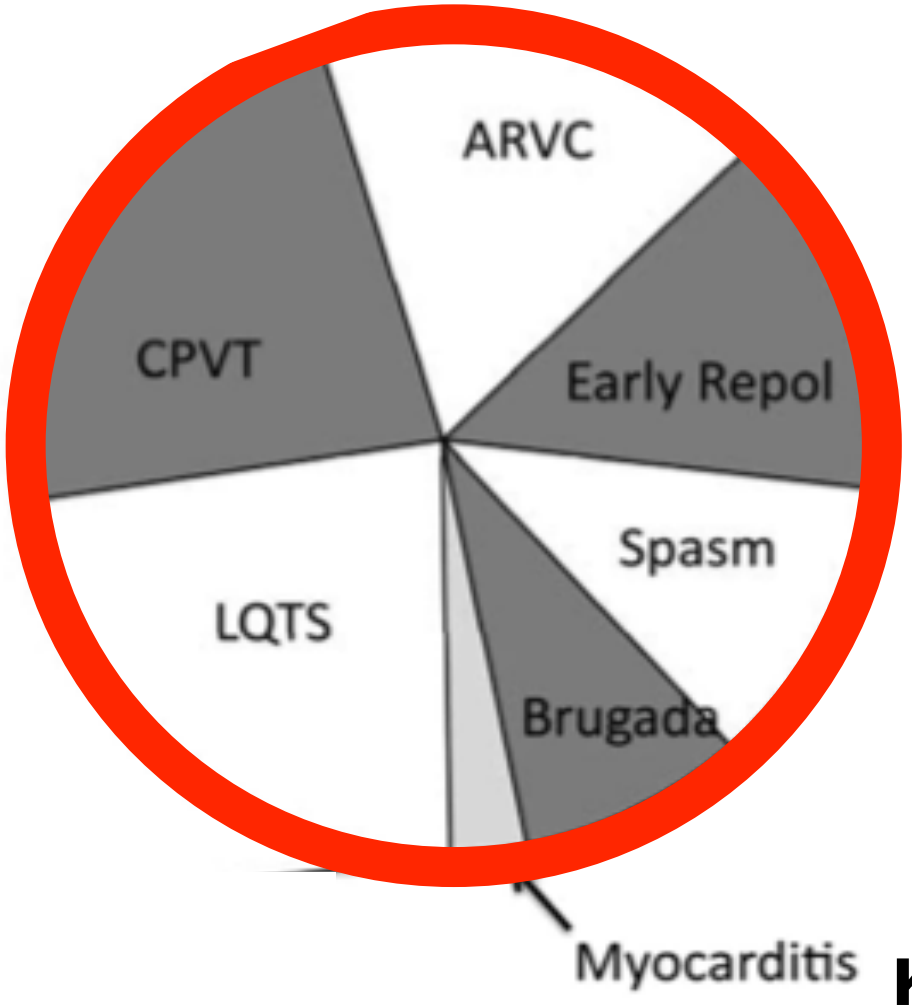
Cardiology Setting

CASPER Registry



After Normal ECG, Echo, Coro

Systematic algorithm including pharmacological, exercise, and genetic testing??

Krahn et al. Circulation 2009

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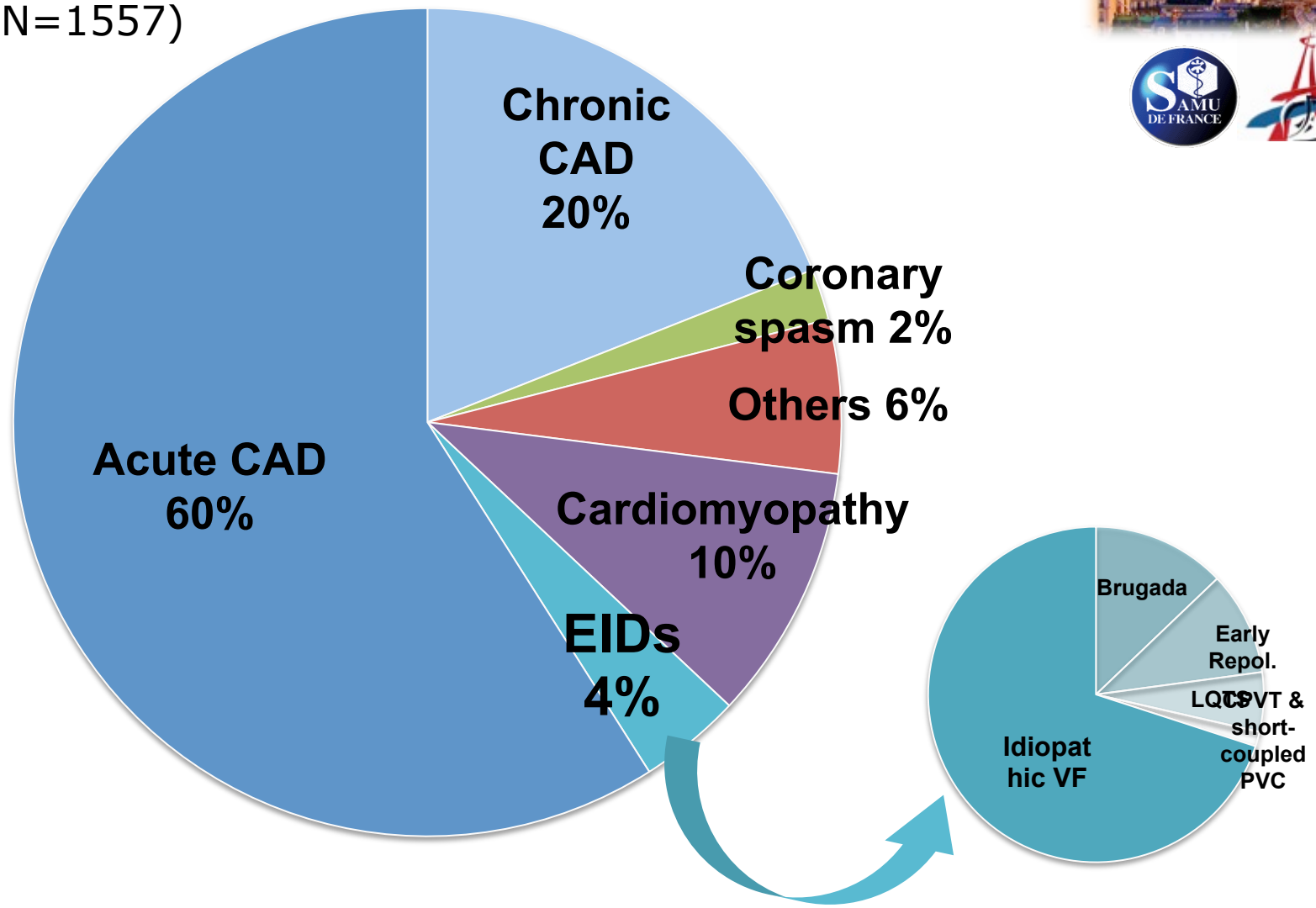
Back to Real World?

(N=1557)



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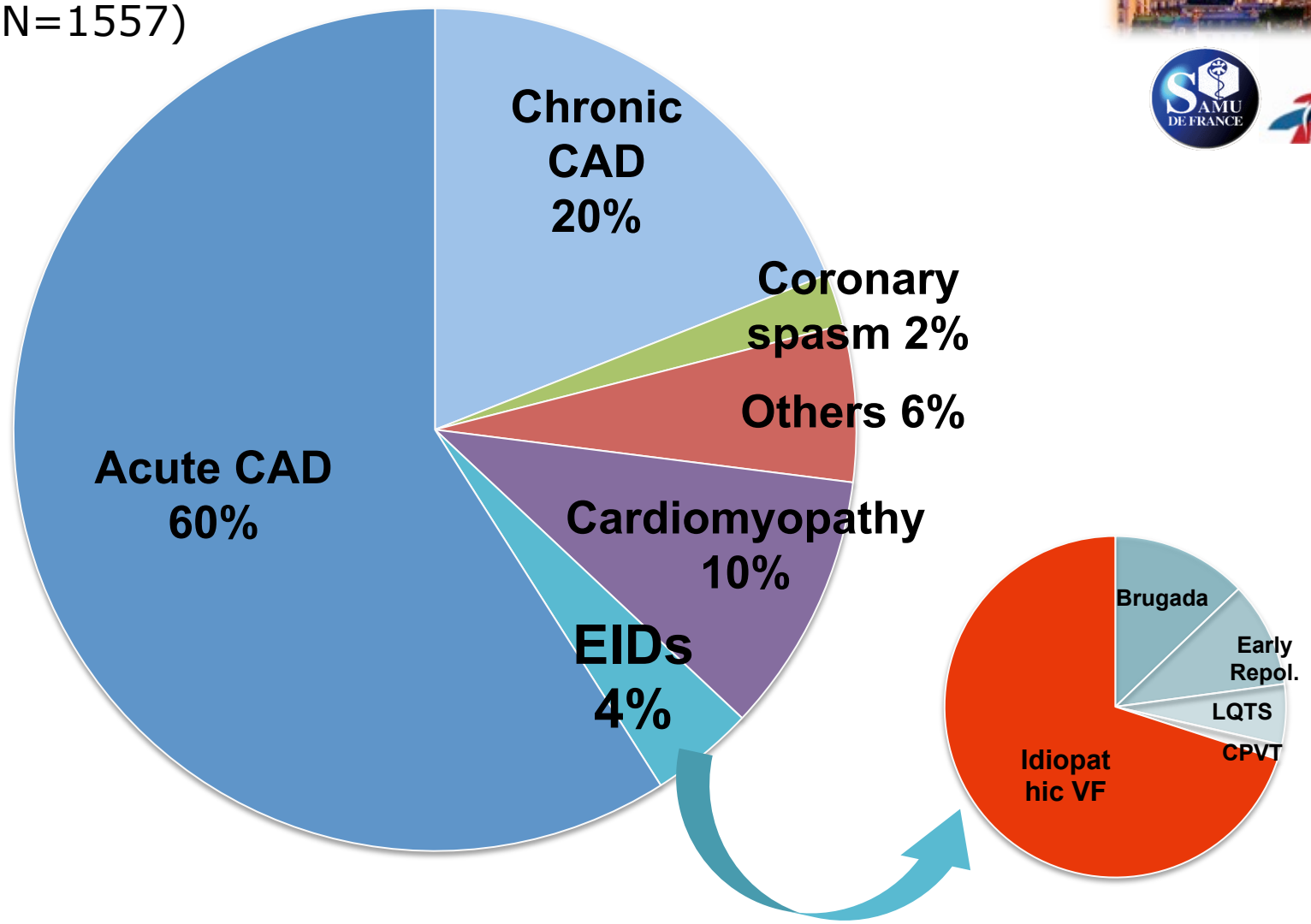
Back to Real World?

(N=1557)



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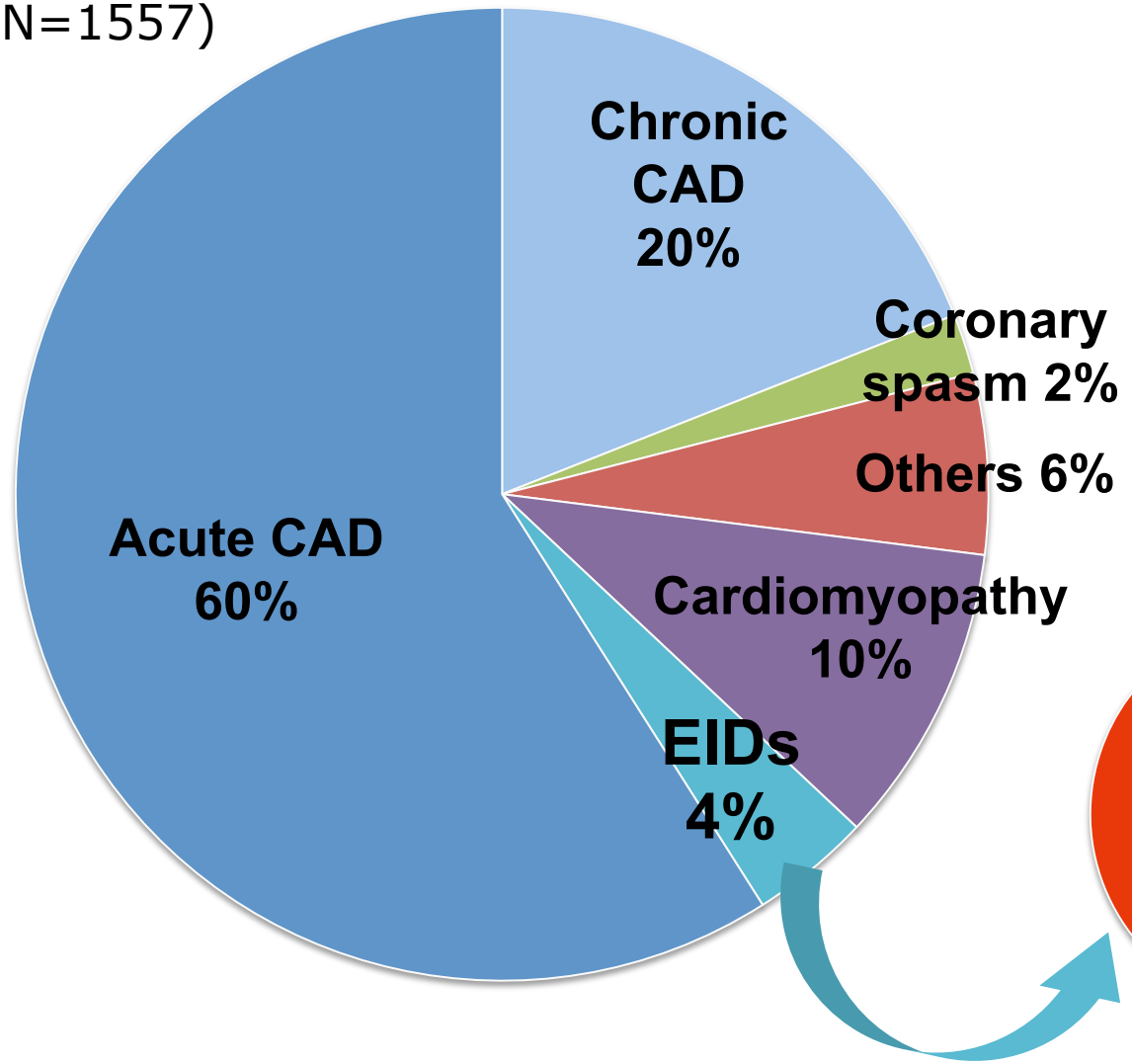
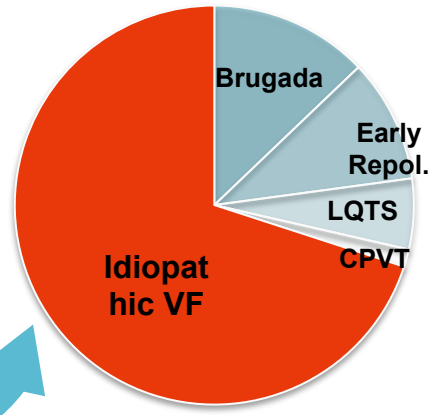
Back to Real World?

(N=1557)



49 were labelled as Idiopathic Ventricular Fibrillation



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Investigations in Real World

	IVFs n/49 (%)
Coronary angiography	47 (95.9)
Cardiac MRI	40 (81.6)
Provocative testing	
Ergonovine	19 (38.8)
Ajmaline	21 (42.9)
Isoprenaline	10 (20.4)
Adenosine	2 (4.1)
Adrenaline	0 (0)
Electrophysiological study	12 (24.5)
Genetic testing	9 (18.4)
Holter ECG	6 (12.2)
Right ventricular angiography	5 (10.2)
Exercise testing	4 (8.2)
Signal averaged ECG	2 (4.1)
Coronary CT	1 (2.0)
Cardiac scintigraphy (for ARVC)	1 (2.0)
Cardiac biopsy	0 (0)

Waldmann V et al. Eur Heart J 2018

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Investigations in Real World

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Cardiac biopsy	0 (0)

Less than 20% of the cases labeled IVF received a comprehensive investigation

Younger patients and those admitted to university centers were more thoroughly investigated

Family screening and genetic testing were initiated in only 24 and 18% of cases, respectively

Waldmann V et al. Eur Heart J 2018

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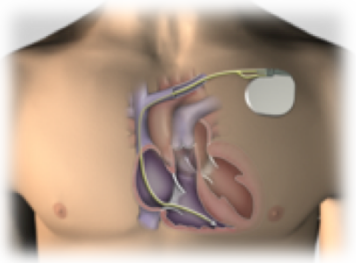
Fighting Against SCD

Decrease Incidence

Improve Outcome

CAD Prevention

Risk Stratification



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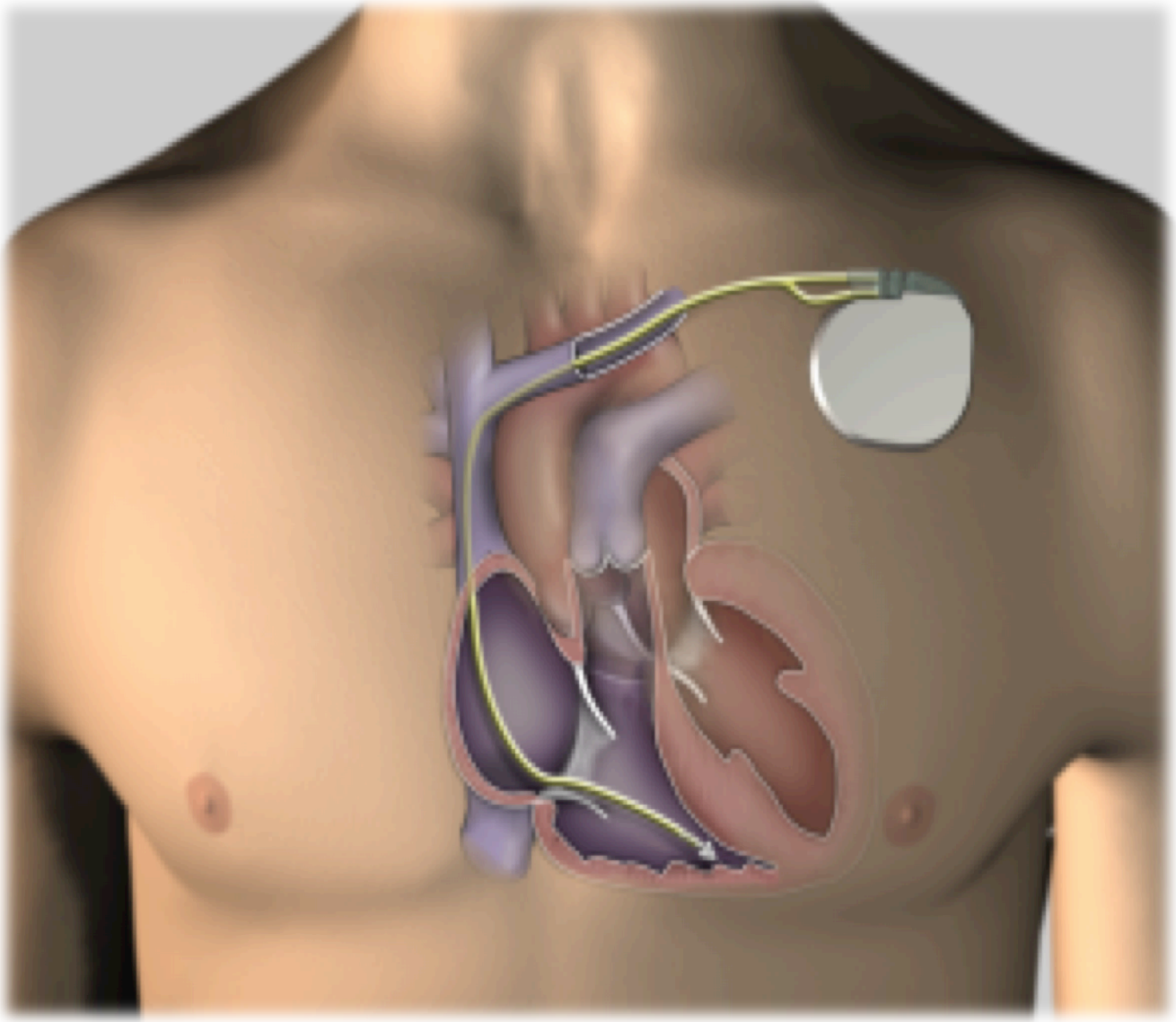
Rational for Risk Stratification



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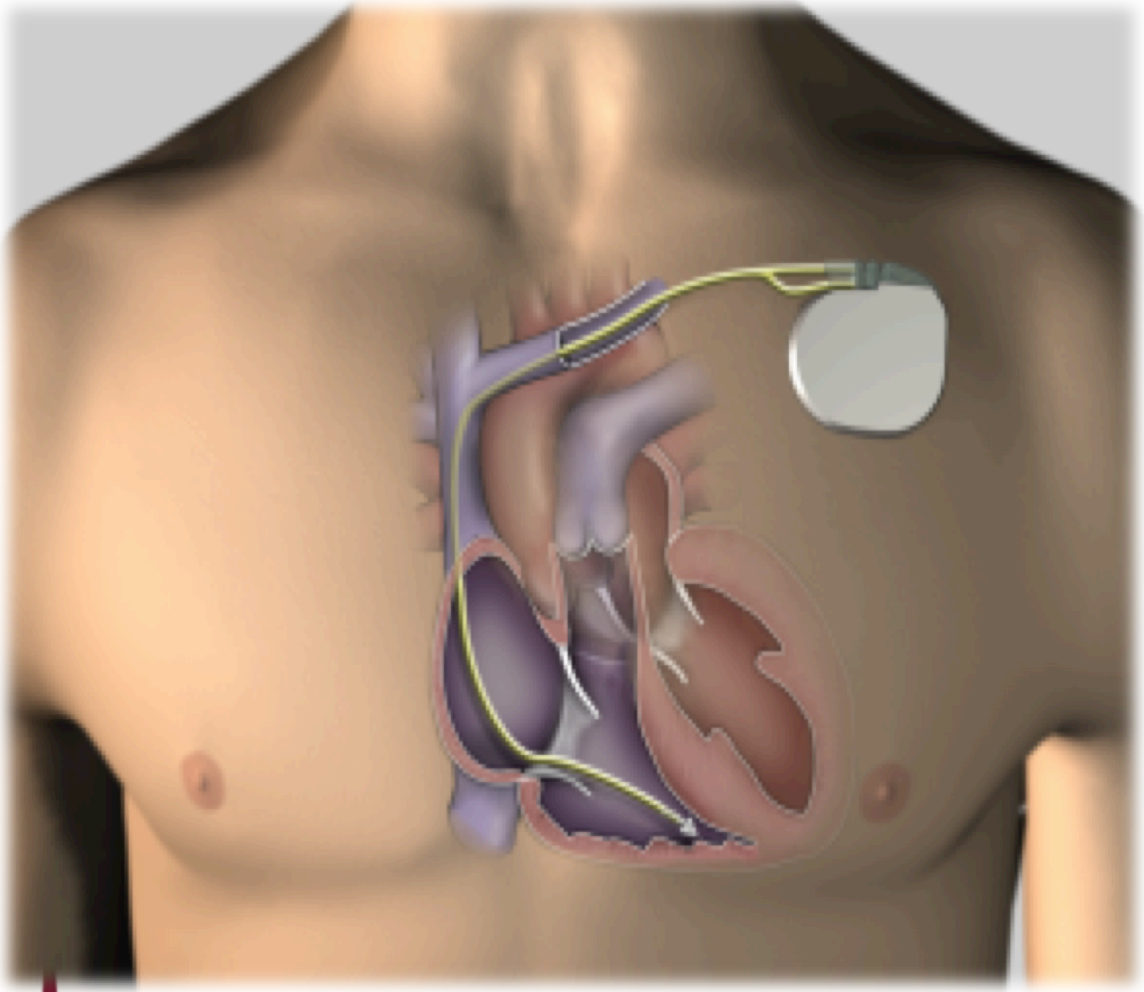
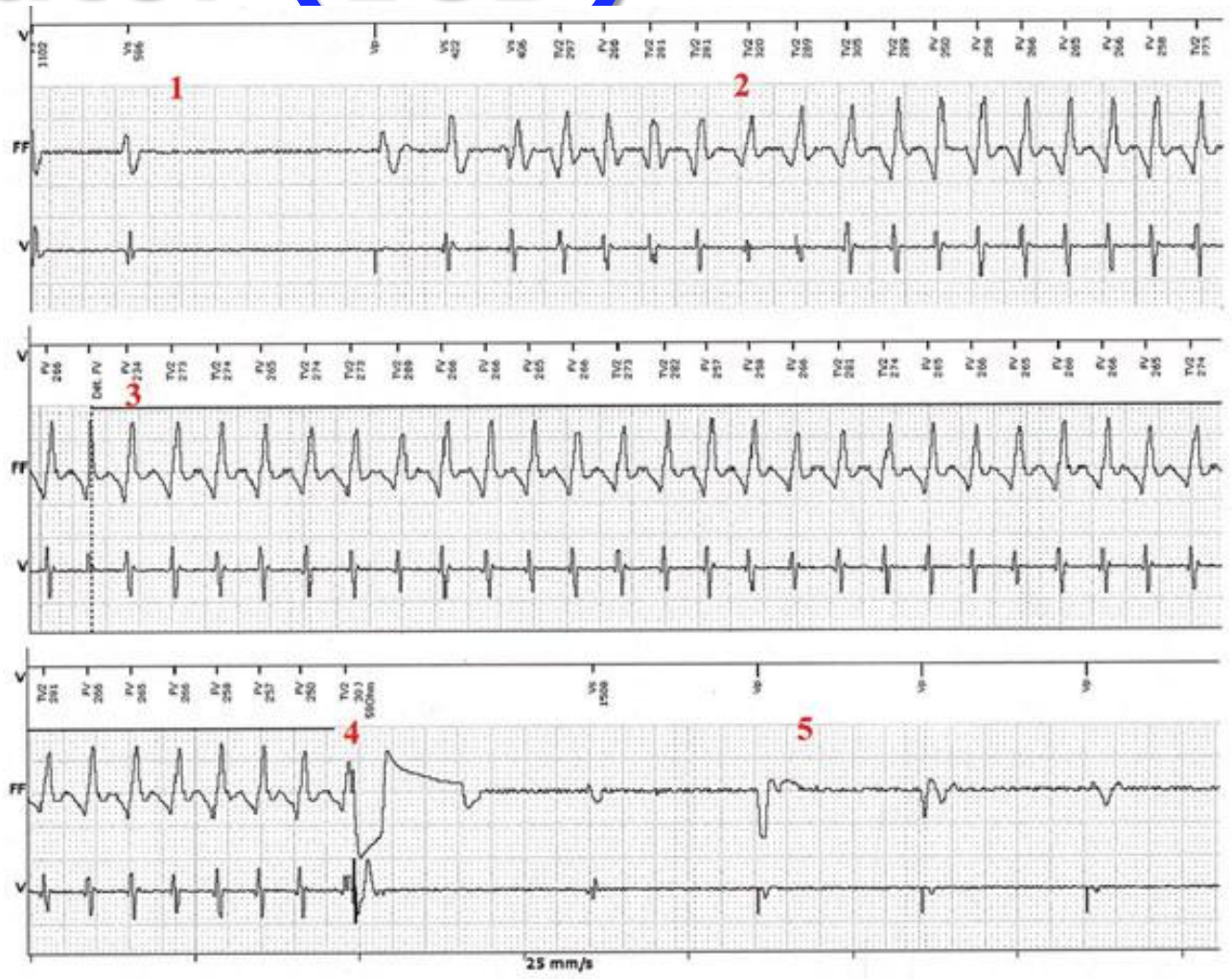
Implantable Cardioverter Defibrillator (ICD)





