



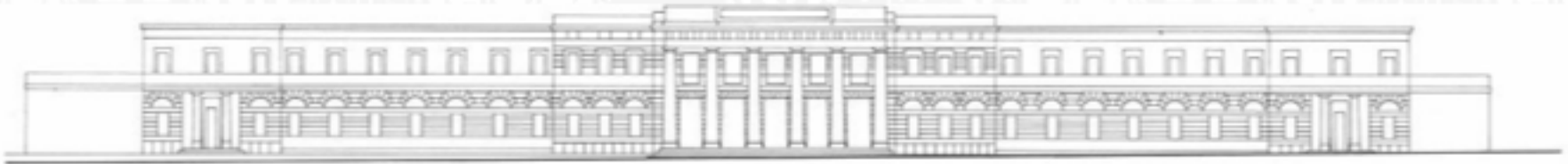
Quale Imaging scelgo per primo nella SCA?

Napoli 18 aprile marzo 2015

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# La TAC coronarica rapida e risolutiva nel rule out della sospetta SCA nel dipartimento di emergenza

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Azienda Ospedaliero-Universitaria di Cagliari  
Università degli Studi di Cagliari



# Dolore toracico

## *Task Force Report*

### **Task Force on the Management of Chest Pain**

Members: L. Erhardt, J. Herlitz, I. Bossaert, M. Halinen, M. Keltai, C. Marcassa, T. Quinn and H. Van Weert

The European Heart Journal 2002

“... Today there is no universally applicable and recommended algorithm that can be used for patients with chest pain. Clinical judgement is still the most important factor for proper management of patients. ...”

# **CHEST PAIN VOLUME**

(American Chest Pain Registry)

- 7-9 million ED visits/year
- 1/3 of U.S. EDs had a CPU
- 3 million unnecessary admissions
- 60,000 mistaken discharges with MI
- 13-15 billion dollars unnecessary cost

# Management of Chest Pain

Chest pain accounts for 5-20% of emergency department visits



**Life-threatening conditions:**

-Acute coronary syndrome

-Aortic dissection

-Pulmonary embolism

-Pneumothorax

-Pneumomediastinum

-Pericarditis

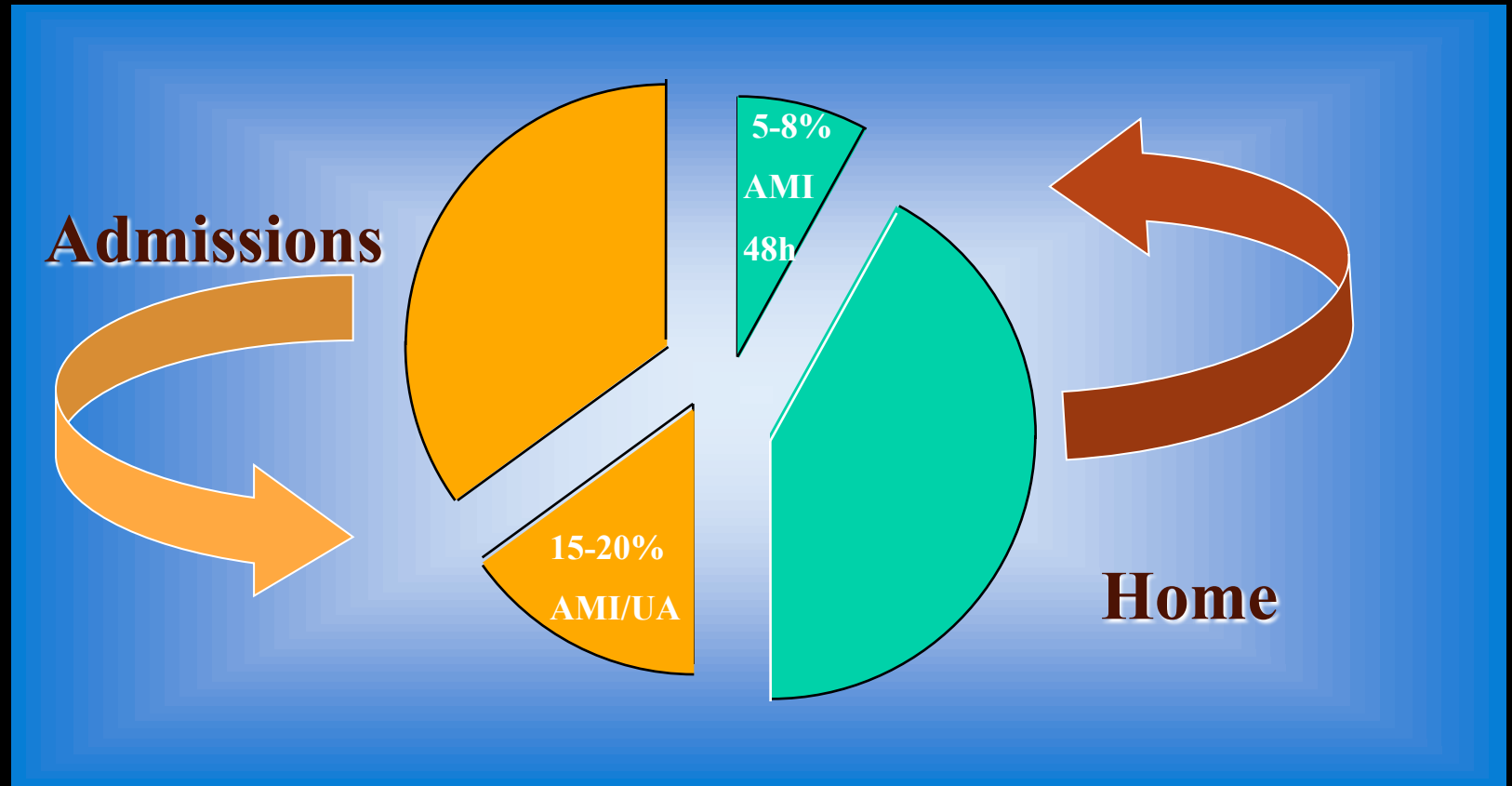
-Esophageal perforation

Pertanto, nella gestione del paziente con dolore toracico il percorso diagnostico deve essere sempre improntato su criteri di efficienza e rapidità'.



