

# NOVEDADES EN EL DIAGNÓSTICO DE LA CARDIOPATÍA ISQUÉMICA

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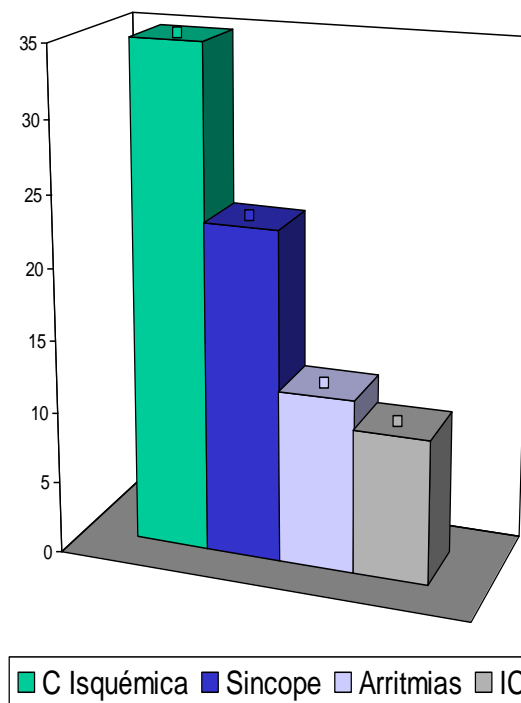
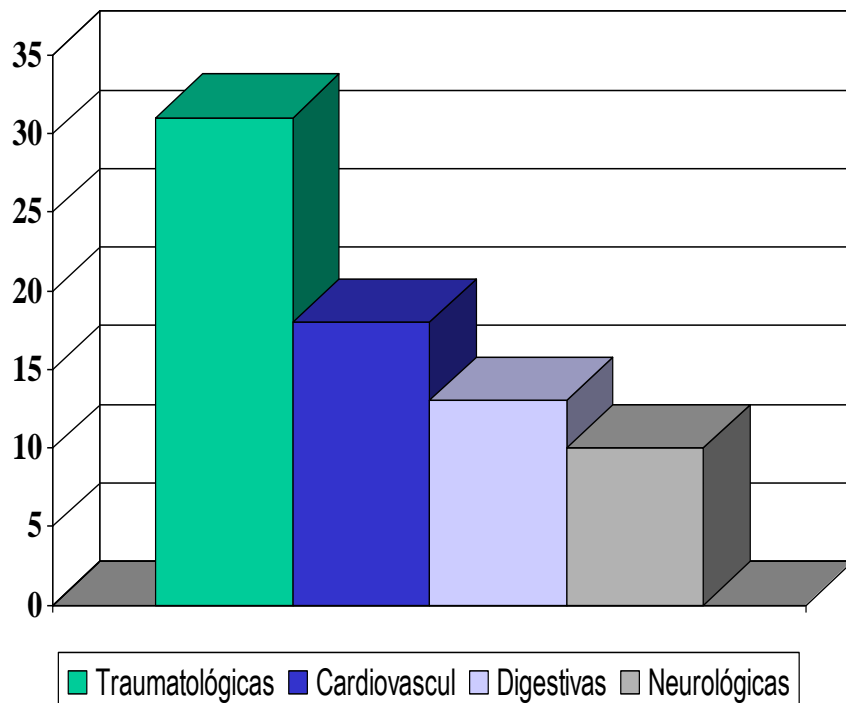
4 de julio de 2011

**Defunciones según la Causa de Muerte**  
Año 2009

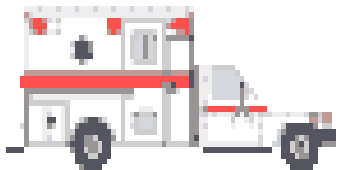
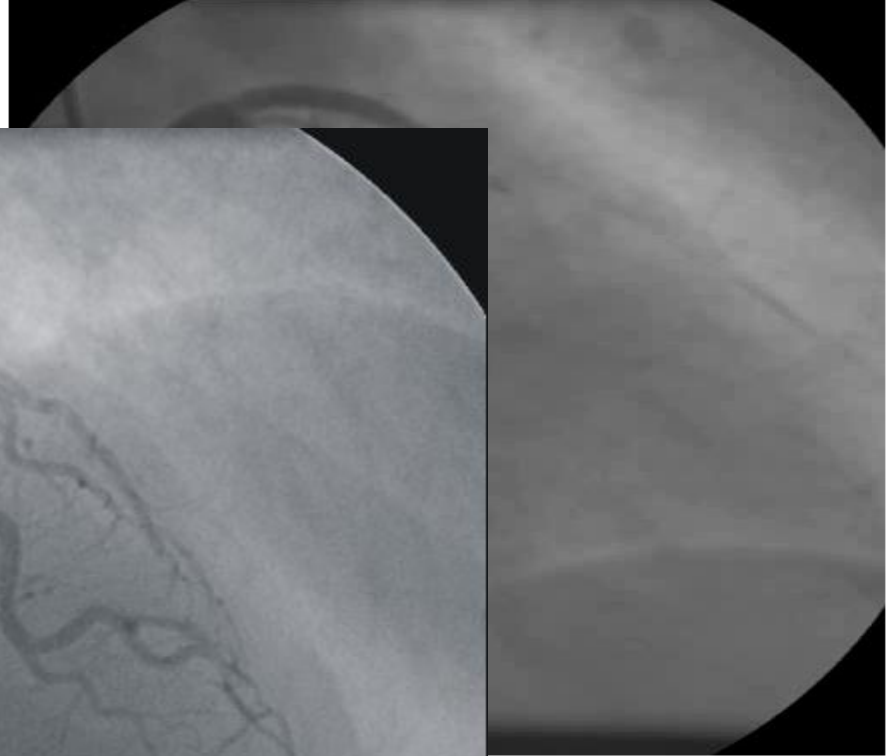
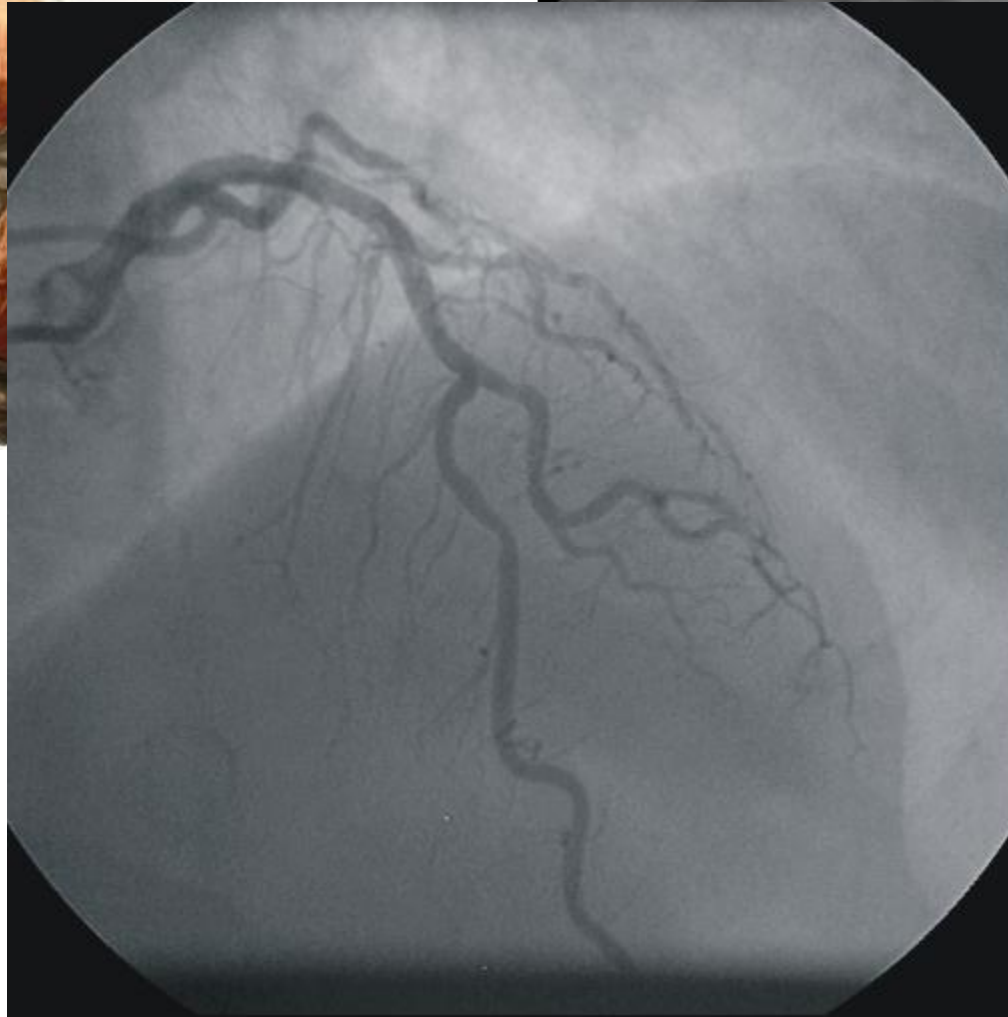
**Número de defunciones según las causas  
de muerte más frecuentes<sup>1</sup>**  
Año 2009

	Total	Hombres	Mujeres
<b>Total defunciones</b>	<b>384.933</b>	<b>199.095</b>	<b>185.838</b>
Enfermedades isquémicas del corazón	35.607	20.316	15.291
Enfermedades cerebrovasculares	31.143	13.210	17.933
Cáncer de bronquios y pulmón	20.401	17.279	3.122
Insuficiencia cardíaca	17.601	6.117	11.484
Enfermedades crónicas de las vías respiratorias inferiores	15.940	11.912	4.028

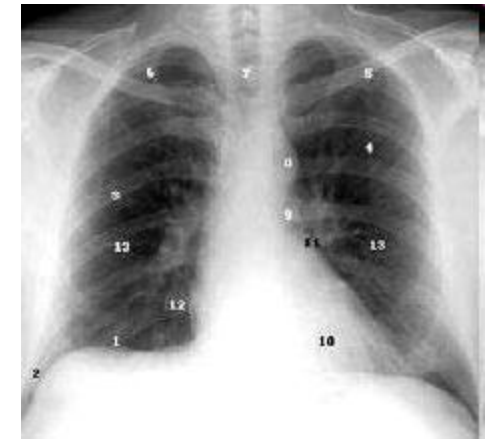
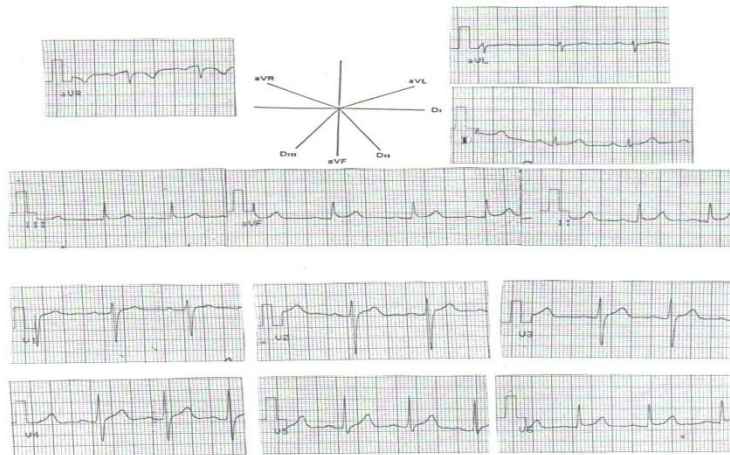
# ¿ Cuáles son las Urgencias más frecuentes ?



