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CARDIOLOGIA DE PRECISÃO:
INTEGRAÇÃO ENTRE IMAGEM
CARDIOVASCULAR E GENÉTICA NA
AVALIAÇÃO DO PACIENTE
08/05/2026
10:30 – 11:30
AUDITORIO 3
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SOCERJ 2026
7 A 8 DE MAIO DE 2026

Placas e Prognóstico:
A Força da AngioTC na Cardiologia de Precisão

Filipe Penna de Carvalho

SOCERJ 1955

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Por que preciso de um exame?

Diagnóstico

Prognóstico

Conduta

AHA/ACC CLINICAL PRACTICE GUIDELINE

2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

5.1.3. Intermediate-High Risk Patients With Stable Chest Pain and No Known CAD

Recommendations for Intermediate-High Risk Patients With Stable Chest Pain and No Known CAD
Referenced studies that support the recommendations are summarized in Online Data Supplements 29 and 30.

COR	LOE	Recommendations
		Index Diagnostic Testing
Anatomic Testing		
1	A	1. For intermediate-high risk patients with stable chest pain and no known CAD, CCTA is effective for diagnosis of CAD, for risk stratification, and for guiding treatment decisions.[1-12]
Stress Testing		
1	B-R	2. For intermediate-high risk patients with stable chest pain and no known CAD, stress imaging (stress echocardiography, PET/SPECT MPI or CMR) is effective for diagnosis of myocardial ischemia and for estimating risk of MACE.[8,13-35]

ESC European Society of Cardiology
European Heart Journal (2024) **45**, 3415–3537
https://doi.org/10.1093/eurheartj/ehae177

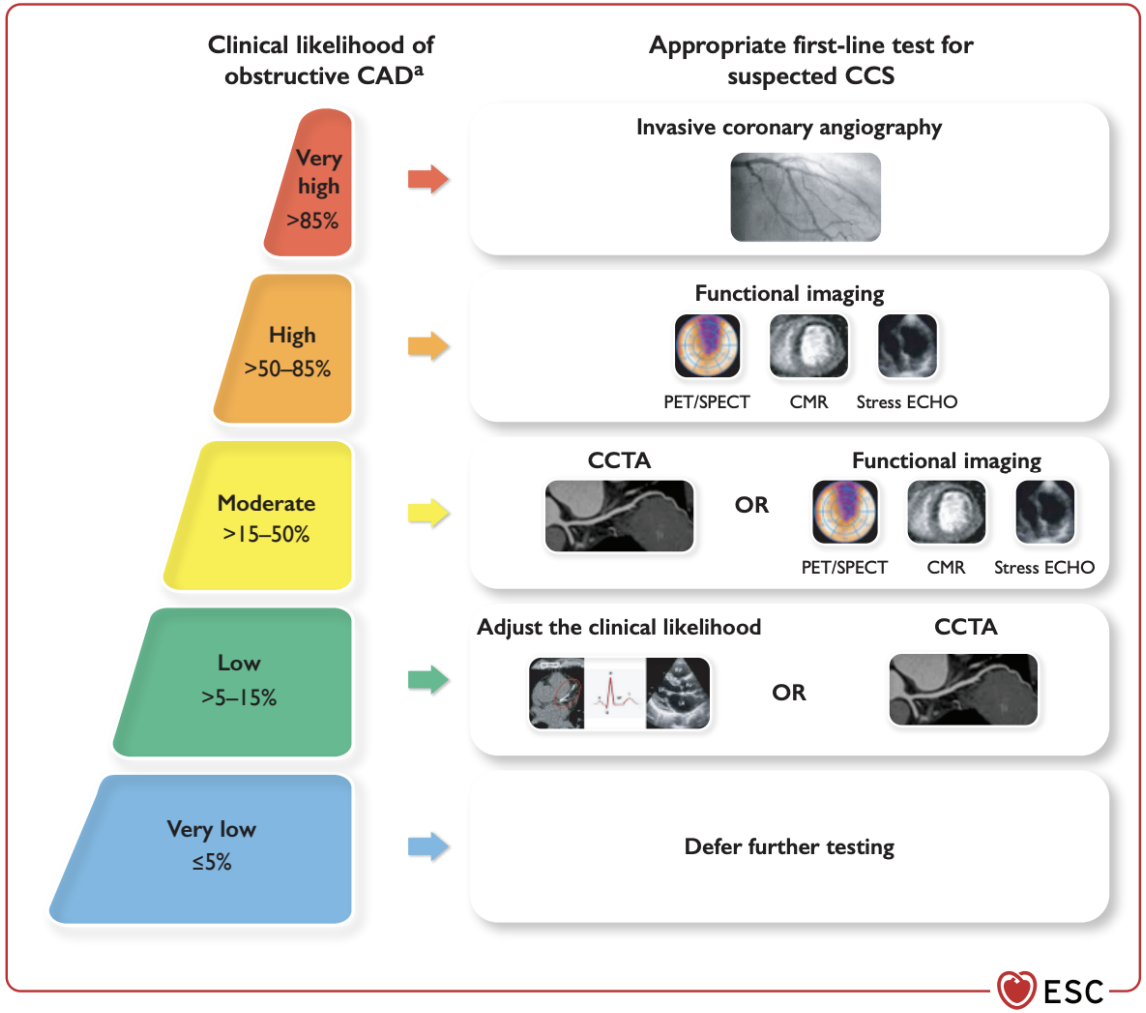
ESC GUIDELINES

2024 ESC Guidelines for the management of chronic coronary syndromes

Recommendation Table 8 — Recommendations for non-invasive anatomical imaging tests in the initial diagnostic management of individuals with suspected chronic coronary syndrome—coronary computed tomography angiography, if available, and supported by local expertise (see also Evidence Table 8)

Recommendations	Class[a]	Level[b]
In individuals with suspected CCS and low or moderate (>5%–50%) pre-test likelihood of obstructive CAD, CCTA is recommended to diagnose obstructive CAD and to estimate the risk of MACE.[33,34,145,212,214–221]	I	A
CCTA is recommended in individuals with low or moderate (>5%–50%) pre-test likelihood of obstructive CAD to refine diagnosis if another non-invasive test is non-diagnostic.[222]	I	B
CCTA is not recommended in patients with severe renal failure (eGFR <30 mL/min/1.73 m^2), decompensated heart failure, extensive coronary calcification, fast irregular heart rate, severe obesity, inability to cooperate with breath-hold commands, or any other conditions that can make obtaining good imaging quality unlikely.	III	C

CAD, coronary artery disease; CCS, chronic coronary syndrome; CCTA, coronary computed tomography angiography; eGFR, estimated glomerular filtration rate; MACE, major adverse cardiovascular events.
[a]Class of recommendation.
[b]Level of evidence.



→ AVALIAÇÃO FUNCIONAL OU ANATÔMICA ESTÃO BEM INDICADAS

→ MAIOR RISCO: FUNCIONAL ; MENOR RISCO: ANATÔMICO

→ CONSIDERAR EXPERTISE LOCAL

ESC European Society of Cardiology
European Heart Journal - Imaging Methods and Practice (2024) **2**, qyae075
https://doi.org/10.1093/ehjimp/qyae075

ORIGINAL ARTICLE

ESC pre-test probability estimates for obstructive coronary artery disease: can they be used in Brazil?

Fernanda Erthal [1,2,*], **Ronaldo Lima**[2,3], **Filipe Penna**[2], **Benjamin J.W. Chow**[4], **and Ronaldo Gismondi**[1]

Table 5 Pre-test probabilities of obstructive coronary artery disease in 15 815 symptomatic patients according to age, sex, and the nature of symptoms in a pooled analysis[64] of contemporary data[7,8,62]

	Typical		Atypical		Non-anginal		Dyspnoea[a]	
Age	Men	Women	Men	Women	Men	Women	Men	Women
30–39	3%	5%	4%	3%	1%	1%	0%	3%
40–49	22%	10%	10%	6%	3%	2%	12%	3%
50–59	32%	13%	17%	6%	11%	3%	20%	9%
60–69	44%	16%	26%	11%	22%	6%	27%	14%
70+	52%	27%	34%	19%	24%	10%	32%	12%

©ESC 2019

CAD = coronary artery disease; PTP = pre-test probability.