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We commonly use absolute risk to determine candidacy for therapy in CVD. *(Eg. in patients with AF, annualized stroke estimates guide decision making for anticoagulation…)*

The goal must be the identification of patients the most likely to benefit from ICD therapy (who are not sytematically those at higher risk of SCD)

Competing risk situation…

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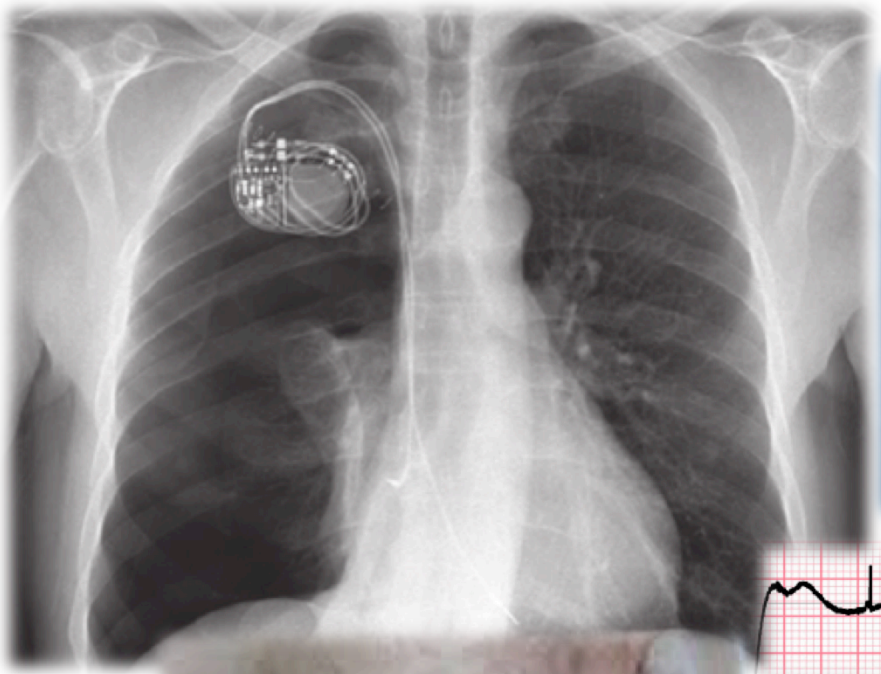
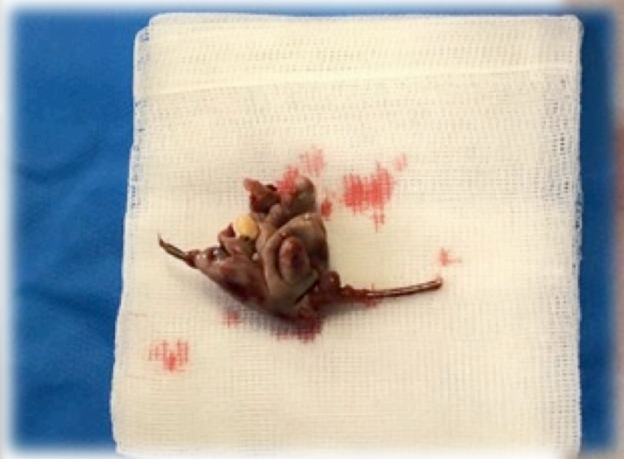
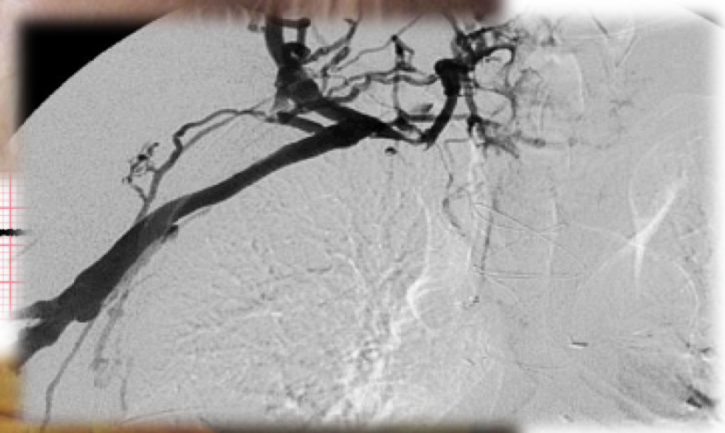
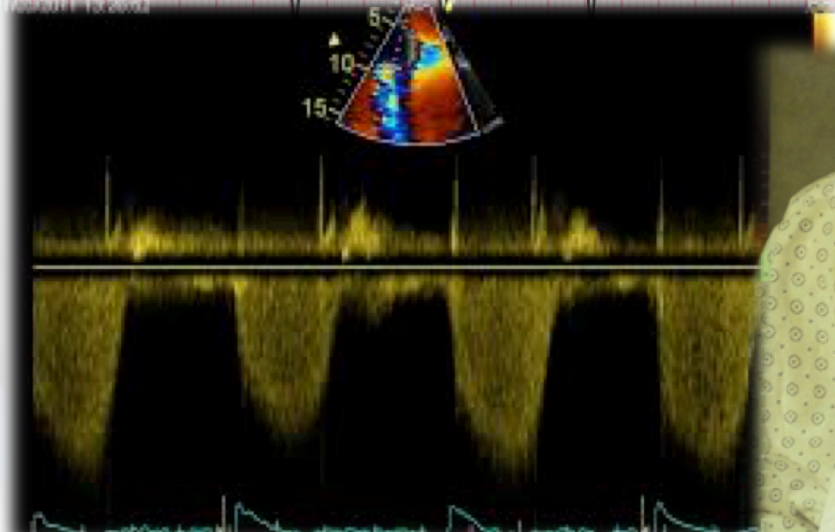
Some Potential Issues…

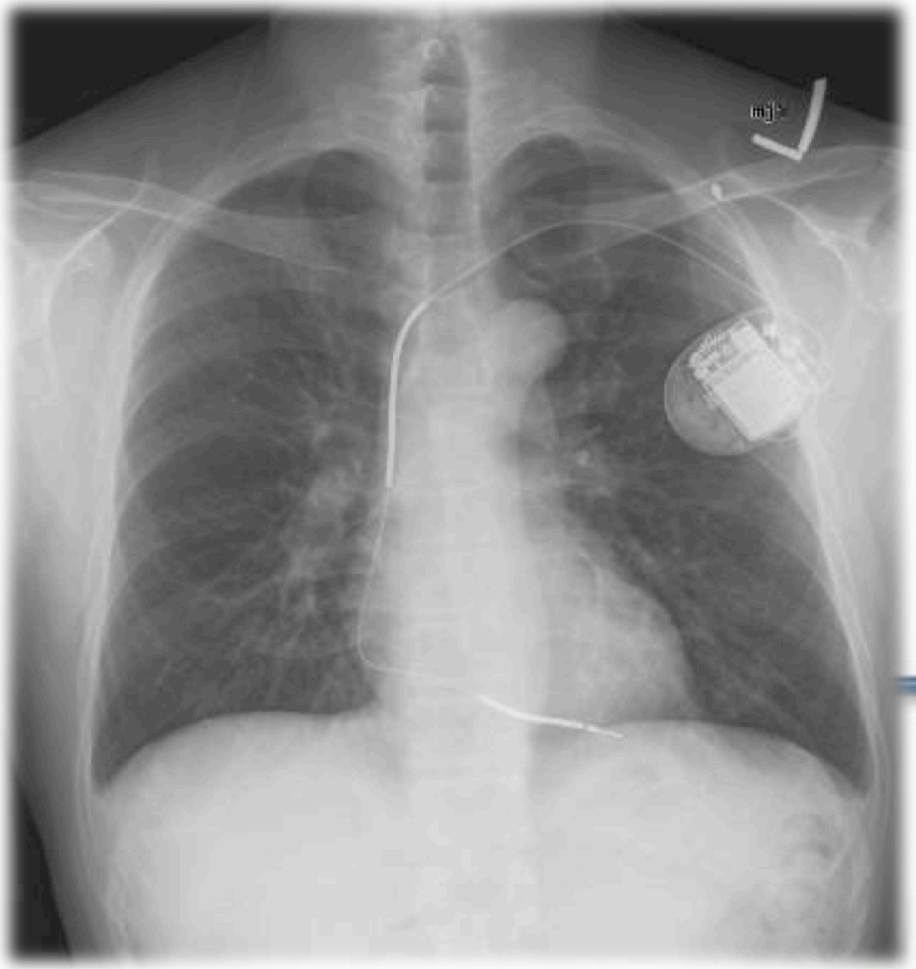


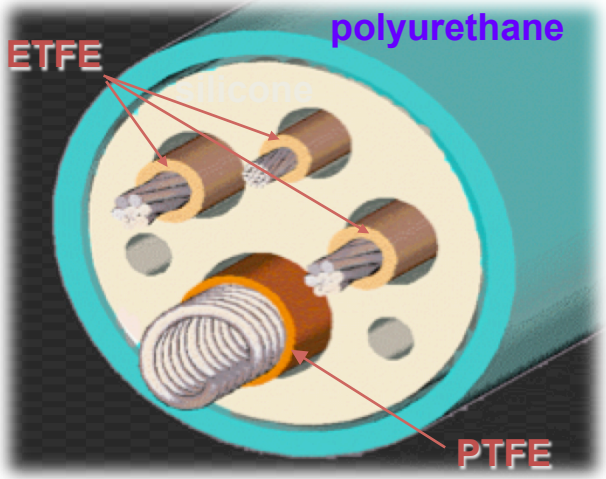






Lead – Achilles Tendon





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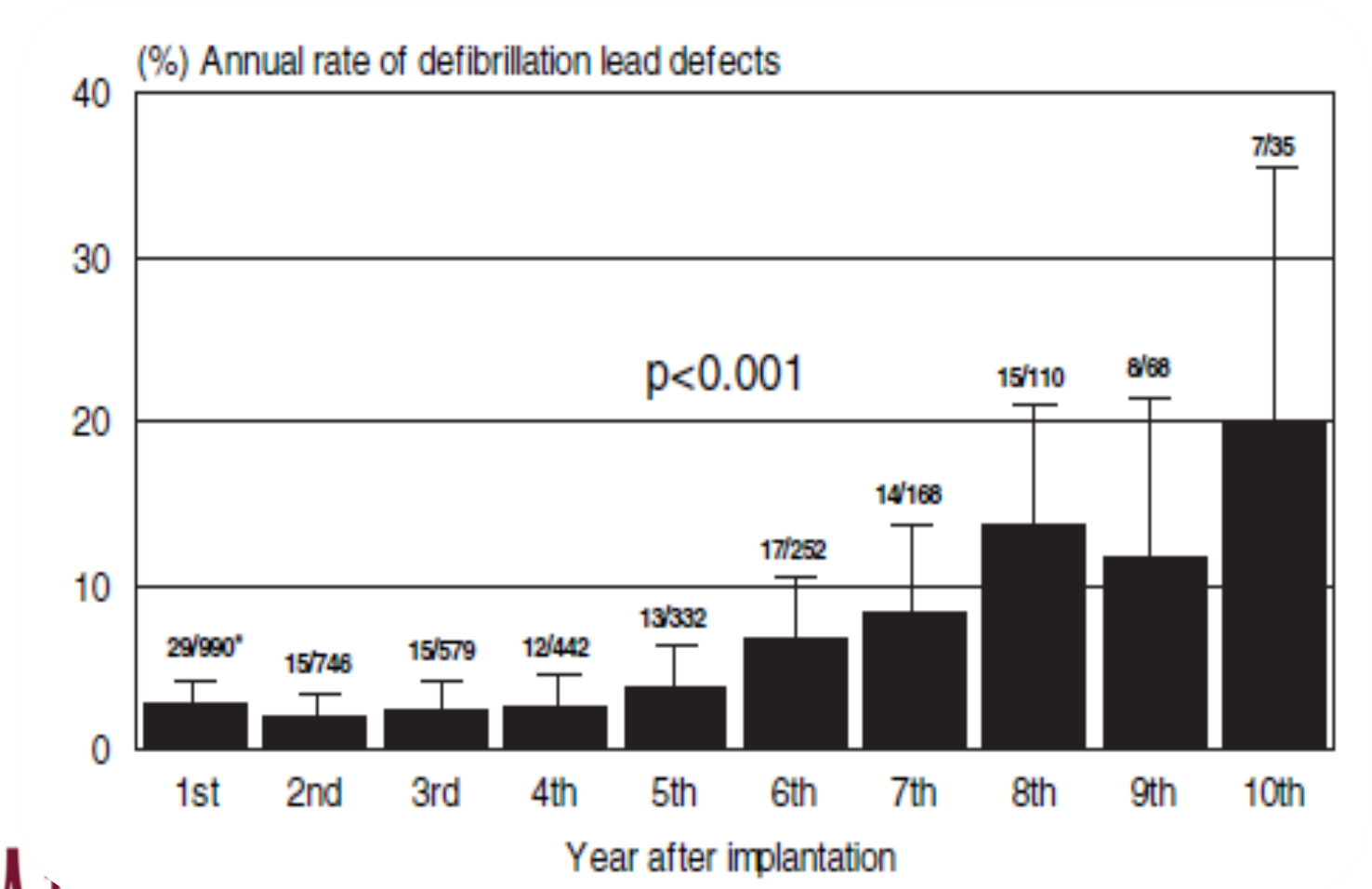
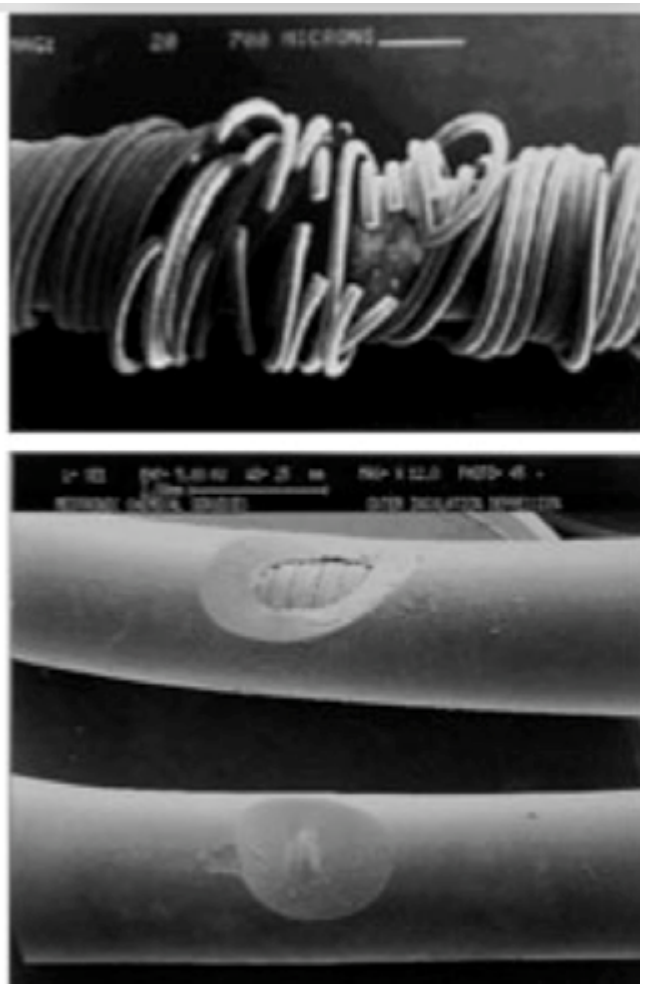
Lead – Achilles Tendon

Up to 20% annual rate of failure for >10 yo ICD leads…





Kleemann et al. Circulation 2007

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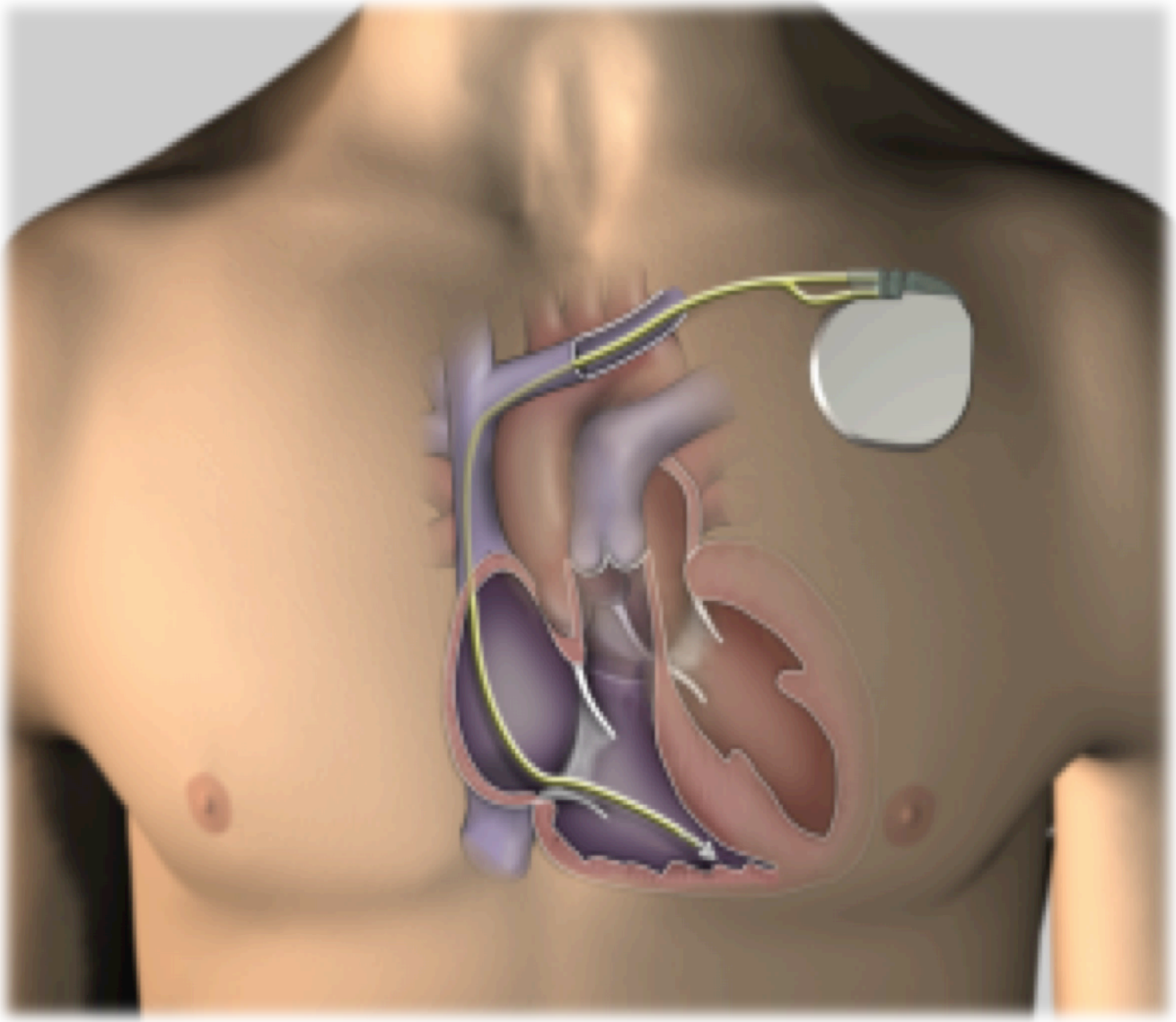
ICD-Based Prevention(s)



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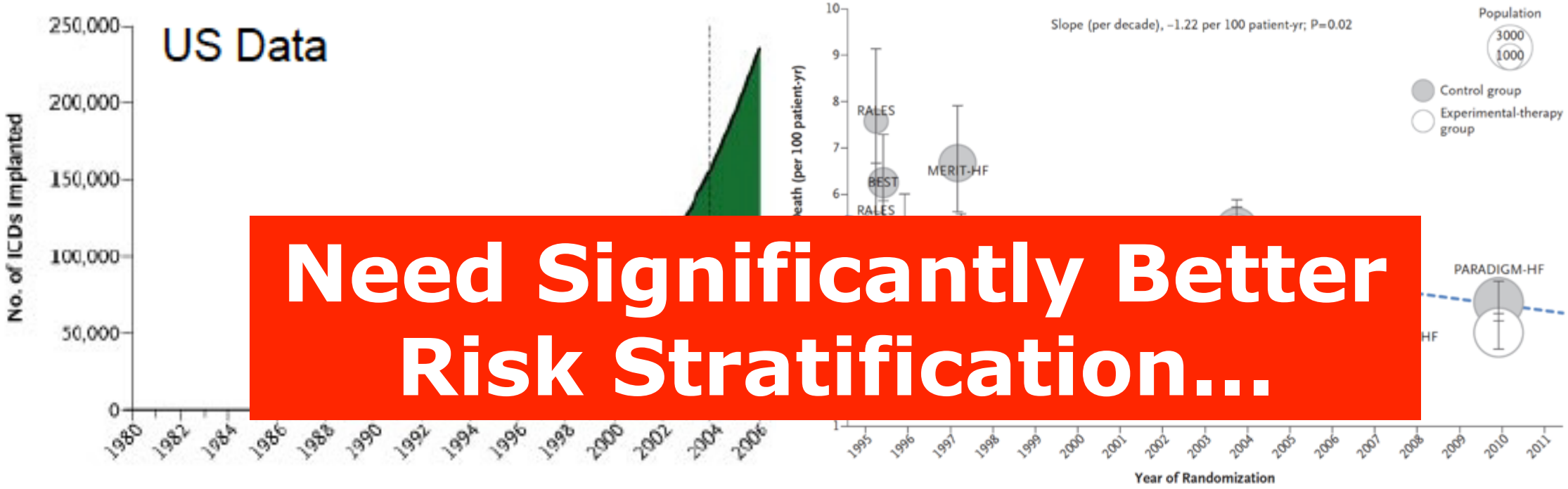
Primary Prevention ICD

Many Receive ICDs That They Do Not Use



Need Significantly Better Risk Stratification…

SCDHeFT trial 2005: 5.1% ICD shock per year
DANISH Trial 2016: 3.6% per year (shocks+ATP)
Number Needed to Treat (NNT) rising
HF management better, cost not sustainable

Bardy et al NEJM 2005
Kober et al NEJM 2016
Shen et al NEJM 2017

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Primary Prevention ICD

Many Do Not Receive ICDs When They Should Do

Oregon SUDS

Portland, Oregon (2002-2012)

Narayanan K et al. Circulation 2013

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Primary Prevention ICD

Many Do Not Receive ICDs When They Should Do

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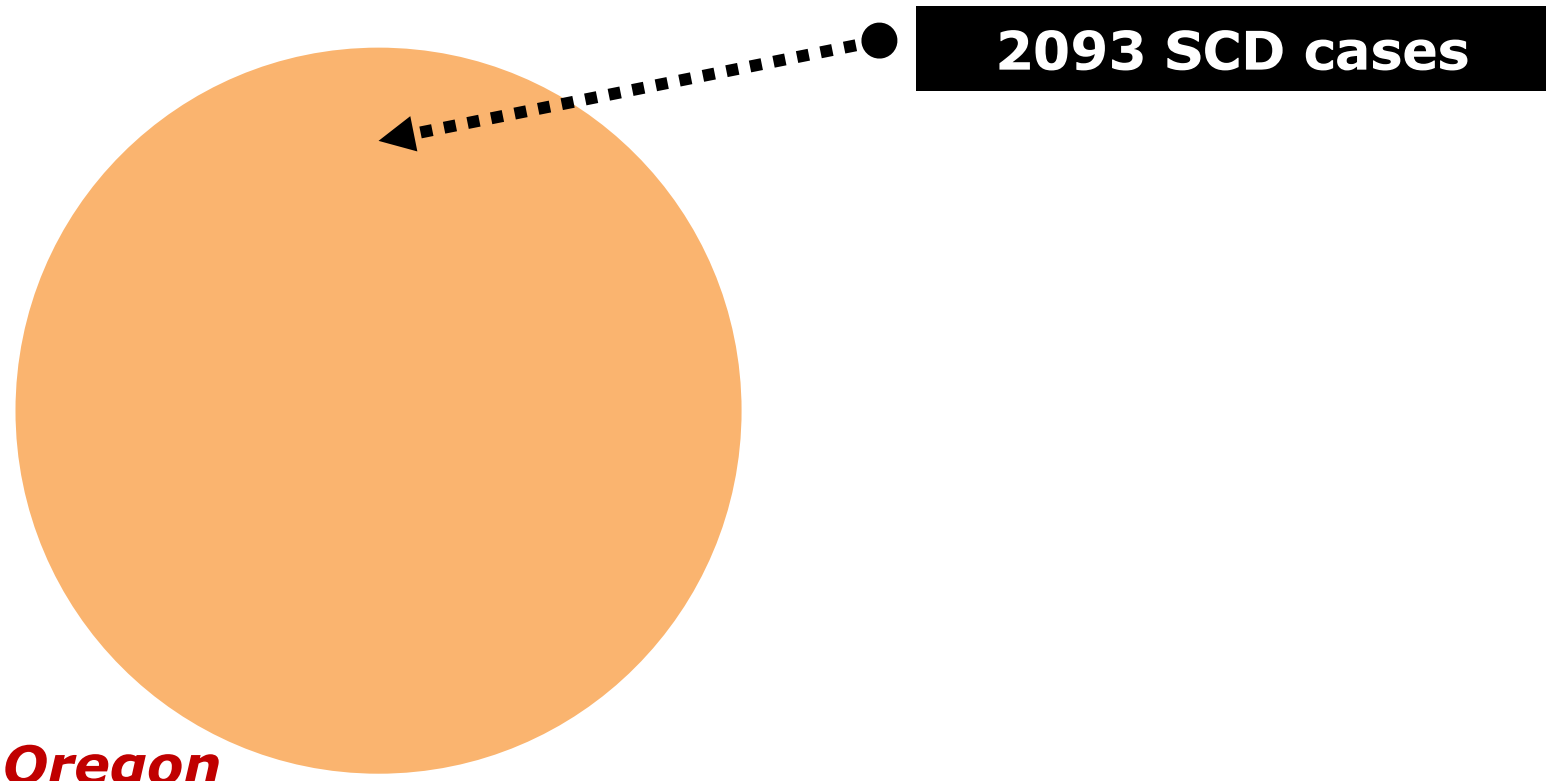

