Ecocardiochirurgia 2016,
Milano 22-23 marzo

Paziente con sospetta cardiopatia ischemica cronica. Perché dovremmo rivolgerci allo stress MR potendo disporre di metodiche più pratiche (ecostress) e consolidate (SPECT) ?

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FIGURE 2 Duke Treadmill Score Calculation and Utility

$$\text{Duke Treadmill Score} = \text{Exercise Duration (min)} - 5\,(\text{ST Deviation (mm)}) - 4\,(\text{Angina Index})$$

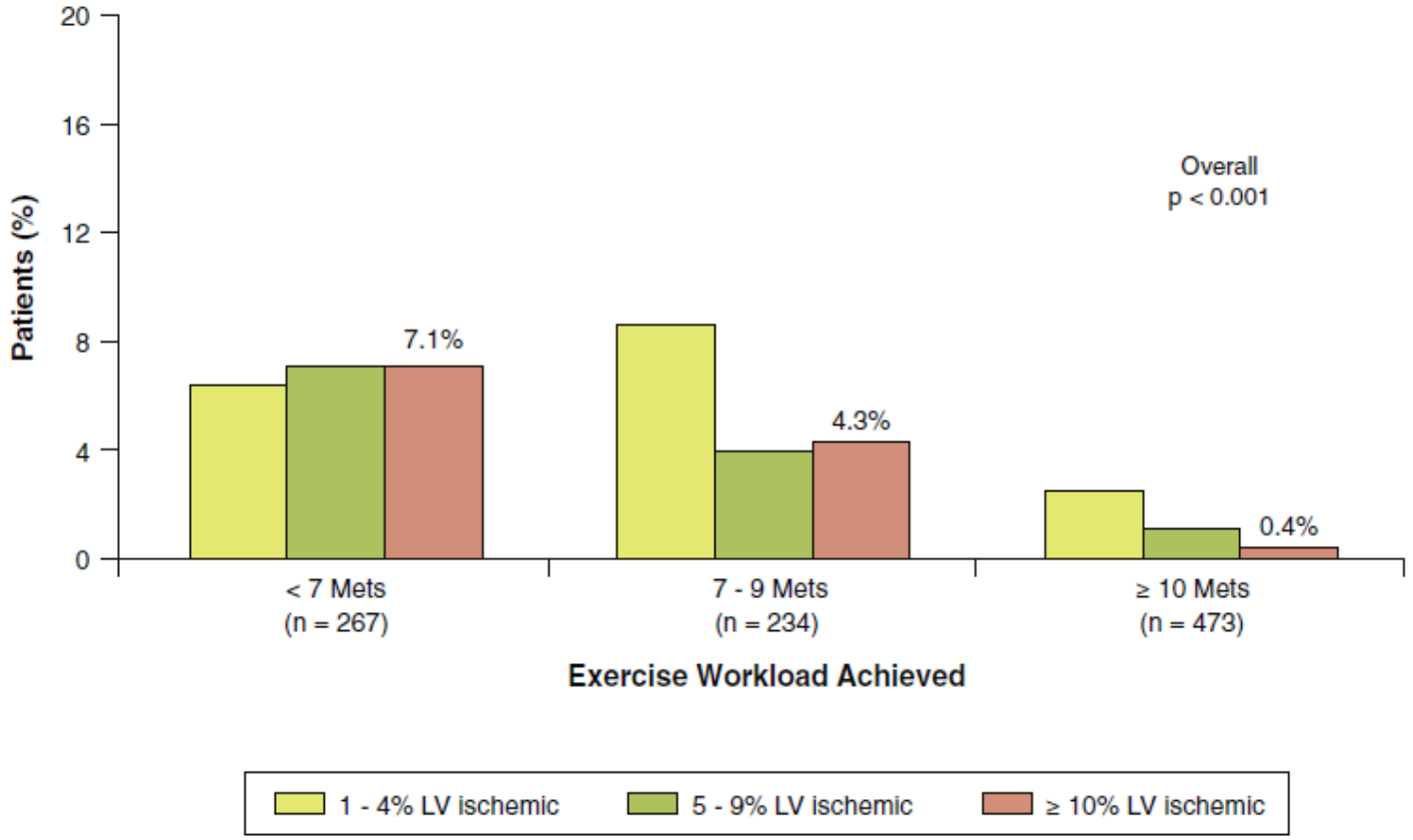
Angina Index

0 – none, 1 – typical angina, 2 – angina causing test cessation

Score	Risk Group	Stenosis ≥ 75%	Multivessel Disease	1-Year Mortality
≥ 5	Low	40.1%	23.7%	0.25%
-10 to 4	Intermediate	67.3%	55.0%	1.25%
≤ -11	High	99.6%	93.7%	5.25%

Relationship between ischemia extension and exercise capacity

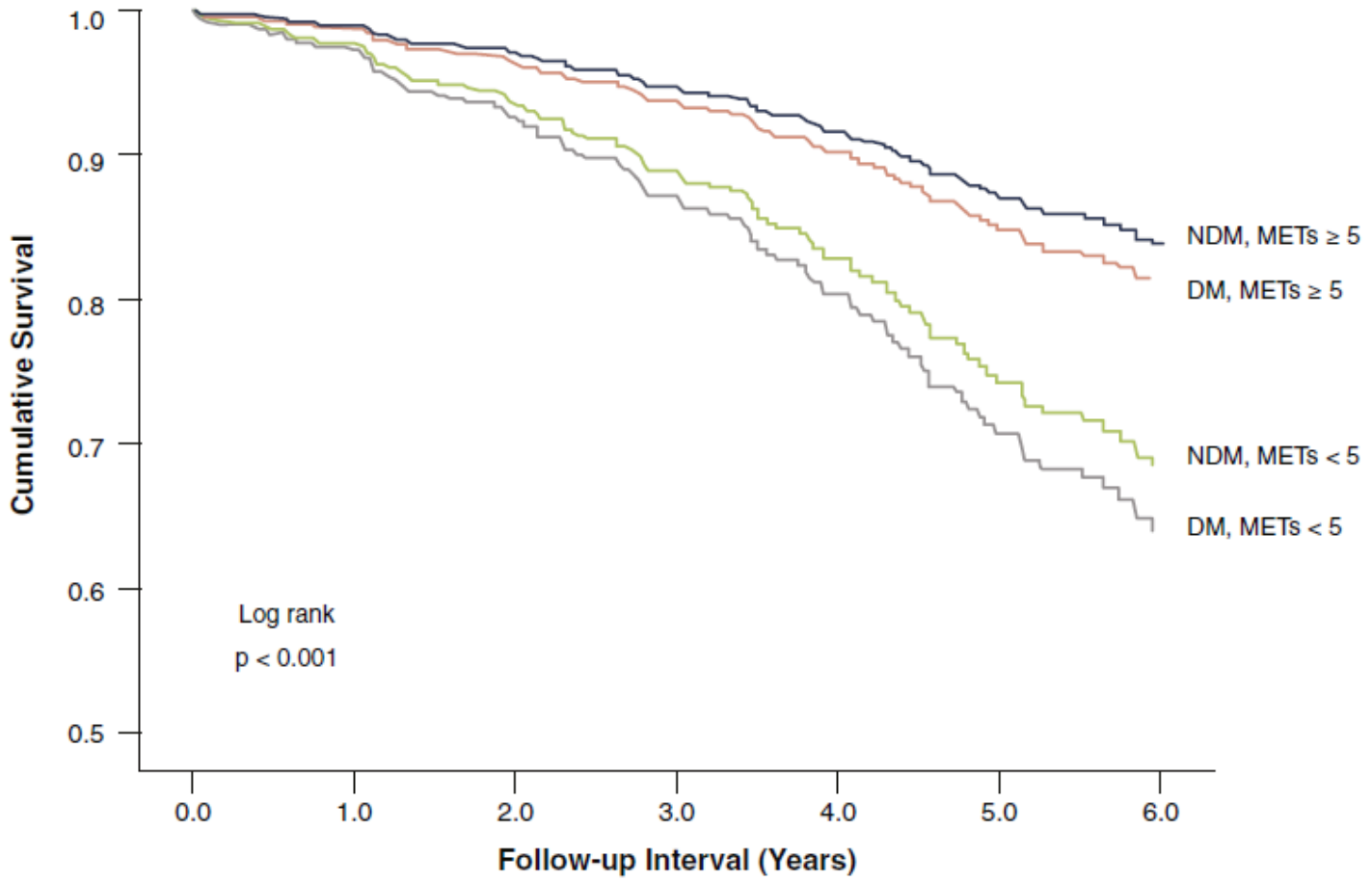
FIGURE 1 Prevalence of Increasing Percentages of LV Ischemia Stratified by Exercise Workload in Patients Undergoing Exercise Stress Electrocardiography



Bourque, JACC 2009

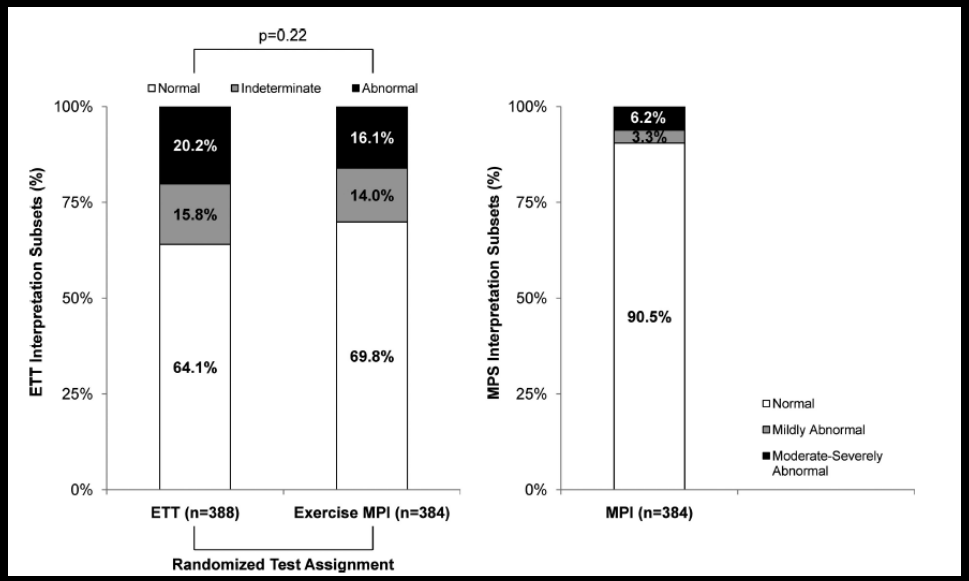
Relationship between survival, diabetes and exercise capacity

