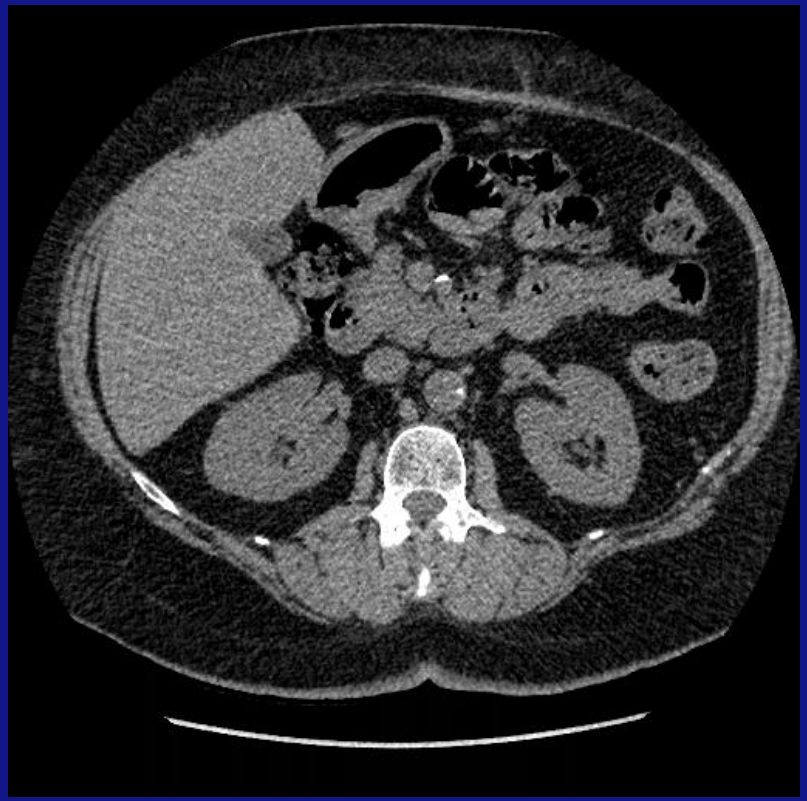
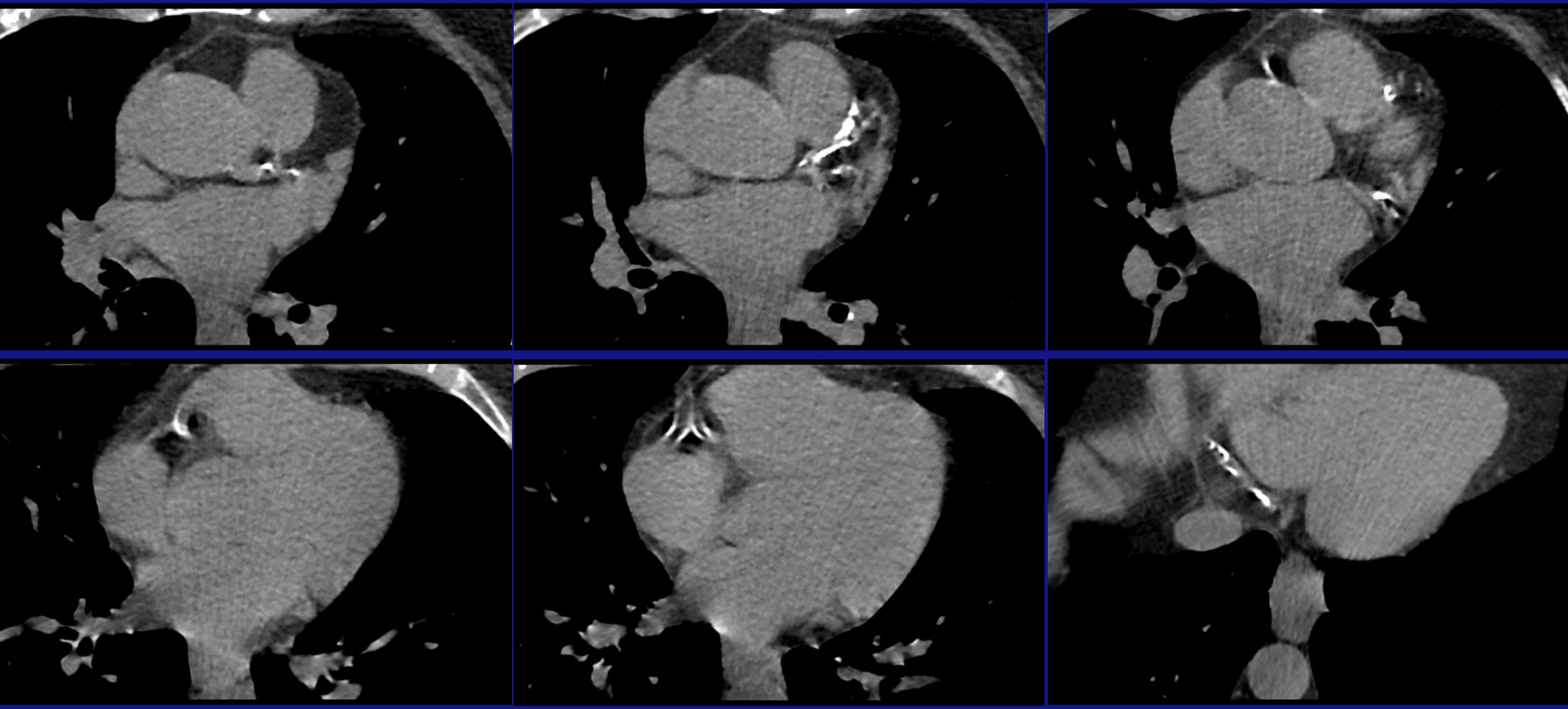
Quelle attitude clinique adopter devant la découverte fortuite de calcifications coronaires sur un scanner non dédié?

