2023
11ème SÉMINAIRE de CARDIOLOGIE INTERVENTIONNELLE de TROYES
01 & 02 AVRIL
SALLE DU CONSEIL MUNICIPAL
HOTEL DE VILLE de TROYES

La vision claire

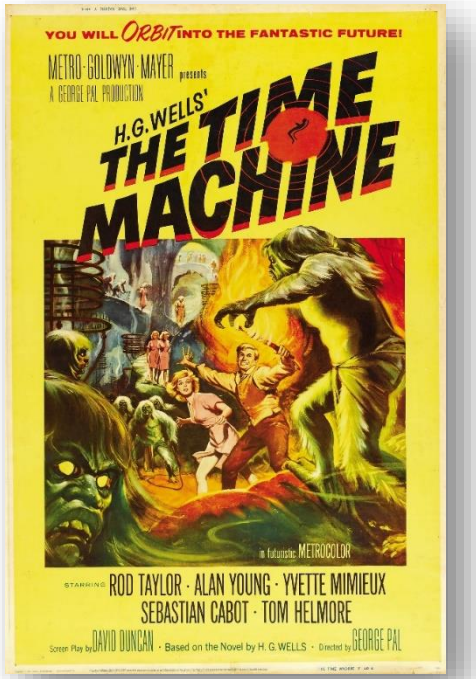
Scanner Coronaire: Indications et Résultats

Anis SFAXI , Jossigny

Déclaration de conflits d'intérêts

- Je n'ai pas trouvé de conflits d'intérêts concernant cette présentation……..et pas faute d'en avoir cherché!

Scanner coronaire : un voyage dans le temps…



Pal G & al. Metro-Goldwyn-Mayer-1960

Scanner coronaire : il était une fois en…2018

Indications

- Pas de recommandations officielles
- Des consensus d'experts

recommandations

Les indications actuelles du scanner cardiaque

Archives of cardiovascular Diseases, 2009 ; 1 : 15 - 22.

SPECIAL ARTICLE

Cardiac computed tomography: indications, applications, limitations, and training requirements

Report of a Writing Group deployed by the Working Group Nuclear Cardiology and Cardiac CT of the European Society of Cardiology and the European Council of Nuclear Cardiology

Eur Heart J. 2008 ; 29 : 531 - 556.

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

J Am Coll Cardiol. 2010 ; 56 : 1864 - 1894.

Indications : patient symptomatique

Objectif : Eliminer une coronaropathie

Table 16 Use of coronary computed tomography angiography for the diagnosis of stable coronary artery disease

Recommendations	Class [a]	Level [b]
Coronary CTA should be considered as an alternative to stress imaging techniques for ruling out SCAD in patients within the lower range of intermediate PTP for SCAD in whom good image quality can be expected.	IIa	C
Coronary CTA should be considered in patients within the lower range of intermediate PTP for SCAD after a non conclusive exercise ECG or stress imaging test or who have contraindications to stress testing in order to avoid otherwise necessary invasive coronary angiography if fully diagnostic image quality of coronary CTA can be expected.	IIa	C
Coronary calcium detection by CT is not recommended to identify individuals with coronary artery stenosis.	III	C
Coronary CTA is not recommended in patients with prior coronary revascularization.	III	C
Coronary CTA is not recommended as a 'screening' test in asymptomatic individuals without clinical suspicion of coronary artery disease.	III	C

CTA = computed tomography angiography; ECG = electrocardiogram; PTP = pre-test probability; SCAD = stable coronary artery disease.
[a] Class of recommendation.
[b] Level of evidence.

Indications : patient symptomatique

Etude SCOT-Heart

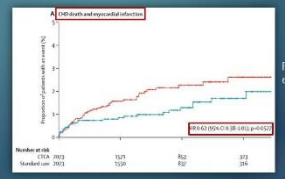
CT coronary angiography in patients with suspected angina due to coronary heart disease (SCOT-HEART): an open-label, parallel-group, multicentre trial

Newby et al., Lancet 2015; 385: 2383–91

Angine de poitrine due à une maladie coronaire

Certain/Exclu Probable/ Peu probable

- Augmentation de la certitude diagnostique (p=0,001)
- Diminution des tests secondaires avec plus de coronarographies
- Modifications des traitements médicamenteux



Probable réduction mortalité et IDM (p = 0,0527)

Perspectives

- innovations technologiques
  - 320 détecteurs pour une couverture du massif cardiaque en 1 seule phase
  - Scanner double tube et double énergie : amélioration de la résolution temporelle et spatiale
- Etude fonctionnelle des lésions
  - FFR CT : mesure de la réserve du flux coronaire
  - Perfusion myocardique après stress

- Consensus d'experts 2008- 2010
- Recommandations timides: 2013 ESC Guidelines on the management of stable CAD : Classe IIa C
- Résultats des premières études randomisées PROMISE et SCOT-HEART(2015) avec un recul de 2 ans:
  - Précision du diagnostic – ajustement thérapeutique préventif
  - A 2 ans : réduction <u>probable</u> des décès et IDM
- Les débuts de l'étude fonctionnelle des lésions

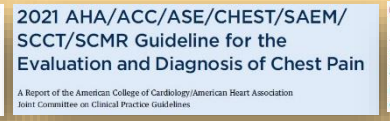
Scanner coronaire : Retour vers…2023!

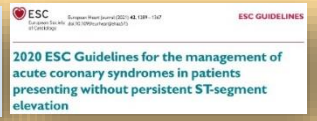
Indications

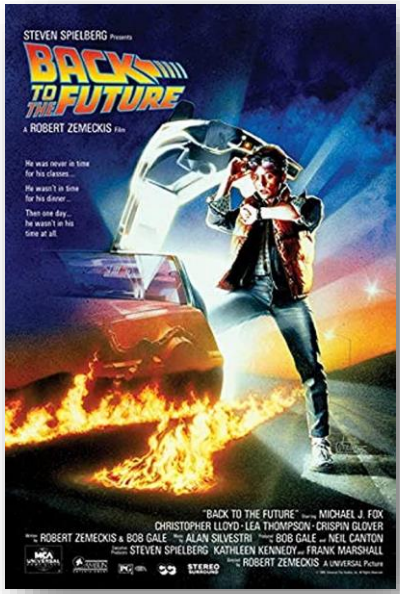
Patient symptomatique

- Non coronarien connu
- Coronarien

Patient asymptomatique







Zemeckis R & al. Universal Pictures - 1985

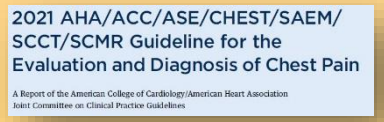
Résultats

Analyse anatomique

- Caractéristiques de la plaque
- Détection de la plaque vulnérable
- Étude de la graisse péri coronaire

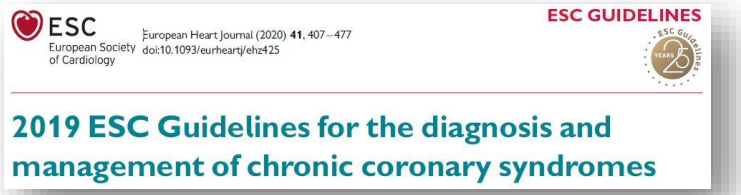
Analyse fonctionnelle

- FFR-CT
- Perfusion CT

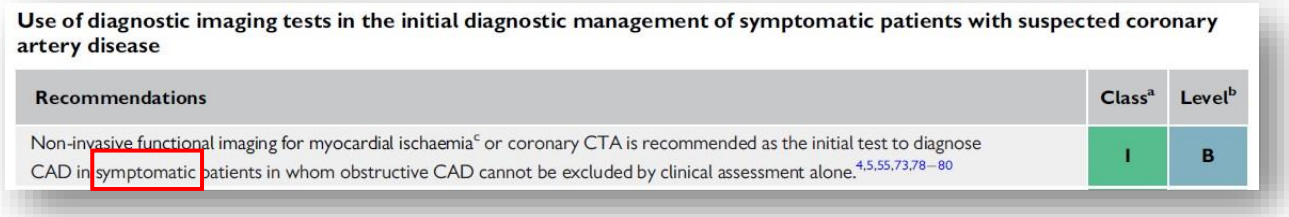


Scanner coronaire : Du vert dans les Guidelines

Test initial chez le patient **symptomatique** à risque intermédiaire

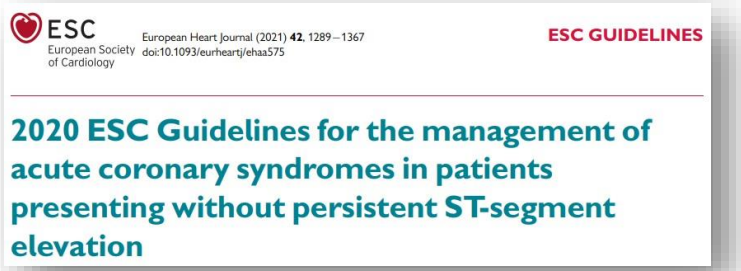


Knuuti J& al. European Heart Journal (2020) 41, 407 - 477

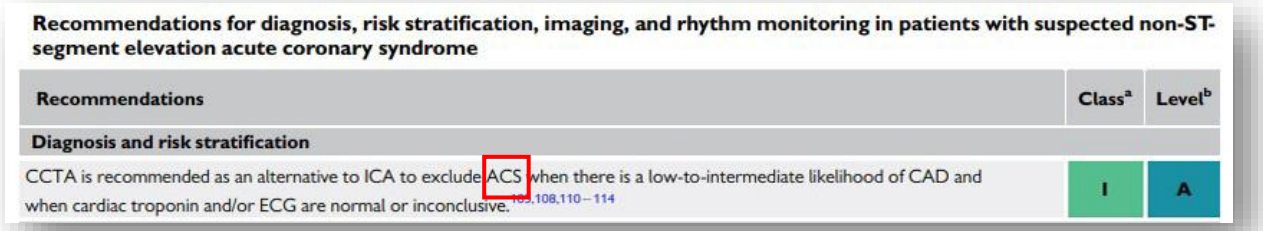


Use of diagnostic imaging tests in the initial diagnostic management of symptomatic patients with suspected coronary artery disease

Recommendations	Class[a]	Level[b]
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