FIGURE 5 Survival by Diabetes Status and Stress Exercise Workload Achieved



Pedala, J Nucl Cardiol 2014

WOMAN trial, Circulation 2011



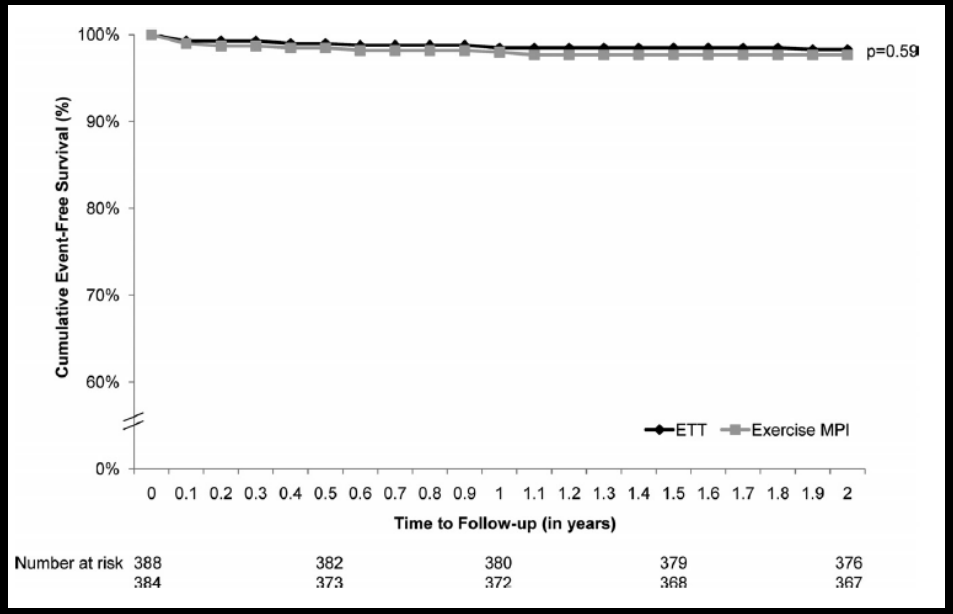
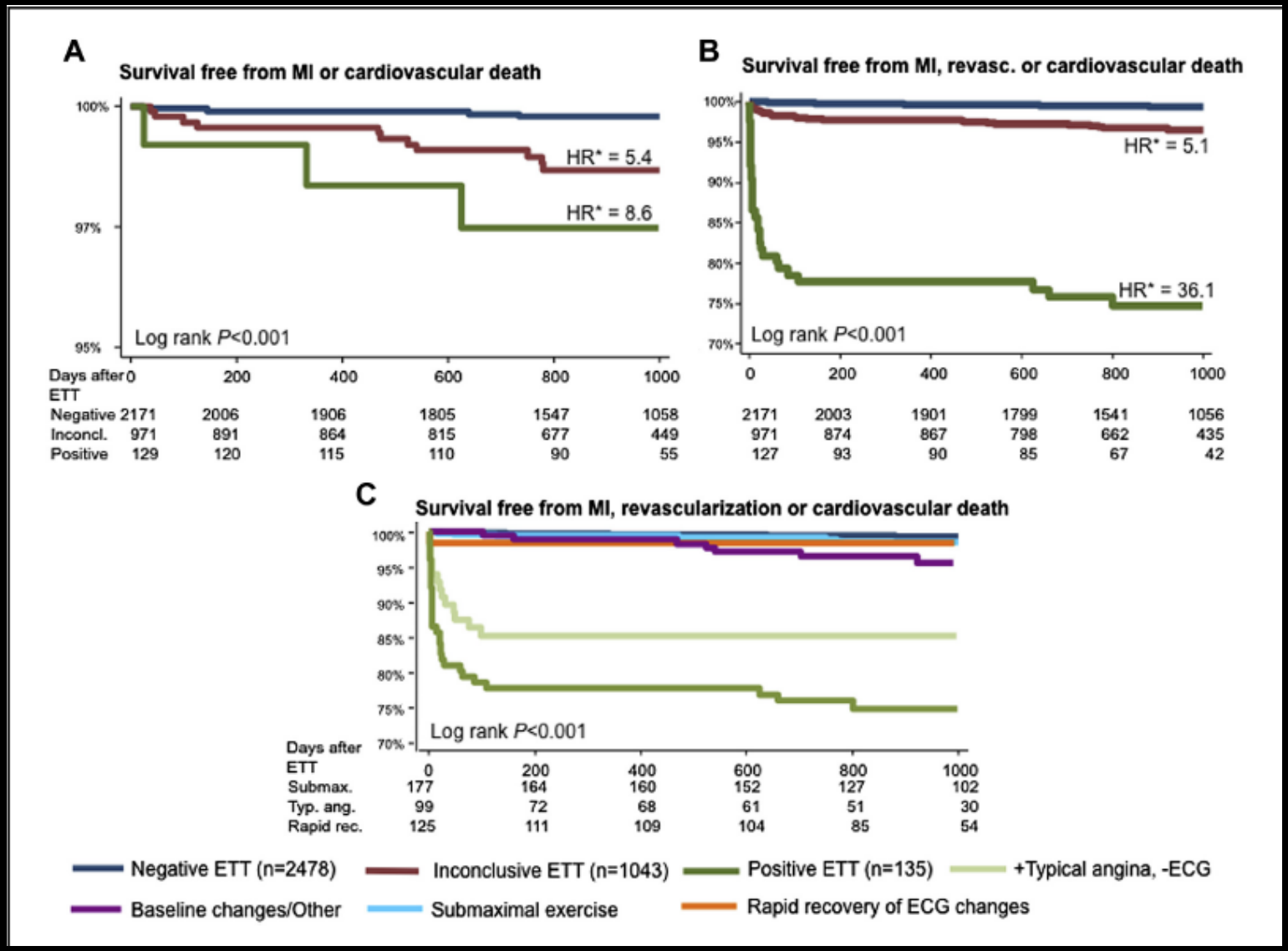


Table 2. Exercise Test and Index Duke Activity Status Index Results by Randomized Test Strategy: Exercise Treadmill Test vs Exercise Myocardial Perfusion Imaging

	ETT (n=388)	Exercise MPI (n=384)	*P*
DASI METs	11.7 (8.2, 14.5)	12.2 (8.3, 14.5)	0.71
Resting			
Heart rate, bpm	76 (68, 86)	72 (65, 81)	<0.001
Blood pressure, mm Hg	132/78	132/78	0.59/0.80
Peak exercise			
Heart rate, bpm	149 (137, 160)	149 (139, 158)	0.99
Blood pressure, mm Hg	176/82	170/80	0.09/0.10
Heart rate recovery at 1 min, bpm	23 (16, 32)	23 (15, 33)	0.65
% with ≤12 bpm	20.4	17.2	0.32
≥85% predicted maximal heart rate, %	88.1	88.4	0.88
Peak exercise METs	8.2 (7.0, 10.1)	8.5 (7.0, 10.1)	0.50
Maximum ST-segment Δ	−0.5 (0.0, −1.1)	−0.4 (0.0, −1.0)	0.38
Maximum ST-segment Δ, if abnormal	−1.5 (−1.0, −1.9)	−1.4 (−1.0, −1.9)	0.72
% with ≥1 mm ST-segment Δ	35.9	32.5	0.32
No. of abnormal leads	3 (2, 5)	4 (3, 6)	0.18
Time to ≥1 mm ST-segment Δs, min	5.0 (3.0, 7.0)	5.0 (3.0, 7.0)	0.79
Recovery time to ST segment <1 mm, min	2.0 (1.0, 3.0)	1.2 (1.0, 4.8)	0.94
Exertional symptoms, %			
Chest pain	13.2	11.6	0.51
Dyspnea	37.0	42.2	0.14
Fatigue	51.4	52.8	0.71

Exercise Treadmill Testing prognostic value



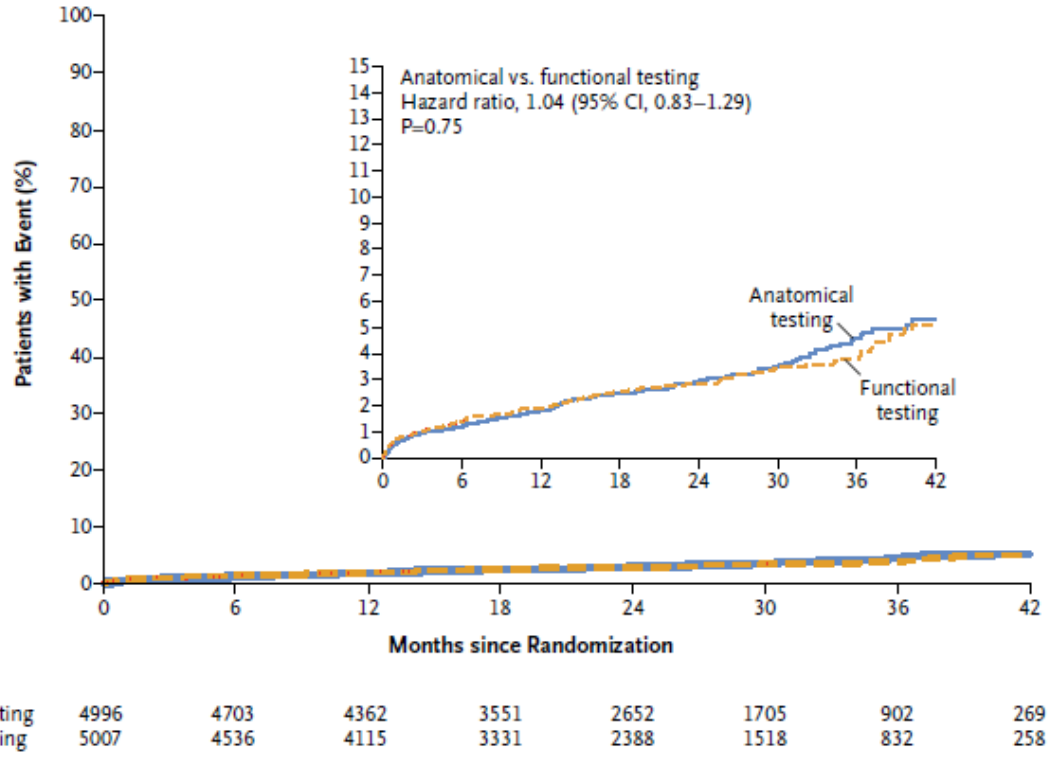
Christman, JACC 2014

Elderly

- functional limitations and comorbidities limit exercise testing
- reduced prognostic value of ST-depression
- prognostic importance of exercise capacity
- reduced prognostic value of DTS

IMAGING

Coronary CT vs SPECT



No. at Risk								
Anatomical testing	4996	4703	4362	3551	2652	1705	902	269
Functional testing	5007	4536	4115	3331	2388	1518	832	258

Figure 2. Kaplan–Meier Estimates of the Composite Primary End Point as a Function of Time after Randomization.
The graph shows the unadjusted Kaplan–Meier estimates of the primary composite end point (death from any cause, nonfatal myocardial infarction, hospitalization for unstable angina, or major procedural complication). The adjusted hazard ratio for a CTA strategy, as compared with a usual-care strategy of functional testing, was 1.04 (95% CI, 0.83 to 1.29), with adjustment for age, sex, risk equivalent of coronary artery disease (history of diabetes, peripheral arterial disease, or cerebrovascular disease), and the prespecification of the intended functional test if the patient were to be randomly assigned to the functional-testing group. The inset shows the same data on an enlarged y axis.