B. Dubourg

Exemple



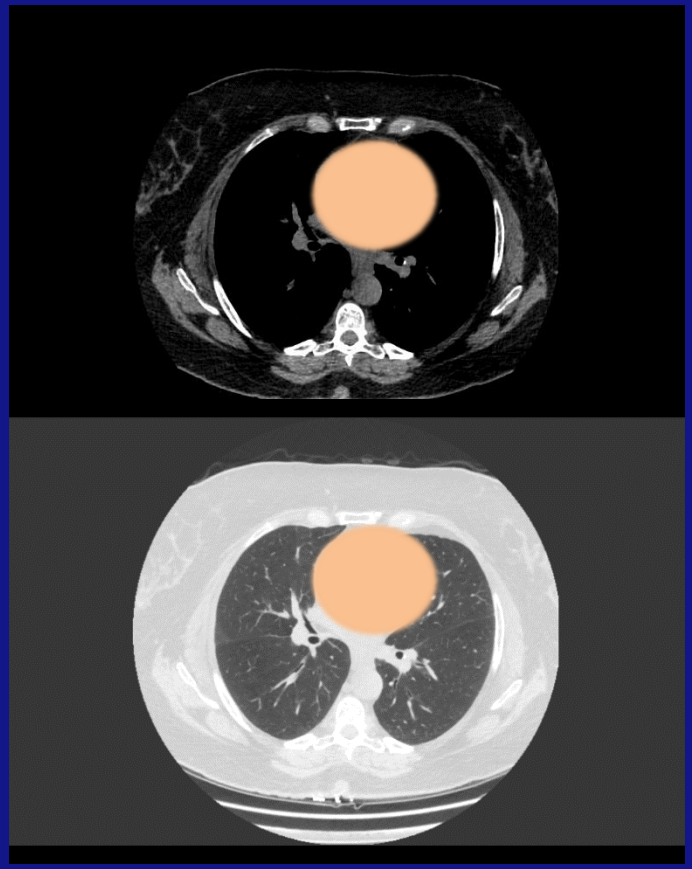


PDA

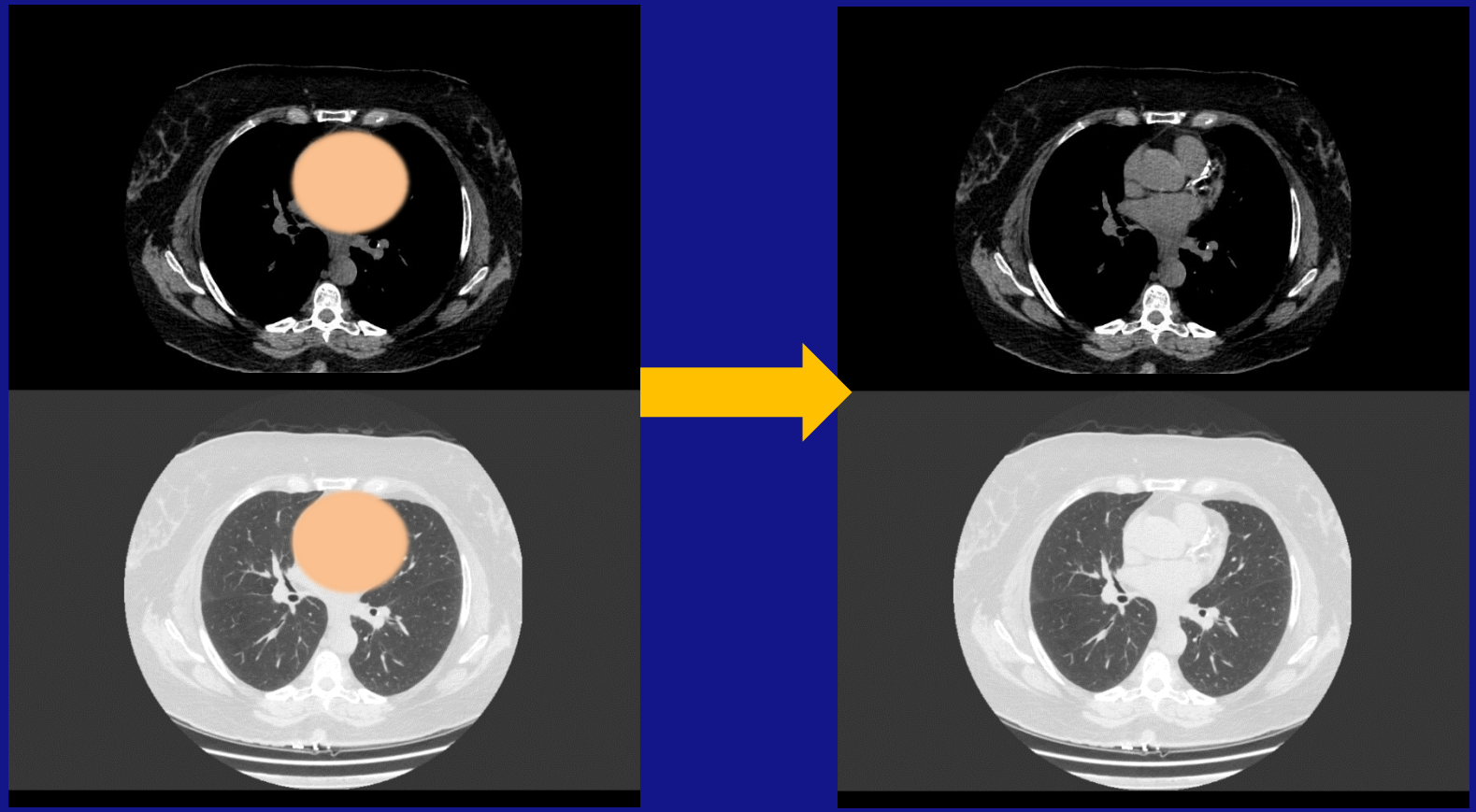
Que devrait dire le radiologue?

- Doit il decrire les calcifications?
- Peut il calculer le score calcique?
- Peut il donner une estimation du score calcique?

Description?