**Collada Jiménez JL. Centro Salud Isabel II (Parla).  
Demanda de Atención Urgente atendido por un equipo de AP  
Aten Primaria 2004; 34 (1): 136.**

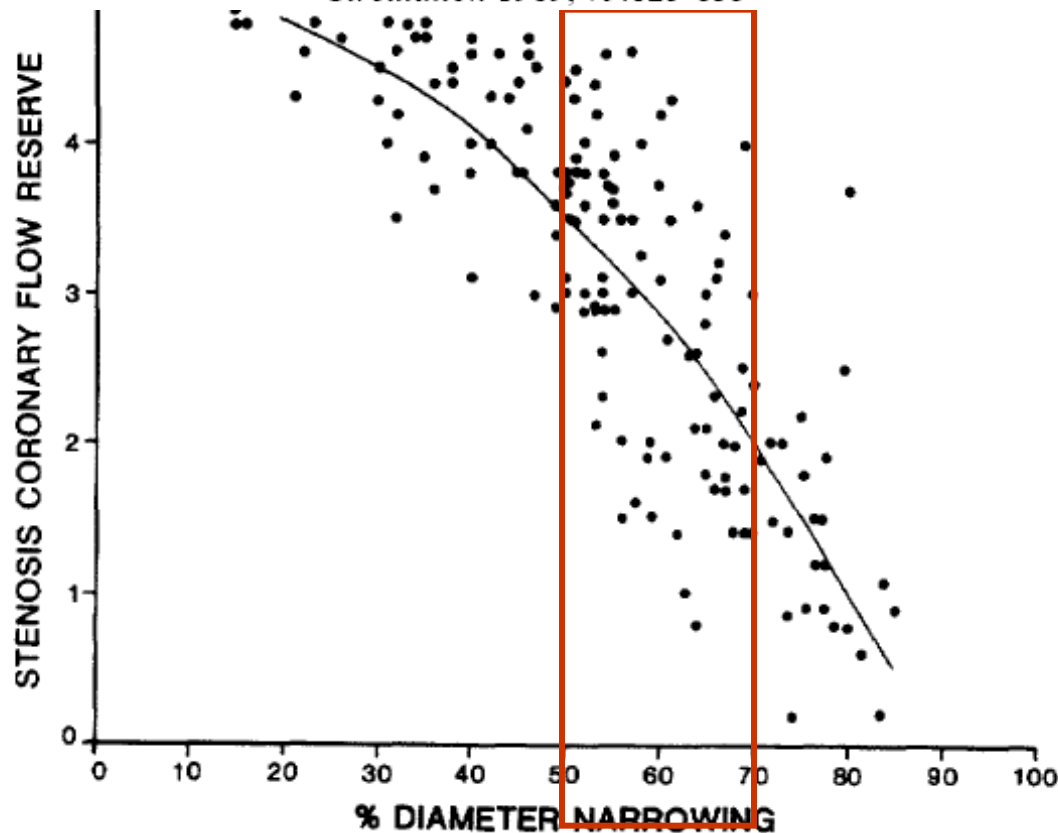


# ¿ Diagnóstico de cardiopatía isquémica : anatómico o funcional ?



**Assessment of coronary artery disease severity by positron emission tomography. Comparison with quantitative arteriography in 193 patients**  
LL Demer, KL Gould, RA Goldstein, RL Kirkeeide, NA Mullani, RW Smalling, A Nishikawa and ME Merhige

*Circulation 1989, 79:825-835*



## ACCF/SCAI/STS/AATS/AHA/ASNC 2009 Appropriateness Criteria for Coronary Revascularization

5. Clinical outcome is related to the extent of coronary artery disease (Table A) (3). Based on this observation and clinical guideline recommendations regarding “borderline” angiographic stenoses (50% to 60%) in epicardial (non-left main) locations, a significant coronary stenosis for the purpose of the clinical scenarios is defined as:

- greater than or equal to 70% luminal diameter narrowing, by visual assessment, of an epicardial stenosis measured in the “worst view” angiographic projection.
- greater than or equal to 50% luminal diameter narrowing, by visual assessment, of a left main stenosis measured in the “worst view” angiographic projection.

## Guidelines on myocardial revascularization

The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

**Table 8** Indications for revascularization in stable angina or silent ischaemia

	Subset of CAD by anatomy	Class <sup>a</sup>	Level <sup>b</sup>	Ref. <sup>c</sup>
For prognosis	Left main >50% <sup>d</sup>	I	A	30, 31, 54
	Any proximal LAD >50% <sup>d</sup>	I	A	30–37
	2VD or 3VD with impaired LV function <sup>d</sup>	I	B	30–37
	Proven large area of ischaemia (>10% LV)	I	B	13, 14, 38
	Single remaining patent vessel >50% stenosis <sup>d</sup>	I	C	—
For symptoms	1VD without proximal LAD and without >10% ischaemia	III	A	39, 40, 53
	Any stenosis >50% with limiting angina or angina equivalent, unresponsive to OMT	I	A	30, 31, 39–43
	Dyspnoea/CHF and >10% LV ischaemia/viability supplied by >50% stenotic artery	IIa	B	14, 38
	No limiting symptoms with OMT	III	C	—

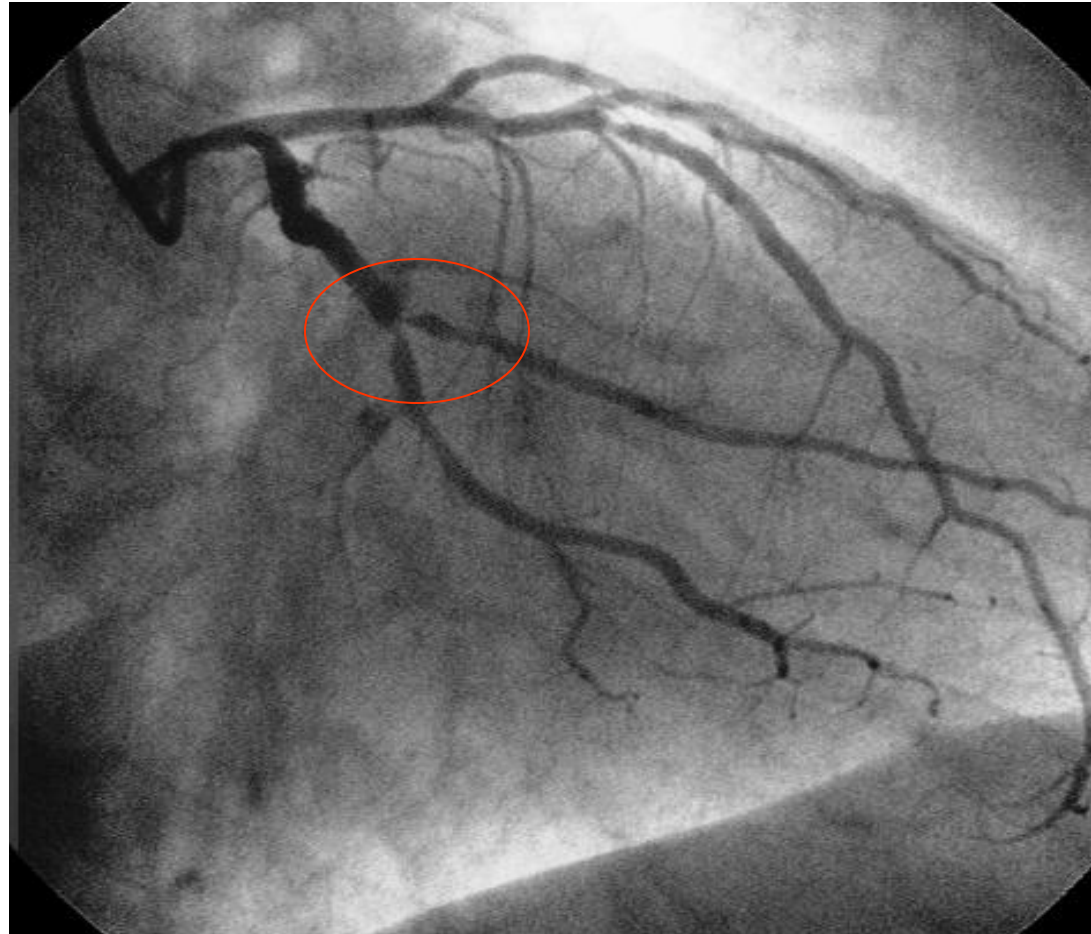
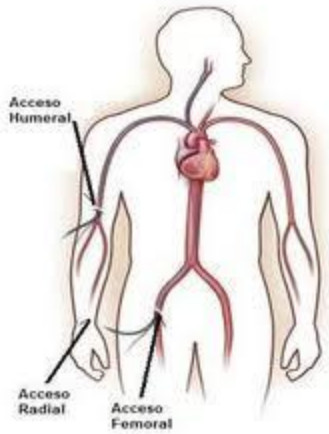
# Diagnóstico anatómico

1. La coronariografía es la mejor técnica para el diagnóstico de estenosis (patrón oro diagnóstico Cardiopatía isquémica) (Limitación: Lesiones intermedias 50-70%).
2. El grado de extensión coronario “simple” en mono/multivaso ha demostrado de forma repetida ser un buen marcador (Syntax score).
3. Ha sido la base de las diferentes formas de revascularización (quirúrgica vs percutánea) desde hace muchos años.



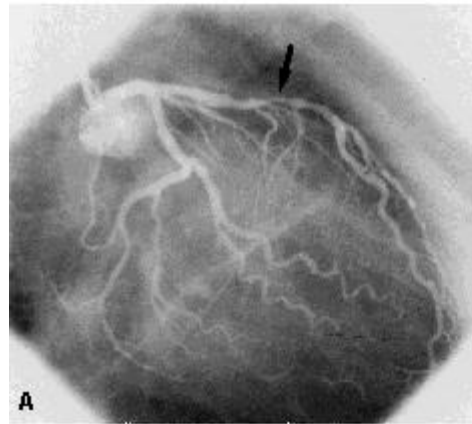
# Registro de la Sección de Hemodinámica 2010 SEC

**120.000 coronariografías (56% vía radial)**

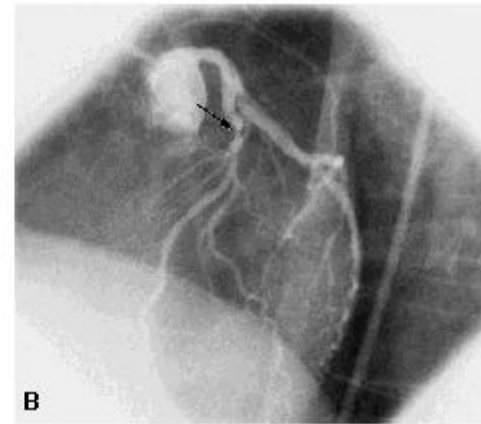




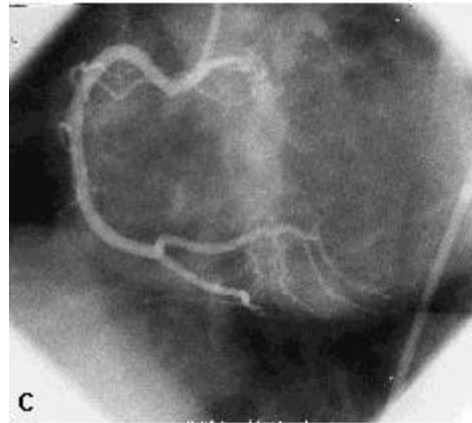
# Coronariografía Rotacional Tridimensional (X-PerSwing)