PROMISE trial N Eng J Med 2015

CT+FFR vs Coronary angiography

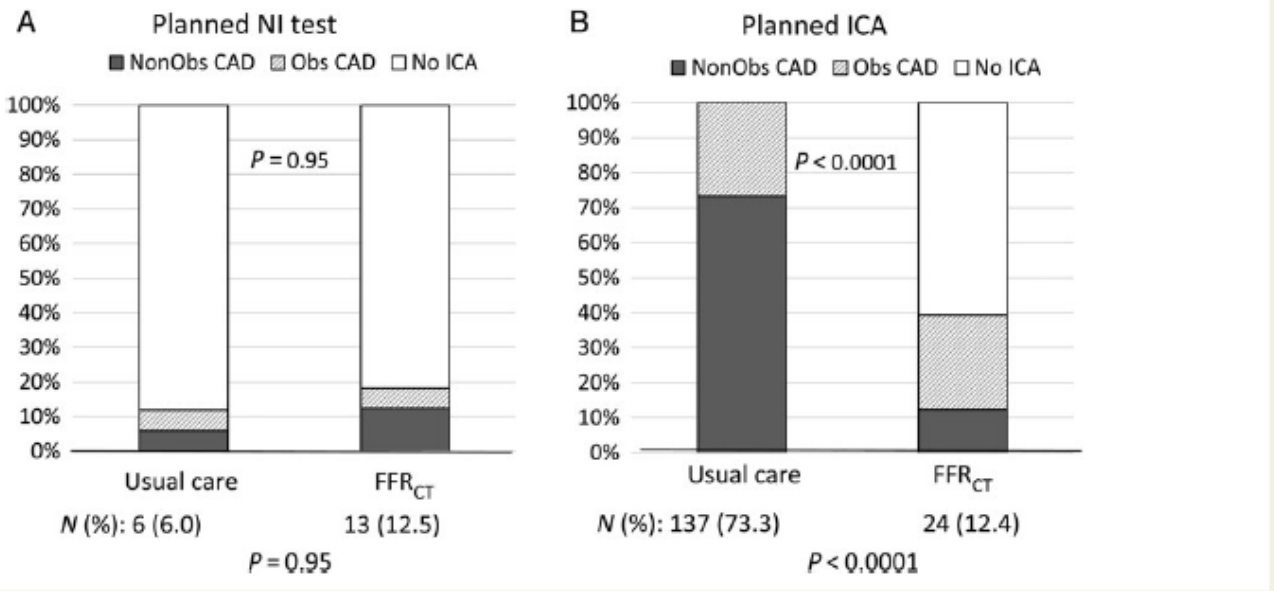
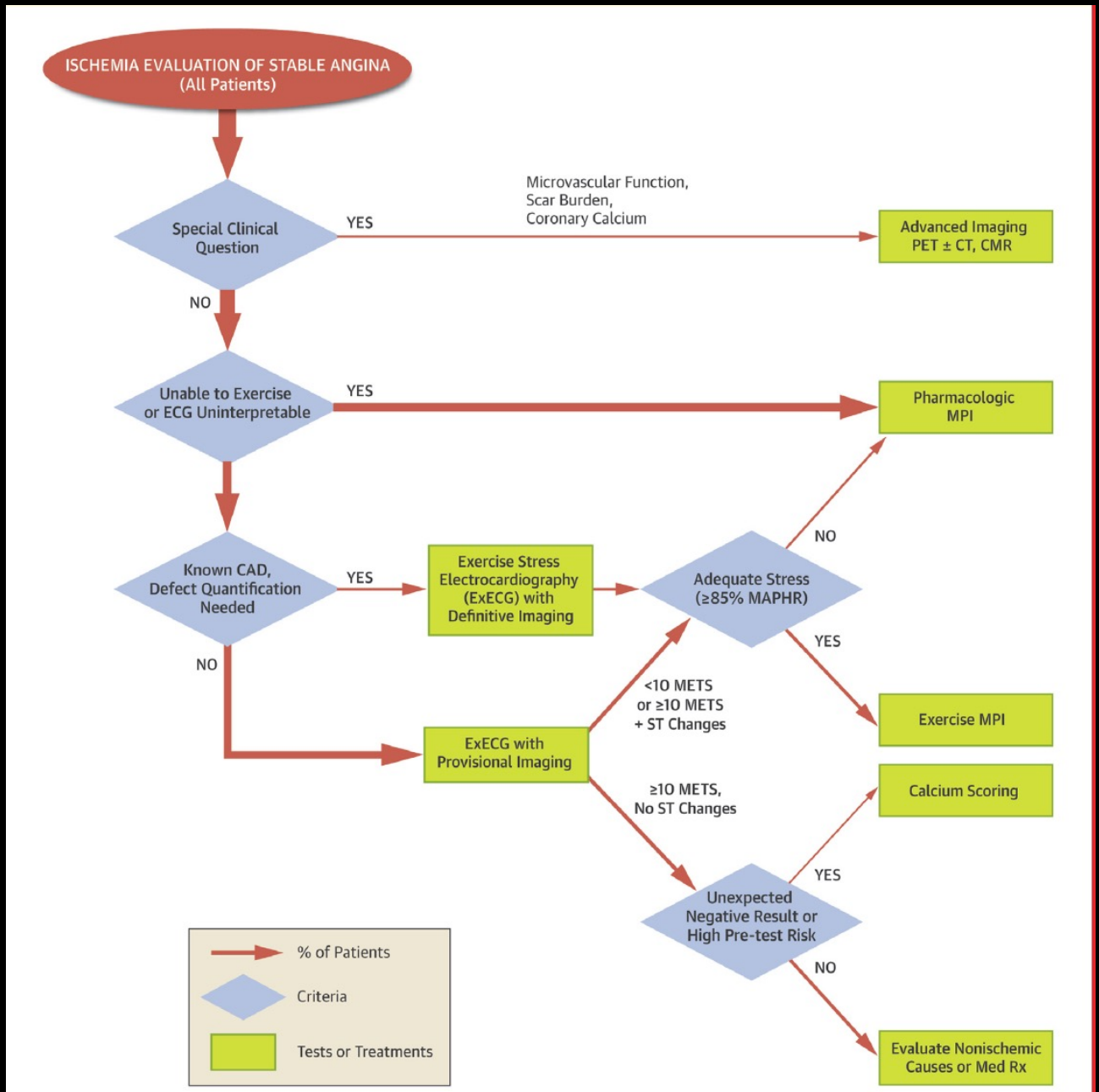
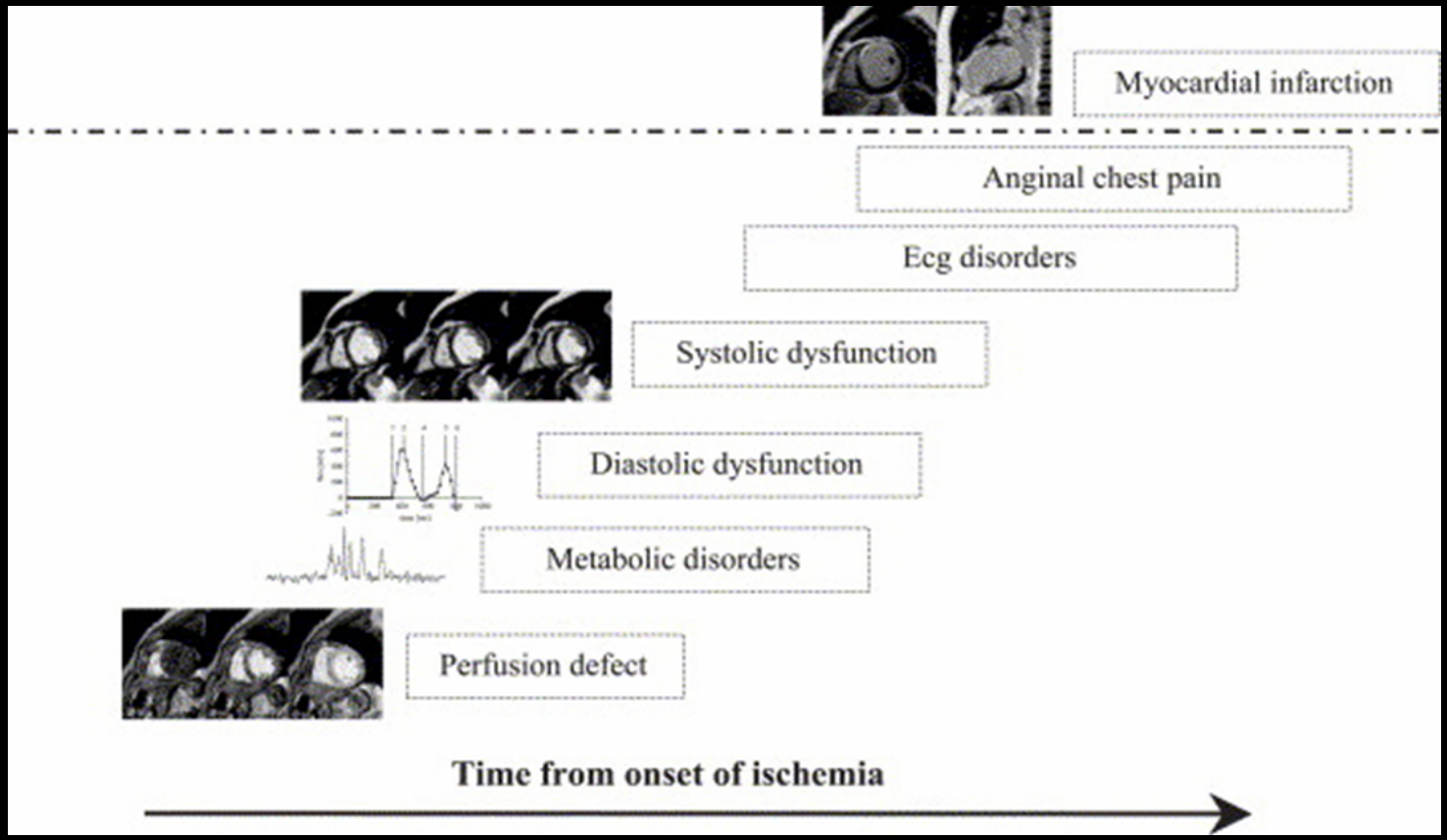


Figure 2 Determination of the rate of invasive catheterization without obstructive coronary artery disease. NI, non-invasive; ICA, invasive coronary angiography; Obs CAD, obstructive coronary artery disease; FFR_{CT}, computation of fractional flow reserve from coronary computed tomographic angiography data.

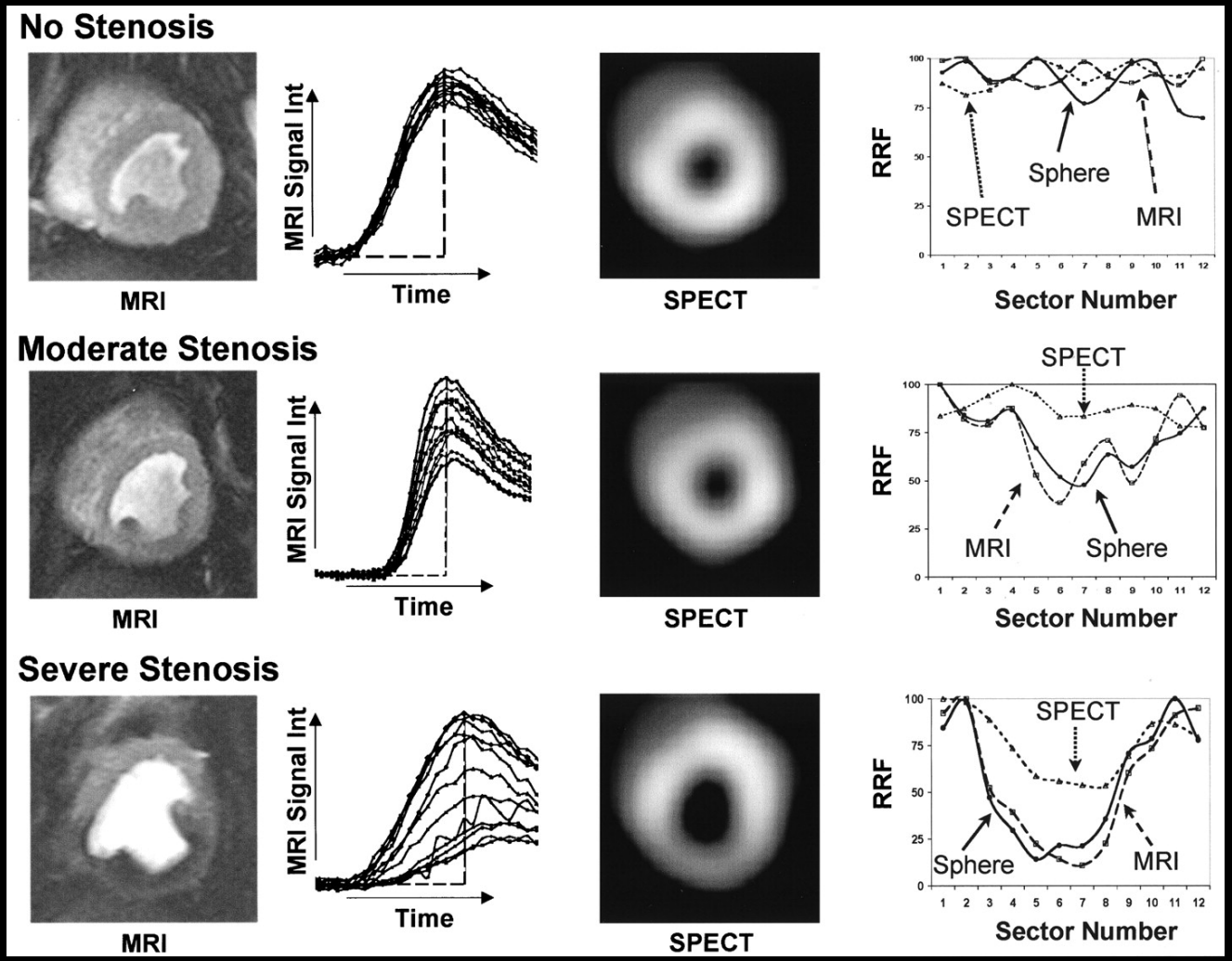
PLATFORM trial EHJ 2015



Bourque, J.M. et al. J Am Coll Cardiol Img. 2015; 8(11):1309-21.