Table 4 Comparison of mean prevalence of obstructive CAD according to Diamond-Forrester (a) and ESC 2019 (b) PTP categories

Table 4a

	n	Observed stenosis ≥50%	DF
Low PTP	21	1 (5%)	10%
Intermediate PTP	219	36 (17%)	39%
High PTP	60	22 (37%)	78%

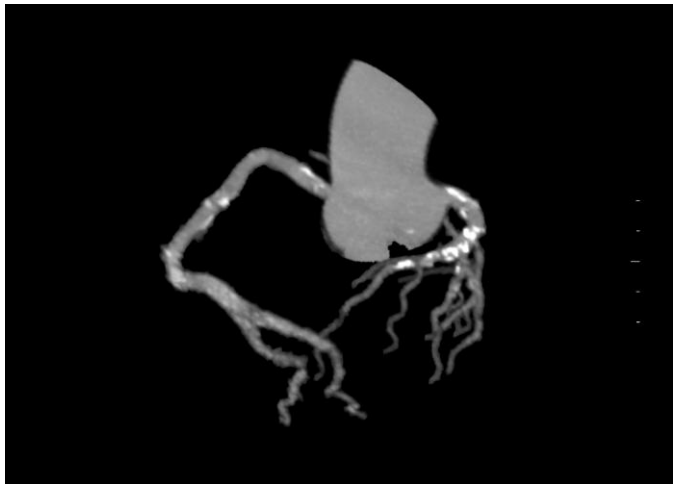
DF, Diamond-Forrester updated score; PTP, pre-test probability.

Table 4b

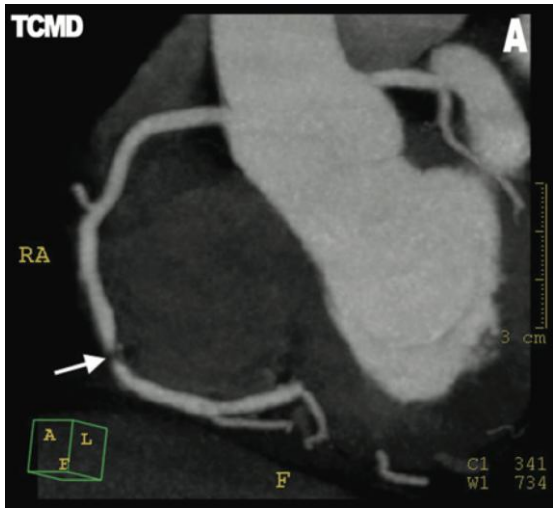
	n	Observed stenosis ≥50%	ESC
Low PTP	32	1 (3%)	3%
Intermediate PTP	133	17 (13%)	10%
High PTP	169	47 (28%)	28%

ESC, European society of cardiology 2019 score; PTP, pre-test probability.

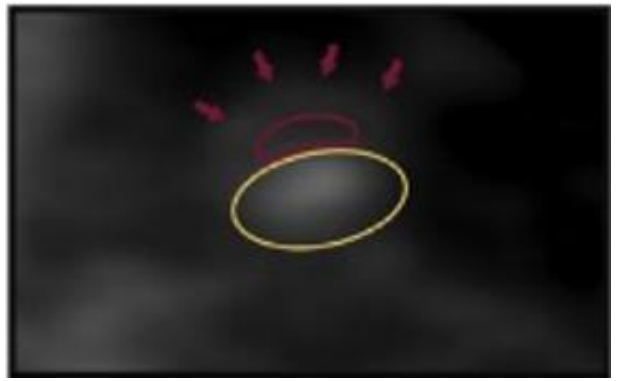
Prognóstico na DAC Estável



Carga de Aterosclerose

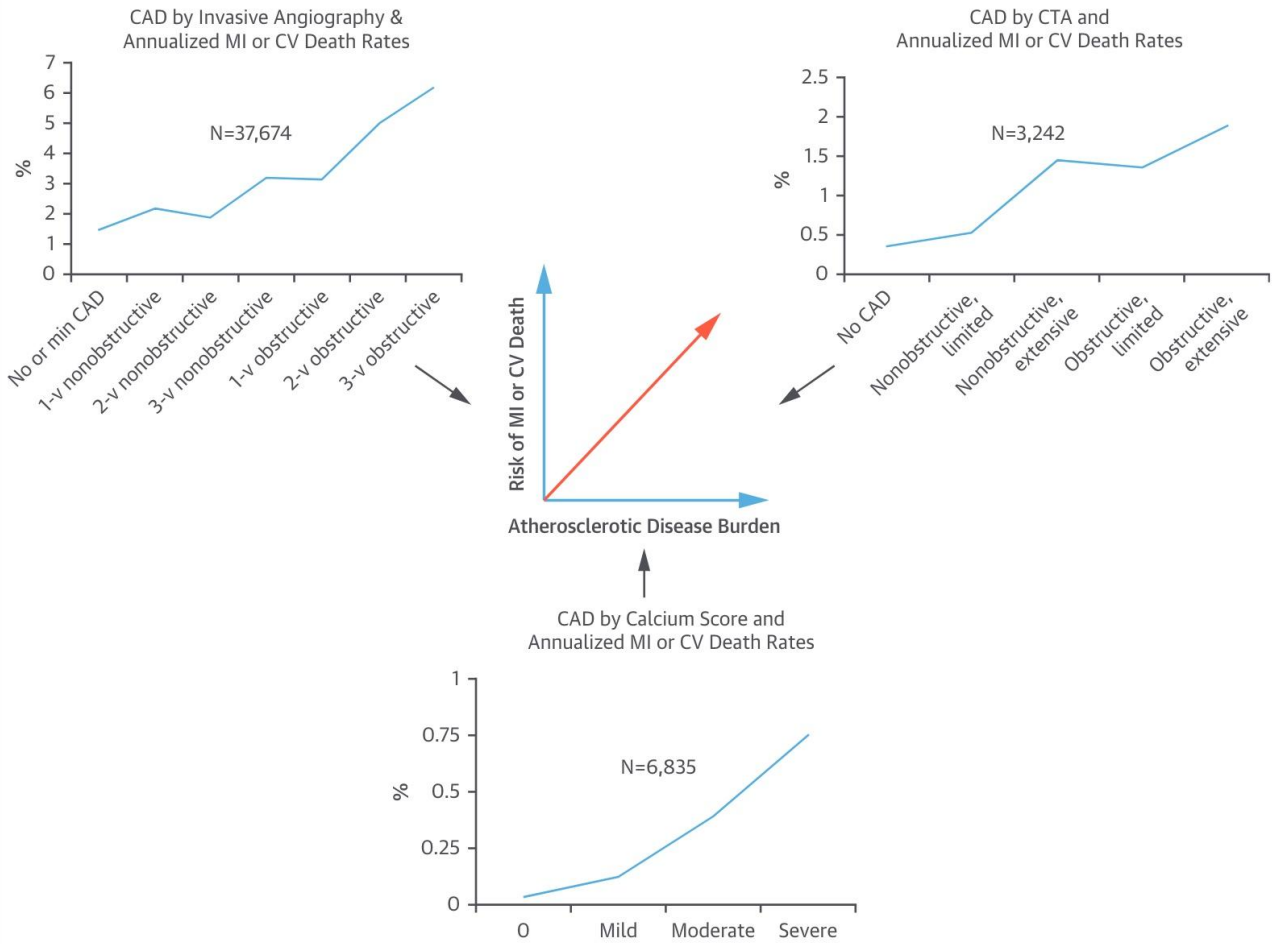


Estenose



Morfologia de Placa

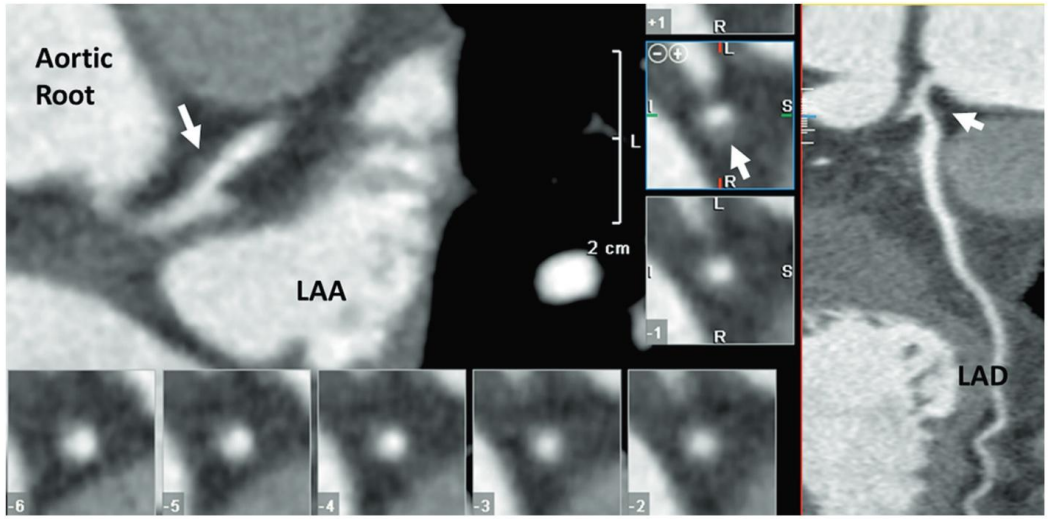
FIGURE 3 The Risk Continuum of Coronary Atherosclerotic Disease