# ER CHEST PAIN TRIAGE

*Rationale*



Yale ED Registry Chest Pain Patients (n=1,423) 1995

# ER CHEST PAIN TRIAGE

*Decisional Process characterized by:*



- ◆ High Cost
- ◆ Low Efficiency
- ◆ High risk

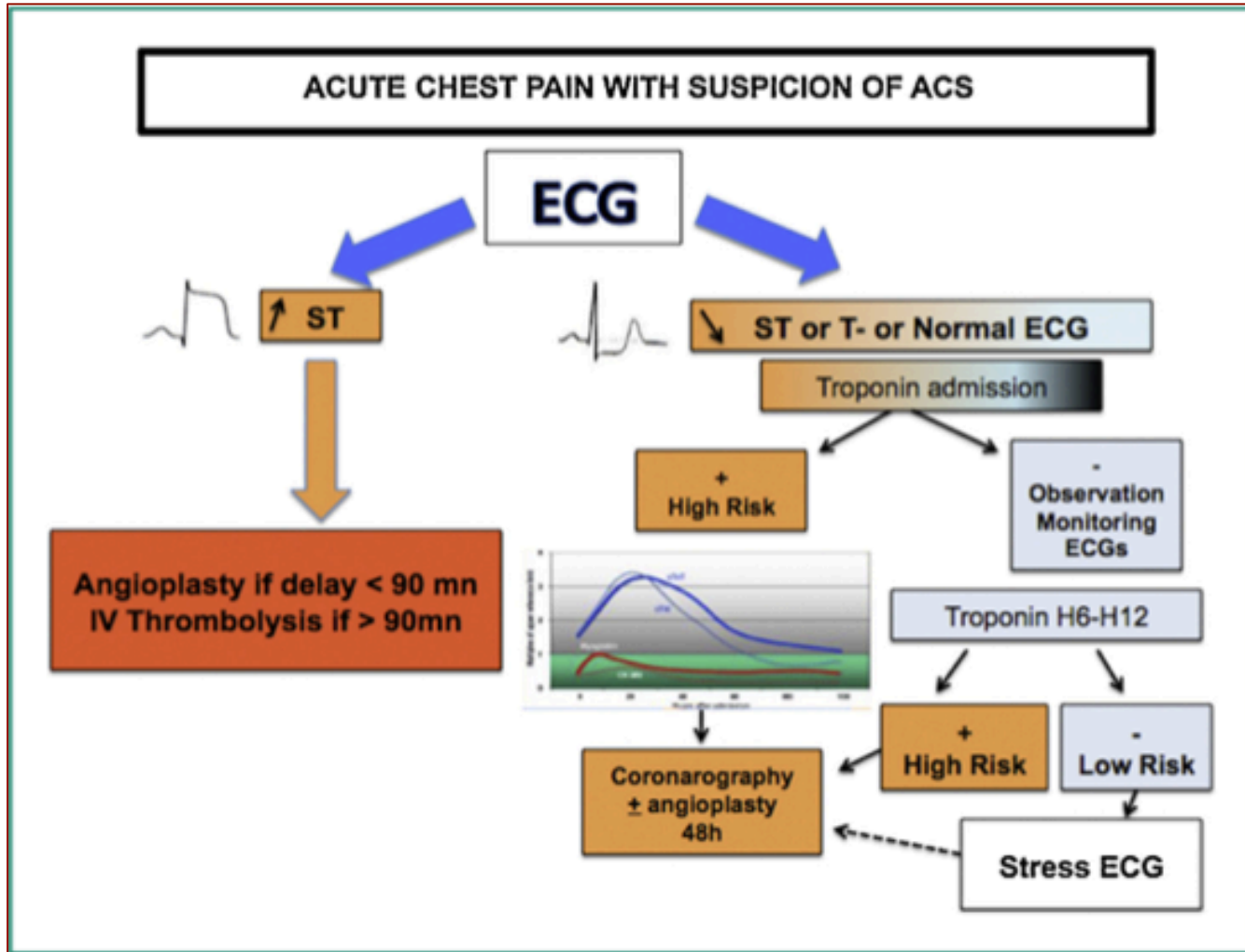
# Optimal Triage of ER Chest Pain Patients

## *goals*

- ◆ Rapid identification of pts *without* ACI, for ER discharge and out-pt work-up
- ◆ Rapid identification of pts *with* ACI for aggressive therapy

# Flow chart in cases suspected ACS

From Pernes, Diagnostic and Interventional Imaging 2015



# ACC-AHA: Immediate Management



It is reasonable for patients with possible ACS who have normal serial ECGs and cardiac troponins to have a treadmill ECG (LOE: A), stress myocardial perfusion imaging, or stress echocardiography before discharge or within 72 hours after discharge.



European Heart Journal (2011) 32, 2999–3054  
doi:10.1093/eurheartj/ehr236

**ESC GUIDELINES**

## ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation

Coronary CT angiography should be considered as an alternative to invasive angiography to exclude ACS when there is a low to intermediate likelihood of CAD and when troponin and ECG are inconclusive.

IIa

B

In patients without recurrence of pain, normal ECG findings, negative troponins tests, and a low risk score, a non-invasive stress test for inducible ischaemia is recommended before deciding on an invasive strategy.

I

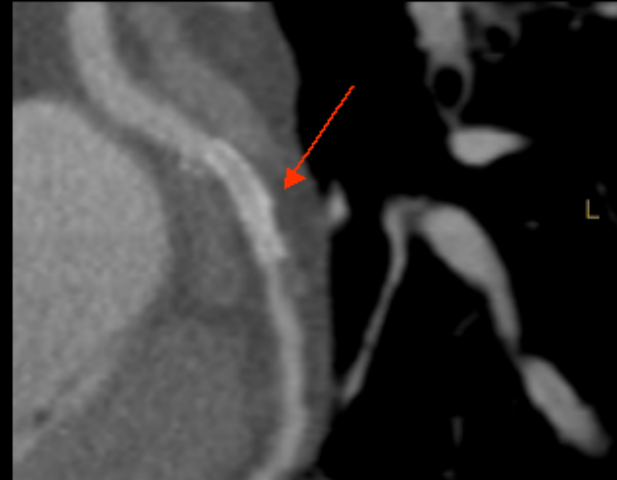
A

# Coronary CTA

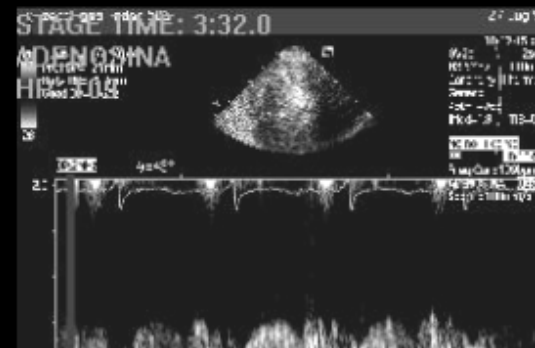
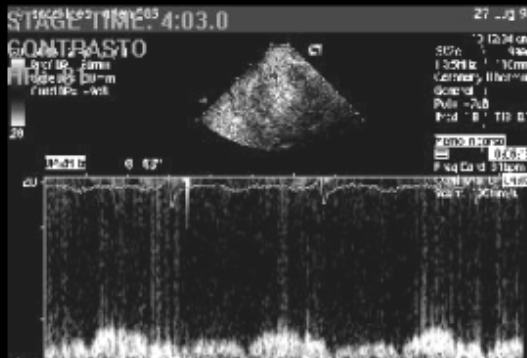