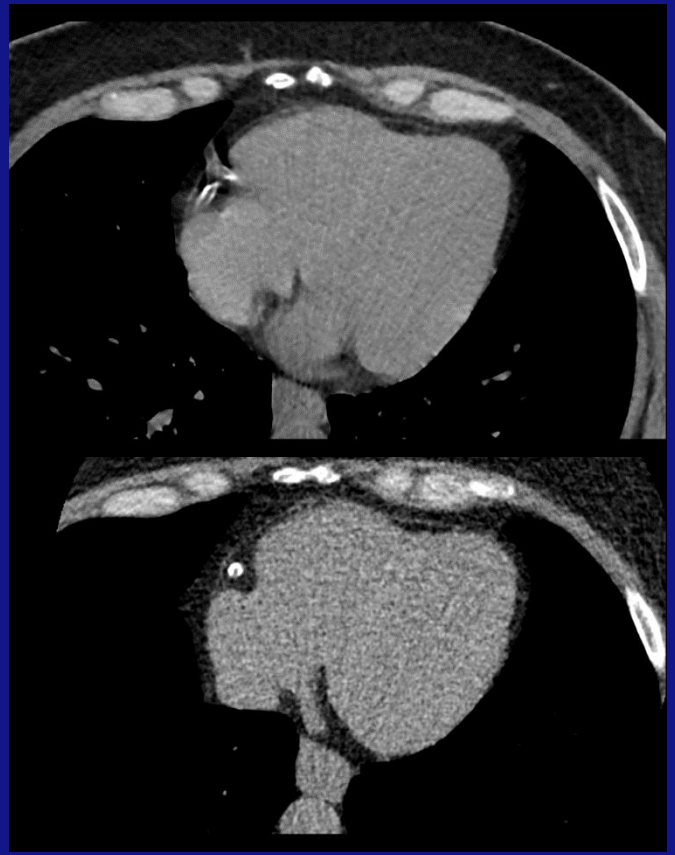


Description?



Peut on calculer le score calcique?

- Actuellement NON:
  - Scanner injecté
  - Scanner non synchronisé
- MAIS:
  - Augmentation de la resolution temporelle
  - Soustraction de l'iode
- MAIS:
  - 0 non synchro ≠ 0 synchro



Current Cardiovascular Imaging Reports (2019) 12:37
https://doi.org/10.1007/s12410-019-9511-7

CARDIAC COMPUTED TOMOGRAPHY (B CHOW AND G SMALL, SECTION EDITORS)

Check for updates

Coronary Artery Calcium Scoring in 2019: Past, Present, and Future

Ramzi Dudum [1,2] · Omar Dzaye [1,2] · Steven J. Lahti [1,2] · Sina Kianoush [1,2] · Seamus P. Whelton [1,2] · Michael J. Blaha [1,2]

Peut on donner une estimation visuelle?

Table 1
CAC-DRS category determined risk classifications and treatment recommendations.

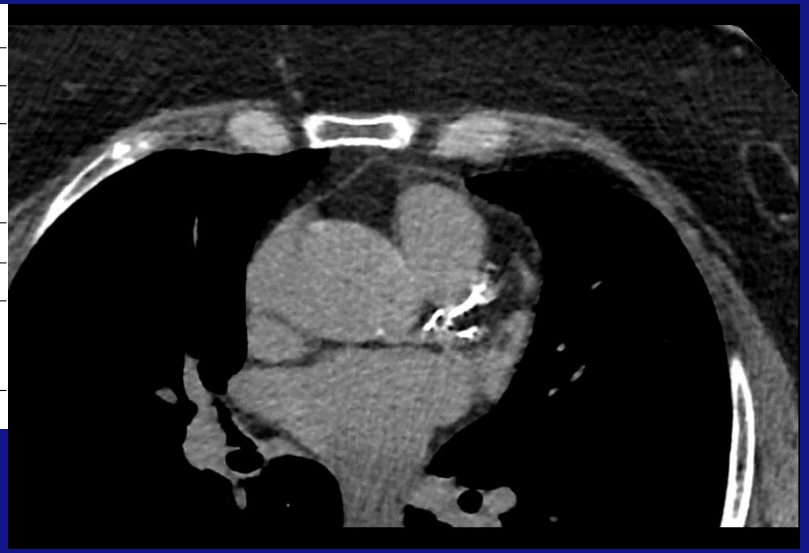
a. Agatston Score

	CAC Score	Risk	Treatment Recommendation
CAC-DRS 0	0	very low	statin generally not recommended*
CAC-DRS 1	1–99	mildly increased	moderate intensity statin
CAC-DRS 2	100–299	moderately increased	moderate to high intensity statin + ASA 81mg
CAC-DRS 3	> 300	moderately to severely increased	high intensity statin + ASA 81mg

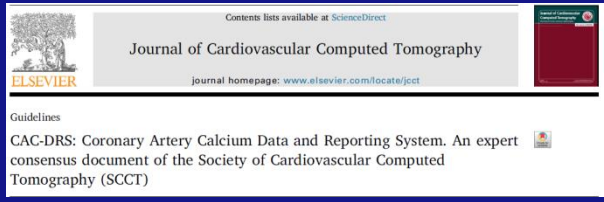
b. Visual Score

	CAC Score	Risk	Treatment Recommendation
CAC-DRS 0	0	very low	statin not recommended*
CAC-DRS 1	1	mildly increased	moderate intensity statin
CAC-DRS 2	2	moderately increased	moderate to high intensity statin + ASA 81mg
CAC-DRS 3	3	moderately to severely increased	high intensity statin + ASA 81mg

*excluding familial hypercholesterolemia.



Agatston scoring = A	**Number of vessels = N**
Case	**CAC-DRS Category**
i. CAC 0	CAC-DRS A0
ii. CAC 1–99 in LM, LAD and LCx	CAC-DRS A1/N3
iii. CAC 100–299 in LAD, LCX and RCA	CAC-DRS A2/N3
iv. CAC > 300 in LM, LAD, LCx and RCA	CAC-DRS A3/N4
Visual estimation = V	
Case	**CAC-DRS Category**
i. CAC 0	CAC-DRS V0
ii. CAC 1 in LM, LAD and LCx	CAC-DRS V1/N3
iii. CAC 2 in LAD, LCX and RCA	CAC-DRS V2/N3
iv. CAC 3 in LM, LAD, LCx and RCA	CAC-DRS V3/N4


Contents lists available at ScienceDirect
Journal of Cardiovascular Computed Tomography
journal homepage: www.elsevier.com/locate/jcct
ELSEVIER

Guidelines

CAC-DRS: Coronary Artery Calcium Data and Reporting System. An expert consensus document of the Society of Cardiovascular Computed Tomography (SCCT)

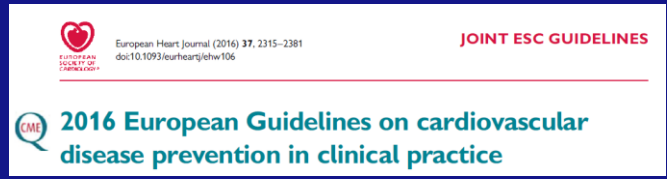
Utilité du score calcique si…

- Score calcique finalement calculé car examen realisé sur une scanner de dernière génération.
- Score calcique réalisé durant le meme temps d’examen.
- Score calcique réalisé dans un second temps.