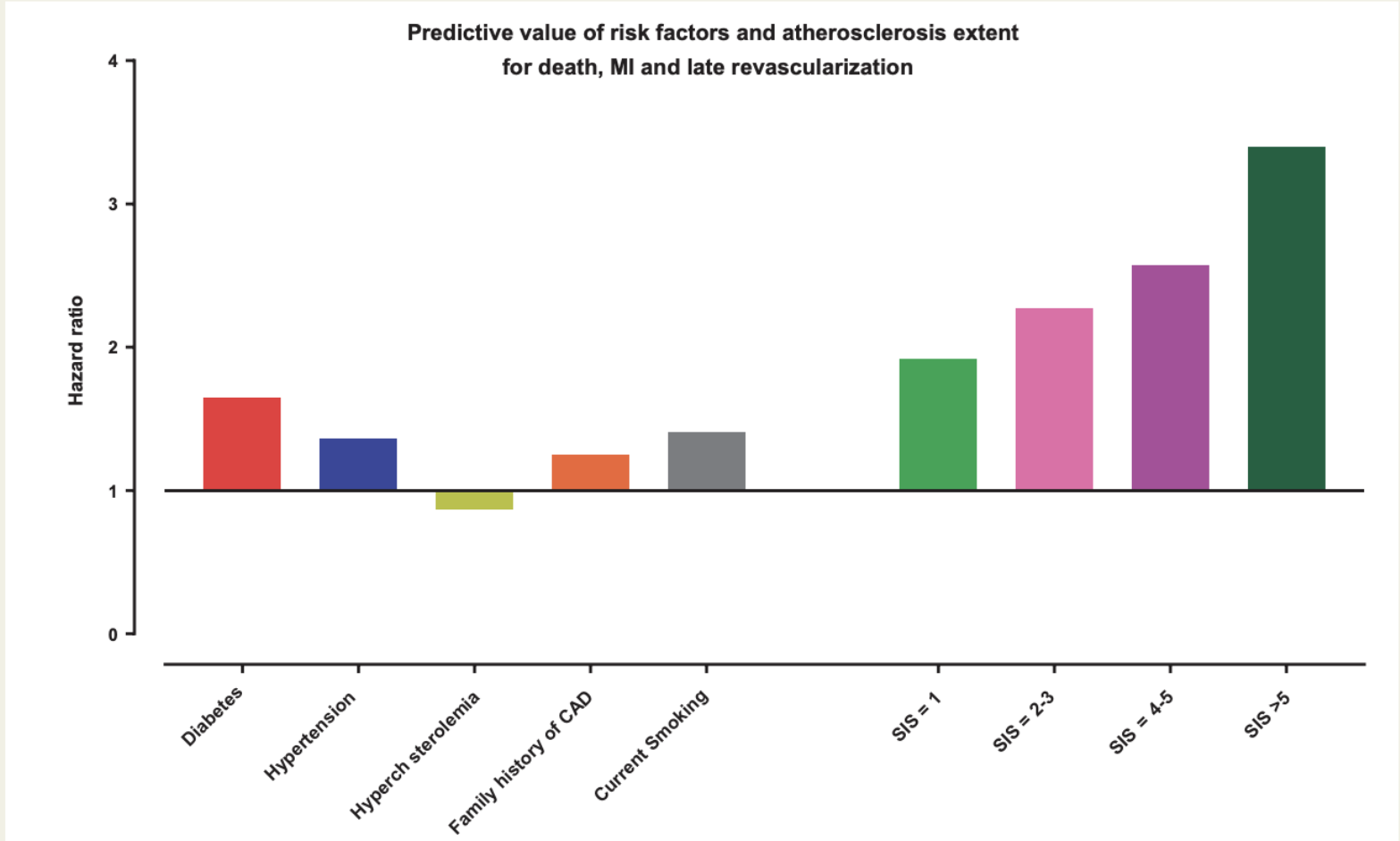
Continuous risk from coronary atherosclerotic disease according to its disease burden, using 3 clinical studies with different patient risk profiles as examples (8,9,71). For each study, the annualized rate of myocardial infarction (MI) or cardiovascular (CV) death is provided according to the assessment of coronary atherosclerotic disease. Note the near-linear relationship between the extent of coronary artery disease (CAD) and risk, but varying degrees of absolute risk according to patient population risk characteristics. Also, note that patients with extensive nonobstructive coronary atherosclerotic disease and patients with single-vessel CAD have similar risks. Min. = minimal; V = vessel.

- **Carga aterosclerótica** está relacionada ao **prognóstico**
- **Oportunidade** de detectar e iniciar tratamento **precocemente**

FIGURE 1 Nonobstructive Coronary Atherosclerotic Disease by Computed Tomography Angiography



A computed tomography angiographic image of coronary atherosclerotic disease in the ostial and proximal left anterior descending artery (LAD) of a 43-year-old woman who presented with atypical chest pain and negative stress test results is shown. The atherosclerotic disease is characterized by a noncalcified plaque that extends from the distal left main coronary artery into the LAD with approximately 40% lumen stenosis. **Arrows** point to the same atherosclerotic plaque displayed in different projections. LAA = left atrial appendage.



HR* (95% CI)	1.65 (1.26-2.16)	1.36 (1.08-1.72)	0.87 (0.70-1.08)	1.25 (0.99-1.58)	1.41 (1.08-1.84)		1.92 (1.41-2.64)	2.27 (1.69-3.07)	2.57 (1.75-3.76)	3.37 (2.31-4.92)

*Adjusted for age and BMI

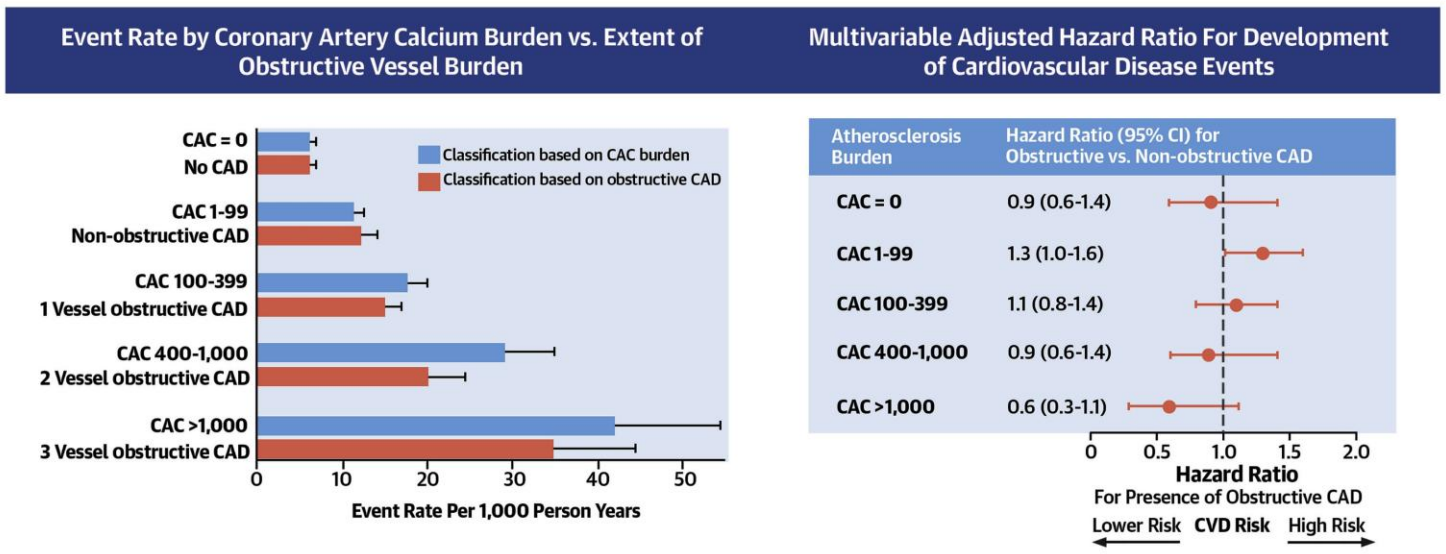
Figure 1 Age and body mass index adjusted hazard ratios are provided for cardiovascular risk factors and the segment involvement score subgroups showing that the number of coronary segments with plaque provide the strongest prognostic information. BMI, body mass index; MI, myocardial infarction; SIS, segment involvement score.