# Angio TC vs Angiography

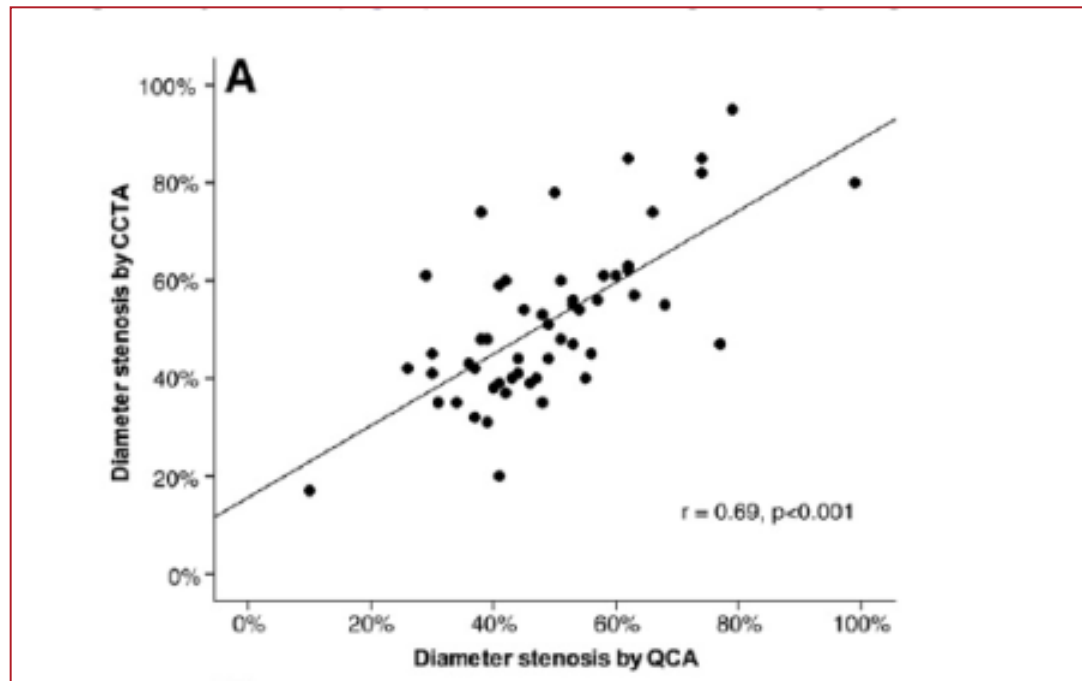


Coronary flow reserve at follow up: 1.1



# Correlation between coronary computed tomographic and QCA

Kristensen, International Journal of Cardiology 2009





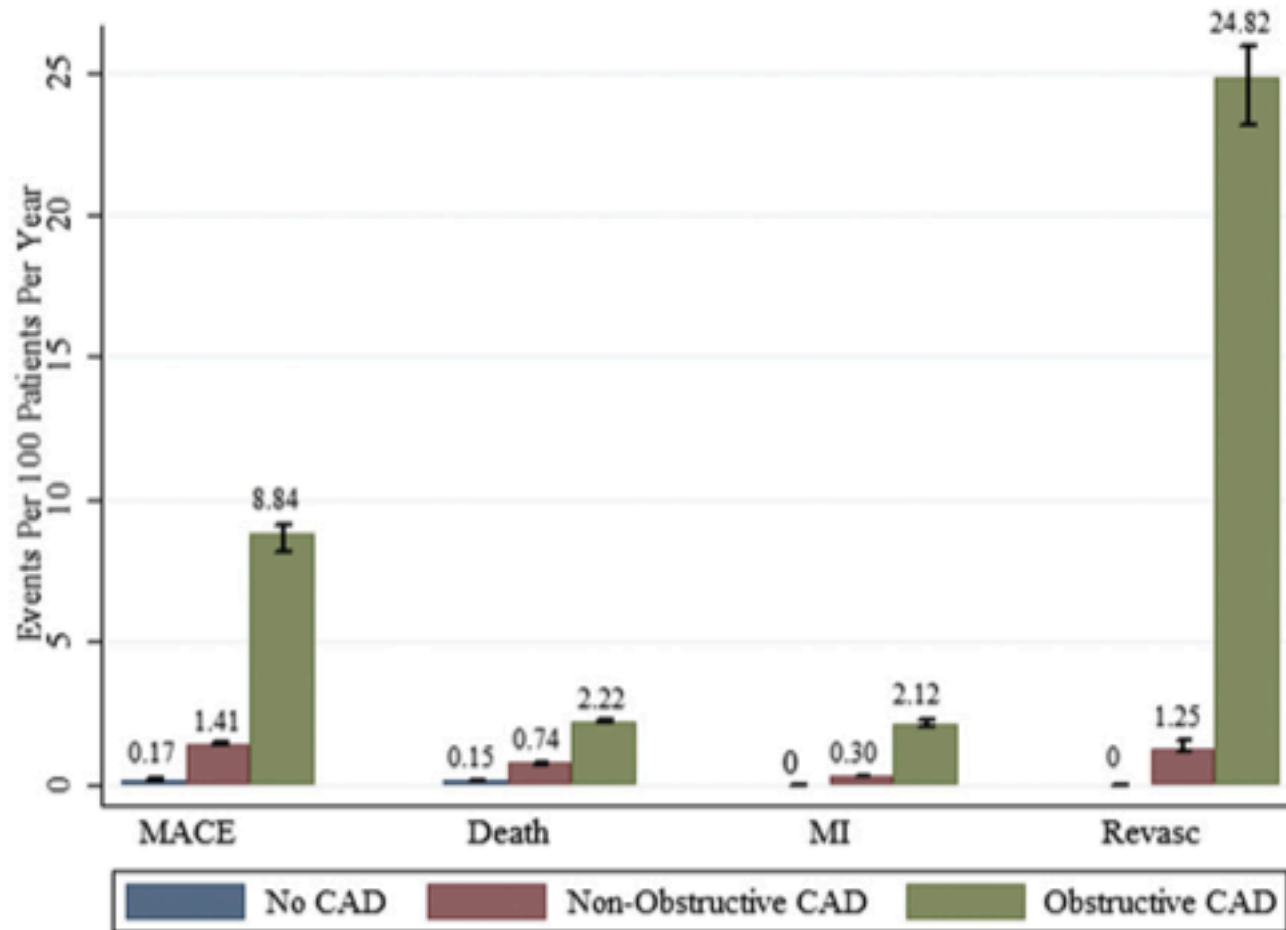
# Diagnostic Performance of 64-Multidetector Row CCTA for Evaluation of Coronary Artery Stenosis in Individuals Without Known Coronary Artery Disease

Budoff MJ, *Circulation* 2008

<b>Patient-Based-Analysis</b>				
	Estimate,%	95% CI, %	Subjects in Group, n	Subjects Correct by CCTA,n
<b>≥50% stenosis</b>				
Sensitivity	95	85-99	55	52
Specificity	83	76-88	172	142
PPV	64	53-75	81	52
NPV	99			
<b>≥70% stenosis</b>				
Sensitivity	94	79-99	31	29
Specificity	83	77-88	196	162
PPV	48	35-62	60	29
NPV	99	96-100	164	162

# Prognostic Value of CT Angiography A Systematic Review and Meta-Analysis

Hultern JACC 2011



# Cardiac computed tomography in patients with acute chest pain

Nieman K, EHJ 2013

Study	n	Population	Scanner	ACS definition	ACS rate (MI rate)	CT criterion	sens (%)	spec (%)
Rubinshtein et al. <sup>7</sup>	58	Higher risk (incl. history of CAD)	64-CT	Positive troponins, or >50% stenosis by invasive angiography, or positive ischaemia test	34%	Stenosis	100	92
Gallagher et al. <sup>8</sup>	92	Low-risk ED	64-CT	MI, UAP	13%	Stenosis	86	92
ROMICAT I <sup>9</sup>	368	Low-risk ED	64-CT <sup>a</sup>	MI (8), UAP (23)	8.4% (2%)	Plaque	100	54
						Stenosis	77	87
Hansen et al. <sup>10</sup>	89	Low-risk ED	64-DSCT	MI	4% (4%)	Plaque	100	41
						Stenosis	75	86
Dedic et al. <sup>11</sup>	111	Any-risk ED (incl. low-positive troponins)	64-DSCT <sup>a</sup>	MI (13), UAP (6)	17% (12%)	Calcium	89	41
						Plaque	100	40
						Stenosis	89	79