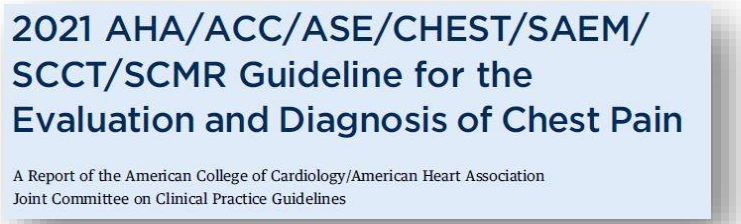


Collet JP & al. European Heart Journal (2021) 42, 1289 - 1367

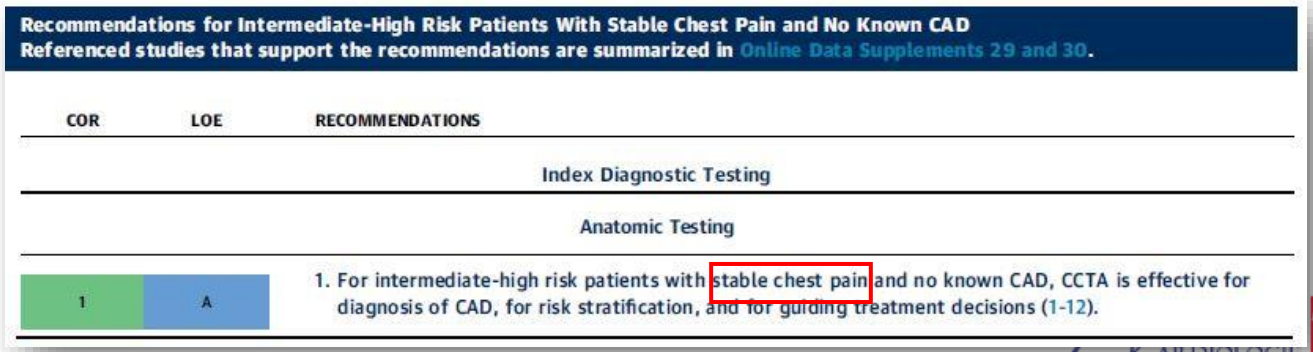


Recommendations for diagnosis, risk stratification, imaging, and rhythm monitoring in patients with suspected non-ST-segment elevation acute coronary syndrome

Recommendations	Class[a]	Level[b]
Diagnosis and risk stratification		
CCTA is recommended as an alternative to ICA to exclude ACS when there is a low-to-intermediate likelihood of CAD and when cardiac troponin and/or ECG are normal or inconclusive.[103,108,110–114]	I	A



Gulati M & al. J Am Coll Cardiol.78(22):e187-e285.



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).

Scanner coronaire : Revue de littérature

TABLE 2 Randomized Controlled Trials Evaluating the Utility of CTA

First Author/Study, Year (Ref. #)	Objective	Design	CT Method	Study Population	N Patients	Country	Primary Endpoint and Other Clinically Relevant Endpoints	Results
Min et al., 2012 (119)	Utility of CTA in CCS	CTA vs functional imaging by	CTA by 64-detector row scanner	Stable suspected angina	180 (91 vs 89)	United States	Near-term angina-specific health status	Both arms improved angina-specific health status
SCOT-HEART, 2015 (24,120)	Utility of CTA in CCS	CTA vs standard of care	CTA by 64- or 320-detector row scanner	Stable suspected angina	4,146 (2,073 vs 2,073)	United Kingdom	Certainty of diagnosis of angina caused by coronary heart disease at 6 weeks Death from coronary heart disease or nonfatal MI at 5 y	Reclassification of the diagnosis of angina caused by coronary heart disease: 23% vs 1%; $P < 0.0001$ 2.3% vs 3.9%; HR: 0.59 (0.41-0.84); $P = 0.004$
PROMISE, 2015 (49)	Utility of CTA in CCS	CTA vs functional test	CTA by ≥64-detector row scanner	Nonurgent suspected angina	10,003 (4,996 vs 5,007)	United States and	Death, nonfatal MI, hospitalization for unstable angina,	3.3% vs 3.0% (a median follow-up of 25 months);
CAPP, 2015 (121)	Utility of CTA in CCS	CTA vs exercise stress ECG	CTA by 64-detector row scanner	Stable suspected angina	500 (250 vs 250)	United Kingdom	The change of the SAQ score at 3 months	Difference of angina stability: −11.1 (−17.4 to −4.8: CTA better); $P = 0.001$; quality of life: −5.7 (−10.3 to −1.2: CTA better); $P = 0.014$
CRESCENT, 2016 (122)	Utility of CTA in CCS	Calcium score + CTA vs functional testing	Calcium score = 0 and pretest probability ≤70%: CTA not performed	Stable suspected angina	350 (242 vs 108)	Netherlands	Absence of chest pain complaints at 1 y	39% vs 25%; $P = 0.012$
Dewey et al., 2016 (20)	Utility of CTA in CCS	CTA vs ICA	CTA by 320-detector row scanner	Suspected coronary artery disease because of atypical chest pain	340 (168 vs 172)	Germany	Major procedural (CTA or ICA) complication occurring within 48 h Cardiac death, stroke, MI, unstable angina, or revascularization	0.6% vs 0.0%; $P = 1.00$ 4.2% vs 3.7% (a median follow-up of 3.3 y); $P = 0.86$
IAEA-SPECT/CTA, 2017 (123)	Utility of CTA in CCS	CTA vs functional testing by stress myocardial perfusion imaging	CTA by ≥64-detector row scanner	Symptomatic patients with an intermediate likelihood of CAD or asymptomatic patients at intermediate-high risk of coronary event	303 (152 vs 151)	Brazil, Czech Republic, India, Mexico, Slovenia, Turkey	Additional noninvasive testing or ICA within 6 months	27.7% vs 16.8%; adjusted OR: 2.0 (1.1-3.6); $P = 0.023$
CAT-CAD, 2018 (124)	Utility of CTA in CCS	CTA vs ICA	CTA by dual-source scanner	Stable suspected angina	120 (60 vs 60)	Poland	Rate of ICA ICA not leading to revascularization	35% vs 98%; $P < 0.001$ 8% vs 70%; $P < 0.001$
CONSERVE, 2019 (21)	Utility of CTA in CCS	CTA vs ICA	NA	Stable suspected angina	1,631 (823 vs 808)	North America, East Asia, Europe, India	Death, MI, unstable angina, stroke, urgent and/or emergent revascularization or cardiac hospitalization at 1 y	4.6% vs 4.6%; $P = 0.99$
CARE-CCTA, 2019 (125)	Utility of CTA in CCS	CTA vs myocardial perfusion SPECT	CTA by 64-detector row scanner	Stable suspected angina with 10%-90% pretest probability of CAD	903 (460 vs 443)	Korea	Total cost Death, ACS, cerebrovascular accident, revascularization, stent thrombosis, or significant bleeding at 1 y	$4,514 vs $5,208; $P = 0.043$ 4.6% vs 5.4%; $P = 0.455$
RESCUE, 2020 (126)	Utility of CTA in CCS	CTA vs myocardial perfusion SPECT	CTA by ≥64-detector row scanner	Stable suspected angina	1,050 (518 vs 532)	United States, Germany, the Netherlands	Cardiac death, MI, or revascularization	HR: 1.03 (0.61-1.75); (median follow-up of 16.2 months); $P = 0.19$
IMAGE-HF 1C, 2020 (127)	Utility of CTA in heart failure	CTA vs ICA	CTA by ≥64-detector row scanner	Heart failure of unknown etiology	253 (124 vs 129)	Canada, Finland	Total cost at 12 months	C$7,611 vs C$8,482; $P = 0.310$
Goldstein et al., 2007 (128)	Utility of CTA in ACS	CTA vs standard of care	CTA by 64-detector row scanner	Suspected ACS at low risk	197 (99 vs 98)	United States	Test complications Time from randomization until completion of testing interpretation	0.0% vs 0.0%; $P = NA$ 3.4 h vs 15.0 h; $P < 0.001$
Chang et al., 2008 (129)	Utility of CTA in ACS	CTA vs standard of care	CTA by 64-detector row scanner	Low-to-high risk for ACS	266 (133 vs 133)	Korea	Admission Death, MI, or target vessel revascularization at 1 month	41% vs 50%; $P = 0.14$ 0.0% vs 0.8%; $P = NA$
Miller et al., 2011 (130)	Utility of CTA in ACS	CTA vs standard of care	CTA by 64-detector row scanner	Suspected ACS without cardiac enzyme elevation	60 (30 vs 30)	United States	Total cost at 90 days	$10,134 vs $16,579; $P = 0.144$
CT-STAT, 2011 (131)	Utility of CTA in ACS	CTA vs myocardial perfusion SPECT	CTA by 64- or 320-detector row scanner	Suspected ACS at low-to-intermediate risk	699 (361 vs 338)	United States	Time from randomization to when test results were called to emergency department physicians	2.9 h vs 6.3 h; $P < 0.001$
ROMICAT-II, 2012 (132)	Utility of CTA in ACS	CTA vs standard of care	CTA by ≥64-detector row scanner	Suspected ACS	1,000 (501 vs 499)	United States	Length of stay in the hospital	23.2 h vs 30.8 h; $P < 0.001$
ACRIN PA 4005, 2012 (133)	Utility of CTA in ACS	CTA vs standard of care	CTA by ≥64-detector row scanner	Suspected ACS at low-to-intermediate risk	1,370 (908 vs 462)	United States	Cardiac death or MI within 30 days in patients with a negative CTA examination Death or MI at 30 days	0.0% (0/640) 1.10% vs 1.08%; difference 0.02% (−5.6% to 5.7%)
CATCH, 2013 (134,135)	Utility of CTA in ACS	CTA vs standard of care	CTA by 320-detector row scanner	Suspected ACS	600 (299 vs 301)	Denmark	Cardiac death, MI, hospitalization for unstable angina, late symptom-driven revascularization, or readmission for chest pain	11% vs 16% (a median follow-up of 18.7 months); $P = 0.04$
CT-COMPARE, 2014 (136)	Utility of CTA in ACS	CTA vs exercise stress ECG	CTA by 64- or 128-detector row scanner	Low-to-intermediate risk for ACS	562 (322 vs 240)	Australia	Diagnostic performance for ACS Hospital cost at 30 days	AUC 0.97 vs 0.87; $P = 0.22$ A$2,193 vs A$2,704; $P < 0.001$
Levsky et al., 2015 (137)	Utility of CTA in ACS	CTA vs myocardial perfusion SPECT	CTA by 64-detector row scanner	Suspected ACS	400 (200 vs 200)	United States	ICA not leading to revascularization within 1 y	7.5% vs 10%; $P = 0.44$
BEACON, 2016 (138)	Utility of CTA in ACS	CTA vs standard of care	CTA by ≥64-detector row scanner	Suspected ACS	500 (250 vs 250)	The Netherlands	The number of patients requiring revascularization within 30 days	9% vs 7%; $P = 0.40$
Levsky et al., 2018 (139)	Utility of CTA in ACS	CTA vs stress echocardiography	CTA by 64-detector row scanner	Low-to-intermediate risk for ACS	400 (201 vs 199)	United States	Hospitalization rate Median emergency department length of stay for discharged patients Median hospital length of stay	19% vs 11%; $P = 0.026$ 5.4 h vs 4.7 h; $P < 0.001$ 58 h vs 34 h; $P = 0.002$
CARMENTA, 2019 (95)	Utility of CTA in NSTEMI	Routine clinical care vs CMR first vs CTA first	CTA by second-generation dual-source scanner	Suspected NSTEMI	207 (69 vs 68 vs 70)	The Netherlands	Proportion of patients referred to ICA during initial hospitalization	100% vs 66% ($P = 0.001$ vs routine care) vs 87% ($P < 0.001$ vs routine care)

