Sfide
in cardiologia clinica

10/11 marzo 2017
Mantova MaMu, Centro Congressi Mantova Largo di Porta Pradella, 1

Dolore Toracico: Il Corretto Approccio ed il Valore Incrementale de "Multimodality Imaging" nei Pazienti con Rischio di Malattia Basso-intermedio

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Board Member of ESCR
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Centro Cardiologico Monzino

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AGENDA

European Heart Journal Advance Access published January 18, 2016

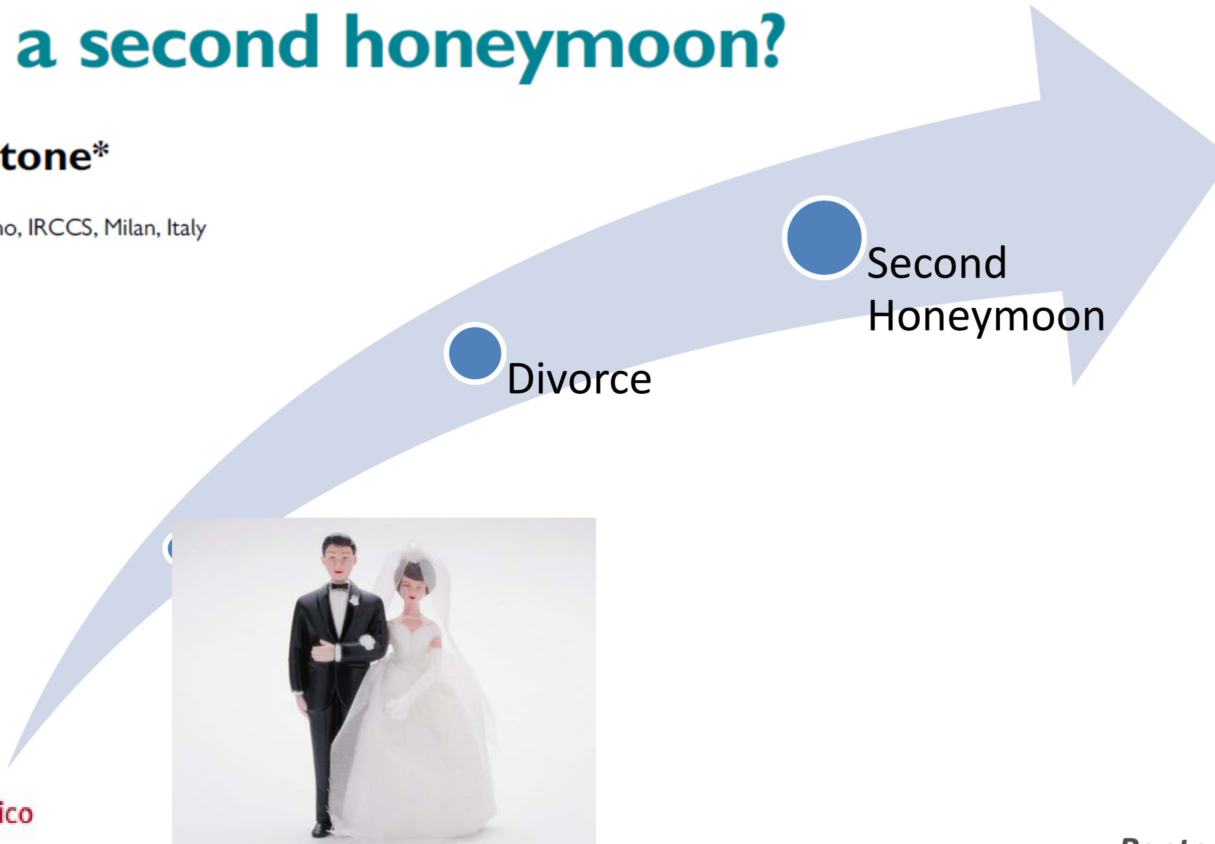
European Heart Journal
doi:10.1093/eurheartj/ehv748

EDITORIAL

Anatomy and physiology in ischaemic heart disease: a second honeymoon?

Gianluca Pontone*

Centro Cardiologico Monzino, IRCCS, Milan, Italy



Centro Cardiologico Monzino

Pontone G, Eur Heart J 2016

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EUROPEAN SOCIETY OF CARDIOLOGY®

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EDITORIAL

Anatomy and physiology in ischaemic heart disease: a second honeymoon?

Gianluca Pontone*

Centro Cardiologico Monzino, IRCCS, Milan, Italy

Second Honeymoon

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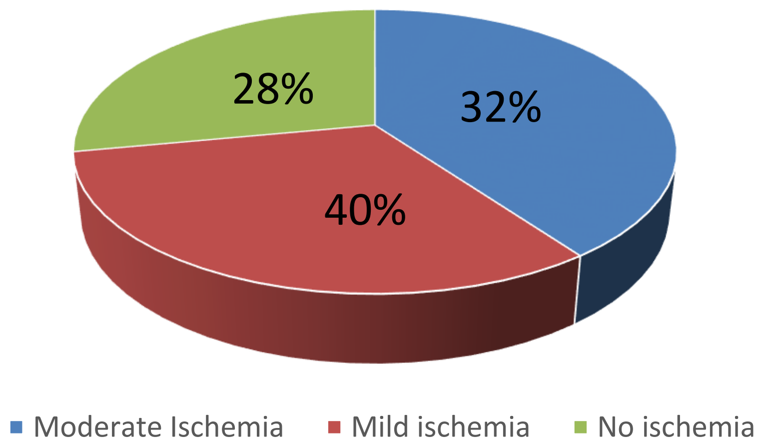
Pontone G, Eur Heart J 2016

THE PHASE OF DIVORCE: anatomy or phisiology ?

However, this marriage was troubled by reports suggesting that more than two-thirds of acute myocardial infarctions may have non obstructive coronary artery stenosis

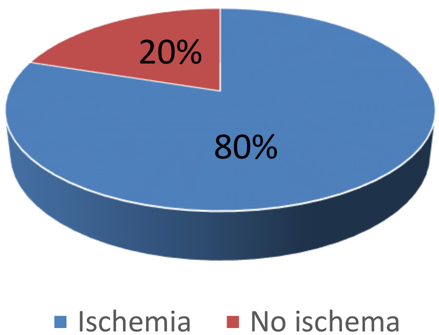
Shaw L et al , CIRCULATION 2008

Stenoses > 70%



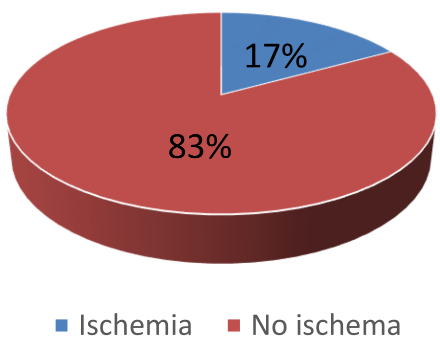
Tonino PA et al , NEJM 2009

Stenoses > 70%



Tonino PA et al , NEJM 2009

Stenoses < 50%



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Pontone G, Eur Heart J 2016

THE PHASE OF DIVORCE: the gatekeeper

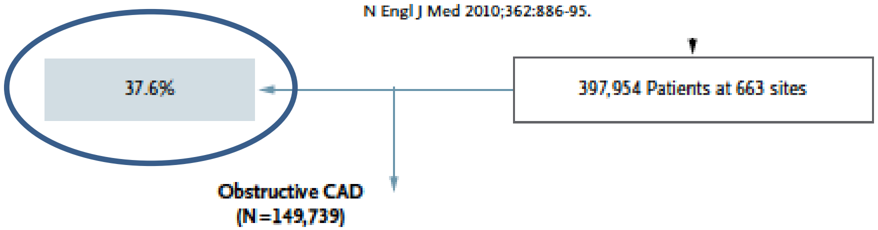
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Low Diagnostic Yield of Elective Coronary Angiography

Manesh R. Patel, M.D., Eric D. Peterson, M.D., M.P.H., David Dai, M.S., J. Matthew Brennan, M.D., Rita F. Redberg, M.D., H. Vernon Anderson, M.D., Ralph G. Brindis, M.D., and Pamela S. Douglas, M.D.

N Engl J Med 2010;362:886-95.



Multivessel CAD	53.0%
1-vessel CAD	46.7%
2-vessel CAD	30.5%
3-vessel CAD	22.5%

The “ischemic approach” alone is not enough efficient as gatekeeper for ICA

«Which alternative to functional strategy in patients with suspected coronary artery disease ?»

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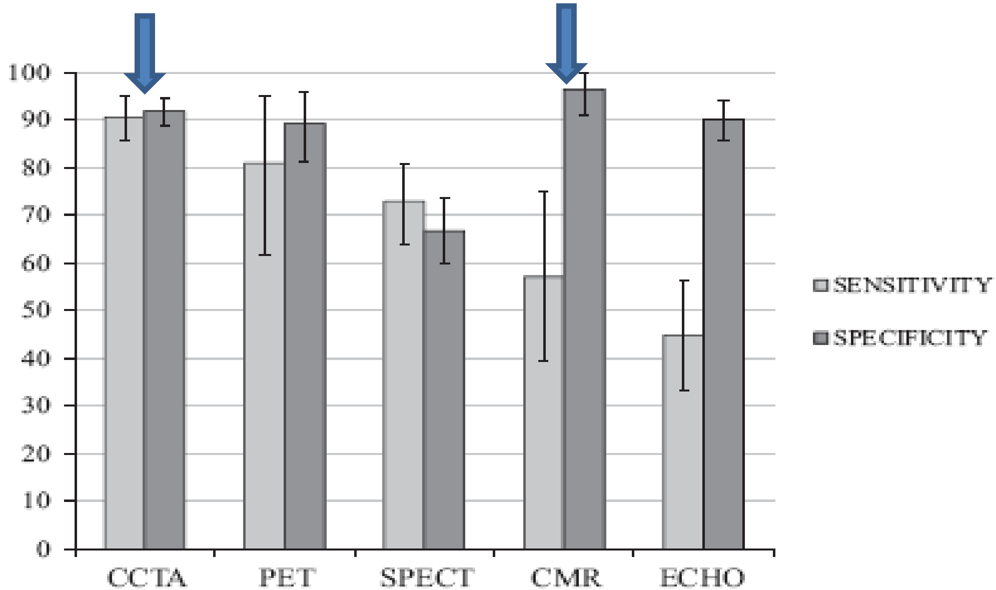
Patel M et al, NEJM 2010

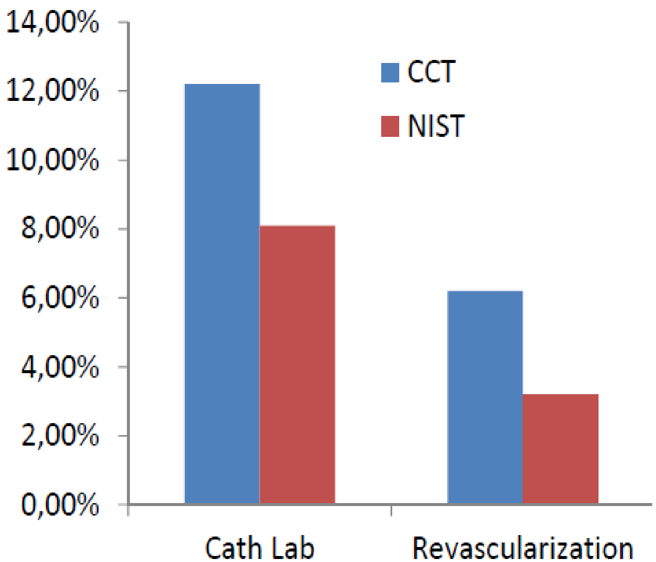
THE PHASE OF DIVORCE: role of CCT



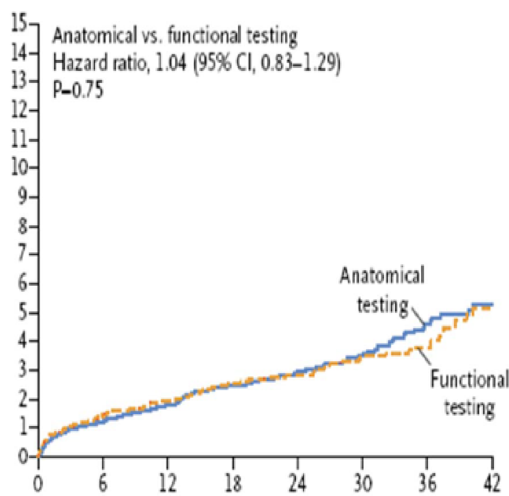
Neglia D et al, Circulation CI 2015 (EVINCI Trial)

CCT showed the highest accuracy in low to intermediate risk patients (prevalence of CAD 29%) as compared to other functional imaging modalities

Douglas P et al, NEJM 2015 (PROMISE Trial)



Modified by Pontone G et al



In symptomatic intermediate risk patients (prevalence 53%) patients with suspected CAD who required non invasive testing, an initial strategy of CTA showed similar clinical outcome, QOL and cost as compared to functional testing

How to improve the detection of coronary artery disease functionally significant with new emerging techniques ?

1. Stress Cardiac Magnetic Resonance (CMR)
2. Fractional Flow Reserve CT (FFRct)
2. Stress CT perfusion (CTP)

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THE PHASE OF DIVORCE: role of CMR

1. Why do we need CMR in suspected CAD ?

ACCF/SCAI/STS/AATS/AHA/ASNC/HFSA/SCCT
2012 Appropriate Use Criteria for
Coronary Revascularization Focused Update

A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Association for Thoracic Surgery, American Heart Association, American Society of Nuclear Cardiology, and the Society of Cardiovascular Computed Tomography

Endorsed by the American Society of Echocardiography and the Heart Rhythm Society

Table A2. Noninvasive Risk Stratification

High-risk (>3% annual mortality rate)

1. Severe resting left ventricular dysfunction (LVEF <35%)
2. High-risk treadmill score (score ≤ −11)
3. Severe exercise left ventricular dysfunction (exercise LVEF <35%)
4. Stress-induced large perfusion defect (particularly if anterior)
5. Stress-induced multiple perfusion defects of moderate size
6. Large, fixed perfusion defect with LV dilation or increased lung uptake (thallium-201)
7. Stress-induced moderate perfusion defect with LV dilation or increased lung uptake (thallium-201)
8. Echocardiographic wall motion abnormality (involving >2 segments) developing at low dose of dobutamine (≤10 mg/kg/min) or at a low heart rate (<120 beats/min)
9. Stress echocardiographic evidence of extensive ischemia

① LV DILATATION AND LOW EF

② PERFUSION DEFECT

③ WALL MOTION ABNORMALITIES

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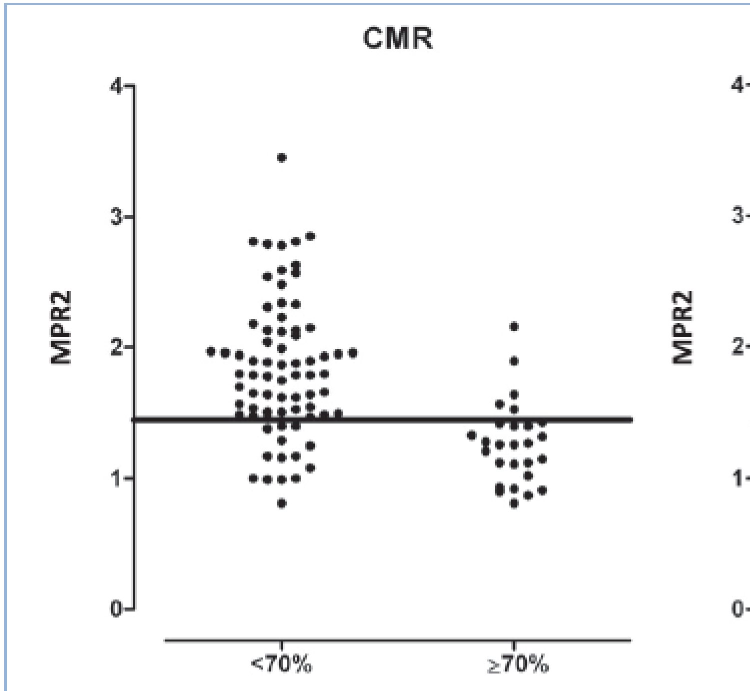
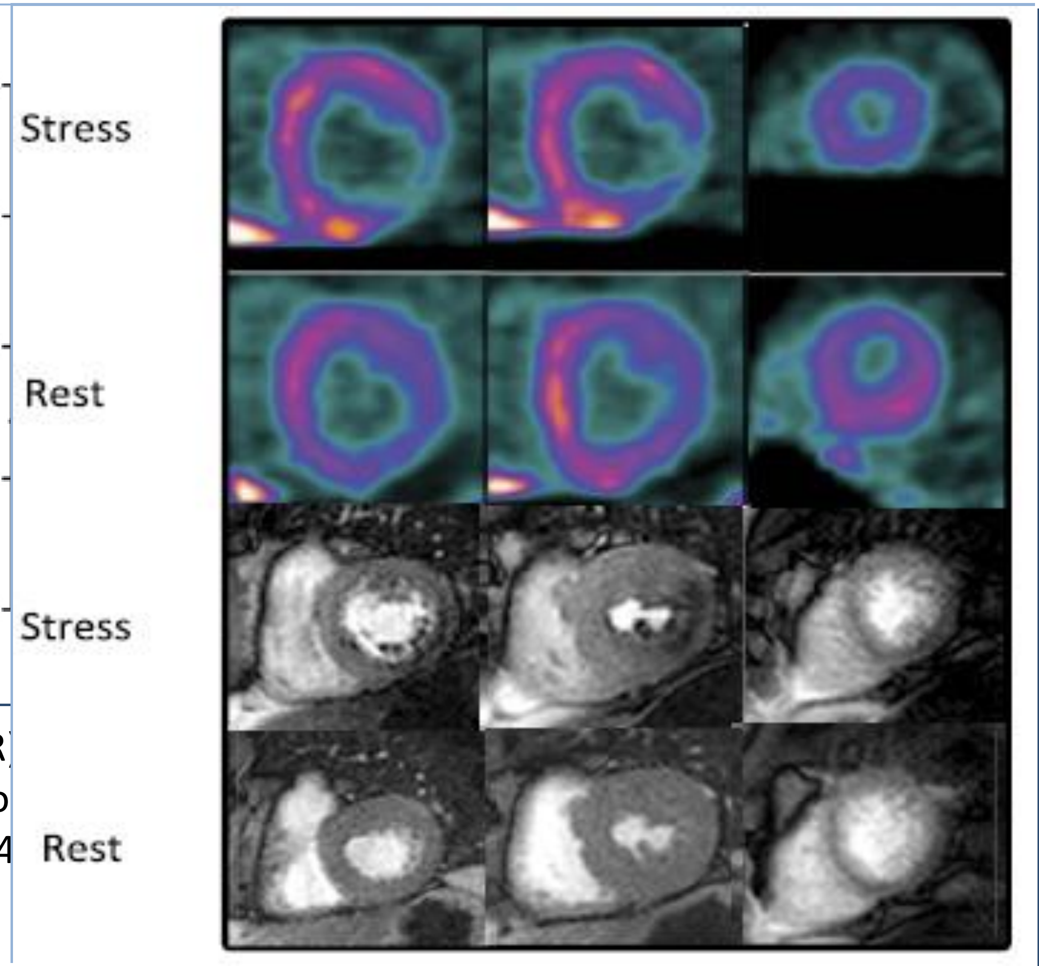
THE PHASE OF DIVORCE: role of CMR

1. Why do we need a functional test in suspected CAD ?
2. Which is the diagnostic accuracy of stress CMR in suspected CAD ?



