



PALAIS DU PHARO
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24 • 25 • 26
JANVIER 2024



WWW.HIGHTECH-CARDIO.ORG

Le scanner coronaire en dépistage

Bernard Chevalier

ICPS

FRANCE

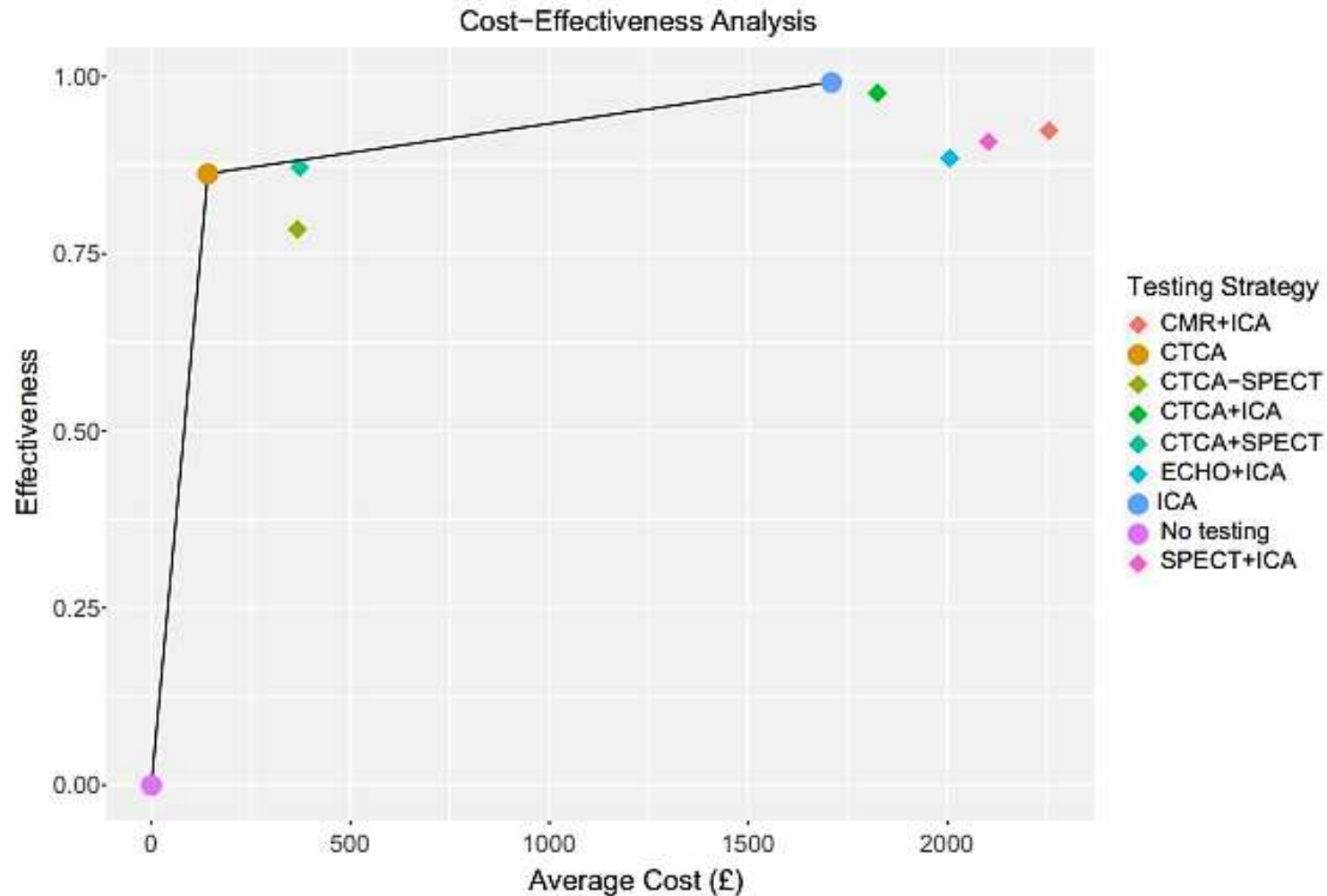
Non-invasive functional imaging for myocardial ischaemia^c or coronary CTA is recommended as the initial test to diagnose CAD in symptomatic patients in whom obstructive CAD cannot be excluded by clinical assessment alone.^{4,5,55,73,78-80}

I

B

The Updated NICE Guidelines: Cardiac CT as the First-Line Test for Coronary Artery Disease