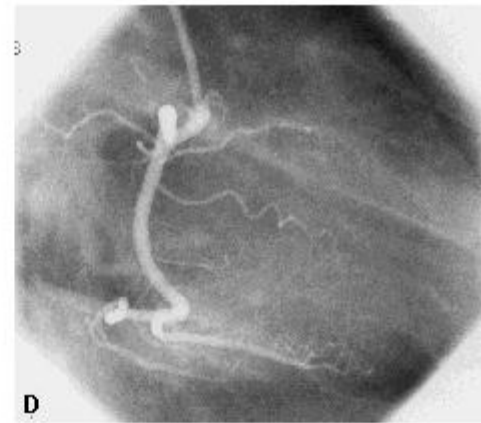
A



B



C



D

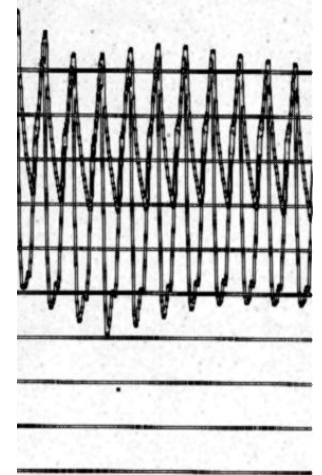
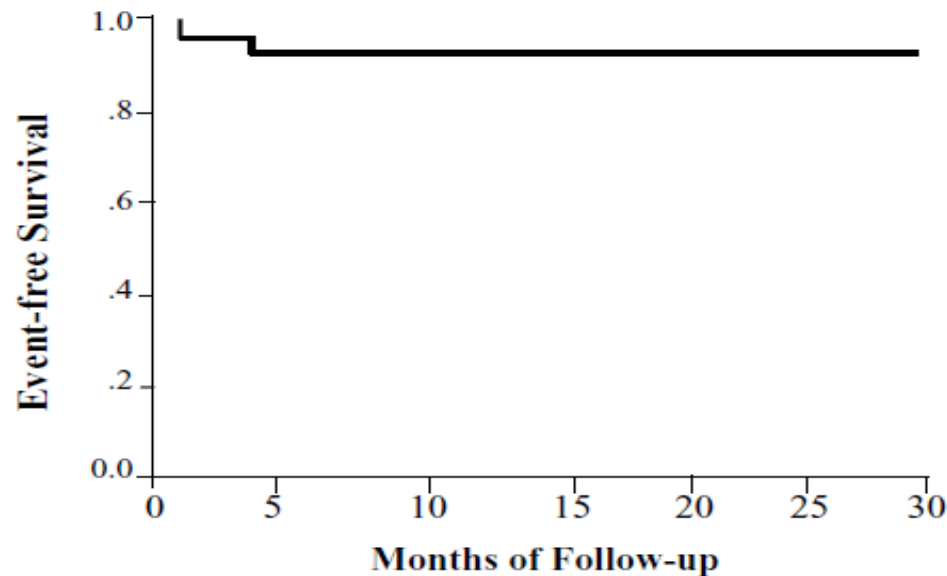
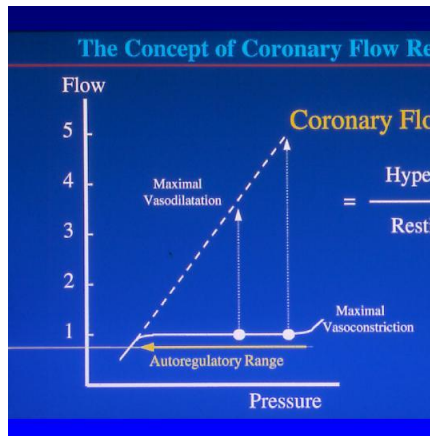
# Métodos de diagnóstico intracoronario

 *Original Contribution*

## Should We Treat Patients with Moderately Severe Stenosis of the Left Main Coronary Artery and Negative FFR Results?

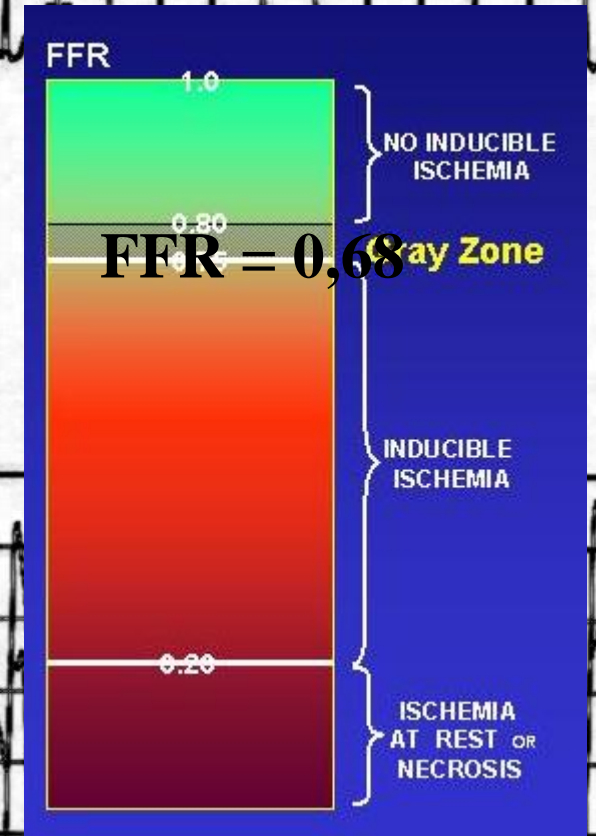
Manuel Jiménez-Navarro MD, José María Hernández-García MD, Juan H. Alonso-Briaies MD,

J INVAS CARDIOL 2004;16:398-400

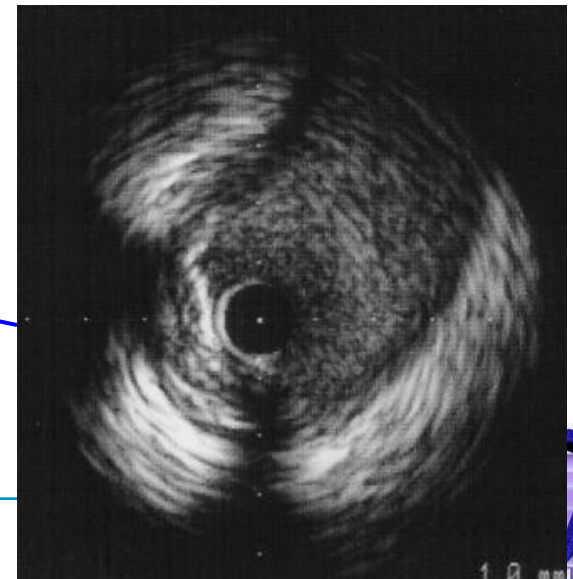
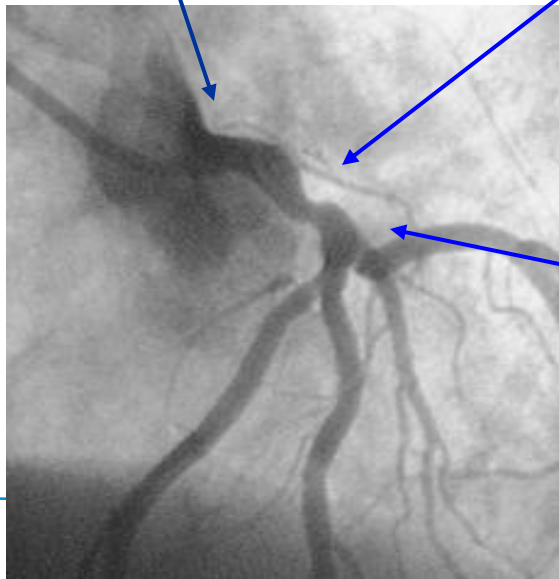
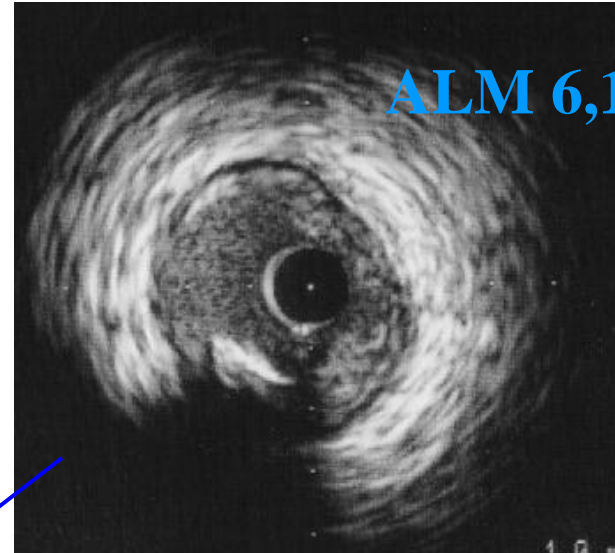
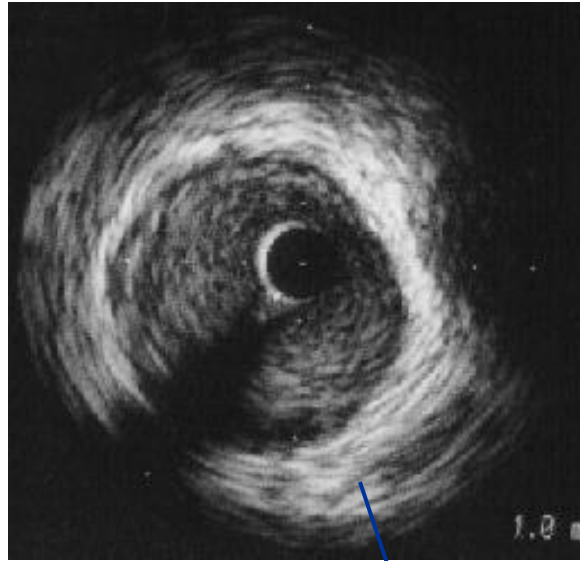


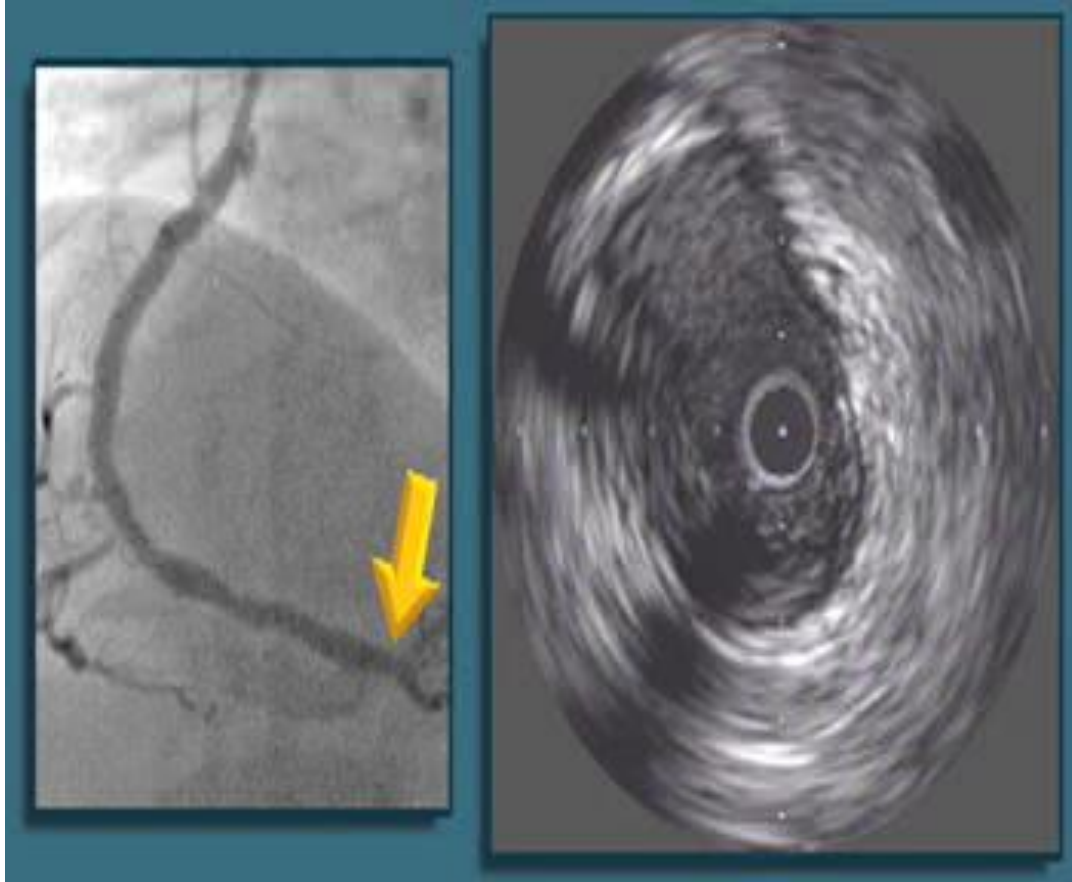
# Métodos de diagnóstico intracoronarior