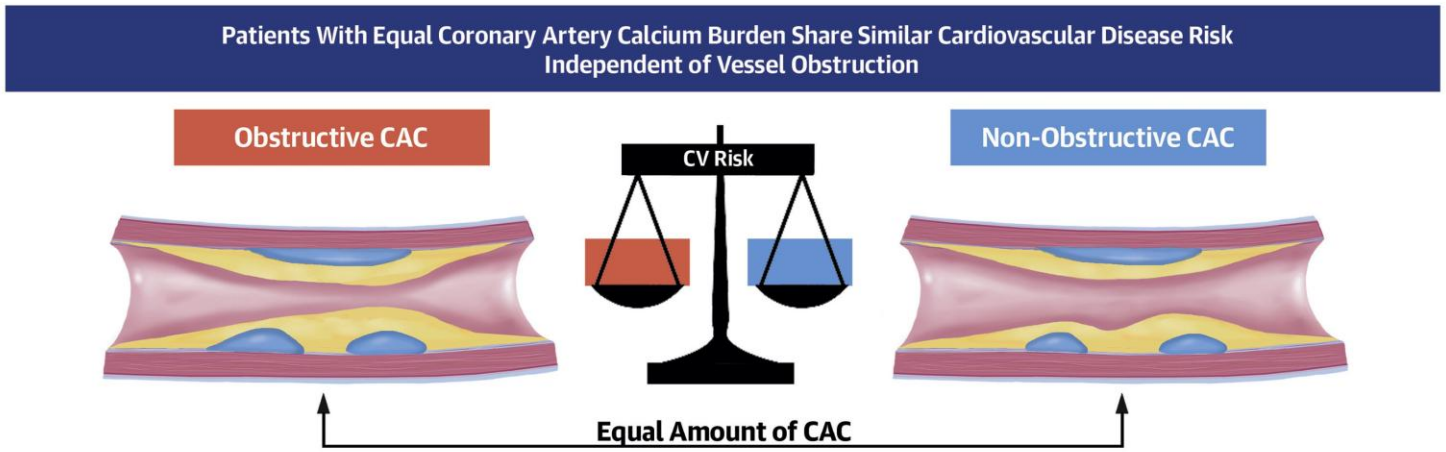
- **Extensão de doença** na ATC relacionada ao **prognóstico**
- **Melhor correlação** que **qualquer** fatores de risco tradicionais

ESC European Society of Cardiology
European Heart Journal - Cardiovascular Imaging (2020) **21**, 479–488
doi:10.1093/ehjci/jez322

A.R. van Rosendael *et al.*

CENTRAL ILLUSTRATION: Atherosclerosis Plaque Burden, Not Stenoses Per Se, Is the Main Predictor of Risk for Cardiovascular Disease Events in Patients With Stable Coronary Artery Disease

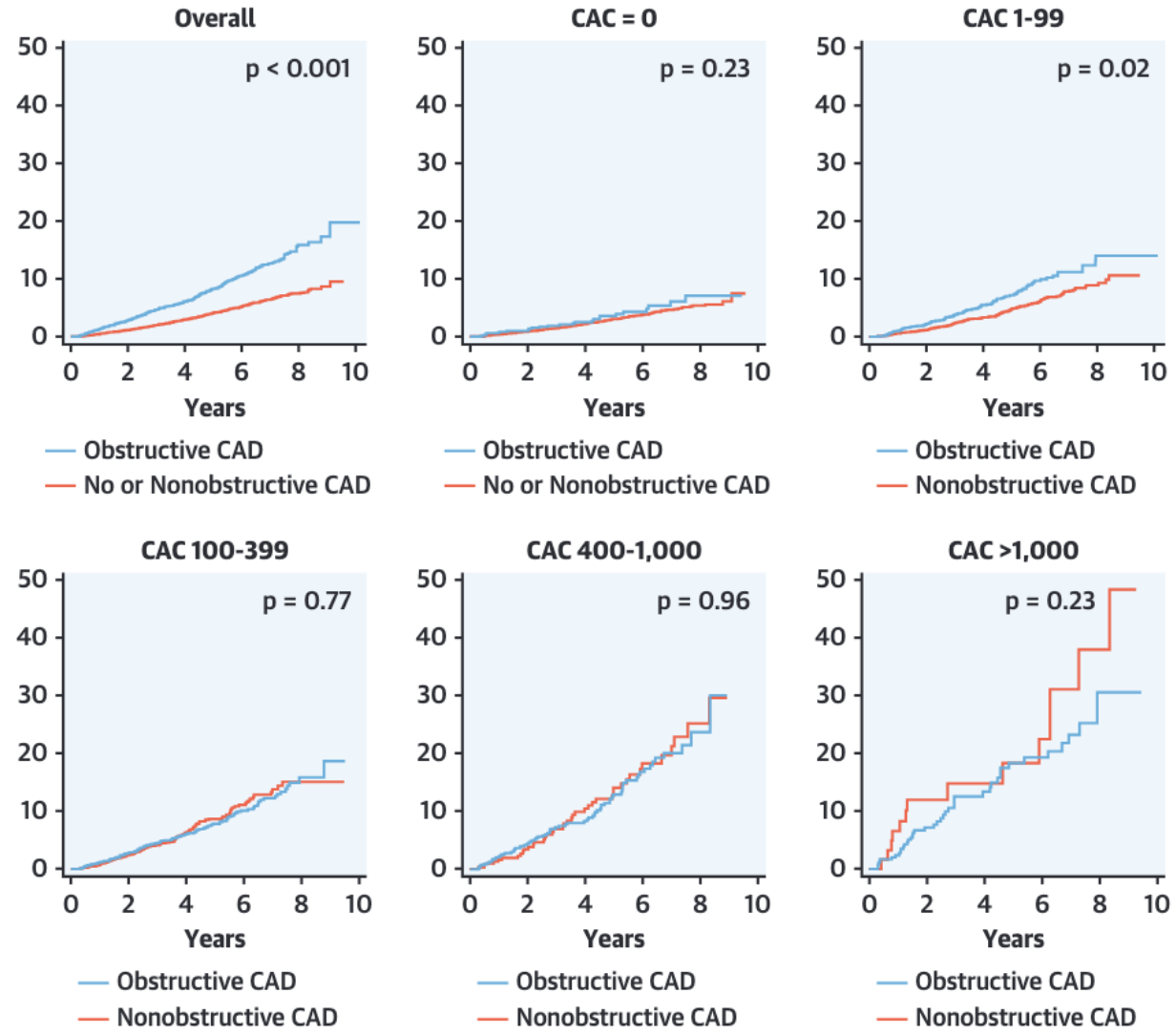




Mortensen, M.B. et al. J Am Coll Cardiol. 2020;76(24):2803-13.

- **Extensão de doença** na ATC relacionada ao **prognóstico**
- **Independente** do grau de estenose

FIGURE 2 Cumulative Incidence of CVD and Death in Patients With Nonobstructive Versus Obstructive CAD Stratified by Atherosclerosis Burden



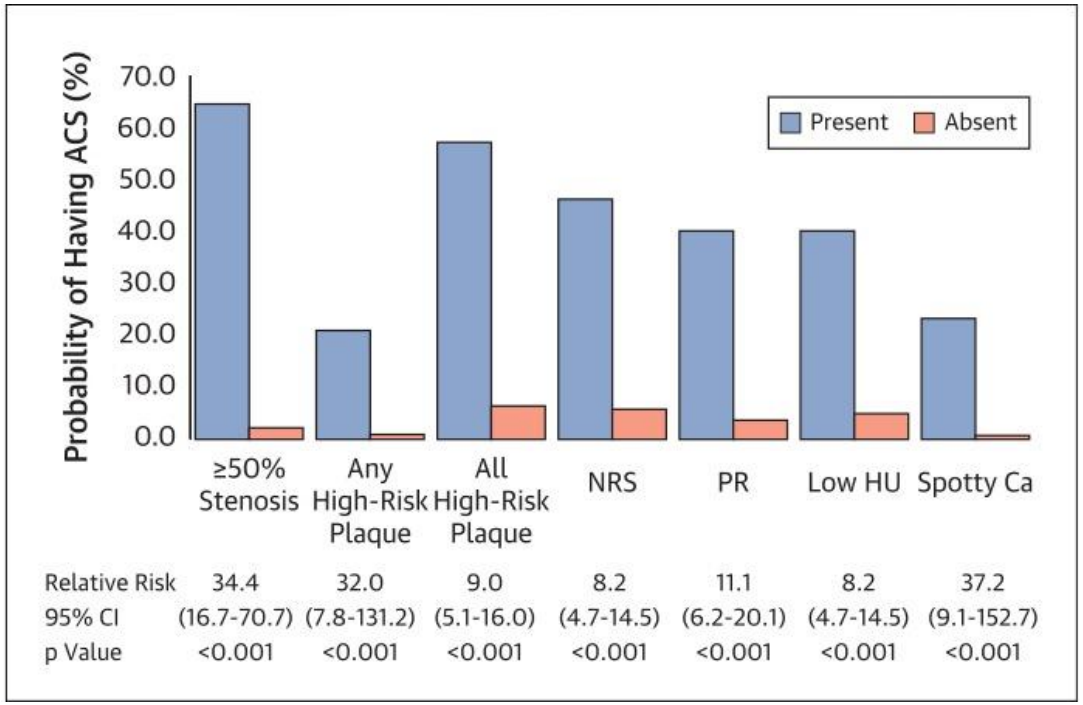
Clinical events included myocardial infarction, stroke, and all-cause death. CVD = cardiovascular disease; other abbreviations as in Figure 1.