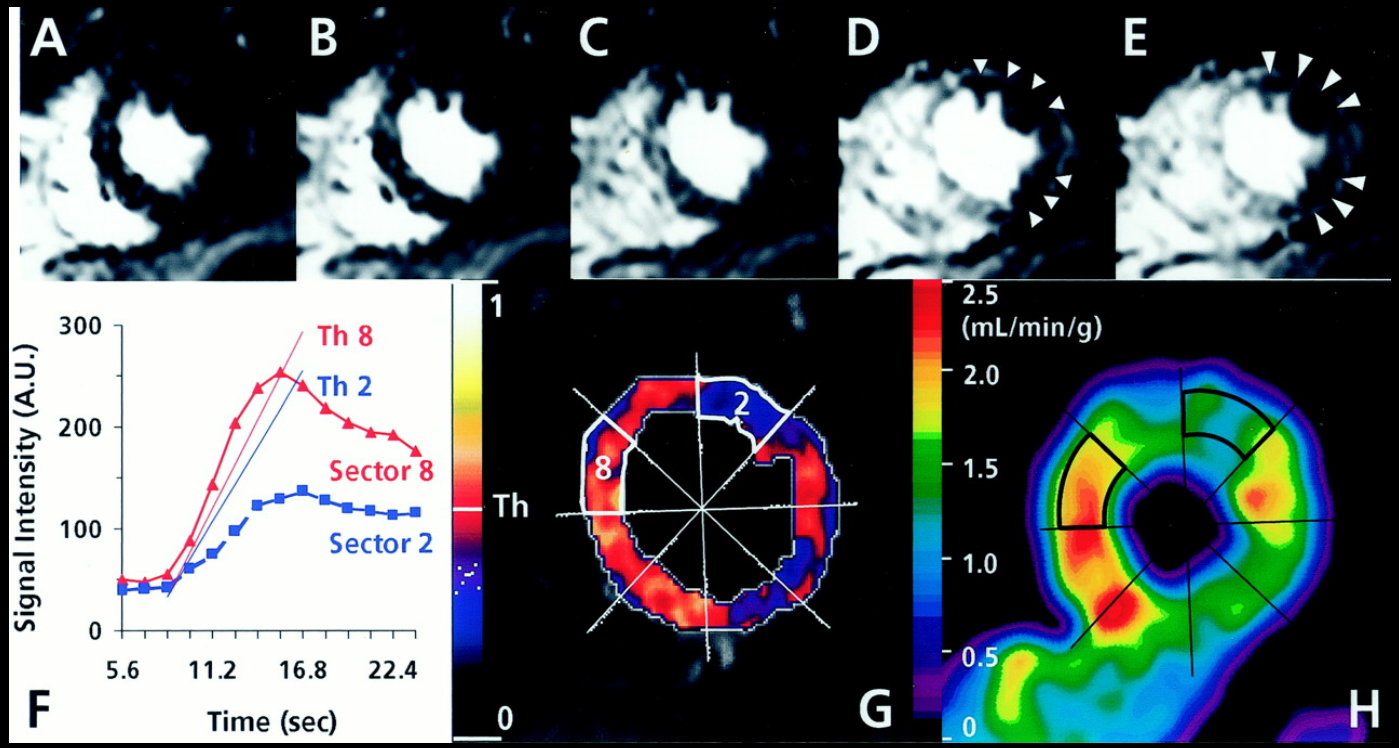

Myocardial infarction
Anginal chest pain
Ecg disorders
Systolic dysfunction
Diastolic dysfunction
Metabolic disorders
Perfusion defect
Time from onset of ischemia

MRFP, 99mTc-sestamibi SPECT, and microsphere data during pharmacological vasodilation in animals with no (top), moderate (middle), and severe (bottom) reductions in microsphere flow in the circumflex bed



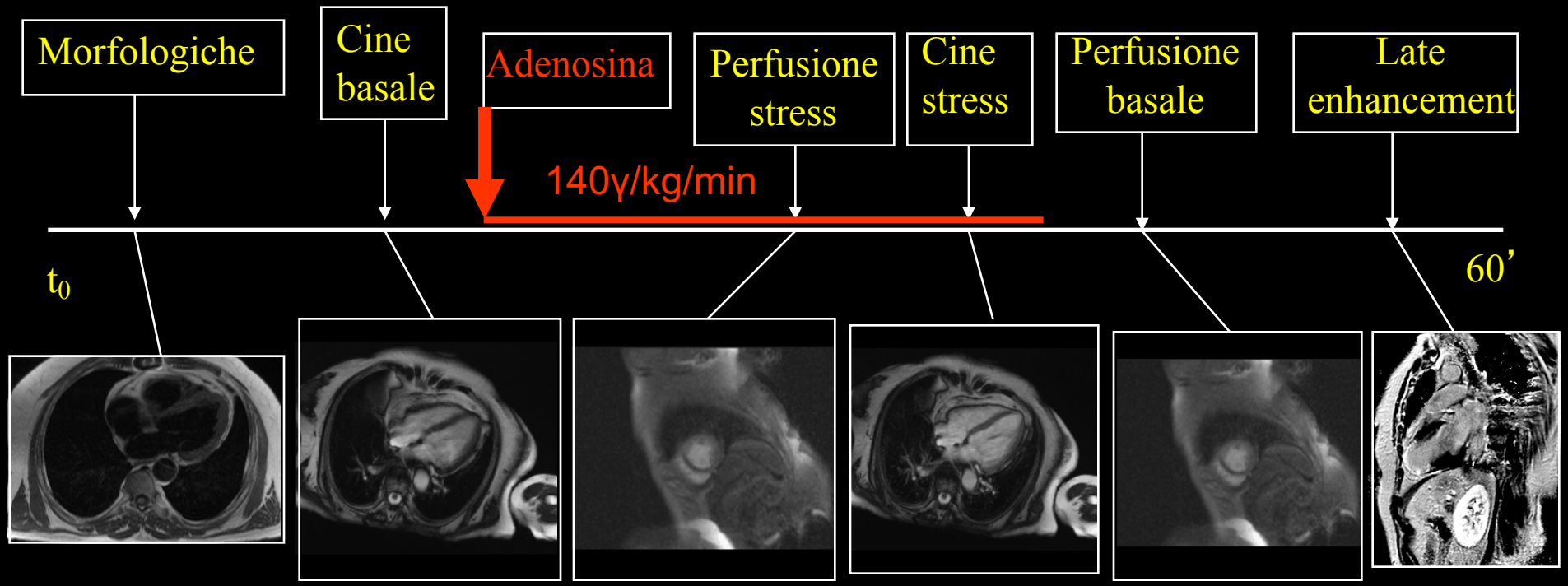
Lee, D. C. et al. Circulation 2004;110:58-65

In this patient with stenoses in the left anterior descending coronary artery and the right coronary artery, the transit of CM through the left ventricular myocardium during hyperemia demonstrates delayed wash-in in both the subendocardial and subepicardial layers of both arteries (A through E, arrowheads)