97-11-06



# Ecografía intracoronaria (IVUS)

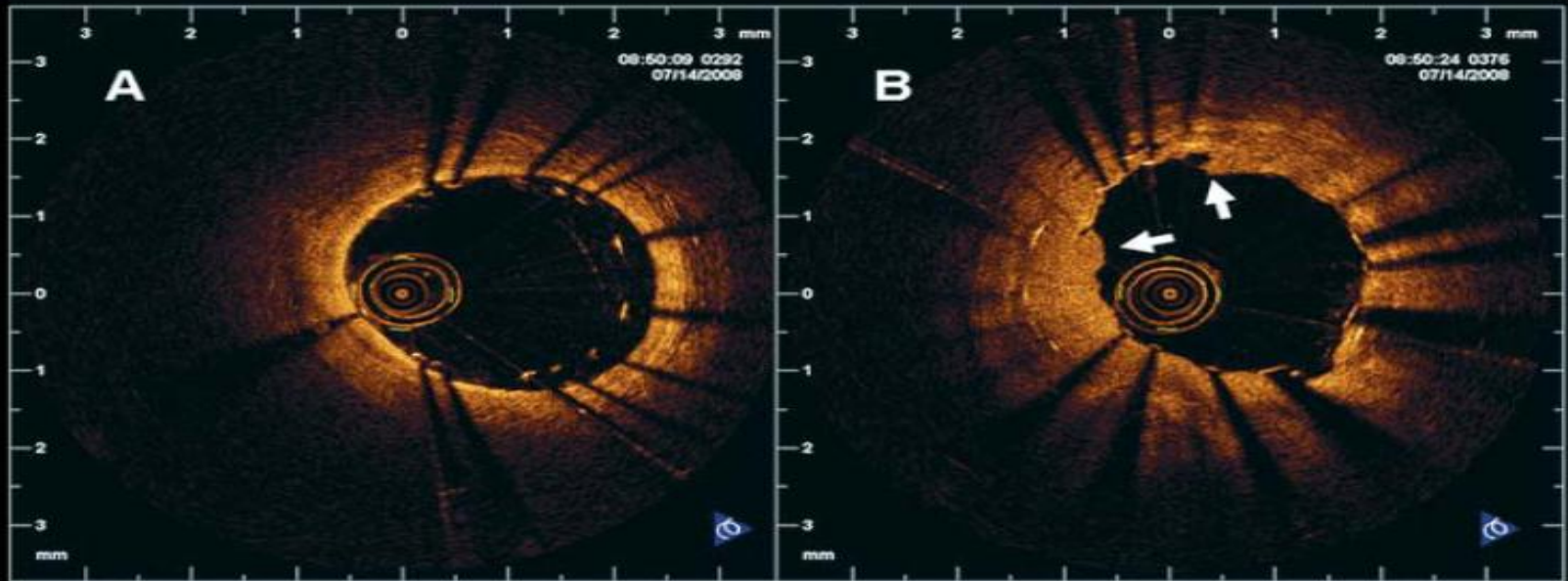




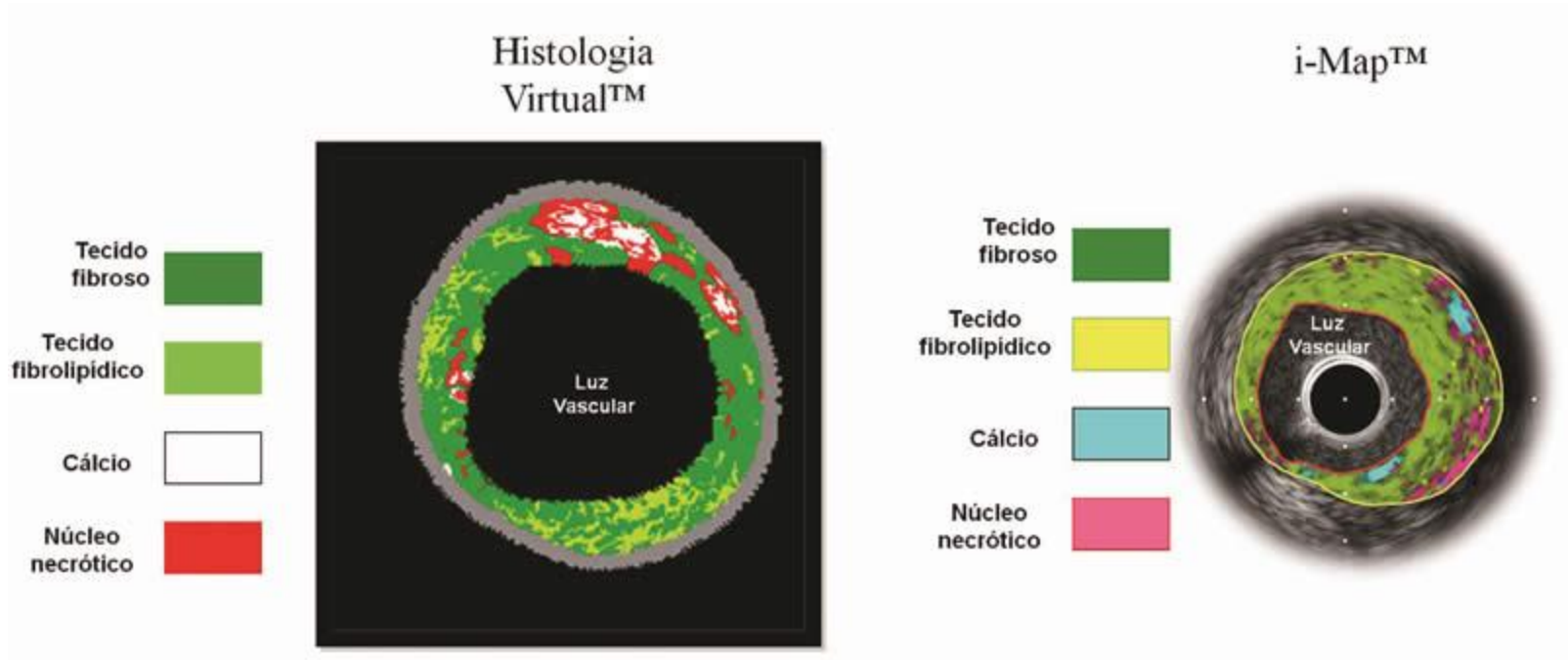
# La tomografía de coherencia óptica ya está preparada: afinen el instrumento

Francesco Prati<sup>a,b</sup> y Maria Teresa Mallus<sup>a</sup>

Marcador radiopaco del catéter de OCT



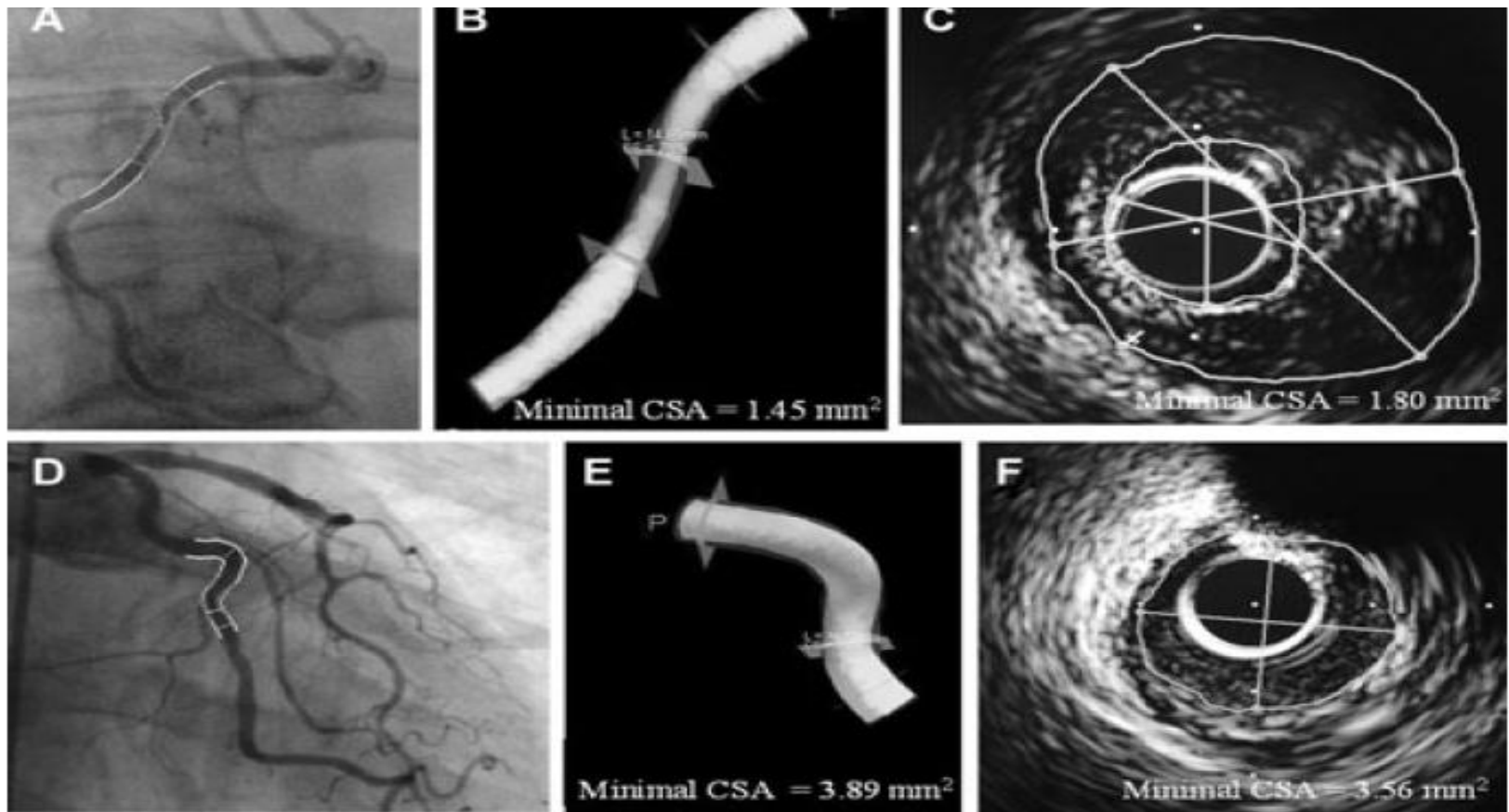
# Histología virtual : ¿ lesiones intermedias ?