Alastair J. Moss¹ • Michelle C. Williams¹ • David E. Newby¹ • Edward D. Nicol²



Forte valeur prédictive négative

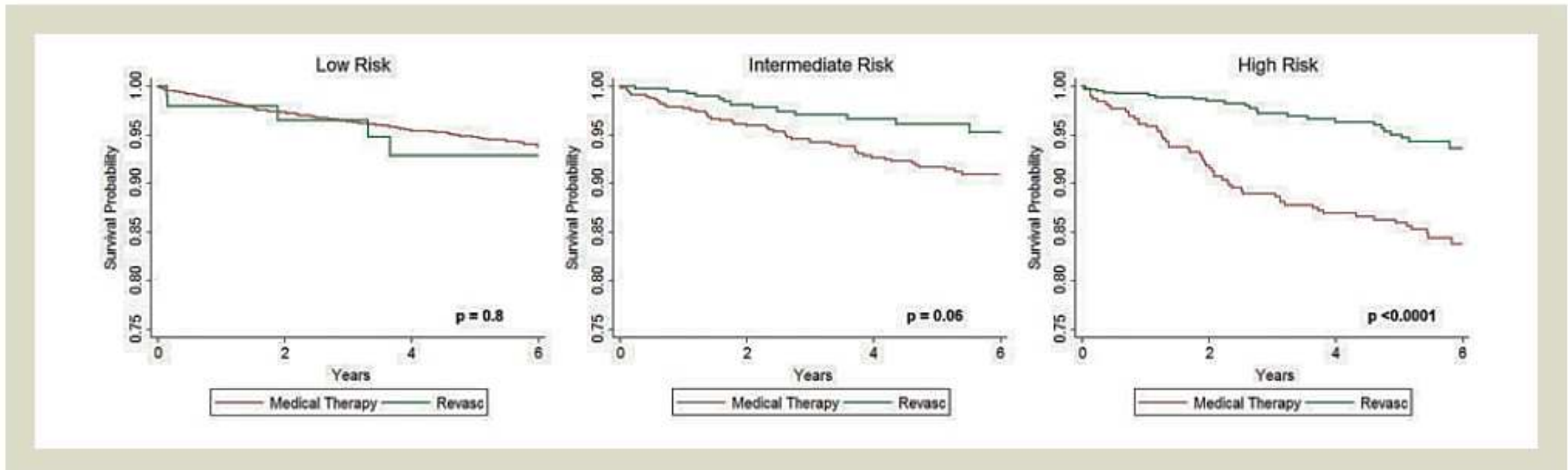
Study/Author	Reference standard (ICA)	Year	Number of Patients	Sensitivity	Specificity	PPV	NPV	+LR	-LR	Accuracy
ACCURACY (Budoff MJ et al.)	≥50%	2008	230	95	83	64	99	5.56	0.06	NA
Meijboom WB et al.	≥50%	2008	360	99	64	86	97	2.76	0.01	88
MINISCAD (Marano R et al.)	>50%	2009	327	94	88	91	91	7.83	0.07	91
CORE-64 (Arbab-Zadeh A et al.)	≥50%	2012	273	91	87	9	88	7.00	0.10	NA
EVINCI (Neglia D et al.)	>70%, 30-70% with FFR ≤0.80, or LM >50%	2015	475	91	92	83	96	11.38	0.10	91
Budoff MJ et al.	>50%	2017	77	85	90	81	92	8.50	0.17	NA
PICTURE (Budoff MJ et al.)	≥50%	2017	230	92	78	82	90	4.18	0.10	NA
Andreini D et al.: Patients with atrial fibrillation	>50%	2017	83	95	98	95	98	39.00	0.05	96
Andreini D et al.: Patients with heart rate ≥80bpm	>50%	2018	40	100	82	100	82	5.56	0	90
Motoyama S et al.: UHR-CT, Median CACS 171	≥75%	2018	59	100	80	94	100	5.00	0	NA
Takagi H et al.: UHR-CT, Median CACS 250	≥50%	2018	38 Vessels: 113	100 96	67 81	94 80	100 96	3.00 4.96	0 0.05	95 88
VERDICT: NSTEMACS (Linde JJ et al.)	≥50%	2020	1,023	97	72	91	88	3.49	0.05	89
Latina J et al. ¹⁵ : UHR-CT, Median CACS 1205	≥70%	2021	15 Vessels: 86	100 86	100 88	100 70	100 95	- 7.17	0 0.16	NA NA
CREDENCE: AI-QCT (Griffin WF et al. ¹⁹)	≥50% ≥70%	2022	303	94 94	68 82	81 69	90 97	2.94 5.22	0.09 0.07	84 86

CTA versus test fonctionnel

	Diagnosis	Outcome
EVINCI	Superior	No difference
PROMISE	Non-inferior	No difference
CAPP	Superior	-
CRESCENT	Superior	Superior
SCOT HEART	Superior	Superior

Neglia Circ Cardiovasc Imaging 2015; Douglas NEJM 2015; Mc Kavanagh Eur Heart J Cardiovasc Imaging 2015; Lubbers Eur Heart J 2016; Newby NEJM 2018

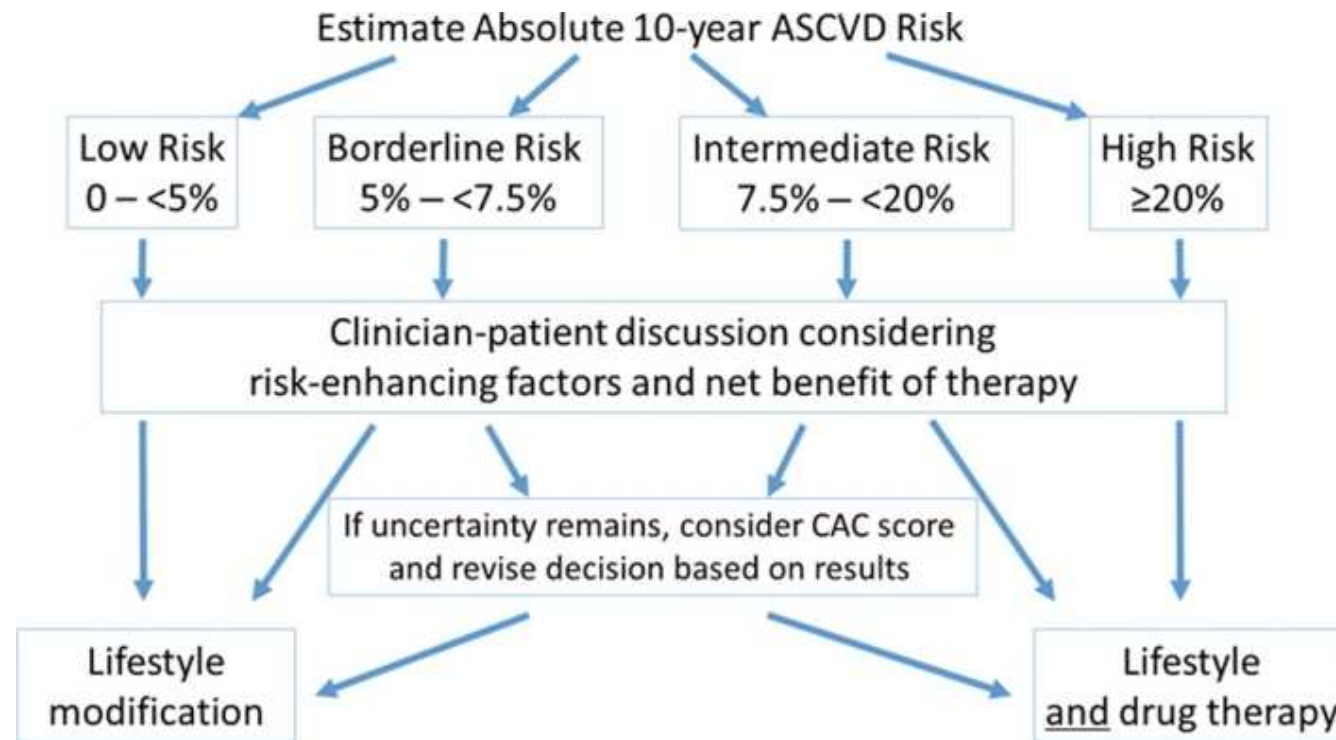
Coronary revascularization vs. medical therapy following coronary-computed tomographic angiography in patients with low-, intermediate- and high-risk coronary artery disease: results from the CONFIRM long-term registry