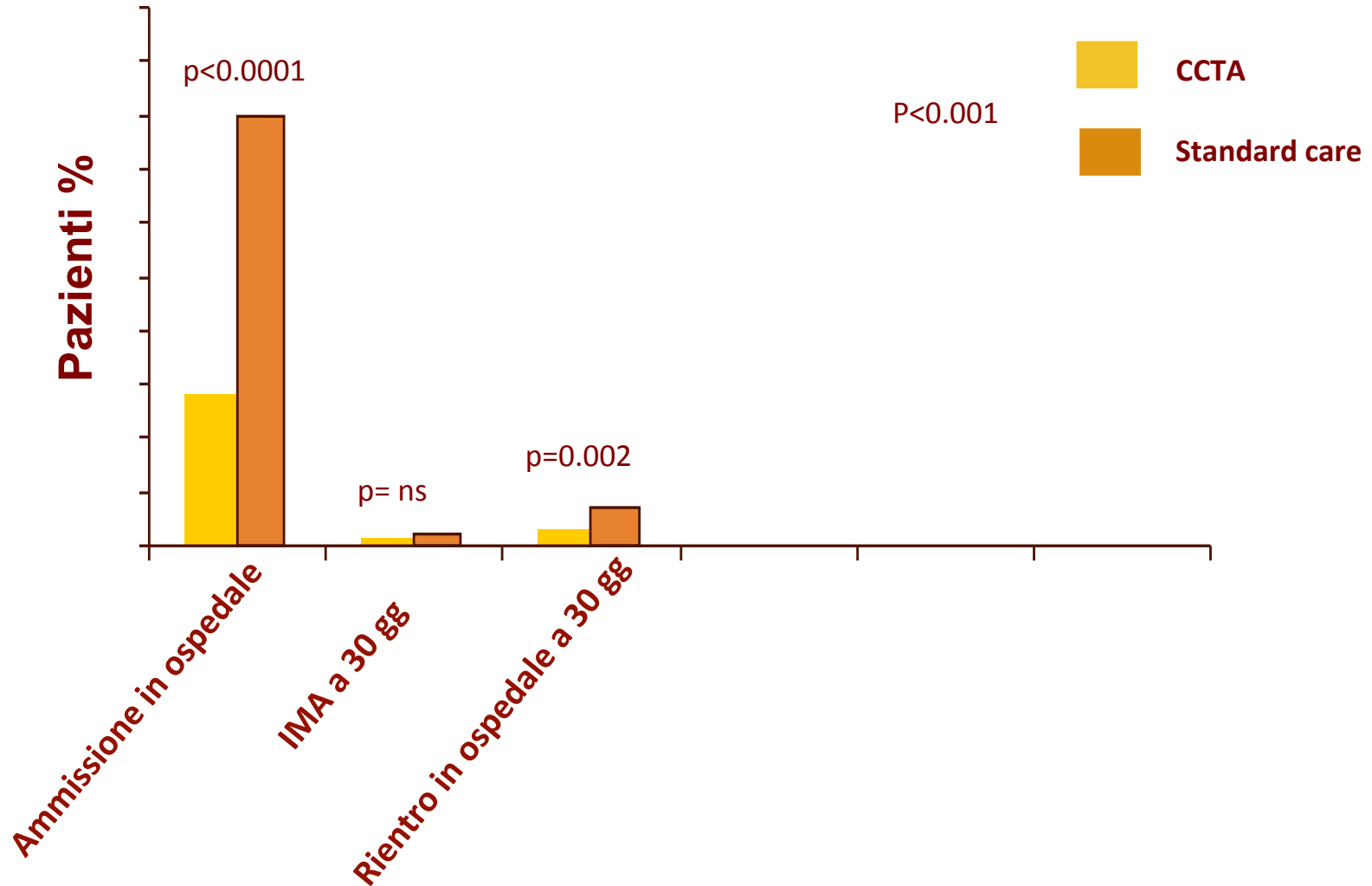
# Cardiac computed tomography in patients with acute chest pain

Nieman K, EHJ 2013

Study	CT-STAT <sup>12</sup> (2011)		ACRIN <sup>13</sup> (2012)		ROMICAT II <sup>14</sup> (2012)	
	CTA	Controls	CTA	Controls	CTA	Controls
Population	699 TIMI risk score 0–4 MI 0.9%		1370 TIMI risk score 0–2 MI 1%		985 Low–intermediate risk MI 2.5%	
Randomization	1:1		2:1		1:1	
Control group	SPECT MPI		Usual care		Usual care	
ACS diagnosis	1.1%	2.4%	1%	1%	9%	6%
ED discharge			<b>50%</b>	<b>23%</b>	<b>47%</b>	<b>12%</b>
ICA rate	8.0%	7.4%	5%	4%	12%	8%
Revascularization	4.3%	2.7%	3%	1%	6%	4%
Time to diagnosis (median, range)	<b>2.9 h<sup>a</sup> (2.1–4.0)</b>	<b>6.3 h (4–19)</b>				
Length of stay (median, range)			<b>18.0 h (8–27)</b>	<b>24.8 h (19–31)</b>	<b>23.2 h<sup>a</sup></b>	<b>30.8 h</b>
One month MACE			<b>0%<sup>a</sup></b>	<b>0%</b>	0.4%	1.2%
Six months MACE	0.8%	0.4%				
Cost (US\$)	<b>2137<sup>b</sup></b>	<b>3458</b>			4026 <sup>c</sup>	3874