Score calcique: recommendations actuelles

- Population générale:
  - ESC 2016: **modificateur du risque**
    - "CAC scoring may be considered in individuals with calculated SCORE risks around the 5% or 10% thresholds"
    - The reduction of CVD risk in patients treated with lipid- or BP-lowering drugs because of reclassification with, for example,CAC or ABI remains to be demonstrated.

Recommendations	Class[a]	Level[b]	Ref[c]
Coronary artery calcium scoring may be considered as a risk modifier in CV risk assessment.	IIb	B	120–125
Atherosclerotic plaque detection by carotid artery scanning may be considered as a risk modifier in CV risk assessment.	IIb	B	126–128
ABI may be considered as a risk modifier in CV risk assessment.	IIb	B	129–132
Carotid ultrasound IMT screening for CV risk assessment is not recommended.	III	A	128, 133



Score calcique: recommendations actuelles

- Dyslipidémies:
  - ESC 2019: **modificateur du risque**
    - "Reclassification is of value in people identified as being at moderate CV risk by using markers such as CAC score >100 Agatston units"

Recommendations for cardiovascular imaging for risk assessment of atherosclerotic cardiovascular disease

Recommendations	Class[a]	Level[b]
Arterial (carotid and/or femoral) plaque burden on arterial ultrasonography should be considered as a risk modifier in individuals at low or moderate risk.[29,30]	IIa	B
CAC score assessment with CT should be considered as a risk modifier in the CV risk assessment of asymptomatic individuals at low or moderate risk.[14–16,24,26]	IIa	B

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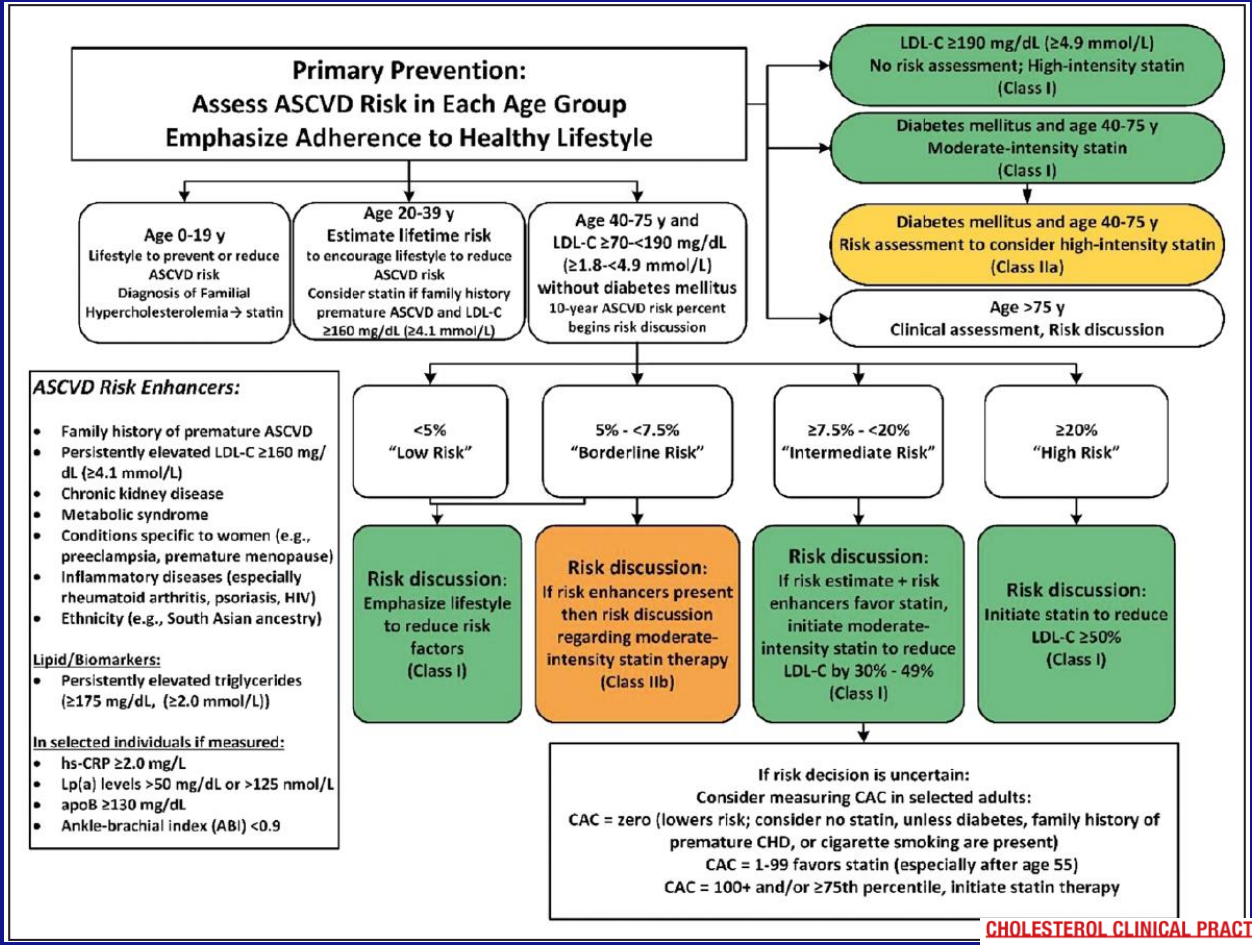
ESC European Society of Cardiology
European Heart Journal (2019) 00, 1–78
doi:10.1093/eurheartj/ehz455
ESC/EAS GUIDELINES