In high-risk asymptomatic adults (with diabetes, a strong family history of CAD, or when previous risk-assessment tests suggest a high risk of CAD), functional imaging or coronary CTA may be considered for cardiovascular risk assessment.

IIb

C



Calcium score ou CTA (injecté)?

1/ Valeur stratificatrice de l'obstruction

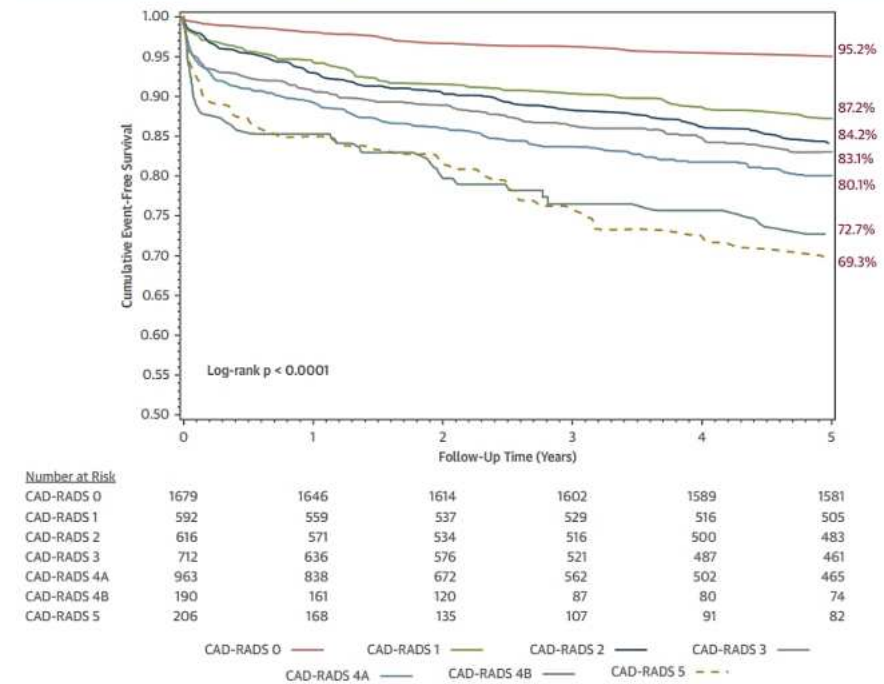
TABLE 5 Incremental Value of CT-Based Assessment of CAD Using CAD-RADS Categories Beyond Risk Factors and CACS in the Overall Population

Univariable Model	C-Statistic	Multivariable Models	C-Statistic	p Value (Difference Between Models)*
ASCVD	0.629 (0.572-0.687)			
CACS	0.657 (0.606-0.708)	ASCVD+CACS	0.682 (0.629-0.735)	0.008
CAD-RADS (+HRP)	0.747 (0.703-0.792)	ASCVD+CACS+CAD-RADS(+HRP)	0.776 (0.734-0.818)	<0.001

ASCVD as continuous variable; CAC as categorical variable (0, 1 to 100, 101 to 400, >400 CACS), CTA per CAD-RADS definition including HRP (vulnerable plaque). *p value shows difference of the stepwise C-statistic comparison between the specific model and the consecutive model.

Abbreviations as in Tables 1 and 2

FIGURE 1 Cumulative Event-Free Survival Through 5 Years of Follow-Up by CAD-RADS Scores



SOCIETAL DOCUMENT

CAD-RADS™ 2.0 – 2022 Coronary Artery Disease-Reporting and Data System



An Expert Consensus Document of the Society of Cardiovascular Computed Tomography (SCCT), the American College of Cardiology (ACC), the American College of Radiology (ACR), and the North America Society of Cardiovascular Imaging (NASCI)