CCS

ACS

- CCTA vs FT
- CCTA vs ICA

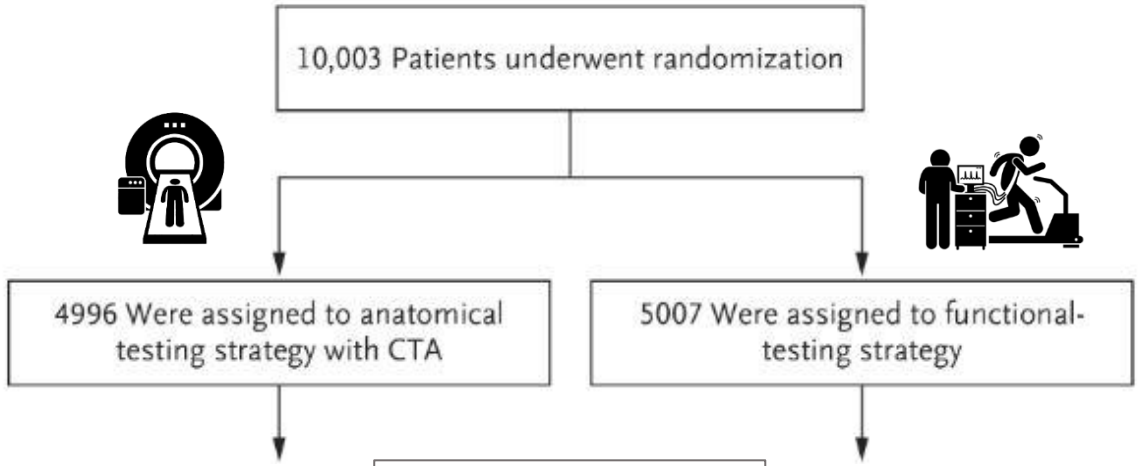
Scanner coronaire : Débuts prometteurs!

PROMISE

Outcomes of Anatomical versus Functional Testing for Coronary Artery Disease

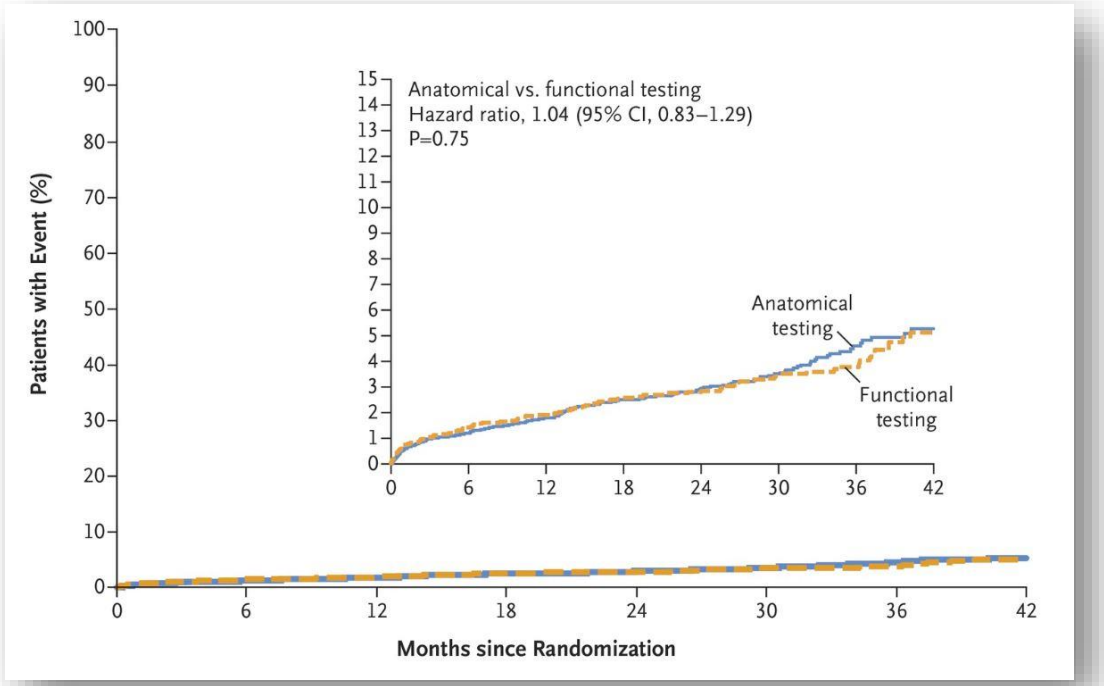
Pamela S. Douglas, M.D., Udo Hoffmann, M.D., M.P.H., Manesh R. Patel, M.D., Daniel B. Mark, M.D., M.P.H., Hussein R. Al-Khalidi, Ph.D., Brendan Cavanaugh, M.D., Jason Cole, M.D., Rowena J. Dolor, M.D., Christopher B. Fordyce, M.D., Megan Huang, Ph.D., Muhammad Akram Khan, M.D., Andrzej S. Kosinski, Ph.D., Mitchell W. Krucoff, M.D., Vinay Malhotra, M.D., Michael H. Picard, M.D., James E. Udelson, M.D., Eric J. Velazquez, M.D., Eric Yow, M.S., Lawton S. Cooper, M.D., M.P.H., and Kerry L. Lee, Ph.D., for the PROMISE Investigators*

N Engl J Med 2015; 372:1291-1300



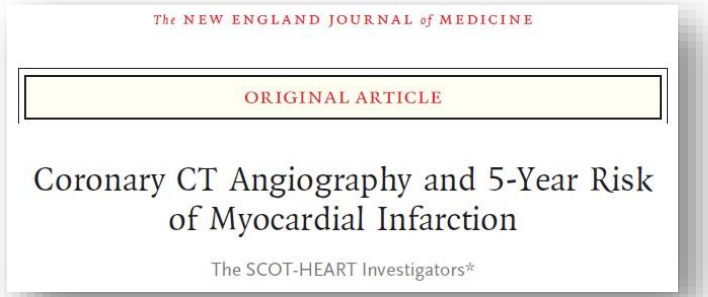
Suivi moyen 2 ans

CP composite : Décès IDM Angor



Scanner coronaire : sauve des vies!