Mean myocardial perfusion reserve (MPR)
stenotic (70%) territories. The best cuto
(CAD) (MPRCMR 1.45 and MPRPET 1.44
positron emission tomography.



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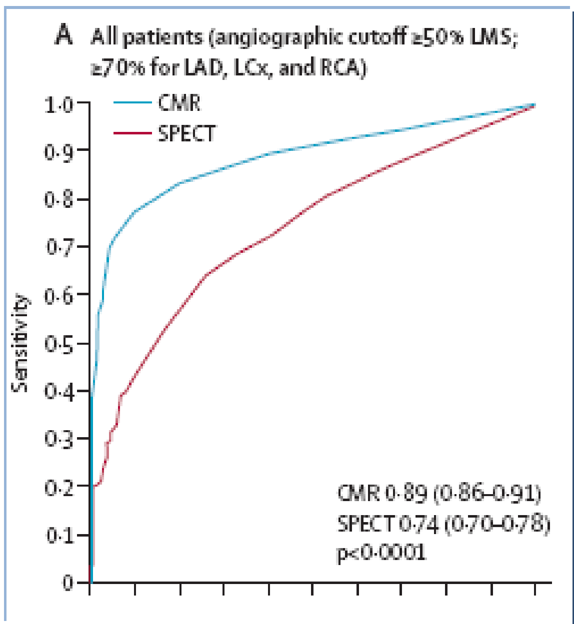
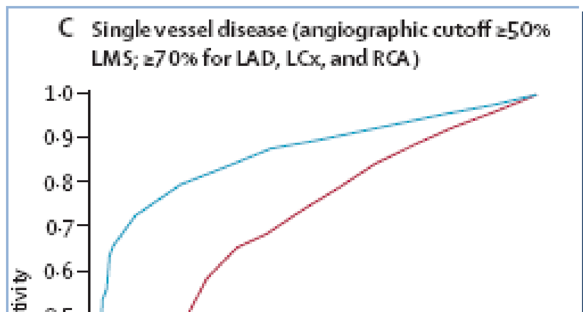
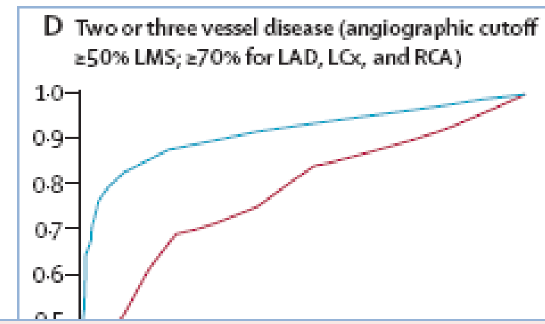
Morton G JACC 2012

THE PHASE OF DIVORCE: role of CMR

1. Why do we need a functional test in suspected CAD ?
2. Which is the diagnostic accuracy of stress CMR in suspected CAD ?
3. Which is the best protocol for stress CMR ?
4. Which is the diagnostic accuracy of stress CMR versus other imaging modality?







The findings of CE-MARC sup
manage ment of stable coron a
the cancer risk associated with

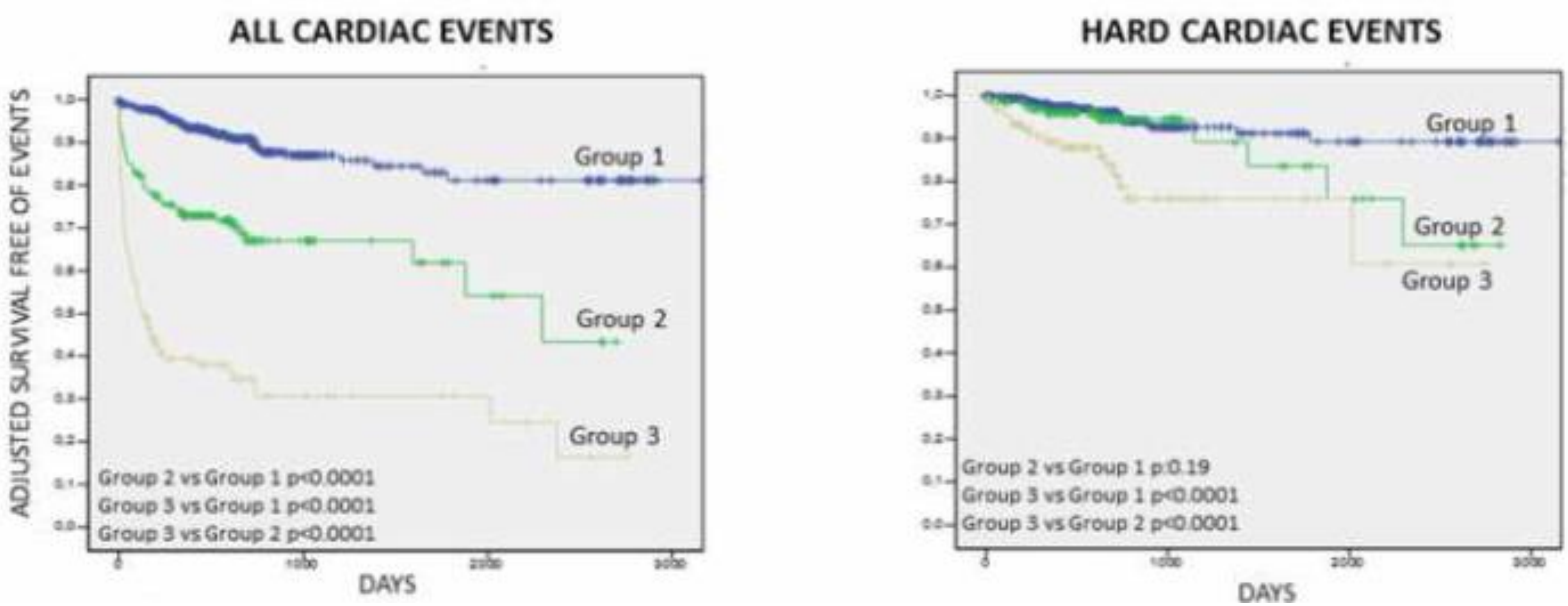
Panel 2: Criteria for a positive CMR

- Any evidence of regional wall motion abnormality (by visual analysis using the 17-segment model[23]), each segment scored as 0 (normal), 1 (mild hypokinesia), 2 (severe hypokinesia), 3 (akinesia), or 4 (dyskinesia)
- Hypoperfusion (ischaemia) assessed by visual comparison of stress and rest CMR perfusion scans (16 segments of the 17 segment AHA/ACC model, excluding the apical cap segment) with scores of 0 (normal), 1 (equivocal), 2 (subendocardial ischaemia), or 3 (transmural ischaemia)
- Visual severity (percentage luminal narrowing) of coronary artery stenosis in the coronary MR angiogram (15 coronary segments)
- Any infarct (scar) on late gadolinium-enhancement images (17 segment model) with scores of 0 (none), 1 (1–25%), 2 (26–50%), 3 (51–75%), or 4 (>75%) for each segment.

Greenwood JP-Lancet 2012

THE PHASE OF DIVORCE: role of CMR

1. Why do we need a functional test in suspected CAD ?
2. Which is the diagnostic accuracy of stress CMR in suspected CAD ?
3. Which is the best protocol for stress CMR ?
4. Which is the diagnostic accuracy of stress CMR versus other imaging modality?
5. Which is the prognostic stratification of stress CMR?



Adjusted survival curves without all cardiac events (left panel) and hard cardiac events (right panel) in patients without perfusion defect or AWM under stress (Group 1), in patients with perfusion defect without AWM under stress (Group 2) and in patients with perfusion defect plus AWM under stress (Group 3). *AWM: abnormal wall motion*

Pontone G, Eur Radiol 2015

ViosWorks

3D cardiac anatomy, function, and flow in 1 free-breathing, 8 min scan

42cm FOV
256 x192
7:55 min

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ViosWorks not commercially available
Expected availability 2016

How to improve the detection of coronary artery disease functionally significant with new emerging techniques ?

1. Stress Cardiac Magnetic Resonance (CMR)
2. Fractional Flow Reserve CT (FFRct)
3. Stress CT perfusion (CTP)

THE PHASE OF DIVORCE: role of FFRct

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ISSN 0735-1097/$36.00
doi:10.1016/j.jacc.2011.06.066

Cardiac Imaging

Diagnosis of Ischemia-Causing Coronary Stenoses by Noninvasive Fractional Flow Reserve Computed From Coronary Computed Tomographic Angiograms

Results From the Prospective Multicenter DISCOVER-FLOW (Diagnosis of Ischemia-Causing Stenoses Obtained Via Noninvasive Fractional Flow Reserve) Study

Bon-Kwon Koo, MD, PHD,* Andrejs Erglis, MD, PHD,† Joon-Hyung Doh, MD, PHD,‡ David V. Daniels, MD,§ Sanda Jegere, MD,‖ Hyo-Soo Kim, MD, PHD,* Allison Dunning, MD,¶ Tony DeFrance, MD,# Alexandra Lansky, MD,** Jonathan Leipsic, BSC, MD,†† James K. Min, MD‡‡

Seoul and Goyang, South Korea; Riga, Latvia; Palo Alto, San Francisco, and Los Angeles, California; New York, New York; New Haven, Connecticut; and Vancouver, British Columbia, Canada

ONLINE FIRST

Diagnostic Accuracy of Fractional Flow Reserve From Anatomic CT Angiography

JAMA. 2012;308(12):doi:10.1001/2012.jama.11274

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ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2013.11.043

CLINICAL RESEARCH — Clinical Trials

Diagnostic Performance of Noninvasive Fractional Flow Reserve Derived From Coronary Computed Tomography Angiography in Suspected Coronary Artery Disease

The NXT Trial (Analysis of Coronary Blood Flow Using CT Angiography: Next Steps)

CrossMark

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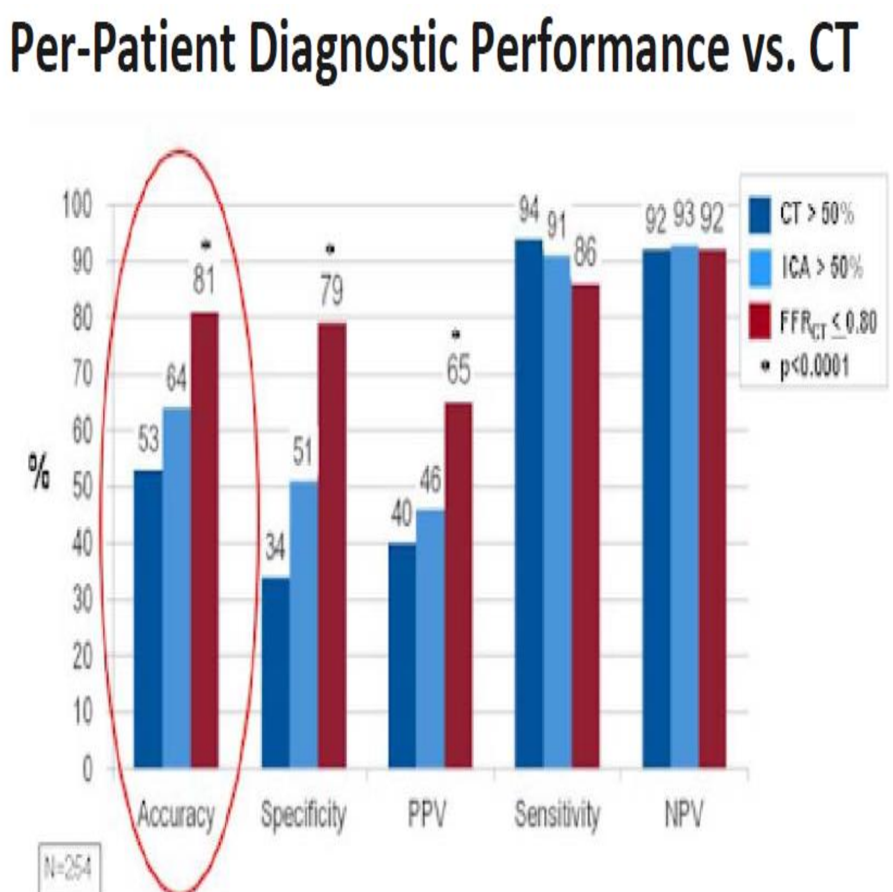
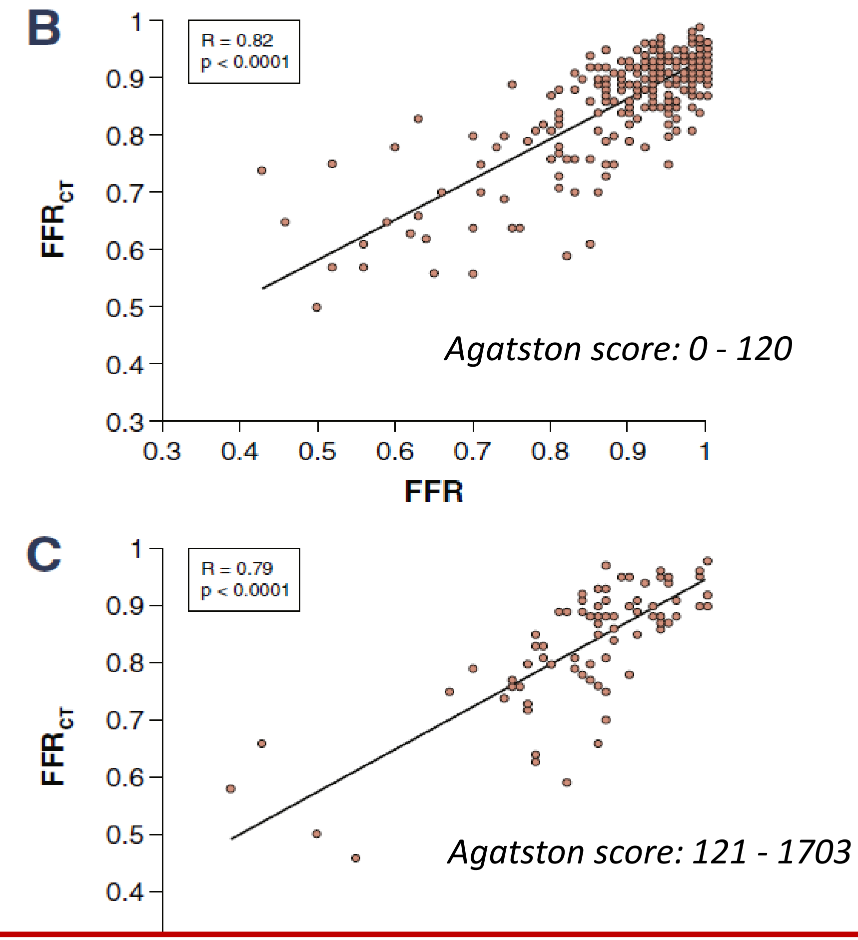
THE PHASE OF DIVORCE: role of FFRct



Nørgaard B, JACC 2014



The fractional flow reserve CCT derived (FFRct) is accurate even in challenging setting such as calcified calcified lesion. When compared to alternative strategy such as TAF, the FFRct has showed higher sensitivity and specificity

THE PHASE OF DIVORCE: role of FFRct

- *HOW TO INCREASE THE COST EFFECTIVENESS OF THE GATEKEEPER TO ICA?*

***P**rospective **L**ongitudin**A**l*
***T**rial of **F**FR$_{CT}$: **O**utcome and **R**esource I**M**pacts study*
- THE PLATFORM trial -

Rationale and design of the Prospective LongitudinAl Trial of FFR$_{CT}$: Outcome and Resource IMpacts study

Gianluca Pontone, MD, PhD,[a] Manesh R. Patel, MD,[b] Mark A. Hlatky, MD,[c] Karen Chiswell, PhD,[b] Daniele Andreini, MD, PhD,[a] Bjarne Linde Norgaard, MD, PhD,[d] Robert A. Byrne, MB, BCh, PhD,[e] Nick Curzen, BM, PhD,[f] Ian Purcell, MD,[g] Matthias Gutberlet, MD, PhD,[h] Gilles Rioufol, MD, PhD,[i] Ulrich Hink, MD,[j] Herwig W. Schuchlenz, MD, PhD,[k] Gudrun Feuchtner, MD,[l] Martine Gilard, MD,[m] Bernard de Bruyne, MD, PhD,[n] Campbell Rogers, MD,[o] and Pamela S. Douglas, MD[b] *Milan, Italy; Durham, NC; Stanford, Redwood City, CA; Munich, Leipzig, Mainz, Germany; Southampton, Newcastle, United Kingdom; Lyon, Brest, France; Graz, Innsbruck, Austria; and Aalst, Belgium*

(Am Heart J 2015;0:1-9.e44.)