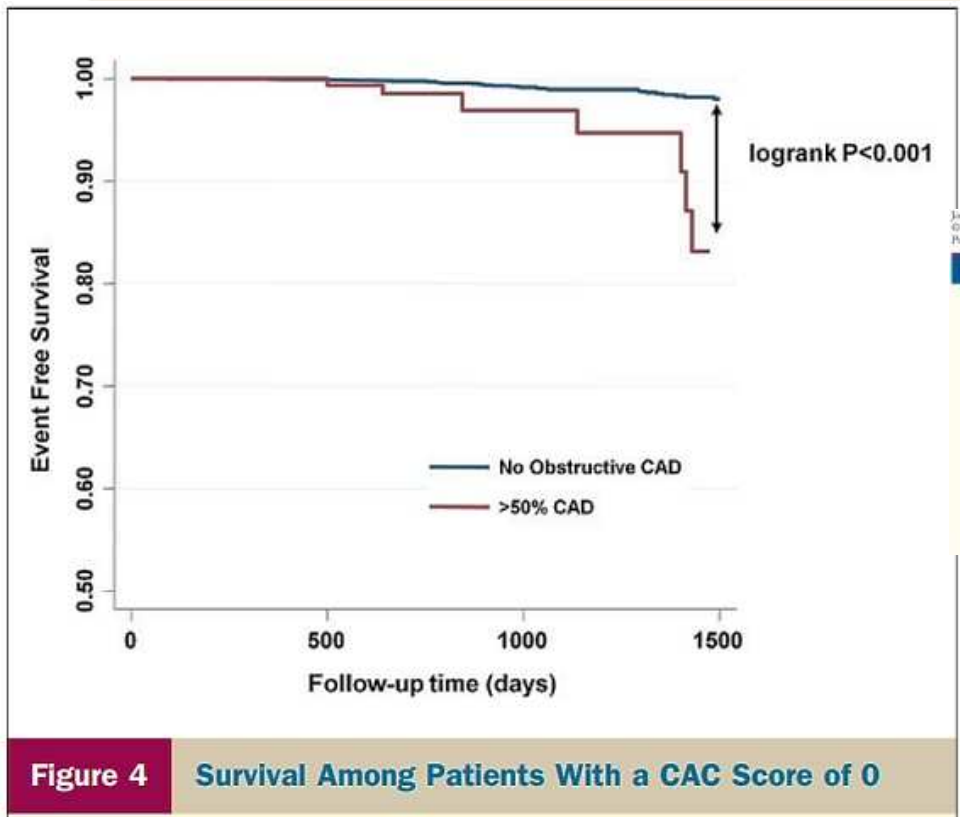
Ricardo C. Cury,^a Jonathon Leipsic,^b Suhny Abbara,^c Stephan Achenbach,^d Daniel Berman,^e Marcio Bittencourt,^f Matthew Budoff,^g Kavitha Chinnaiyan,^h Andrew D. Choi,ⁱ Brian Ghoshhajra,^j Jill Jacobs,^k Lynne Kowek,^l John Lesser,^m Christopher Maroules,ⁿ Geoffrey D. Rubin,^o Frank J. Rybicki,^p Leslee J. Shaw,^q Michelle C. Williams,^r Eric Williamson,^s Charles S. White,^t Todd C. Villines,^u Ron Blankstein^v

TABLE 4 CAD-RADS Reporting and Data System for Patients Presenting With Stable Chest Pain

Category	Degree of Maximal Coronary Stenosis	Interpretation	Further Cardiac Investigation
CAD-RADS 0	0% (No plaque or stenosis)	Absence of CAD ^d	None
CAD-RADS 1	1-24% (Minimal stenosis or plaque with no stenosis ^b)	Minimal non-obstructive CAD ^b	None
CAD-RADS 2	25-49% (Mild stenosis)	Mild non-obstructive CAD	None
CAD-RADS 3	50-69% (Moderate stenosis)	Moderate stenosis	Consider functional assessment ^c
CAD-RADS 4	A - 70-99% stenosis or B - Left main \geq 50% or 3-vessel obstructive (\geq 70%) disease	Severe stenosis	A: Consider ICA ^e or functional assessment B: ICA is recommended
CAD-RADS 5	100% (total occlusion)	Total coronary occlusion or sub-total occlusion	Consider ICA, functional and/or viability assessment
CAD-RADS N	Non-diagnostic study	Obstructive CAD cannot be excluded	Additional/alternative evaluation may be needed

2/ Détection des plaques non-calciifiées

CAC score = 0 (n = 4,738) No CAD (n = 3,915) <50% stenosis (n = 646) ≥50% stenosis (n = 177) ≥70% stenosis (n = 67) p Value



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EXPEDITED PUBLICATION

Prevalence and Severity of Coronary Artery Disease and Adverse Events Among Symptomatic Patients With Coronary Artery Calcification Scores of Zero Undergoing Coronary Computed Tomography Angiography

Results From the CONFIRM (Coronary CT Angiography Evaluation for Clinical Outcomes: An International Multicenter) Registry

Todd C. Villines, MD,* Edward A. Hultén, MD, MPH,* Leslee J. Shaw, PhD,† Manju Goyal, MD,*