- **Extensão de doença** na ATC relacionada ao **prognóstico**
- **Independente** do grau de estenose

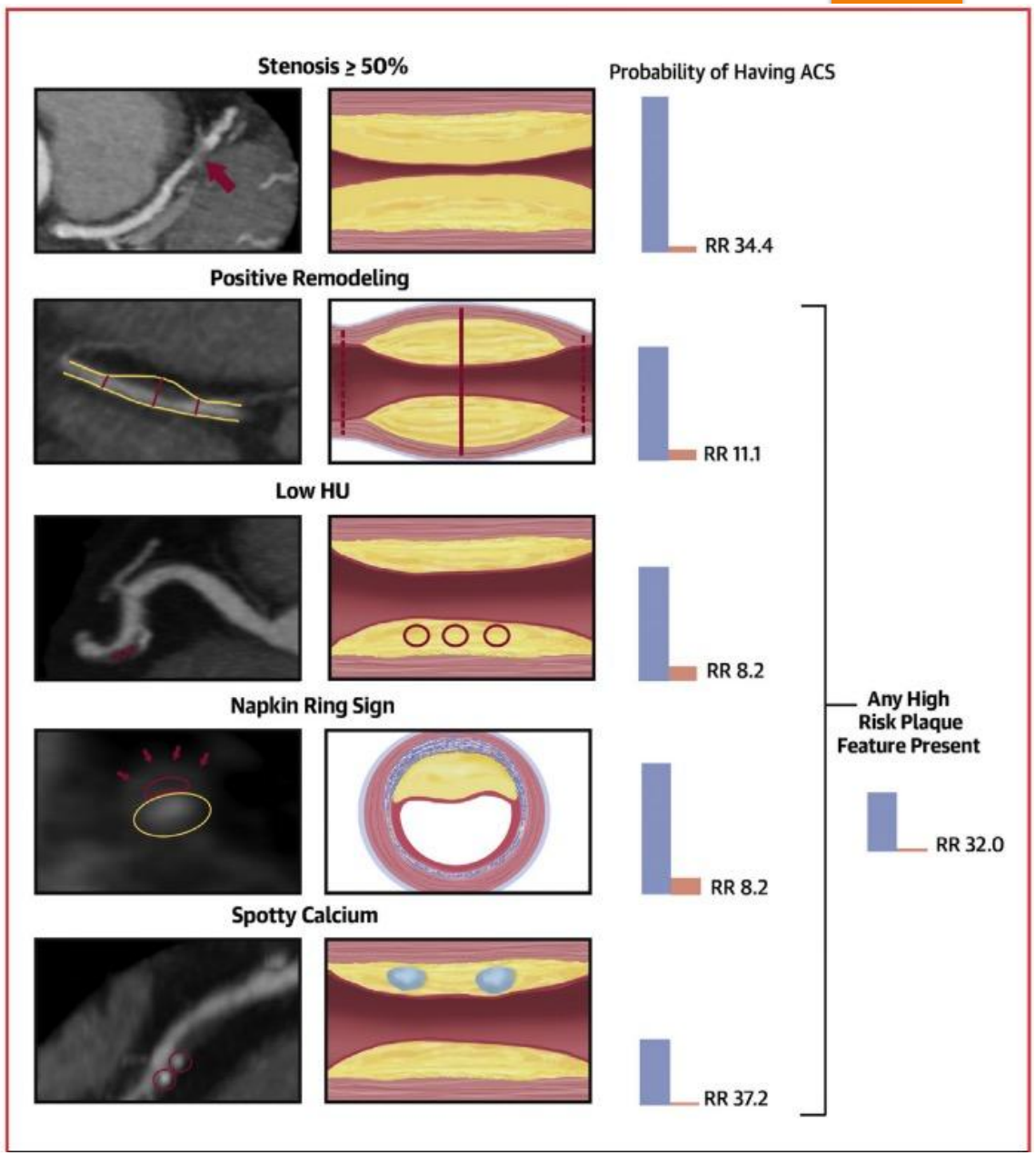
High-Risk Plaque Detected on Coronary CT Angiography Predicts Acute Coronary Syndromes Independent of Significant Stenosis in Acute Chest Pain

Results From the ROMICAT-II Trial

Stefan B. Puchner, MD,*† Ting Liu, MD,*‡ Thomas Mayrhofer, PhD,* Quynh A. Truong, MD, MPH,*§ Hang Lee, PhD,§ Jerome L. Fleg, MD,‖ John T. Nagurney, MD, MPH,¶ James E. Udelson, MD,# Udo Hoffmann, MD, MPH,*§ Maros Ferencik, MD, PhD*§**



MORFOLOGIA DE PLACA → CORRELAÇÃO COM MAIS EVENTOS



Prognostic and Therapeutic Implications of Statin and Aspirin Therapy in Individuals With Nonobstructive Coronary Artery Disease

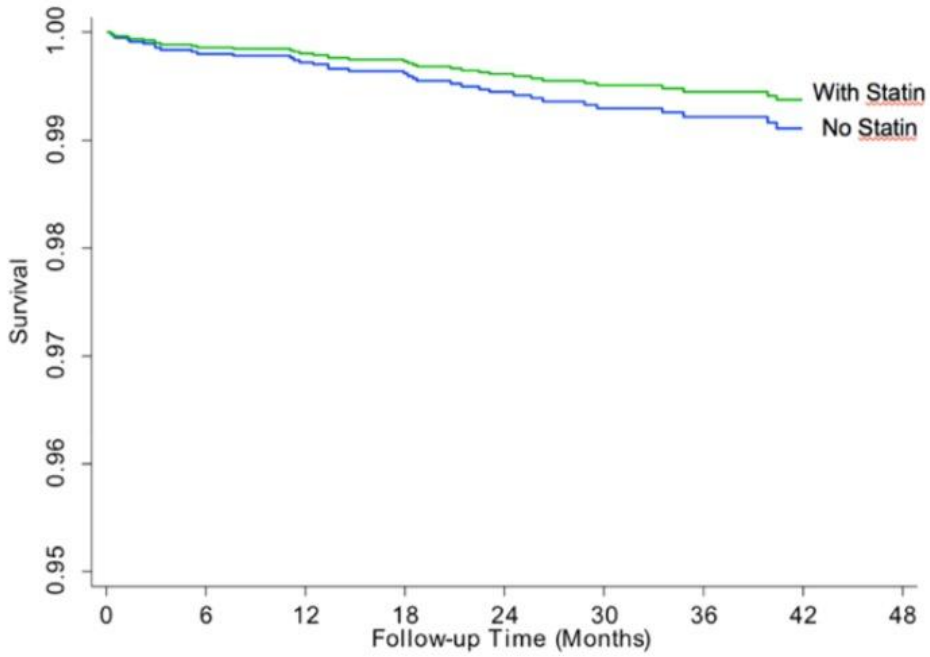
Results From the CONFIRM (Coronary CT Angiography Evaluation For Clinical Outcomes: An International Multicenter Registry) Registry

Benjamin J.W. Chow, Gary Small, Yeung Yam, Li Chen, Ruth McPherson, Stephan Achenbach, Mouaz Al-Mallah, Daniel S. Berman, Matthew J. Budoff, Filippo Cademartiri, Tracy Q. Callister, Hyuk-Jae Chang, Victor Y. Cheng, Kavitha Chinnaiyan, Ricardo Cury, Augustin Delago, Allison Dunning, Gundrun Feuchtner, Martin Hadamitzky, Jörg Hausleiter, Ronald P. Karlsberg, Philipp A. Kaufmann, Yong-Jin Kim, Jonathon Leipsic, Troy LaBounty, Fay Lin, Erica Maffei, Gilbert L. Raff, Leslee J. Shaw, Todd C. Villines, James K. Min; on behalf/for the CONFIRM Investigators