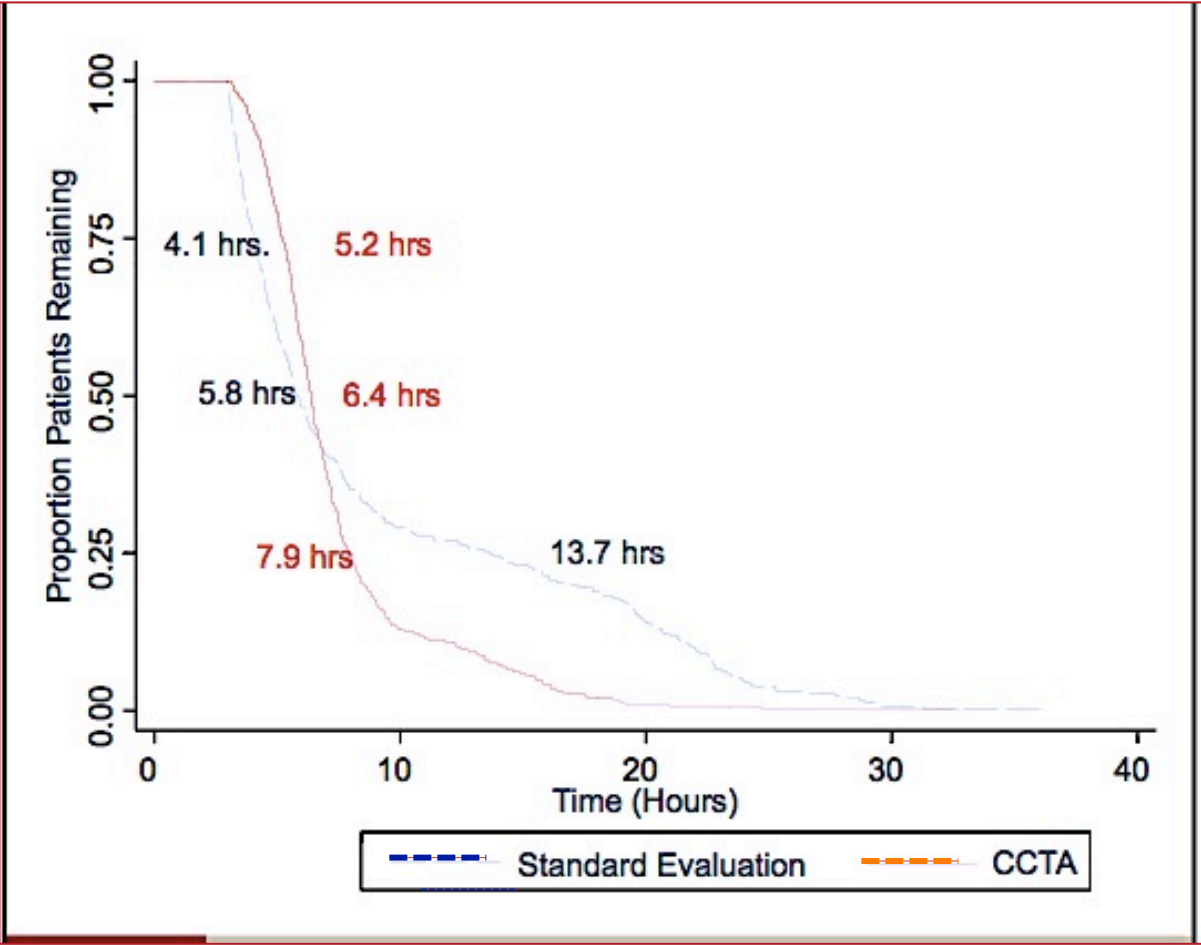
# Associations Between Routine Coronary Computed Tomographic Angiography and Reduced Unnecessary Hospital Admissions, Length of Stay, Recidivism Rates, and Invasive Coronary Angiography in the Emergency Department Triage of Chest Pain

Poon, JACC 2013



# Associations Between Routine Coronary Computed Tomographic Angiography and Reduced Unnecessary Hospital Admissions, Length of Stay, Recidivism Rates, and Invasive Coronary Angiography in the Emergency Department Triage of Chest Pain

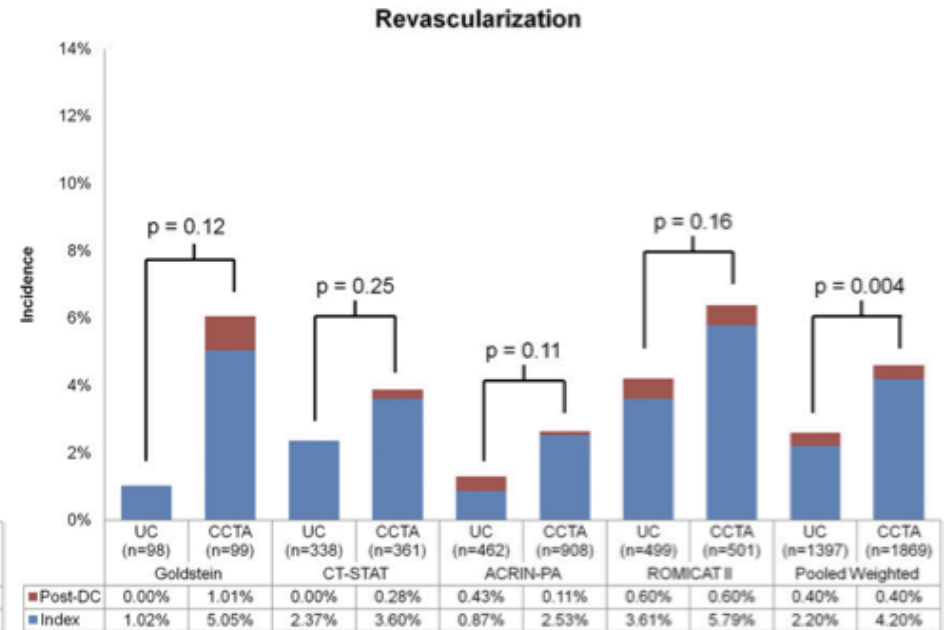
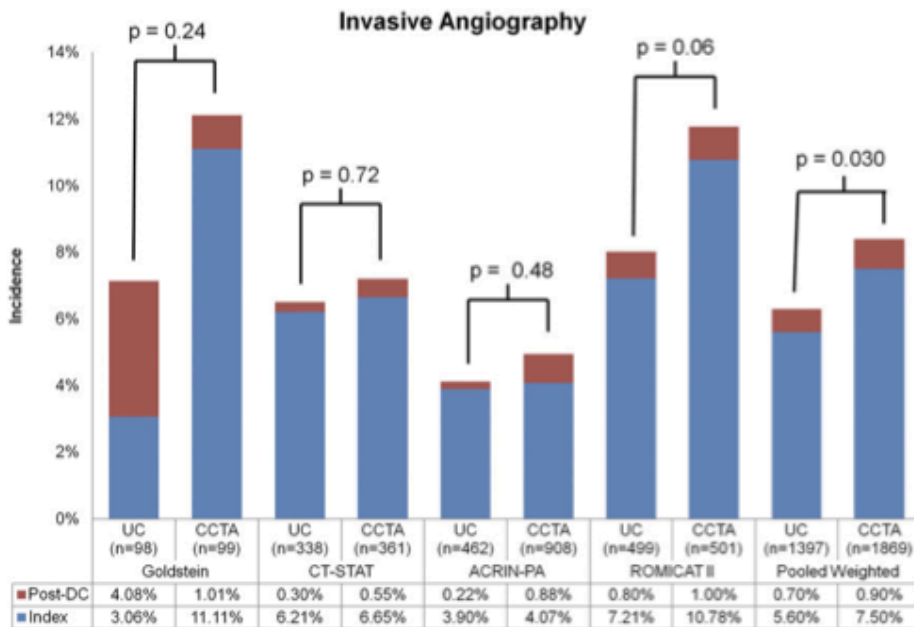
Poon, JACC 2013