SCOT-HEART


The NEW ENGLAND JOURNAL of MEDICINE

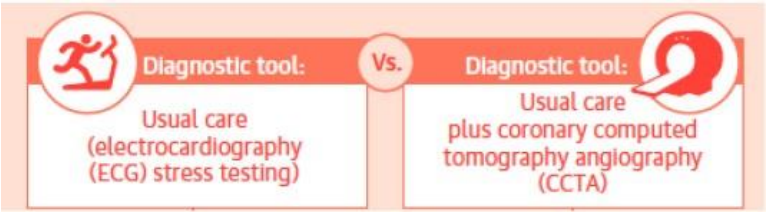
ORIGINAL ARTICLE

Coronary CT Angiography and 5-Year Risk of Myocardial Infarction

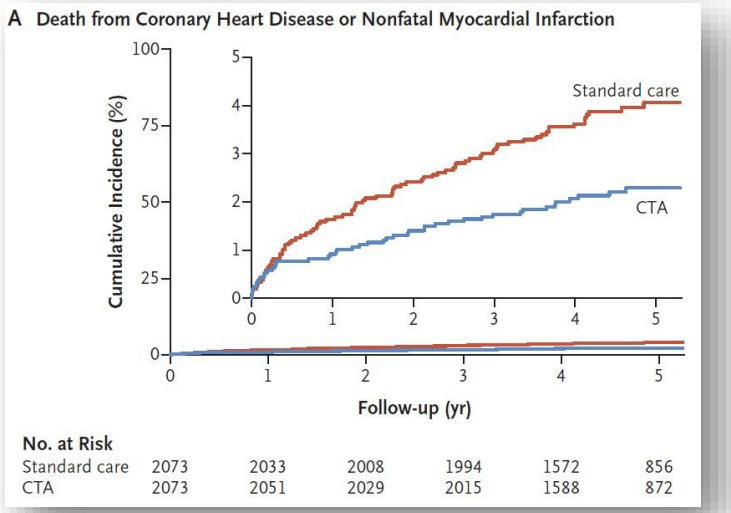
The SCOT-HEART Investigators*

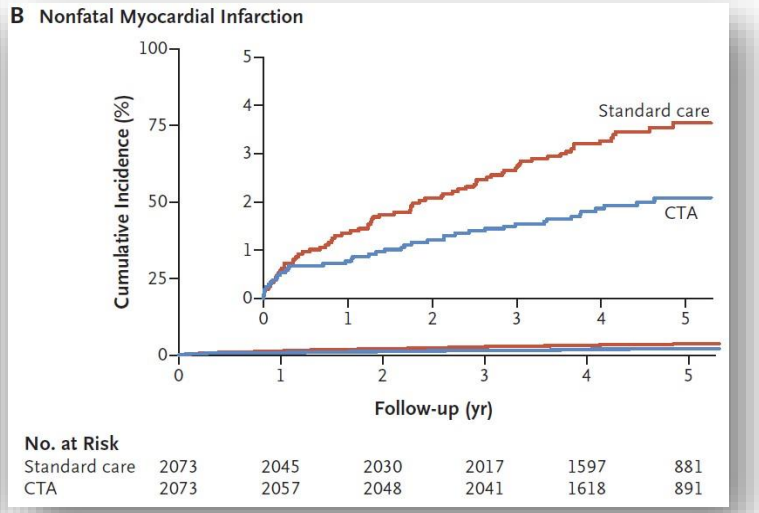
N Engl J Med 2018;379:924-33

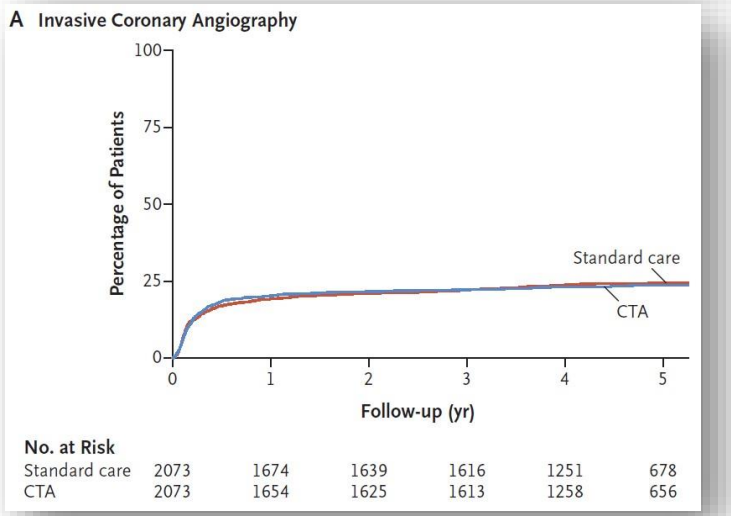
4146 patients

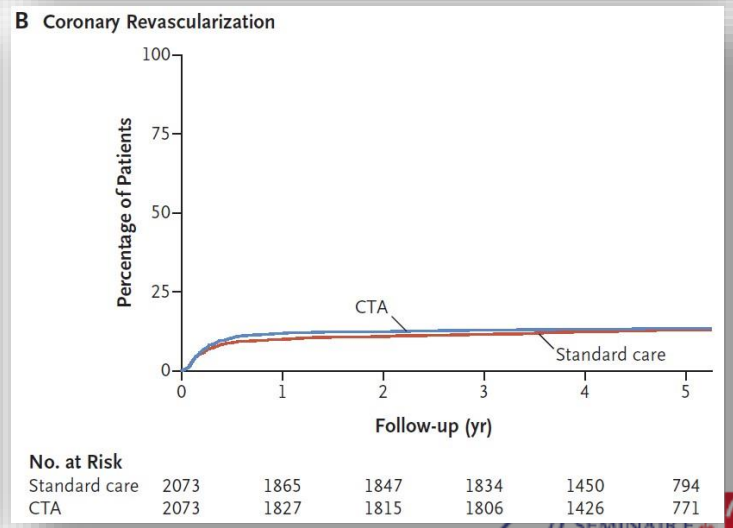


suivi 5 ans









SEMINAIRE de CARDIOLOGIE INTERVENTIONNELLE de TROYES 2023 01 & 02 AVRIL

Scanner coronaire :et la coro?

DISCHARGE

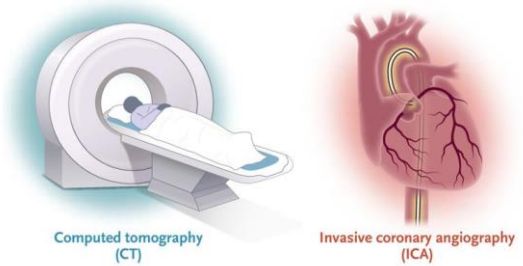
CT or Invasive Coronary Angiography in Stable Chest Pain

The DISCHARGE Trial Group

N Engl J Med 2022;386:1591-602.

3561 patients DT stable risque intermédiaire

1808



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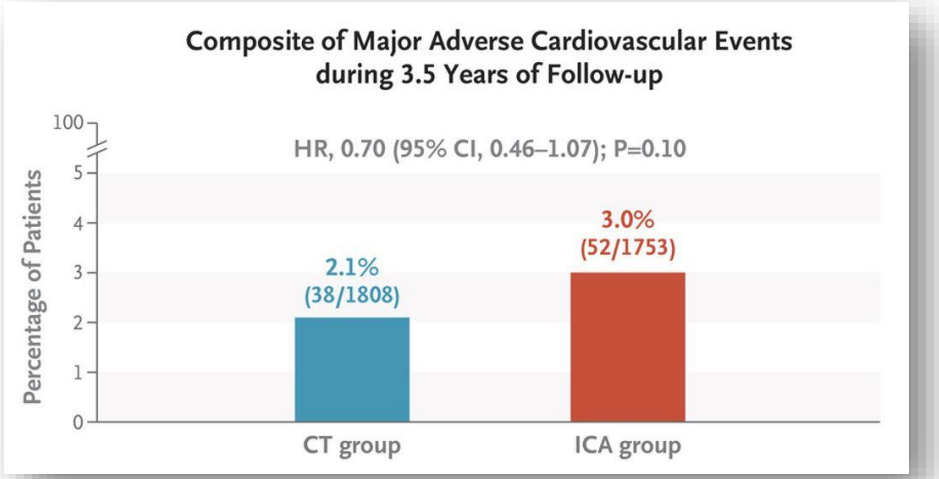
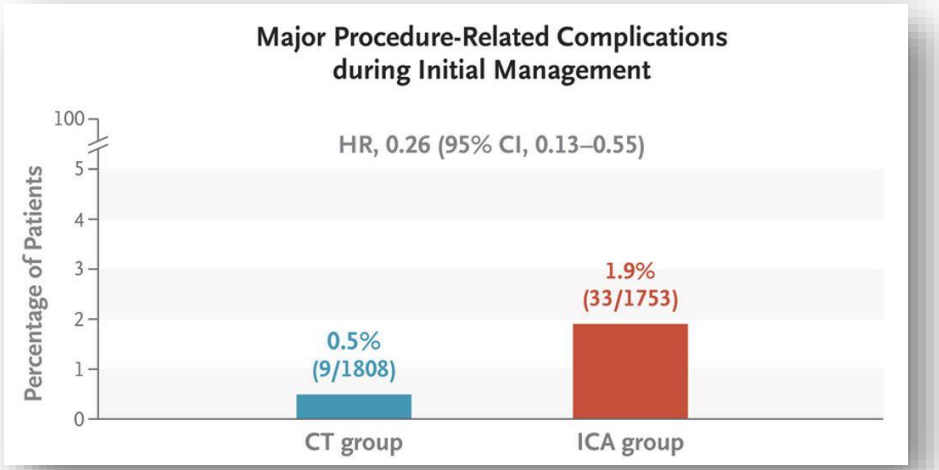
Suivi 3,5 ans

CP composite : MACE Décès CV - IDM - AVC





11ème SEMINAIRE de CARDIOLOGIE INTERVENTIONNELLE de TROYES 2023 01 & 02 AVRIL

Scanner coronaire : Analyse anatomique

Excellente valeur prédictive négative

TABLE 1 Diagnostic Accuracy on Computed Tomography Angiography

Study/First Author (Ref. #)	Year	N Patients	Sensitivity	Specificity	PPV	NPV	Accuracy
ACCURACY (8)	2008	230	95	83	64	99	NA
Meijboom et al. (9)	2008	360	99	64	86	97	88
NIMISCAAD (10)	2009	327	94	88	91	91	91
CORE-64 (11)	2012	273	91	87	90	88	NA
EVINCI (12)	2015	475	91	92	83	96	91
Budoff et al. (13)	2017	77	85	90	81	92	NA
PICTURE (14)	2017	230	92	78	82	90	NA
VERDICT (15)	2020	1,023	97	72	91	88	89
Andreini et al. (17): Patients with atrial fibrillation	2017	83	95	98	95	98	96
Andreini et al. (18): patients with heart rate ≥80 beats/min	2018	40	100	82	100	82	90

NA = not available; NPV = negative predictive value; PPV = positive predictive value.

Scanner coronaire : Analyse anatomique

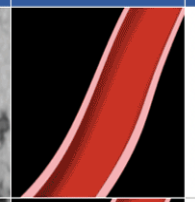
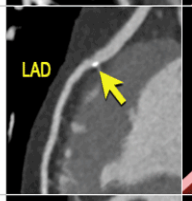
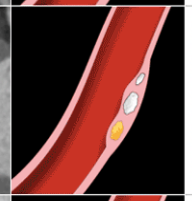
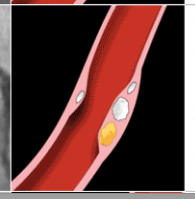
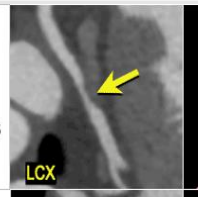
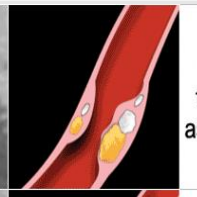
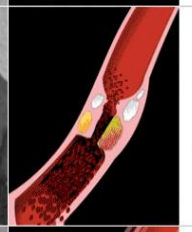
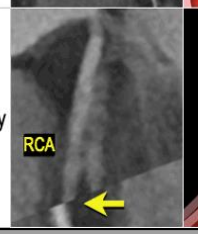
CAD-RADS™ 2.0 – 2022 Coronary Artery Disease-Reporting and Data System

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)

J Am Coll Cardiol Img 2022;15:1974–2001

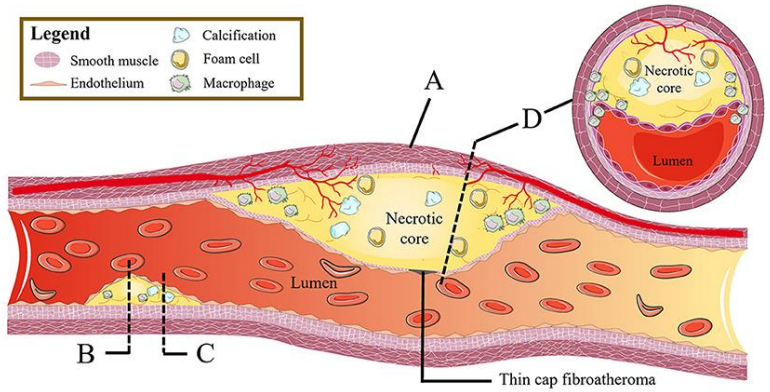
Caractéristiques de la plaque
+
Recommandations de CAT