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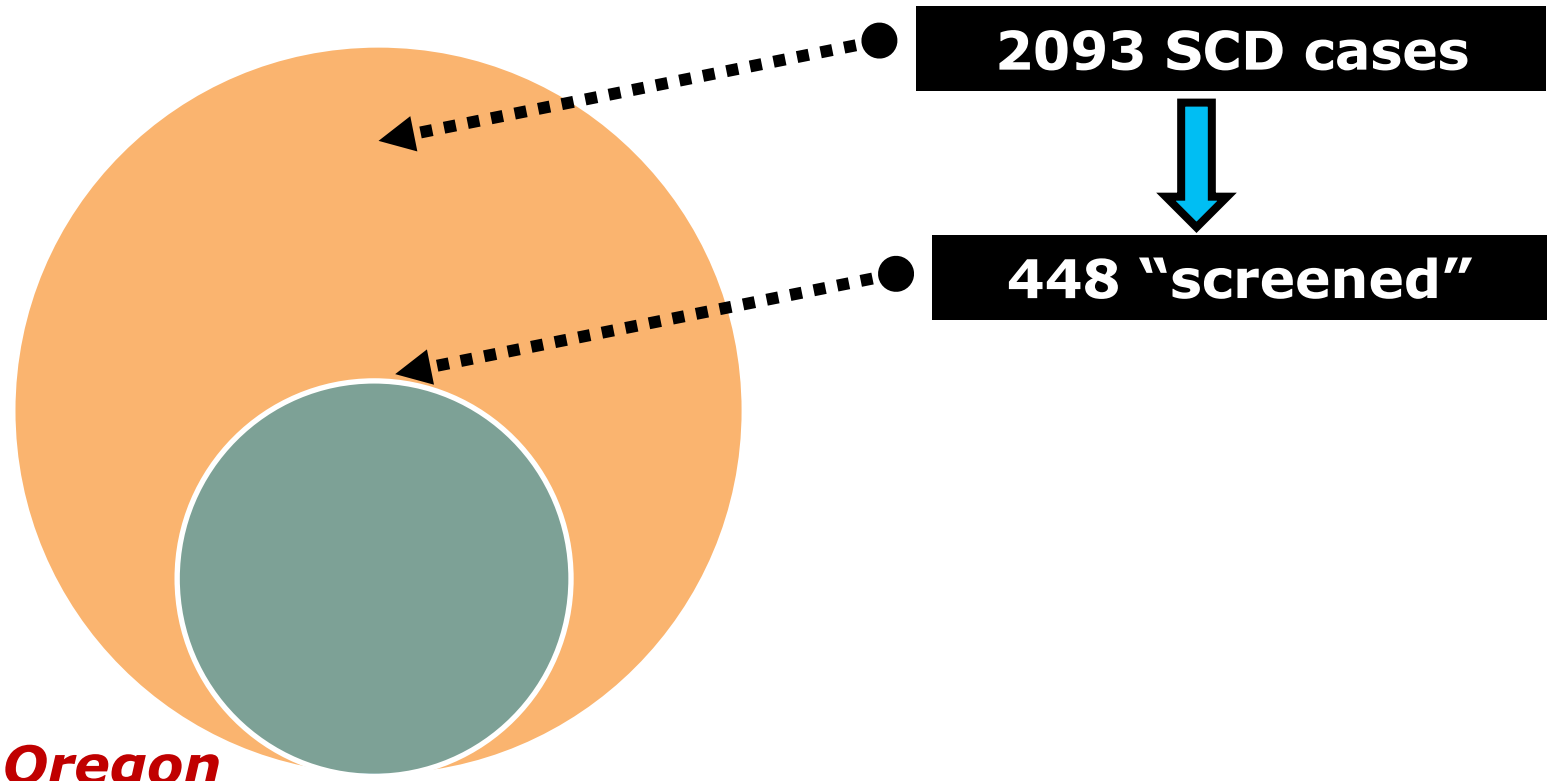

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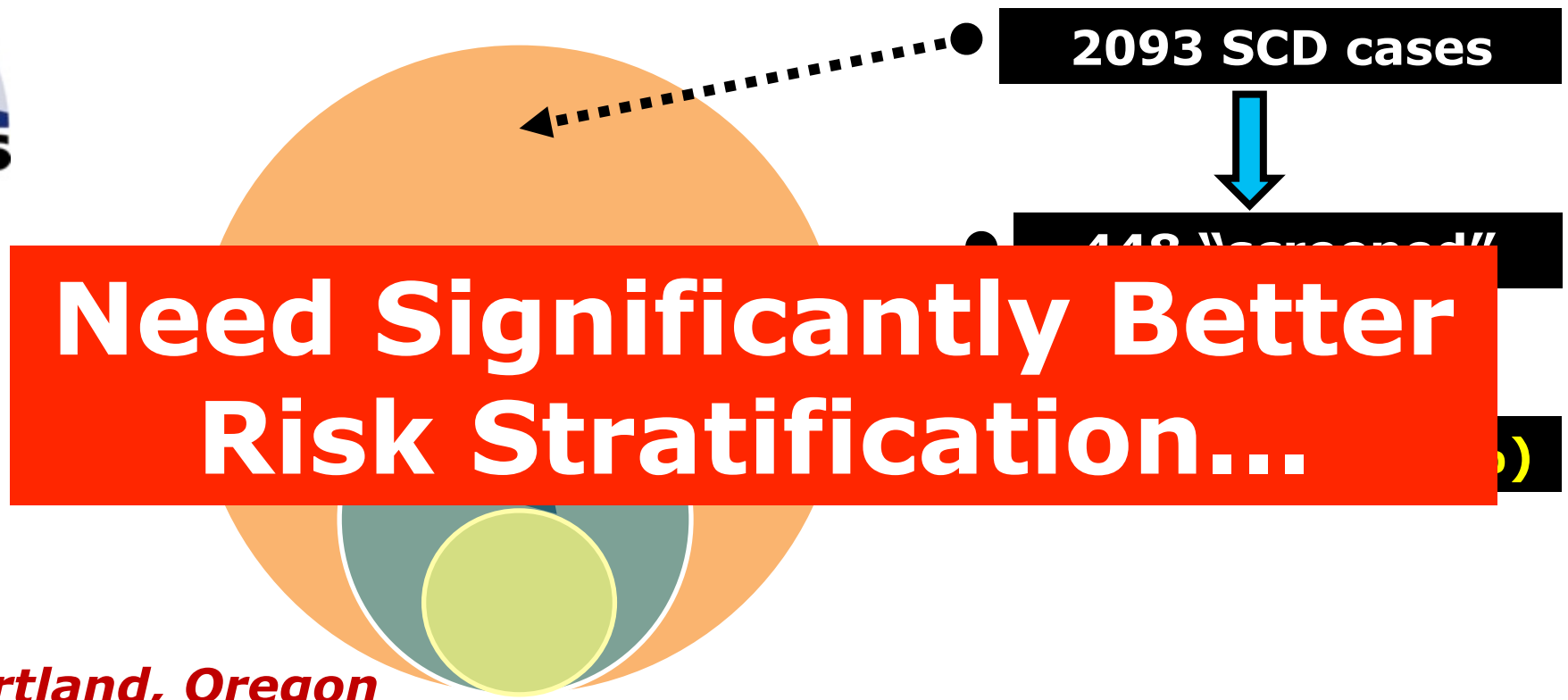

Portland, Oregon (2002-2012)

Portland, Oregon (2002-2012)

Narayanan K et al. Circulation 2013

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Risk Stratification

In a Pt With Known Heart Disease

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Risk Stratification

In a Pt With Known Heart Disease

- **Two categories**

Electrical Disorders and some structural diseases

DCM and Coronary Artery Disease

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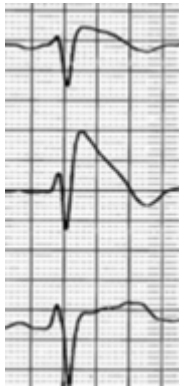
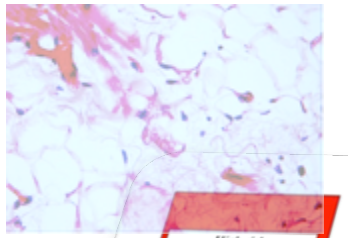
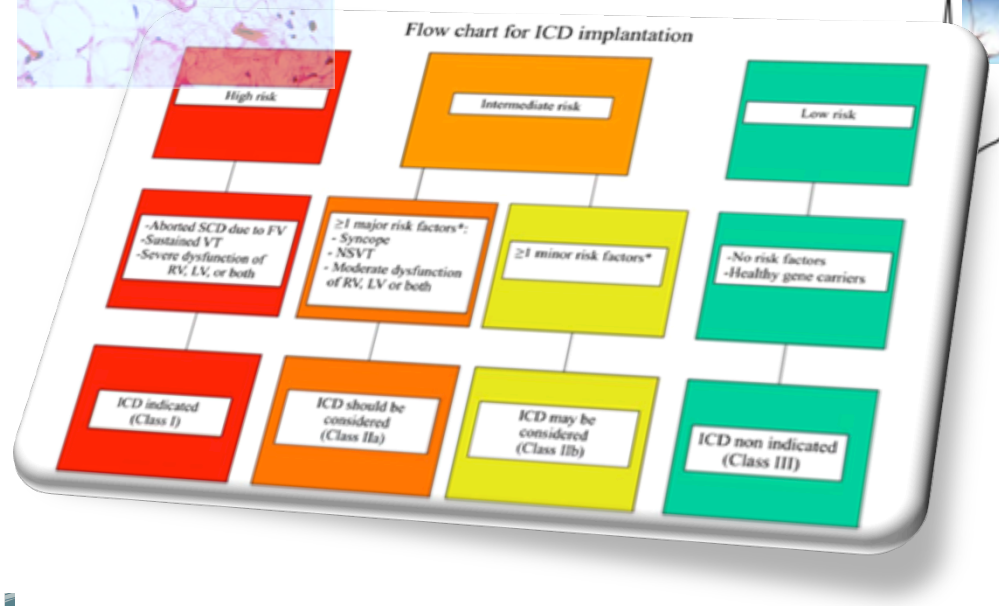
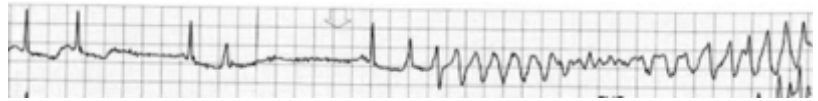


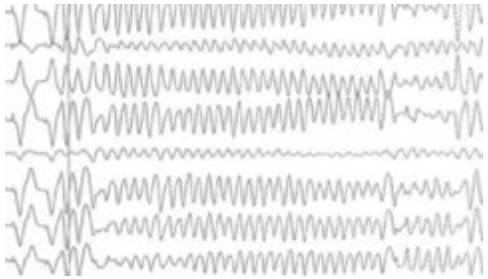


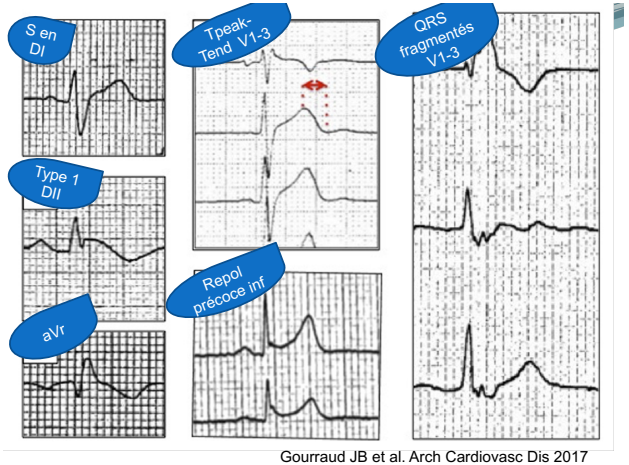


LQTS type 2

LQTS type 3







Gourraud JB et al. Arch Cardiovasc Dis 2017

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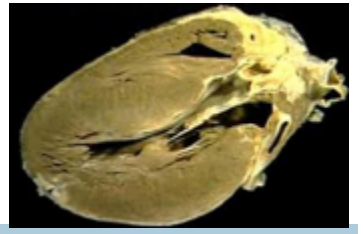
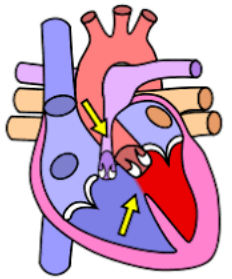


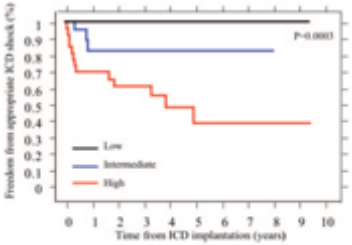
HCM Risk-SCD Calculator

Age	29	Years	Age at evaluation
Maximum LV wall thickness	17	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	32	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 Bernouilli equation: 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 <30s 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 (%):	6.25
ESC recommendation:	ICD should be considered

Variable	Exp(β)	Points Attributed
Prior palliative shunt	3.2	2
Inducible sustained ventricular tachycardia	2.6	2
QRS duration ≥180 ms	1.4	1
Ventriculotomy incision	3.4	2
Nonsustained ventricular tachycardia	3.7	2
LVEDP ≥12 mm Hg	4.9	3
Total points	...	0–12





Risk score	Risk category	N	Annualized rate of appropriate shocks
0-2	Low	18	0%
3-5	Intermediate	24	3.8%
6-12	High	26	17.5%

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Risk Stratification

In a Pt With Known Heart Disease

- **Two categories**

Electrical Disorders and some structural diseases

DCM and Coronary Artery Disease

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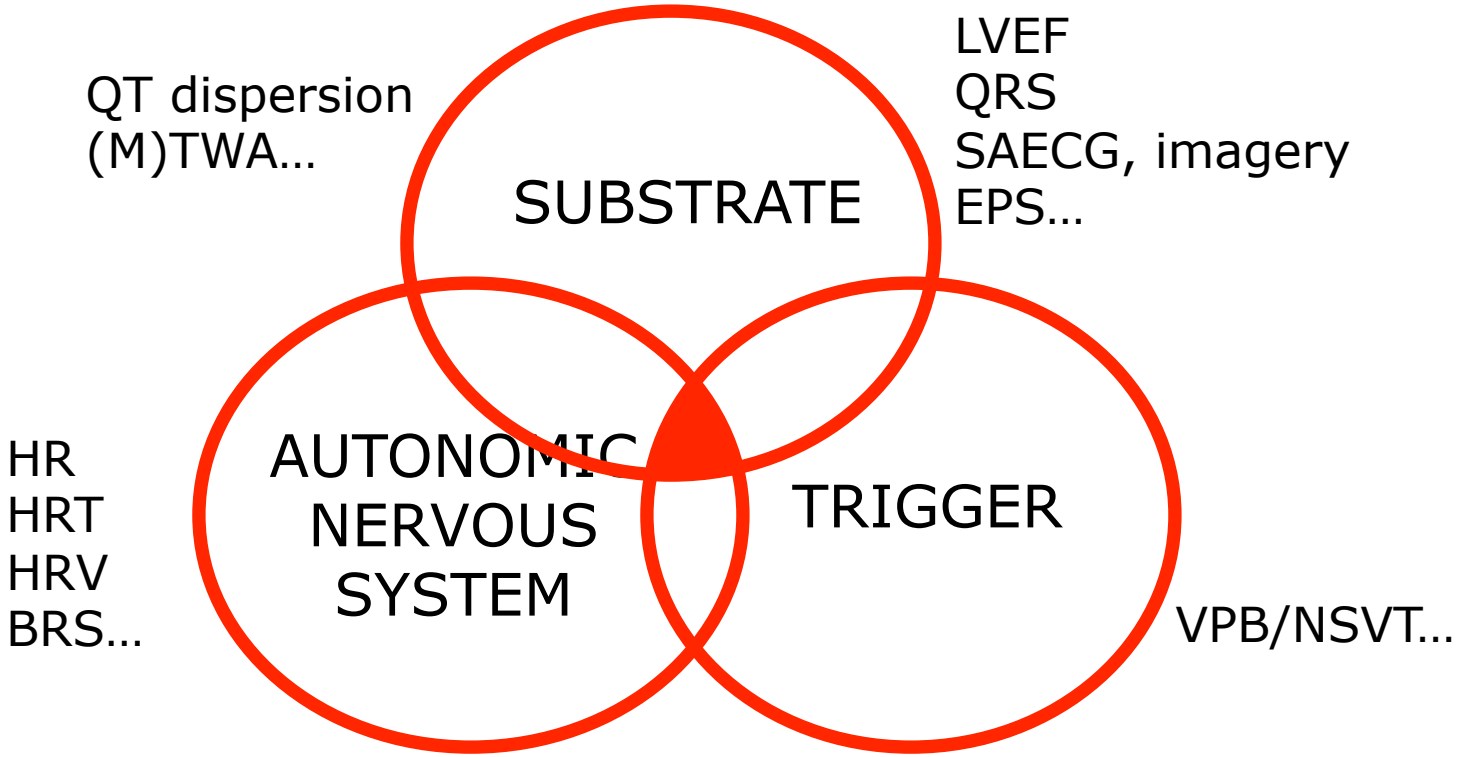
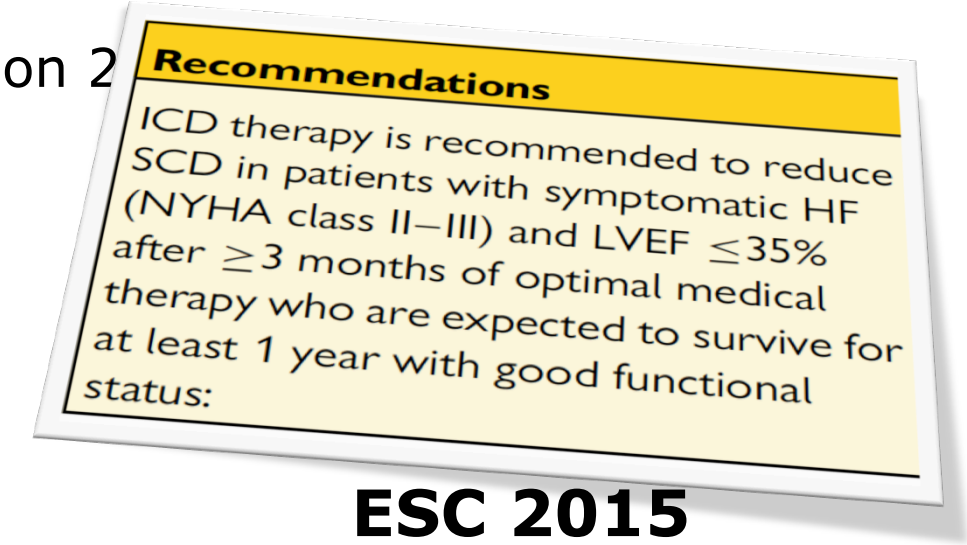
Risk Stratification Approach
(1985-2015)



Risk Stratification Approach
(1985-2015)

- QRS Buxton JACC 2005, Kadish NEJM 2004
- SAECG Bigger NEJM 1997, Galinier EHJ 1996
- EP Study Buxton Circulation 2002
- VPB/NSVT Kadish NEJM 2004, Bardy NEJM 2005
- HRV Camm Circulation 2



ESC 2015

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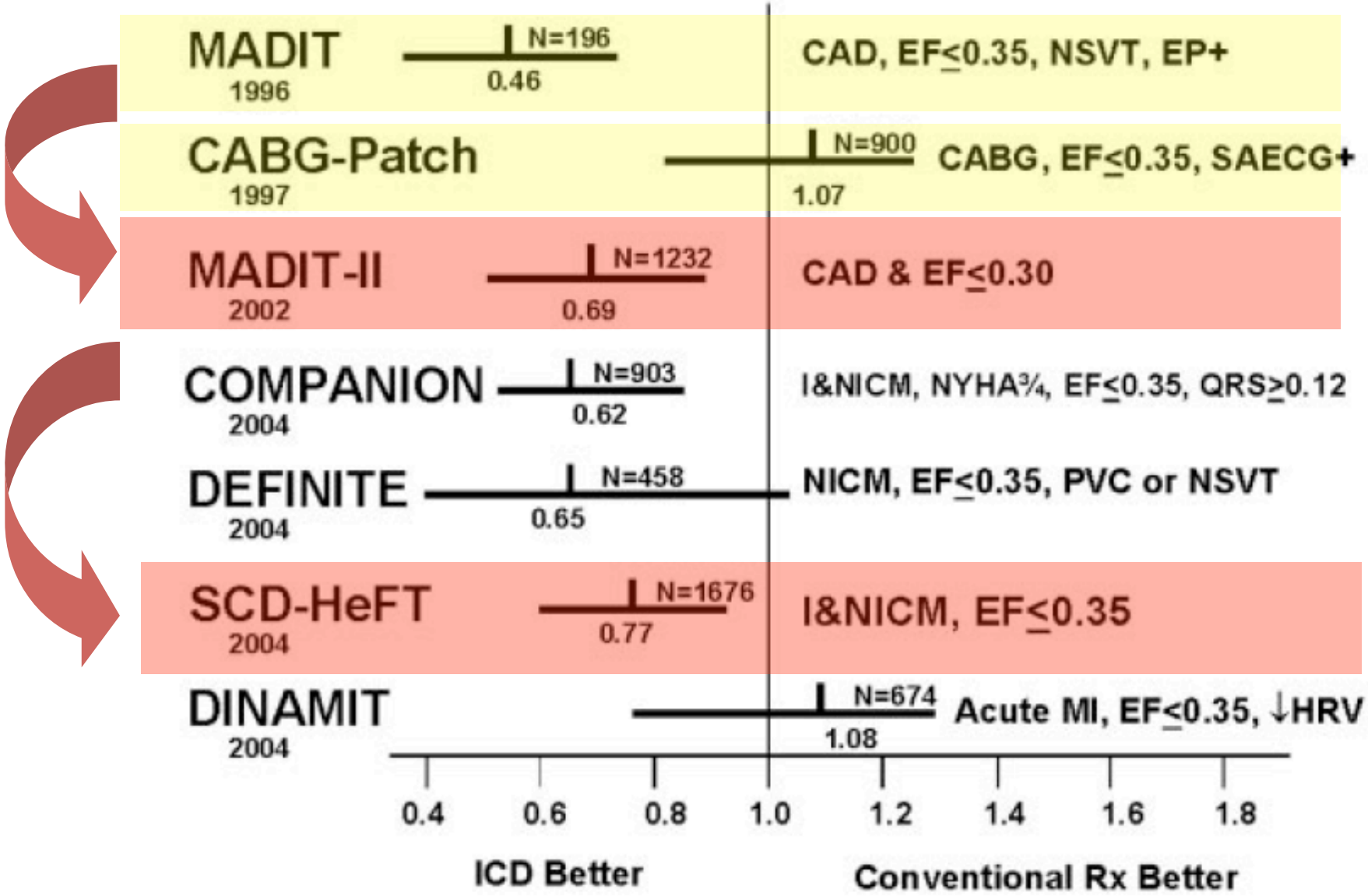
LVEF: Cornerstone?!



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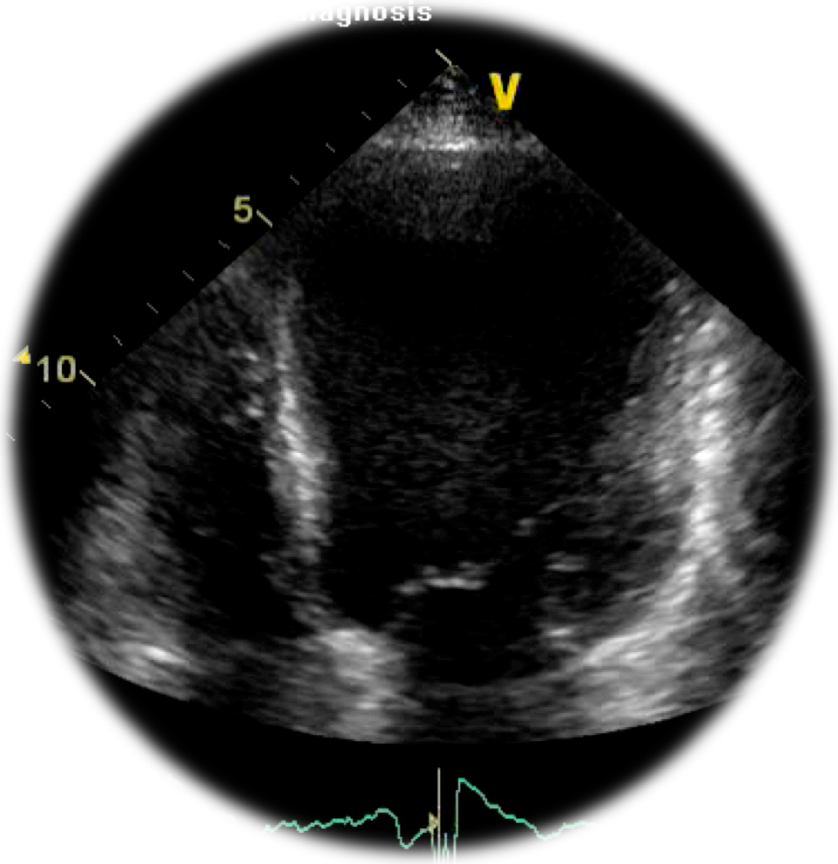
Limits of LVEF to Optimize Primary Prevention in DCM/CAD

The common point between DCM and CAD primary prevention offered by ICD is the limits related to low EF as the only risk marker



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Risk Stratification

In a Pt With Known Heart Disease

- **Two categories**

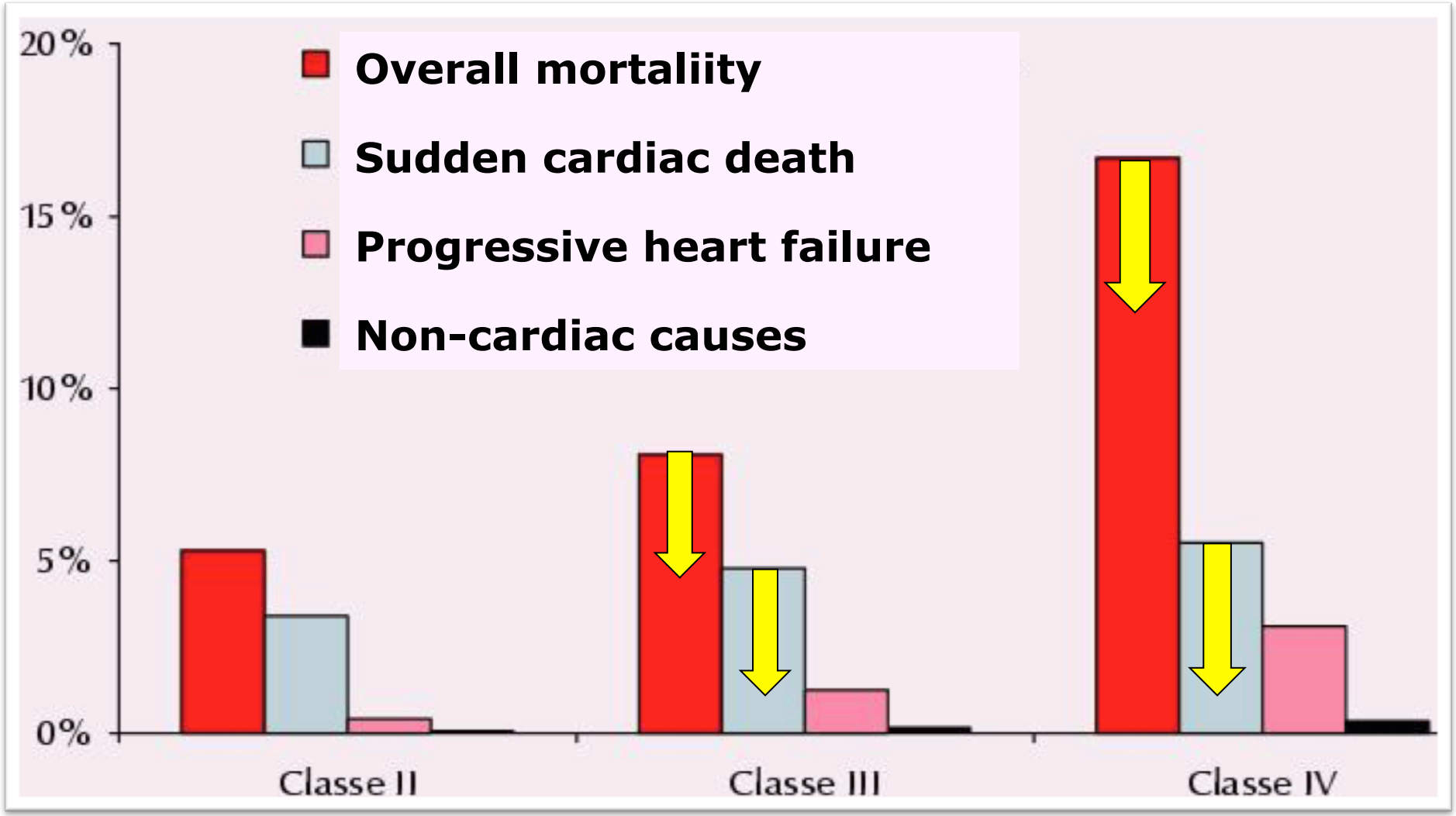
Electrical Disorders and some structural diseases

DCM and Coronary Disease

Competing Risk Situation+++

Competing Risk Situation

Absolute and Proportional Risks



MERIT-HF Lancet 1998

Illustration Using MADIT-II

Journal of the American College of Cardiology
© 2008 by the American College of Cardiology Foundation
Published by Elsevier Inc.