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THE PHASE OF DIVORCE: role of FFRct

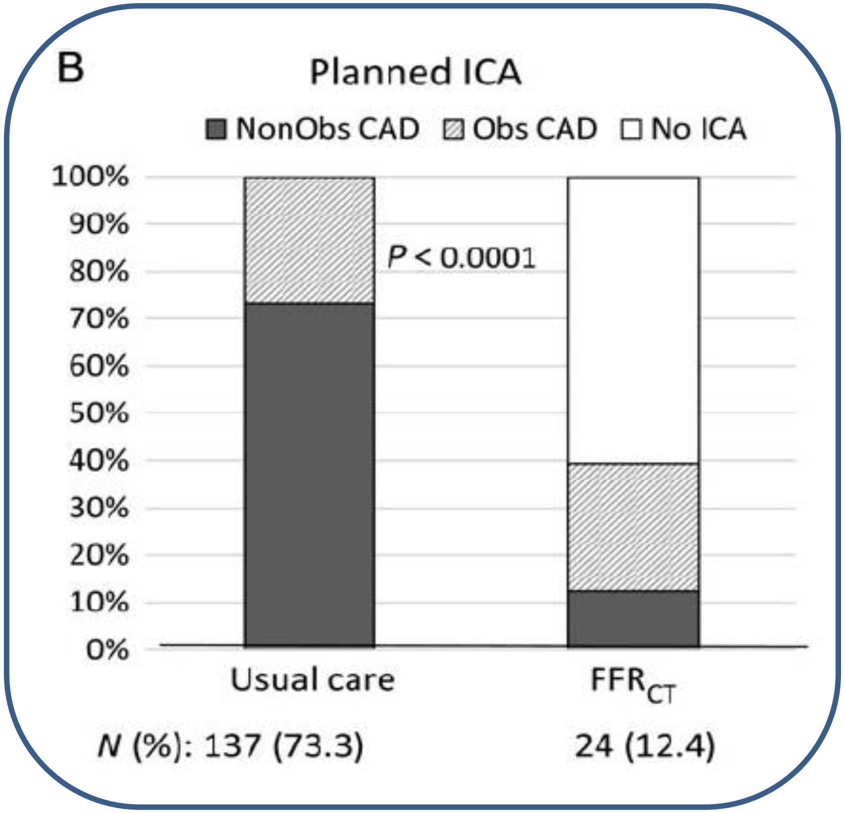
❑ *HOW TO INCREASE THE COST EFFECTIVENESS OF THE GATEKEEPER TO ICA?*

European Heart Journal
doi:10.1093/eurheartj/ehv444

FASTTRACK
ESC Hot Line

Clinical outcomes of fractional flow reserve by computed tomographic angiography-guided diagnostic strategies vs. usual care in patients with suspected coronary artery disease: the prospective longitudinal trial of FFRct: outcome and resource impacts study

Pamela S. Douglas[1]*, Gianluca Pontone[2], Mark A. Hlatky[3], Manesh R. Patel[1], Bjarne L. Norgaard[4], Robert A. Byrne[5], Nick Curzen[6], Ian Purcell[7], Matthias Gutberlet[8], Gilles Rioufol[9], Ulrich Hink[10], Herwig Walter Schuchlenz[11], Gudrun Feuchtner[12], Martine Gilard[13], Daniele Andreini[2], Jesper M. Jensen[4], Martin Hadamitzky[5], Karen Chiswell[1], Derek Cyr[1], Alan Wilk[14], Furong Wang[14], Campbell Rogers[14], and Bernard De Bruyne[15], On Behalf of the PLATFORM Investigators[†]



- 61% patients in FFRct group: ICA cancelled
- **Rate of ICA without obstructive CAD**
  - **By QCA: 73.3% usual care; 12.4% FFR_{CT}**
  - **By site-read angiographic**
  - **data: 56.7% usual care; 9.3% FFR_{CT}**

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Douglas P, Pontone G et al EHJ 2015 (PLATFORM Primary Endpoint)

THE PHASE OF DIVORCE: role of FFRct

- *HOW TO INCREASE THE COST EFFECTIVENESS OF THE GATEKEEPER TO ICA?*

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http://dx.doi.org/10.1016/j.jacc.2015.09.051

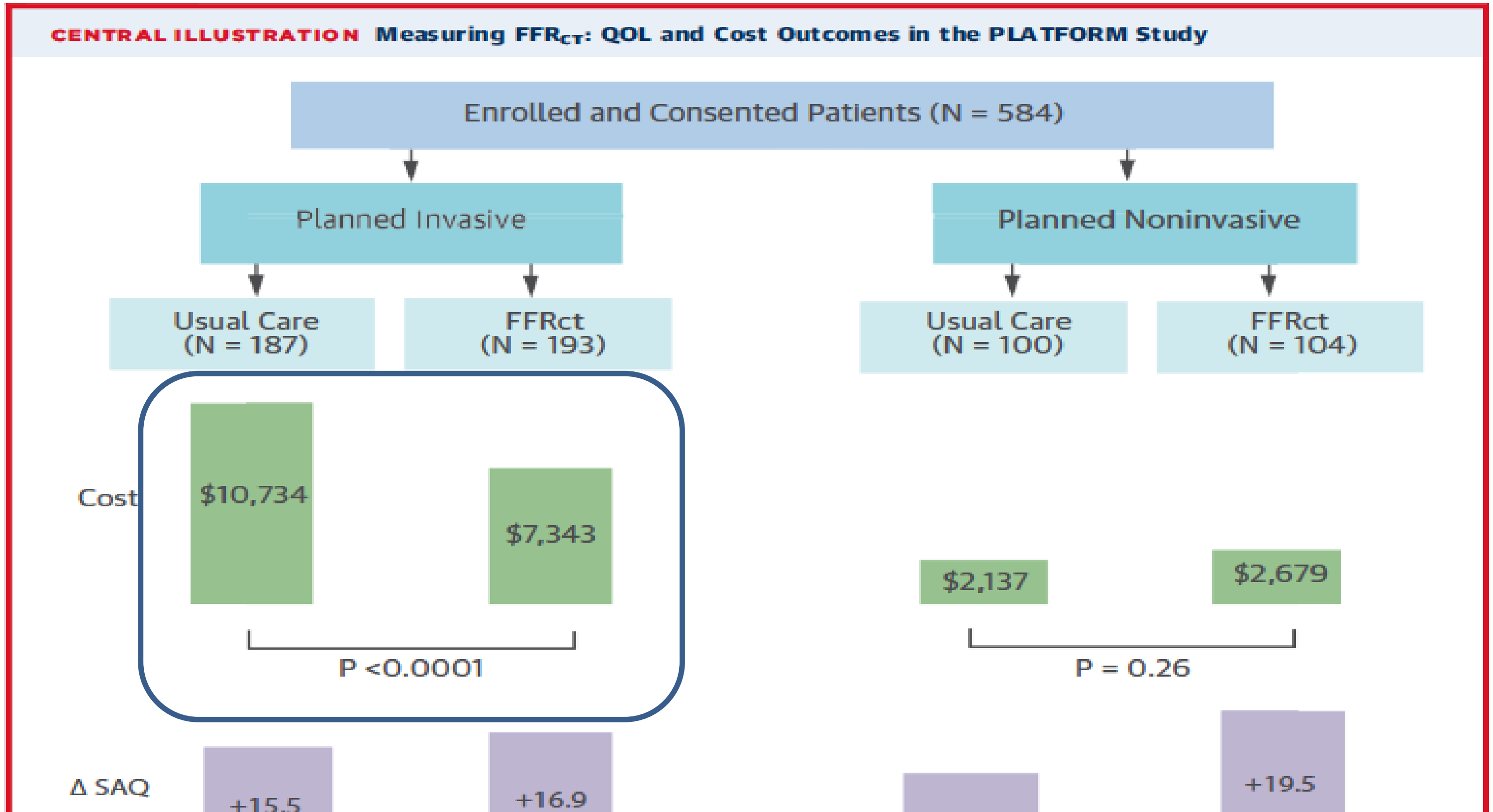
Quality of Life and Economic Outcomes of Assessing Fractional Flow Reserve With Computed Tomography Angiography

The PLATFORM Study

Mark A. Hlatky, MD,* Bernard De Bruyne, MD, PhD,† Gianluca Pontone, MD, PhD,‡ Manesh R. Patel, MD,§ Bjarne L. Norgaard, MD,|| Robert A. Byrne, MB BCh, PhD,¶ Nick Curzen, BM (Hons), PhD,# Ian Purcell, MD,** Matthias Gutberlet, MD,†† Gilles Rioufol, MD,‡‡ Ulrich Hink, MD,§§ Herwig Walter Schuchlenz, MD,|||| Gudrun Feuchtner, MD,¶¶ Martine Gilard, MD,## Daniele Andreini, MD,‡ Jesper M. Jensen, MD,|| Martin Hadamitzky, MD,¶ Alan Wilk, BS,*** Furong Wang, MD,*** Campbell Rogers, MD,*** Pamela S. Douglas, MD,§ for the PLATFORM Investigators

THE PHASE OF DIVORCE: role of FFRct

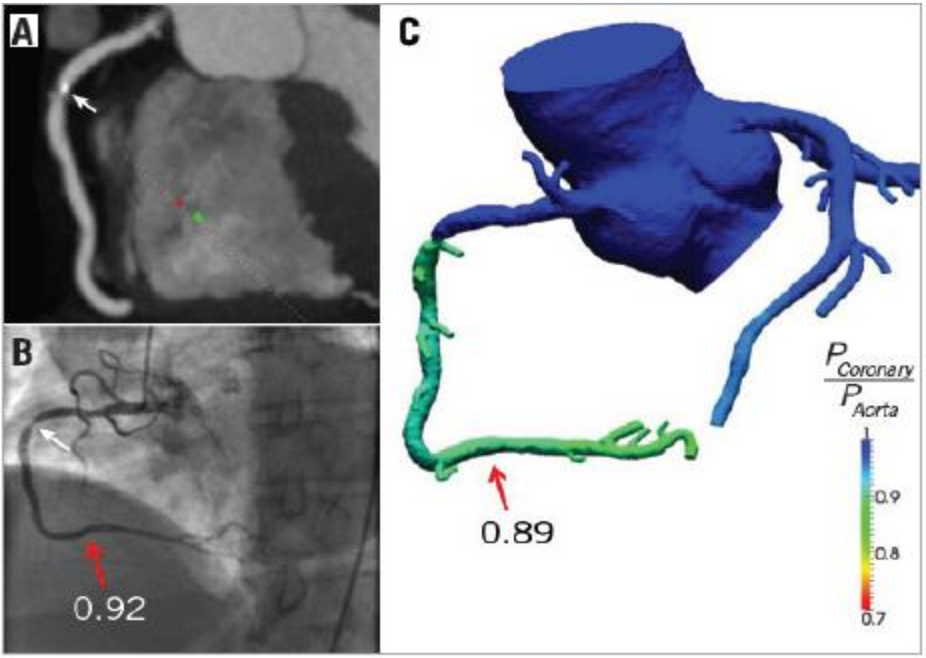
- *HOW TO INCREASE THE COST EFFECTIVENESS OF THE GATEKEEPER TO ICA?*



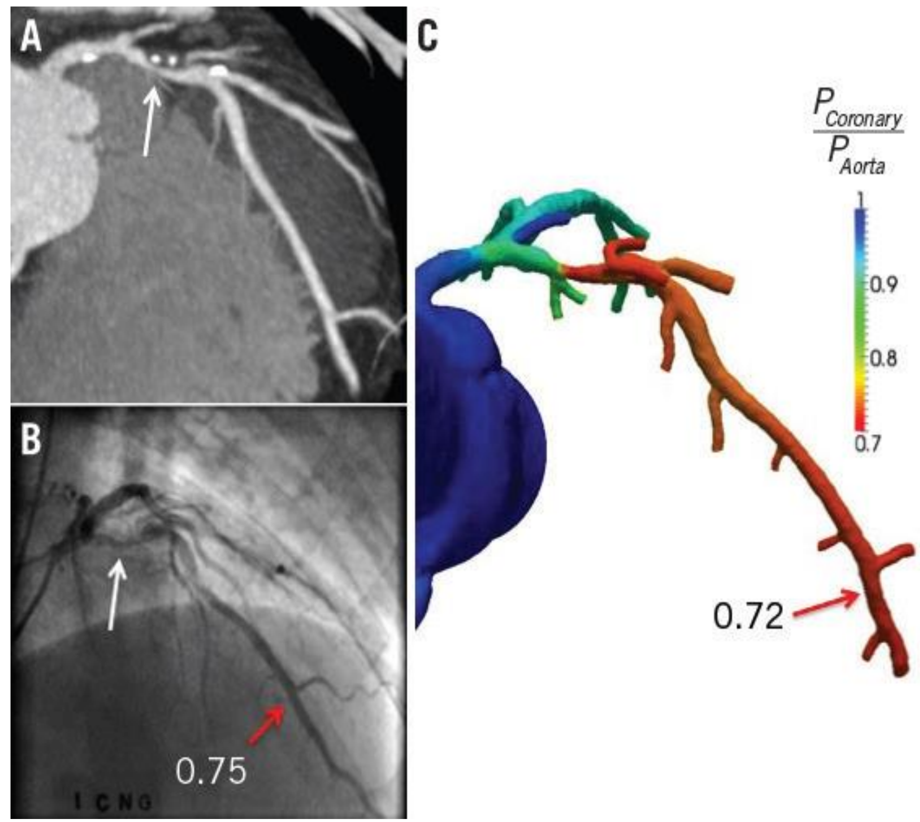
In conclusion, when used as an alternative diagnostic strategy to guide care in patients with planned invasive catheterization, CTA plus selective FFRCT was associated with a significantly lower rate of angiography showing no obstructive CAD, low rates of clinical outcomes, similar QOL, and significant cost savings. When used in those with planned noninvasive testing, clinical events were rare, and there were few differences in resource use, or QOL, although the small sample size in this group precludes firm conclusions.

THE PHASE OF DIVORCE: role of FFRct

- *HOW TO INTEGRATE FFRct WITH ATHEROSCLEROTIC PLAQUE CHARACTERISTICS (APC)?*



Representative example of lesion with non-ischaemic RCA obstructive stenosis. A) Multiplanar reformat of CT demonstrating obstructive stenosis (white arrow) with no APCs (PR [–], LAP [–], SC [–]) in the proximal portion of RCA. B) Invasive coronary angiogram demonstrates obstructive stenosis (white arrow) and FFR value of 0.92 (red arrow), indicating vessel no-ischaemia. C) FFRCT value of 0.89 (red arrow) indicating vessel no-ischaemia.