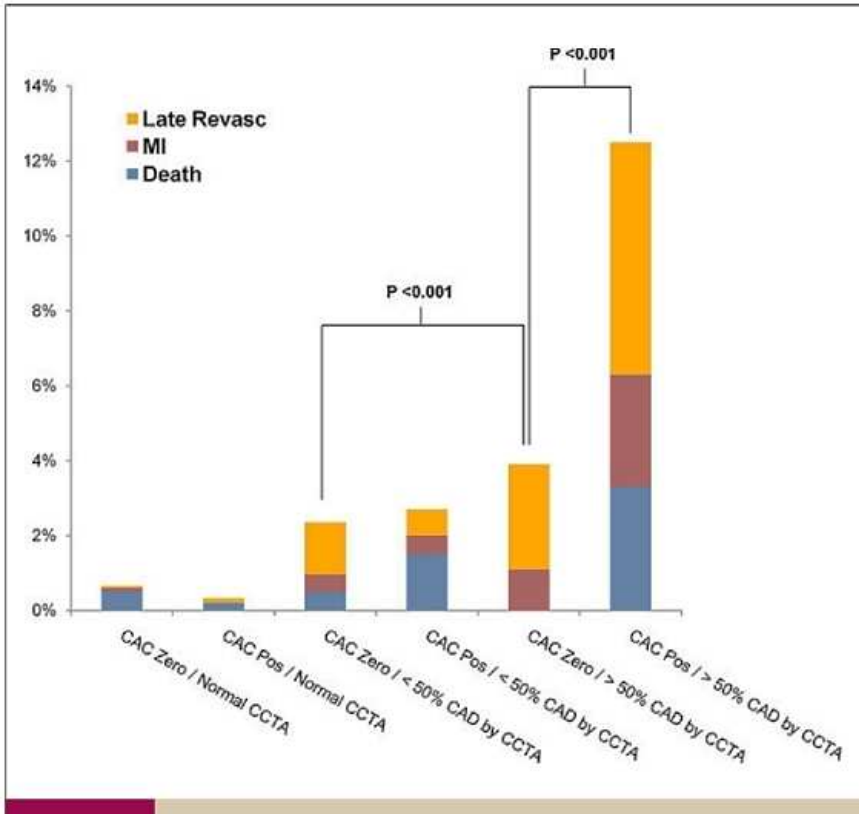


Figure 4 Survival Among Patients With a CAC Score of 0

3/Plaque hostile

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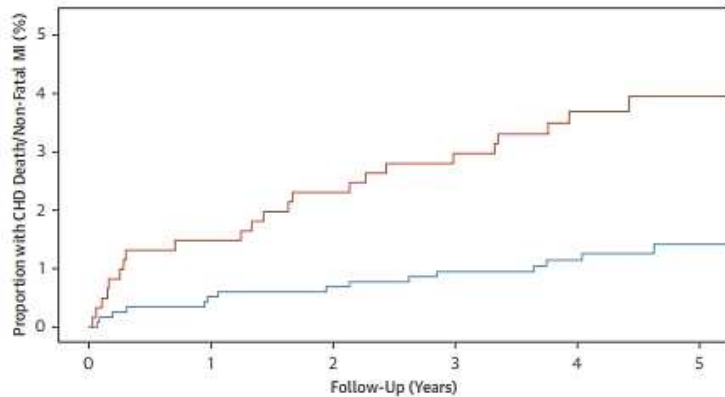
VOL. 73, NO. 1, 2019

Coronary Artery Plaque Characteristics Associated With Adverse Outcomes in the SCOT-HEART Study



Michelle C. Williams, MChB, PhD,^{1,2} Alastair J. Moss, MD,³ Marc Dweck, MChB, PhD,^{1,2} Philip D. Adamson, MD, PhD,⁴ Shirjeel Alam, MD,⁵ Amanda Hunter, MD,⁶ Anoop S.V. Shah, MD,⁷ Tania Pawade, MD,⁸ Jonathan R. Weir-McCall, MChB, PhD,⁹ Giles Roditi, MD,¹⁰ Edwin J.R. van Beek, MD, PhD,¹¹ David E. Newby, MD, PhD,¹² Edward D. Nicol, MD¹³

FIGURE 2 Coronary Heart Disease Death or Nonfatal Myocardial Infarction Across the Total Cohort in Patients With and Without Adverse Plaque

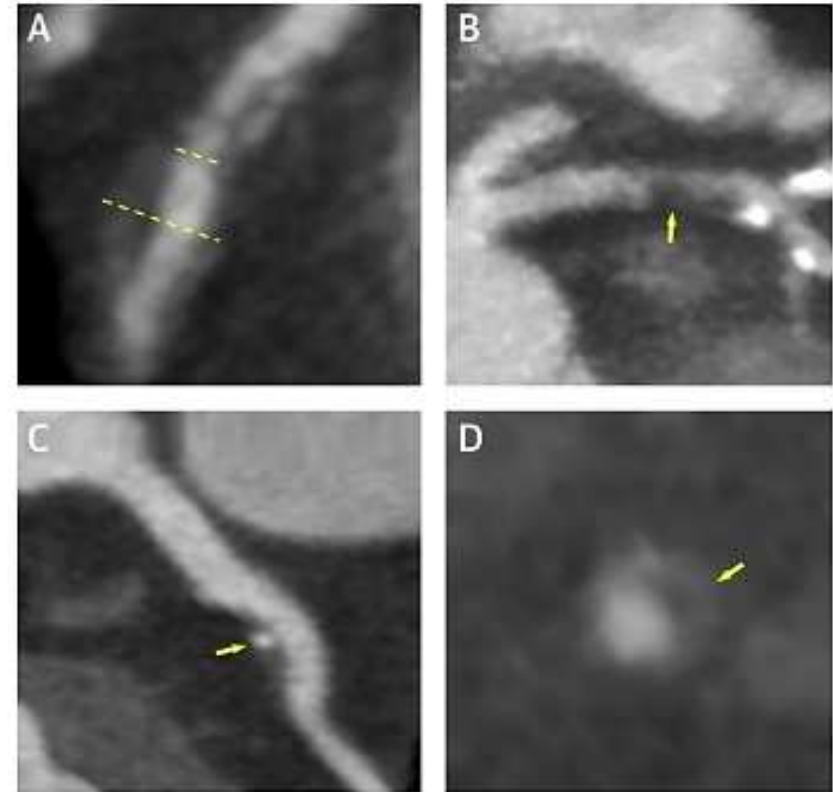


Adverse plaque present	0	1	2	3	4	5
No	1,161 (100)	1,153 (99)	1,146 (99)	1,141 (98)	886 (76)	488 (42)
Yes	608 (100)	598 (98)	590 (97)	582 (96)	467 (77)	255 (42)

Adverse Plaque Present — No — Yes

The effect of the presence of 1 or more adverse plaques (defined by the presence of low attenuation or positive remodeling) on subsequent coronary heart disease (CHD) death or nonfatal myocardial infarction (MI). Cumulative incidence plot for patients with and without adverse plaque features.

FIGURE 1 Coronary Plaque Characteristics Identified on Computed Tomography Coronary Angiography



Coronary atherosclerotic plaque features detected using computed tomography coronary angiography including (A) positive remodeling, (B) low-attenuation plaque, (C) spotty calcification, and (D) the "napkin ring" sign. Positive remodeling (A) was defined as an outer vessel diameter (long dashed line) that was 10% greater than the mean diameter of the segments immediately proximal (short dashed line) and distal to the plaque. Low-attenuation plaque (B) was defined as a focal central area of plaque with an attenuation density of <30 Hounsfield Units (yellow arrow). Spotty calcification (C) was defined as focal calcification within the coronary artery wall that measured <3 mm in maximum diameter (yellow arrow). The "napkin ring" sign (D) was defined as a central area of low-attenuation plaque with a peripheral rim of high attenuation (yellow arrow).