Vol. 51, No. 3, 2008
ISSN 0735-1097/08/$34.00
doi:10.1016/j.jacc.2007.08.058

Risk Stratification for Primary Implantation of a Cardioverter-Defibrillator in Patients With Ischemic Left Ventricular Dysfunction

Ilan Goldenberg, MD,* Anant K. Vyas, MD, MPH,† W. Jackson Hall, PHD,‡ Arthur J. Moss, MD,* Hongyue Wang, PHD,‡ Hua He, MA,‡ Wojciech Zareba, MD, PHD,* Scott McNitt, MS,* Mark L. Andrews, BBA,* for the MADIT-II Investigators

Rochester and Buffalo, New York

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Goldenberg et al. JACC 2008

Illustration Using MADIT-II

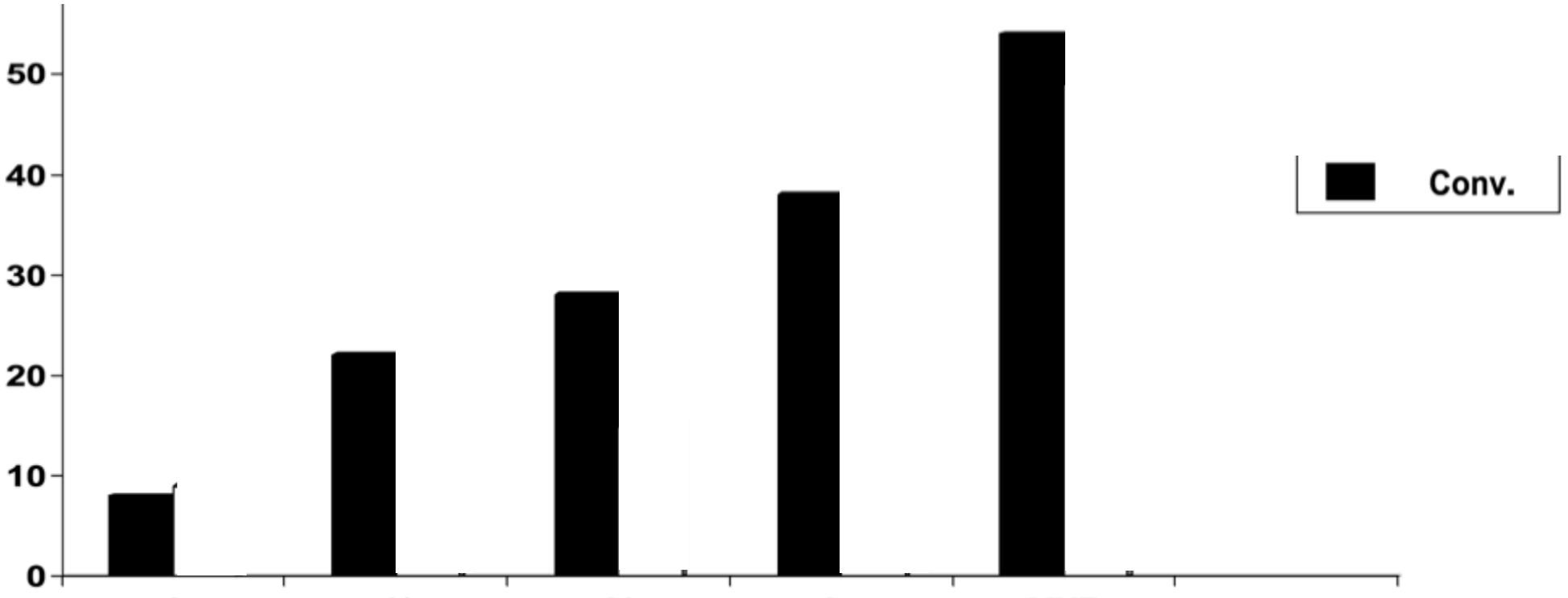
1,232 patients with documented previous MI and EF 30% were randomized to receive a prophylactic ICD or conventional medical therapy in a 3:2 ratio and were followed over a mean 2-yr period

Mortality Score

Risk Factor	HR	95% Confidence Interval	p Value
NYHA functional class >II	1.87	1.23–2.86	0.004
Atrial fibrillation‡	1.87	1.05–3.22	0.034
QRS >120 ms	1.65	1.08–2.51	0.020
Age >70 yrs	1.57	1.02–2.41	0.042
BUN >26 mg/dl (and <50 mg/dl)	1.56	1.00–2.42	0.048

Goldenberg et al. JACC 2008

Illustration Using MADIT-II



% Pts at risk	29%	28%	24%	14%	5%

Goldenberg et al. JACC 2008

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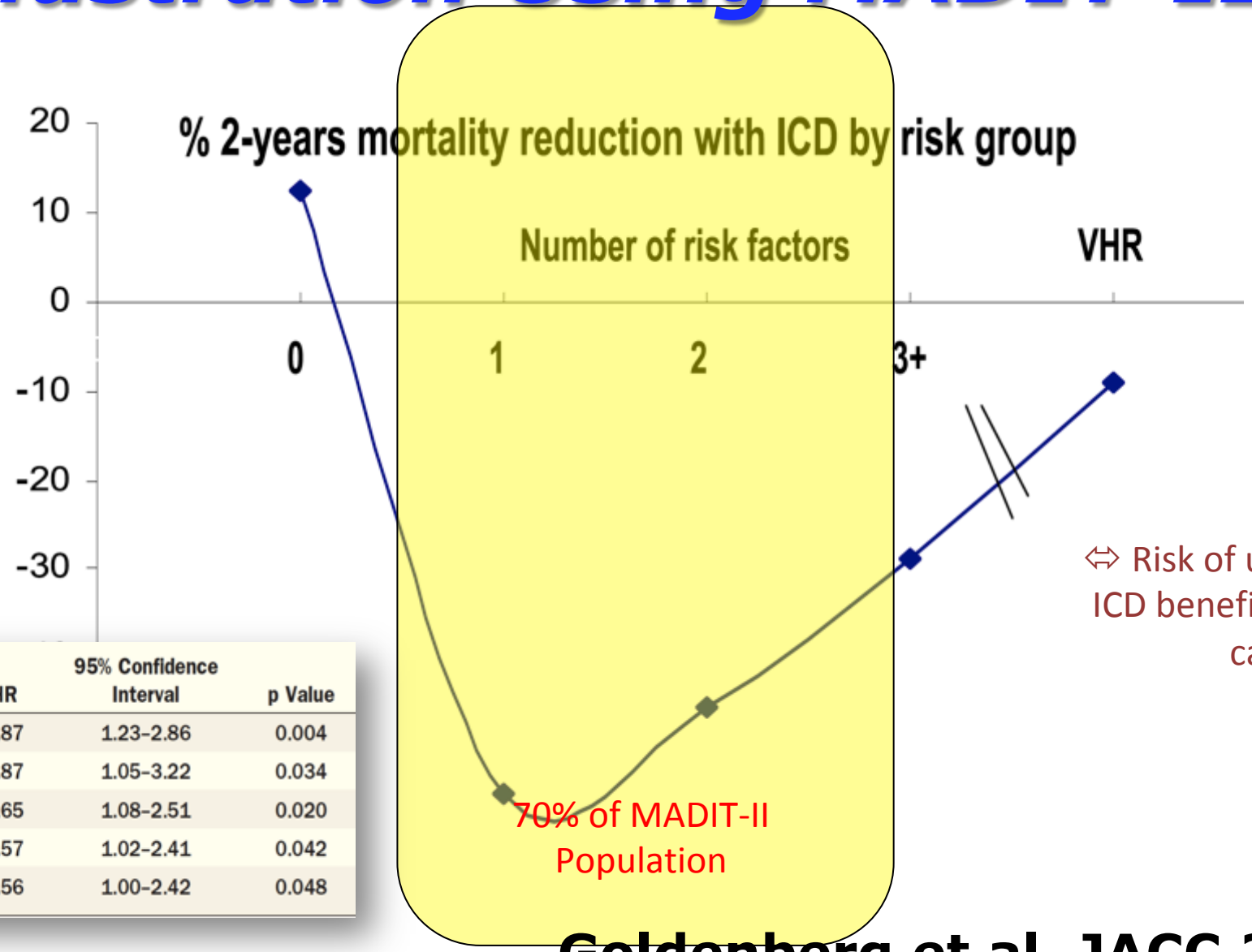
Illustration Using MADIT-II



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⇔ Risk of underestimation of ICD benefit in adequate ICD candidates

Goldenberg et al. JACC 2008

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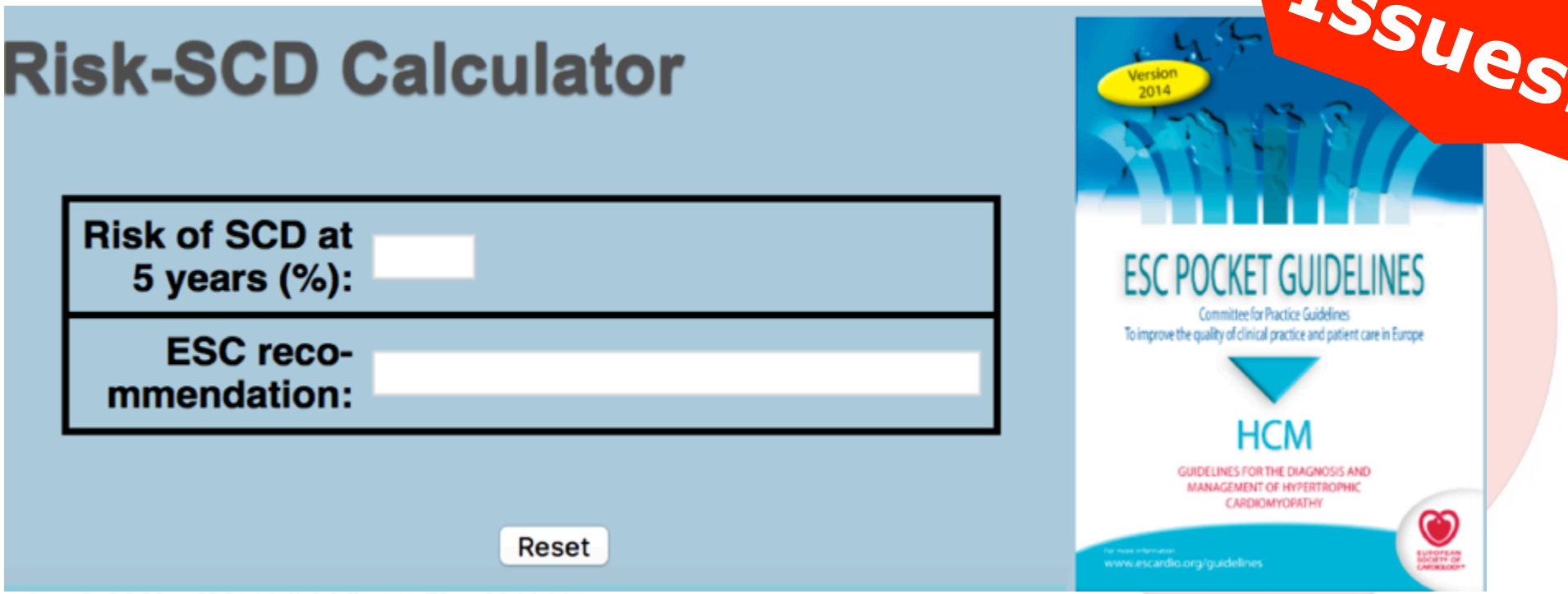
Risk Stratification – Pittfalls

Majority in the General Population

Tools for Risk Stratification Ver

2 Issues…



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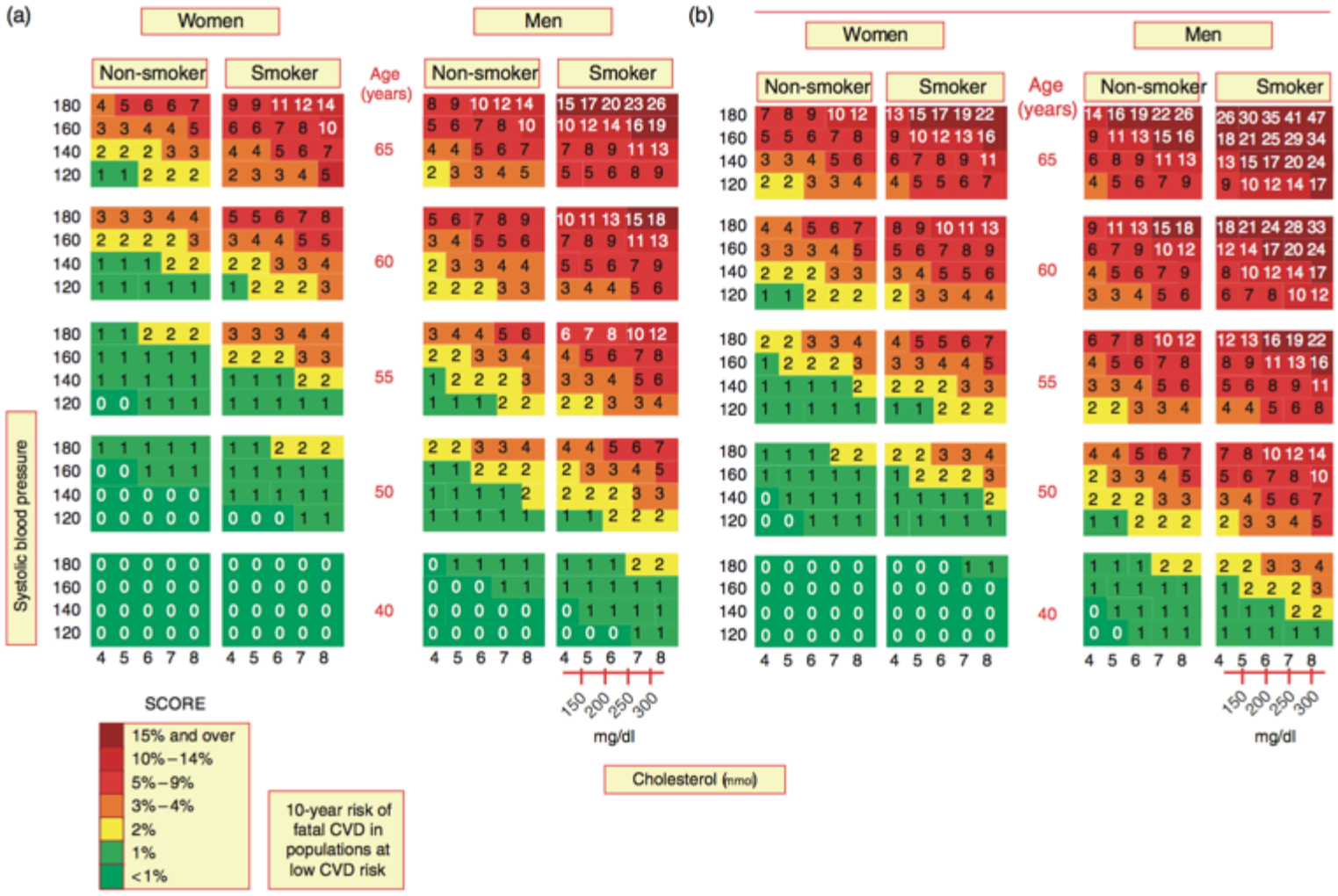
Risk Stratification

In a Pt w/o Known Heart Disease

1



SCORE risk in low (a) or high-risk (b) countries. CVD, cardiovascular disease.

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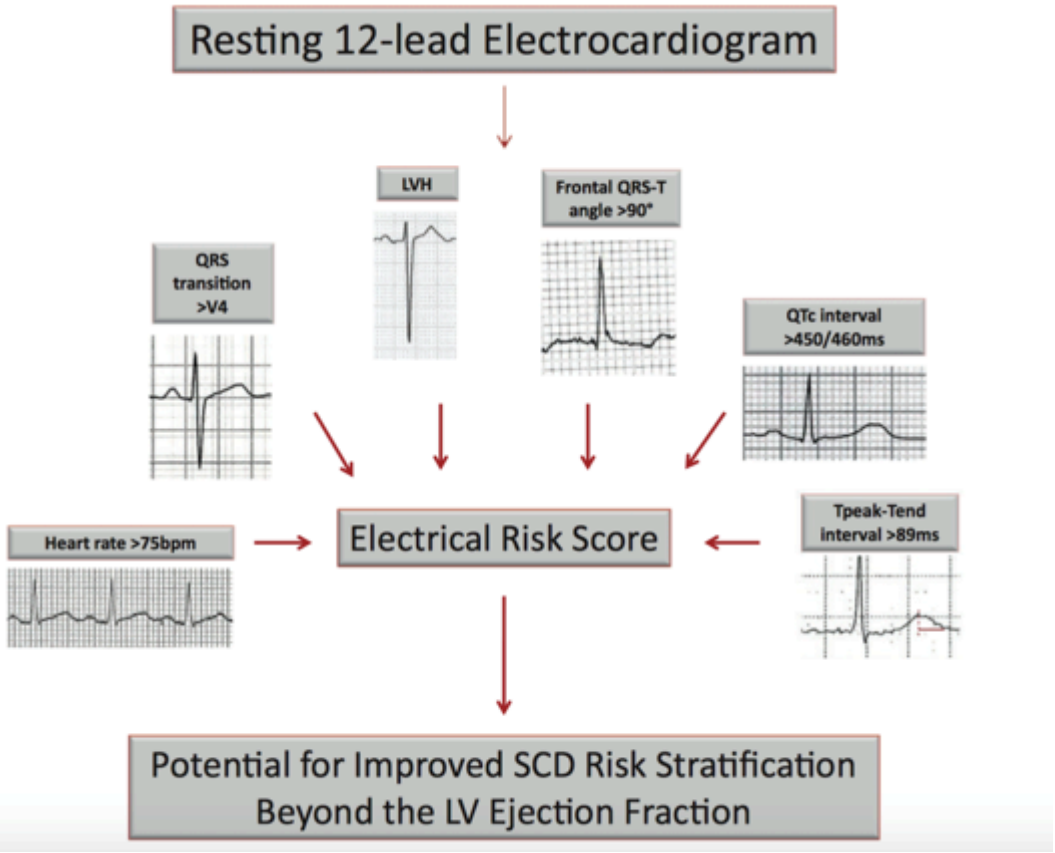
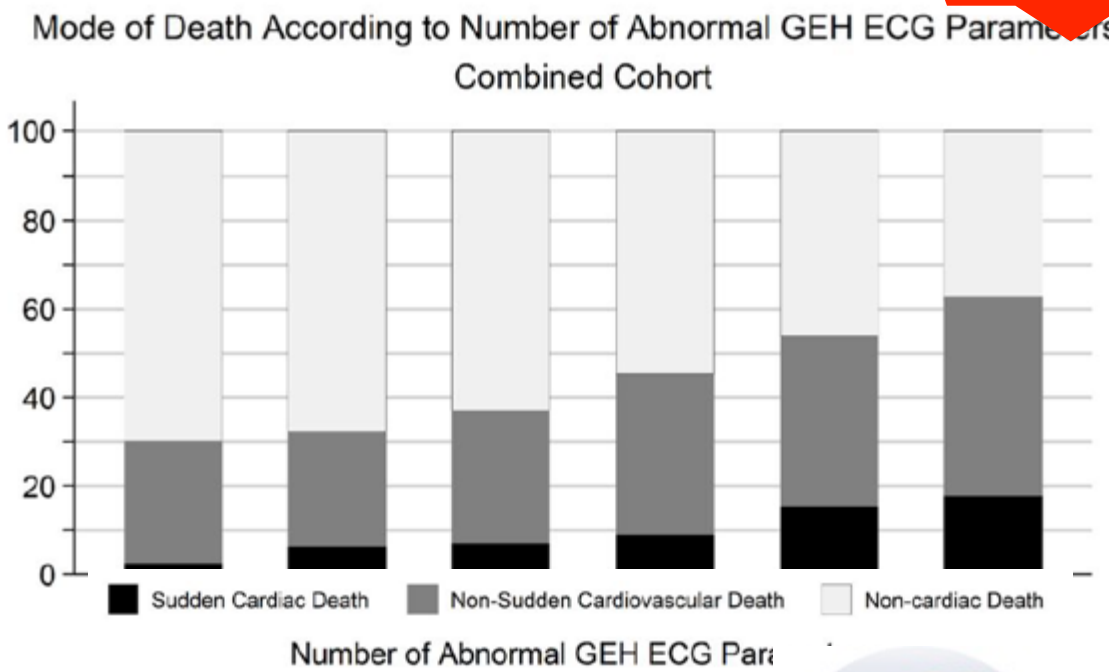
Risk Stratification

In a Pt w/o Known Heart Disease

2





ARIC

Oregon SUDS

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Waks JW et al. Circulation 2016
Aro AL et al. EHJ 2017

CHS

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Risk Stratification

In a Pt w/o Known Heart Disease

2

Circulation

HOME ABOUT THIS JOURNAL ...AHA JOURNALS

ORIGINAL RESEARCH ARTICLE

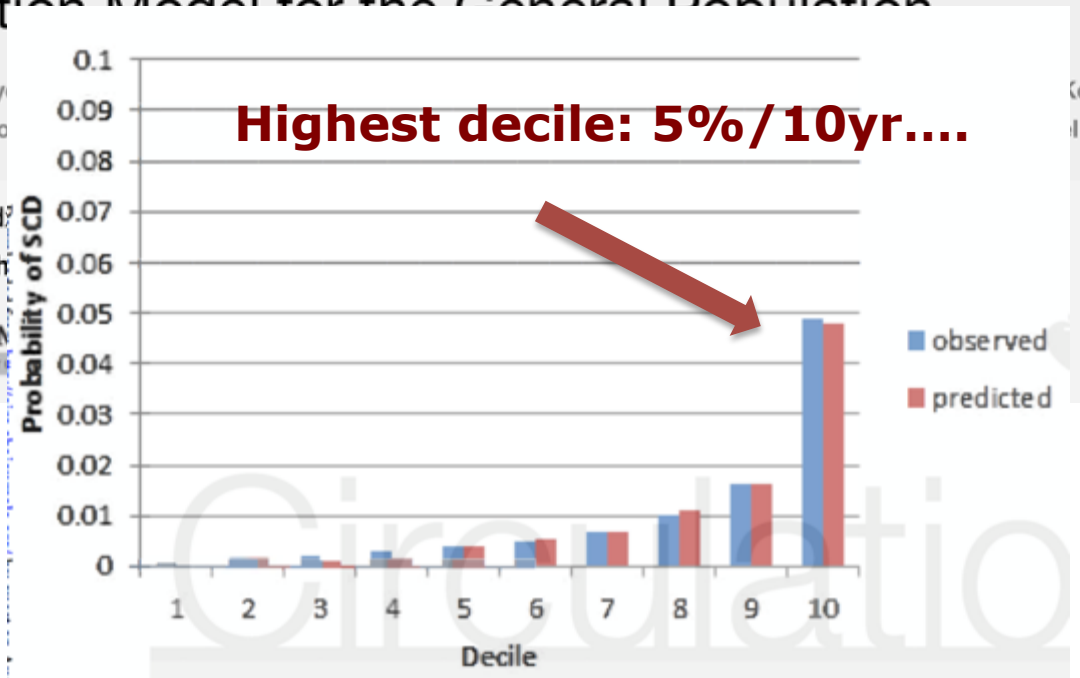
10-Year Risk Model of SCD Among Healthy Middle Age Population Using clinical, biological and ECG data

Development and Validation of a Sudden Cardiac Death Predict... Model for the General Population

Rajat Deo, Fay... Kestenbaum, Lin Y. Chen, Susan R. Heckbert, Aaro... G. Shlipak and Alvaro Alonso

DOI http://d...

Published Ah...