# Outcomes After Coronary Computed Tomography Angiography in the Emergency Department

## A Systematic Review and Meta-Analysis of Randomized, Controlled Trials

Hulten , JACC 2013



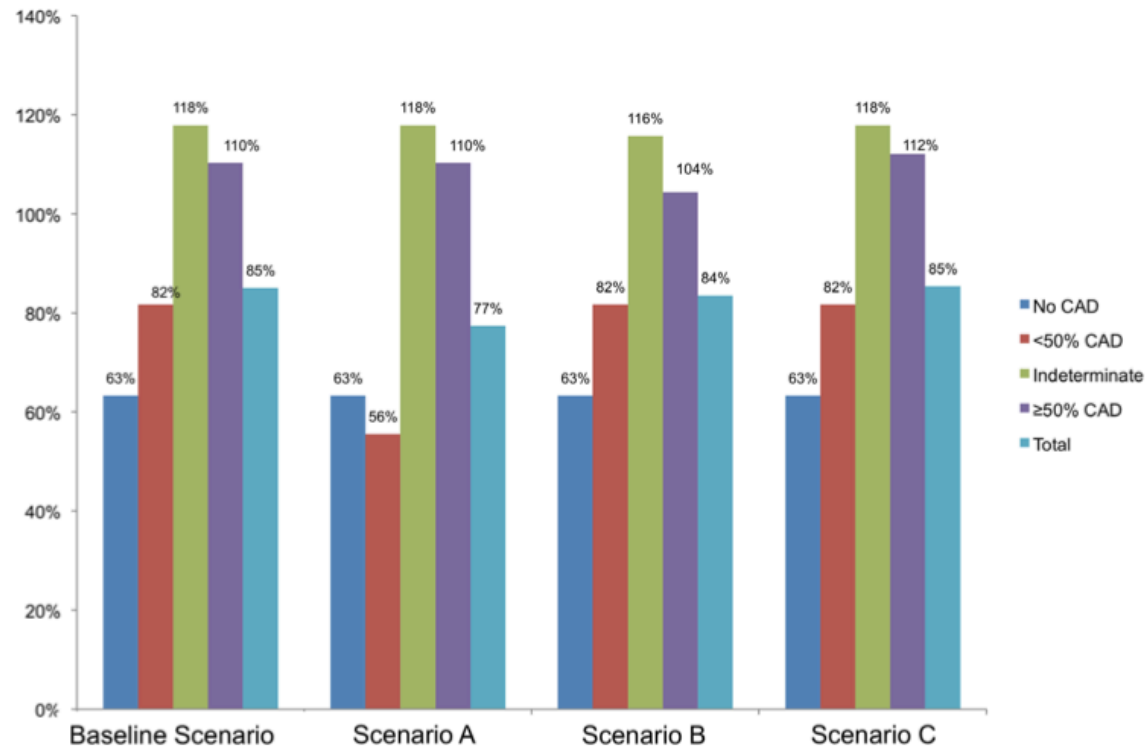
# Cost and Resource Utilization Associated With Use of Computed Tomography to Evaluate Chest Pain in the Emergency Department

## The Rule Out Myocardial Infarction Using Computer Assisted Tomography (ROMICAT) Study

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Hulten, Circ Cardiovasc Qual Outcomes. 2013

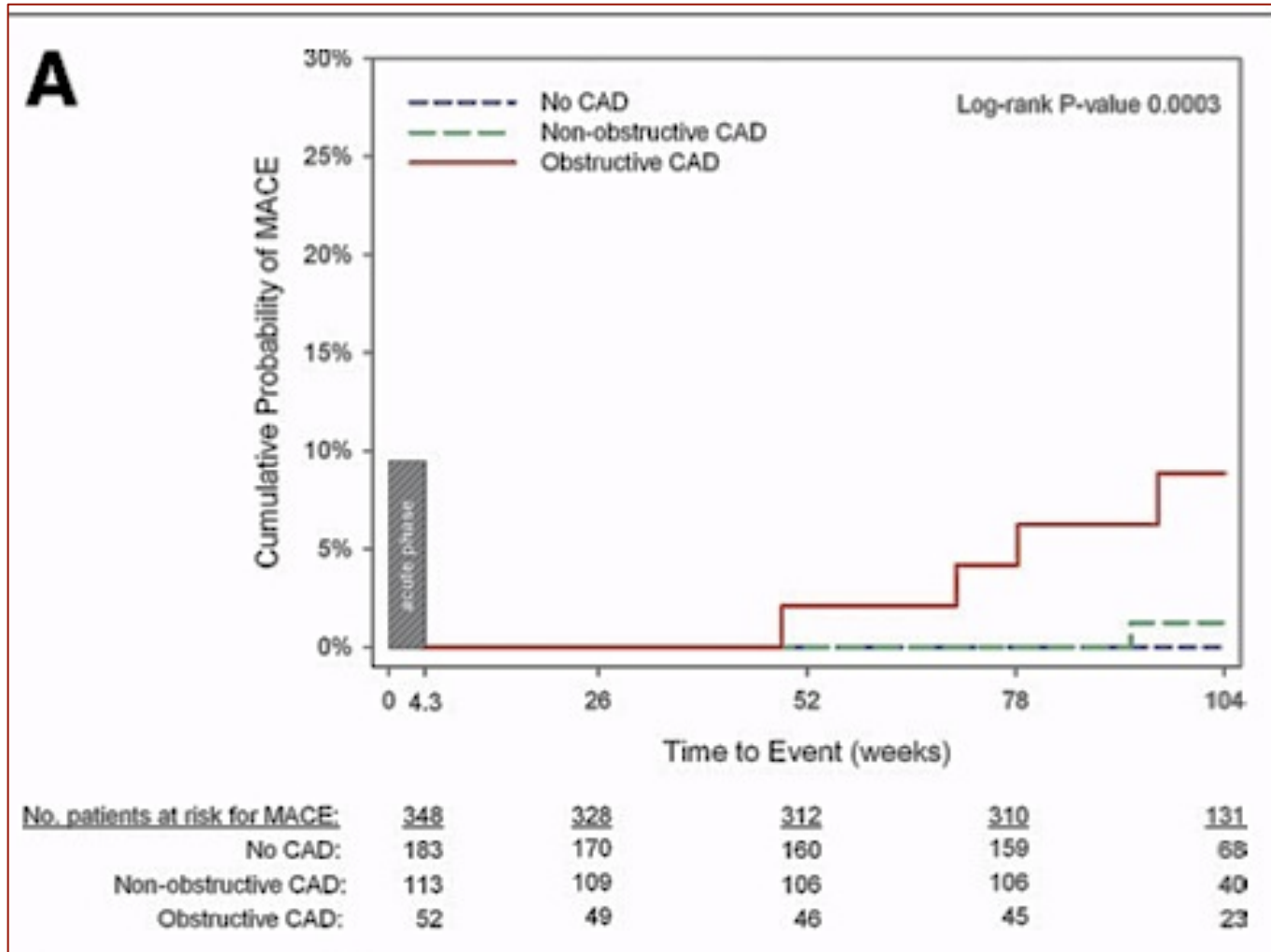
Cost Models Indexed as a Percent of Real World Cost  
And Discounted for Shorter ED Stay





# Prognostic Value of CT Angiography for Major Adverse Cardiac Events in Patients With Acute Chest Pain From the Emergency Department 2-Year Outcomes of the ROMICAT Trial