2019 ESC/EAS Guidelines for the management of dyslipidaemias: *lipid modification to reduce cardiovascular risk*

The Task Force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS)



CHOLESTEROL CLINICAL PRACTICE GUIDELINES

2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

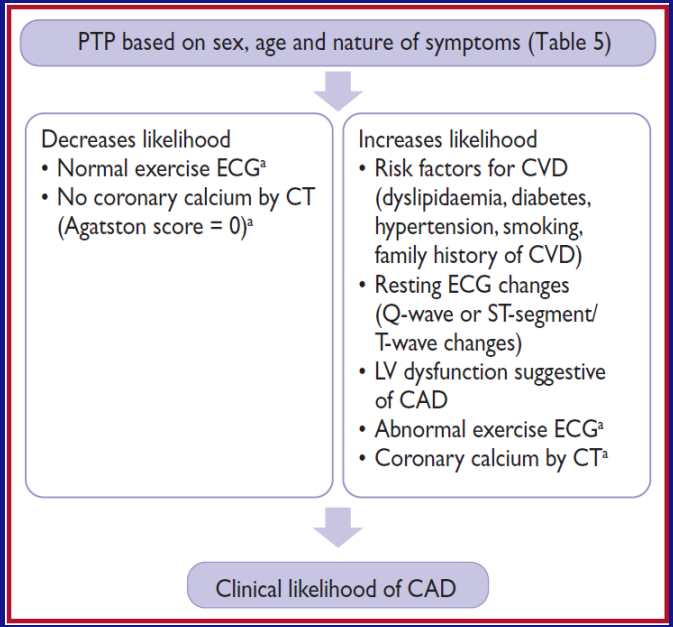
Score calcique: recommendations actuelles

Recommendations	Class[a]	Level[b]
Routine assessment of microalbuminuria is indicated to identify patients at risk of developing renal dysfunction or at high risk of future CVD.[27,38]	I	B
A resting ECG is indicated in patients with DM diagnosed with hypertension or with suspected CVD.[38,39]	I	C
Assessment of carotid and/or femoral plaque burden with arterial ultrasonography should be considered as a risk modifier in asymptomatic patients with DM.[60–62]	IIa	B
CAC score with CT may be considered as a risk modifier in the CV risk assessment of asymptomatic patients with DM at moderate risk.[c] [63]	IIb	B

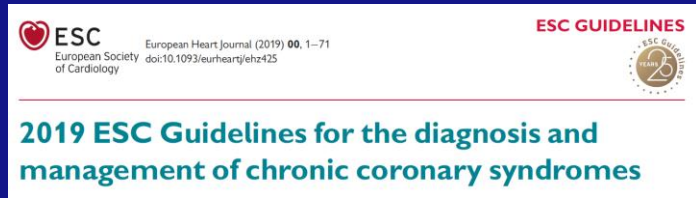
- Diabétique:
  - ESC 2019: **modificateur du risque ET indicateur à un test ischémique**:
    - "Asymptomatic subjects with significant atherosclerosis burden (i.e. CAC score >400) may be referred for functional imaging or CTCA; however, identification of the presence of significant coronary artery stenoses has not been shown to be better than aggressive medical treatment for CVRFs."

Score calcique: recommendations actuelles

- Maladie coronaire chronique
  - ESC 2019
  - Pas de CAC
  - Facteur de risque à prendre en compte dans l'évaluation de la probabilité pré test.