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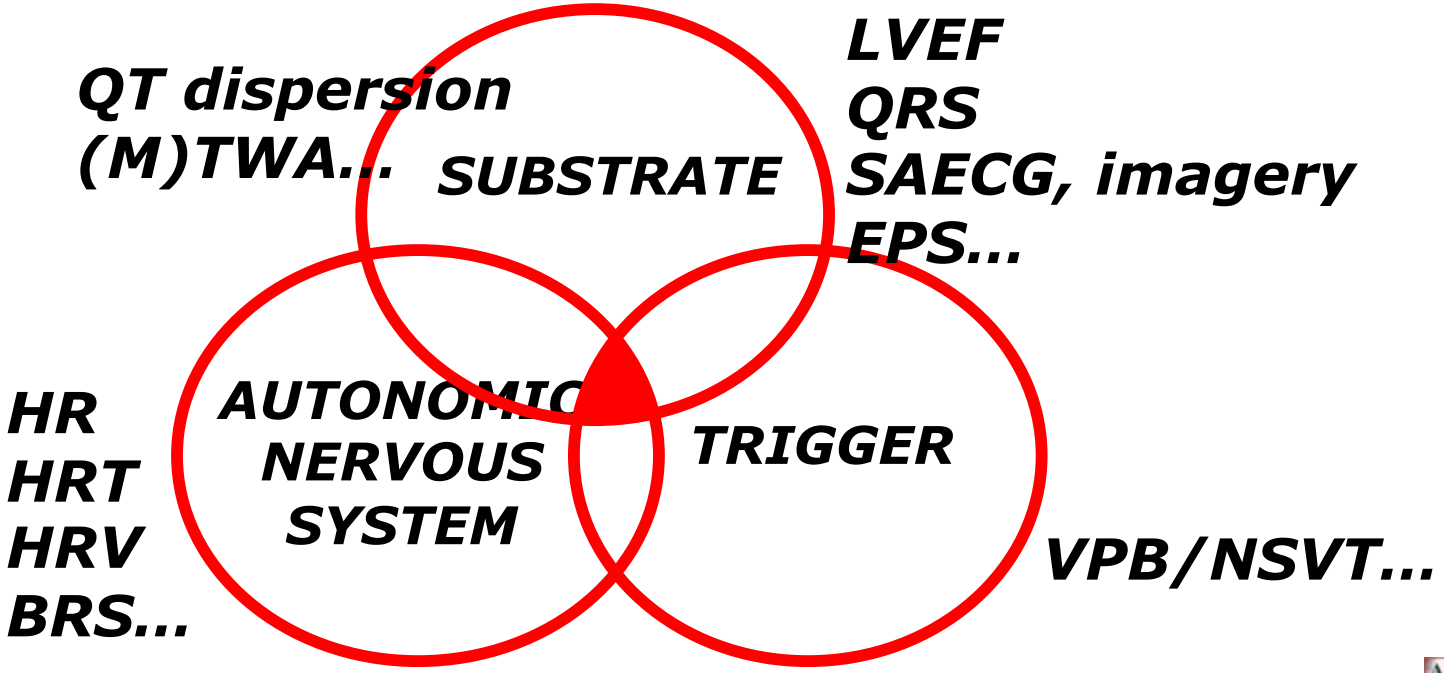
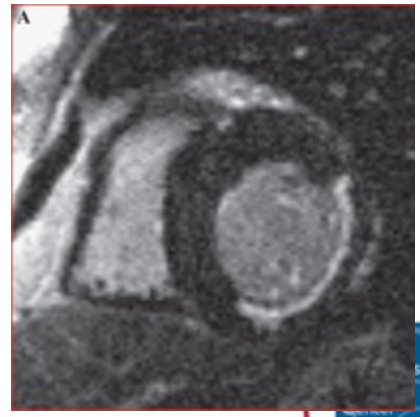
Need for Better Risk Stratification



New Imagery/mapping? (fibrosis),
Biomarkers, **genetics**
Focus on moderate low LVEF



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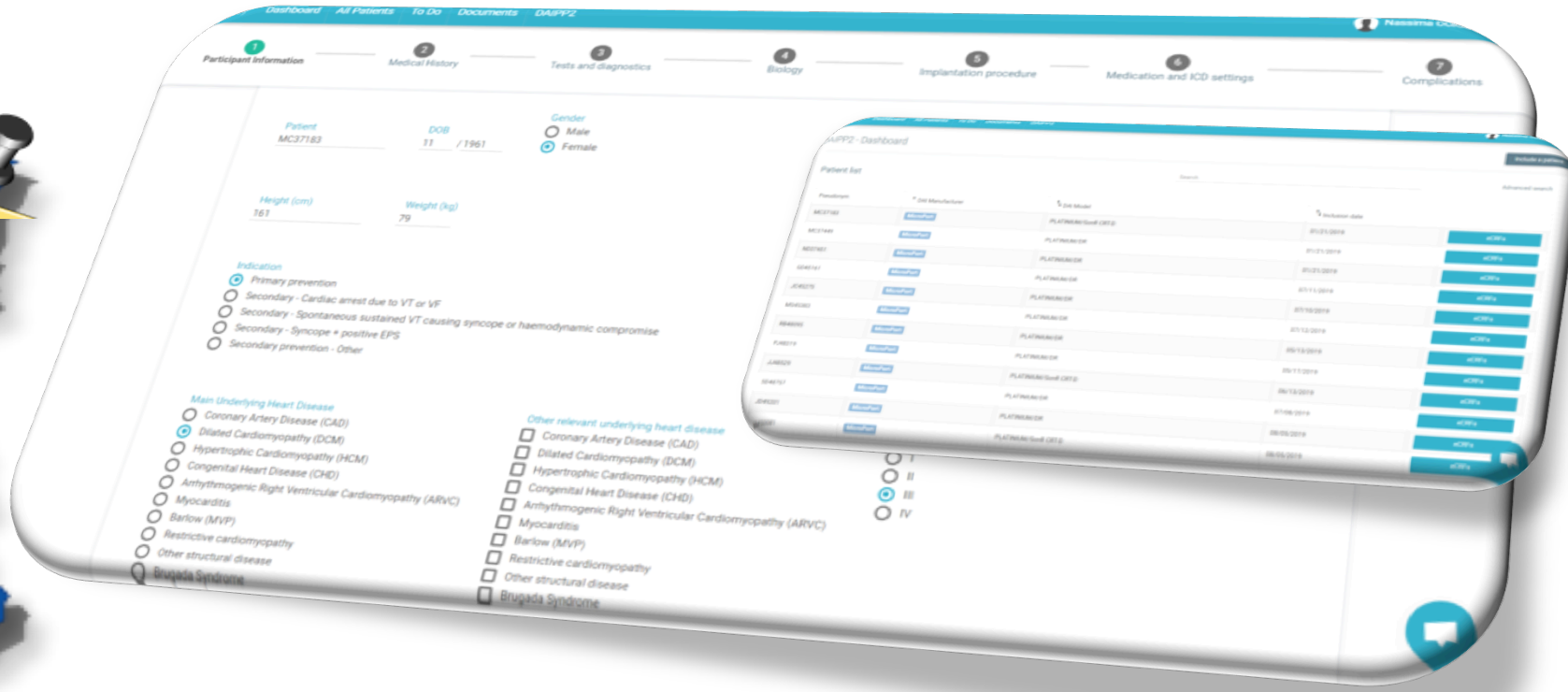
Real-Time FU ICD Cohort

Big Data Analytics



DAI-PP CONSORTIUM

Inserm :implicity

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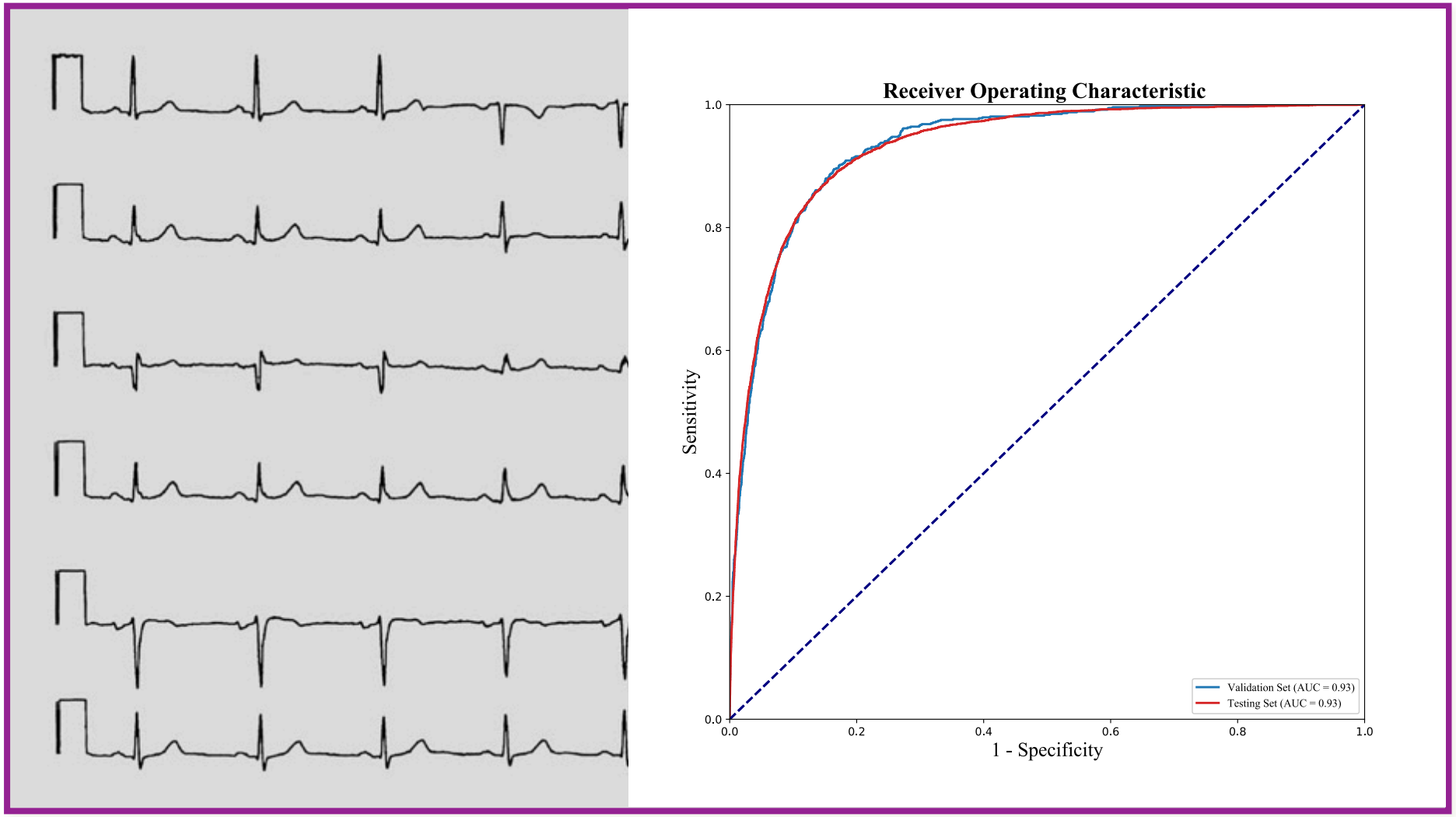
Is the Ejection Fraction Low?



Attia et. al. Nature Medicine 2019

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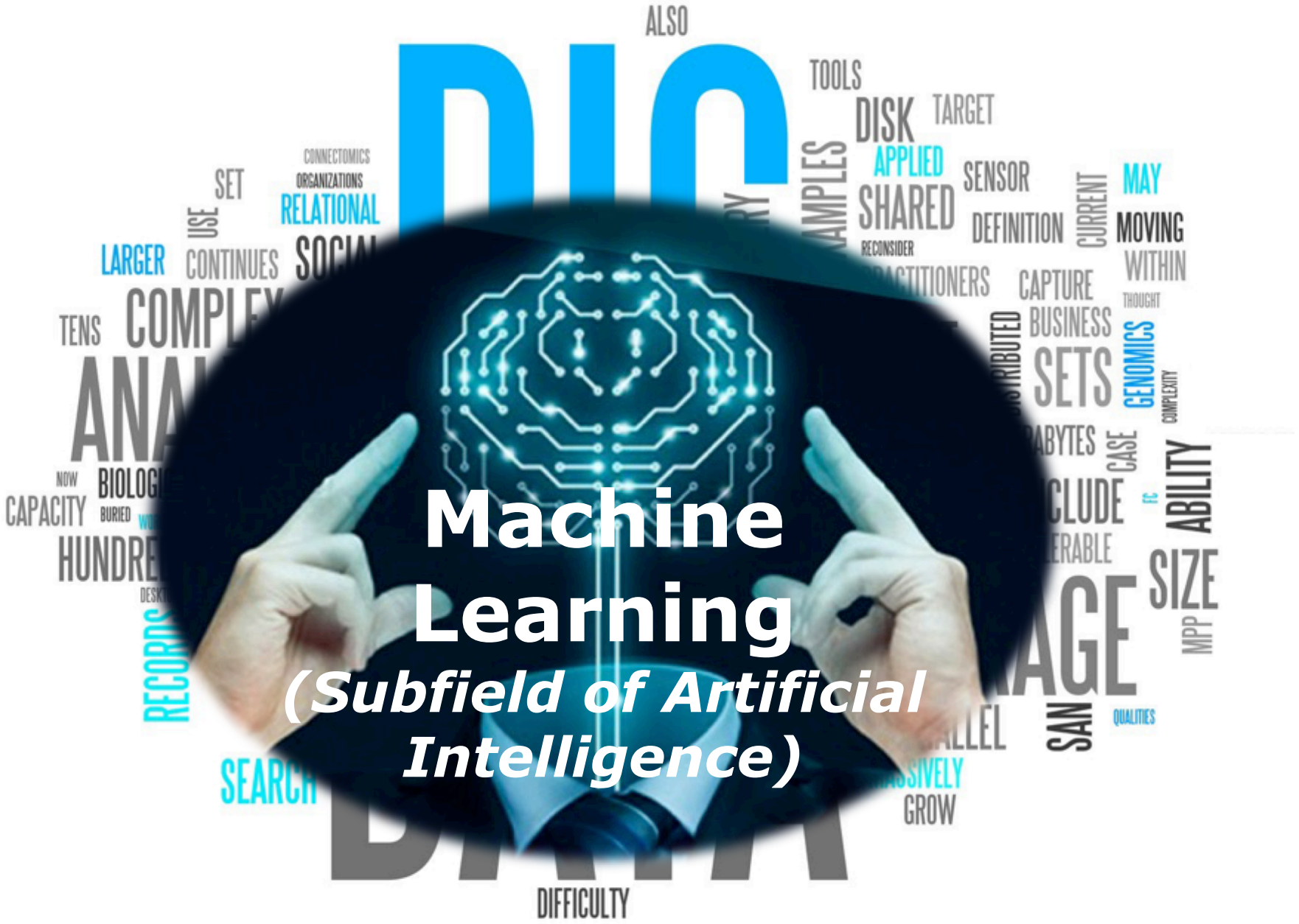

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Big Data Analytics – New Opportunities for Using Quantity for Quality!

1) More Powerful Risk Prediction Models

- Evaluate patterns on data associated with the outcome, directly from the crude data, with a specific training process...
- Integrative score from multiple sources, including '-omic' data

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Big Data Analytics – New Opportunities for Using Quantity for Quality!

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2) **Phenomapping**
   - Identify similar patient clusters, creating multiple phenotypes within each disease entity... Eg. DANISH...

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Big Data Analytics – New Opportunities for Using Quantity for Quality!

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2) **Phenomapping**
   - Identify similar patient clusters, creating multiple phenotypes within each disease entity... Eg. DANISH...

3) **Precision Health**
   - Better estimate the potential benefits of therapies for individual patient. Eg. ICD benefit in the setting of competing-risk situation

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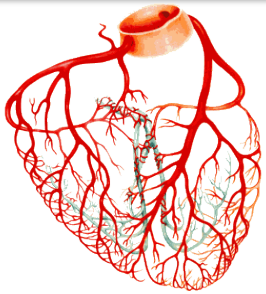
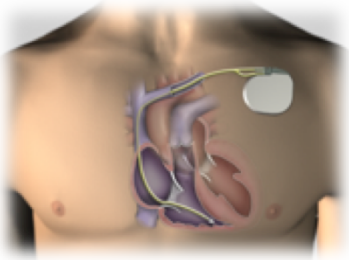
Fighting Against SCD

Decrease Incidence

CAD Prevention



Risk Stratification



Improve Outcome

❑ ***New preventive tools***

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Fighting Against SCD

New Preventive Tools

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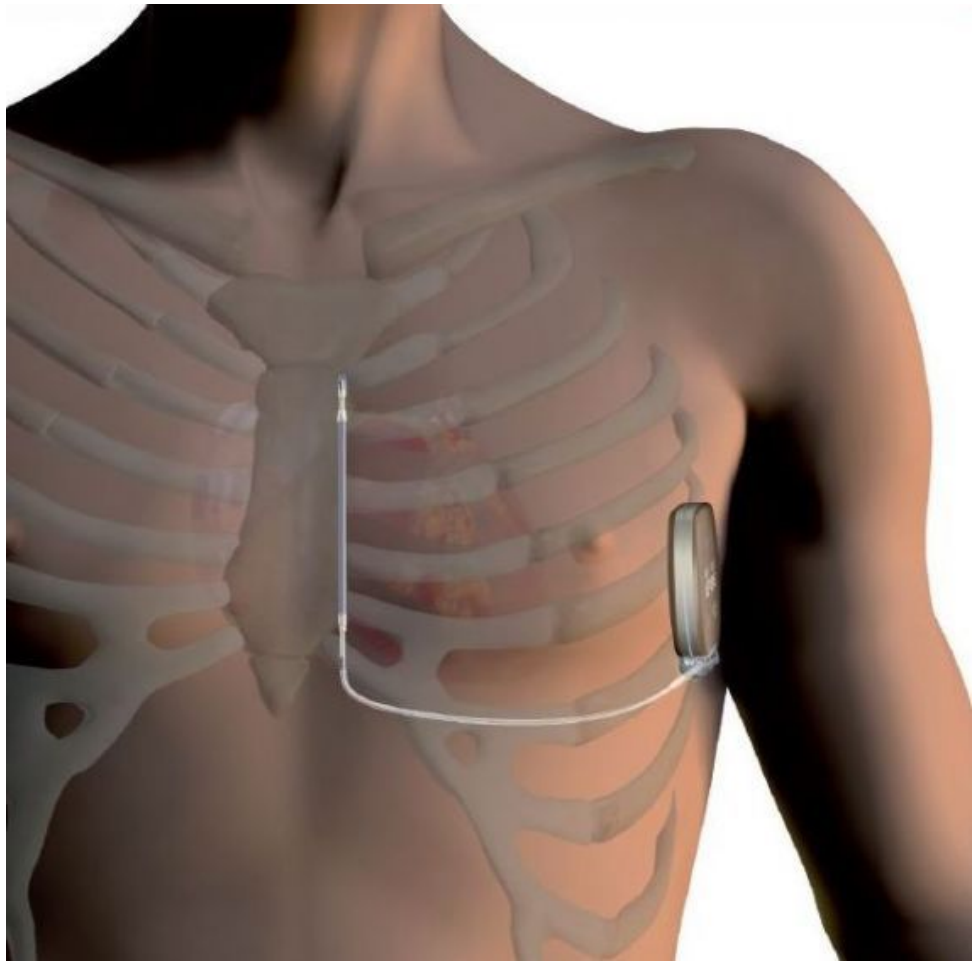
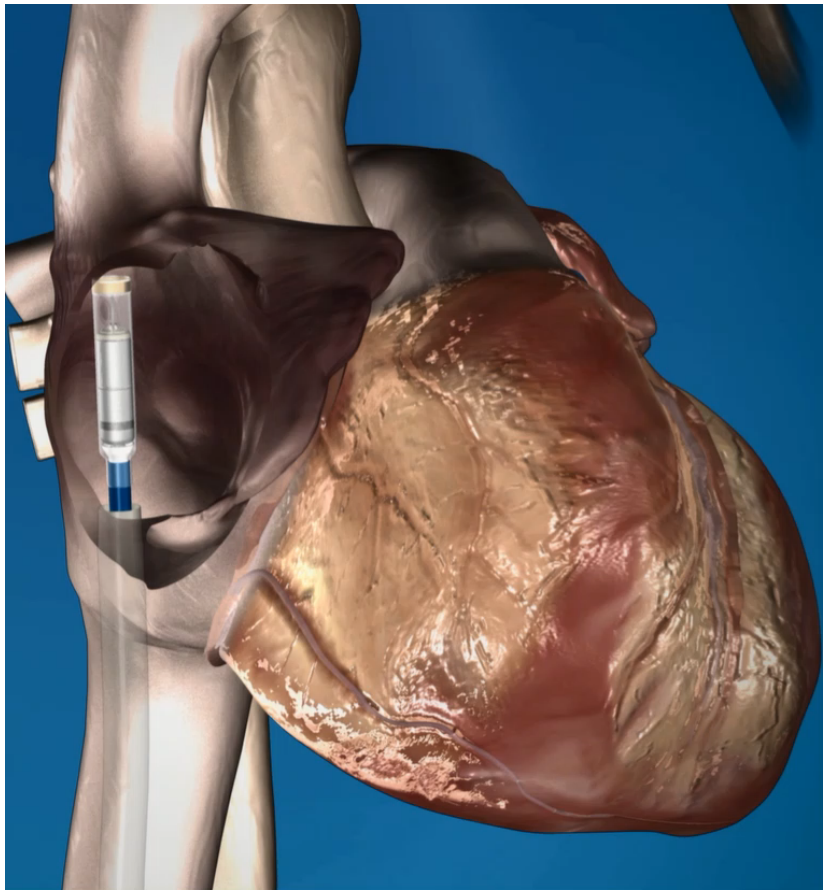
Fighting Against SCD

New Preventive Tools





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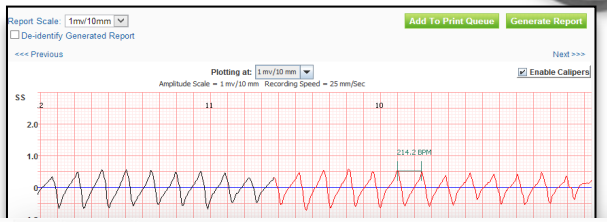
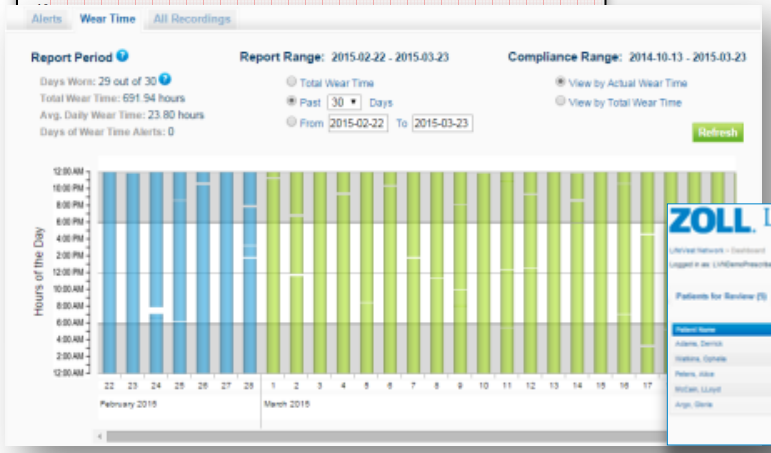
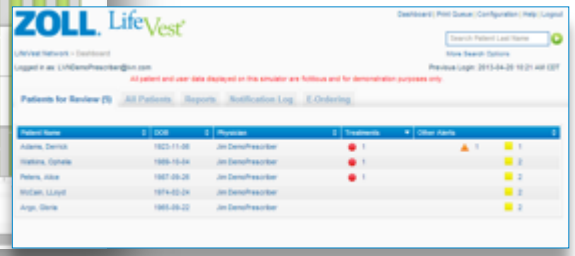
Fighting Against SCD

New Preventive Tools







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Three National Registries

Use of the Wearable Cardioverter Defibrillator in High-Risk Cardiac Patients

Data From the Prospective Registry of Patients Using the Wearable Cardioverter Defibrillator (WEARIT-II Registry)

Valentina Kutyifa, MD, PhD; Arthur J. Moss, MD; Helmut Klein, MD; Yitschak Biton, MD; Scott McNitt, MS; Bonnie MacKecknie; Wojciech Zareba, MD, PhD; Ilan Goldenberg, M

ORIGINAL RESEARCH ARTICLE

Experience With the Wearable Cardioverter-Defibrillator in Patients at High Risk for Sudden Cardiac Death

Nadine K. Wäßnig, MD*
Michael Günther, MD*
Silvio Quick, MD
Christian Pfluecke, MD
Fabian Rottstädt
Steven J. Szymkiewicz, MD
Steven Ringquist, PhD
Ruth H. Strasser, MD, PhD
Uwe Speiser, MD

- *USA*
- *2011–2016*

- *Germany*
- *2010–2013*

Kutyifa et al. Circulation 2015

Wäßnig et al. Circulation 2016

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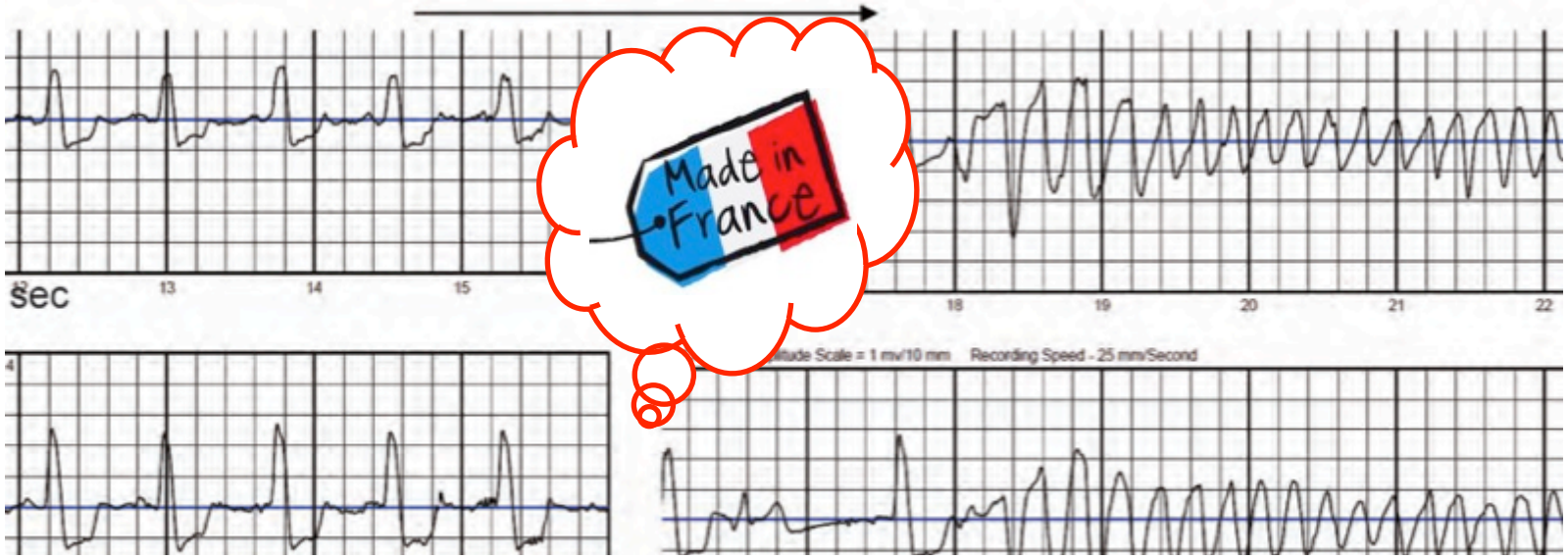
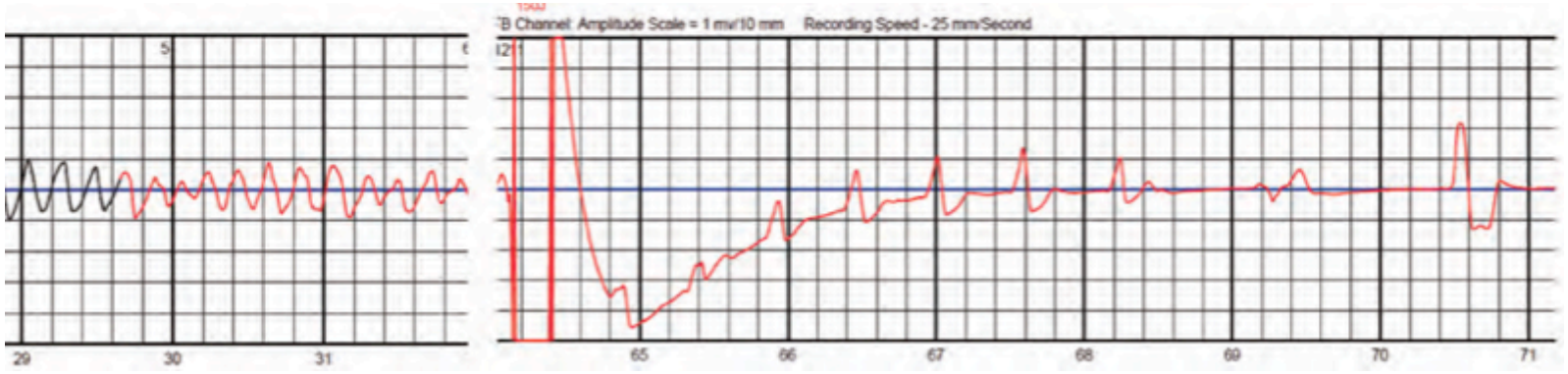


1% WCD Therapy 2%

100% Successful shock conversion 94%

0.5% Inappropriate shock 0.4%

22.5h Wear time per day 23h



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ACC Late Breaking Clinical Trials 2018

VEST & VEST REGISTRY

UCSF
University of California
San Francisco

Vest Prevention of Early Sudden Death Trial (VEST)

Jeffrey Olgin, MD, FACC
Division of Cardiology, UCSF
On behalf of the VEST Investigators