# IMAGING

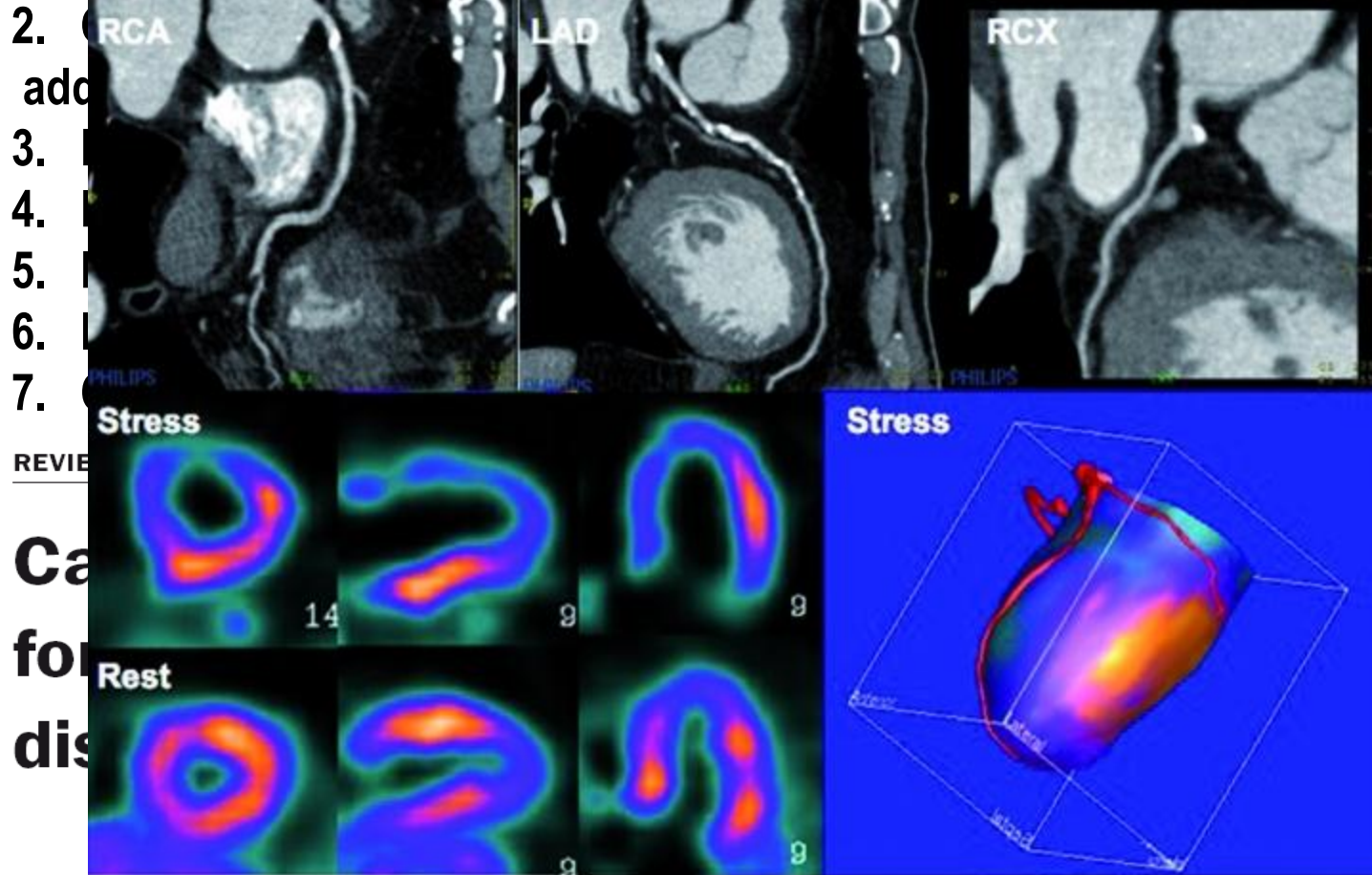
## Comparison between Three-Dimensional Angiographic Reconstruction and Intravascular Ultrasound Imaging for the Measurement of Cross-Sectional Luminal Dimensions in Intermediate Coronary Lesions





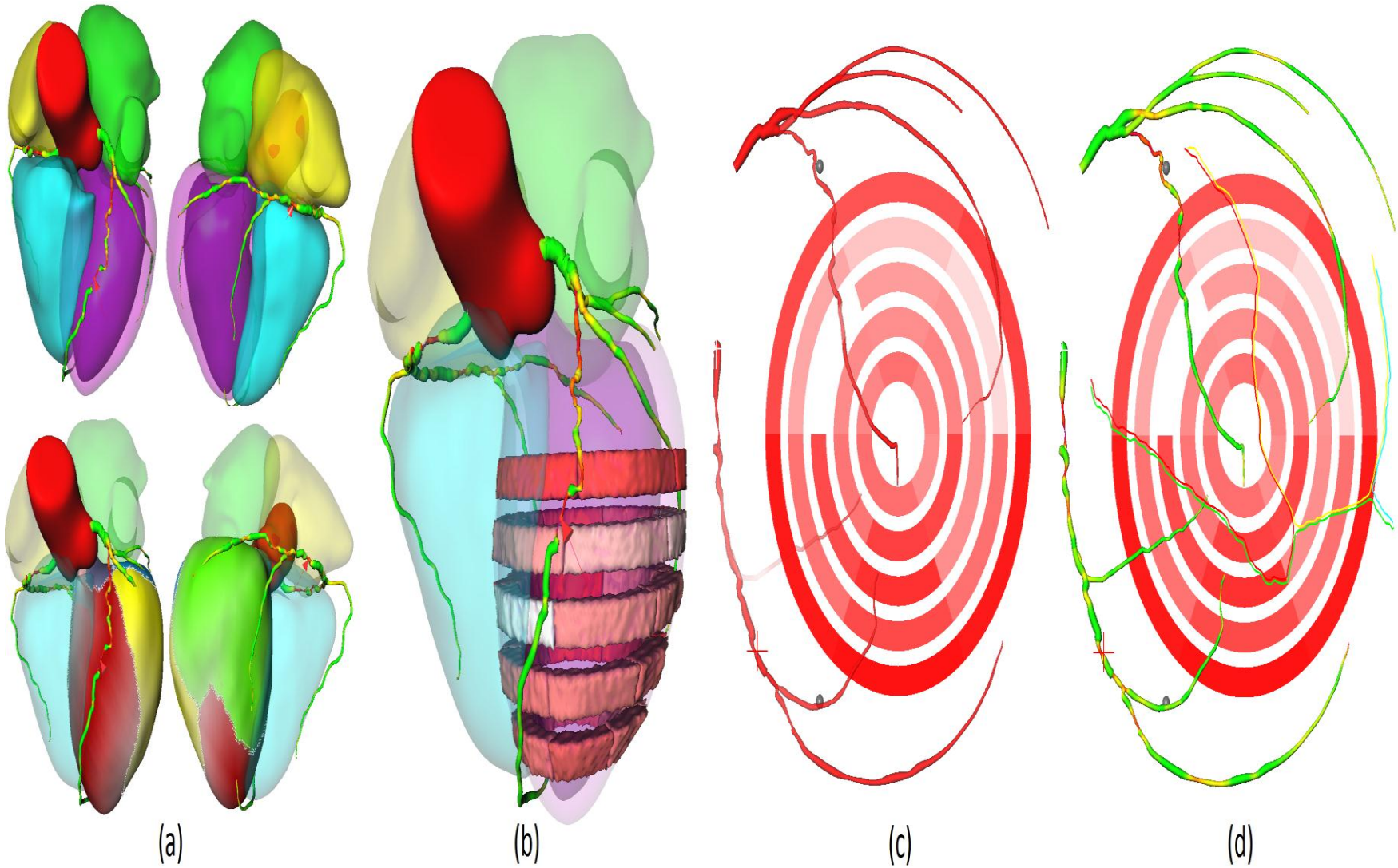
# Diagnóstico funcional : Detección de isquemia (Flujo/Perfusión)

1. Ergometría convencional: S y E 70%.



P. Knaapen, S. de Haan, O.S. Hoekstra, K. Halbmeijer, Y.E. Appelman, J.G.J. Groothuis, E.E. Comans, M.R. Meijerink, A.A. Lammertsma, M. Lubberink, M.J.W. Götte, A.C. van Rossum

# Synchronized Multimodal heART Visualization tool



## ¿ Por qué no concuerdan los resultados de las pruebas diagnósticas anatómicas o funcionales ?

- Los métodos diagnósticos se analizan en diferentes poblaciones, con diferentes prevalencias de enfermedad coronaria (Población general; Urgencias; Indicación de coronariografía)
- Los análisis diagnósticos no son completamente ciegos
- Interpretación de las pruebas diagnósticas realizadas con protocolos
- O profesionales diferentes a los de la práctica clínica habitual
- Exclusión de pruebas diagnósticas que no cumplan unos requisitos: limita aun más la validez externa del test.

## ¿ Diagnóstico anatómico o funcional ?



## **Características:**

- **Es imprescindible correcta colaboración del paciente (apnea), a pesar adquisición imágenes pueda ser 20-30 sg.**
- **Es necesario buen control de la frecuencia cardiaca (Doble fuente).**
- **Difícil visualización de arterias de pequeño tamaño.**
- **Permite visualizar la pared de las coronarias.**
- **Pequeño riesgo nefropatía contraste (Contrastes no-iónicos)**
- **Calcificaciones coronarias :**
  - **Marcador pronóstico (Electro Beam Computer Tomography).**
  - **Limitación Tomografía Multidetector.**