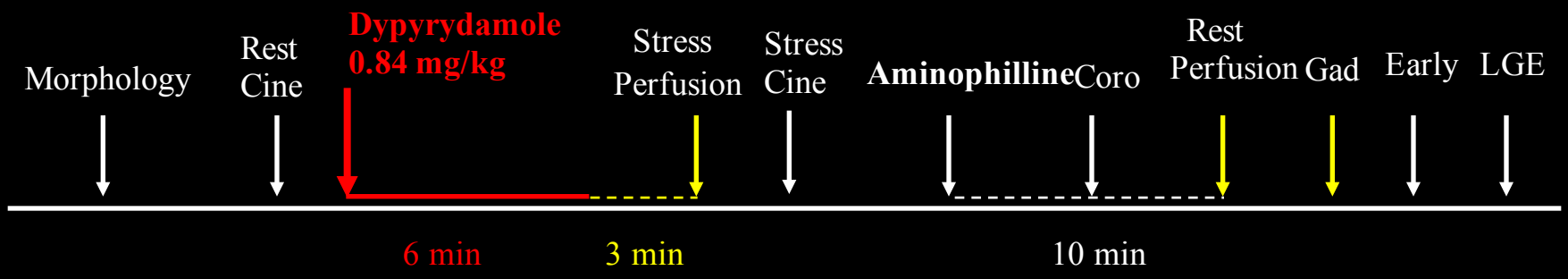


Schwitter, J. et al. Circulation 2001;103:2230-2235

Stress-test con adenosina



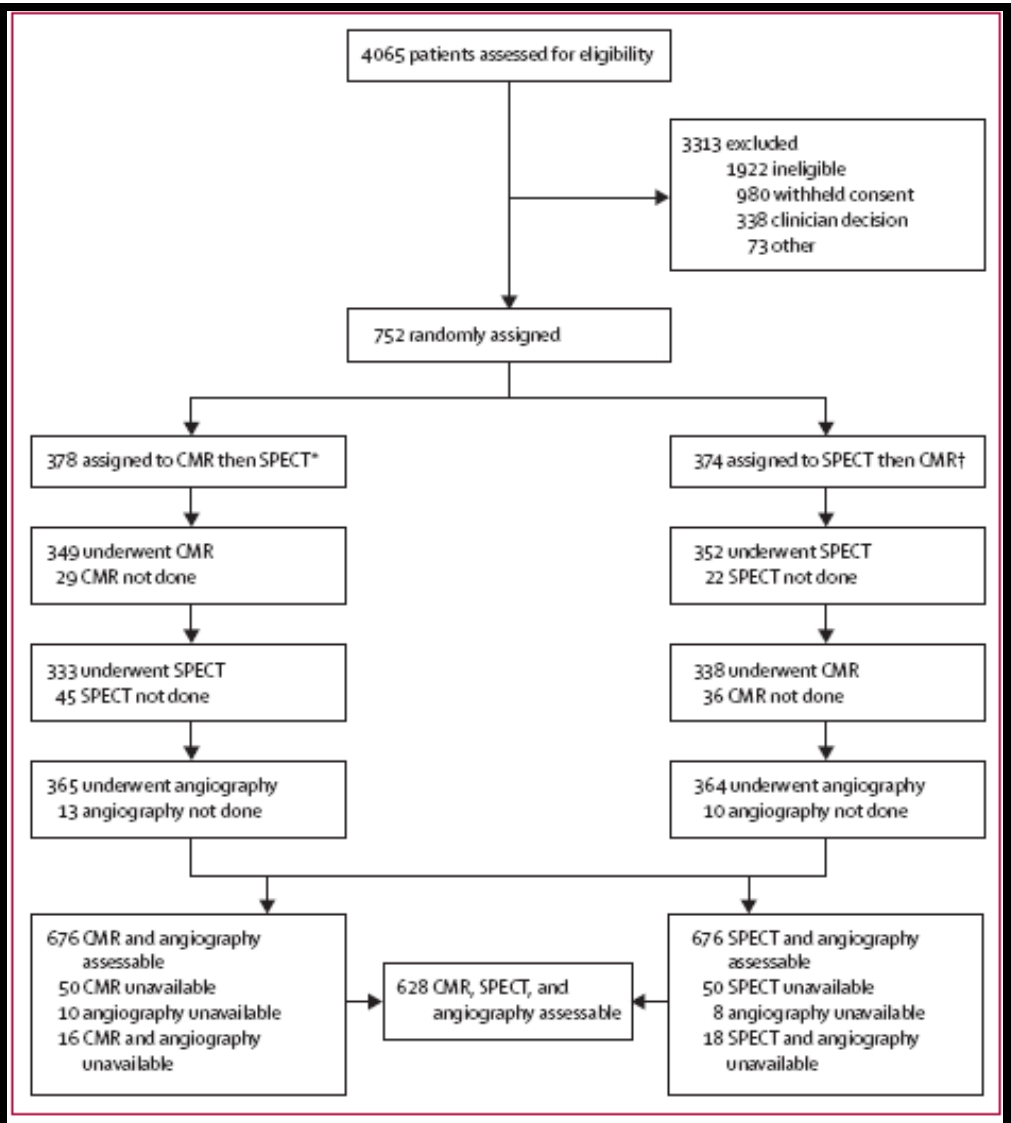
Dypyrydamole stress CMR

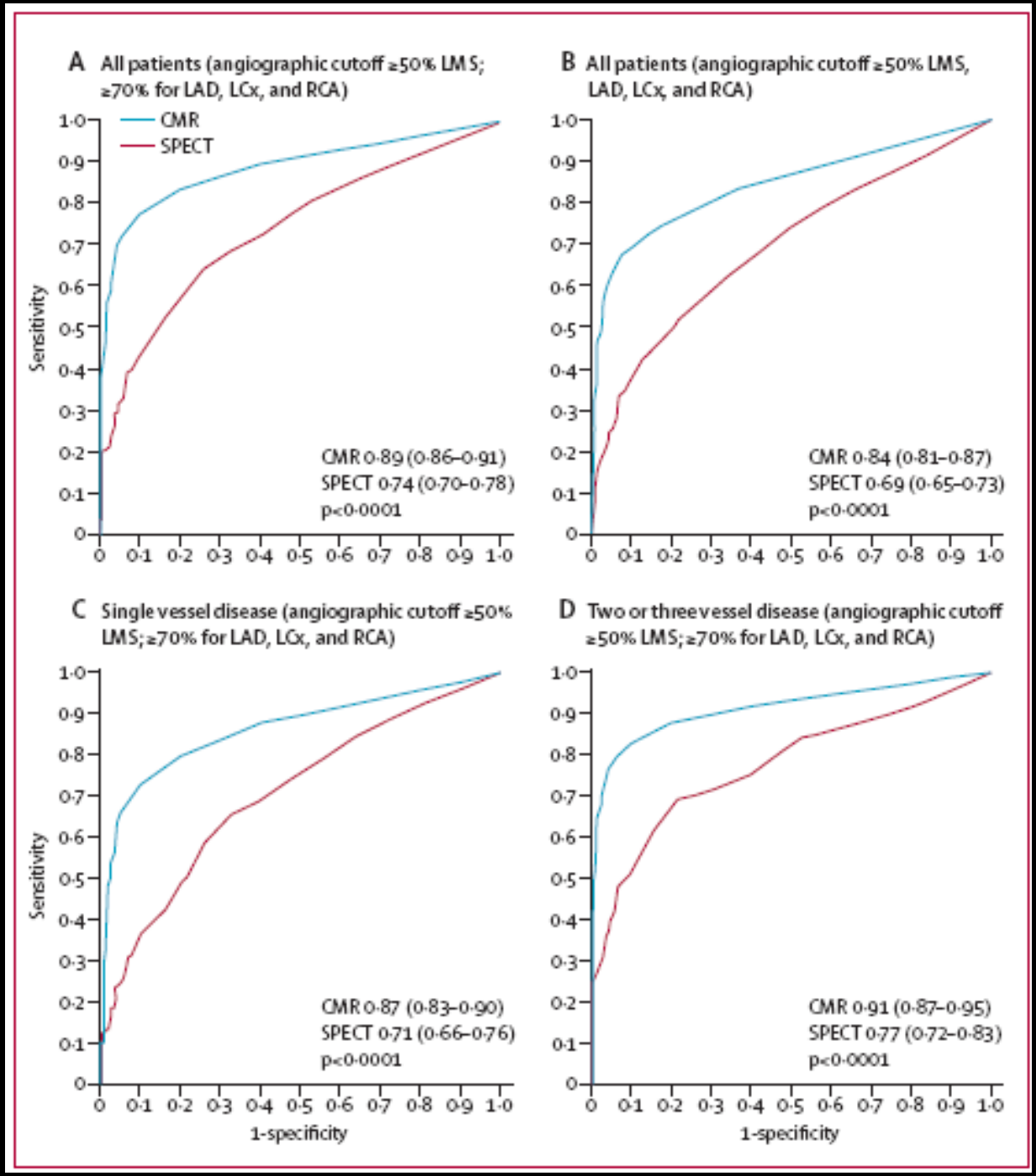


40 min

Cardiovascular magnetic resonance and single-photon emission computed tomography for diagnosis of coronary heart disease (CE-MARC): a prospective trial

John P Greenwood, Neil Maredia, John F Younger, Julia M Brown, Jane Nixon, Colin C Everett, Petra Bijsterveld, John P Ridgway, Aleksandra Radjenovic, Catherine J Dickinson, Stephen G Ball, Sven Plein




A All patients (angiographic cutoff ≥50% LMS; ≥70% for LAD, LCx, and RCA)
CMR
SPECT
Sensitivity
CMR 0·89 (0·86–0·91)
SPECT 0·74 (0·70–0·78)
p<0·0001
B All patients (angiographic cutoff ≥50% LMS, LAD, LCx, and RCA)
CMR 0·84 (0·81–0·87)
SPECT 0·69 (0·65–0·73)
p<0·0001
C Single vessel disease (angiographic cutoff ≥50% LMS; ≥70% for LAD, LCx, and RCA)
Sensitivity
CMR 0·87 (0·83–0·90)
SPECT 0·71 (0·66–0·76)
p<0·0001
1-specificity
D Two or three vessel disease (angiographic cutoff ≥50% LMS; ≥70% for LAD, LCx, and RCA)
CMR 0·91 (0·87–0·95)
SPECT 0·77 (0·72–0·83)
p<0·0001
1-specificity

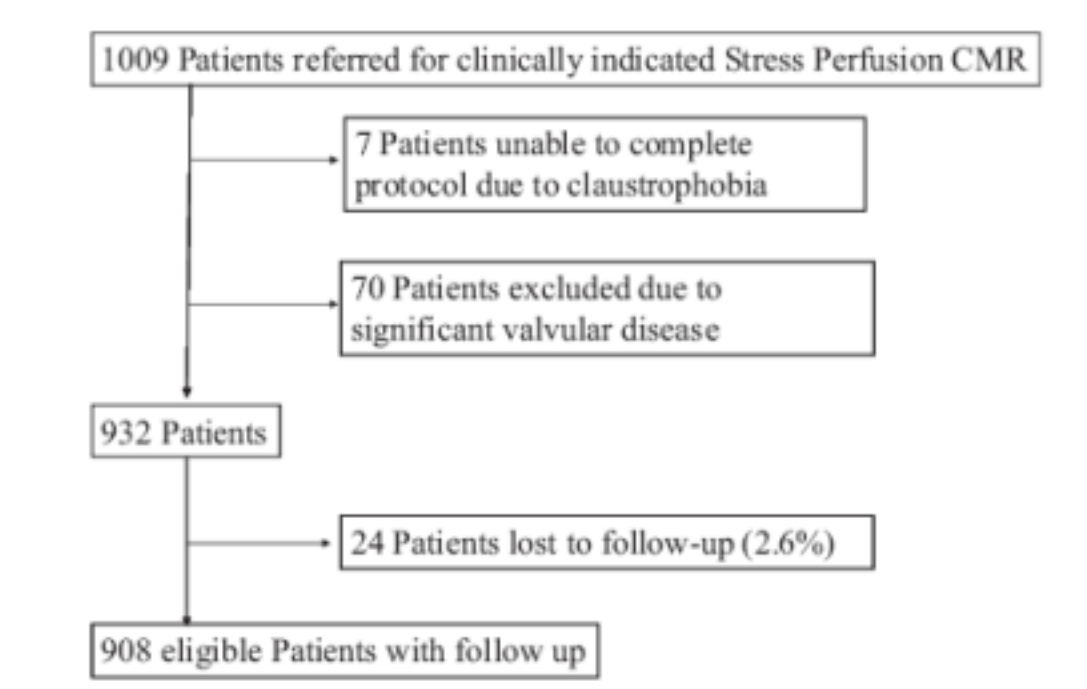
STRENGTH

- prospective trial
- large number of patients
- coronary angiography as gold standard in all patients
- CMR diagnostic accuracy in agreement with previous studies

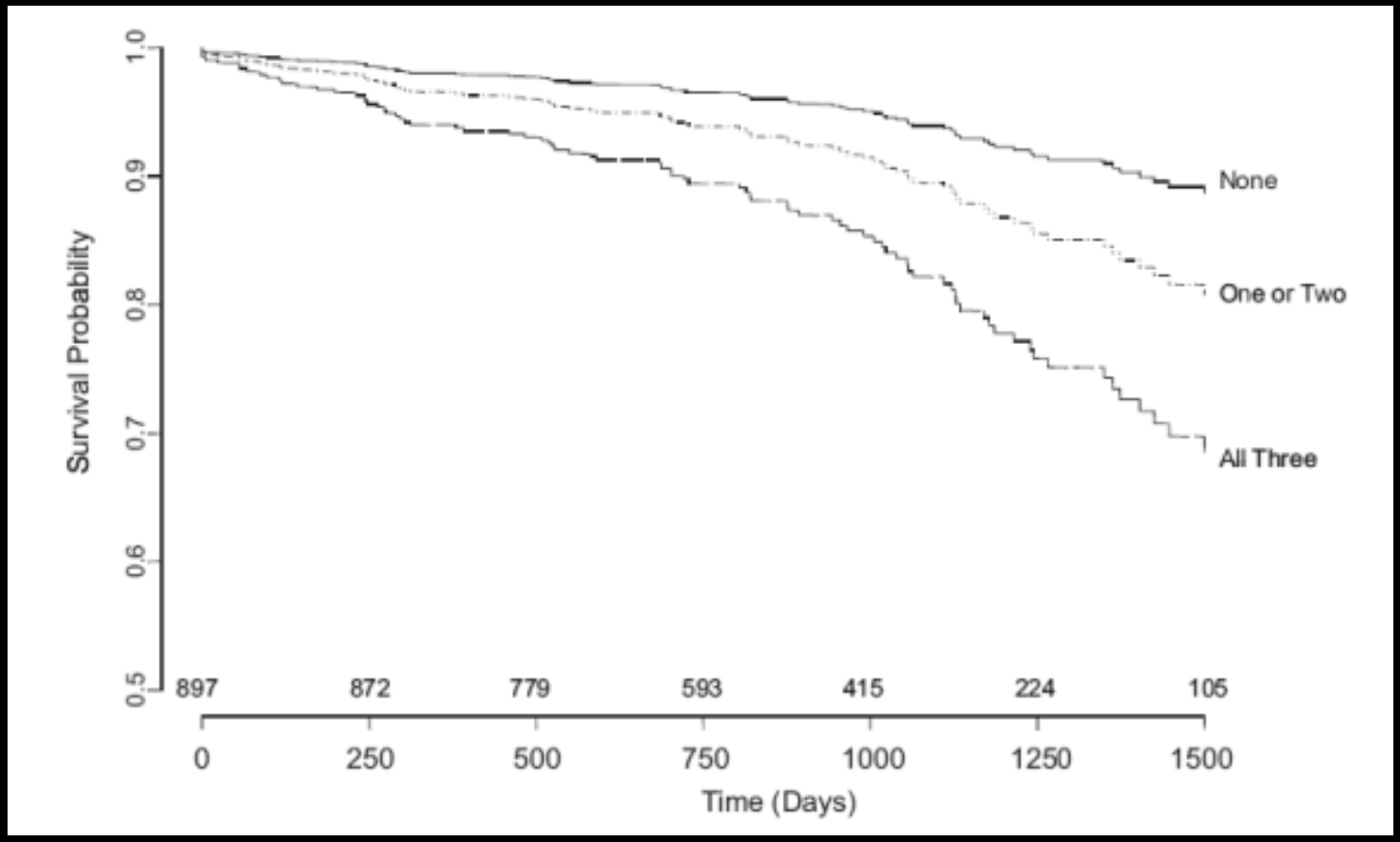
LIMITATIONS

- SPECT diagnostic accuracy under standard
- monocentric experience
- high number of patients with SPECT of inadequate quality

Incremental prognostic significance of combined cardiac magnetic resonance imaging, adenosine stress perfusion, delayed enhancement and left ventricular function over Preimaging information for the prediction of adverse events.