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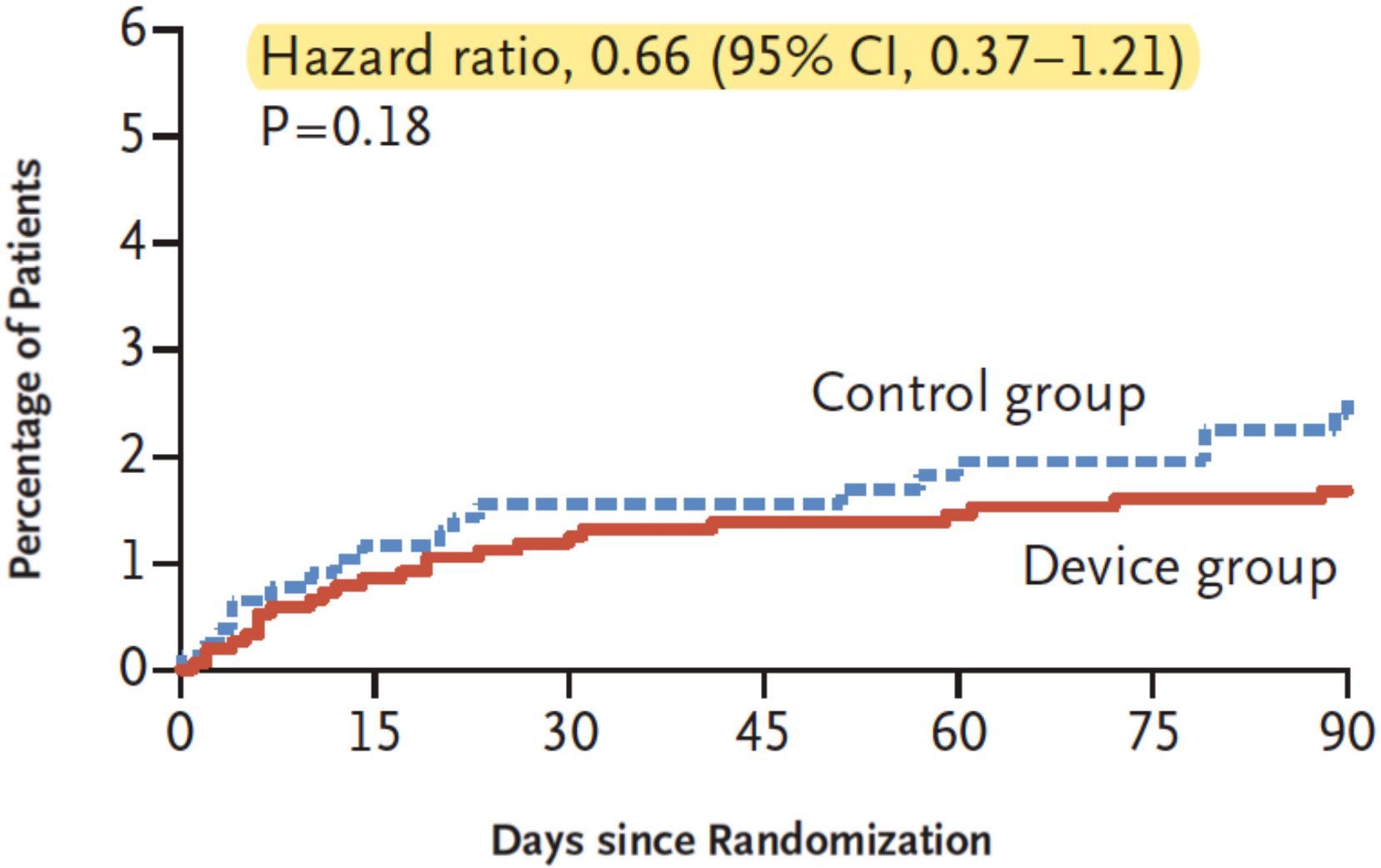
Cardiovascular research Center PARCC

VEST Trial – I^{ary} Outcome

(Total SCD among 1524+778: 44/86 [51%])



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I^{ary} Outcome – SCD

(Total SCD among 1524+778: 44/86 [51%])

Clinical event type	WCD (N=1524)	Control (N=778)	P value*
FATAL EVENTS, n (%)			
Sudden Death (1° outcome)	25 (1.6%)	19 (2.4%)	0.18
Non-sudden death	21 (1.4%)	17 (2.2%)	0.15
Congestive heart failure death	10 (0.7%)	5 (0.6%)	1.0
Recurrent MI death	1 (0.1%)	1 (0.1%)	1.0
Stroke death	0 (0.0%)	**4 (0.5%)**	**0.01**
Other cardiovascular death	5 (0.3%)	3 (0.4%)	1.0
Other death	5 (0.3%)	4 (0.5%)	0.72
Indeterminate death	2 (0.1%)	2 (0.3%)	0.83
Death, any cause	48 (3.1%)	**38 (4.9%)**	**0.04**
NON-FATAL EVENTS, n (%)			
Rehospitalization, cardiovascular	334 (22%)	174 (22%)	0.81
Rehospitalization, any cause	475 (31%)	253 (33%)	0.51

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WCD Group

25 SCD

–16 w/o WCD

–9 with WCD

- **4 ES**
- **Non A**

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WCD Adherence

Characteristic	WCD Group (N=1524)	Control Group (N=778)
WCD received, n (%)	1455 (95.5%)	20 (2.6%)*
Average hours/day WCD worn	14.1 ± 9.3	0.8 ± 3.9*
ICD during follow up (<90 days), n (%)	67 (4.4%)	44 (5.7%)
ICD Implant timing (days since randomization), median (IQR)	62 (24-81)	58 (25-77)

*P <0.001

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Scientific Evidence for WCD (99-)

Observational (>20 hours/day)

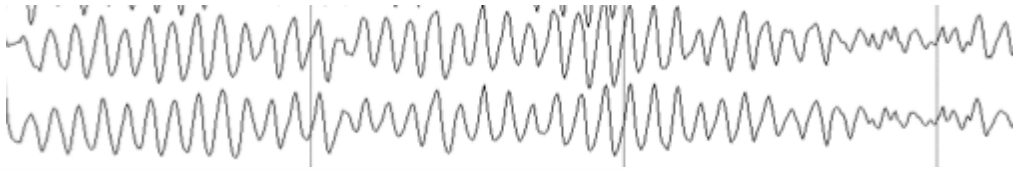
Interventional (14 hours/day)

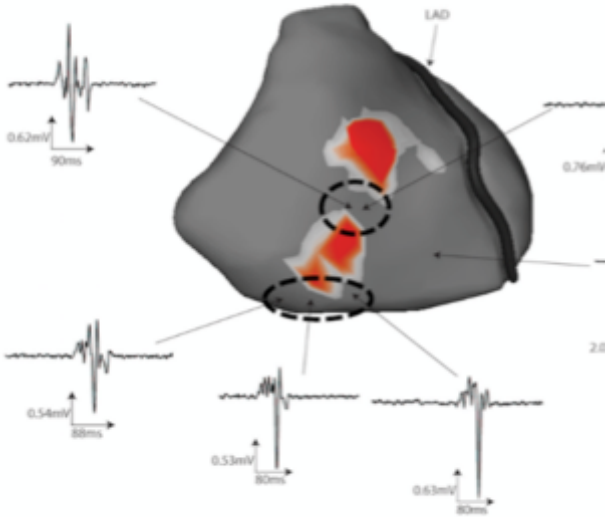
Kutyifa Circulation 2015
Wäßnig Circulation 2016

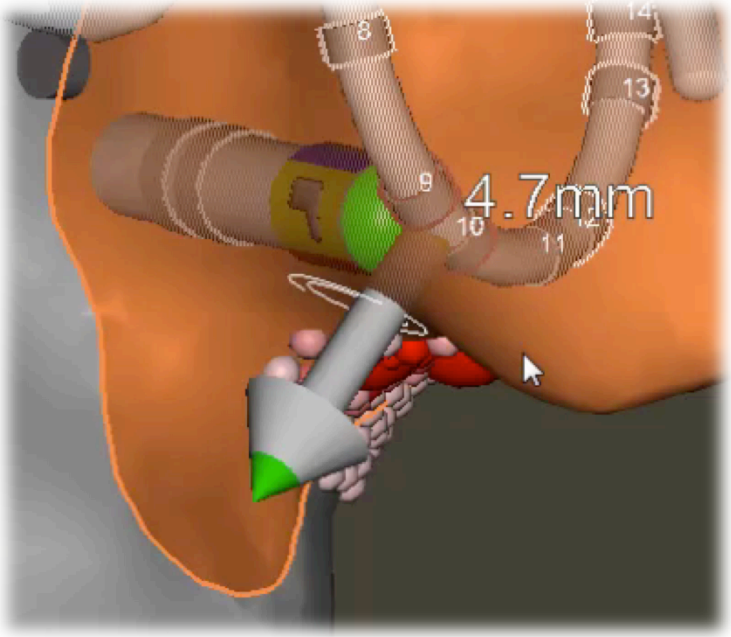
Olgin N Engl J Med 2018

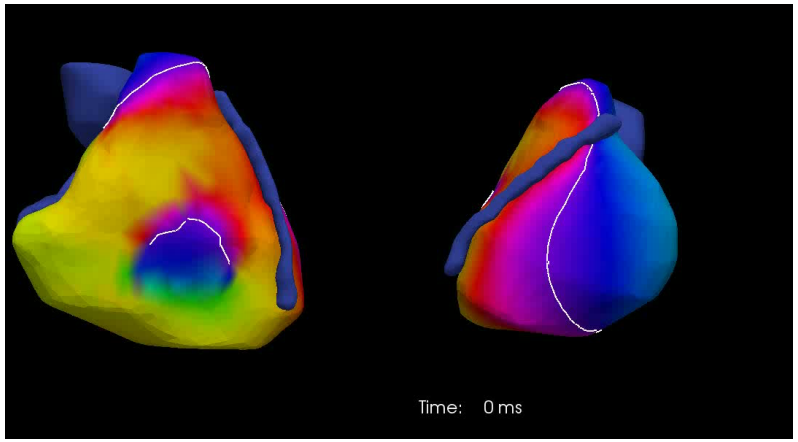
Fighting Against SCD

New Preventive Tools









Haissaguerre M et al. Circ Arrhythm Electrophysiol 2018

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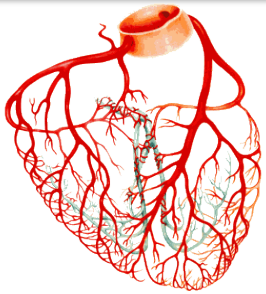
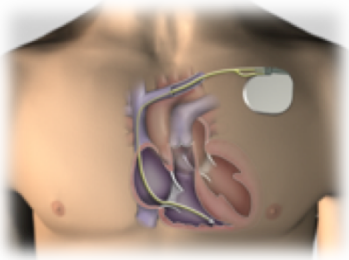
Fighting Against SCD

Decrease Incidence

CAD Prevention



Risk Stratification



Improve Outcome

- ***New preventive tools***
- ***New approaches for identification of HR Pts***

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Fighting Against SCD

New Approaches for Preventing SCD

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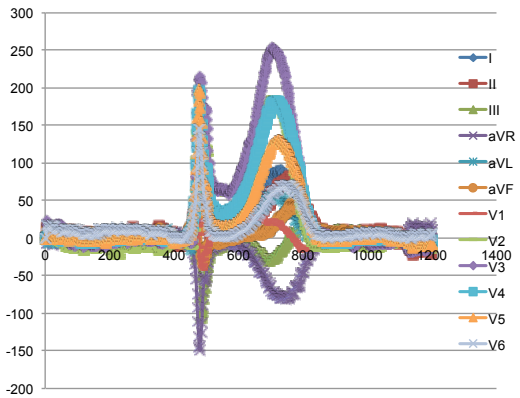
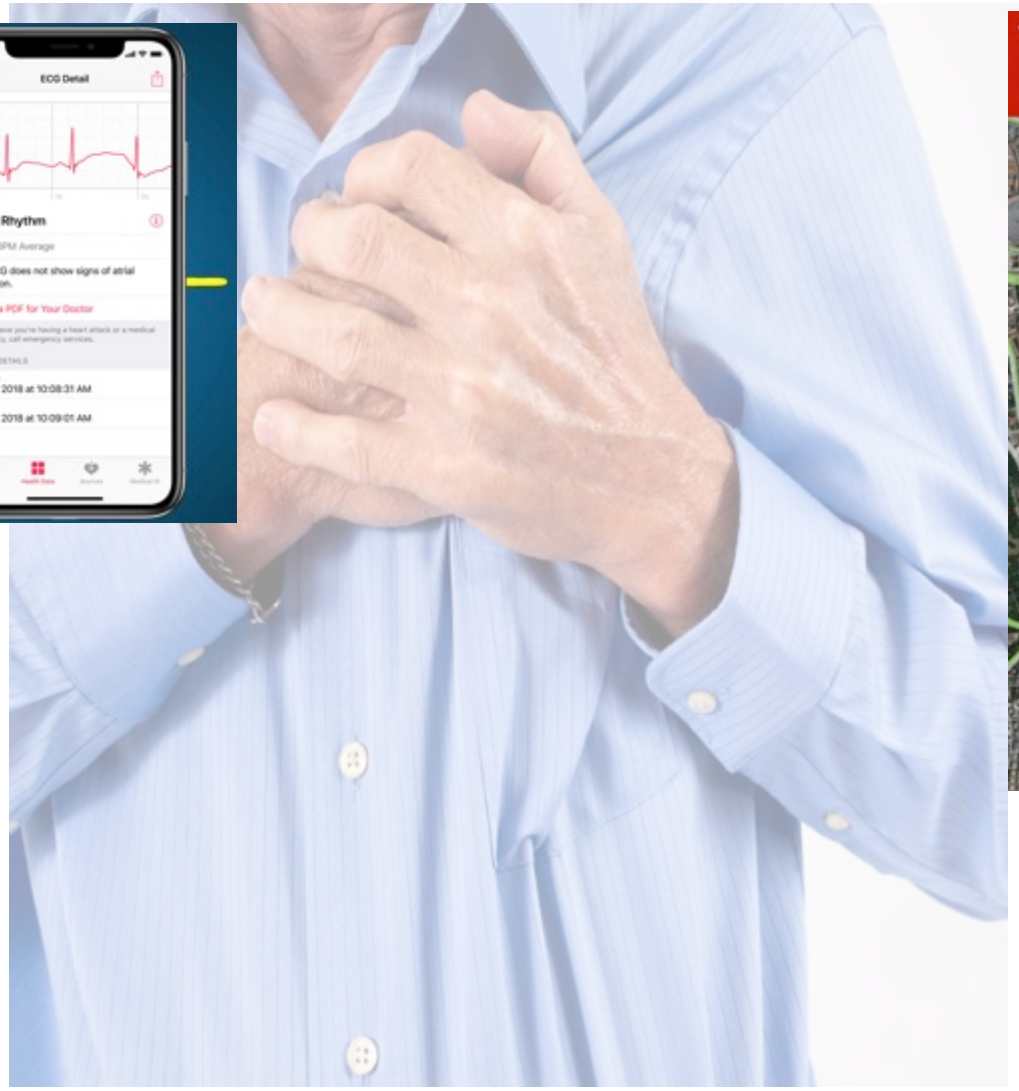
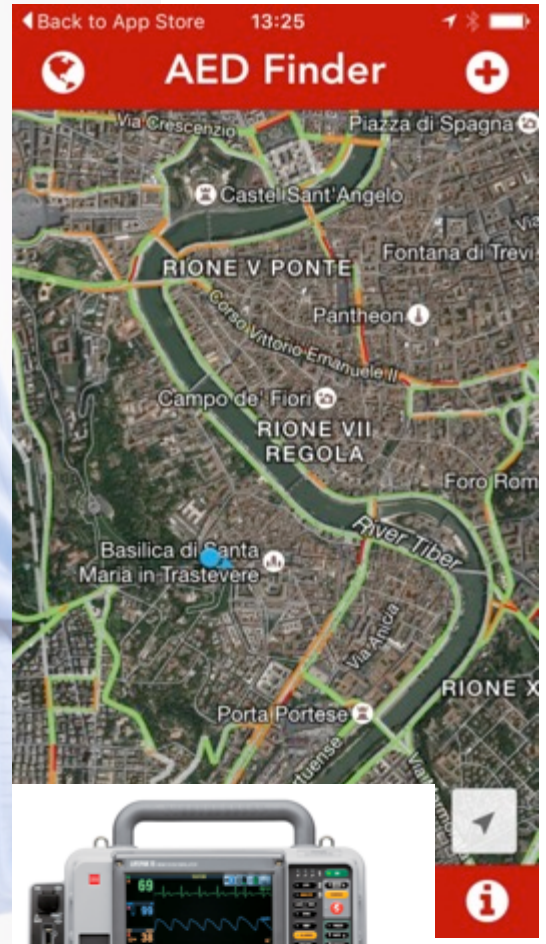
“Near-Term” Prevention??







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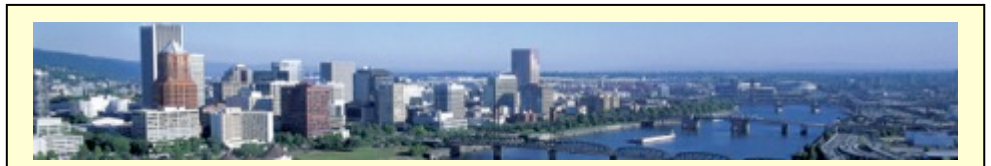

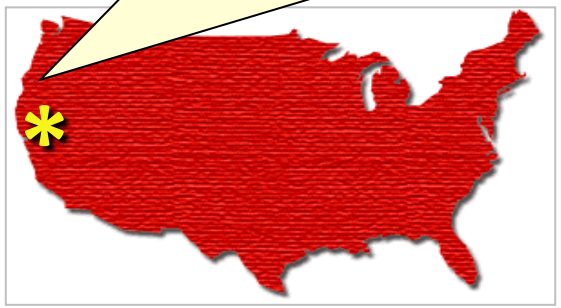

PREHOSPITAL CARE REPORT

OR - Multnomah

Case #: 4016275 **County Run #:** **Pt #** 1 **of** 1 **Unit ID:** 333 **Date:** 8/5/2011

DISPATCH INFORMATION

Time Received:	14:39:07			**Incident Location:**	
Time Dispatched:	14:39:14	**Time To Hosp:**	15:00:27	153 SE 84TH AVE , PORT, OR	
Time Enroute:	14:39:36	**Time At Hosp:**	15:06:39		**Initial Mode:** CODE 3
Time On Scene:	14:41:49				**Final Mode:** CODE 3
Time at Pt Side:	14:42:22	**Time Cleared:**			**ALS Assessment:** AMR EMT-P

ALS Ambulance

ature of Call: CH1 Chest Pain_Discom >1 prob

PAT

Nam	)	**D.O.B.:**	04/05/1956	☐ **Age Estimated**	
Address:	153 SE 84TH AVE ,	**Ethnicity:**	Unknown	**Age:** 55 years	**Months:** **Days:**
City, State, Zip:	PORT, OR 97233	**Physician:**		**Sex:** Male	**Weight:** 100 Kg
Phone :	(503) 285-4419	**Employer:**		**Triage Tag :**	
SSN:	000-00-0000	**Responsible Party:**	chaverria, eduardo	**Phone:**	(503) 285-4419

NARRATIVE

☐ **Special Study**

AMR ARRIVED TO FIND PT C/O CHEST PAIN x 35MINUTES; PT STATED HE DID NOT WANT AN IV AND THEN CODED; SHOCKED; WOKE UP SAID FEELING FINE; CODED AGAIN, SHOCKED AGAIN TO NSR. 8/23/05: TC to PT to see if he would be willing to give written consent and attempt another appointment with GCRC. He enthusiastically provides consent. Tells me he has a stent. 10/11/05: PT visits OHSU, to furnish a blood specimen and obtain an EKG. He provides additional details of circumstances prior to arrest. Tells me that he was semi-retired from "dry-wall" construction work. That particular day he was not working, was at home, sitting on couch, watching TV, drinking a beer. He had Pain in the left neck, that radiated to his shoulder, but he assumed that it was muscle related since he had ben working all the previous week. The pain progressed, then evolved to mis-sternal chest pain that felt like bad indigestion. He could relieve the pain by rubbing his sternum. His son was at home, and he called him and said: "you'd better check on me because I might be having a heart attack". His son was concerned and dialed 011. He did not arrest until after the medics arrived. In fact he remembers getting up to get dressed, and arguing with the EMT's about not wanting to go to the hospital. His Mother was at the scene and observed the whole resuscitation. He relates that the EMT paid him a visit one week later and told him that the last words he said before arresting was "take care of my men" (he did have past active duty service in the marines). He further volunteers that his Mother had 3 brothers that all died suddenly between 40 - 50 years who lived back east. He also points out that his previous CPR training lead him to take an Aspirin before the ambulance arrived, and he points out that he "washed it down with a beer".

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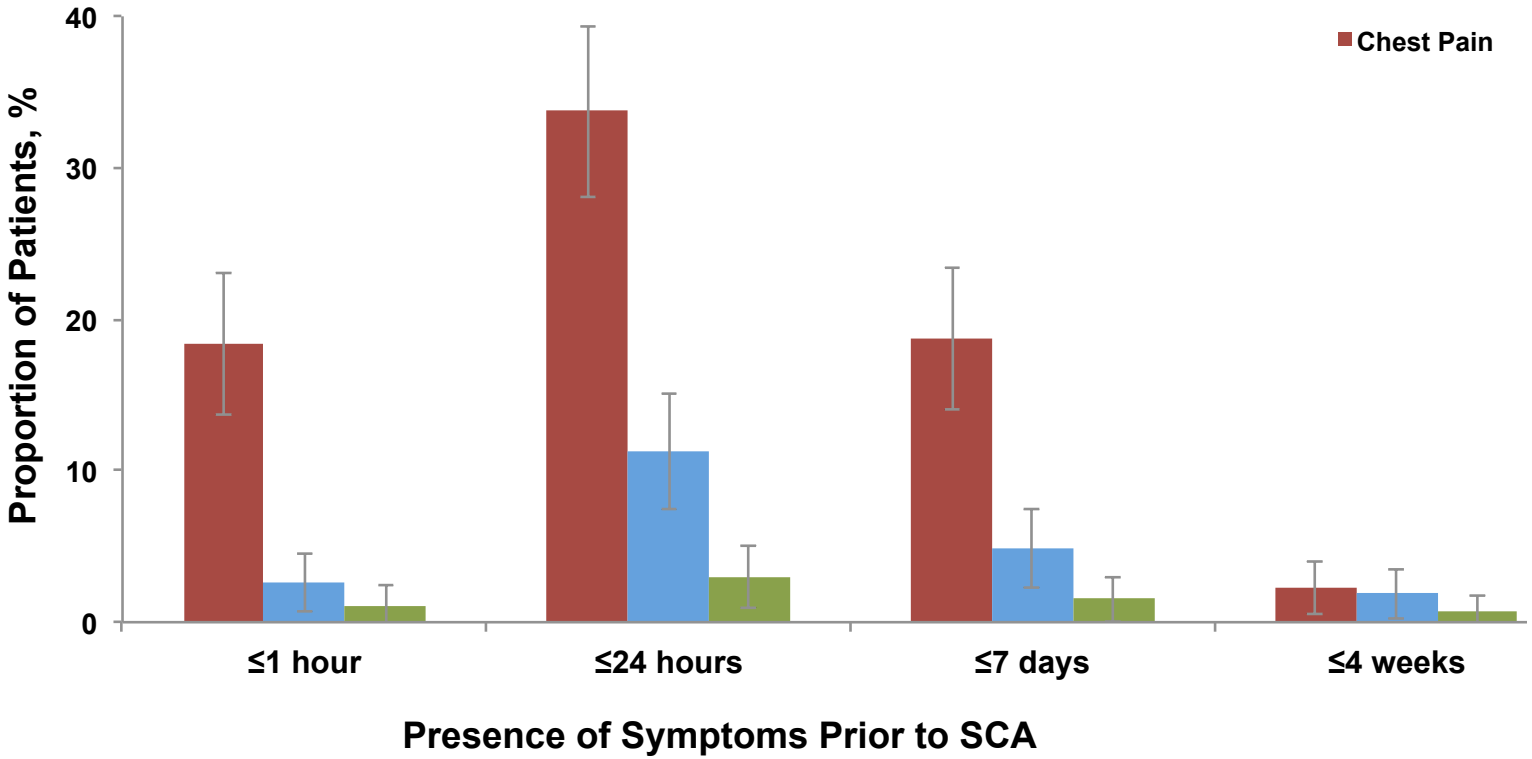
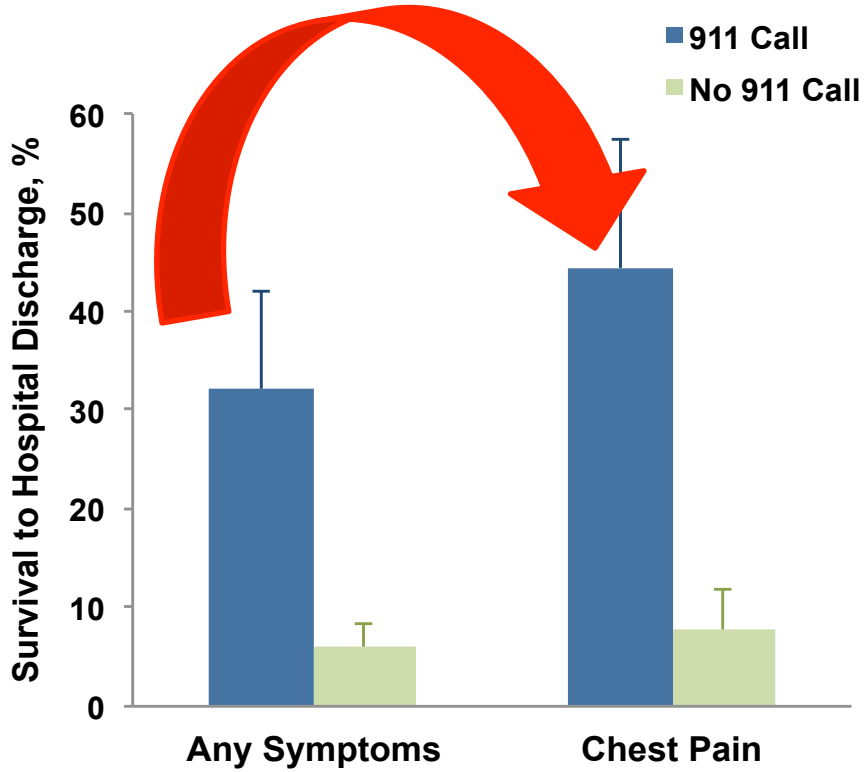
Annals of Internal Medicine

ORIGINAL RESEARCH

Warning Symptoms Are Associated With Survival From Sudden Cardiac Arrest



Survival x7



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CEMS. Ann Int Med. 2016;164:23-9.