Schlett, JACC imaging 2011

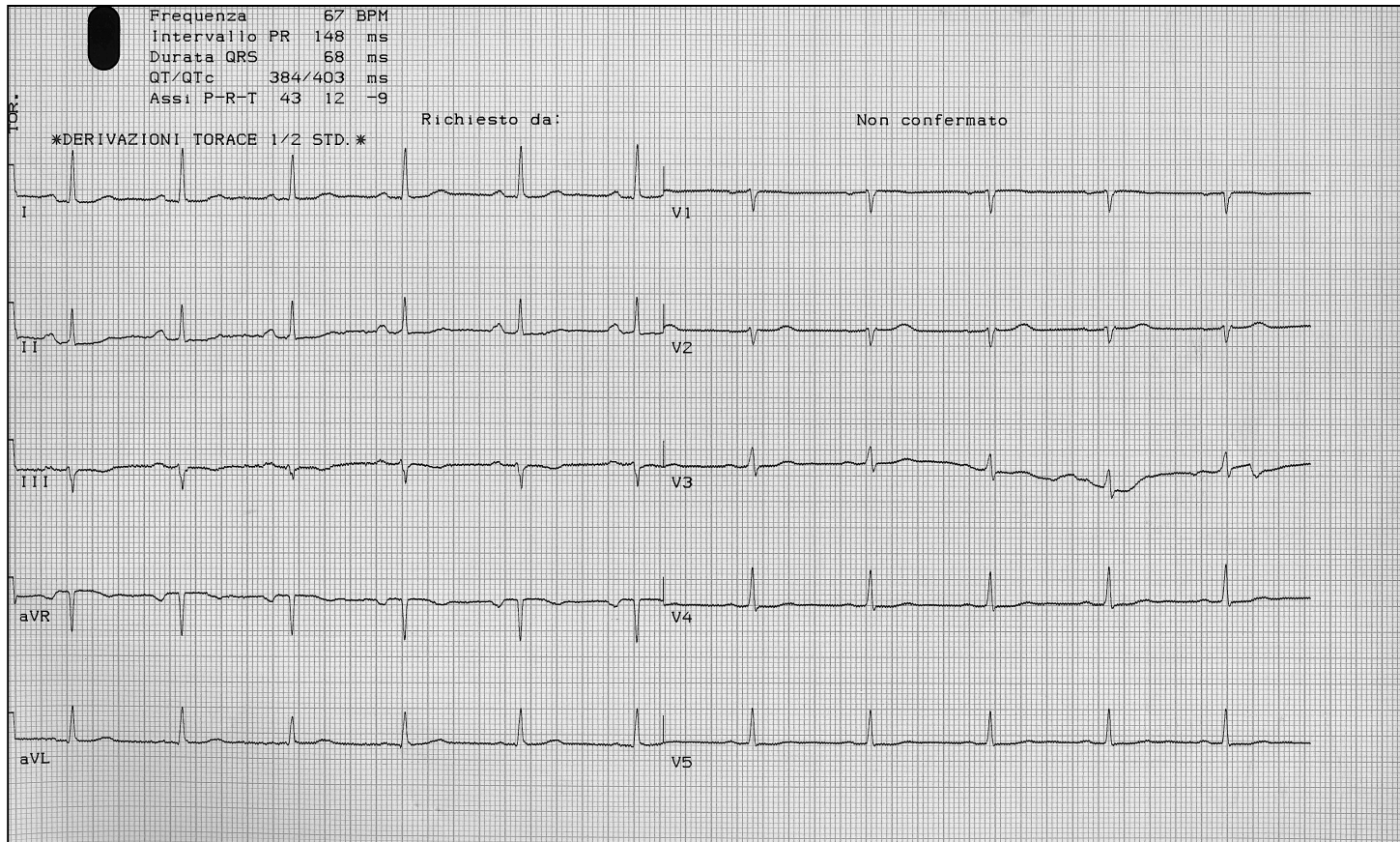


# Clinical Case

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- Male , 53 years old
- No Family history
- Dyslipidemia
- Active men (tennis player)
- Symptomatic for chest pain

# ECG in PS



Troponina negativa

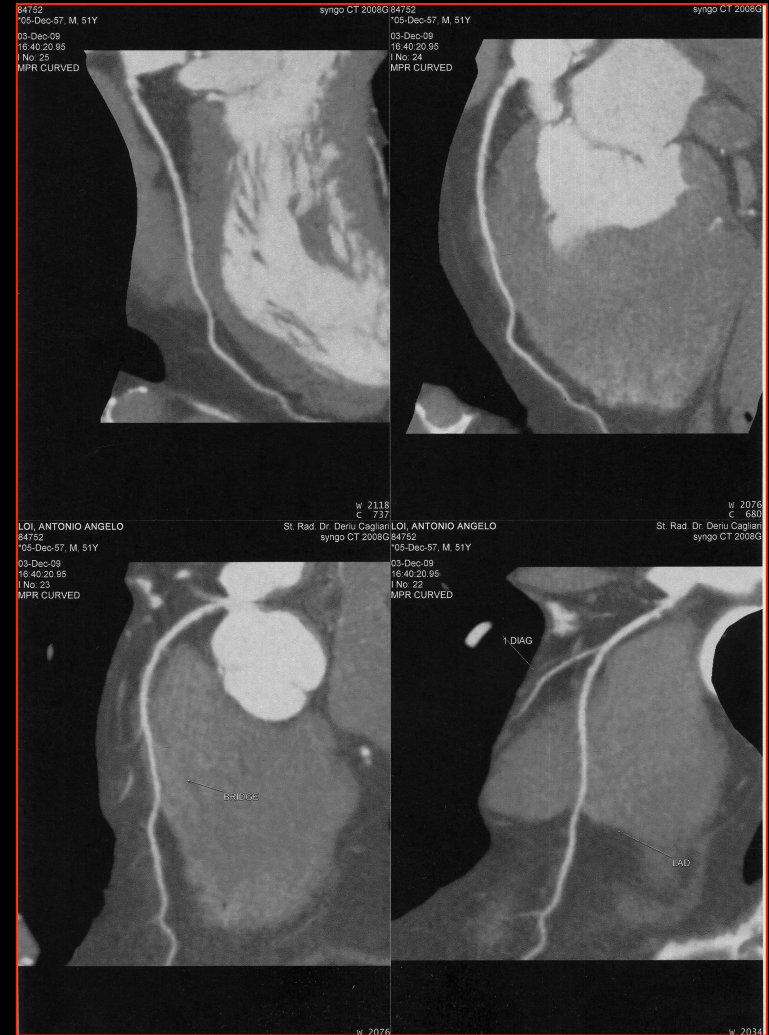


# ANGIO TC

## Right coronary artery



## LAD coronary artery



# ANGIO TC

ACCES#232465  
84752  
05/12/1957  
051Y  
M

IM:1  
16:25:15



St. Rad. Dr. Deriu Cagliari  
W 255 : L 127

Circulation 1<VRT COLLECTION>  
TAC TORACE CON MDC - TAC COLLO MDC -

Dimissione dal PS  
Aggiunta in terapia beta-bloccante

## Limiti organizzativi CT angiography in CHEST PAIN evaluation

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- Tecnologia adeguata non disponibile in molti centri
- Certificazione e expertise personale
- Disponibilità 7g/h 24