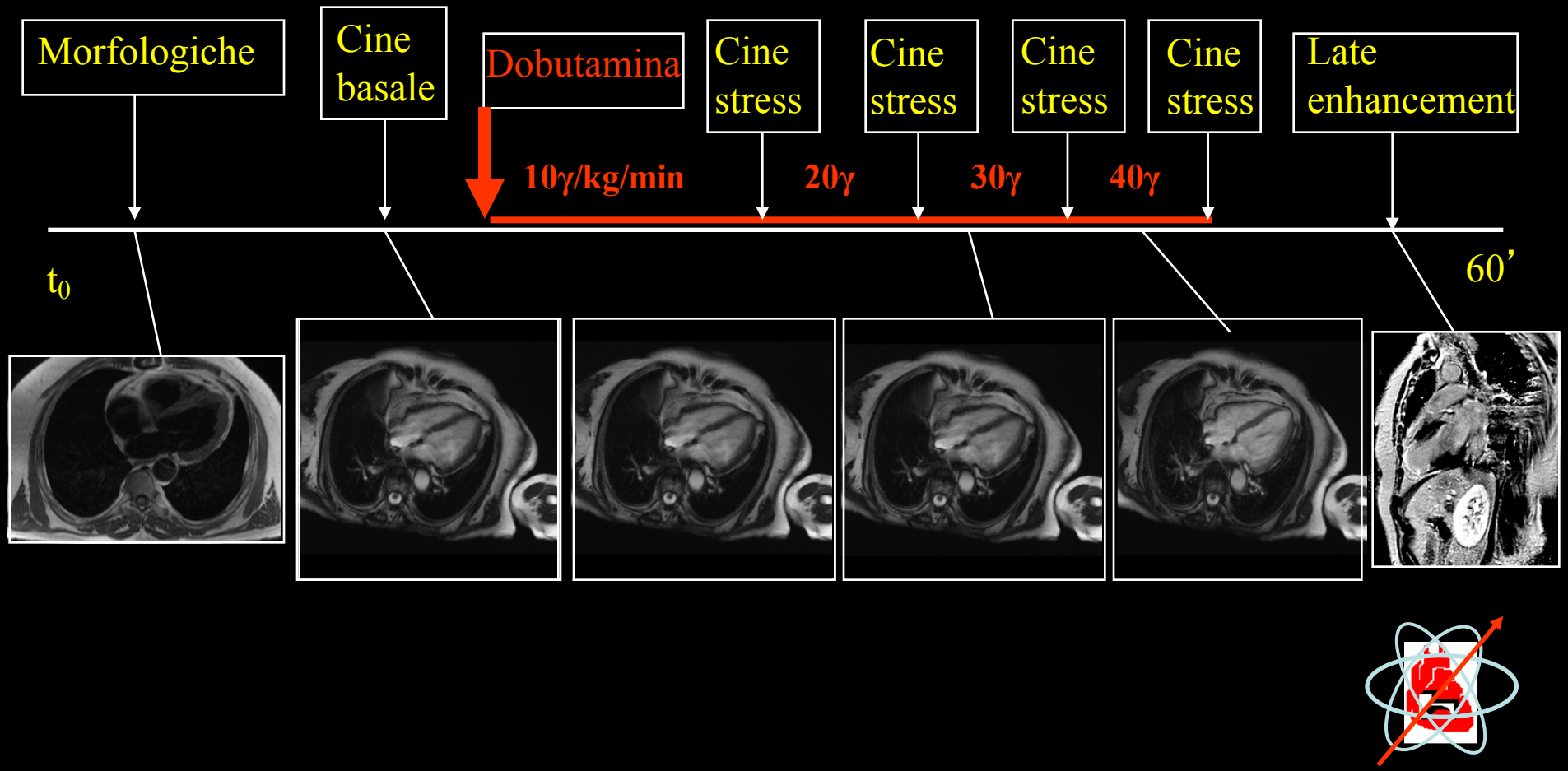


Bingham , Circulation 2011



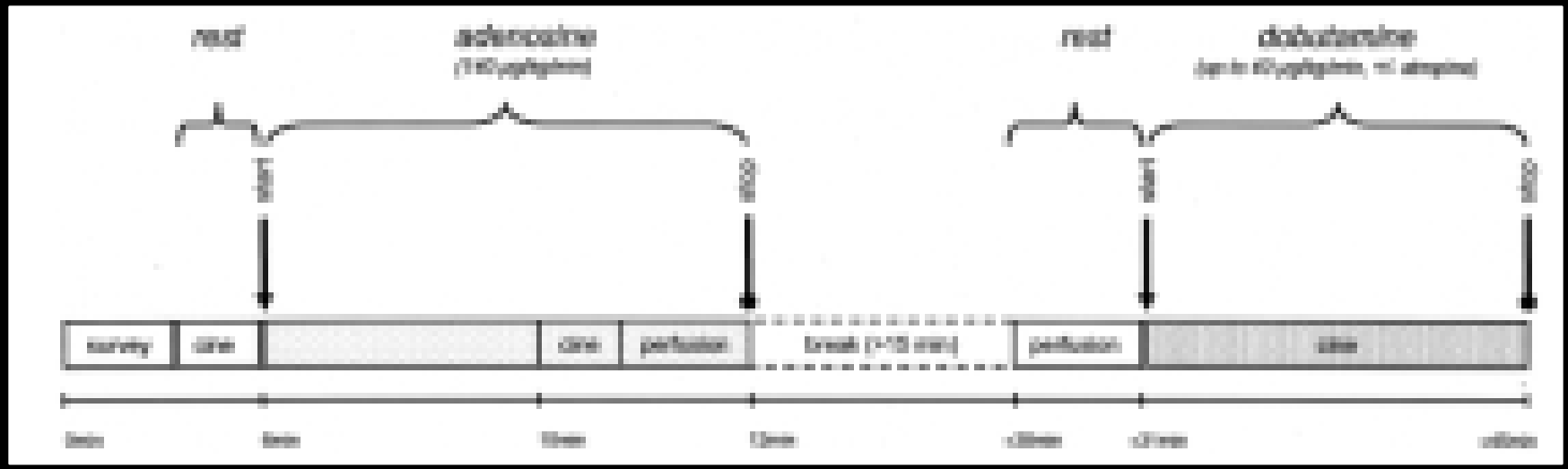
Bingham, Circulation 2011

Stress-test con dobutamina



Comparison of Dobutamine Stress Magnetic Resonance, Adenosine Stress Magnetic Resonance, and Adenosine Stress Magnetic Resonance Perfusion

I. Paetsch, MD; C. Jahnke, MD; A. Wahl, MD; R. Gebker, MD; M. Neuss, MD; E. Fleck, MD; E. Nagel, MD



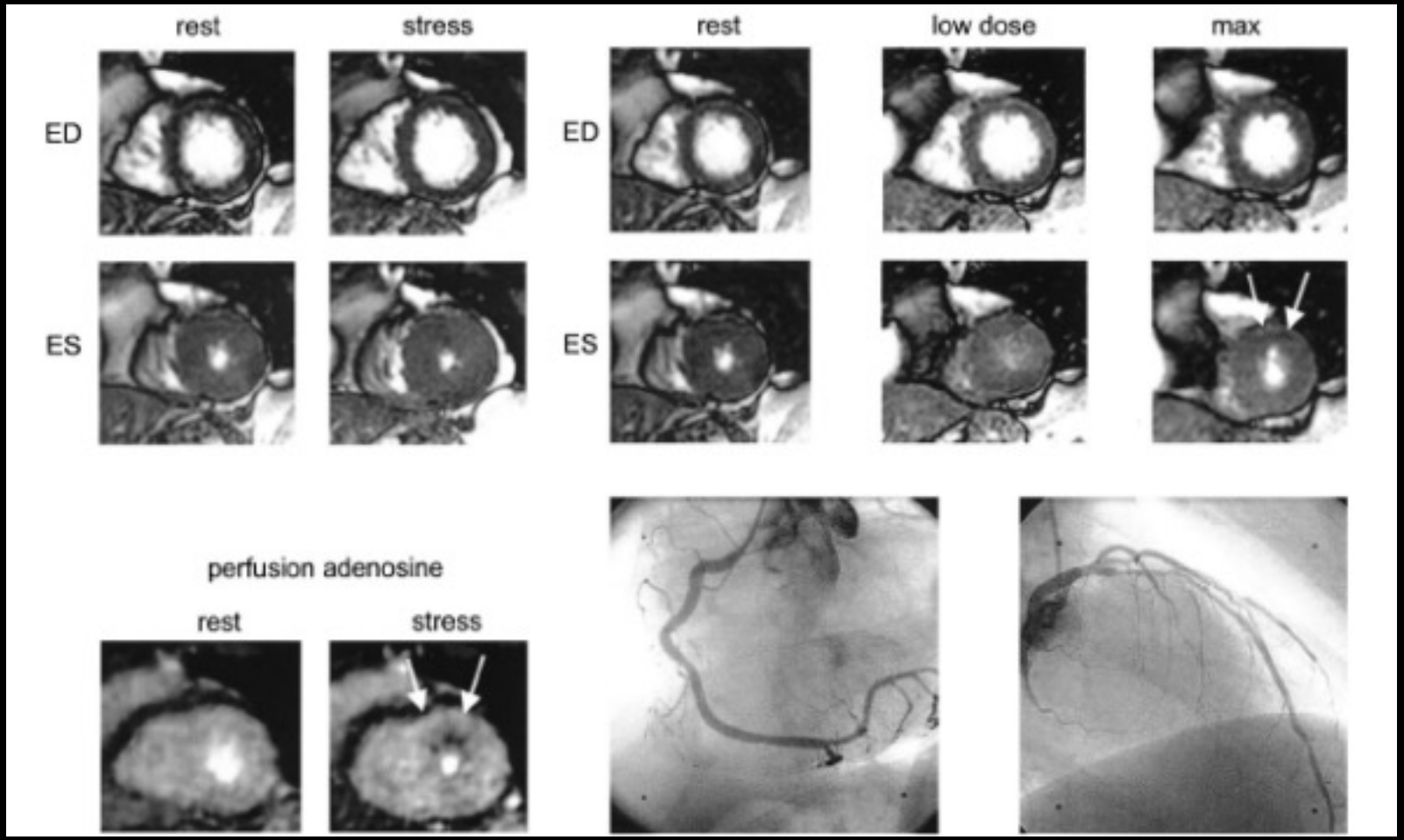
Circulation 2004

In-stent restenosis, proximal LAD

False-negative result of adenosine-stress wall motion

True-positive result of adenosine-stress perfusion

True-positive result of dobutamine-high dose wall motion

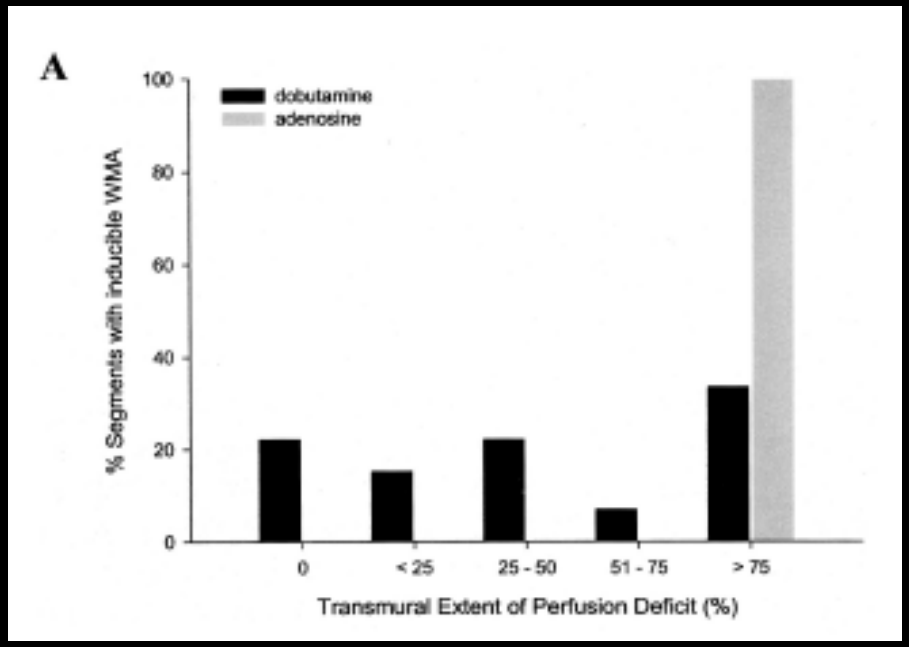


Paetsch, Circulation 2004

TABLE 3. Diagnostic Performance of DSMR, Adenosine Stress MR (Analysis B), and Adenosine Stress MR Perfusion

	DSMR	Adenosine Stress MR	Adenosine Stress MR perfusion
Sensitivity, %	89*	40	91
Specificity, %	80	96	62
Accuracy, %	86*	58	81
Positive predictive value, %	91	95	83
Negative predictive value, %	77*	44	76

*$P<0.01$ for dobutamine vs adenosine stress MR.