Representative example of a lesion with ischaemic LAD obstructive stenosis. A) Multiplanar reformat of CT demonstrating obstructive stenosis (white arrow) with APCs (PR [+], LAP [+], SC [+]) in the proximal portion of LAD. B) Invasive coronary angiogram demonstrates obstructive stenosis (white arrow) and FFR value of 0.75 (red arrow), indicating vessel ischaemia. C) FFRCT value of 0.72 (red arrow) indicating vessel ischaemia. LAD: left anterior descending artery

Nakazato R Eurointervention 2015

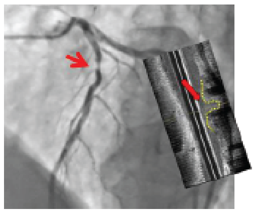
THE PHASE OF DIVORCE: role of FFRct

- *HOW TO PREDICT THE PLAQUE RUPTURE ?*

EMERALD study

<u>E</u>xploring the <u>ME</u>chanism of the Plaque <u>R</u>upture in <u>A</u>cute Coronary Syndrome using Coronary CT Angiography and Computationa<u>L</u> Fluid <u>D</u>ynamics

2012-06 Acute MI



Patients with <u>Acute Coronary Syndrome</u>
From 11 International Cardiovascular Centers
(Korea, Japan, Belgium, Denmark, the Netherlands)

↓

Patients who underwent <u>Coronary CT angiography</u>
before ACS event (1 month – 2 year before the event)
(N=128)

↓

Validation with clinical data, cCTA and coronary angiography

Screening Failure (N=45)
- No adequate CT image: 26
- Unclear diagnosis: 14
- No definite culprit lesion on Angiography: 5

Exclusion by core laboratory due to CT image quality (N=12)

↓

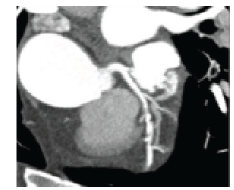
Final Enrollment for cCTA and CFD analysis
(N=71)

CASE	CONTROL
Culprit Lesion (N=75)	Non- Culprit Lesion (N=151)

↓

cCTA analysis		CFD analysis
adverse plaque characteristics (Core Lab – SNU Bundang Hospital)	+	Non-invasive hemodynamics (Core Lab - HeartFlow Inc.)

2011-04 CT, Asymptomatic



Koo EuroPCR 2016

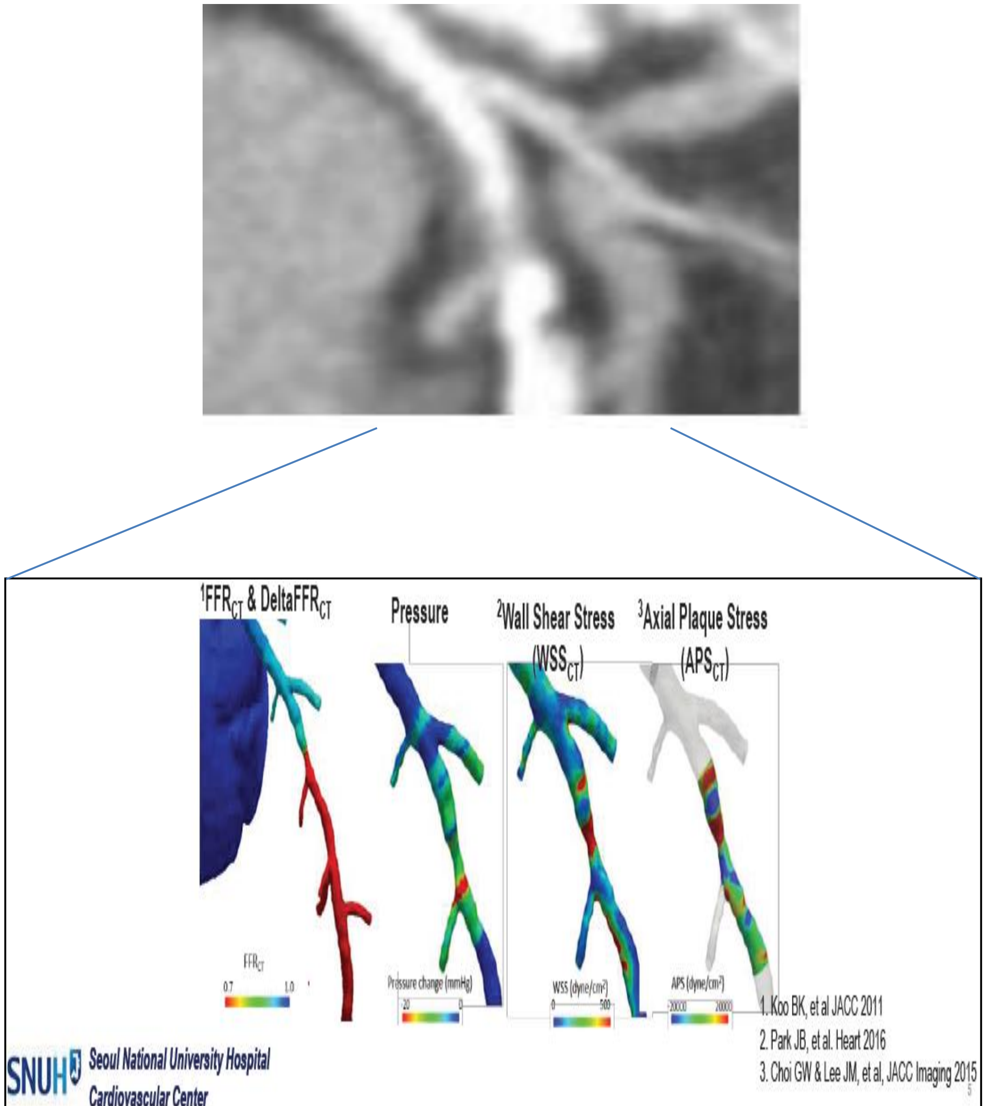
THE PHASE OF DIVORCE: role of FFRct

2016 euro PCR

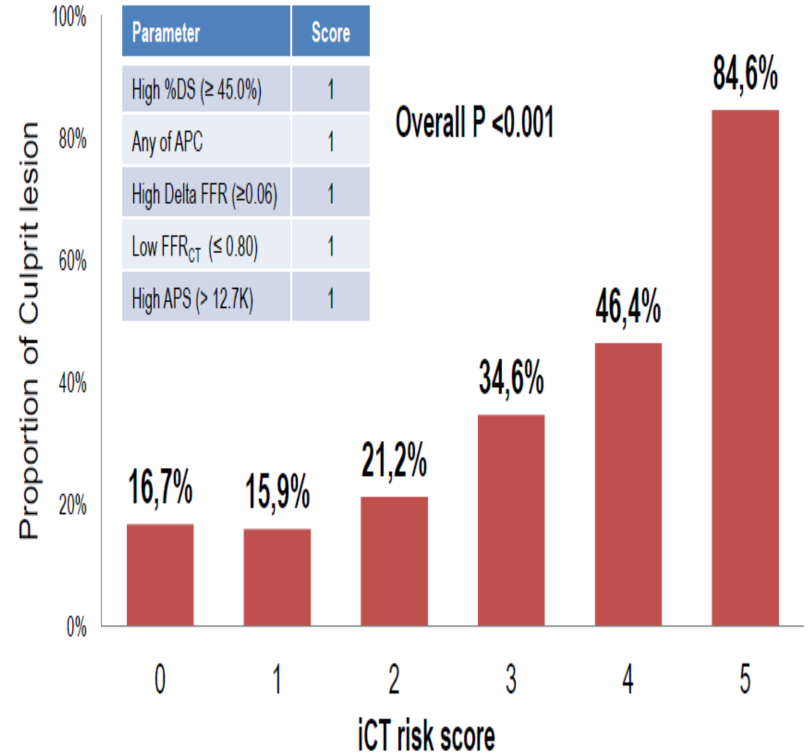
EMERALD study

CV PIPELINE BY MARKETMONITORS INC

Exploring the MEchanism of the Plaque Rupture in Acute Coronary Syndrome using Coronary CT Angiography and ComputationaL Fluid Dynamics



Integrated cCTA (iCT) risk score



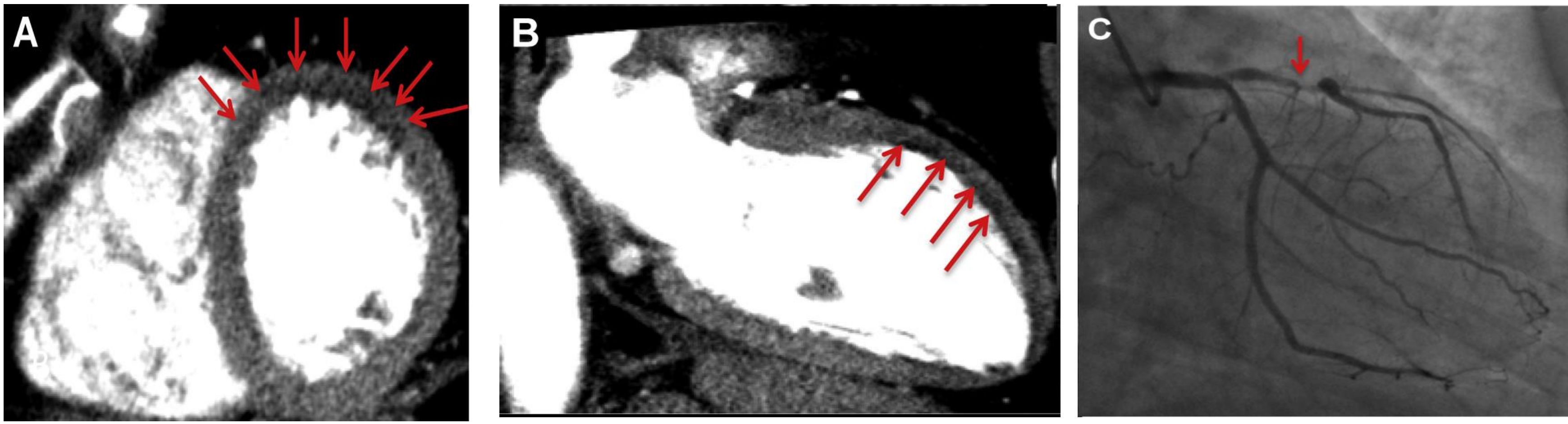
Koo EuroPCR 2016

How to improve the detection of coronary artery disease functionally significant with new emerging techniques ?

1. Stress Cardiac Magnetic Resonance (CMR)
2. Fractional Flow Reserve CT (FFRct)
3. Stress CT perfusion (CTP)

THE PHASE OF DIVORCE: role of CTP

Visual assessment: Areas of reduced perfusion appear hypoenhanced compared with the normal myocardium, which implies either myocardial ischemia or myocardial infarction.



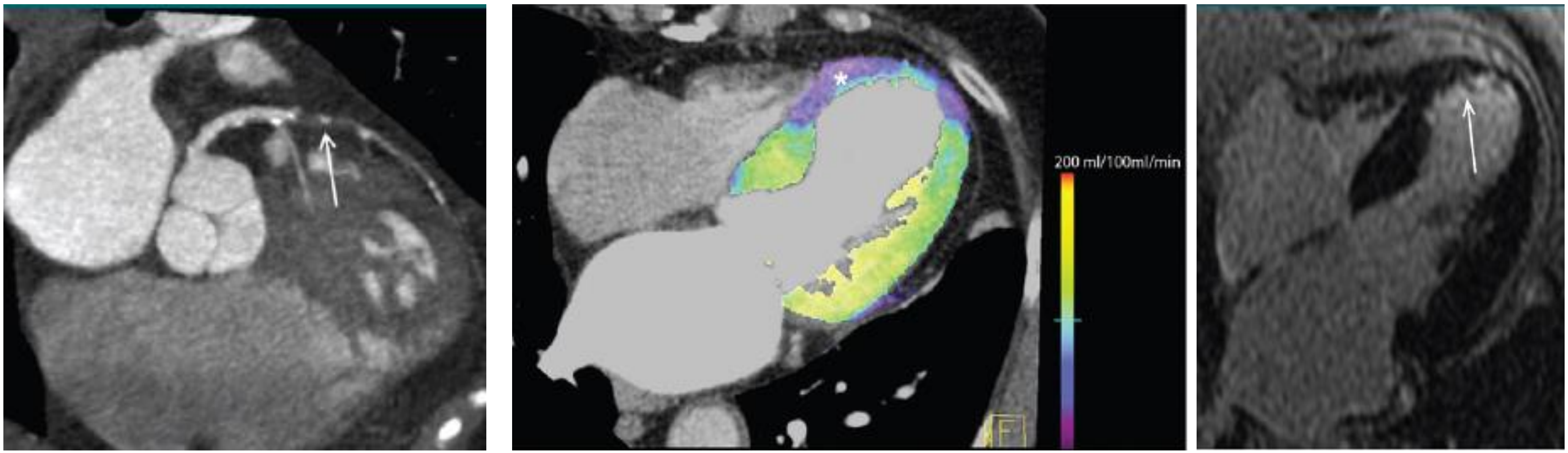
Strenghts: Fast analysis

Pitfalls: Normal left ventricular myocardial enhancement demonstrates substantially lower attenuation in the lateral wall when compared with the anterior, septal, and inferior walls in patients with normal coronary arteries. The lateral myocardial wall is located adjacent to the air within the lungs and is not subjected to the same beam-hardening effect

Choi AD et al , JCCT 2014

THE PHASE OF DIVORCE: role of CTP

Quantitative assessment : Myocardial Blood Flow (MBF): maximum TAC slope/maximum AIF (ml/100 ml/min)



Images in a 75-year-old woman with typical symptoms of chest pain. (a) Curved multiplanar reformat of the left anterior descending coronary artery shows a subtotal occlusion of the middle left anterior descending coronary artery (arrow). (b) Stress myocardial CT perfusion color-coded map in a four-chamber view, from dynamic CT acquisition with a DS CT scanner, shows a hypoperfused area at the level of the septum and the apex (*). Both myocardial areas look thinner compared with the other myocardial segments. (c) MR image acquired with delayed enhancement in a four-chamber view