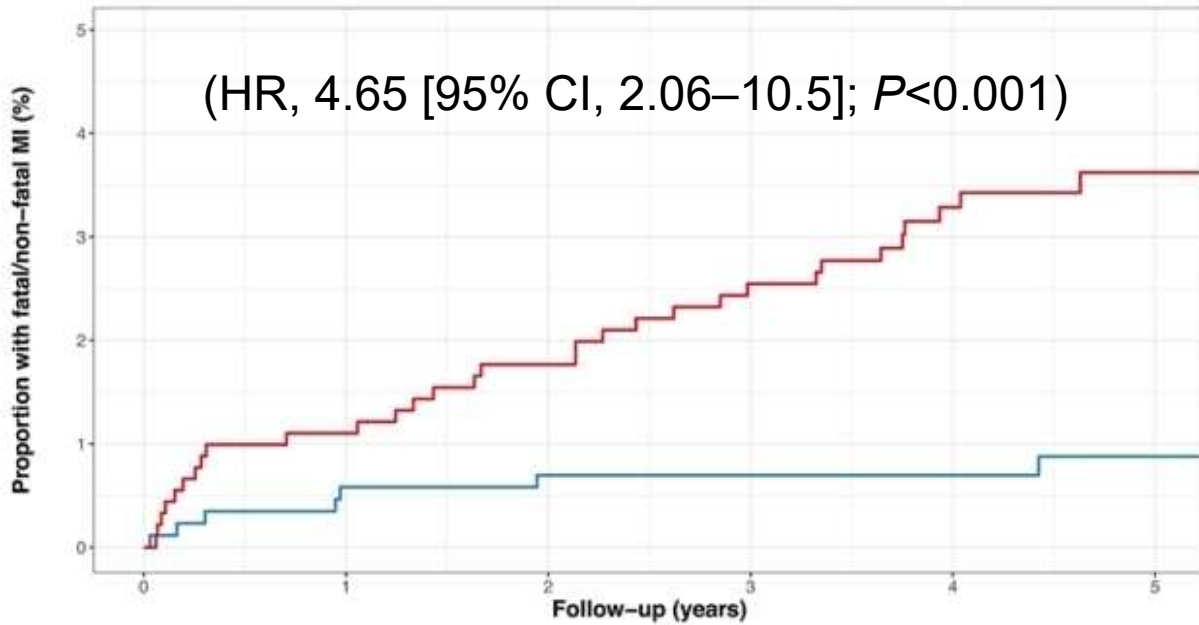
Low-Attenuation Noncalcified Plaque on Coronary Computed Tomography Angiography Predicts Myocardial Infarction

Results From the Multicenter SCOT-HEART Trial (Scottish Computed Tomography of the HEART)

BACKGROUND: The future risk of myocardial infarction is commonly assessed using cardiovascular risk scores, coronary artery calcium score, or

Michelle C. Williams¹⁰,
MChB, PhD

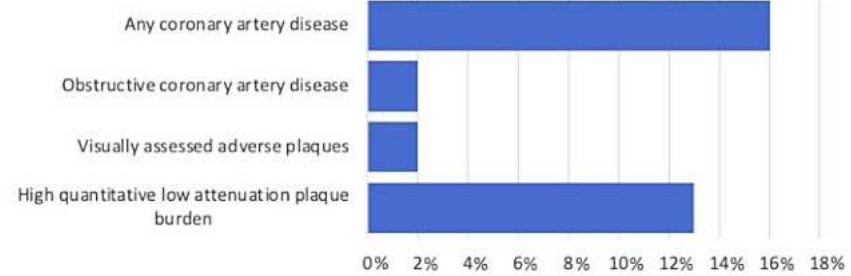
Low-attenuation non-calcified plaque burden — ≤ 4% — > 4%



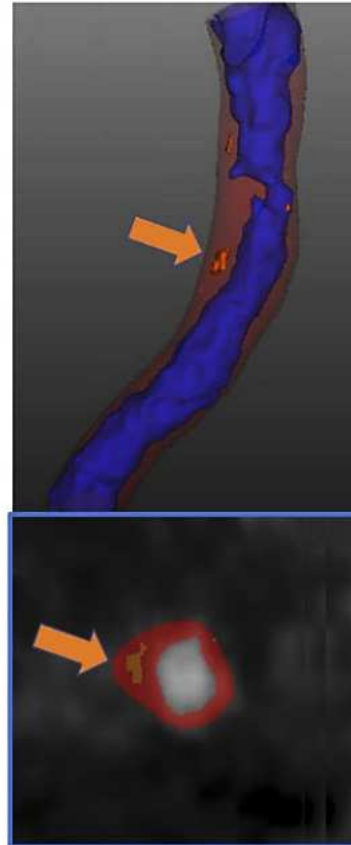
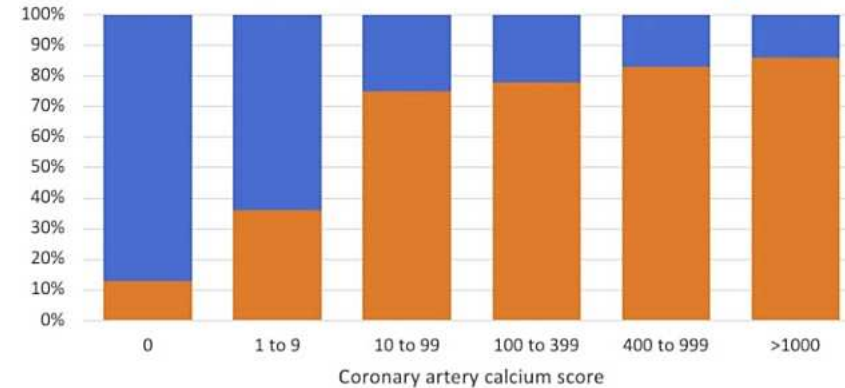
Low-attenuation non-calcified plaque burden

≤ 4%	862 (100)	856 (99)	851 (99)	849 (98)	659 (76)	360 (42)
> 4%	907 (100)	895 (99)	885 (98)	874 (96)	694 (77)	383 (42)