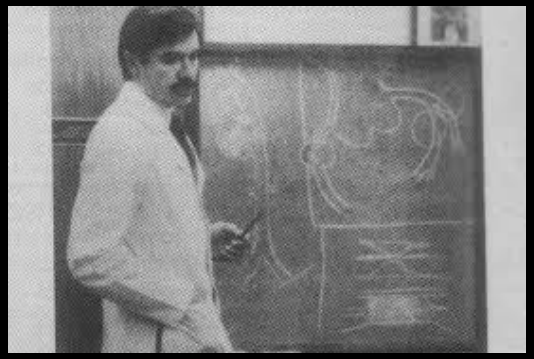


- *La RM cardiaca con stress farmacologico (adenosina/dipiridamolo/ Dobitamina) ha dimostrato una accuratezza diagnostica uguale o superiore a Eco-stress e SPECT negli studi di confronto di metodica finora pubblicati.*

- *La caratterizzazione tissutale della RM rappresenta un valore incrementale diagnostico e prognostico rispetto a ECO e SPECT*

- *La valutazione multiparametrica morfo-funzionale è un valore incrementale diagnostico nei pazienti con quadri di doppia patologia (ischemica e ipertrofica, infiltrativa, valvolare, aortica, congenita)*


Welcome To
THE REAL WORLD
POPULATION:
EVERYONE BUT YOU



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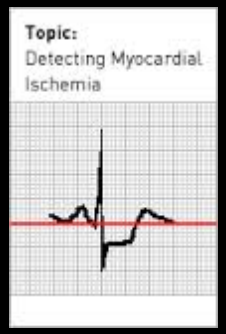
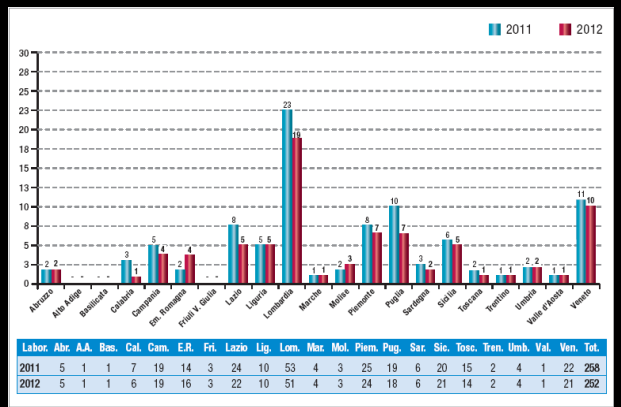


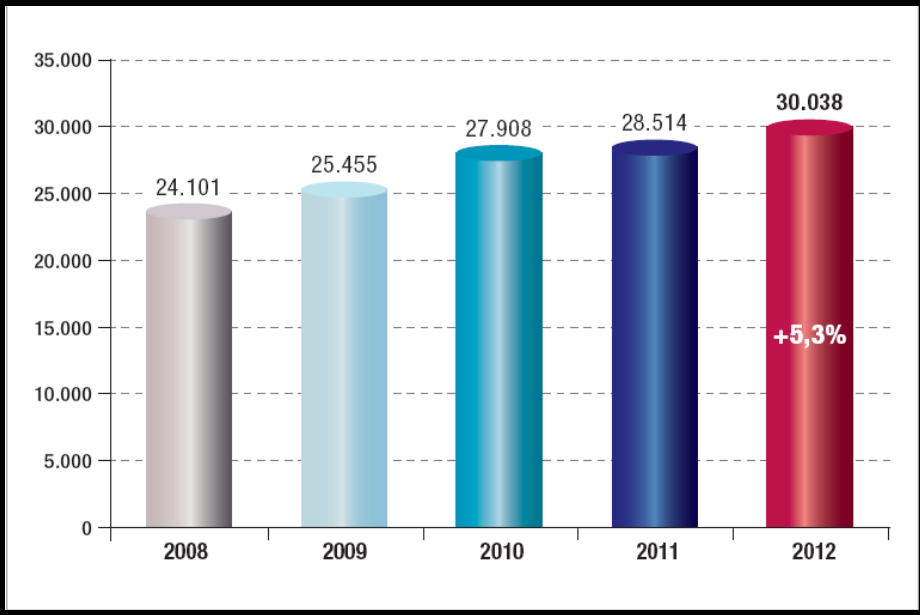


	Labor.	Abr.	A.A.	Bas.	Cal.	Cam.	E.R.	Fri.	Lazio	Lig.	Lom.	Mar.	Mol.	Piem.	Pug.	Sar.	Sic.	Tosc.	Tren.	Umb.	Val.	Ven.	Tot.
2011	5	1	1	7	19	14	3	24	10	53	4	3	25	19	6	20	15	2	4	1	22	258
2012	5	1	1	6	19	16	3	22	10	51	4	3	24	18	6	21	14	2	4	1	21	252