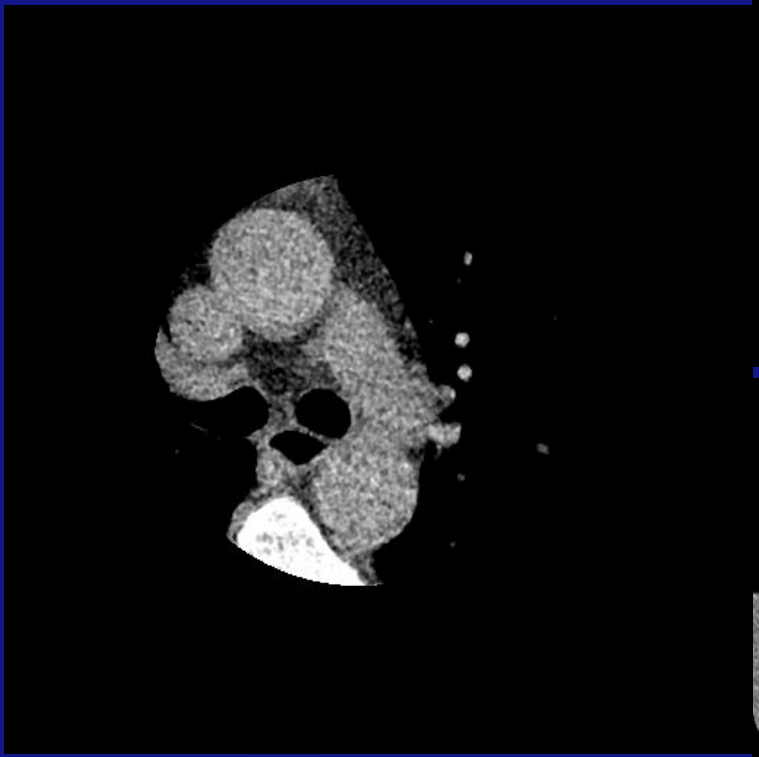


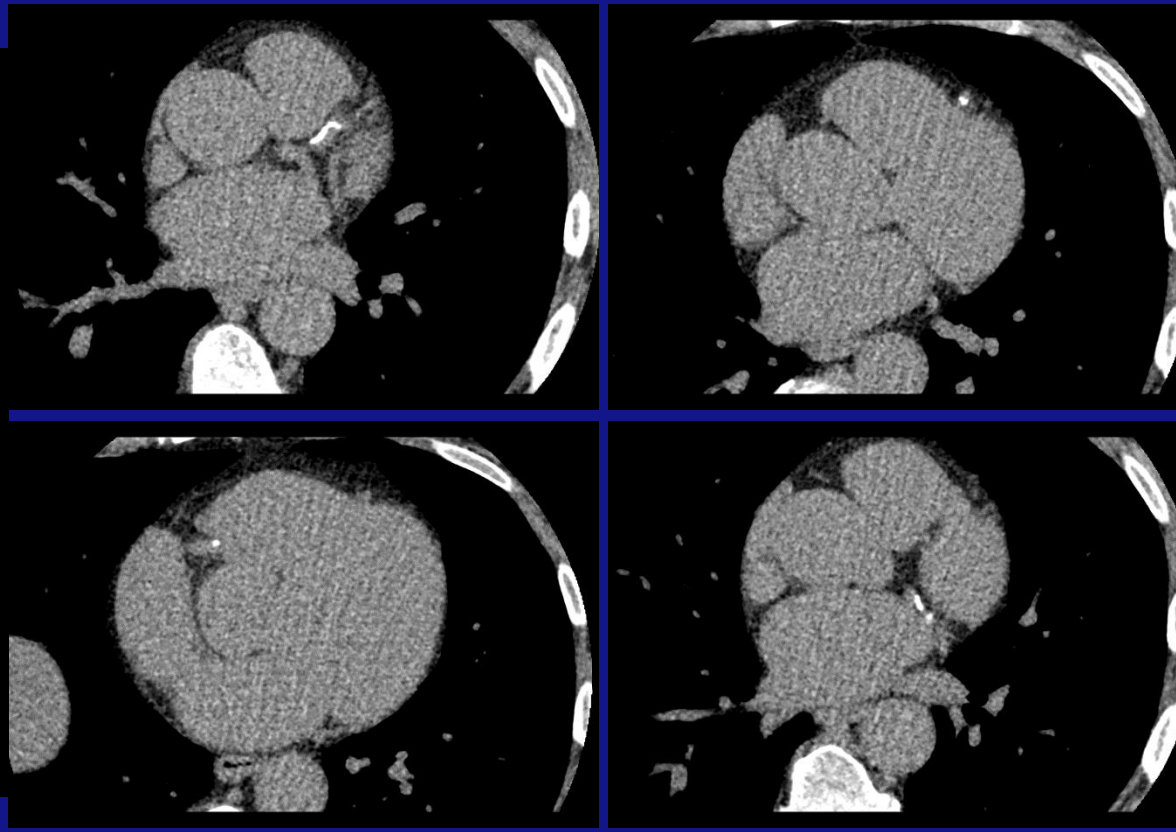
Coronary calcium detection by CT is not recommended to identify individuals with obstructive CAD.	III	C



Conclusion score calcique

- Facteur de risque cardio vasculaire
- Mais surtout considéré comme un modificateur du risque
- ± intérêt clinique:
  - diabétique asymptomatique: recherche d'ischémie silencieuse si > 400
  - Dyslipidémie (USA++)
- Pas un indicateur de la sévérité d'une coronaropathie.
- Car:
  - Plaque calcifiée = stable
  - Quantité de calcification n'est pas forcément corrélée à la sévérité des sténoses coronaires.
  - Absence de visualisation des plaques lipidiques.





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DFOV23.9 x18.7 cm
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Ex:Nov 13 2019
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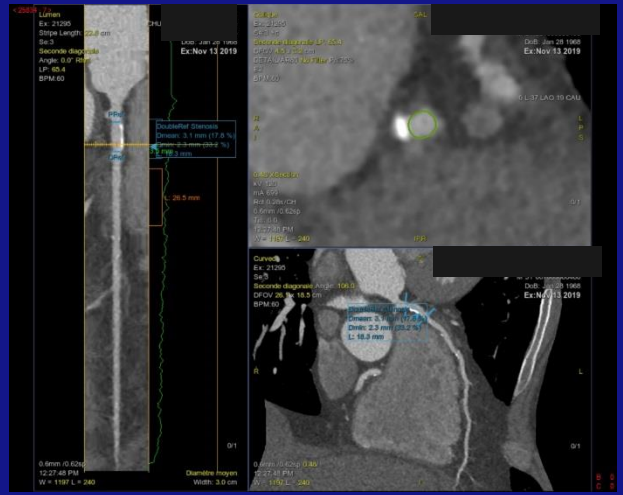
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Stripe Length: 52.8 cm
Se:3
Seconde diagonale
Angle: 0.0° Rot
LP: 65.4
BPM:60
Ex:Nov 13 2019
DoubleRef Stenosis
Dmean: 3.1 mm (17.6 %)
Dmin: 2.3 mm (33.2 %)
L: 26.5 mm
Diamètre moyen
Width: 3.0 cm
Ex:21295
Se:3
Seconde diagonale Angle: 106.0
DFOV 26.9x 18.5 cm
BPM:60
DoB: Jan 28 1968
Ex:Nov 13 2019
Dmean: 3.1 mm (17.6 %)
Dmin: 2.3 mm (33.2 %)
L: 16.9 mm

Ex:21295
Se:3
Premiere Diagonale Angle:30.0
DFOV12.3 x9.8 cm
BPM:60
DoB: Jan 28 1968
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Ex:21295
Se:3
Branche marginale Gauche Angle:-39.0
DFOV15.6 x11.1 cm
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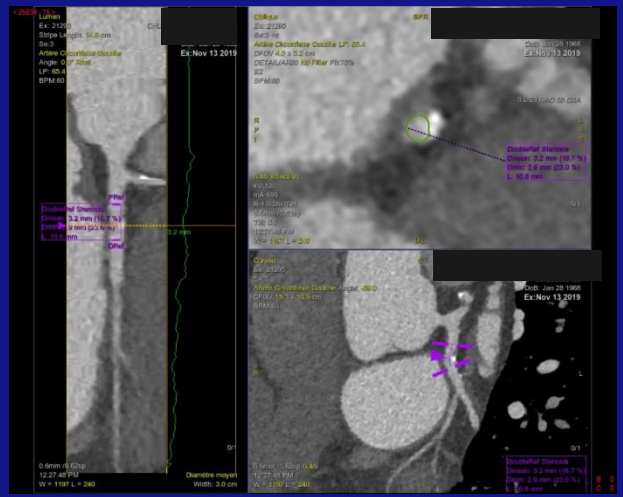
Lumen
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Stripe Length: 54.8 cm
Se:3
Artère Coronaire Droite
Angle: 0.0° Rot
LP: 65.4
BPM:60
Ex:Nov 13 2019
DoubleRef Stenosis
Dmean: 3.2 mm (18.7 %)
Dmin: 2.9 mm (23.0 %)
L: 11.8 mm
Diamètre moyen
Width: 3.0 cm
Ex:21295
Se:3
Artère Coronaire Droite Angle: -38.0
DFOV 15.1x 10.6 cm
BPM:60
DoB: Jan 28 1968
Ex:Nov 13 2019
DoubleRef Stenosis
Dmean: 3.2 mm (18.7 %)
Dmin: 2.9 mm (23.0 %)
L: 6.0 mm