- Degré de sténose (Cad-Rads 0-5)
- Longueur
- Topographie
- Charge calcique (P1-4)
- Pontage (G)
- Stent (S)
- Non analysable (N)
- Critères fonctionnels (I)
- Critères de vulnérabilité (HPR)

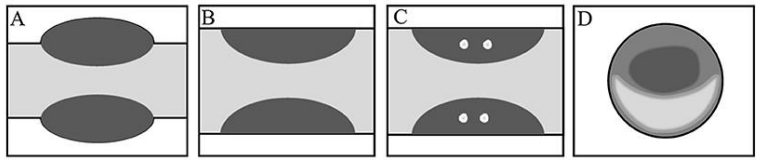
Cad-Rads	Stenosis	CT imaging	Illustration	Additional Tests
Cad-Rads **0**	0% No stenosis			None
Cad-Rads **1**	1-24% Minimal stenosis			None
Cad-Rads **2**	25-49% Mild stenosis			None
Cad-Rads **3**	50-70% Moderate stenosis			Consider functional assessment
Cad-Rads **4**	A: 70-99% stenosis in 1 or 2 vessels B: >50% stenosis in the left main or >70% stenosis in 3-vessels			A: Consider functional assessment or ICA B: ICA is recommended
Cad-Rads **5**	100% total occlusion			ICA and/or viability assessment
Cad-Rads **N**	Non-diagnostic study			Additional evaluation

Scanner coronaire : Plaque à Haut Risque (HRP)

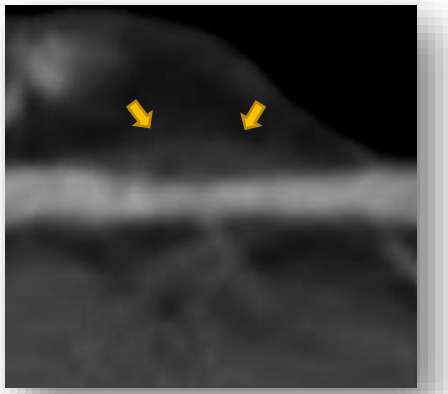
Plaque vulnérable



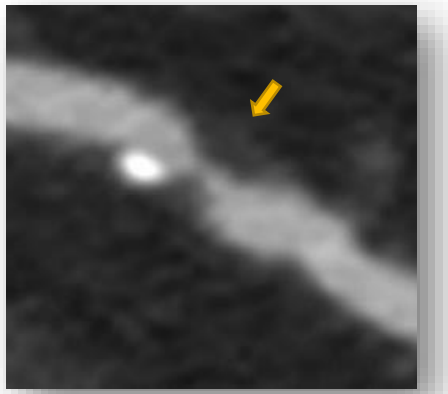
Lu G, & al. Front. Cardiovasc. Med. 8:743538.



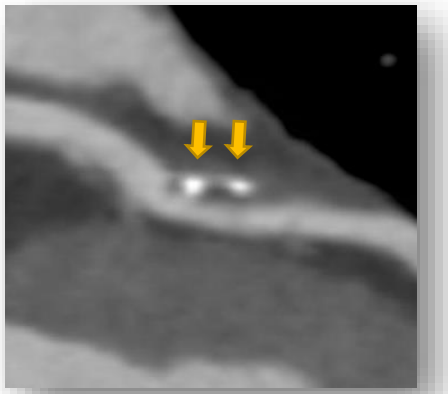
Remodelage positif > 10%



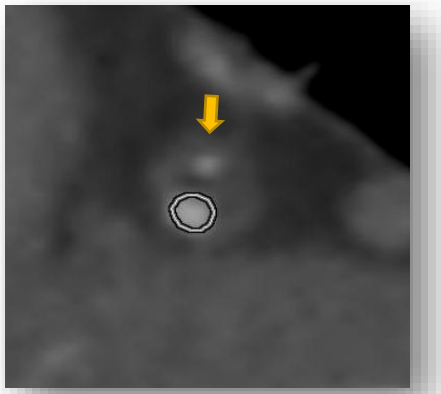
Hypodensité <30UH



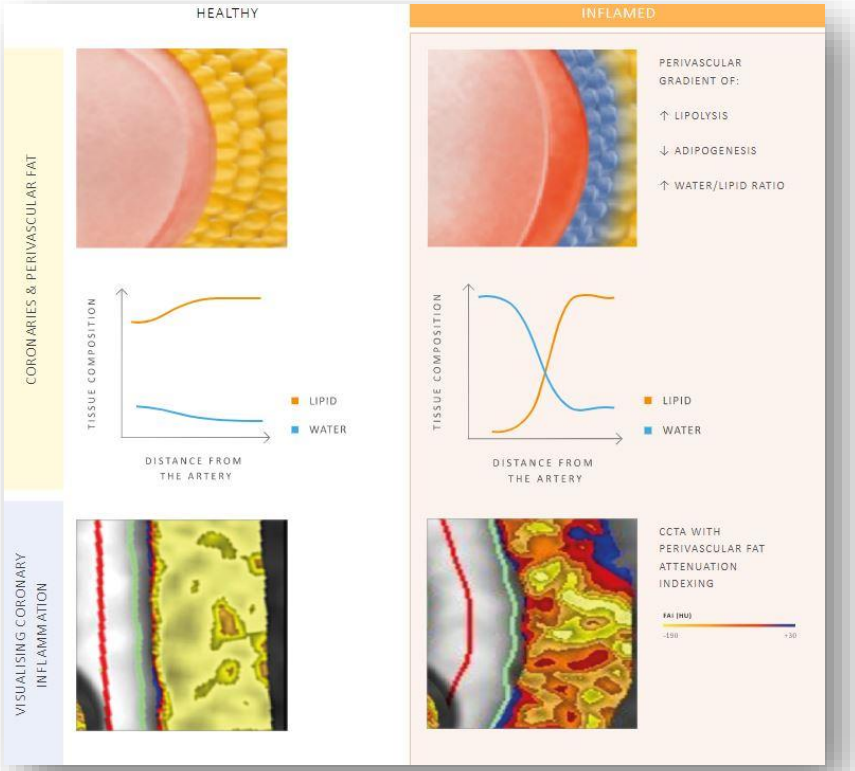
Spotty calcifications < 3 mm



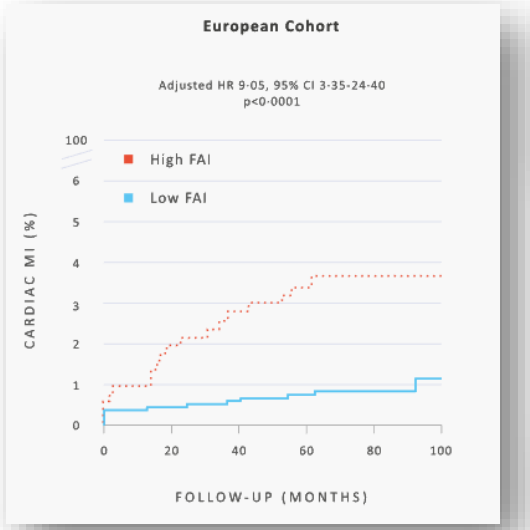
Napkin - Ring sign

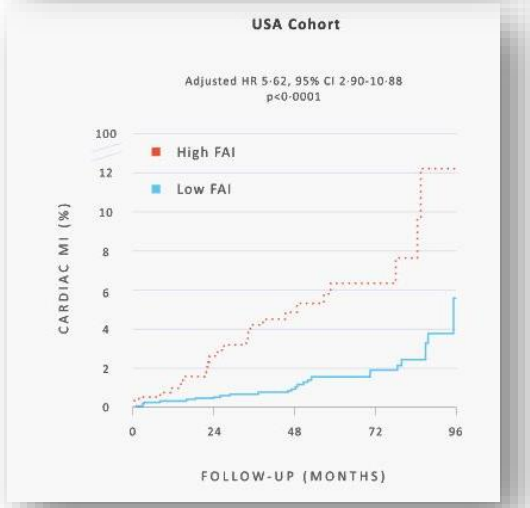


Scanner coronaire : FAI marqueur d'inflammation



Fat Attenuation Index (FAI)

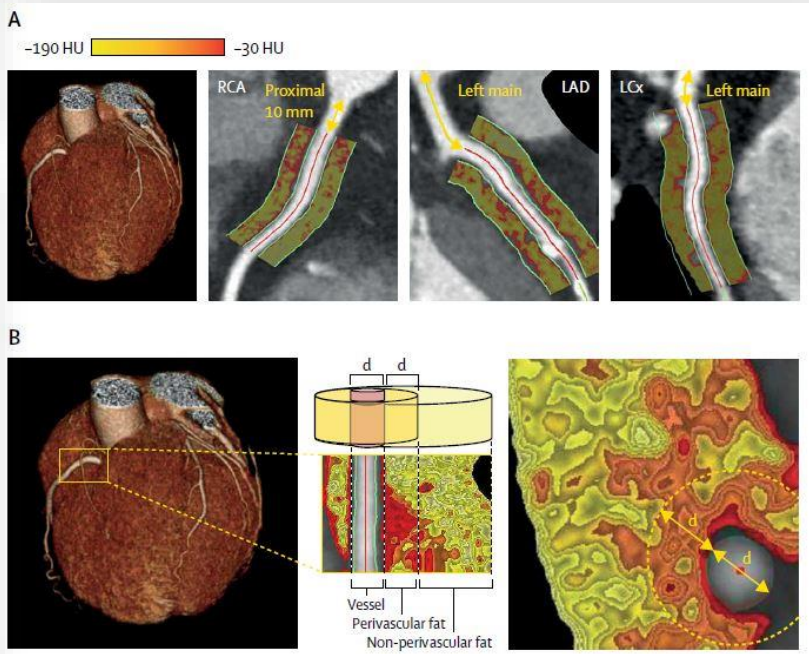




Non-invasive detection of coronary inflammation using computed tomography and prediction of residual cardiovascular risk (the CRISP CT study): a post-hoc analysis of prospective outcome data