***Marcadores de Calcificación Coronaria : Bilirrubina total baja (< 0.70).***

***Cistatina; BNP; PCR***

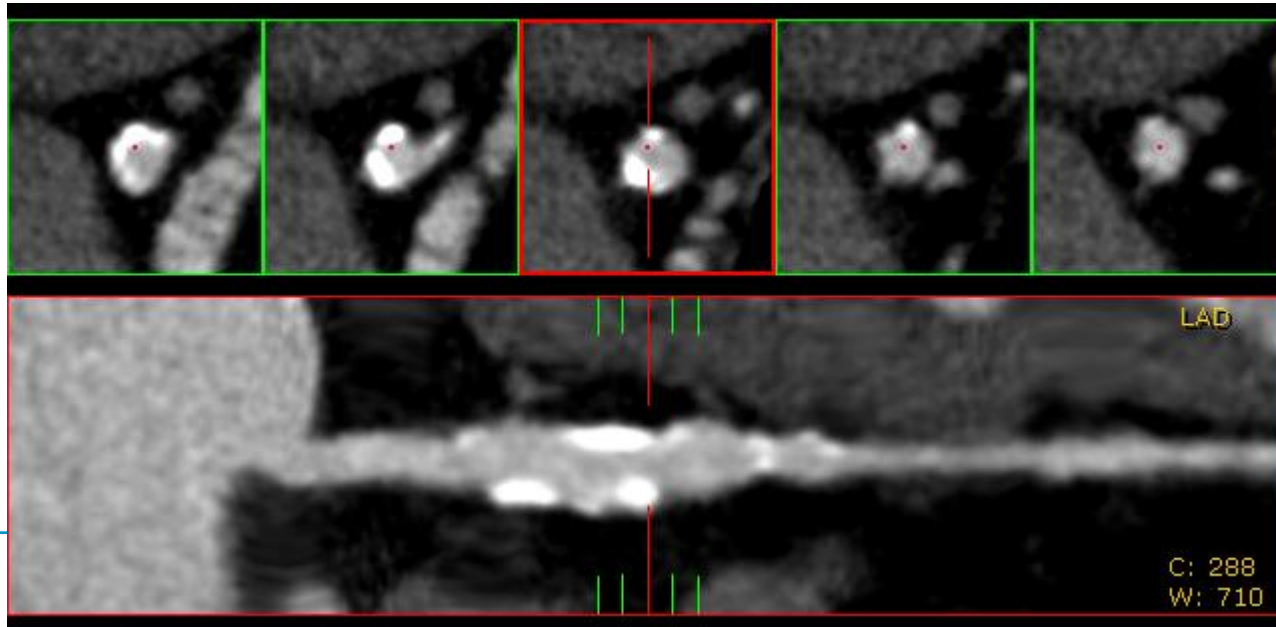
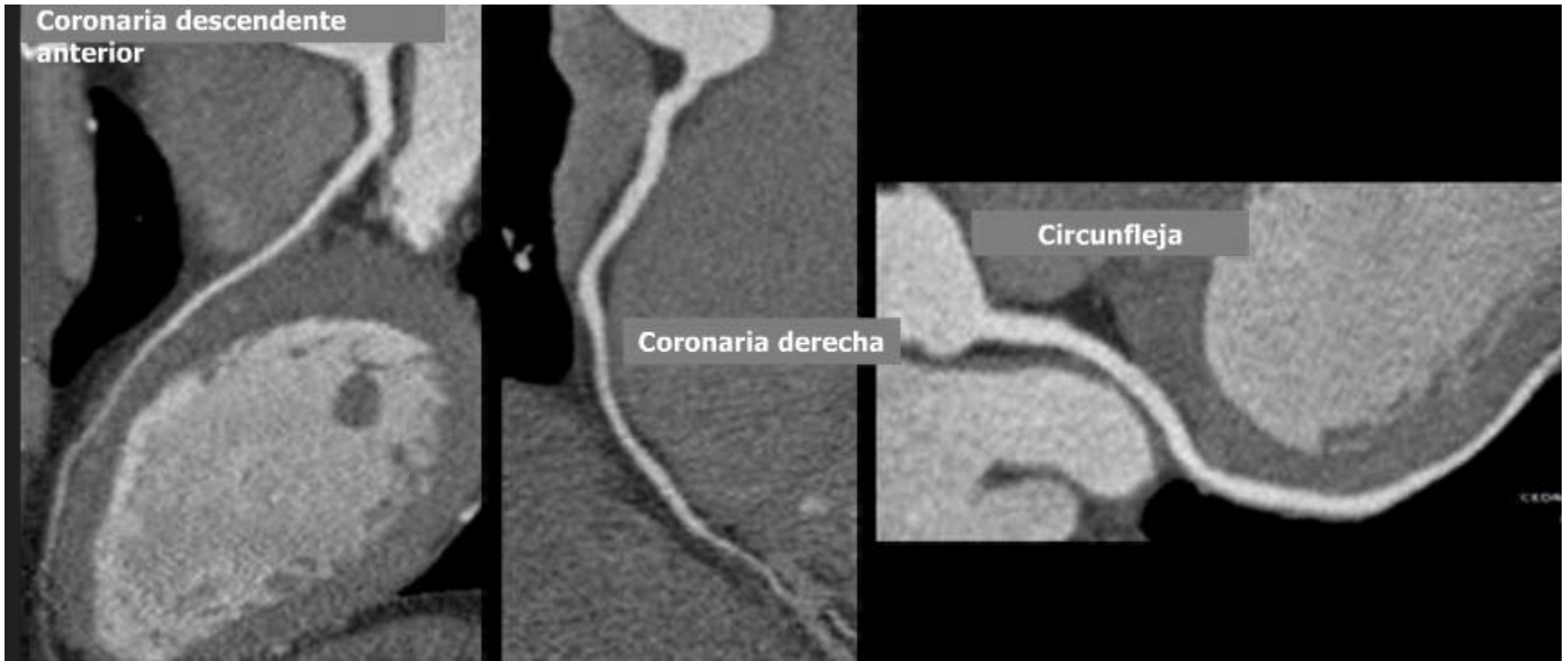
***Dr. Amalio Ruiz.***



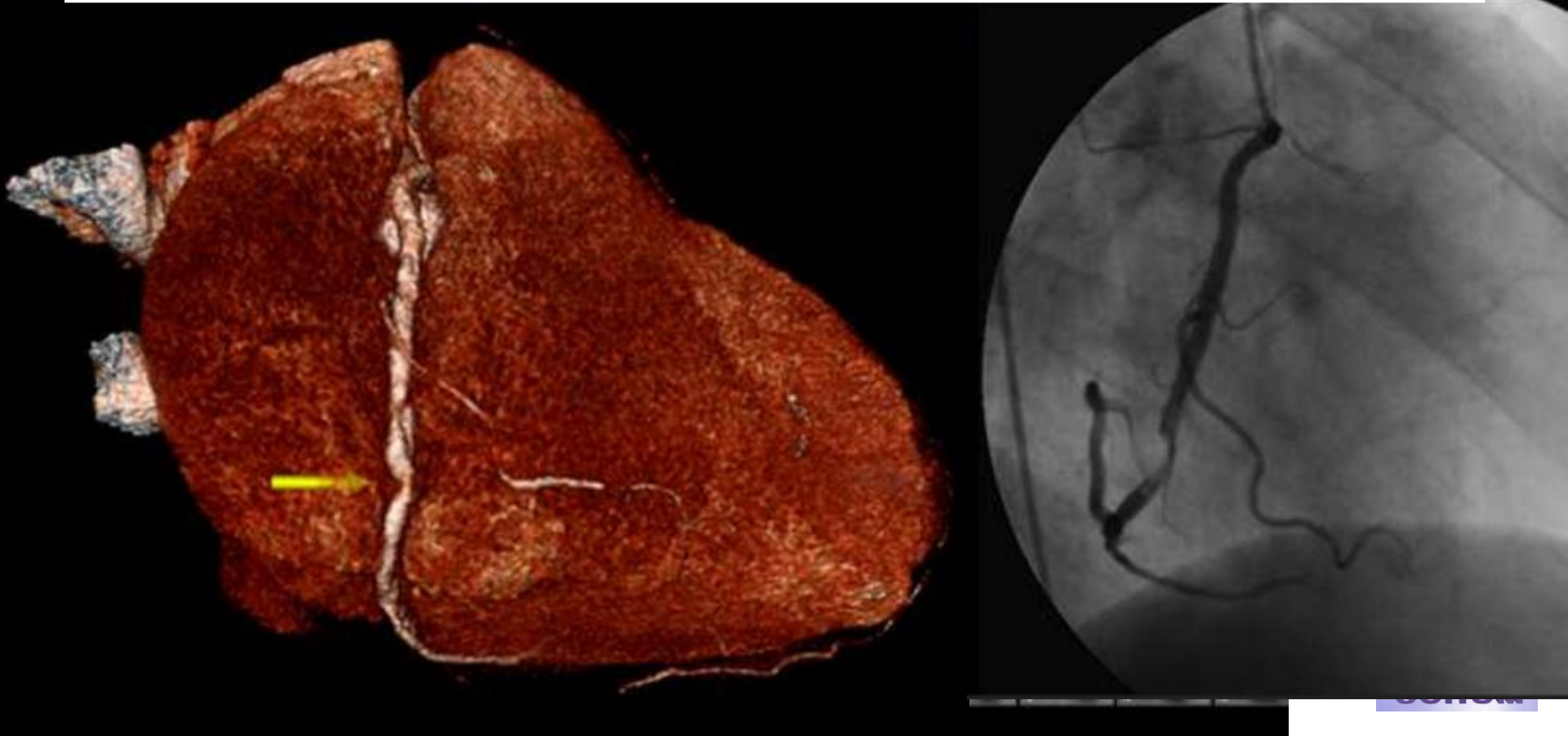
# ¿ Es comparable con la coronariografía ?







**¿ Existe una buena correlación entra mabas técnicas ?**



## Diagnostic Performance of Coronary

Measure of Accuracy	Patient-Based Detection	
	Quantitative MDCTA (N=291)	Visual MDCTA (N=291)
AUC — median (95% CI)	0.93 (0.90–0.96)	0.93 (0.89–0.95)
Stenosis by CCA — no.	163	163
Stenosis by MDCTA — no.	152	146
False positive — no.	13	11
False negative — no.	24	28
Sensitivity — % (95% CI)	85 (79–90)	83 (76–88)
Specificity — % (95% CI)	90 (83–94)	91 (85–96)
Positive predictive value — % (95% CI)	91 (86–95)	92 (87–96)
Negative predictive value — % (95% CI)	83 (75–89)	81 (73–87)

ber, NCT00738218.)

# What Is the Prognostic Value of a Zero Calcium Score? Ask Bayes!

To challenge the efficacy of CS testing using results obtained from a cohort of patients in which it is accepted to have no application (symptomatic patients with a consequent high pre-test probability of obstructive CAD), and to apply the negative conclusions of this challenge to *all* patients seems unfair. I think Bayes himself would agree.

**a** \*John W. McEvoy, MB

\*Johns Hopkins Hospital  
Ciccarone Center for the Prevention of Heart Disease



ONLINE FIRST | LESS IS MORE

# Impact of Coronary Computed Tomographic Angiography Results on Patient and Physician Behavior in a Low-Risk Population

John W. McEvoy, MB, BCh, BAO, MRCPI; Michael J. Blaha, MD, MPH; Khurram Nasir, MD, MPH;

*Arch Intern Med.* 2011;171(14):1260-1268.

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INVITED COMMENTARY

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ONLINE FIRST

# Pseudodisease, the Next Great Epidemic in Coronary Atherosclerosis?



**Table A** Pretest Probability of CAD by Age, Sex, and Symptoms

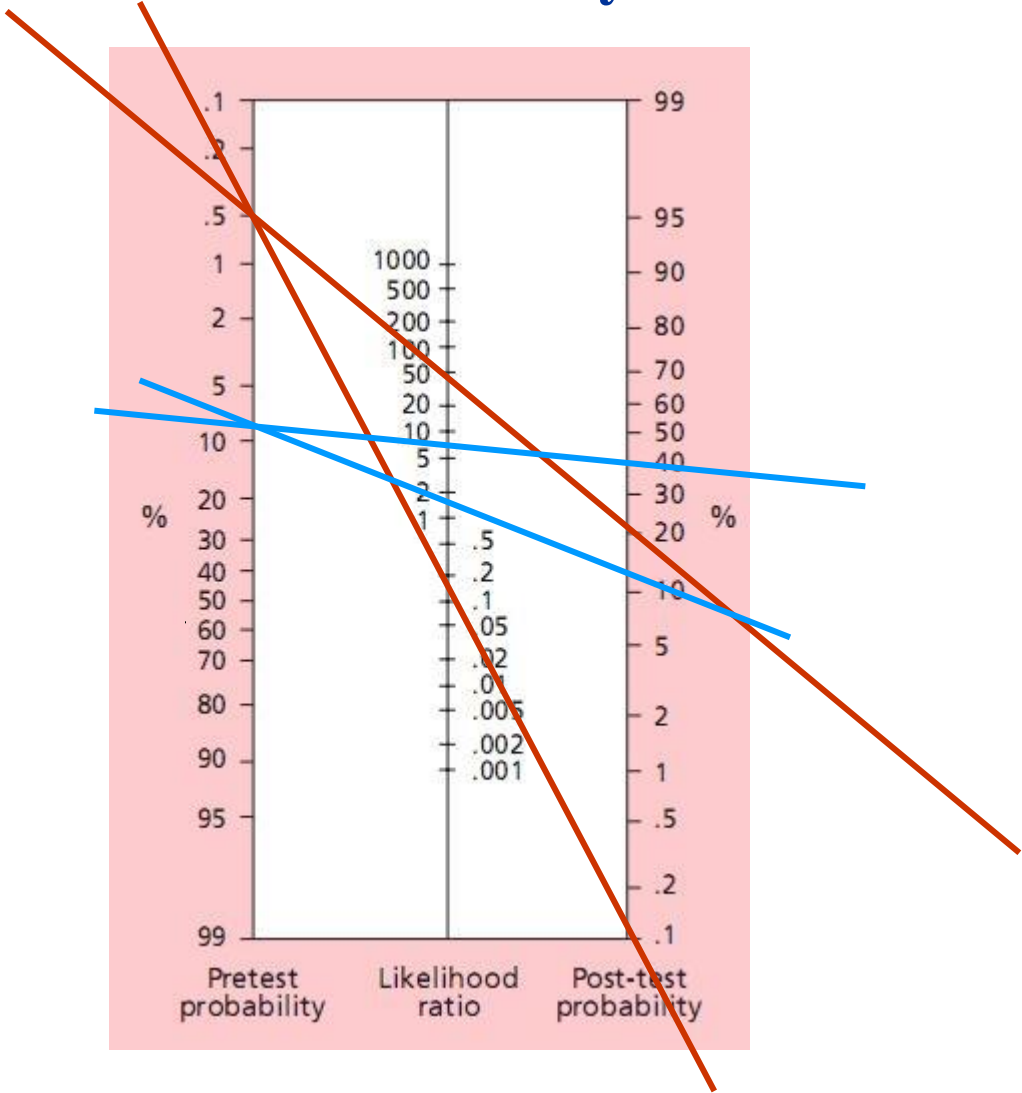
Age	Sex	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain	Asymptomatic
<39	Men	Intermediate	Intermediate	Low	Very low
	Women	Intermediate	Very low	Very low	Very low
40-49	Men	High	Intermediate	Intermediate	Low
	Women	Intermediate	Low	Very low	Very low
50-59	Men	High	Intermediate	Intermediate	Low
	Women	Intermediate	Intermediate	Low	Very low
>60	Men	High	Intermediate	Intermediate	Low
	Women	High	Intermediate	Intermediate	Low

- **Low pretest probability:** <10% pretest probability of CAD.
- **Intermediate pretest probability:** Between 10% and 90% pretest probability of CAD.
- **High pretest probability:** >90% pretest probability of CAD.