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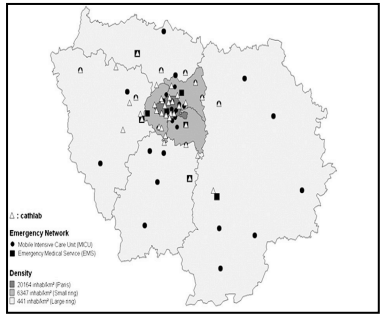

Les registres de cardiologie de l'ARS Île-de-France

e-MUST et CARDIO-ARSIF

Identifying Patients at Risk for Prehospital Sudden Cardiac Arrest at the Early Phase of Myocardial Infarction

The e-MUST Study (Evaluation en Médecine d'Urgence des Stratégies Thérapeutiques des infarctus du myocarde)

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Karam N et al. Circulation 2016

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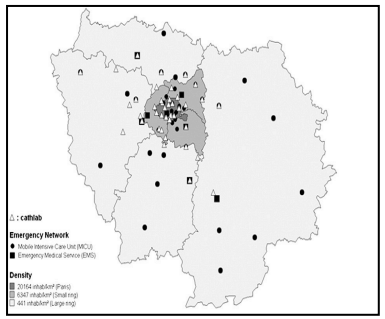

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e-MUST et CARDIO-ARSIF

- Sex Male □ Female □
- Age (years) [ ]
- Onset of chest pain (hours (24h), minutes) [/]
- Chest pain intensity (1 to 10) [ ]
- Chest pain Location
- Chest □ Shoulders □ Arms □ Back □
- Are you short of breath? No □ Yes □
- Are you a current smoker? No □ Yes □
- Have you been treated previously for CAD? No □ Yes □
- Has anybody in your family been treated for CAD? No □ Yes □
- Are you diabetic or treated for diabetes? No □ Yes □
- Do you have HBP or are you treated for HBP? No □ Yes □
- Do you have dyslipidemia or are you treated for dyslipidemia? No □Yes □
- What is your approximative weight (kg) and height (cm)

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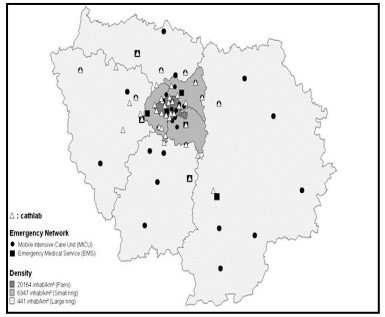
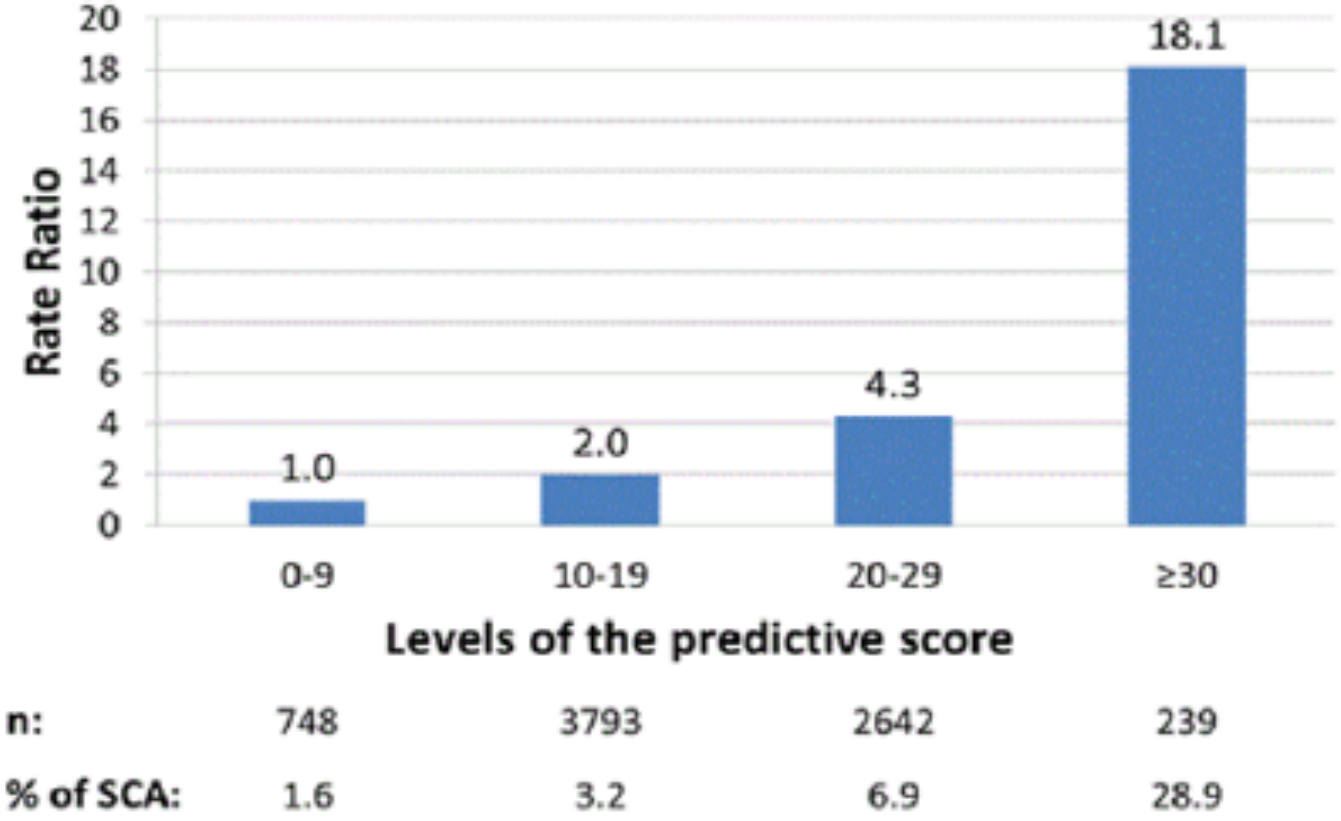


Agence Régionale de Santé Île-de-France

Les registres de cardiologie de l'ARS Île-de-France

e-MUST et CARDIO-ARSIF



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H E G P

Fighting Against SCD

Decrease Incidence

CAD Prevention

Risk Stratification

Improve Outcome

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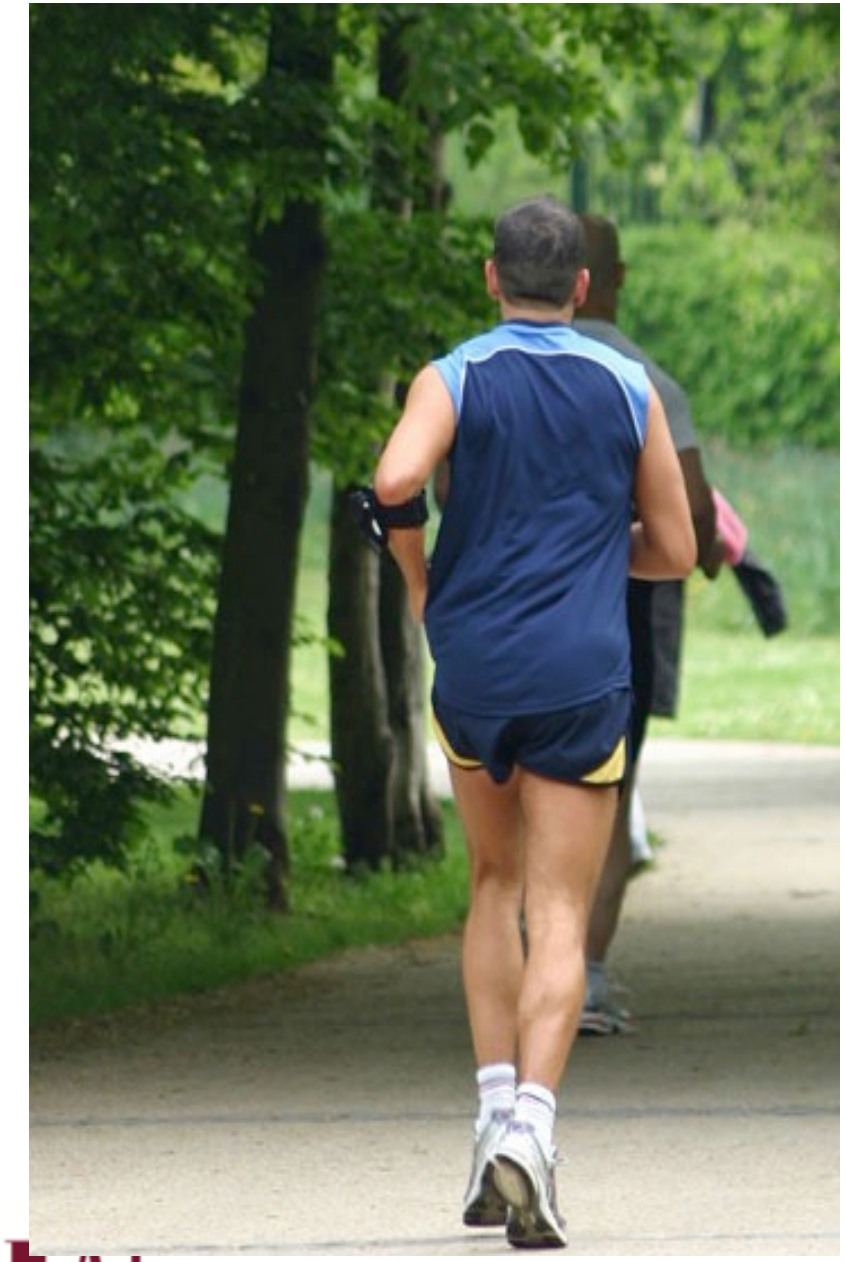
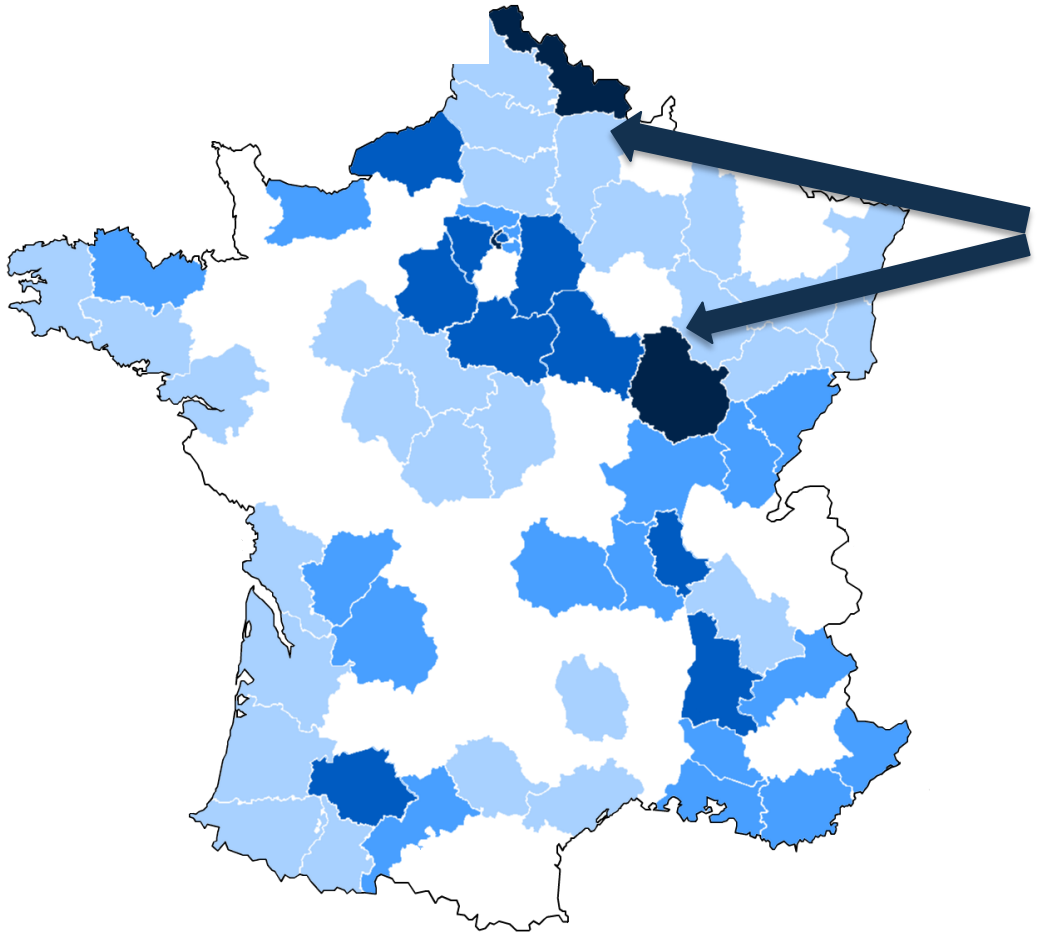
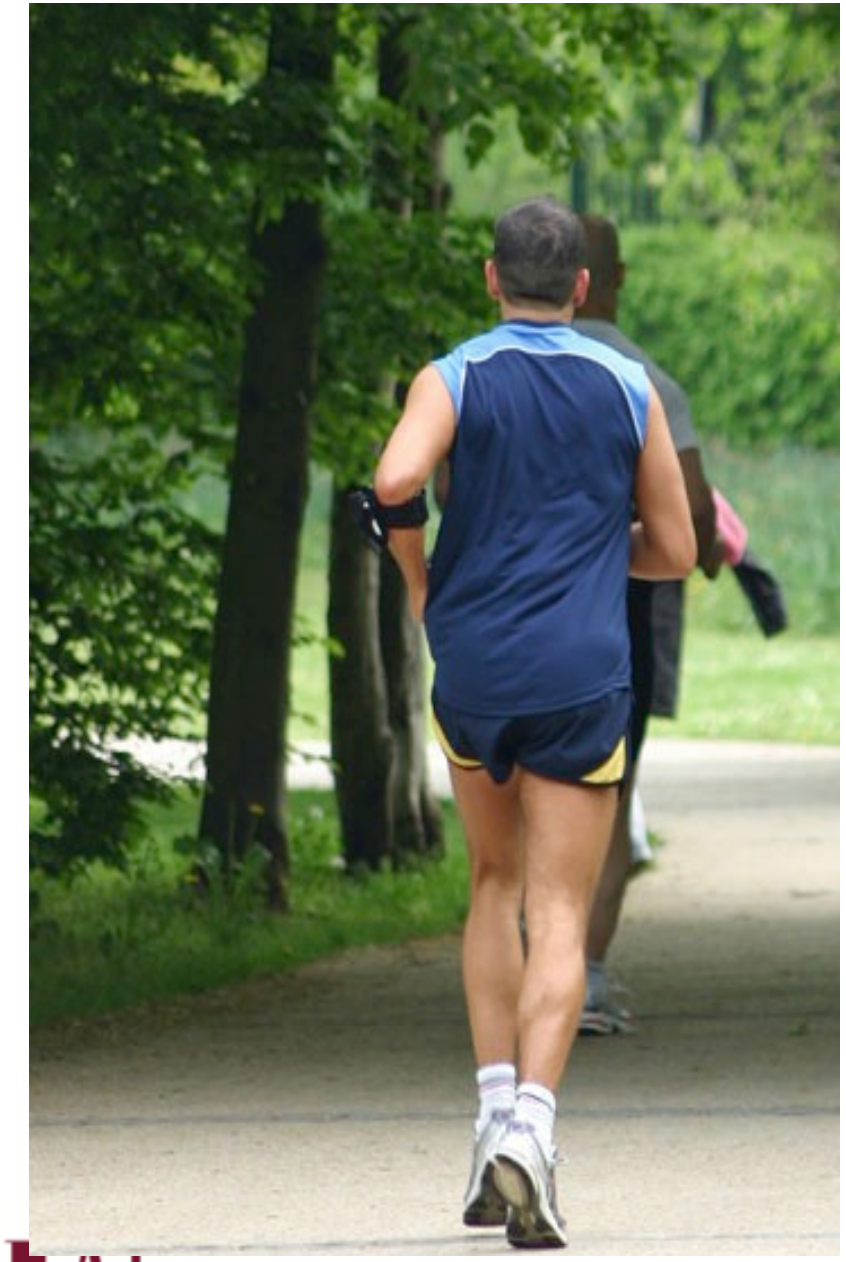


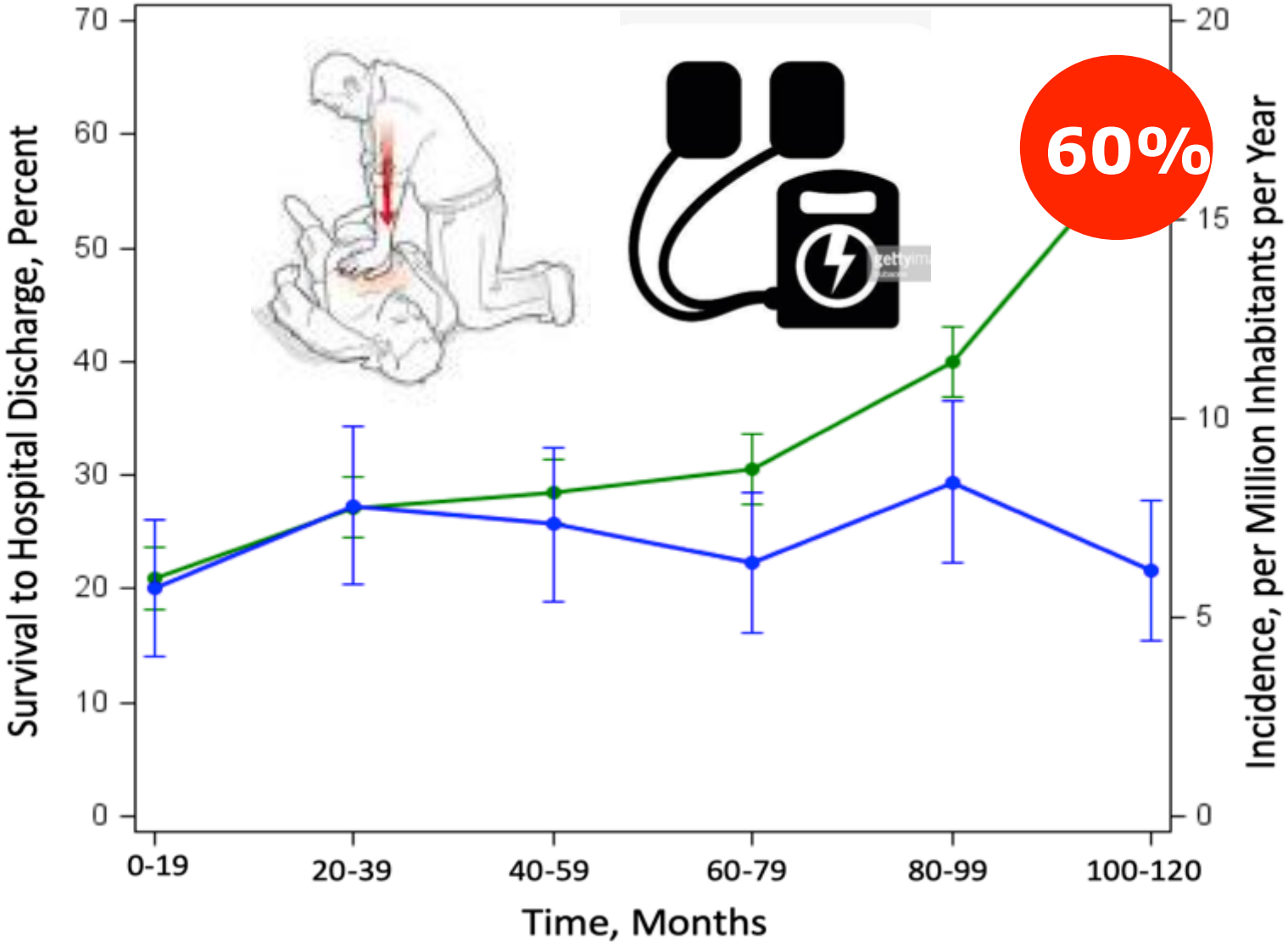


43.6% of survival

Circulation. 2011; Eur Heart J 2013; JAMA 2013



Survival After SCA During Sports in Paris, 2005-2016



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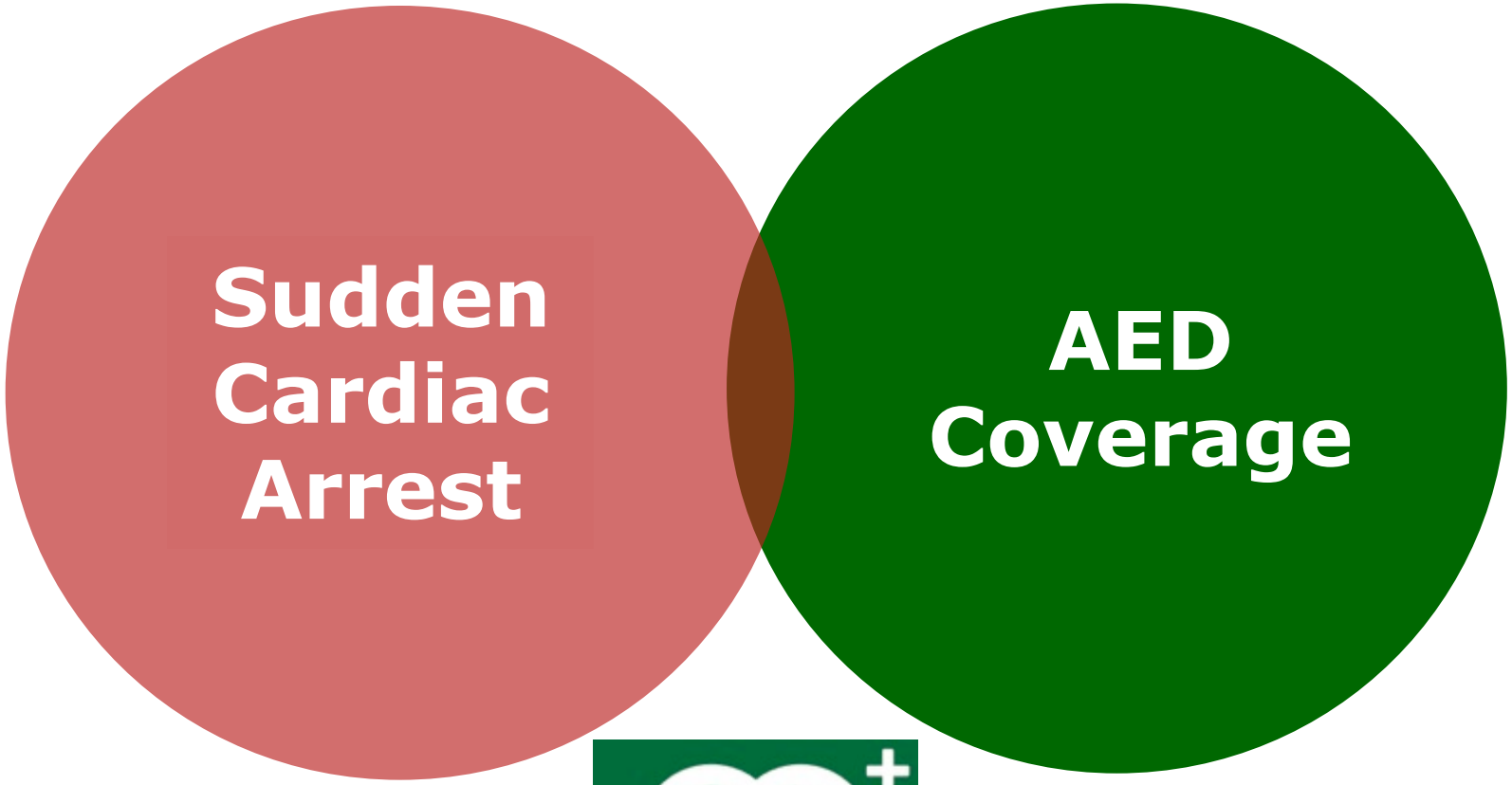
AED & ICD – Common Point!