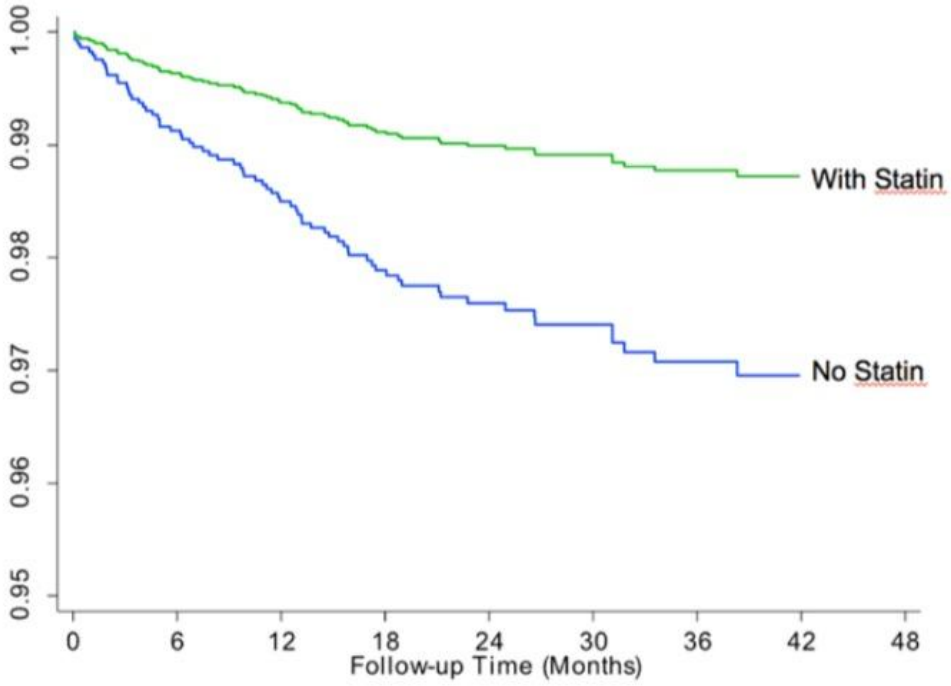
Table 4. Cox Models for All-Cause Mortality in Patients With Nonobstructive CAD

Models	Hazard Ratio* (95% CI)	*P* Value
All patients (n=10 418)		
Statin therapy	0.52 (0.34–0.79)	0.002
ASA therapy	0.77 (0.53–1.12)	0.173
Nonobstructive CAD (n=4706)		
Statin therapy	0.39 (0.23–0.65)	<0.001
ASA therapy	0.66 (0.42–1.04)	0.070
No coronary plaque (n=5712)		
Statin therapy	0.64 (0.30–1.37)	0.252
ASA therapy	0.73 (0.37–1.47)	0.384

CAD indicates coronary artery disease; and CI, confidence interval.
*Adjusted for National Cholesterol Education Program/Adult Treatment Program III risk.



ANGIOTC NORMAL



DAC NÃO OBSTRUTIVA (<50%) NA ANGIOTC

ESTATINA PARA QUEM TEM PLACA...

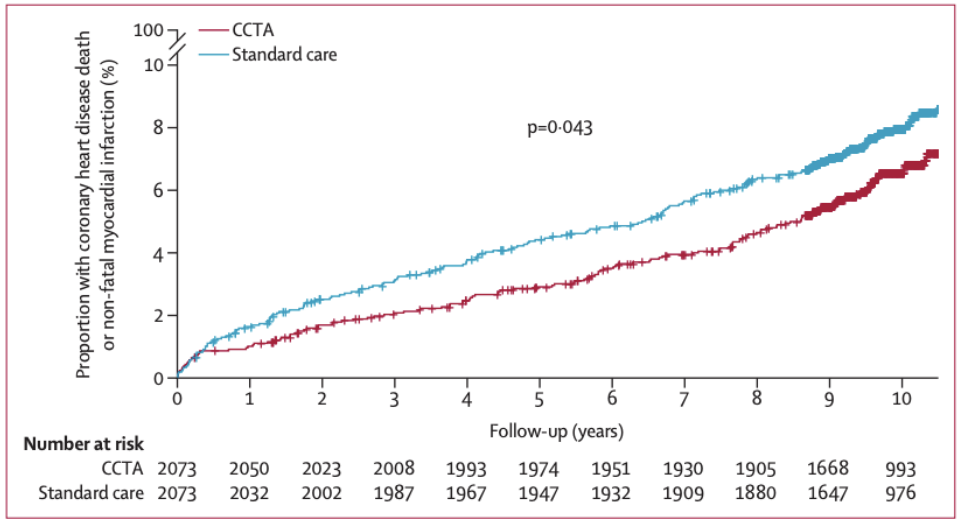


***Figure 2*: Cumulative incidence for the primary outcome of coronary heart disease death and non-fatal myocardial infarction**
P value indicates the log-rank test. CCTA=coronary CT angiography.