**Table 4** Index criteria decision statistics

BNP range History	All Undivided	Low		Medium		High	
		Negative	Positive	Negative	Positive	Negative	Positive
At least 1 finding positive							
PPV	62%	8%	47%	58%	80%	81%	95%
NPV	88%	99%	79%	71%	31%	52%	30%
Sensitivity	91%	78%	93%	81%	91%	91%	97%
Specificity	52%	61%	20%	44%	14%	31%	20%
Accuracy	70%	62%	52%	62%	71%	77%	92%
LR+	1.9	2.0	1.2	1.5	1.0	1.32	1.2
LR-	0.2	0.4	0.4	0.4	0.7	0.3	0.1
At least 2 findings positive							
PPV	81%	19%	58%	75%	89%	92%	97%
NPV	80%	98%	68%	66%	44%	48%	20%
Sensitivity	74%	57%	58%	54%	78%	75%	86%
Specificity	85%	90%	68%	83%	66%	77%	53%
Accuracy	80%	89%	64%	69%	75%	76%	84%
LR+	5.0	5.6	1.8	3.0	2.3	3.3	1.9
LR-	0.3	0.5	0.6	0.6	0.3	0.3	0.3
At least 3 findings positive							
PPV	88%	30%	74%	83%	92%	93%	98%
NPV	67%	97%	68%	60%	34%	33%	10%
Sensitivity	44%	30%	47%	22%	44%	42%	53%
Specificity	95%	97%	88%	96%	88%	90%	82%
Accuracy	72%	94%	70%	63%	55%	54%	55%
LR+	9.0	10.2	3.7	6.1	3.6	4.1	3.0
LR-	0.6	0.7	0.6	0.8	0.6	0.6	0.6

# Teorema de Bayes





**EXPERT CONSENSUS DOCUMENT**

# **ACCF/ACR/AHA/NASCI/SAIP/SCAI/SCCT 2010 Expert Consensus Document on Coronary Computed Tomographic Angiography**

A Report of the American College of Cardiology Foundation Task Force on  
Expert Consensus Documents

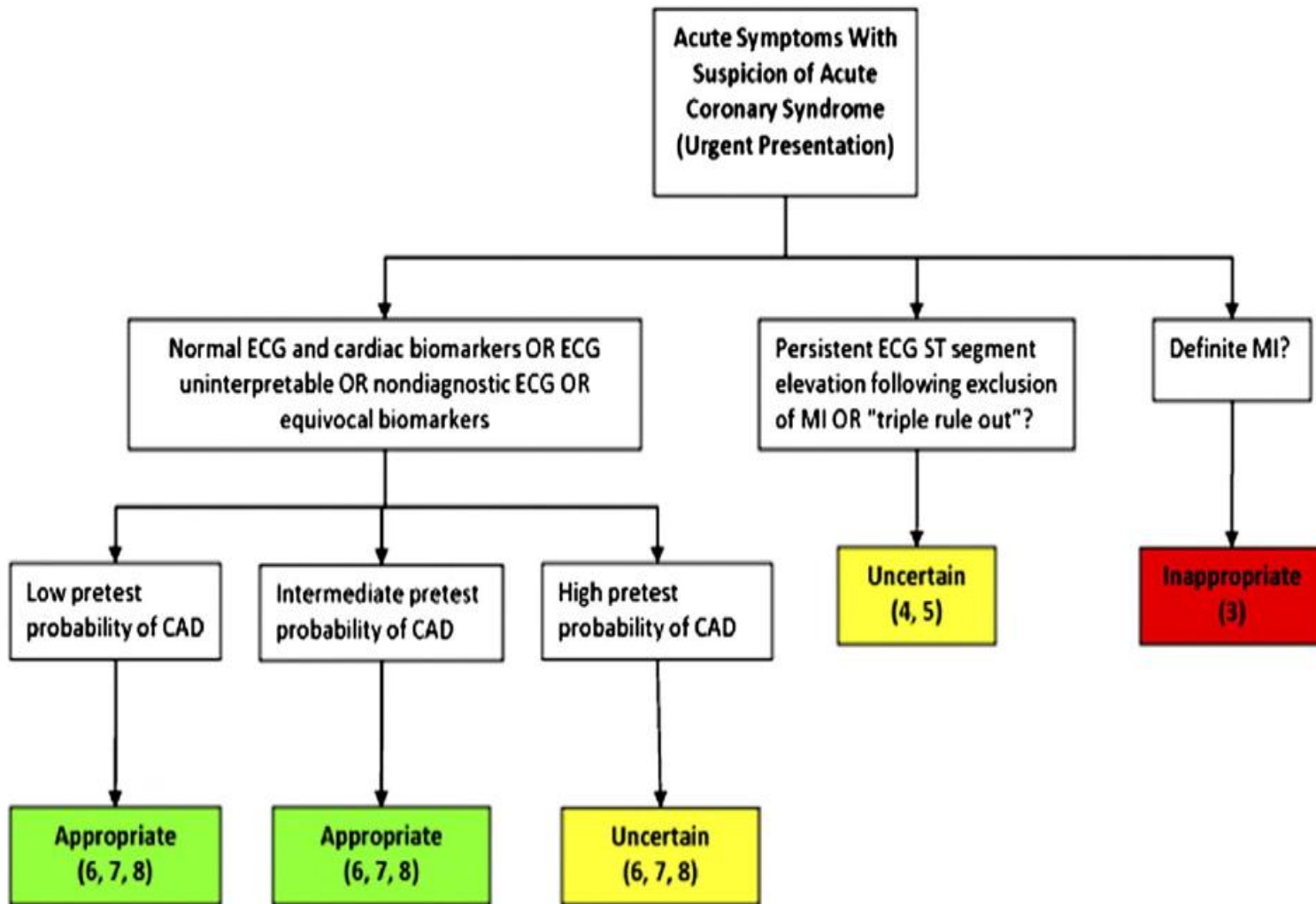
## **¿Qué puede aportar la tomografía coronaria multicorte ?**

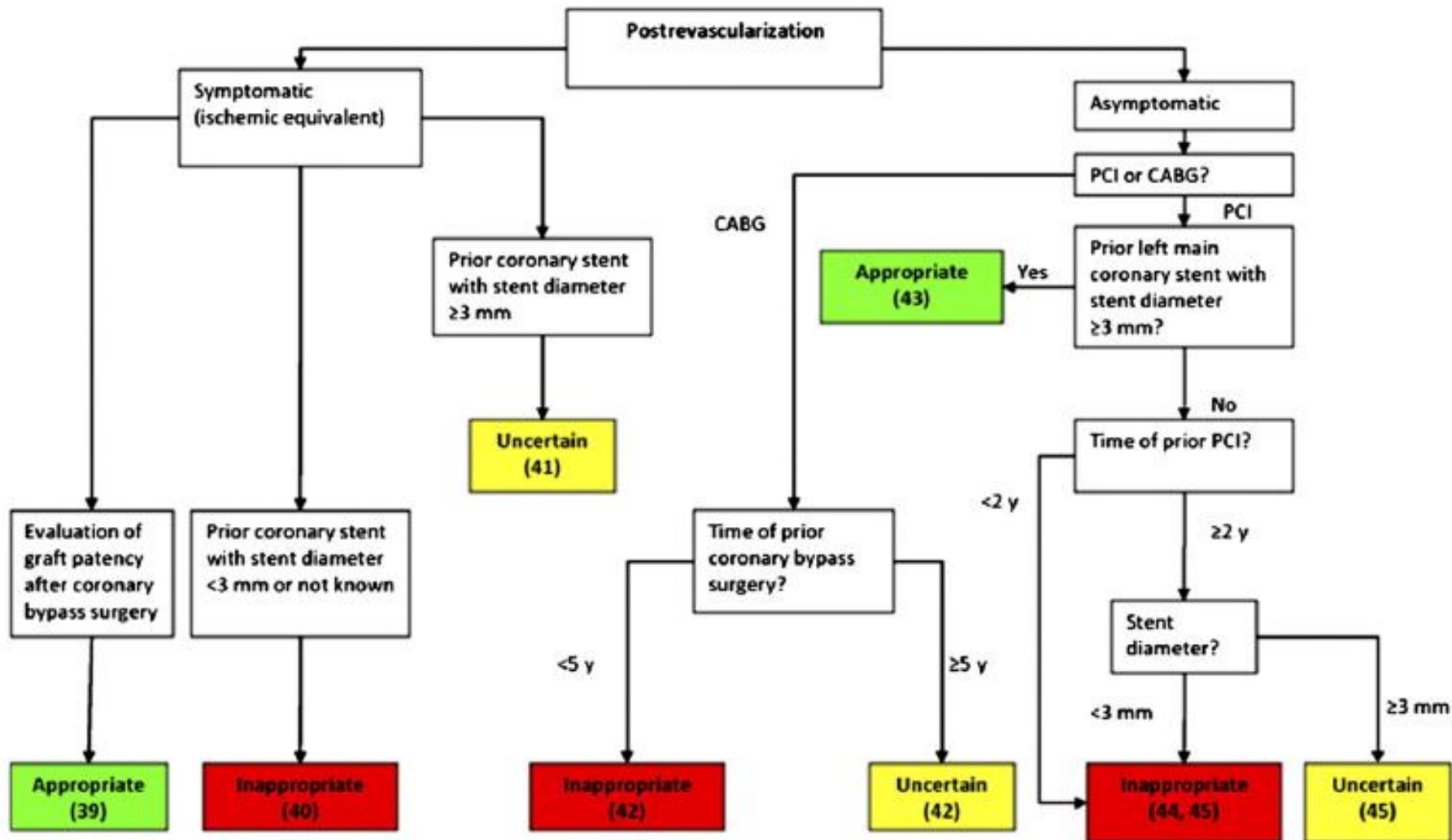
- 1. Estudiar la pared del vaso.**
- 2. Miocardiopatías: Exclusión de enfermedad coronaria.**
- 3. Valvulopatías: Exclusión de enfermedad coronaria.**
- 4. Anomalías coronarias.**
- 5. Valoración de injertos aortocoronarios.**