Oikonomou & al. Lancet 2018; 392: 929–39

4000 patients
Suivi 10 ans

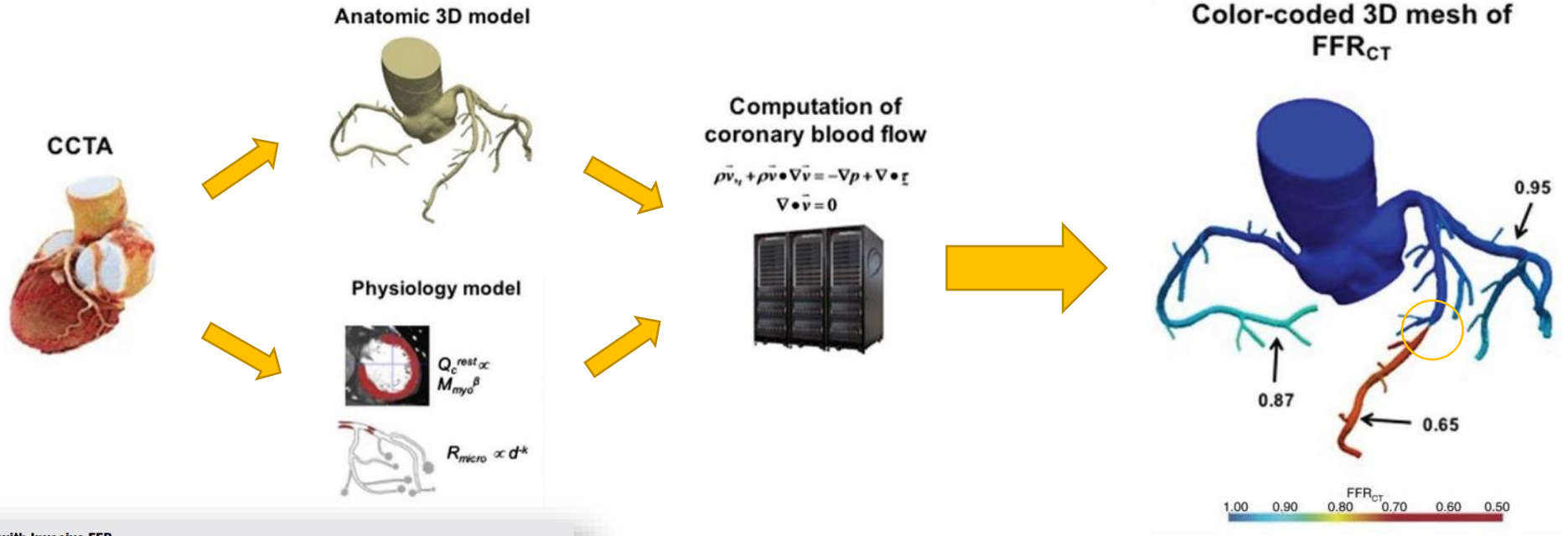


INTERVENTIONNELLE de TROYES 2023 01 & 02 AVRIL

Scanner coronaire : la dynamique des fluides

FFR-CT

HeartFlow®



Diagnostic Performance of FFR_{CT} in Comparison with Invasive FFR

Parameter	DISCOVER-FLOW (85)	DeFACTO (74)	NXT (73)	Renker et al (86)	Coenen et al (88)	De Geer et al (90)	Kruk et al (94)	Yang et al (89)
Year	2011	2012	2014	2014	2015	2015	2016	2016
Design	Prospective multicenter	Prospective multicenter	Prospective multicenter	Retrospective single center	Retrospective single center	Retrospective single center	Prospective single center	Prospective single center
CT system	64 section or higher	64 section or higher	64 section or higher	DSCT (64 or 128 sections)	DSCT (64 or 128 sections)	DSCT (128 sections)	DSCT (128 sections)	DSCT (128 sections)
FFR_{CT} software	FFR_{CT}, HeartFlow V1.2	FFR_{CT}, HeartFlow V1.2	FFR_{CT}, HeartFlow V1.4	cFFR, Siemens V1.4	cFFR, Siemens V1.4	cFFR, Siemens V1.4 and V1.7	cFFR, Siemens V1.4	cFFR, Siemens V1.4
No. of patients	103	252	254	53	106	21	90	72
No. of vessels	159	407	484	67	189	23	96	138
Sensitivity *(%)**	88 (77, 95)	89 (73, 86)	84 (75, 89)	85 (62, 97)	88 (78, 94)	83 (NA)	76 (NA)	87 (75, 94)
Specificity *(%)**	82 (73, 89)	61 (54, 67)	86 (82, 89)	95 (72, 94)	65 (55, 74)	76 (NA)	72 (NA)	77 (66, 85)
PPV *(%)**	74 (62, 84)	56 (49, 62)	61 (53, 69)	71 (49, 87)	65 (55, 74)	56 (NA)	67 (NA)	71 (58, 81)
NPV *(%)**	92 (78, 90)	84 (78, 98)	95 (93, 97)	93 (81, 98)	88 (79, 94)	93 (NA)	80 (NA)	90 (80, 96)
AUC*	0.90 (NA)	0.79 (0.72, 0.87)	0.93 (0.91, 0.95)	0.92 (NA)	0.83 (NA)	NA	0.83 (0.7, 0.90)	0.89 (0.84, 0.95)

Note.—PPV = positive predictive value, NPV = negative predictive value, DSCT = dual-source CT, NA = not available.

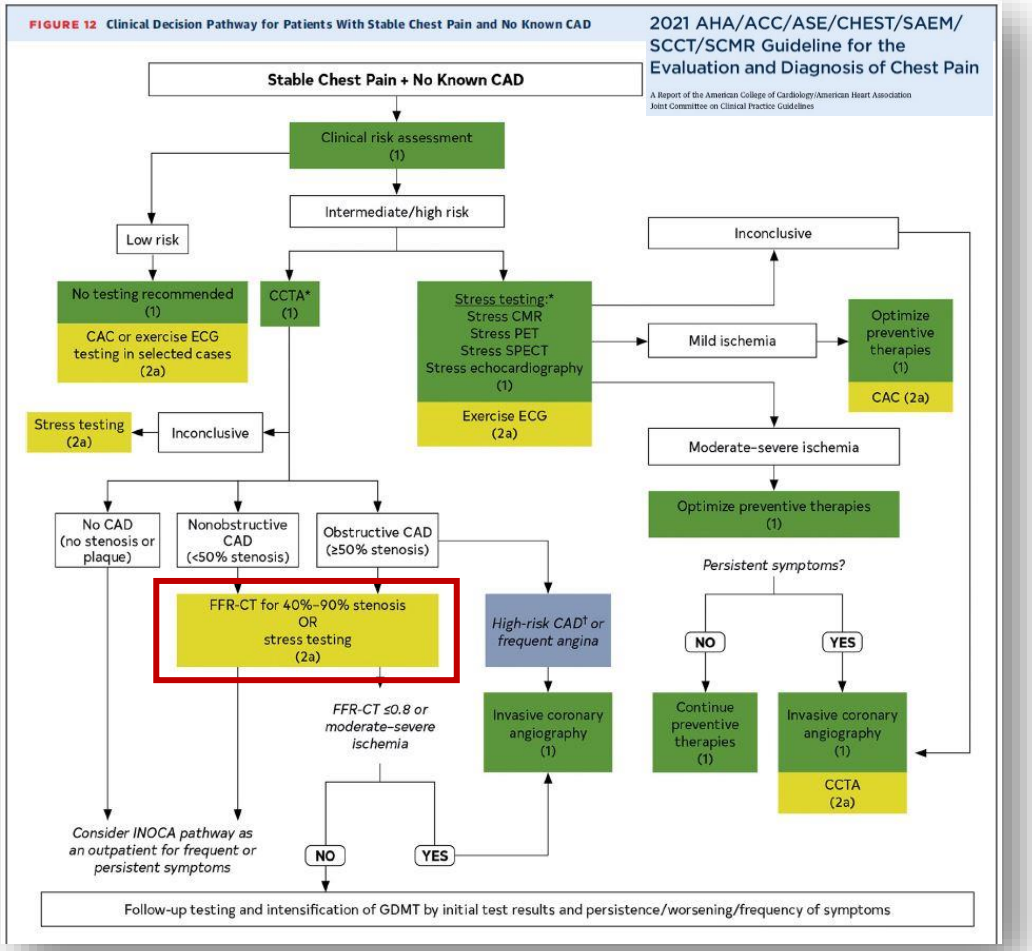
* Data presented on a per-vessel level with 95% confidence interval in parentheses.

Précision diagnostique 80-94% comparée à la FFR invasive

Scanner coronaire : FFR-CT Super Star!

étude	année	Nb	référence
NXT	2014	254	J Am Coll Cardiol 2014;63:1145–55
PLATFORM	2016	584	J Am Coll Cardiol 2016;68:435–45
SYNTAX III REVOLUTION	2019	223	Circulation: Cardiovascular Interventions. 2019;12:e007607
ADVANCE Registry	2020	5083	J Am Coll Cardiol Img 2020;13:97–105
FORECAST	2021	1400	European Heart Journal (2021) 42, 3844–3852
PRECISE	2022	2013	AHA 2022
TARGET	2023	1216	ACC 2023

Equivalence dans les MACE
Réduction du nombre de coronarographies « blanches »
Réduction du coût / prise en charge invasive

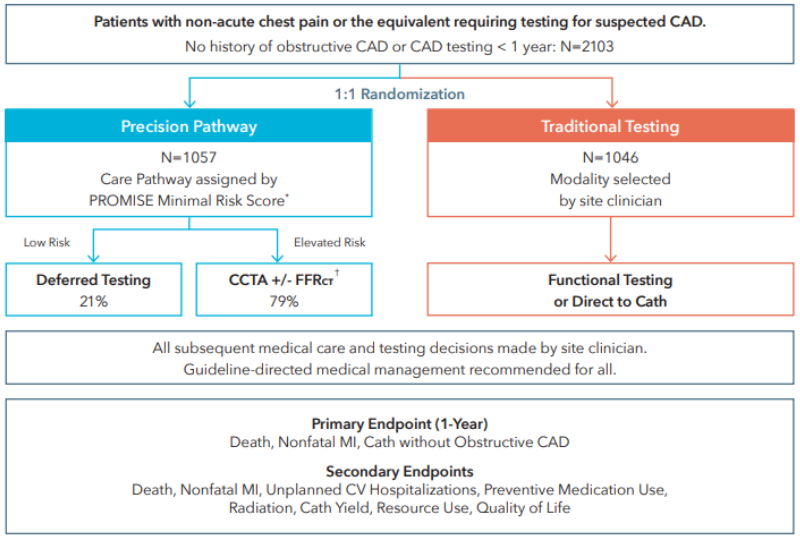


Gulati M & al. J Am Coll Cardiol.78(22):e187-e285.