Rossi A et al, EHJ CI 2013

Huber AM et al, Radiology 2013

THE PHASE OF DIVORCE: role of CTP

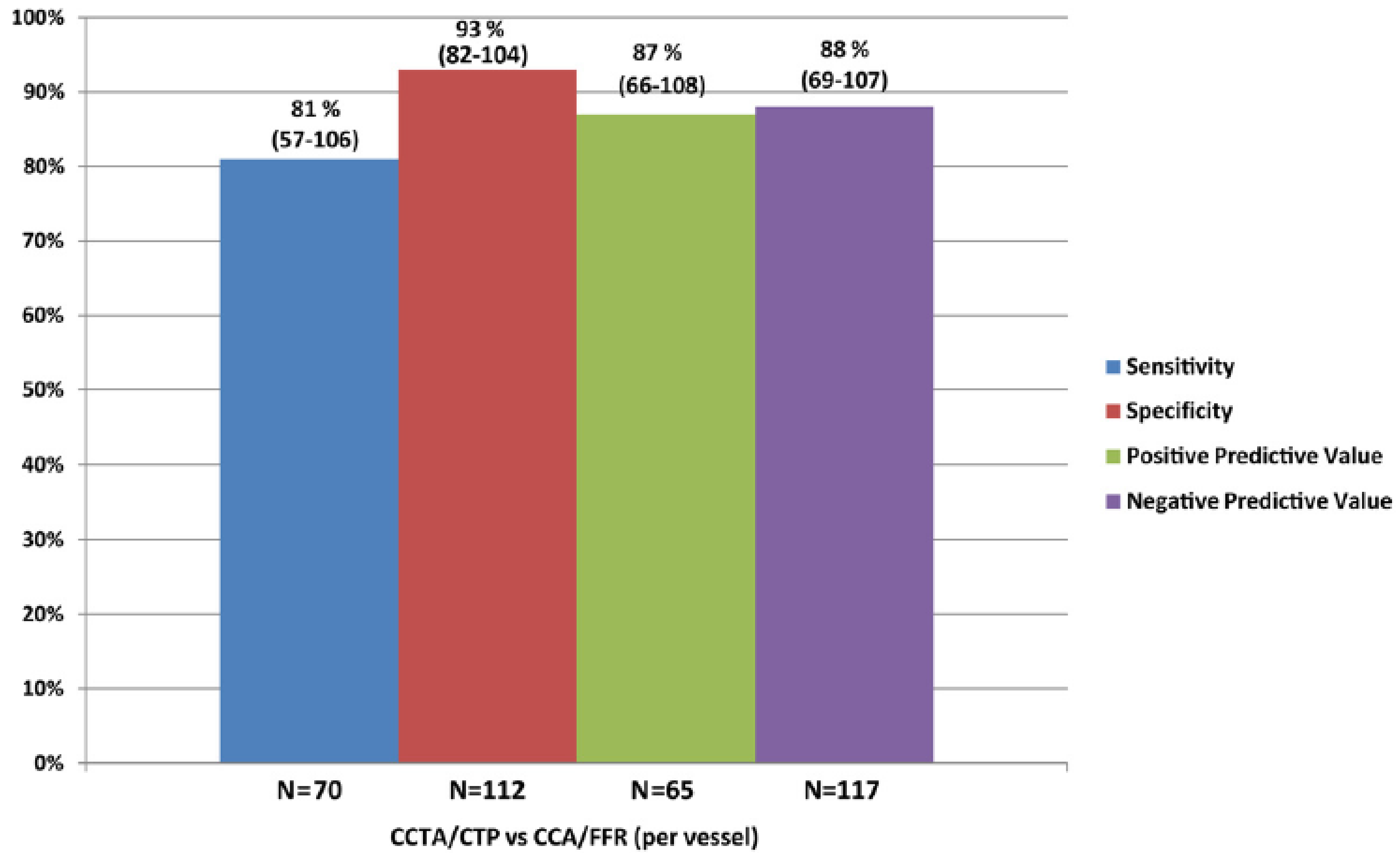


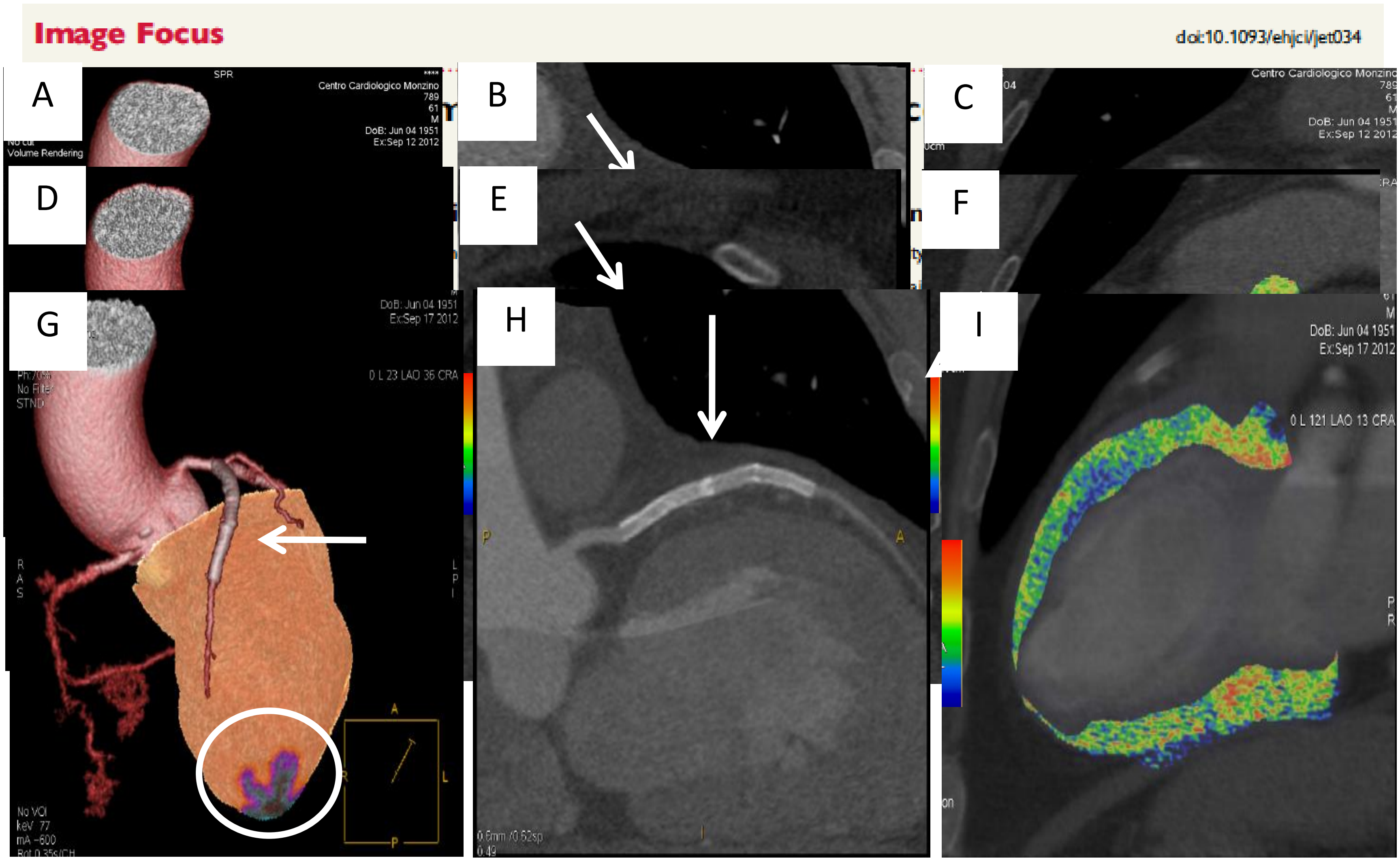
Figure 3. Studies using coronary computed tomography angiography (CCTA) and computed tomography perfusion (CTP) compared with conventional coronary angiography (CCA) and fractional flow reserve (FFR) as the reference standard.

Tashakkor AY et al , Canadian journal of Cardiology 2012
Pontone G, Guaricci AI, Ongoing Metanalysis on stress CTP

THE PHASE OF DIVORCE: role of CTP

OPEN ISSUES AND POTENTIAL SOLUTIONS

① Beam hardening and Dual Energy CT



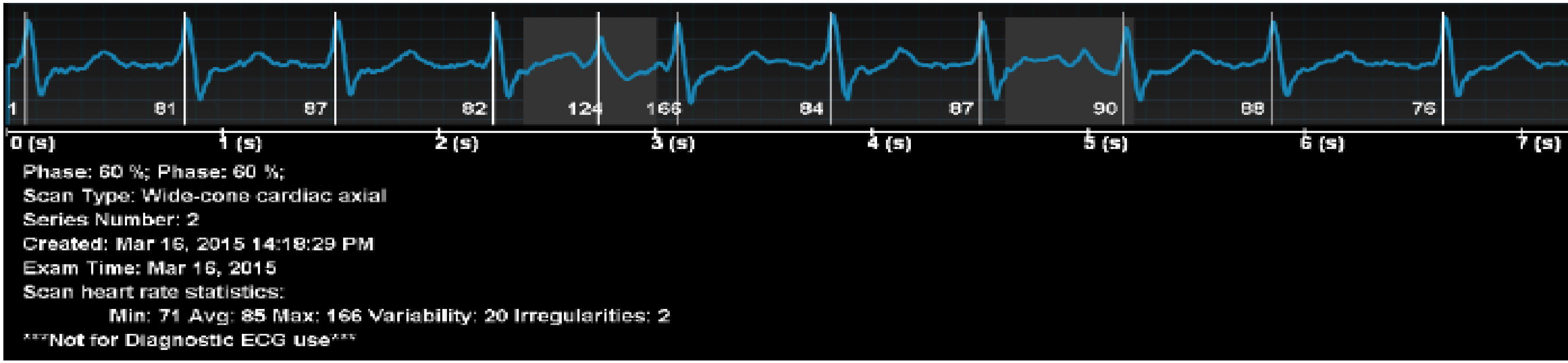
Pontone G et al EHJCI 2013

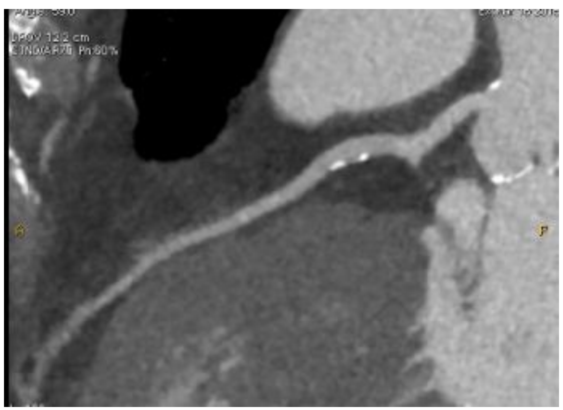
THE PHASE OF DIVORCE: role of CTP

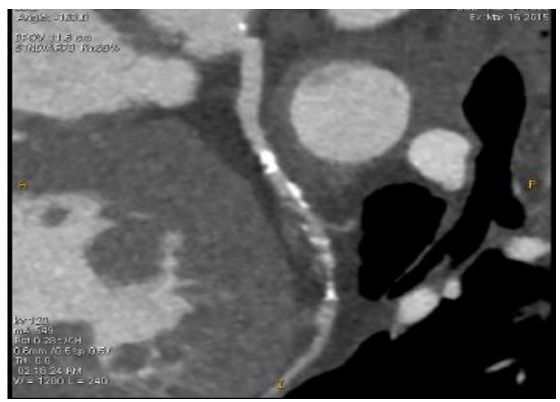
OPEN ISSUES AND POTENTIAL SOLUTIONS

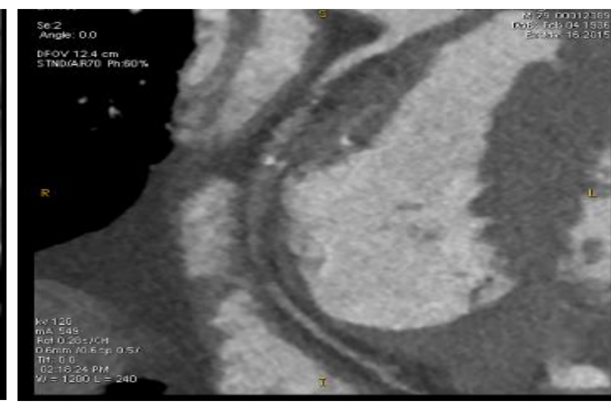
② Heart Rate related artefacts and New generation CT scanner

- AF patients





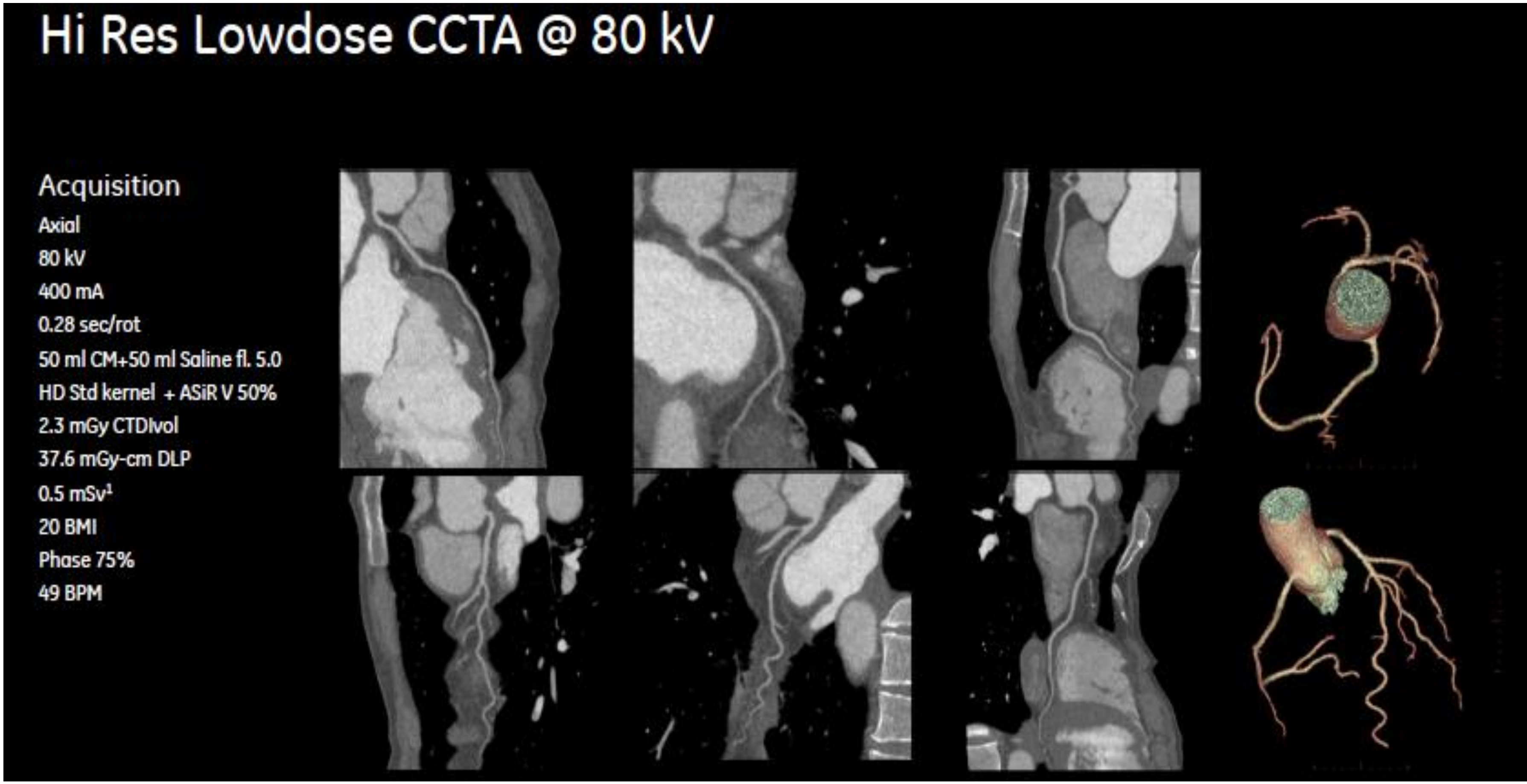




THE PHASE OF DIVORCE: role of CTP

OPEN ISSUES AND POTENTIAL SOLUTIONS

③ **Effective Radiation Dose and New generation CT scanner**



THE PHASE OF DIVORCE: role of CTP

Journal of Cardiovascular Computed Tomography xxx (2016) 1–5

Contents lists available at ScienceDirect

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journal homepage: www.JournalofCardiovascularCT.com

Research paper

Rationale and design of the PERFECTION (comparison between stress cardiac computed tomography PERfusion versus Fractional flow rEserve measured by Computed Tomography angiography In the evaluation of suspected cOroNary artery disease) prospective study

Gianluca Pontone [a,*], Daniele Andreini [a,b], Andrea I. Guaricci [c,d], Marco Guglielmo [a], Saima Mushtaq [a], Andrea Baggiano [a], Virginia Beltrama [a], Daniela Trabattoni [a], Cristina Ferrari [a], Giuseppe Calligaris [a], Giovanni Teruzzi [a], Franco Fabbiocchi [a], Alessandro Lualdi [a], Piero Montorsi [a,b], Antonio L. Bartorelli [a,b], Mauro Pepi [a]

[a] *Centro Cardiologico Monzino, IRCCS, Milan, Italy*
[b] *Department of Cardiovascular Sciences and Community Health, University of Milan, Italy*
[c] *Institute of Cardiovascular Disease, Department of Emergency and Organ Transplantation, University Hospital "Policlinico Consorziale" of Bari, Bari, Italy*
[d] *Department of Medical and Surgical Sciences, University of Foggia, Foggia, Italy*

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Pontone G JCCT 2016 (PERFECTION Study)

THE PHASE OF DIVORCE: role of CTP

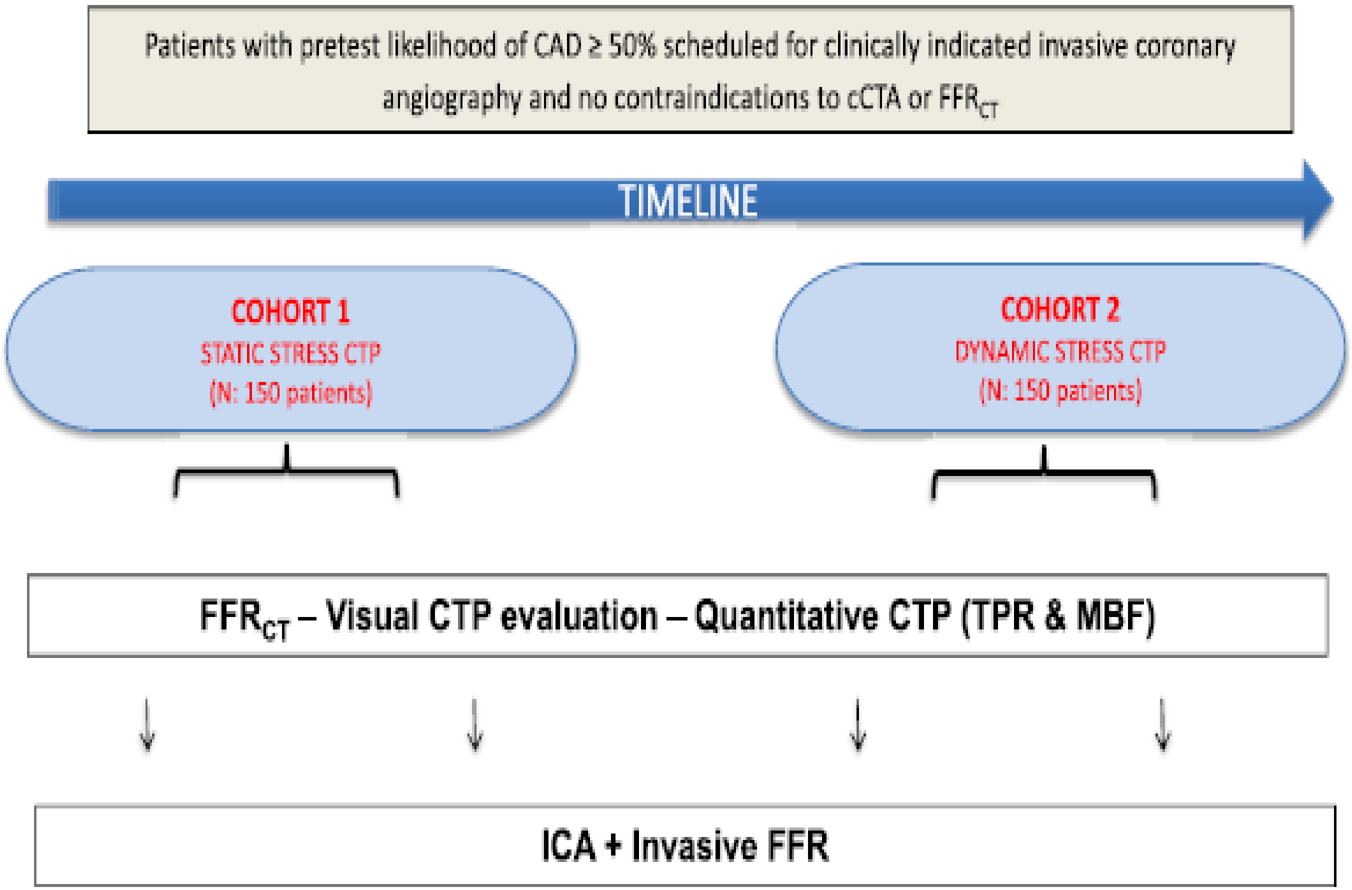

Figure 1. PERFECTION study workflow. CTP: computed tomography perfusion; FFR: fractional flow reserve; FFR_{CT}: fractional flow reserve measured by computed tomography angiography; ICA: invasive coronary angiography; MBF: myocardial blood flow; TPR: transmural perfusion ratio.