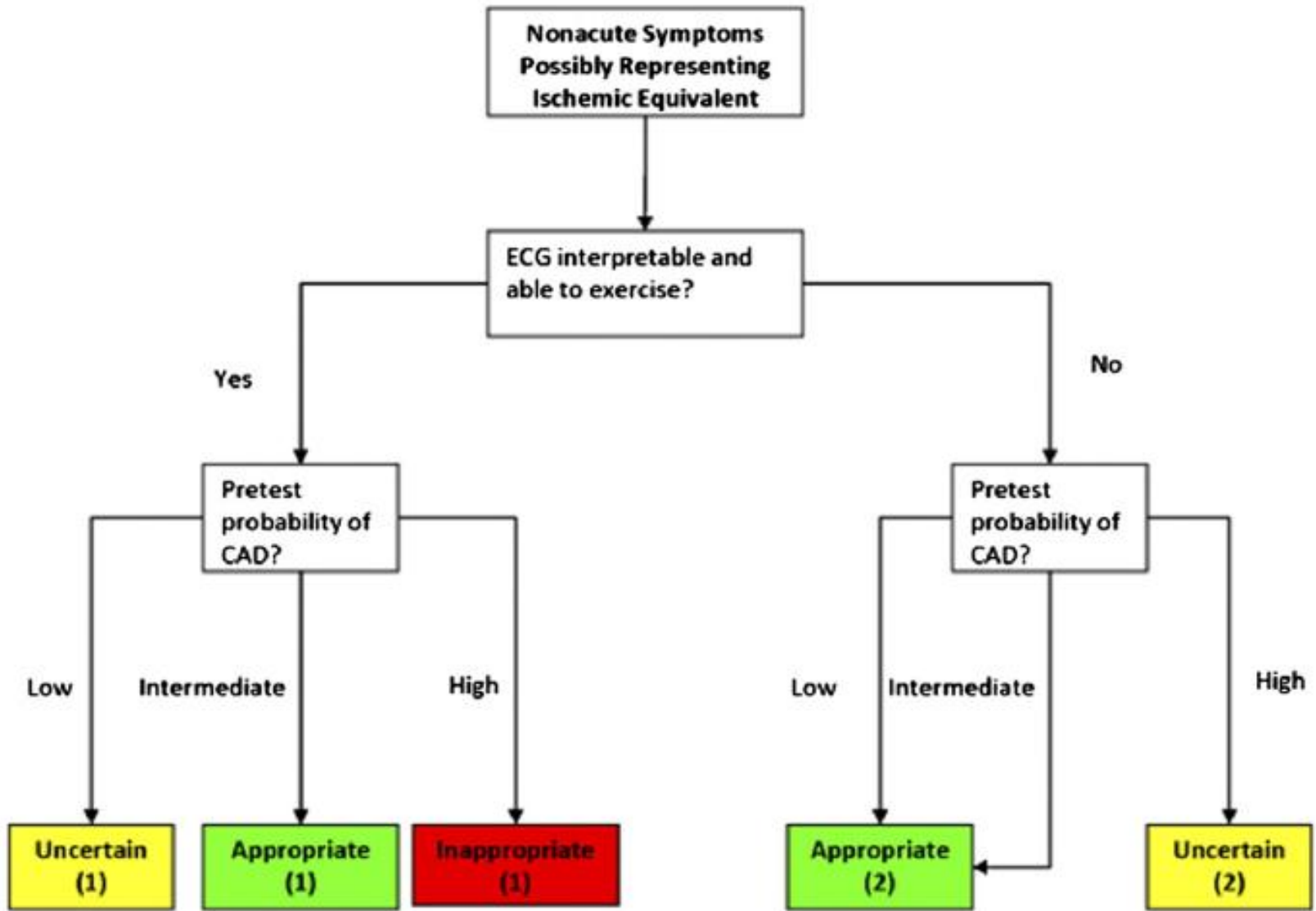


# Diagnosis of ALCAPA Syndrome in Adults









# Injertos aortocoronarios



# PLACA CALCICA $\geq 130$ UH



# ¿ Cuáles son las limitaciones de la técnica ?

## 1. Dosis de radiación.

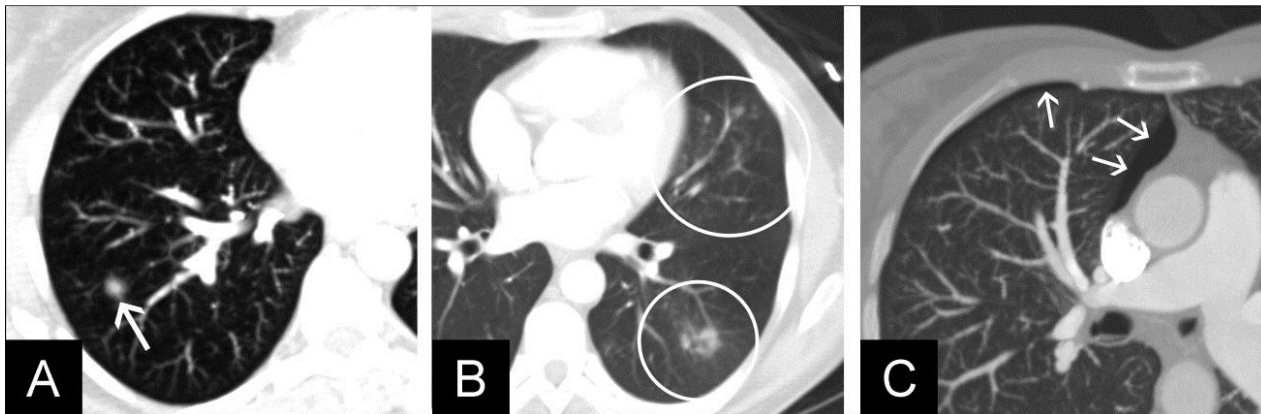
**Table 4. Representative Values and Ranges of Effective Dose Estimates for Cardiac Studies**

Examination	Representative Effective Dose Value (mSv)	Range of Reported Effective Dose Values (mSv)
Chest X-ray PA and lateral	0.1	0.05–0.24
Diagnostic invasive coronary angiogram	7	2–16
64-slice coronary CTA*		
Without tube current modulation	15	12–18
With tube current modulation	9	8–18
Prospectively triggered coronary CTA*	3	2–4
Percutaneous coronary intervention or radiofrequency ablation	15	7–57
Myocardial perfusion study		
Sestamibi (1-day) stress/rest	12	N/A
Tetrofosmin (1-day) stress/rest	10	N/A
Thallium stress/redistribution	29	N/A
Rubidium-82 rest/stress	10	N/A
Myocardial viability study		
PET F-18 FDG	14	N/A
Thallium stress/reinjection	41	N/A



## Hallazgos Extracardiacos “casuales” (20-55%)

1. Hallazgo benigno: No requiere seguimiento posterior.
2. Hallazgo clínicamente significativo: requiere investigación posterior:
  - Seguimiento (5-25%): Nódulos pulmonares calcificados / no (+ fte)
  - Intervención inmediata (2-4%): Ca. pulmonar; Tromboembolismo.
    - ¿ son realmente asintomáticos ?
    - ¿ se debe limitar el campo no cardiaco ?



Lehman S ET AL. Significance of Cardiac Computed Tomography Incidental Findings  
in Acute Chest Pain (ROMICAT)  
Am J Med 2009; 122 (6): 543-549

# “ Triple role-out” in the Emergency Department

## Realización de Tomografía en Urgencias para descartar:

- Enfermedad Coronaria
- Tromboembolismo pulmonar
- Patología aórtica (Síndrome Aórtico Agudo)

American Journal of Emergency Medicine (2011) 29, 187–195



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The  
American Journal of  
Emergency Medicine

**Results:** We analyzed 832 consecutive observation patients including 214 patients who underwent the TRO protocol. Mean total length of stay was 16.1 hours for TRO patients, 16.3 hours for TRO plus other imaging test, 22.6 hours for nuclear stress testing, 23.3 hours for nuclear stress testing plus other imaging tests, and 23.7 hours for nuclear stress testing plus TRO ( $P < .0001$  for TRO and TRO + other test compared to stress test  $\pm$  other test). Mean imaging times were 3.6, 4.4, 5.9, 7.5, and 6.6 hours, respectively ( $P < .05$  for TRO and TRO + other test compared to stress test  $\pm$  other test). Mean imaging costs were \$1307 for TRO patients vs \$945 for nuclear stress testing.

Kevin M. Takakuwa MD<sup>a,\*</sup>, Ethan J. Halpern MD<sup>a</sup>, Frances S. Shofer PhD<sup>b</sup>



# Incremental Value of Adenosine-induced Stress Myocardial Perfusion Imaging with Dual-Source CT at Cardiac CT Angiography<sup>1</sup>



NIH Public Access

Author Manuscript

*J Nucl Cardiol.* Author manuscript; available in PMC 2010 September 28.

Published in final edited form as:

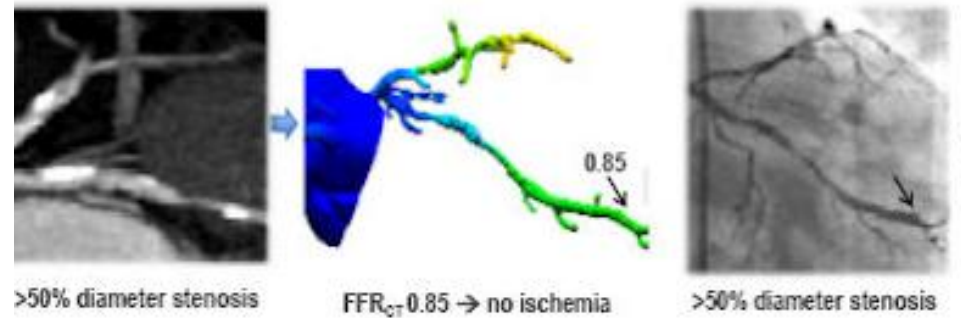
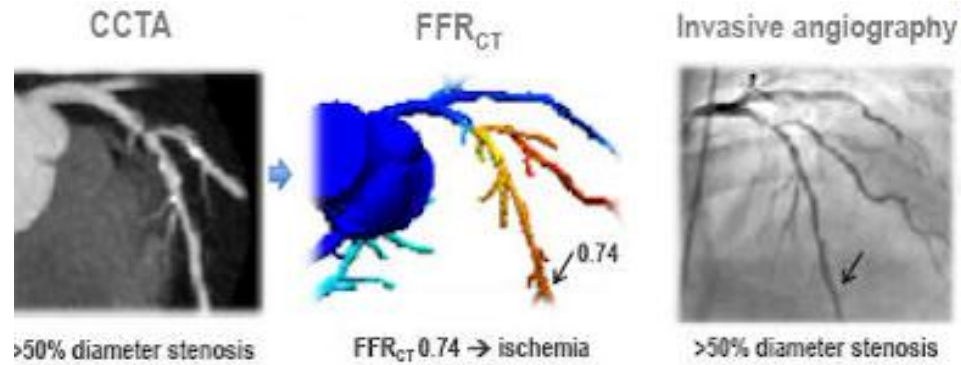
*J Nucl Cardiol.* 2010 ; 17(1): 27–37. doi:10.1007/s12350-009-9156-z.

**Direct comparison of rest and adenosine stress myocardial perfusion CT with rest and stress SPECT**

**Conclusions**—CTP compares favorably with SPECT-MPI for detection, extent, and severity of myocardial perfusion defects at rest and stress.



# FFR – TC



HeartFlow Inc

## **CONCLUSIONES:**

- 1. Existe una alta prevalencia de enfermedad coronaria en nuestro medio.**
- 2. Probablemente por ello se han desarrollado diversas técnicas para su diagnóstico tanto invasivas como no invasivas.**
- 3. La tomografía computerizada se está desarrollando como técnica no invasiva de gran relevancia.**
- 4. Siempre el criterio clínico ES y SERÁ la principal herramienta clínica de los médicos en el diagnóstico de enfermedad coronaria.**





**Enrique Simonet. Anatomía del corazón (1890).**