Ex:21295
Se:3
Artere coronaire droite Angle:-38.0
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BPM:60
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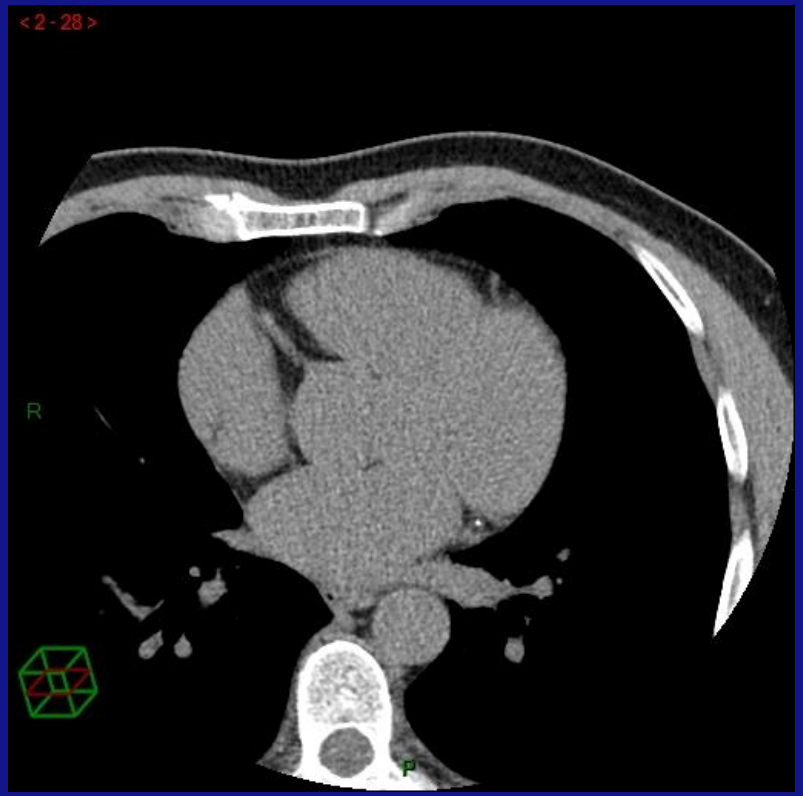
P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Se:3
Premiere Diagonale Angle: 175.0
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W =1495 L =291

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Se:3
Artere interventriculaire posterieure Angle: -158.0
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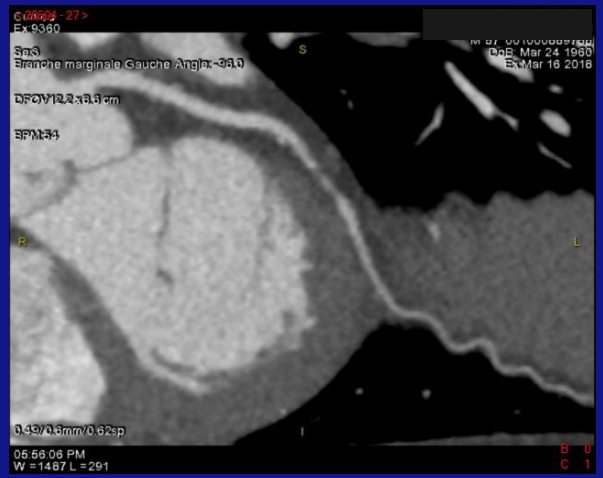
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Se:3
Branche marginale Gauche Angle: -34.0
DFOV12.2 x 8.8 cm
BPM:54
0.49/ 0.6mm/0.62sp
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W =1487 L =291

SRP
Ex:9360
Se:3 +c
MIP No cut Grayscale
DFOV9.0cm
STND/AR50 Fil:75%
0 L99LAO21CRA
BPM:54
A
S
L
P
I
R
No VOI
kV 100
mA519
Rot 0.28s/CH
0.6mm/0.62sp
Tilt:0.0 HR
05:56:06 PM
DoB: Mar 24 1960
Ex:Mar 16 2018

Angioscanner coronaire

New major recommendations in 2019	
Basic testing, diagnostics, and risk assessment	
Non-invasive functional imaging for myocardial ischaemia or coronary CTA is recommended as the initial test for diagnosing CAD in symptomatic patients in whom obstructive CAD cannot be excluded by clinical assessment alone.	I
It is recommended that selection of the initial non-invasive diagnostic test be based on the clinical likelihood of CAD and other patient characteristics that influence test performance, local expertise, and the availability of tests.	I
Functional imaging for myocardial ischaemia is recommended if coronary CTA has shown CAD of uncertain functional significance or is not diagnostic.	I
Invasive angiography is recommended as an alternative test to diagnose CAD in patients with a high clinical likelihood and severe symptoms refractory to medical therapy, or typical angina at a low level of exercise and clinical evaluation that indicates high event risk. Invasive functional assessment must be available and used to evaluate stenoses before revascularization, unless very high grade (>90% diameter stenosis).	I

Coronary calcium detection by CT is not recommended to identify individuals with obstructive CAD.	III	C

ESC
European Society of Cardiology
European Heart Journal (2019) 00, 1–71
doi:10.1093/eurheartj/ehz425
ESC GUIDELINES

2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes

TABLE 2 CAD-RADS Reporting and Data System for Patients Presenting With Stable Chest Pain