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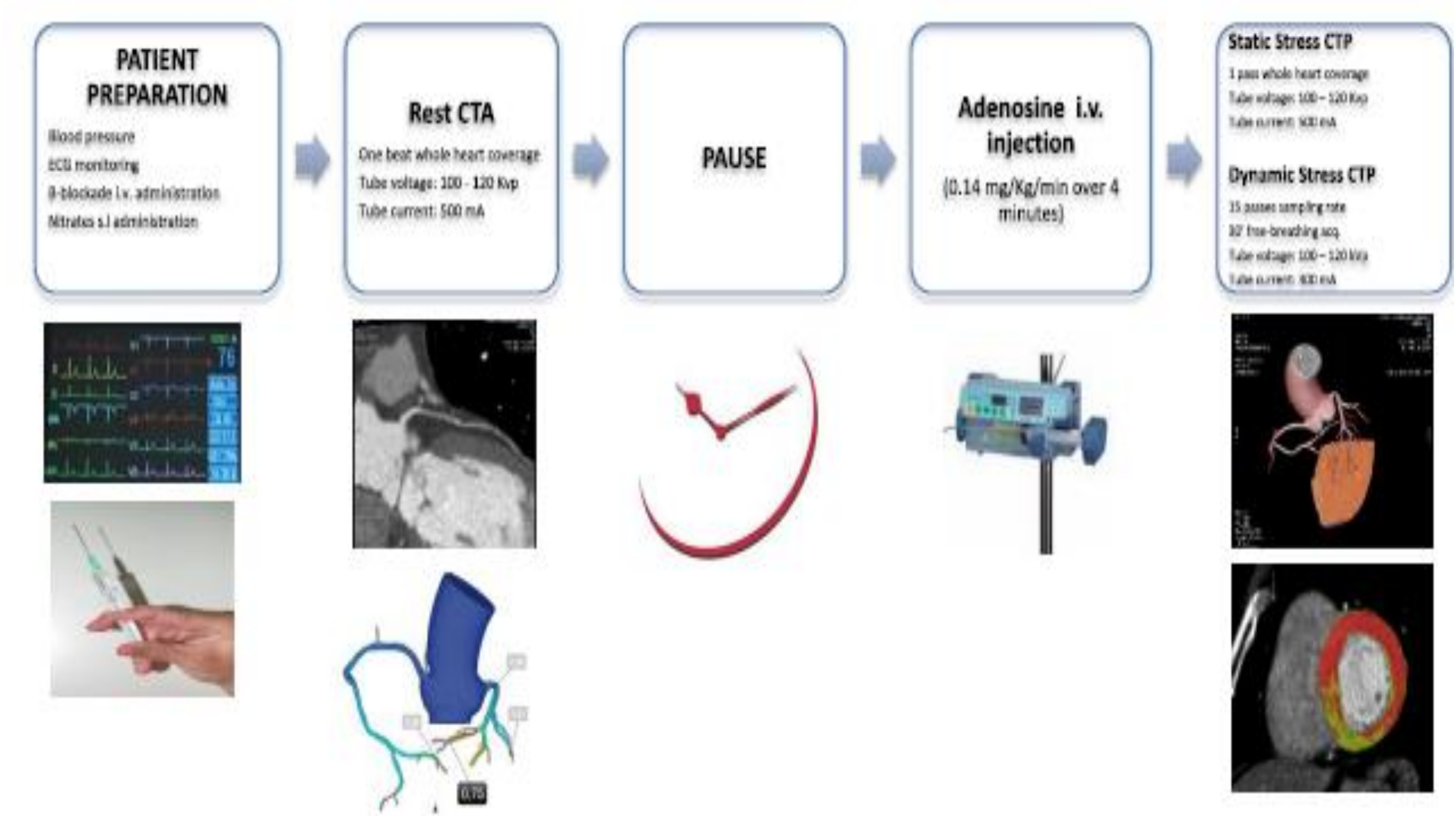

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THE PHASE OF DIVORCE: role of CTP

Clinical case #1: A 83-year-old woman, known for recent onset of typical chest pain, performed SPECT, resulted positive for reversible perfusion deficit at mid-basal portion of postero-lateral wall.

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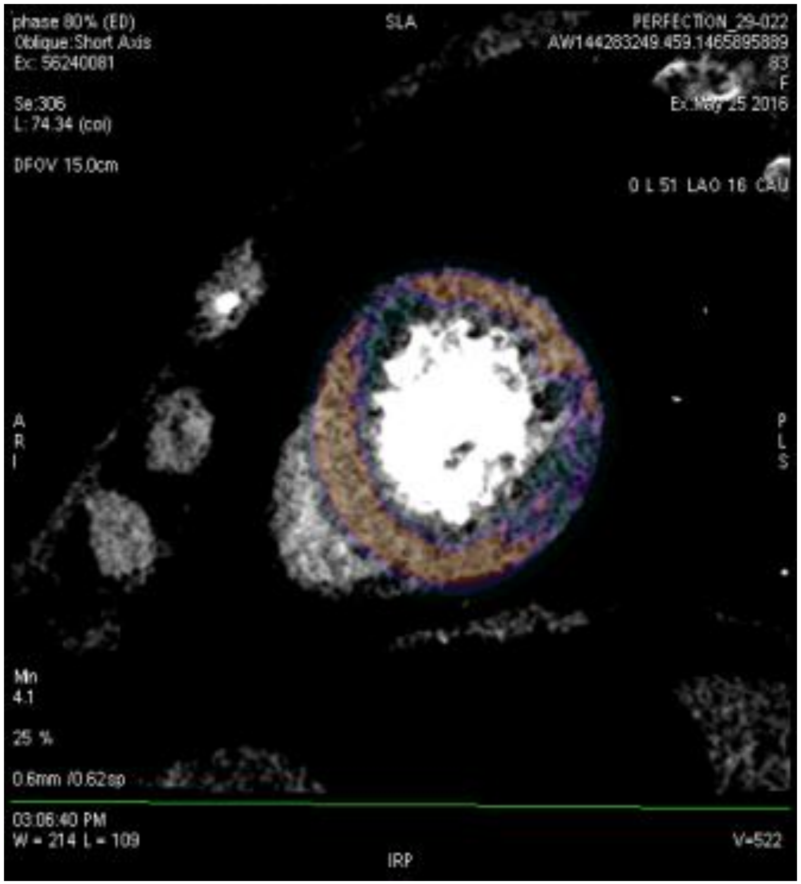

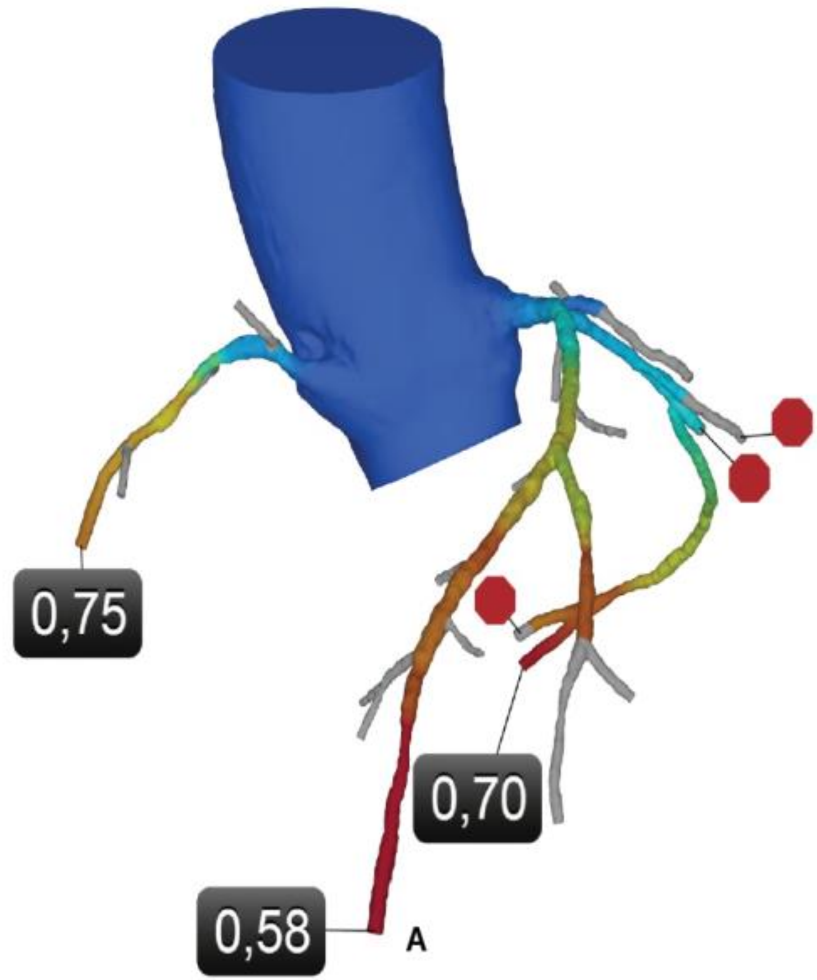

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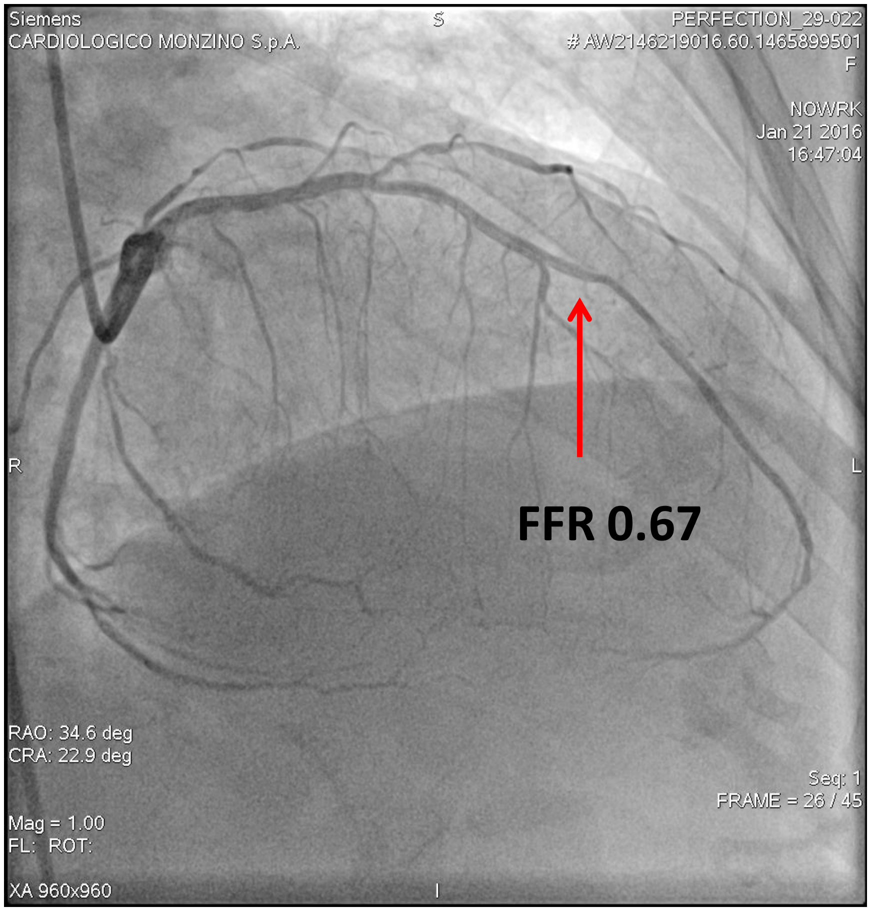

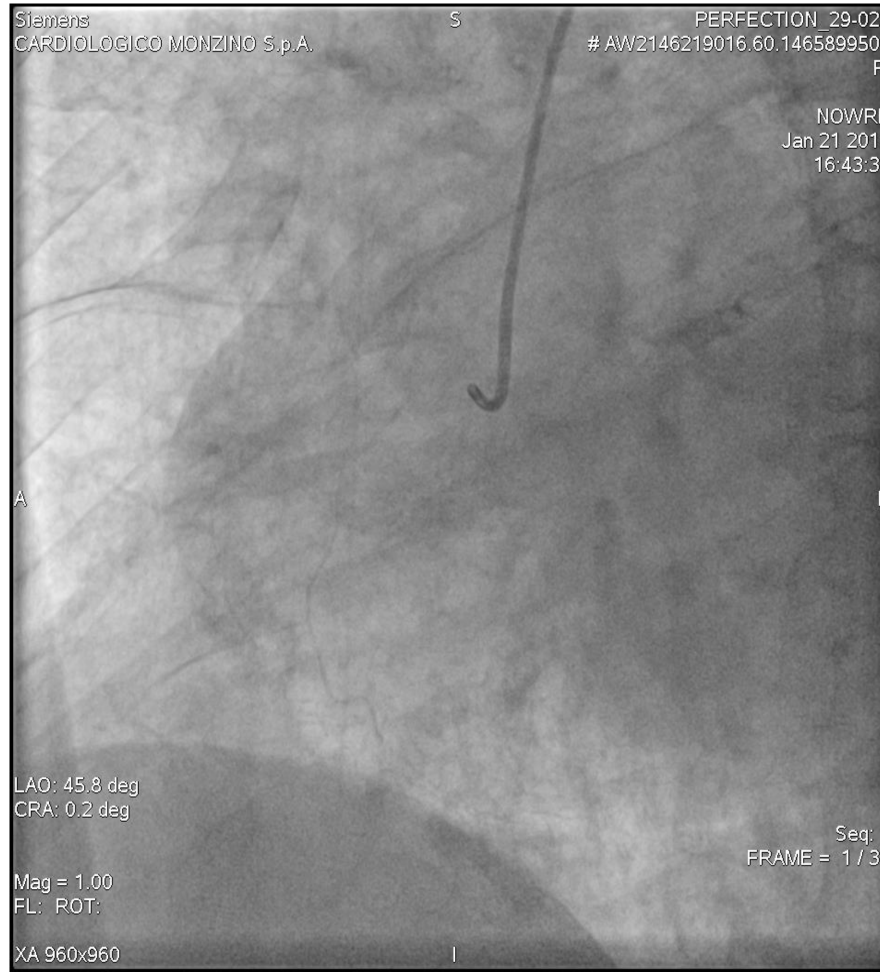

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Pontone G JCCT 2016 (PERFECTION Study)

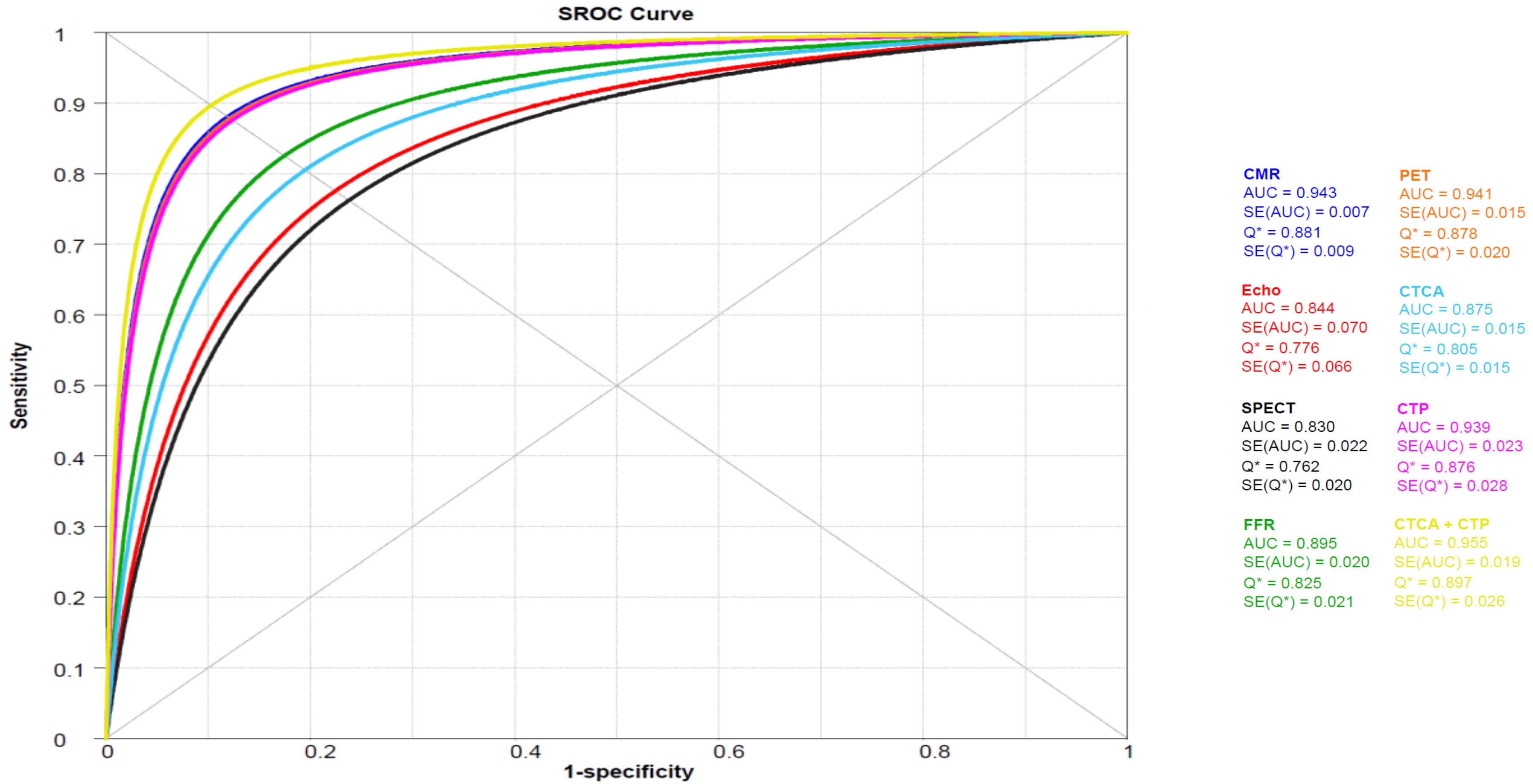
Who is the winner ?