Coronary artery disease in patients with coronary artery calcium score of zero



Quantitative low attenuation plaque burden and coronary artery calcium score



SOCIETAL DOCUMENT

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Ricardo C. Cury,^a Jonathon Leipsic,^b Suhny Abbara,^c Stephan Achenbach,^d Daniel Berman,^e Marcio Bittencourt,^f Matthew Budoff,^g Kavitha Chinnaiyan,^h Andrew D. Choi,ⁱ Brian Ghoshhajra,^j Jill Jacobs,^k Lynne Kowee,^l John Lesser,^m Christopher Maroules,ⁿ Geoffrey D. Rubin,^o Frank J. Rybicki,^p Leslee J. Shaw,^q Michelle C. Williams,^r Eric Williamson,^s Charles S. White,^t Todd C. Villines,^u Ron Blankstein^v

TABLE 2 Different Methods to Categorize the Overall Amount of Coronary Plaque

	Overall Amount of Coronary Plaque	CAC	SIS*	Visual*
P1	Mild	1-100	≤2	1-2 vessels with mild amount of plaque
P2	Moderate	101-300	3-4	1 -2 vessels with moderate amount; 3 vessels with mild amount of plaque
P3	Severe	301-999	5-7	3 vessels with moderate amount; 1 vessel with severe amount of plaque
P4	Extensive	>1000	≥8	2-3 vessels with severe amount of plaque

Note: categories may not always correspond across different scores; if discrepant use coronary artery calcium (CAC) or total plaque burden quantification, if available. *Please note that CAD-RADS 0 denotes absence of stenosis or plaque, therefore PO is not required as a classification. *As there is currently no one single method that should be used to identify the overall amount of plaque, CAD-RADS recommends that imagers select the technique which is considered most appropriate at a given institution. *See examples in [Figures 2 to 6](#).

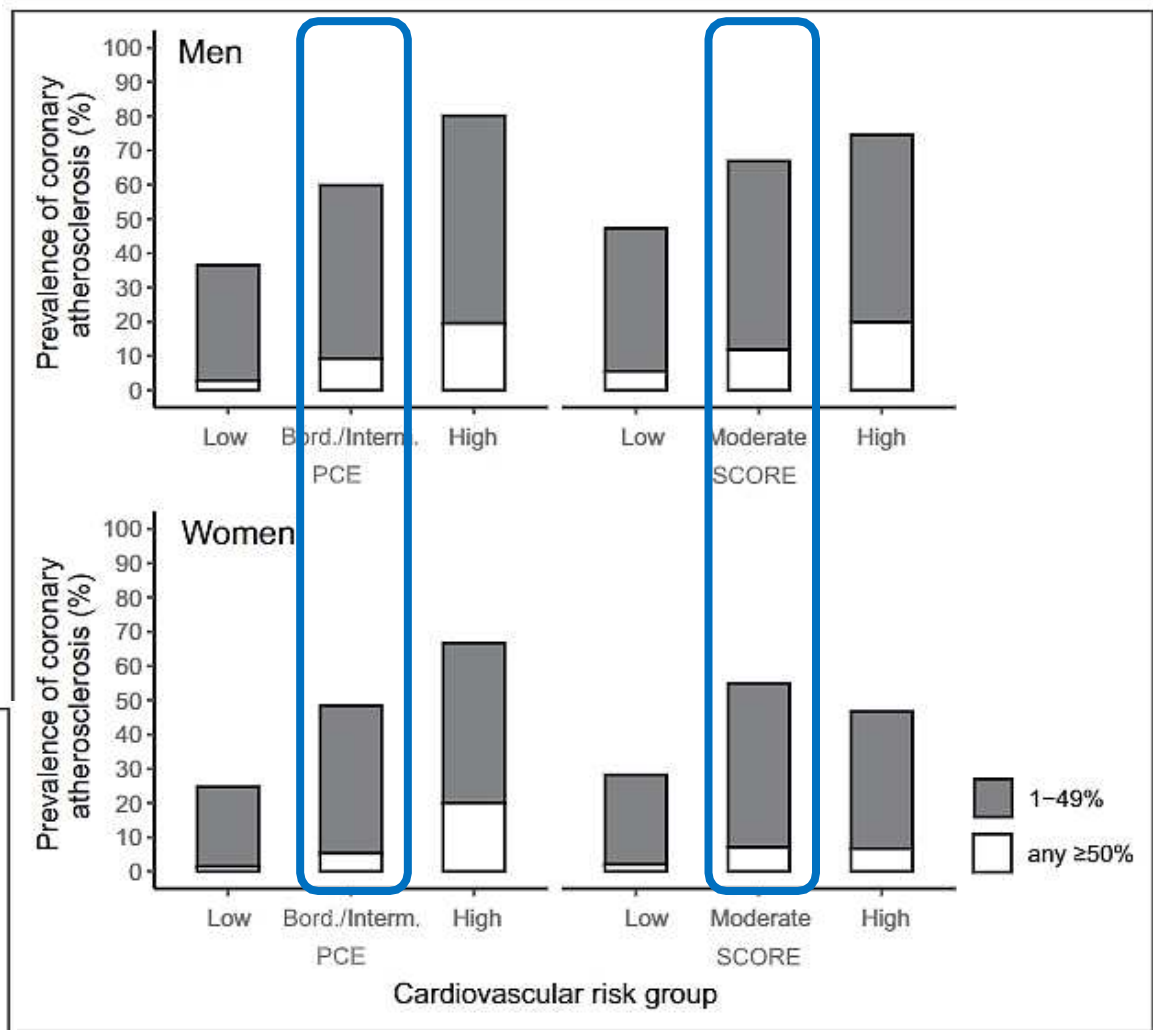
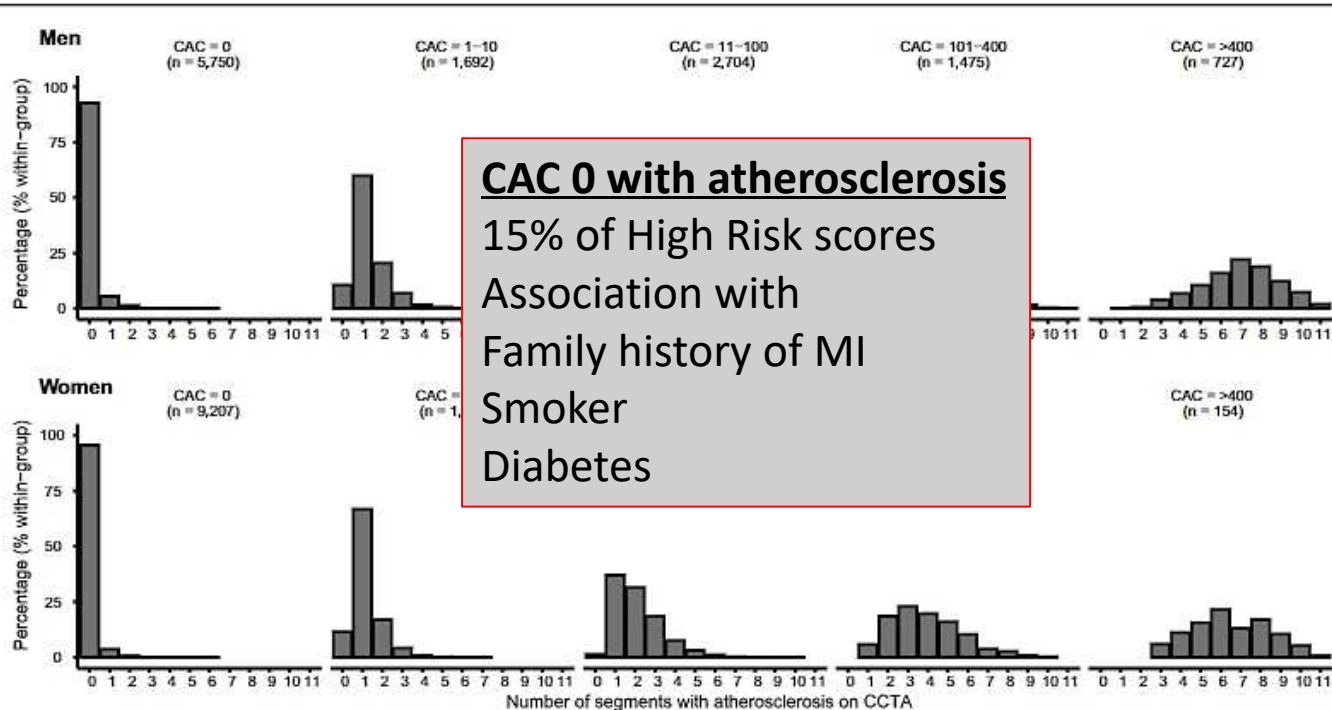
SIS = segment involvement score.