## Limiti tecnici CT angiography in CHEST PAIN evaluation

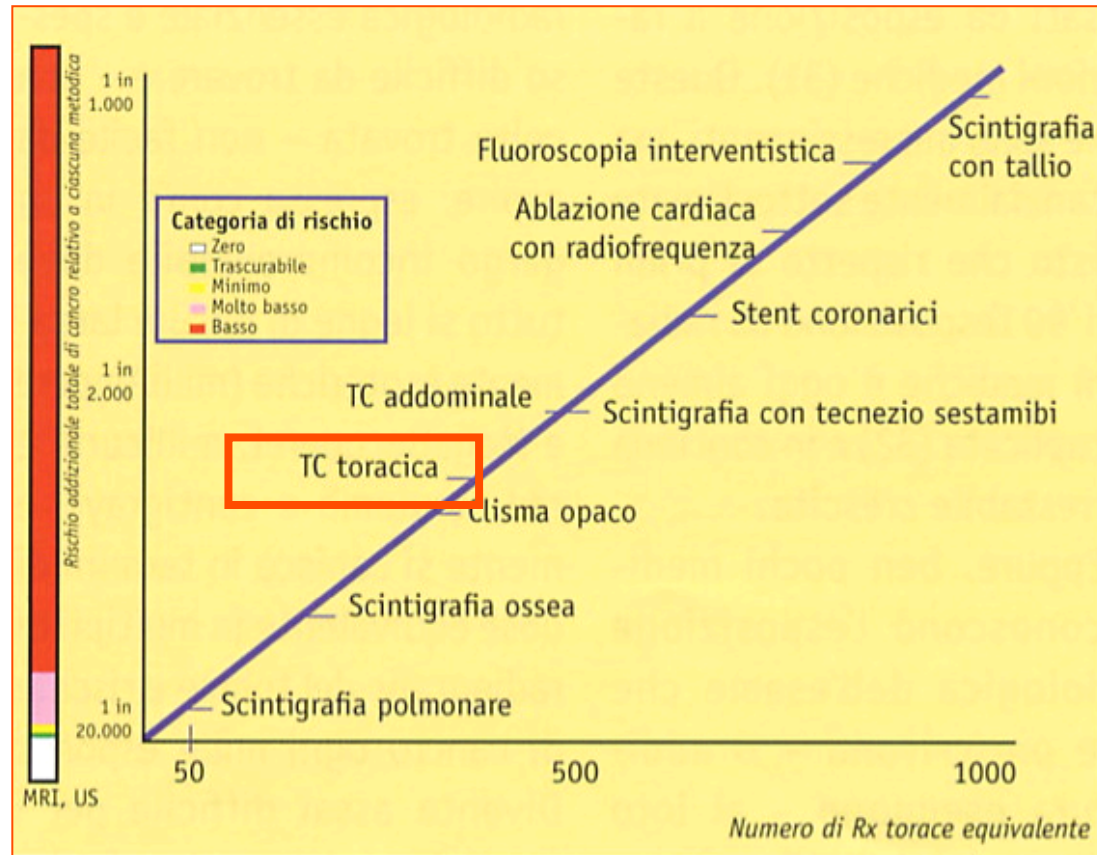
9% esami inconclusivi, 10-15% non eleggibili

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- Presenza di coronaoropatia e calcificazioni
- Aritmia/tachicardia
- Obesità (BMI > 40 kg/m<sup>2</sup>)
- Insufficienza renale
- Allergia mezzi contrasto iodati

# Rischio di cancro fatale e dose *in multipli di Rx torace*

Picano E *BMJ* 2004;329:604



Radiazioni (2.5-4 mSv in studi prospettici e 5-6mSv in studi retrospettivi)

Triplice rule-out 50% dose in piu'

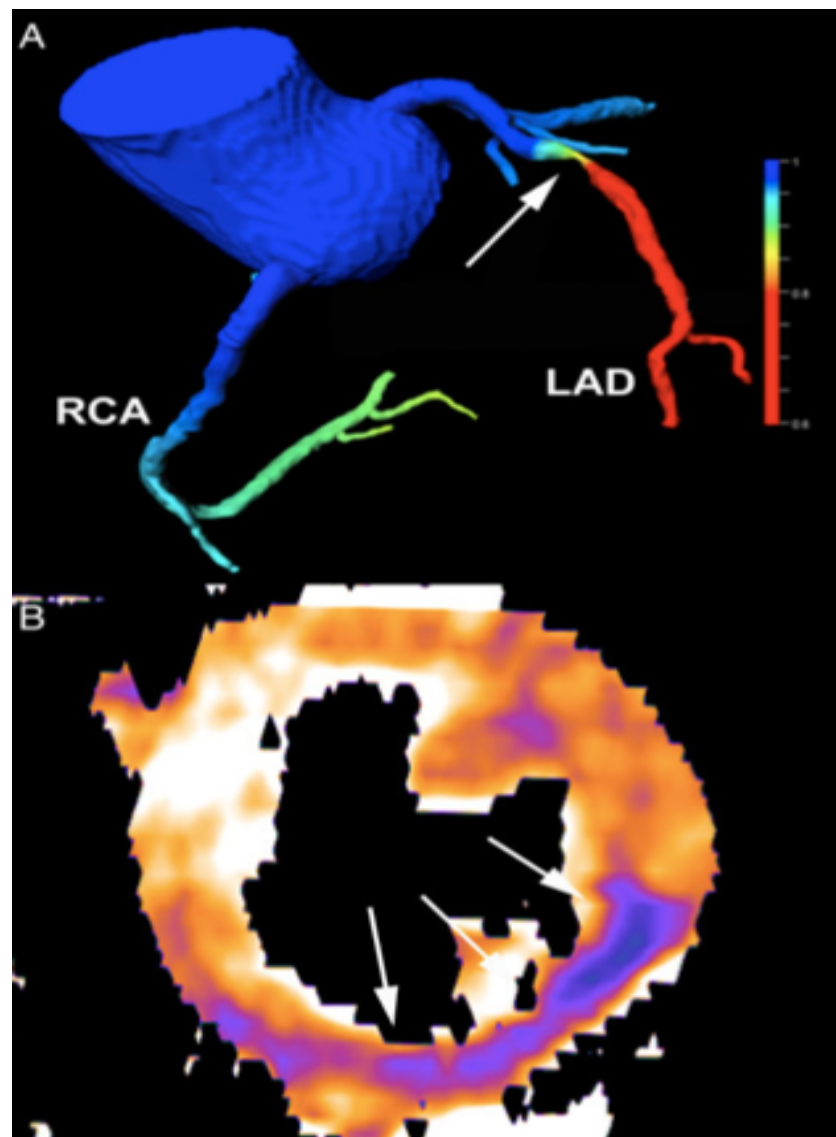


# Prospettive future

## Valori aggiunto CT

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- Valutazione perfusione miocardica
- Severità CAD mediante FFR derivata



# Prospettive future

## Valori aggiunto CT

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Tipologia placca aterosclerotica (placca instabile)

- Bassa attenuazione (<30 HU)
- Rimodellamento positivo
- Alto “Burden” totale
- Calcificazioni “spotty”



# Anatomic and/or functional assessment of CAD

## Pre-test probability