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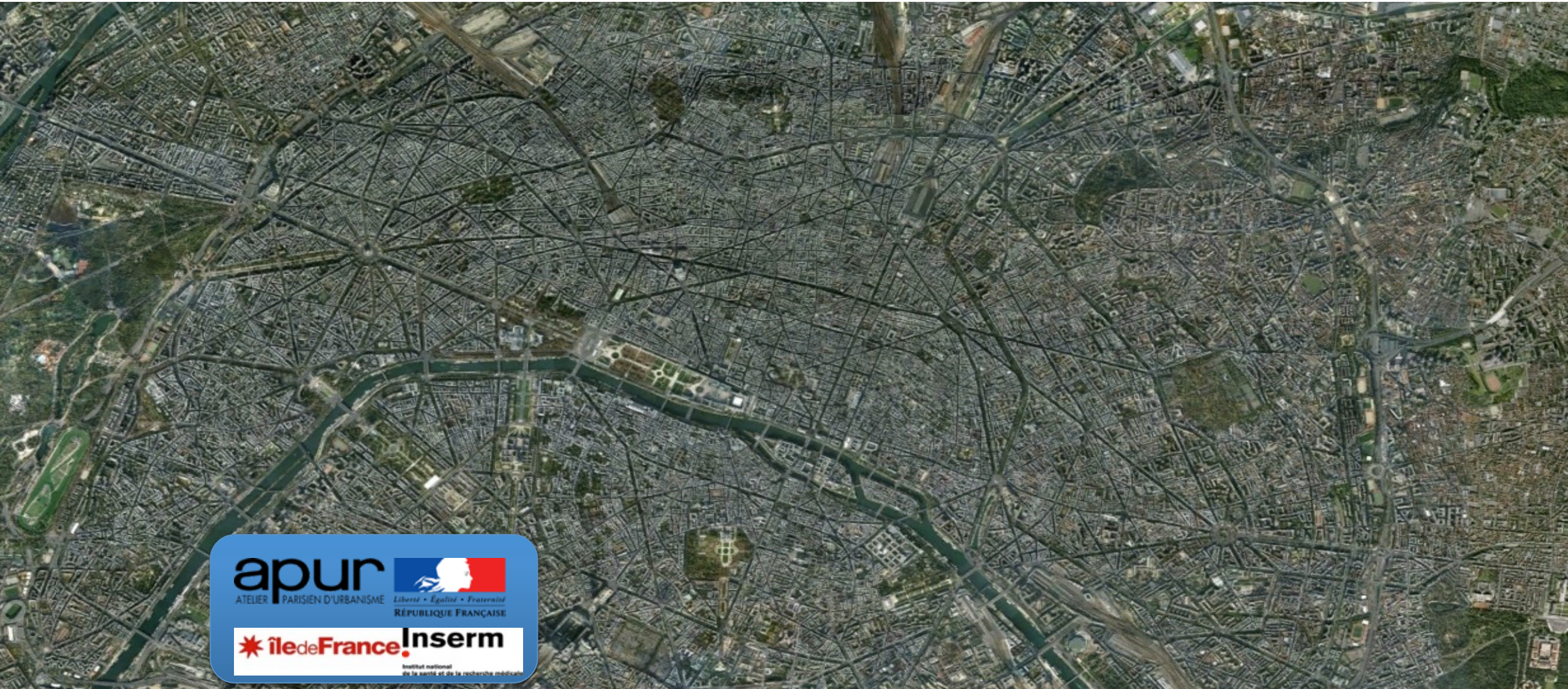
Paris, 2000-2010

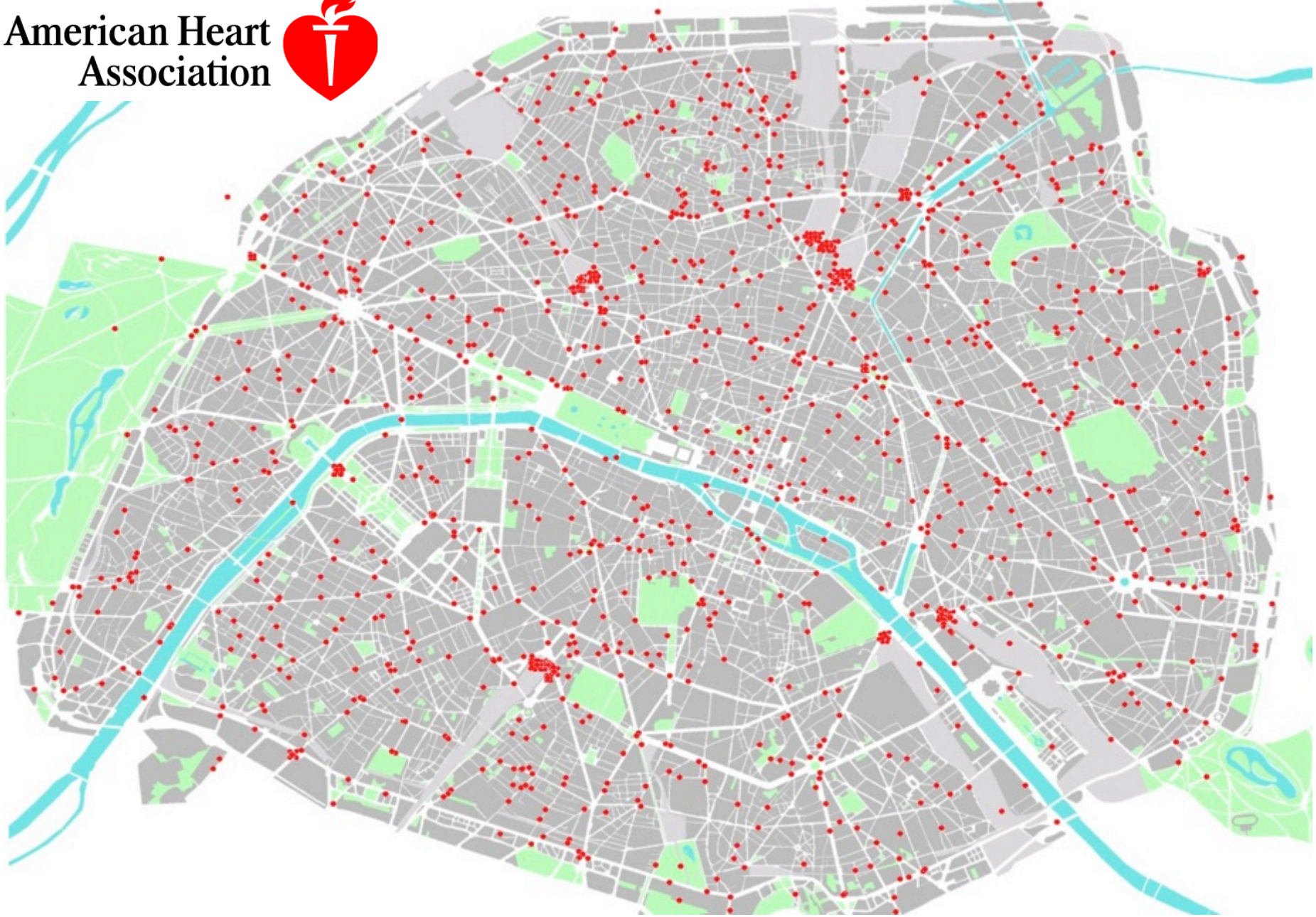


Paris, 2000-2010

Pour chaque 200*200 m

1) Densité de la population
2) Equipements/structures
3) Flux de personnes

American Heart Association



Circulation. 2015 May 5;131(18):1546-54

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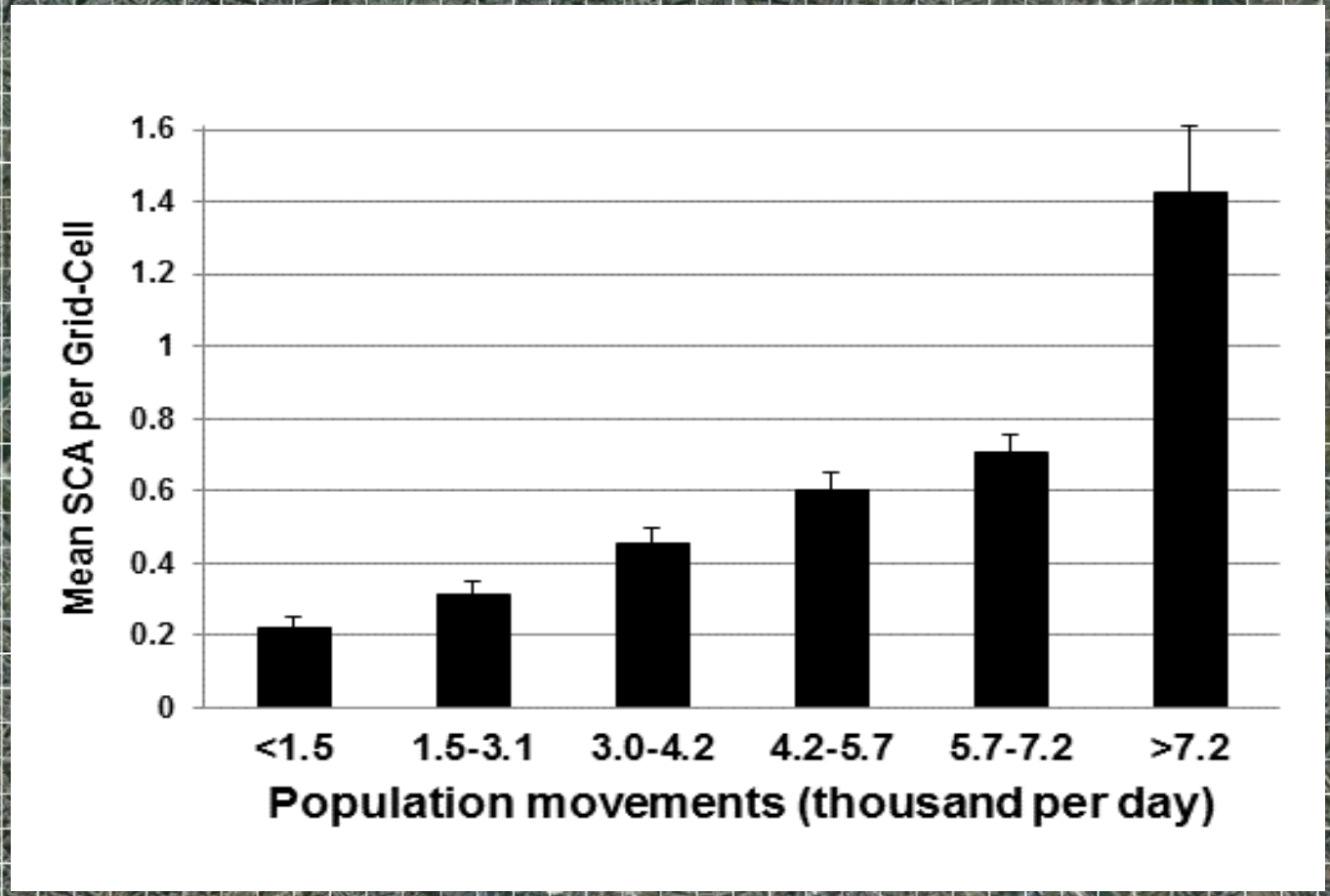

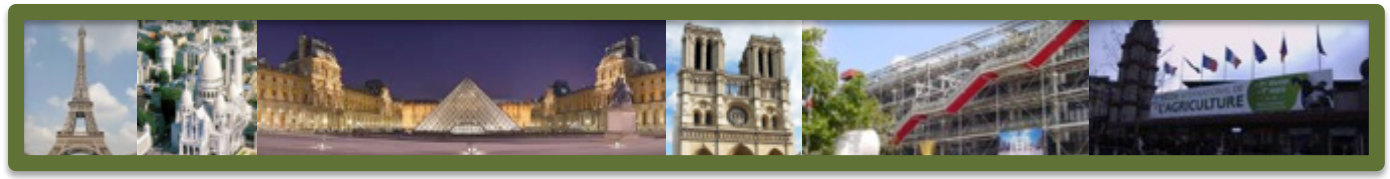

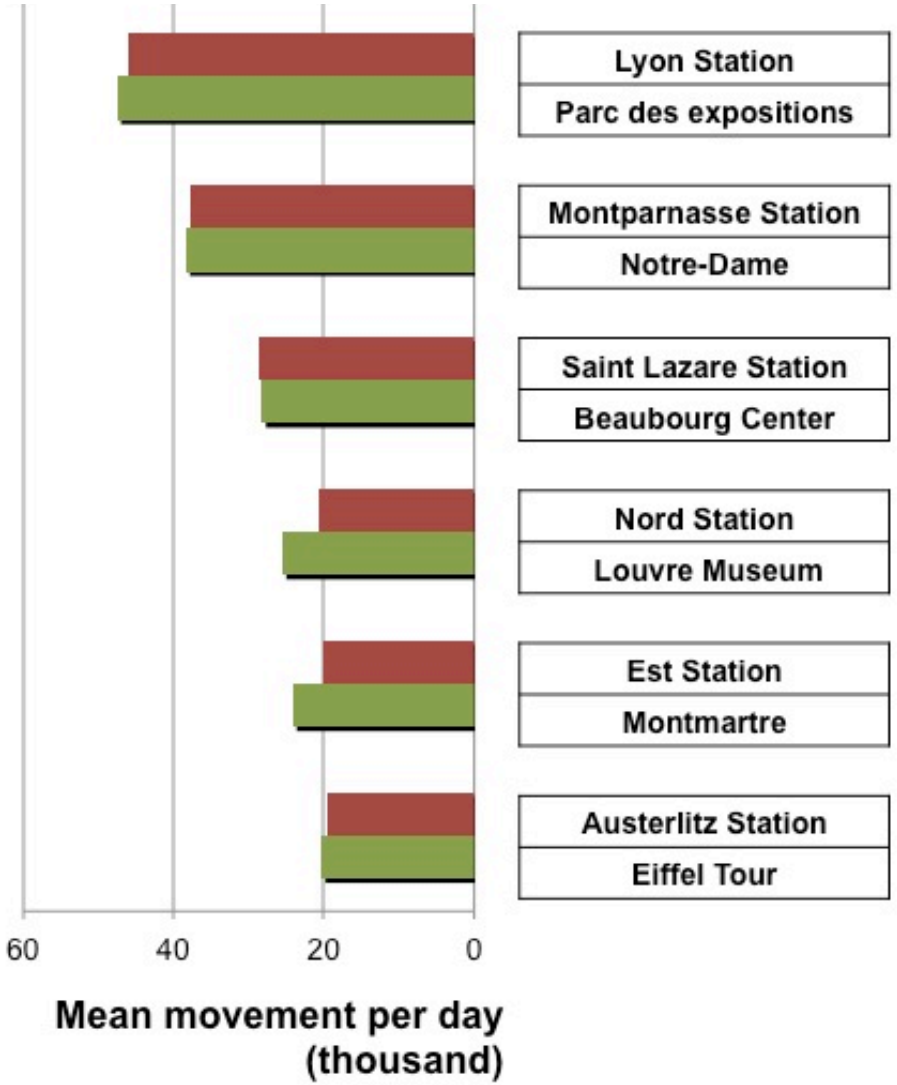

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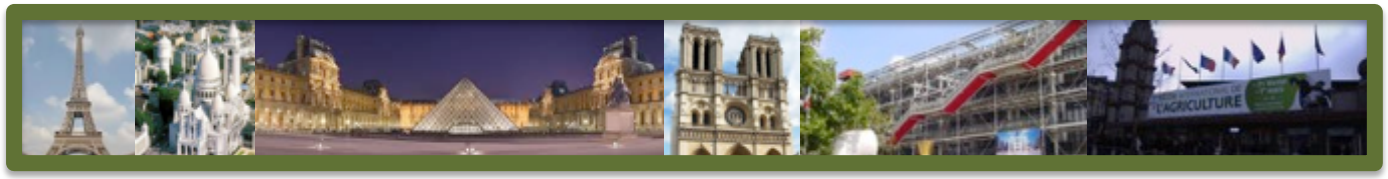

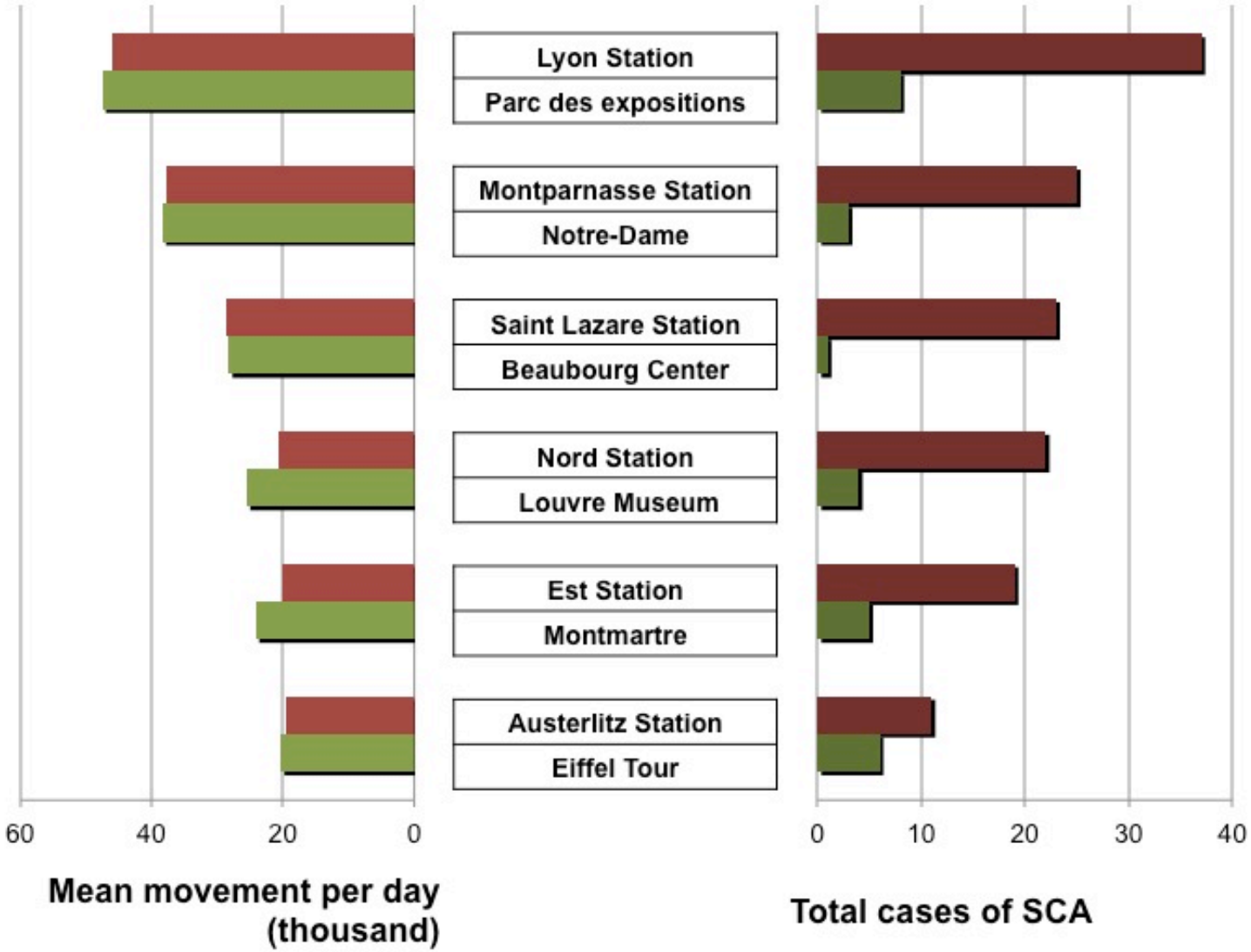

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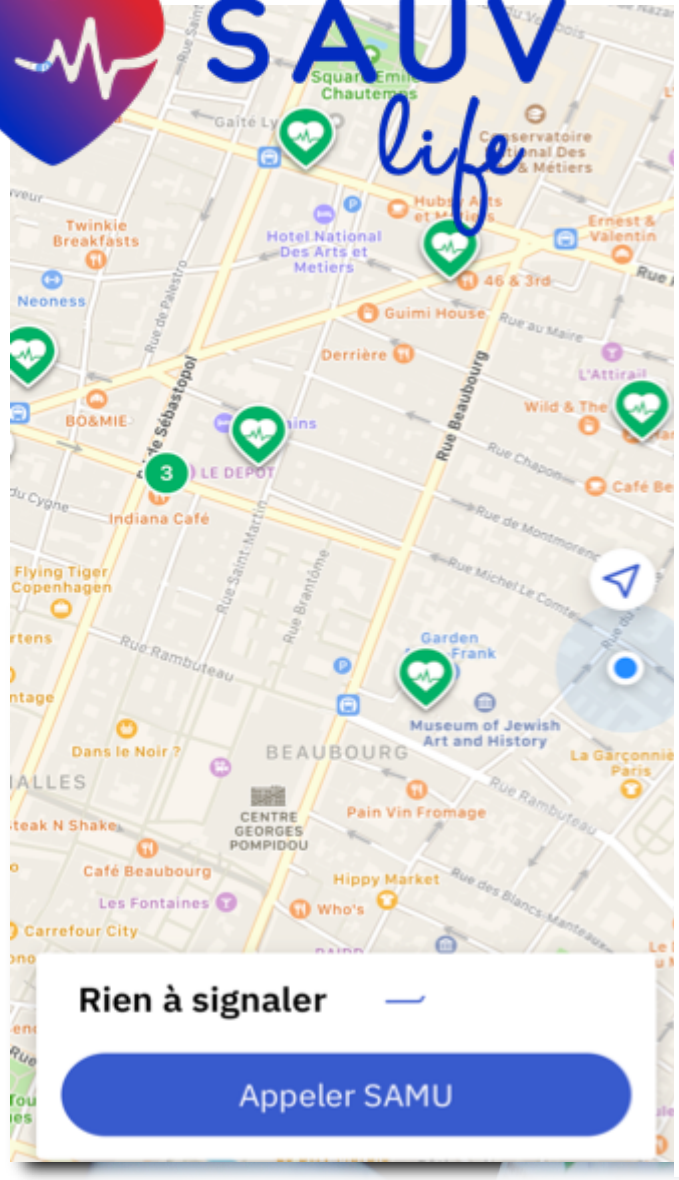
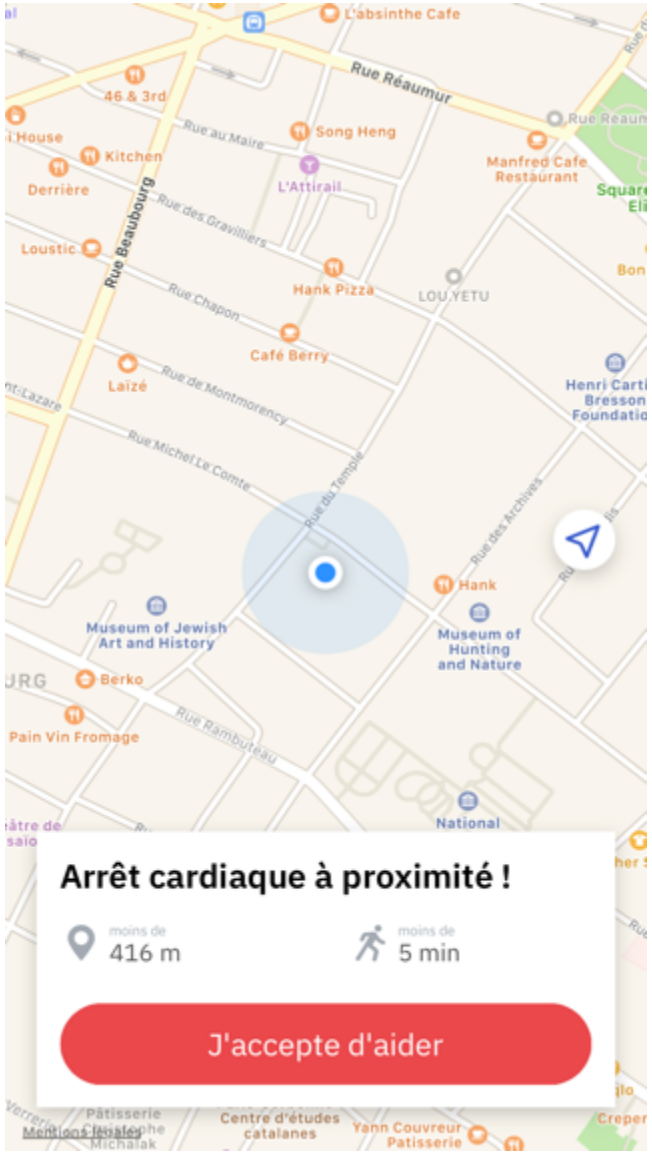
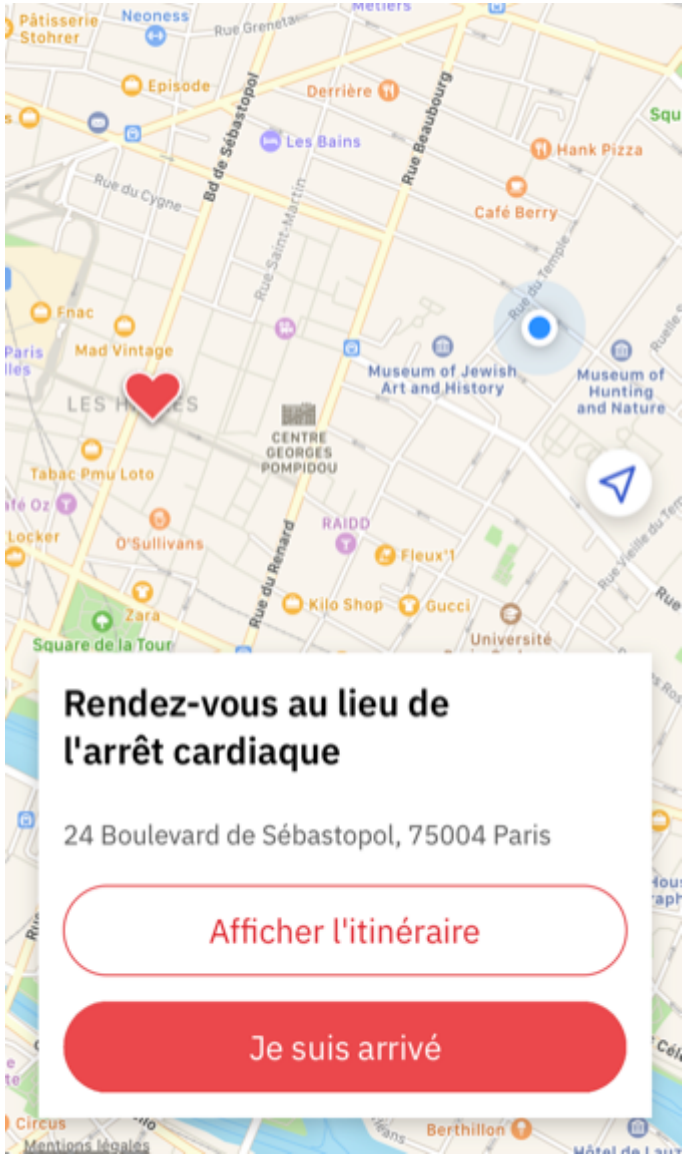
SAUV life







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SAUV Life

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H E G P

BRIGADE DE SAPEURS-POMPIERS DE PARIS

BON SAMARITAIN

Professionnel de l'urgence, vous acceptez d'être géolocalisé comme volontaire du secours d'urgence

Vous pouvez télécharger et vous inscrire sur l'application STAYING ALIVE

En cas d'arrêt cardiaque sur la voie publique, la STA 18-112 envoie l'engin de secours le plus proche ET contacte les « Bons Samaritains » disponibles à proximité de l'intervention.
L'application offre également une cartographie à jour des DSA

Ne pas jeter sur la voie publique

Le Bon Samaritain est utilisé par le CTA 18-112 de la BSPP.

Vous ne serez sollicité qu'en cas d'arrêt cardiaque à proximité.

Vous pouvez répondre « non disponible » selon votre situation et pouvez désactiver le service à tout moment si vous le souhaitez.

Téléchargez l'application **STAYING ALIVE**
Vous pourrez sauver une vie !

AEDMAP

www.aedmap.org

Do Not Spend Time to Get an AED, It Will Come to You!!

Out-of-Hospital Cardiac Arrest (N=18)	Time From Dispatch to Arrival[a]	
	Drone, min:s	EMS, min
Median (IQR)[b]	5:21 (3:03-8:33)	22:00 (17:48-29:00)

Center for Resuscitation Science, Karolinska Institutet, Stockholm, Sweden

Boutilier JJ et al. Circulation. 2017

Claesson A et al. JAMA. 2017

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Towards A Better Managment in 2030…

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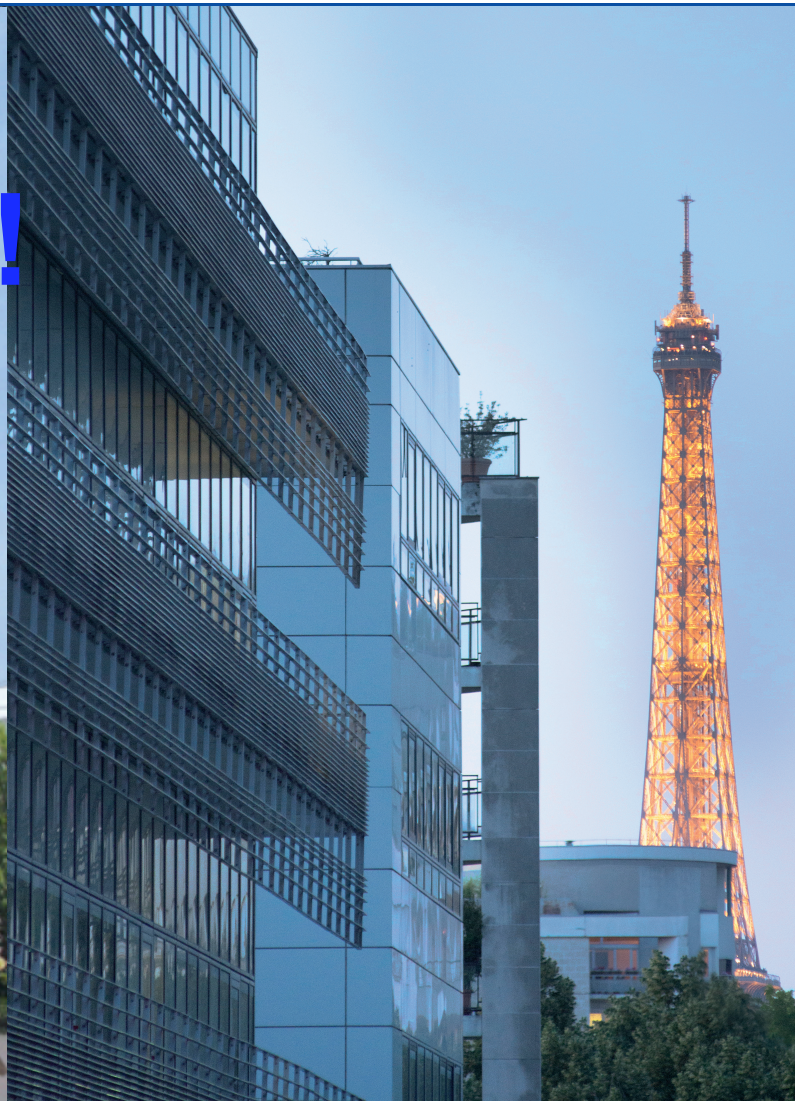
Thank You for Your Attention!



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