"Diagnostic PERFORMANCE of stress echocardiography (Echo), stress single-photon-emission computed tomography (SPECT), positron emission tomography (PET), stress cardiac magnetic resonance (CMR), computed tomography coronary angiography (CTCA), stress perfusion computed tomography (CTP) and computed tomography fractional flow reserve (FFRCT) for the assessment of Coronary Artery Disease (CAD) versus invasive FFR (FFRi): a meta-analysis"

Pontone G ESC 2016 (PERFORMANCE-CAD study)

NEW PERSPECTIVES: who is the winner ?

Summary of receiver operating characteristic curves for prediction of ischemia for a vessel (left panel) as compared to invasive FFR. The Q* statistic represents the point where sensitivity and specificity are equal



AUC: area under the summary receiver operating characteristic curve; CMR cardiac magnetic resonance; CTCA computed tomography coronary angiography; CTP: stress myocardial computed tomography perfusion; Echo: stress echocardiography; FFR_{CT}: Fractional Flow Reserve CT derived; PET positron emission tomography; SE: standard error; SPECT single-photon emission computed tomography

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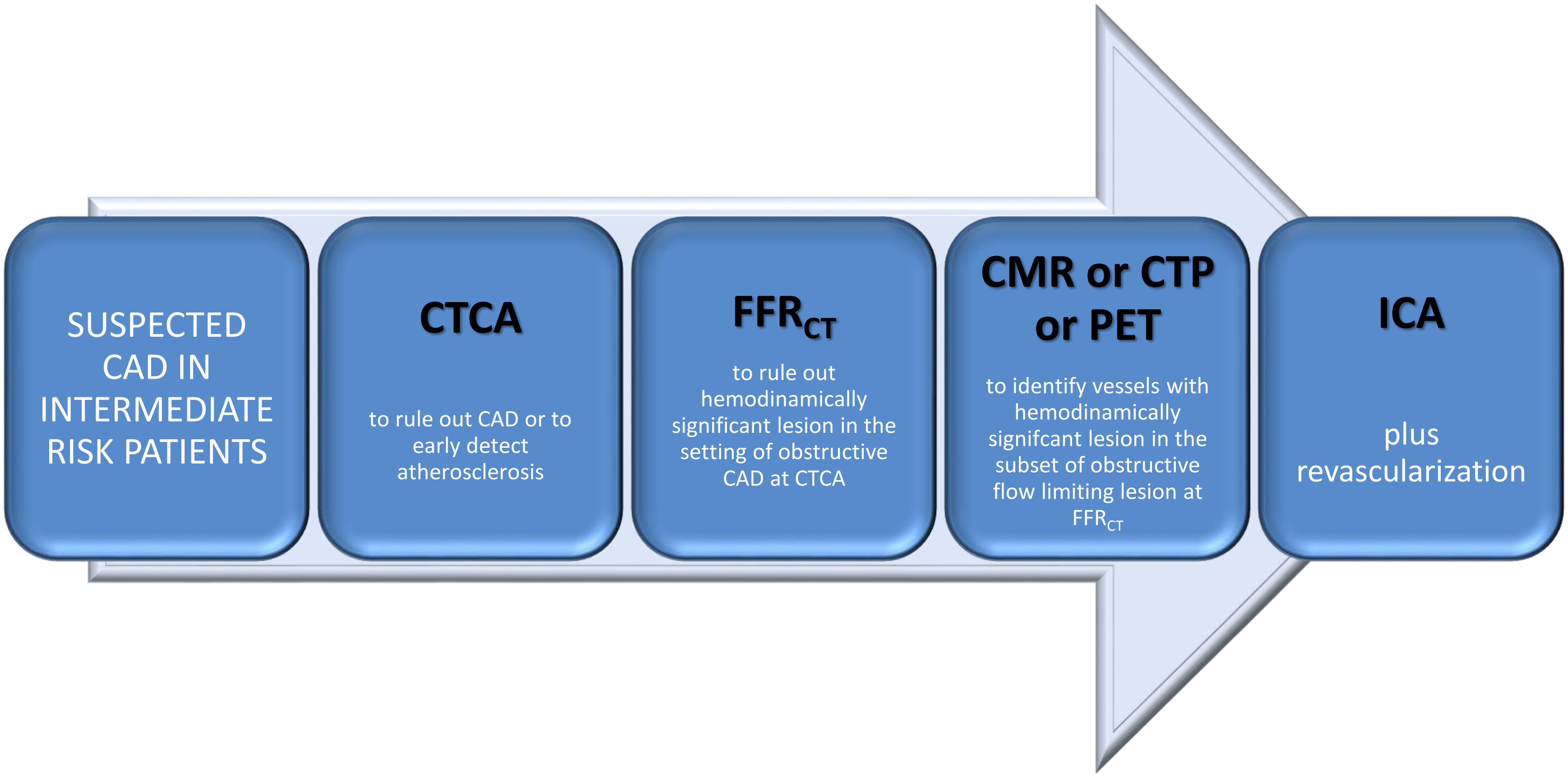
Pontone G ESC 2016 (PERFORMANCE-CAD study

NEW PERSPECTIVES: who is the winner ?



A proposal of diagnostic algorithm to select patients with suspected CAD who could really receive benefits by ICA and consequential revascularizazion.

CAD: coronary artery disease; CMR: cardiac magnetic resonance; CTCA: computed tomography coronary angiography; FFR_{CT}: fractional flow reserve CTCA derived; ICA: invasive coronary angiography;

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Pontone G ESC 2016 (PERFORMANCE-CAD study

DIAGNOSTIC WORK-UP OF SYMPTOMATIC PATIENTS FOR CHEST PAIN WITH HISTORY OF REVASCULARIZATION

«Can we apply the same diagnostic work-up in revascularized patients ?»

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Pontone G ESCR 2016 (PERFORMANCE-CAD study)

DIAGNOSTIC WORK-UP OF SYMPTOMATIC PATIENTS FOR CHEST PAIN WITH HISTORY OF REVASCULARIZATION

Ischemic Heart Disease

The STRATEGY Study (Stress Cardiac Magnetic Resonance Versus Computed Tomography Coronary Angiography for the Management of Symptomatic Revascularized Patients)

Resources and Outcomes Impact

Gianluca Pontone, MD, PhD, FESC, FSCCT; Daniele Andreini, MD, PhD, FESC, FSCCT;
Andrea I. Guaricci, MD, FESC; Cristina Rota, MD; Marco Guglielmo, MD;
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Anna Solbiati, MD; Chiara Segurini, MD; Edoardo Conte, MD; Paola Gripari, MD, PhD;
Andrea Annoni, MD; Alberto Formenti, MD; Maria Petulla', MD; Federico Lombardi, MD;
Giuseppe Muscogiuri, MD; Antonio L. Bartorelli, MD, FESC, FACC; Mauro Pepi, MD, FESC

Pontone G et al, Circulation CI 2016

DIAGNOSTIC WORK-UP OF SYMPTOMATIC PATIENTS FOR CHEST PAIN WITH HISTORY OF REVASCULARIZATION

Which strategy (anatomical or functional) for revascularized patients ?

Computed tomography coronary angiography verSus sTRess cArdiac magneTic rEsonance for the manaGement of sYmptomatic revascularized patients: a cost effectiveness study (STRATEGY study)

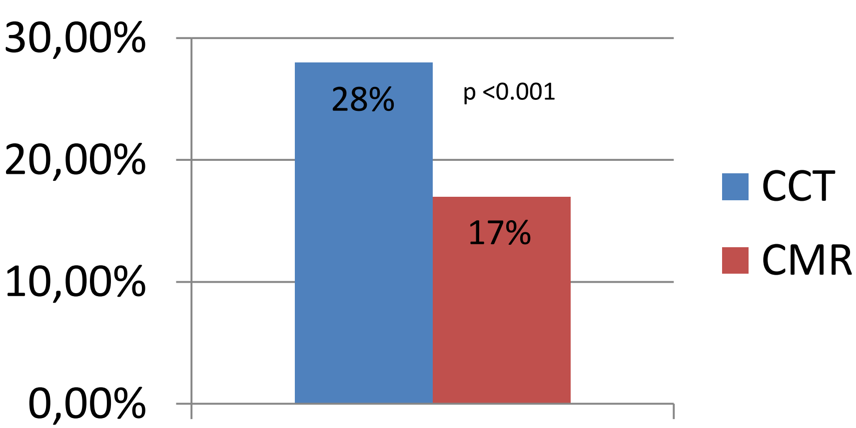
December 2011 → *January 2013*

Symptomatic stented pts → **CCT** / **Stress-CMR**

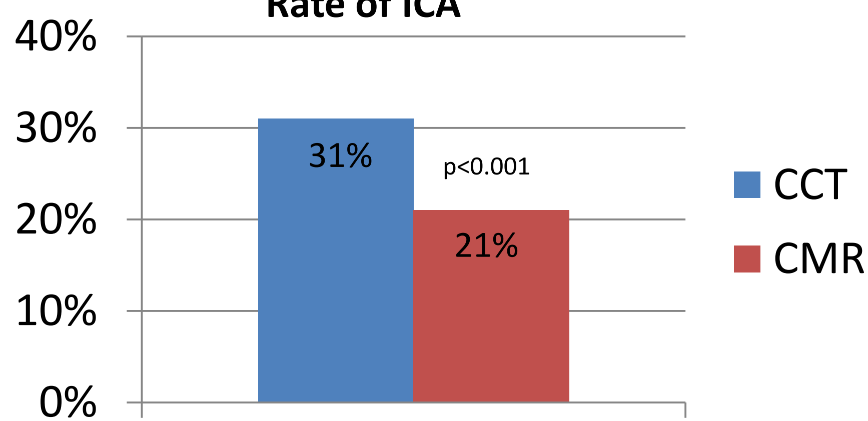
780±370 days →

- **Downstream NI tests**
- **Rate of ICA**
- **Rate of PCI**
- **Radiation exposure**
- **Cumulative costs**
- **MACEs**

Downstream NI tests



Rate of ICA



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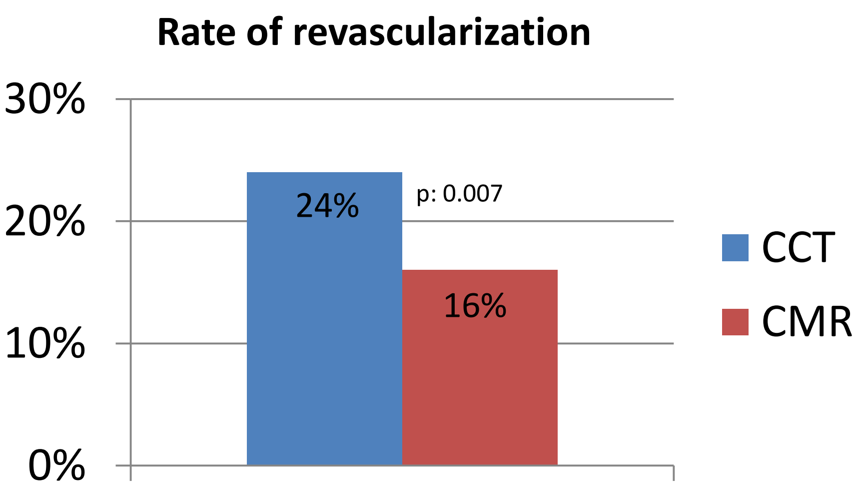

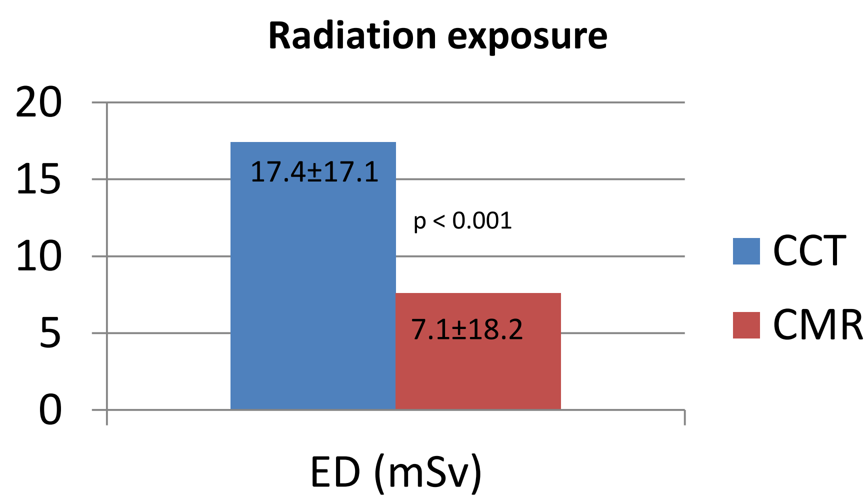

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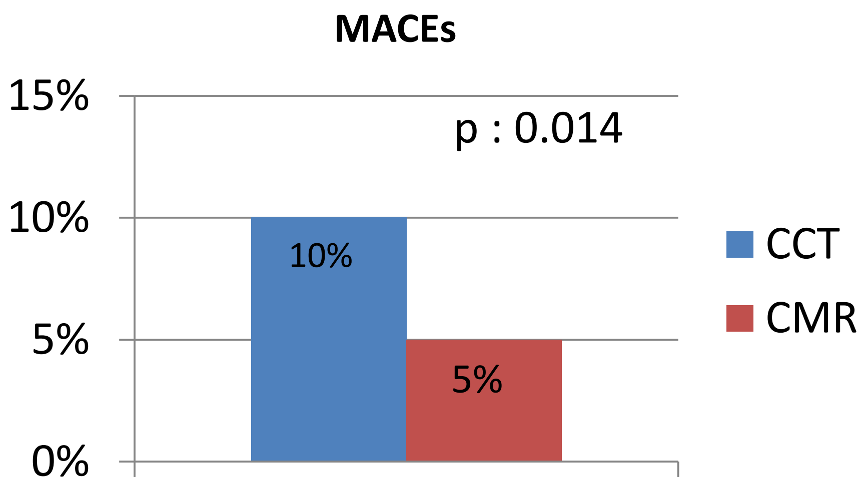
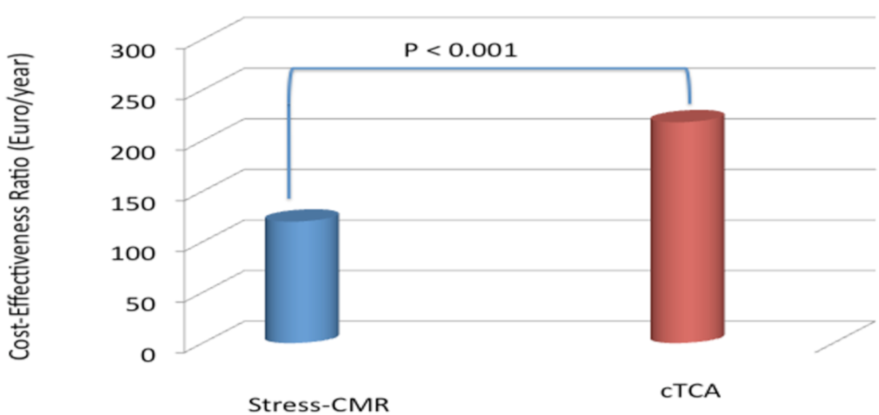