Scanner coronaire : La guerre (froide) des FFR-CT

PRECISE AHA 2022

HeartFlow®

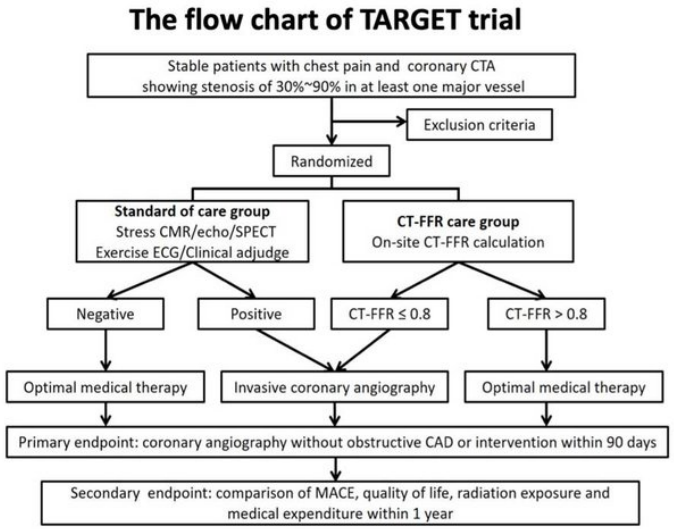


1-Year Results	Precision Pathway (N=1057)	Traditional Testing (N=1046)
Primary Endpoint Composite§	4.2% (44)	11.3% (118)
All-Cause Death	0.5% (5)	0.7% (7)
Nonfatal MI	1.2% (13)	0.5% (5)
ICA w/o Obstructive CAD	2.6% (27)	10.2% (107)
Death or MI	1.7% (18)	1.1% (12)

§Adjusted Hazard Ratio 0.29, p<0.001

TARGET ACC 2023

KEYA MEDICAL



CP : réduction des Coro sans lésion obstructive (« coronarographies blanches »)
CS : aucune différence concernant les MACE

Scanner coronaire : La perfusion myocardique

Acquisition repos / stress

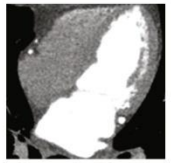
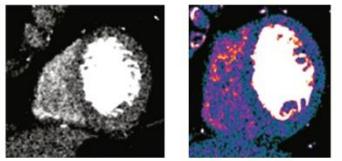
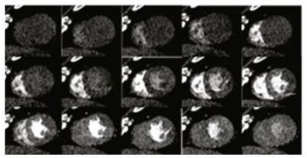
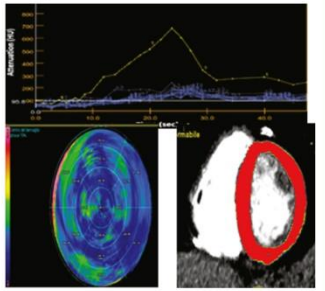
Statique ou dynamique

Validée par des études randomisées

PACIFIC Nous, F.M.A et al J Am Coll Cardiol Img. 2022;15(1):75-87

CATCH 2 Sorgaard MH, et al. JACC Img 2018;11:1611-21

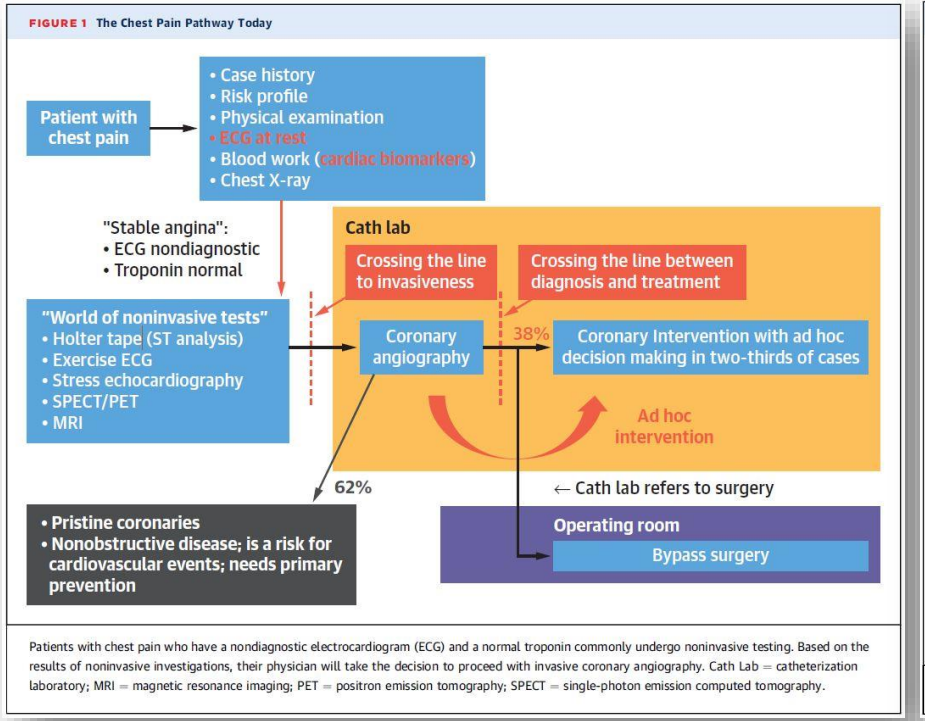
PERFECTION Pontone G, et al. J Am Coll Cardiol Img 2019;12:1487-97

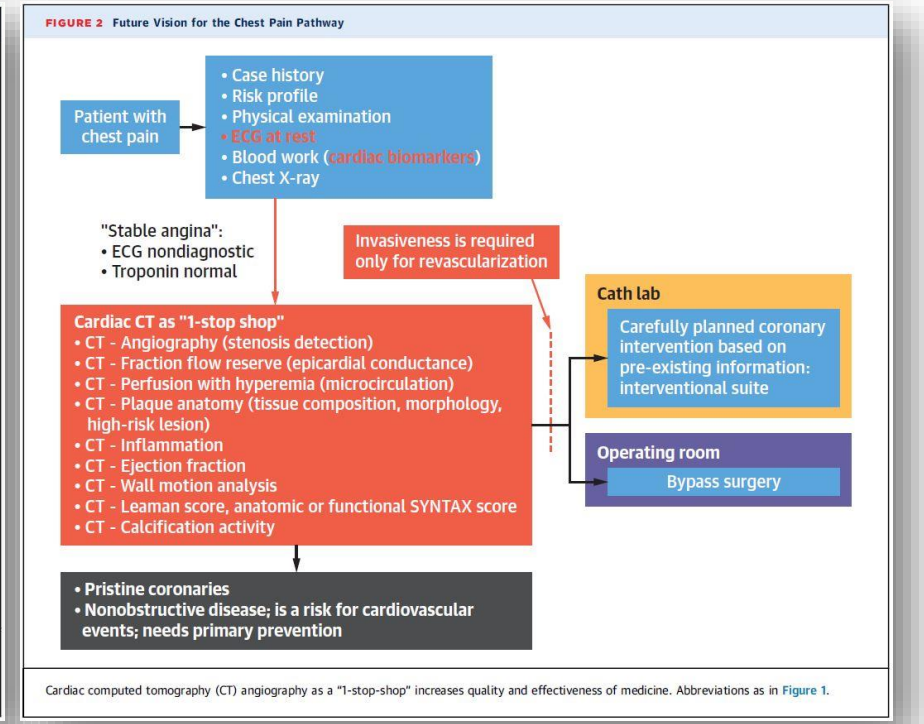
	How to Acquire?	How to Evaluate?	Strengths	Limitations
Static CTP	Acquisition of a single phase during the first-pass of the contrast agent at the time of peak myocardial attenuation 	**Visual assessment** of CT perfusion images with narrow window width and level (200–350 W and 150–200 L, respectively) 	• Simple acquisition (as coronary CTA) • Short breathhold • Simple analysis as only reformatted images needed • Provides integrated anatomic and functional evaluation in a single examination • Feasible also in revascularized patients	• Highly dependent on the contrast bolus timing →peak attenuation • May be missed because only one sample of data was acquired • Breath, high heart rate artifacts, and beam hardening artifacts could be misinterpreted as perfusion defect • Qualitative evaluation of myocardial perfusion • Myocardial hypoperfusion may go undetected in case of balanced ischemia
Dynamic CTP	During intravenous contrast medium injection, repeated rapid CT scans (20-25) are acquired for the detection of contrast wash-in and wash-out phases through the myocardium allowing the determination of time-attenuation curves (TAC) 	Dedicated post-processing software needed to obtain myocardial blood flow quantification from TAC 	• Regular breaths with wide coverage scanner • Quantitative assessment of myocardial perfusion and blood flow • Less beam hardening artifacts • Useful in multivessel involvement • Feasible also in revascularized patients • Comprehensive evaluation of coronary circulation	• Longer breathhold with shuttle mode acquisition • Higher radiation dose • Need dedicated post-processing software • Longer acquisition time in comparison to static • Lack of MBF cut-off

J Am Coll Cardiol. 2021 Nov, 78 (20) 1950–1953

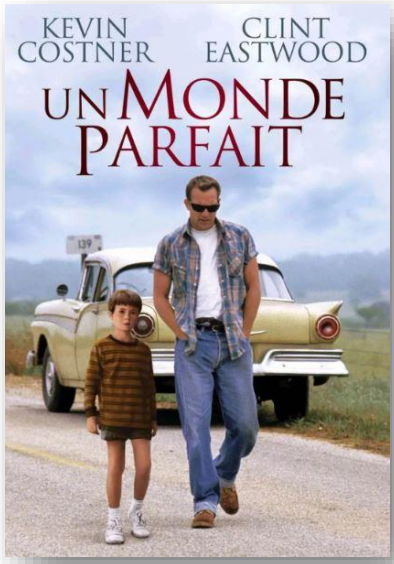
Scanner coronaire : L'outil parfait!