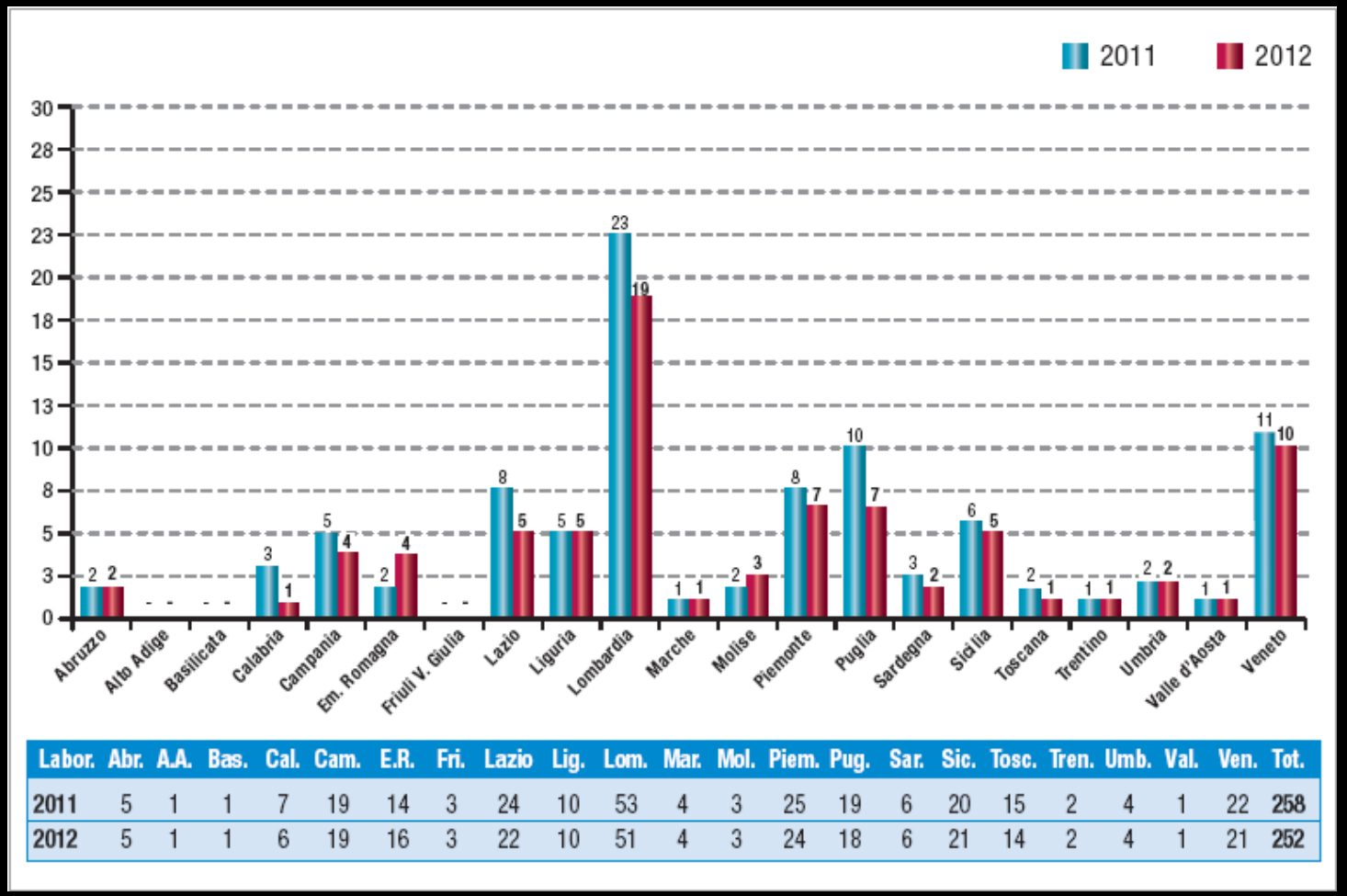
PTCA

2010	2011	Δ%	2012	Δ%
141.916	139.263	-1,9%	138.030	-0,9%

PTCA primarie



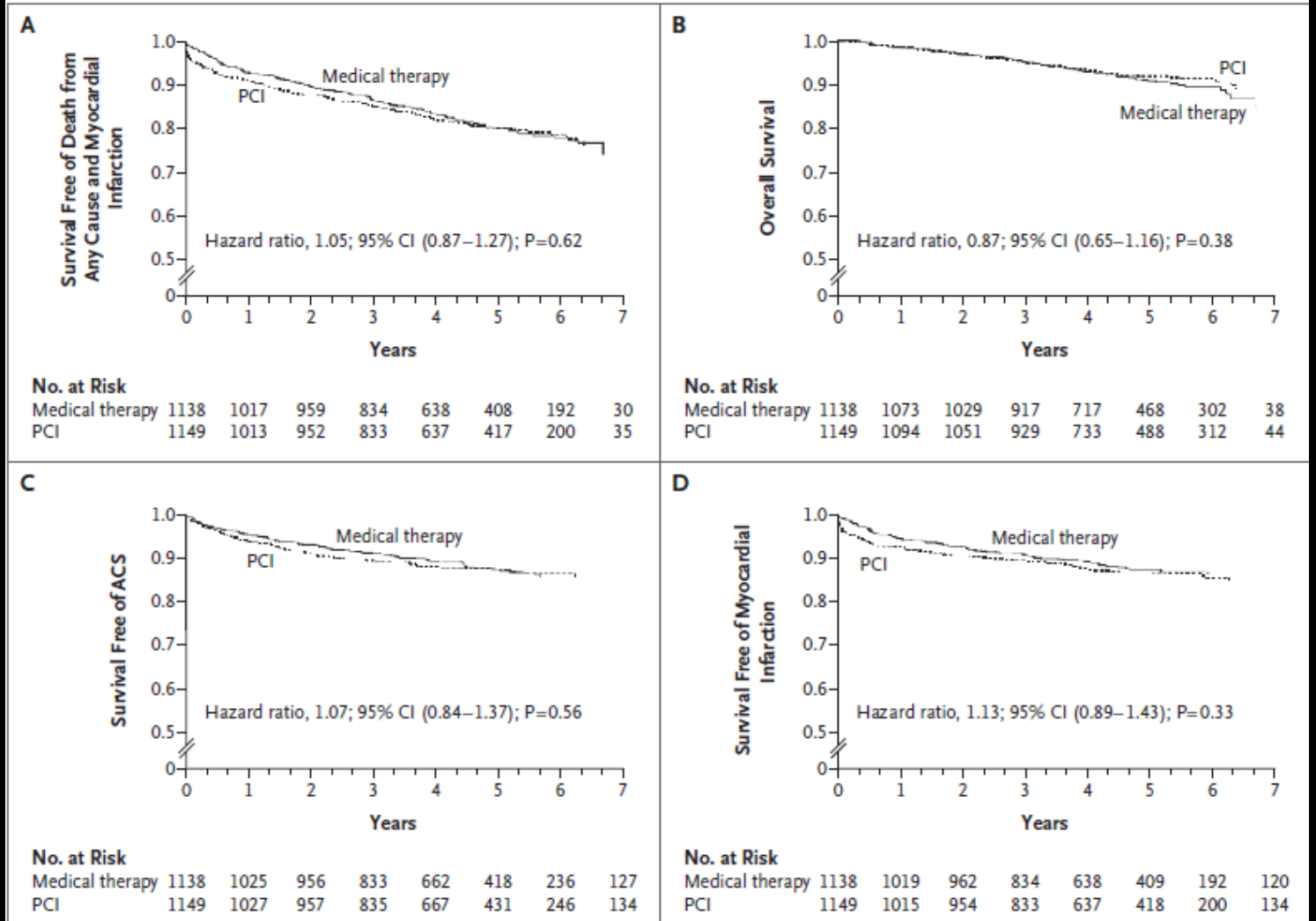
Laboratori < 400 PTCA/anno 2011-2012



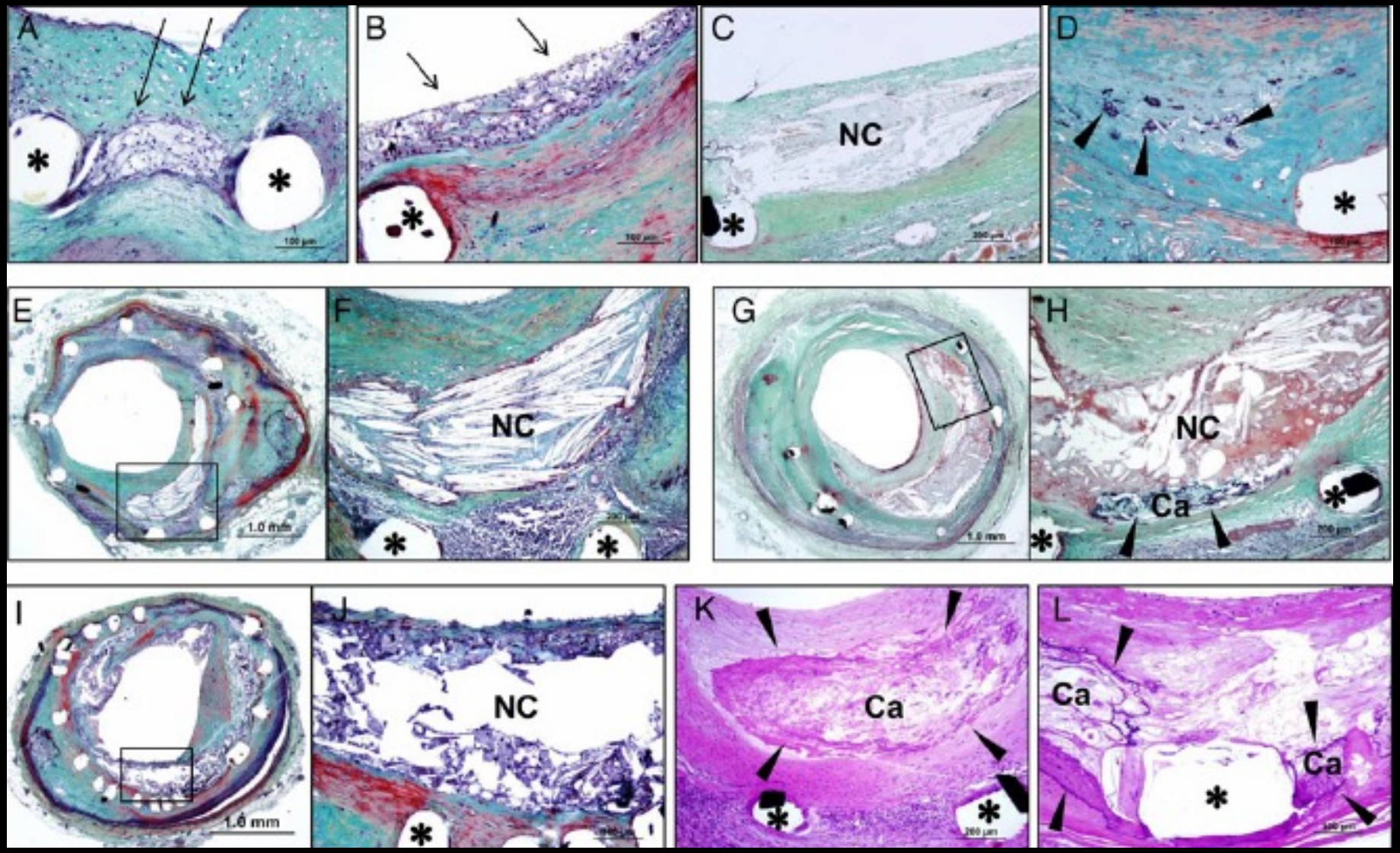
Labor.	Abr.	A.A.	Bas.	Cal.	Cam.	E.R.	Fri.	Lazio	Lig.	Lom.	Mar.	Mol.	Piem.	Pug.	Sar.	Sic.	Tosc.	Tren.	Umb.	Val.	Ven.	Tot.
2011	5	1	1	7	19	14	3	24	10	53	4	3	25	19	6	20	15	2	4	1	22	258
2012	5	1	1	6	19	16	3	22	10	51	4	3	24	18	6	21	14	2	4	1	21	252

Optimal Medical Therapy with or without PCI for Stable Coronary Disease

William E. Boden, M.D., Robert A. O'Rourke, M.D., Koon K. Teo, M.B., B.Ch., Ph.D., Pamela M. Hartigan, Ph.D., David J. Maron, M.D., William J. Kostuk, M.D., Merril Knudtson, M.D., Marcin Dada, M.D., Paul Casperson, Ph.D., Crystal L. Harris, Pharm.D., Bernard R. Chaitman, M.D., Leslee Shaw, Ph.D., Gilbert Gosselin, M.D., Shah Nawaz, M.D., Lawrence M. Title, M.D., Gerald Gau, M.D., Alvin S. Blaustein, M.D., David C. Booth, M.D., Eric R. Bates, M.D., John A. Spertus, M.D., M.P.H., Daniel S. Berman, M.D., G.B. John Mancini, M.D., and William S. Weintraub, M.D., for the COURAGE Trial Research Group*

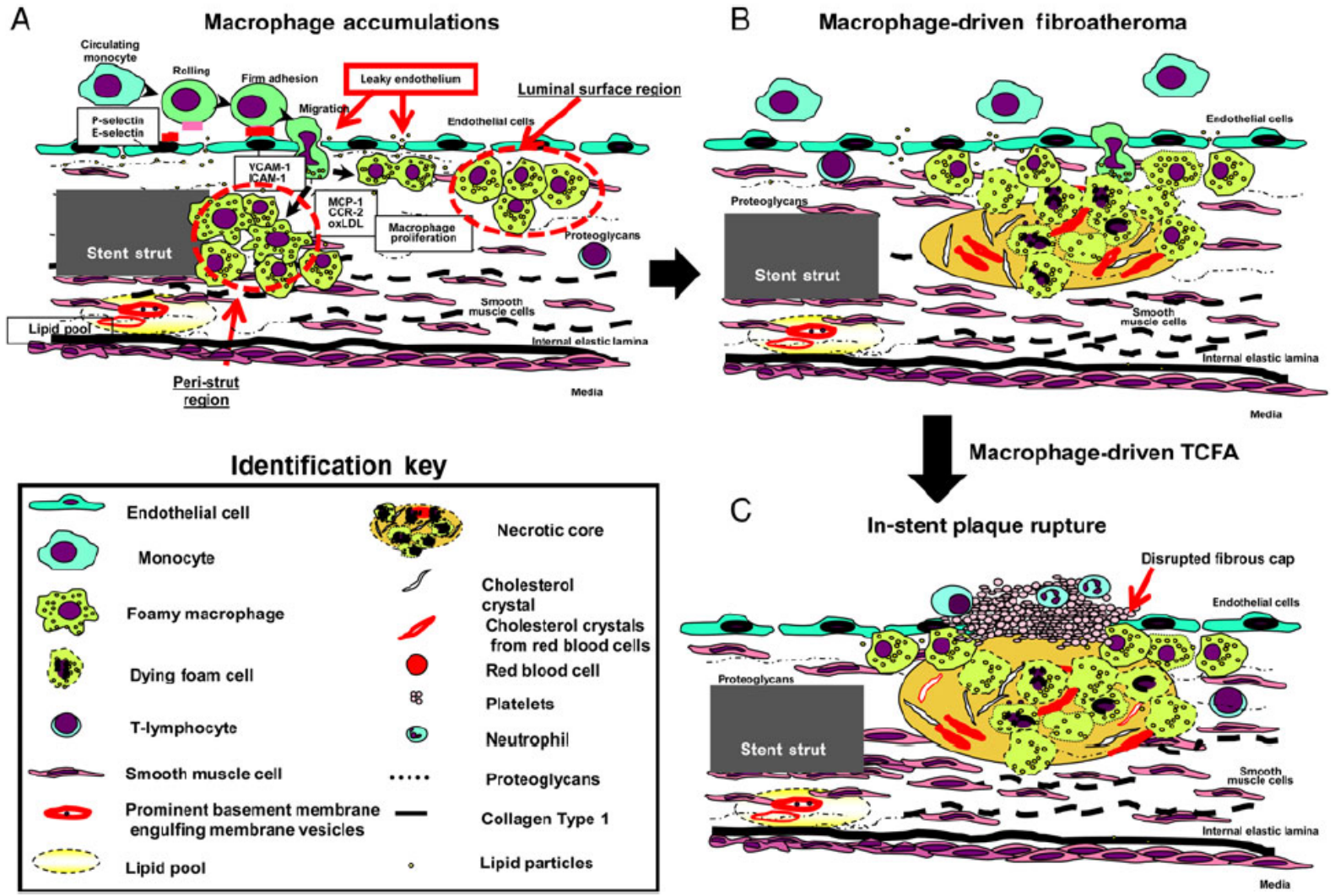


Neoatherosclerosis following first and second generation DES



Otsuka, EHJ 2015

Mechanisms of the development of neoatherosclerosis



Principali effetti iatrogeni della malpractice della cardiopatia ischemica cronica

- equivalenza aterosclerosi coronarica = ischemia miocardica
- rinuncia alla valutazione della soglia, della sede e della estensione dell' ischemia
- rinuncia della ricerca della ottimizzazione della terapia medica
- riflesso oculo-stenotico, con stenting sistematico dell'aterosclerosi coronarica
- accelerazione dell'aterosclerosi coronarica per processi flogistici vascolari
- distorsione della storia naturale dell'aterosclerosi coronarica
- accecamento dell'accuratezza diagnostica e prognostica dei test provocativi
- significativo incremento del rischio operatorio di chirurgia indifferibile e differibile
- significativo incremento dei costi del trattamento della cardiopatia ischemica e delle patologie di interesse chirurgico
- diseducazione della comunità e dei pazienti alla prevenzione primaria e secondaria

CONCLUSIONI

- la rivascolarizzazione miocardica nella cardiopatia ischemica cronica offre vantaggio rispetto alla TM ottimizzata solo in pz selezionati con ampie aree di ischemia inducibile (>10% del VS)

- nella pratica quotidiana l'estensione inappropriata della rivascolarizzazione percutanea con DES non ha dimostrato alcun vantaggio nella riduzione degli outcome maggiori (mortalità, infarto, angina instabile) rispetto alla TMO

- i danni collaterali provocati dall'impiego sistematicamente inappropriato di PTCA+DES sono largamente superiori al vantaggio teorico della rivascolarizzazione

- la prova da sforzo rappresenta tuttora il test con il migliore rapporto costo/efficacia nella diagnosi e nella stratificazione prognostica della cardiopatia ischemica

- l'imaging multimediale offre la possibilità di una accurata valutazione anatomica e morfo-funzionale della cardiopatia ischemica

- la RM cardiaca consente la valutazione della estensione dell'ischemia inducibile e della fibrosi miocardica