→ **MENOS MORTES**

→ **MENOS INFARTOS**

→ **SEM AUMENTO SIGNIFICATIVO DE CAT OU REVASC**

→ **TRATAMENTO CLÍNICO OTIMIZADO**

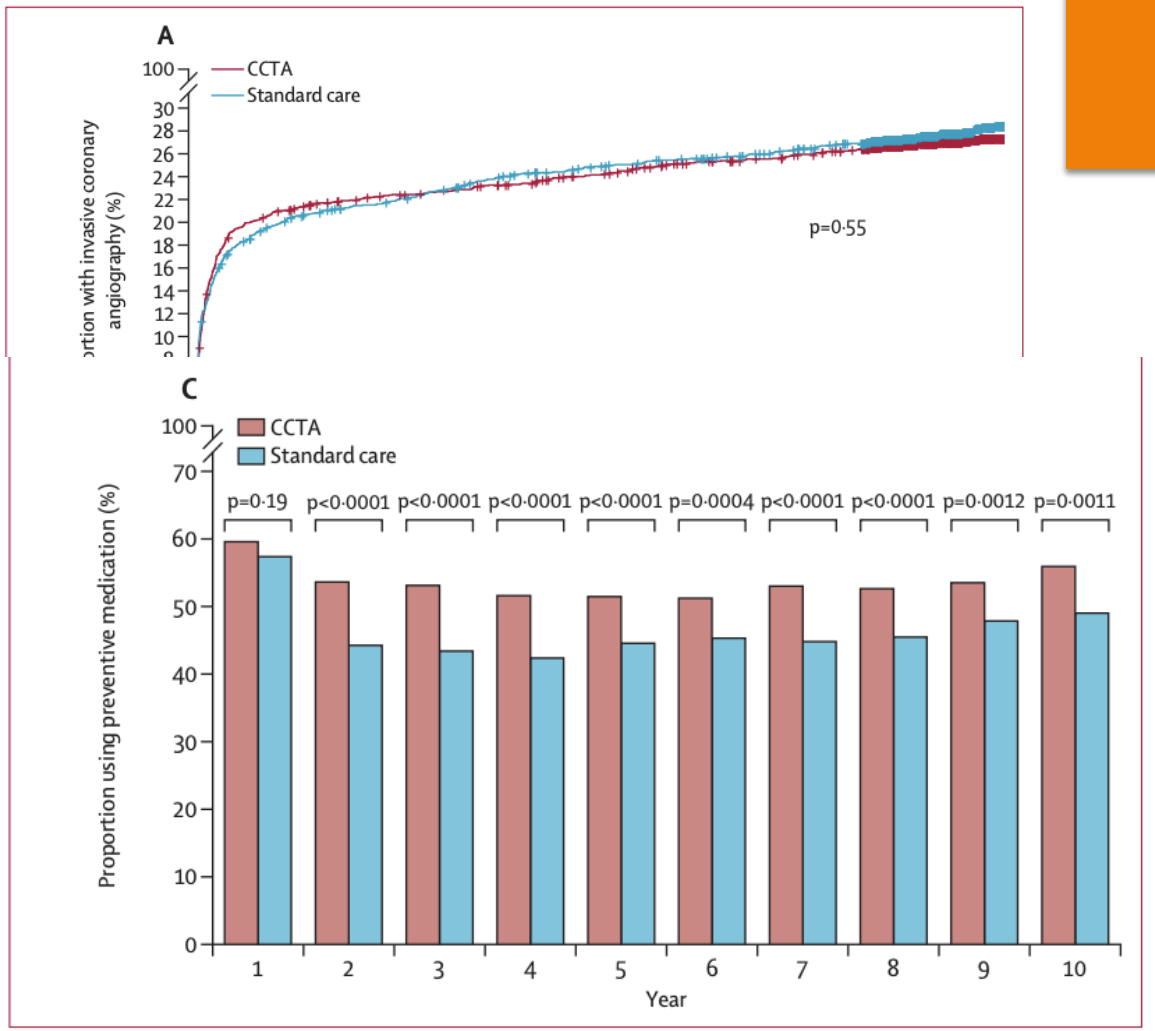


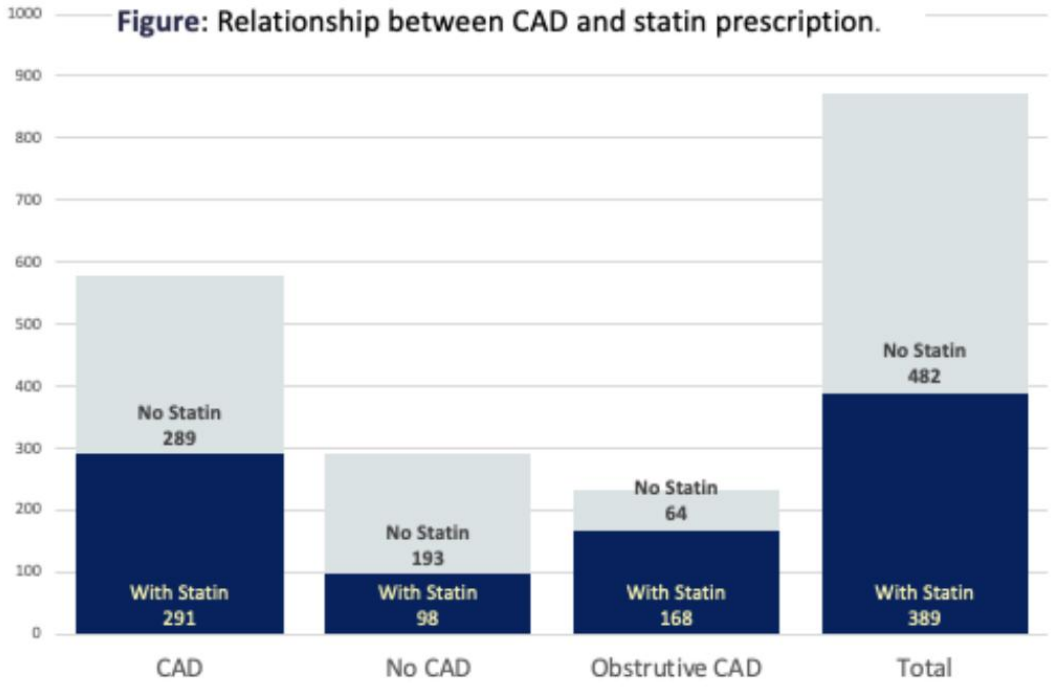
***Figure 3*: Cumulative incidence for (A) invasive coronary angiography and (B) coronary revascularisation, and (C) frequency of preventive medication use**

SCOT-HEART 10 years, Williams et al. Lancet 2025

ASSESSMENT OF THE RELATIONSHIP BETWEEN CORONARY ARTERY ATHEROSCLEROSIS AN STATIN PRESCRIPTION IN PATIENTS WITHOUT KNOWN CORONARY ARTERY DISEASE: A STUDY BASED ON CORONARY ANGIOTOMOGRAPHY

Fernanda Erthal, MD[1], Filipe Penna, MD[1], Juliana Frisso, MD[1], Clerio Azevedo, MD[1], Ronaldo Lima, MD[1], Ronaldo Gismondi, MD[2], Benjamin Chow, MD, FSCCT[3]
[1]CDPI Cardio / Dasa, Rio de Janeiro, Brazil, [2]Universidade Federal Fluminense, Niteroi, Brazil, [3]University of Ottawa Heart Institute, Ottawa, ON, Canada.

Apresentado SCCT 2023



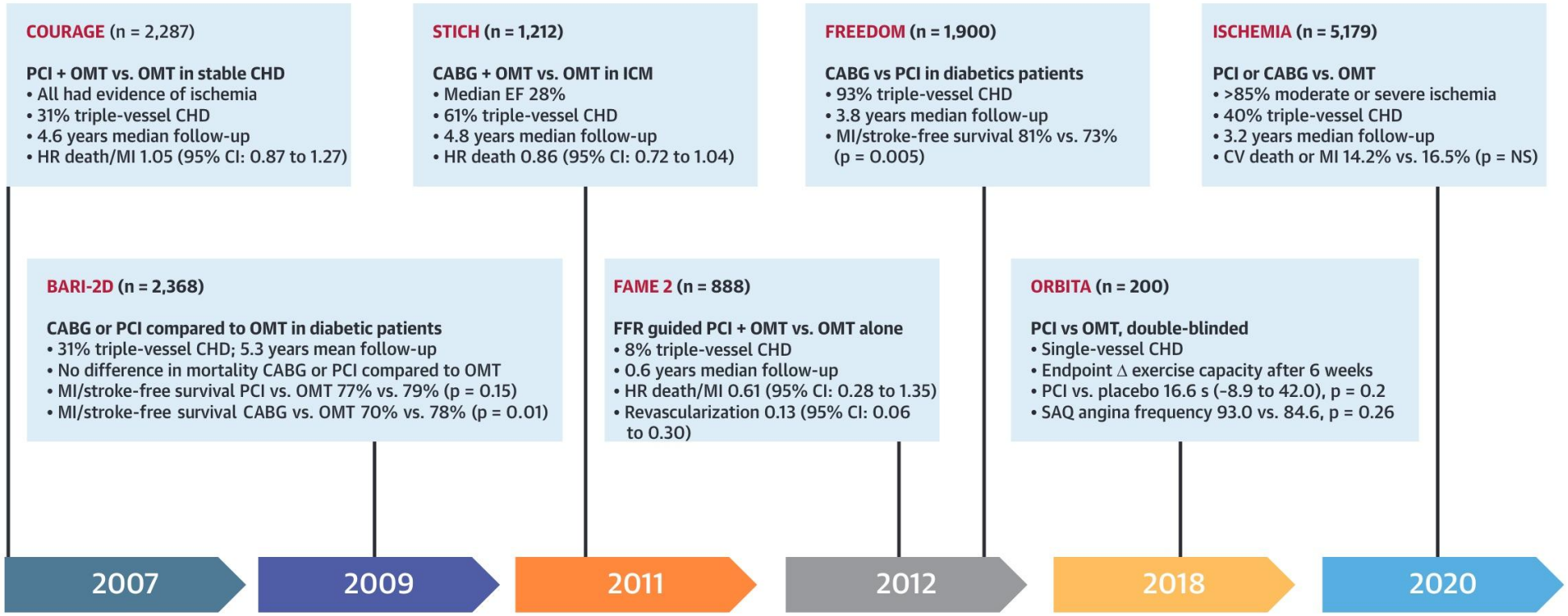
CONCLUSION

- CCTA has the potential to assist with statin prescription in patients without prior known CAD.

- **Aproximadamente 50%** com DAC na ATC **sem** estatina
- **Oportunidade** de implementar **tratamento otimizado**