Le concept du « 1-stop Shop »



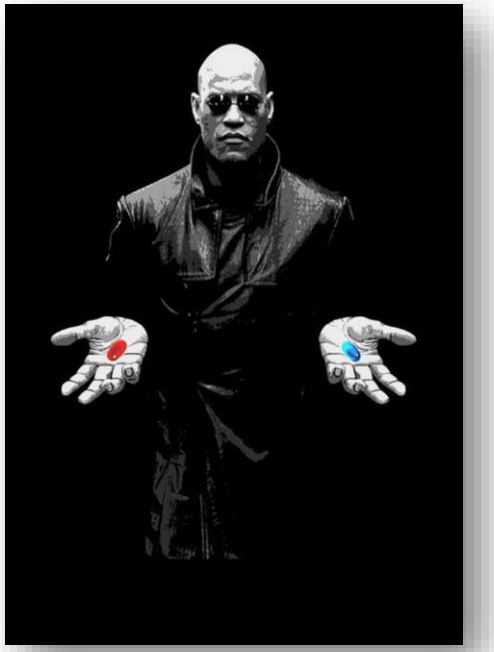


Serruys P & al. J Am Coll Cardiol 2021;78:713–736



Eastwood C. & al. & al. Warner Bros 1993

Scanner coronaire : Bienvenue dans le monde réel!



Pas de FFR-CT en France

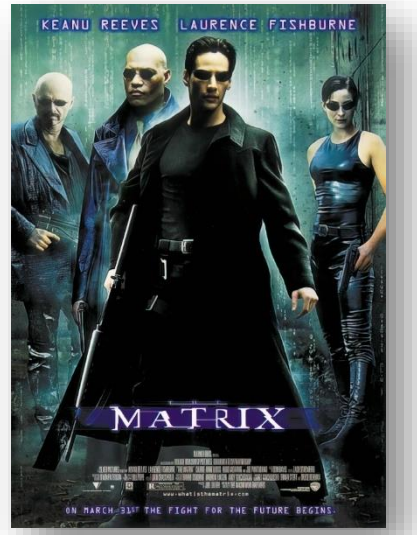
- Monopole de la technique par un leader mondial
- Business Model : service
- Non remboursé (1500$)

Pas de CT-Perfusion en routine

- Examen Irradiant, long, coûteux (vs IRM)

Pas de marqueurs d'inflammation en routine

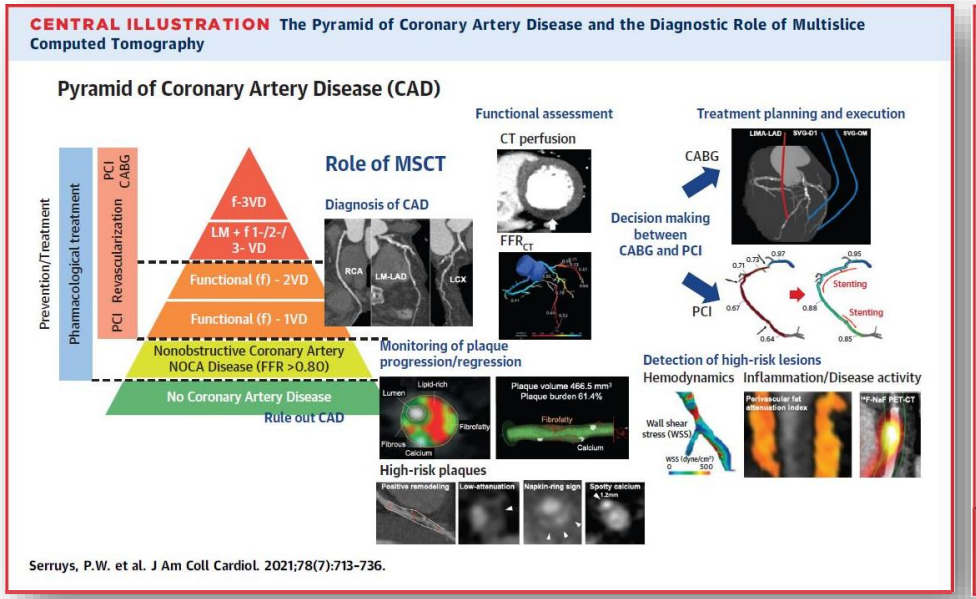
- logiciels coûteux



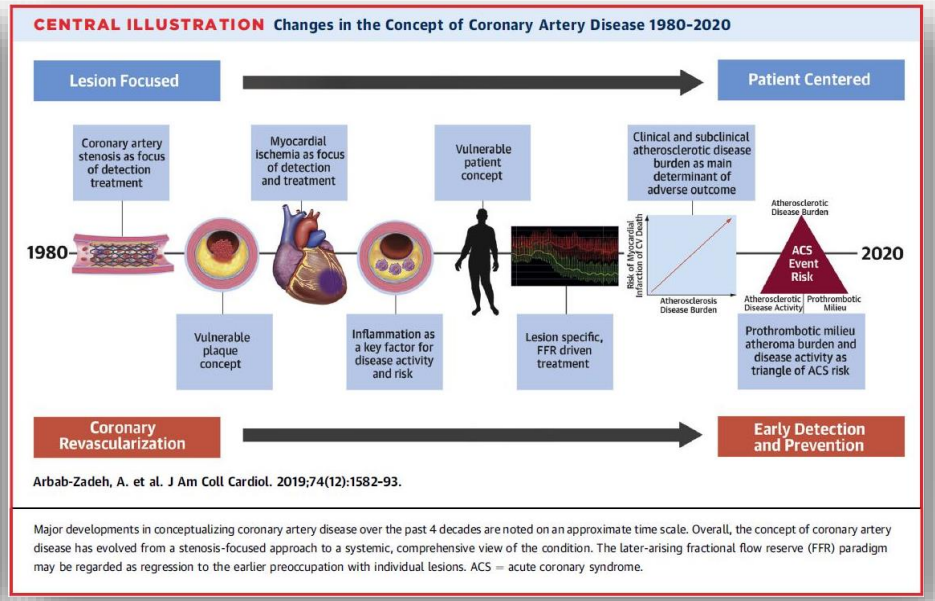
Wachowski's & al. Warner Bros - 1999

Scanner coronaire : Retour vers…2028?

Concept du « 1-Stop Shop »



Changement de paradigme



Zemeckis R & al. Universal Pictures - 1989

Détection précoce = dépistage?

Scanner coronaire : mieux vaut prévenir…

British Heart Foundation
THE SCOT-HEART 2 TRIAL

The SCOT-HEART 2 Trial

Computed Tomography Coronary Angiography (CTCA) for the Prevention of Myocardial Infarction

2020

6000 patients
40-70 ans
Asymptomatiques
1+ FRC

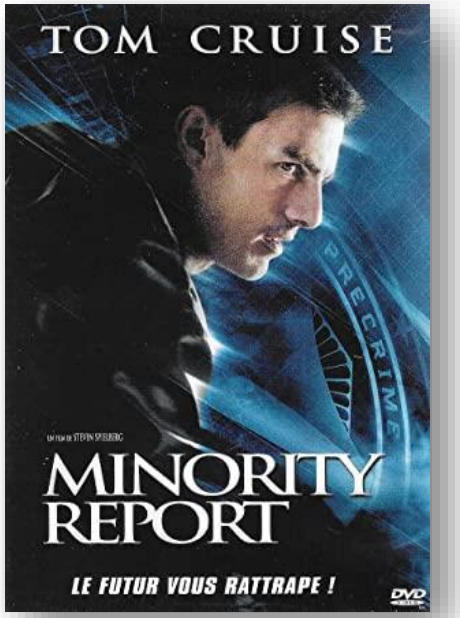
Prévention d'évènements Cardio vasculaires

« Risk score »

Scanner coronaire

CP : Réduction Décès CV, IDM

2027

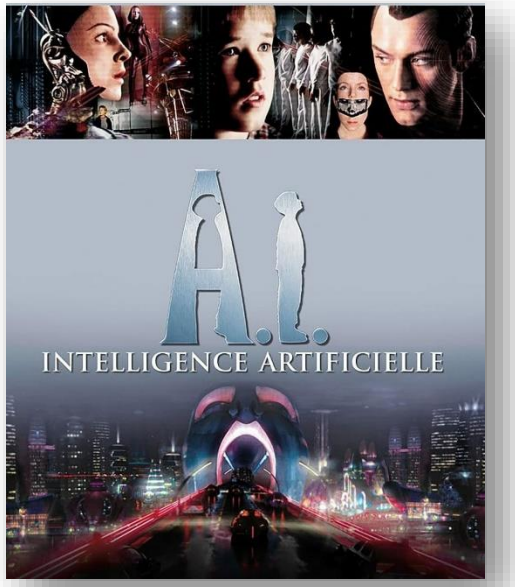


Spielberg S & al. 20th Century Fox - 2002

Scanner coronaire : le futur

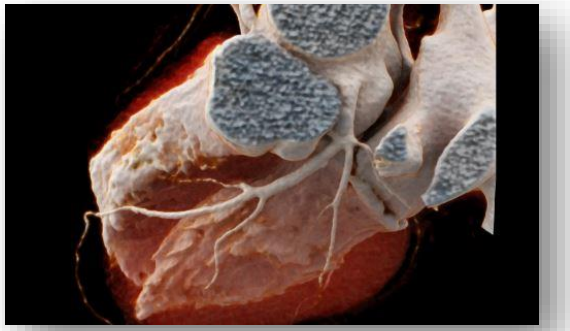
FFR-CT pour tous

French Startup logo?



Spielberg S & al. Warner Bros - 2001

scanner à comptage photonique



Intelligence artificielle – Deep Learning

Scanner coronaire : messages « à emporter »

Aujourd'hui

- Le scanner coronaire : outil indispensable dans la prise en charge de la maladie coronaire chez le patient symptomatique :
  - Éliminer la coronaropathie
  - Détecter la plaque à haut risque pour une meilleure prévention
  - Évaluer le caractère fonctionnel des plaques non obstructives
  - Meilleure orientation des patients vers la prise en charge invasive

Demain

- Concept du « 1-Stop Shop »
- Le dépistage chez le patient asymptomatique

Merci de votre attention