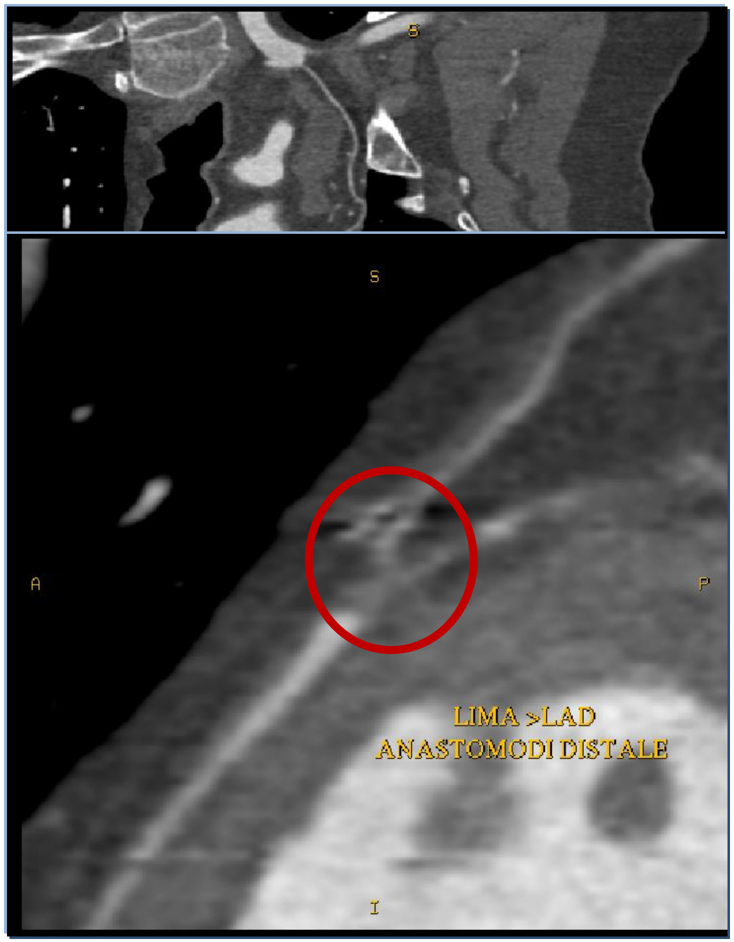


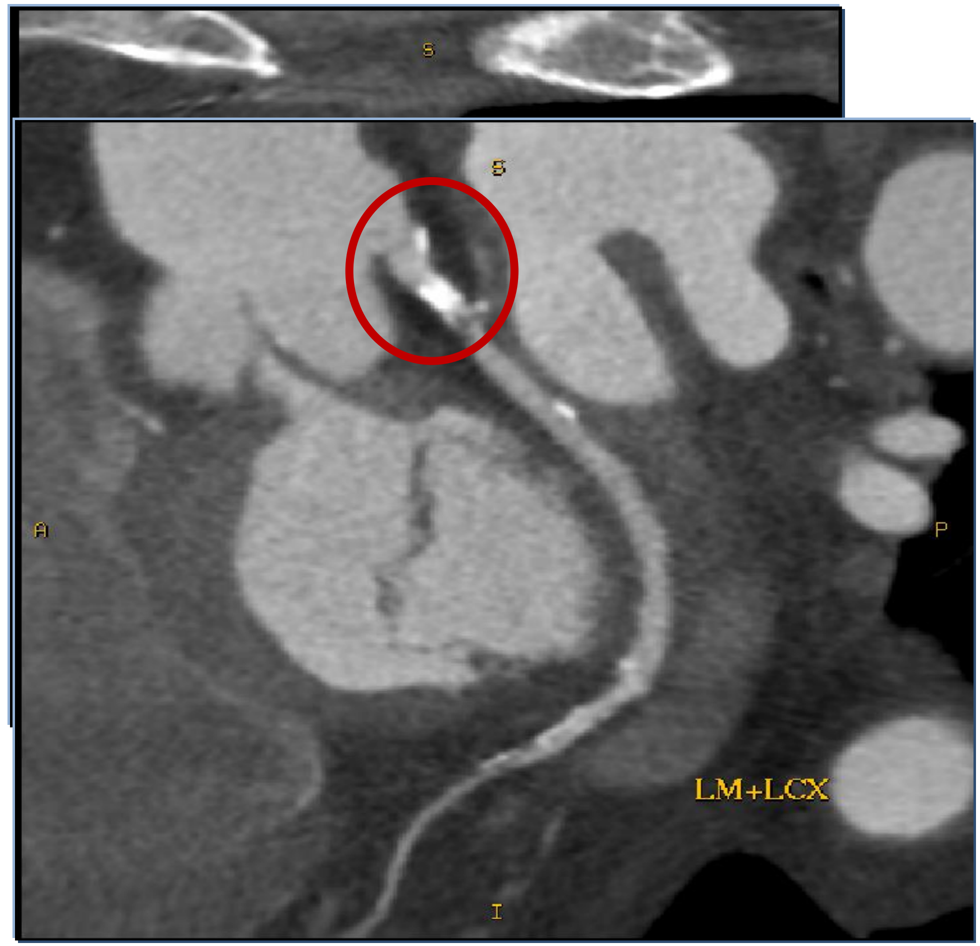
In revascularized patients the functional strategy seems to be superior as compared to anatomical strategy in terms of cost-effectiveness

DIAGNOSTIC WORK-UP OF SYMPTOMATIC PATIENTS FOR CHEST PAIN WITH HISTORY OF REVASCULARIZATION

Clinical case: CMR and planning of revascularization

✓ Male 66 yo with history of previous CABG (LIMA>LAD, SVG>LCX) symptomatic for angina





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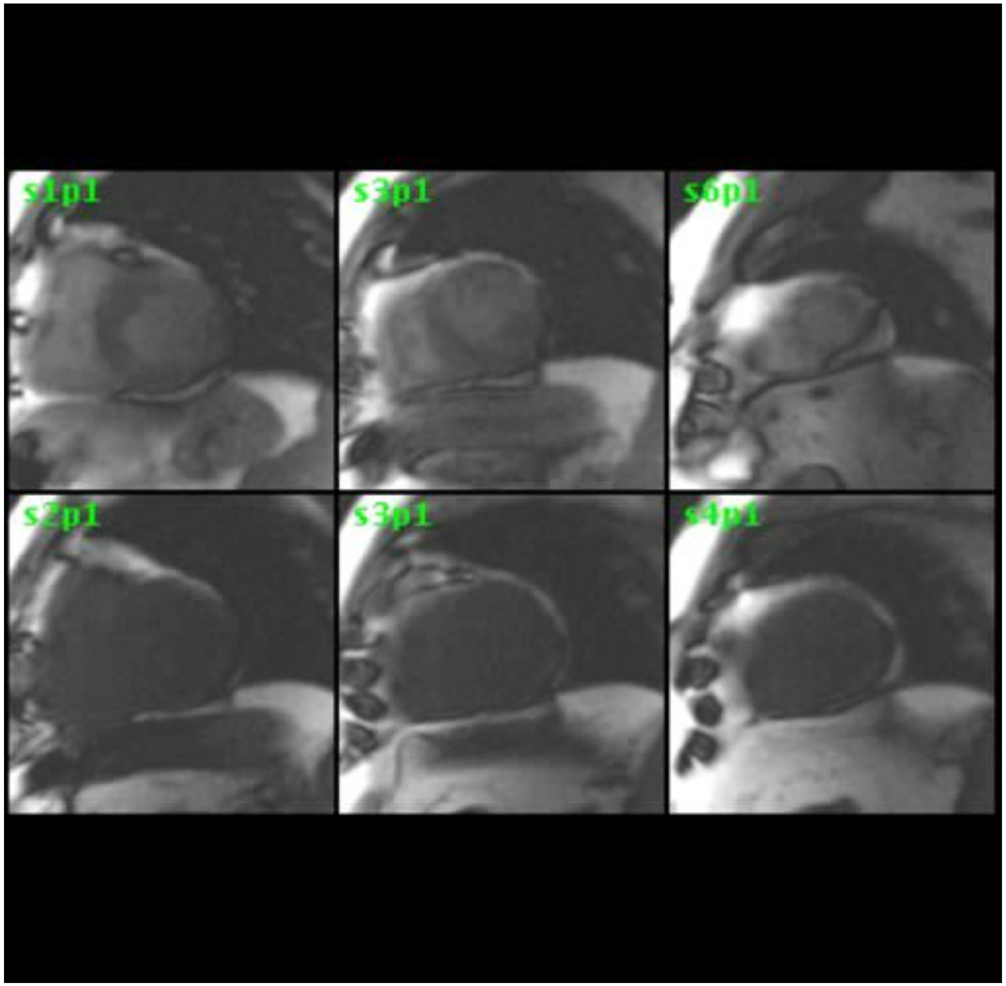

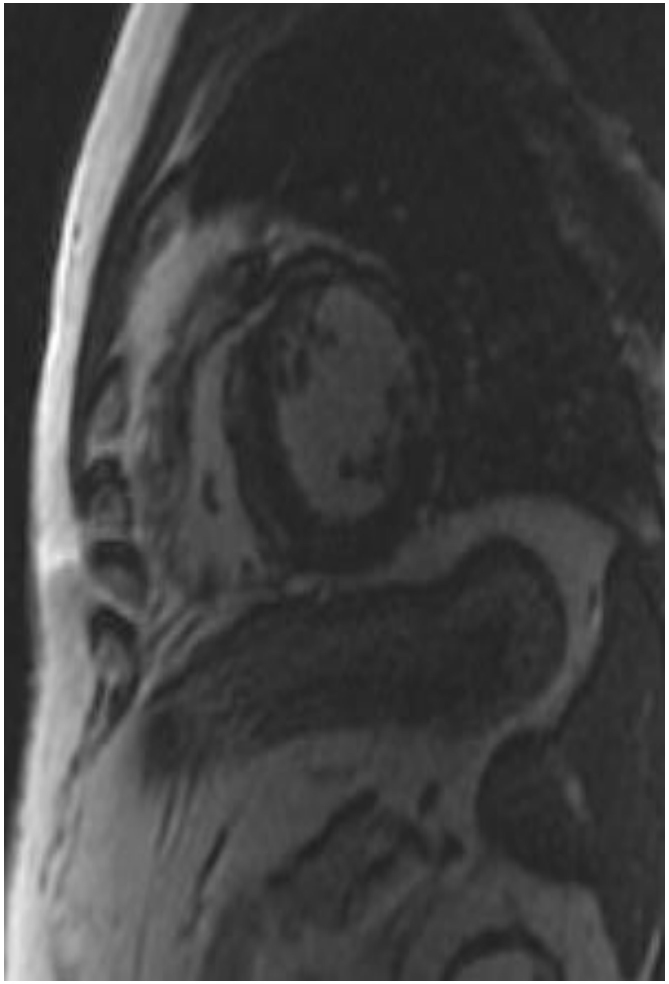

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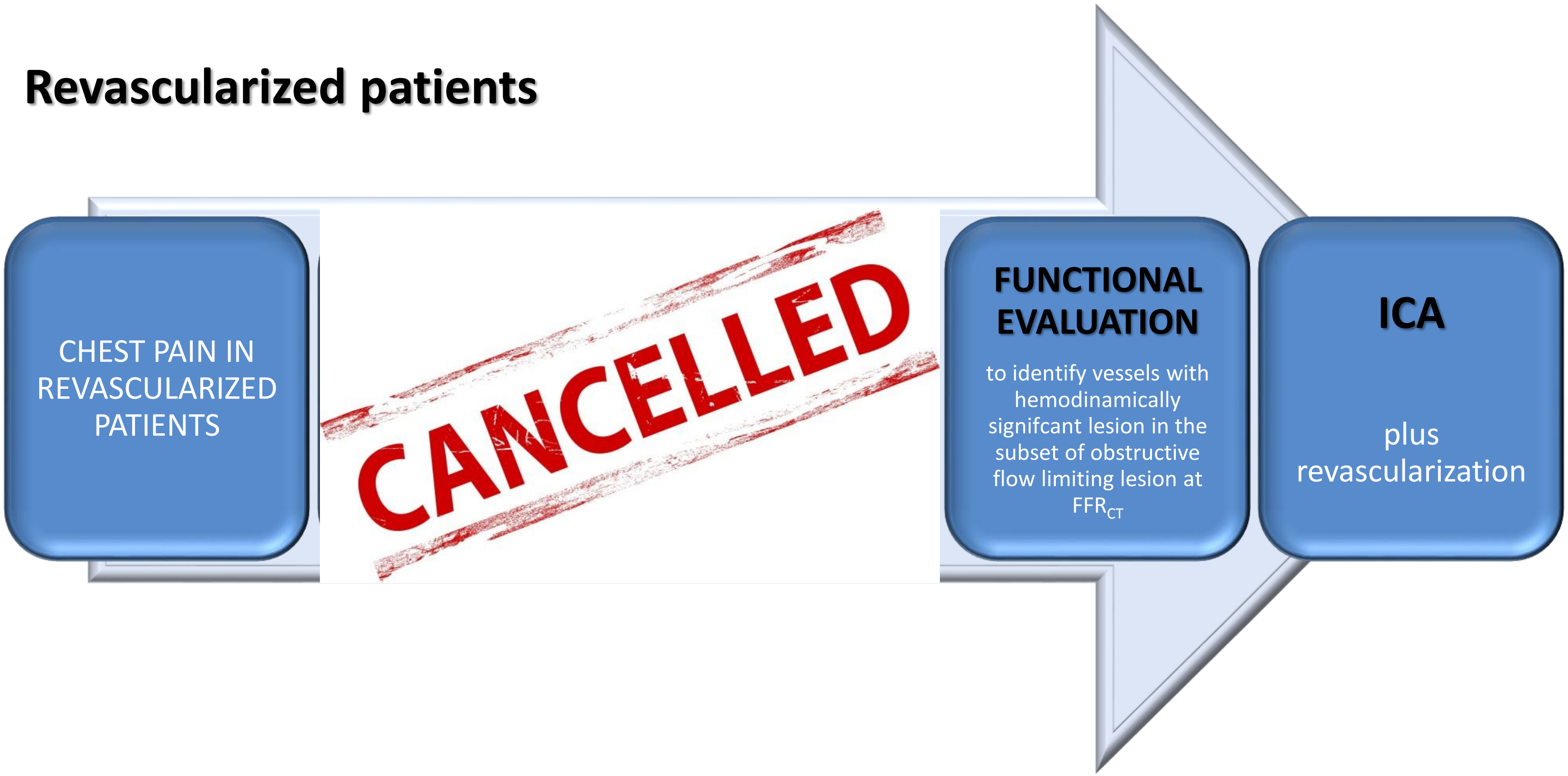
DIAGNOSTIC WORK-UP OF SYMPTOMATIC PATIENTS FOR CHEST PAIN WITH HISTORY OF REVASCULARIZATION

Revascularized patients



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NEW PERSPECTIVES

DECIDE-Gold

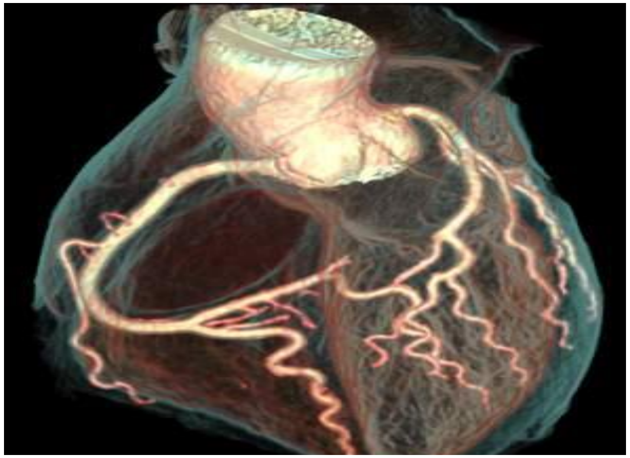
The **DECIDE-Gold** Trial FINAL Protocol

Dual Energy Computed Tomography for Ischemia Determination Compared to "**Gold** Standard"

→ ***DECT vs. invasive FFR***

CREDENCE

FFR CT vs. Stress CMR/SPECT ←



The PERFECTION STUDY

→ ***FFR CT vs. Stress CTP***

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CONCLUSION

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European Heart Journal
doi:10.1093/eurheartj/ehv748

EDITORIAL

Anatomy and physiology in ischaemic heart disease: a second honeymoon?

Gianluca Pontone*

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Centro Cardiologico Monzino

Pontone G, Eur Heart J 2016

THANKS

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January / December 2017

Hands on
Cardiac Magnetic
Resonance

Course venue
Centro Cardiologico Monzino IRCCS, Milano

January / December 2017

Hands on
Cardiac CT

Training course

Course venue
Centro Cardiologico Monzino IRCCS, Milano

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