JACC VOL. 76, NO. 19, 2020
NOVEMBER 10, 2020:2252-66

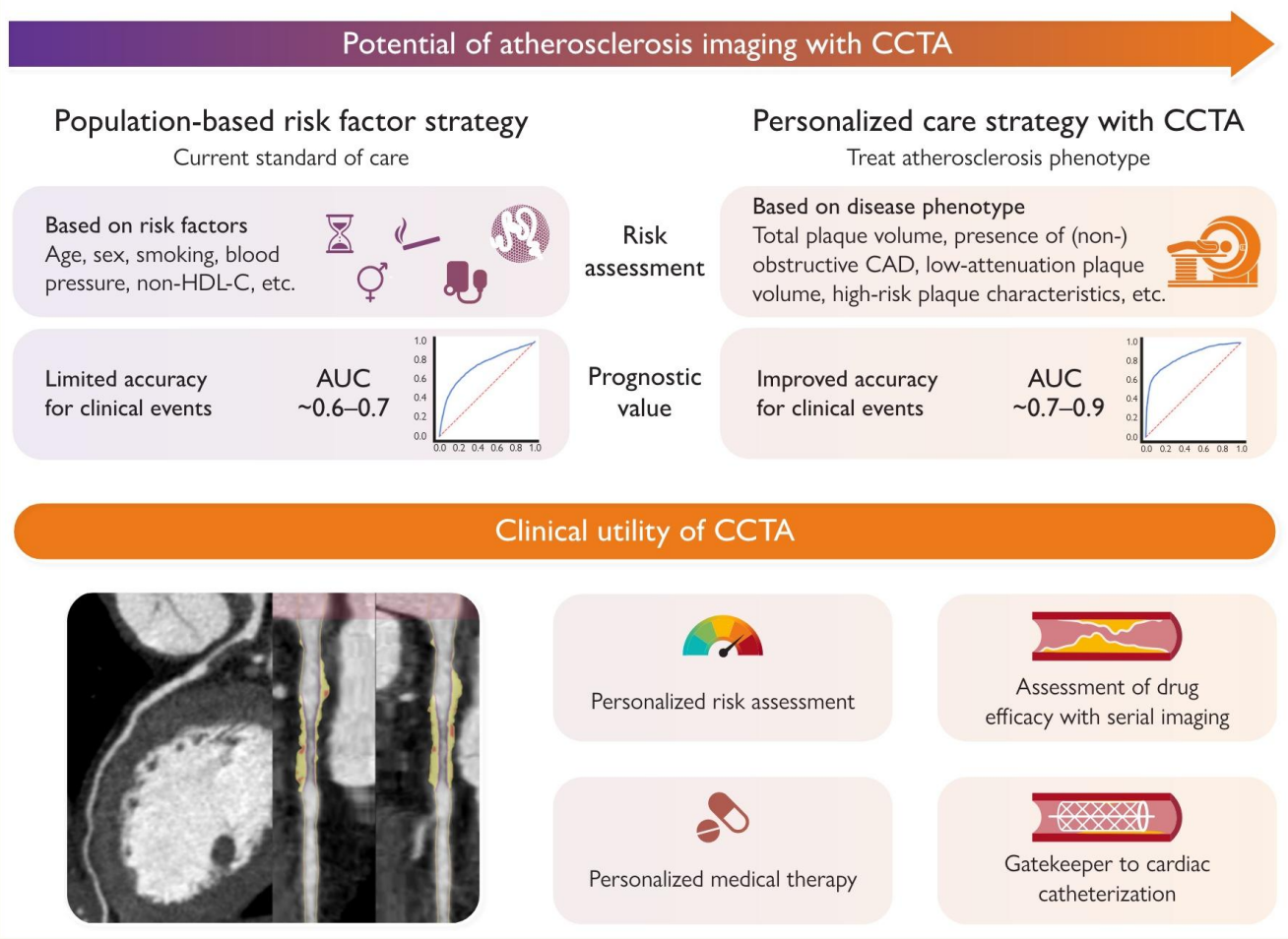
FIGURE 1 Major Clinical Trials for the Management of Stable CHD in the Past 2 Decades



A synopsis is provided summarizing key findings from major clinical trials on the effectiveness of medical therapy, PCI, or CABG in patients with stable coronary heart disease. Data were obtained from the respective publications (7-9,24,49,56,57). To allow comparison of standardized endpoints among trials, we focused our reporting on death, myocardial infarction, or stroke, where available. CABG = coronary artery bypass grafting; CHD = coronary heart disease; PCI = percutaneous coronary intervention; OMT = optimal medical therapy; MI = myocardial infarction; NS = not significant; SAQ = Seattle Angina Questionnaire.

→ **REVASCULARIZAÇÃO NA DAC ESTÁVEL NÃO REDUZ MORTALIDADE**

Graphical Abstract



Coronary computed tomography angiography (CCTA) can change the population risk-based approach to a personalized care approach and provides important clinical utility. Coronary computed tomography angiography allows for precise atherosclerotic plaque quantification and characterization, and CCTA studies have advanced our understanding of vascular biology that holds potential to change our population risk-based approach to a personalized care approach. Coronary computed tomography angiography also provides clinical utility for assessment of drug efficacy and as a gatekeeper to cardiac catheterization lab. AUC, area under the curve; CAD, coronary artery disease; CCTA, coronary computed tomography angiography; HDL-C, high-density lipoprotein cholesterol.

ESC European Society of Cardiology
European Heart Journal (2024) **00**, 1–18
https://doi.org/10.1093/eurheartj/ehae190
STATE OF THE ART REVIEW
Imaging

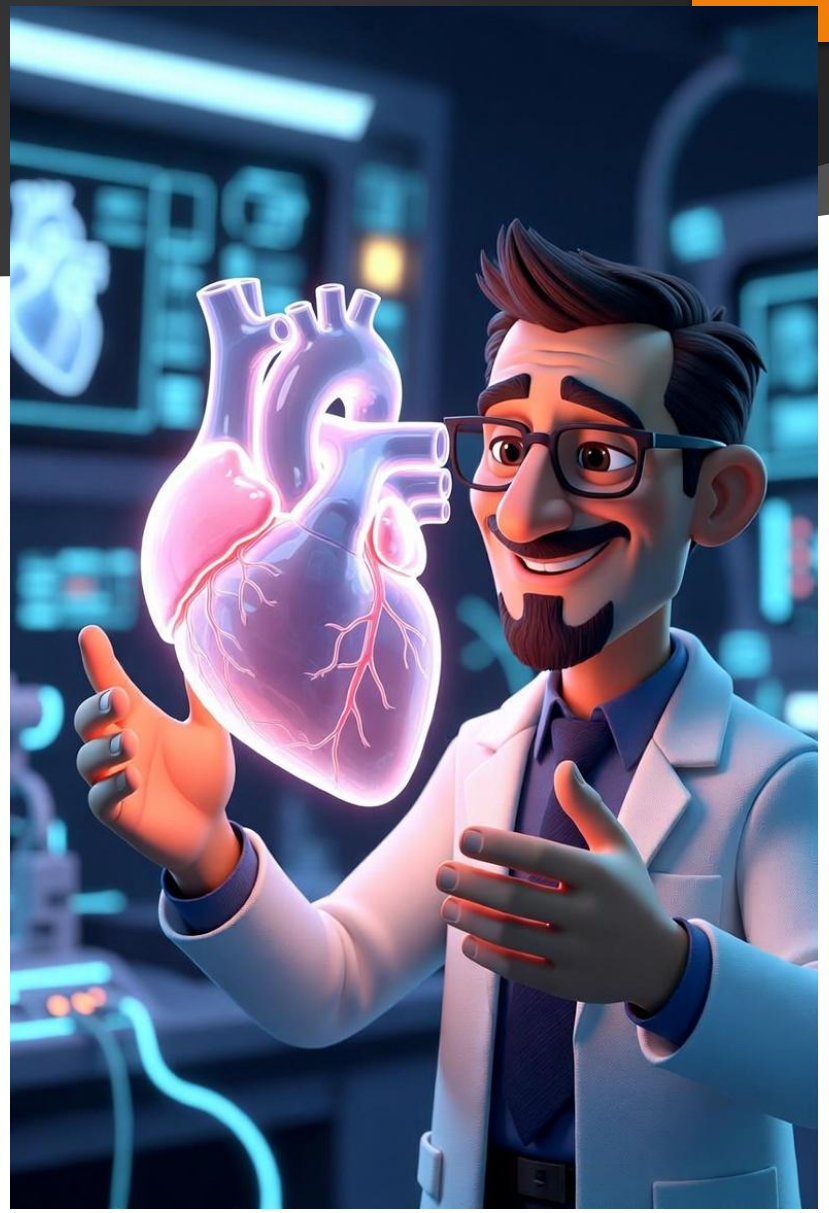
Atherosclerosis evaluation and cardiovascular risk estimation using coronary computed tomography angiography

Nick S. Nurmohamed [1,2,3], Alexander R. van Rosendael[4], Ibrahim Danad [5,6], Quyen Ngo-Metzger[7], Pam R. Taub [8], Kausik K. Ray[9], Gemma Figtree[10], Marc P. Bonaca[11], Judith Hsia [11], Fatima Rodriguez[12], Alexander T. Sandhu[12], Koen Nieman [12], James P. Earls[13,14], Udo Hoffmann[13], Jeroen J. Bax[4], James K. Min[13], David J. Maron [12], and Deepak L. Bhatt [15]*

→ **MUDANÇA DE PARADIGMA**
→ **BUSCAR E TRATAR FENÓTIPO, NÃO FATORES DE RISCO**

Mensagem para casa

- **Carga de placa** de **aterosclerose:**
  - **Melhor relação** com progonóstico
  - Estenose é um **marcador** de alta carga de placa
- Cardiologia de **precisão**:
  - **Personalização** do tratamento clínico otimizado
  - Decisão mais **consciente** sobre **revascularização**



Obrigado!

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