Prevalence of Subclinical Coronary Artery Atherosclerosis in the General Population

Göran Bergström¹, MD, PhD; Margaretha Persson², MD, PhD; Martin Adiels³, PhD; Elias Björnson, PhD; Carl Bonander⁴, PhD; Håkan Ahlström, MD, PhD; Joakim Alfredsson, MD, PhD; Oskar Angerås, MD, PhD; Göran Berglund, MD, PhD; Anders Blomberg, MD, PhD; John Brandberg, MD, PhD; Mats Börjesson⁵, MD, PhD; Kerstin Cederlund, MD, PhD; Ulf de Faire⁶, MD, PhD; Olov Duvernoy, MD, PhD; Örjan Ekblom⁷, PhD; Gunnar Engström⁸, MD, PhD; Jan E. Engvall⁹, MD, PhD; Erika Fagman¹⁰, MD, PhD; Mats Eriksson¹¹, MD, PhD; David Erlinge, MD, PhD; Björn Fagerberg¹², MD, PhD; Agneta Flinck, MD, PhD; Isabel Gonçalves, MD, PhD; Emil Hagström, MD, PhD; Ola Hjelmgren¹³, MD, PhD; Lars Lind¹⁴, MD, PhD; Eva Lindberg, MD, PhD; Per Lindqvist, PhD; Johan Ljungberg, MD, PhD; Martin Magnusson, MD, PhD; Maria Mannila, MD, PhD; Hanna Markstad, MD; Moman A. Mohammad¹⁵, MD, PhD; Fredrik H. Nystrom¹⁶, MD, PhD; Ellen Ostenfeld¹⁷, MD, PhD; Anders Persson¹⁸, MD, PhD; Annika Rosengren¹⁹, MD, PhD; Anette Sandström²⁰, MD; Anders Själander²¹, MD, PhD; Magnus C. Sköld, MD, PhD; Johan Sundström²², MD, PhD; Eva Swahn, MD, PhD; Stefan Söderberg²³, MD, PhD; Kjell Torén, MD, PhD; Carl Johan Östgren²⁴, MD, PhD; Tomas Jernberg²⁵, MD, PhD

SCAPIS

Circulation 2021



25182 individus / 49,5% femmes / 57 ans
 3% diabétiques / LDL 1,33 g/l
 SCORE 1,4 / PCE 6,2

Que retenir?

- Lorsqu'il est d'accès facile
 - L'angioscanner coronaire a le meilleur rapport cout/efficacité versus les tests fonctionnels
 - Il leur est au moins équivalent dans le bilan de symptômes typiques ou atypiques, avec un impact pronostique positif
 - Dans le bilan des patients asymptomatiques à score de risque élevé, le scanner injecté est supérieur au score calcique
 - Meilleure discrimination du CADRADS
 - Détection des plaques non calcifiées
 - Analyse des plaques hostiles
 - Modification de la prise en charge (Statines I A, Aspirine IIb C)
 - Sa place chez les patients asymptomatiques à risque intermédiaire reste à déterminer