	Degree of Maximal Coronary Stenosis	Interpretation	Further Cardiac Investigation	Management
CAD-RADS 0	0% (No plaque or stenosis)	Documented absence of CAD*	None	Reassurance. Consider non-atherosclerotic causes of chest pain
CAD-RADS 1	1-24% - Minimal stenosis or plaque with no stenosis**	Minimal non-obstructive CAD	None	Consider non-atherosclerotic causes of chest pain Consider preventive therapy and risk factor modification
CAD-RADS 2	25-49% - Mild stenosis	Mild non-obstructive CAD	None	Consider non-atherosclerotic causes of chest pain Consider preventive therapy and risk factor modification, particularly for patients with non-obstructive plaque in multiple segments.
CAD-RADS 3	50-69% stenosis	Moderate stenosis	Consider functional assessment	Consider symptom-guided anti-ischemic and preventive pharmacotherapy as well as risk factor modification per guideline-directed care*** Other treatments should be considered per guideline-directed care***
CAD-RADS 4	**A** - 70-99% stenosis or **B** - Left main >50% or 3-vessel obstructive (≥70%) disease	Severe stenosis	A: Consider ICA**** or functional assessment B: ICA is recommended	Consider symptom-guided anti-ischemic and preventive pharmacotherapy as well as risk factor modification per guideline-directed care*** Other treatments (including options of revascularization) should be considered per guideline-directed care***
CAD-RADS 5	100% (total occlusion)	Total coronary occlusion	Consider ICA and/or viability assessment	Consider symptom-guided anti-ischemic and preventive pharmacotherapy as well as risk factors modification per guideline-directed care*** Other treatments (including options of revascularization) should be considered per guideline-directed care***
CAD-RADS N	Non-diagnostic study	Obstructive CAD cannot be excluded	Additional or alternative evaluation may be needed	

The CAD-RADS classification should be applied on a per-patient basis for the clinically most relevant (usually highest-grade) stenosis. All vessels greater than 1.5 mm in diameter should be graded for stenosis severity. CAD-RADS will not apply for smaller vessels (<1.5 mm in diameter). **MODIFIERS:** If more than one modifier is present, the symbol "/" (slash) should follow each modifier in the following order: First: modifier **N (non-diagnostic).** Second: modifier **S (stent).** Third: modifier **G (graft).** Fourth: modifier **V (vulnerability).** *CAD – coronary artery disease. **CAD-RADS 1 – This category should also include the presence of plaque with positive remodeling and no evidence of stenosis. ***Guideline-directed care per ACC Stable Ischemic Heart Disease Guidelines (Fihn et al. JACC 2012) (25). ****ICA – invasive coronary angiography.

STATE-OF-THE-ART PAPER

Coronary Artery Disease - Reporting and Data System (CAD-RADS)

An Expert Consensus Document of SCCT, ACR and NASCI

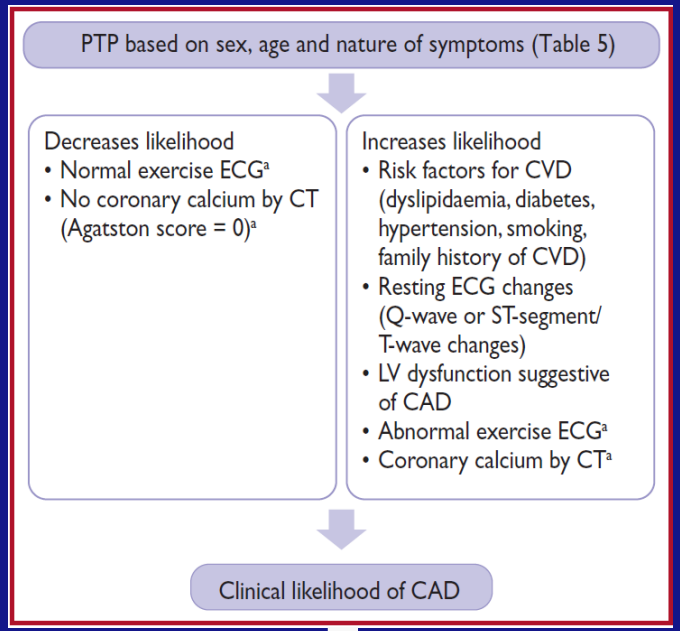
Endorsed by the ACC

Découverte fortuite de calcifications coronaires

- Diagnostic de coronaropathie calcifiée MAIS pas d'indication sur la sévérité.
- Radiologue: précision, quantification visuelle, angioscanner contributif?
- Examen spécialisé avec un cardiologue si absence de suivi cardiologique.
- Au décours:
  - Suspicion de coronaropathie: PEC habituelle
  - Asymptomatique?

Asymptomatique

CORONAROPATHIE?



ANGIOTDM ± Test fonctionnel

ASYMPTOMATIQUE?

Recommendations for screening for coronary artery disease in asymptomatic subjects

Recommendations	Class[a]	Level[b]
Total risk estimation using a risk-estimation system such as SCORE is recommended for asymptomatic adults >40 years of age without evidence of CVD, diabetes, CKD, or familial hypercholesterolaemia.	I	C
Assessment of family history of premature CVD (defined as a fatal or non-fatal CVD event, or/and established diagnosis of CVD in first-degree male relatives before 55 years of age or female relatives before 65 years of age) is recommended as part of cardiovascular risk assessment.	I	C
It is recommended that all individuals aged <50 years with a family history of premature CVD in a first-degree relative (<55 years of age in men or <65 years of age in women) or familial hypercholesterolaemia are screened using a validated clinical score.[455,456]	I	B
Assessment of coronary artery calcium score with computed tomography may be considered as a risk modifier[c] in the cardiovascular risk assessment of asymptomatic subjects.[449,457]	IIb	B
Atherosclerotic plaque detection by carotid artery ultrasound may be considered as a risk modifier[c] in the cardiovascular risk assessment of asymptomatic subjects.[458]	IIb	B
ABI may be considered as a risk modifier[c] in cardiovascular risk assessment.[459]	IIb	B
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
In asymptomatic adults (including sedentary adults considering starting a vigorous exercise programme), an exercise ECG may be considered for cardiovascular risk assessment, particularly when attention is paid to non-ECG markers such as exercise capacity.	IIb	C
Carotid ultrasound IMT for cardiovascular risk assessment is not recommended.[460]	III	A
In low-risk non-diabetic asymptomatic adults, coronary CTA or functional imaging for ischaemia are not indicated for further diagnostic assessment.	III	C
Routine assessment of circulating biomarkers is not recommended for cardiovascular risk stratification.[448,449,461,462]	III	B

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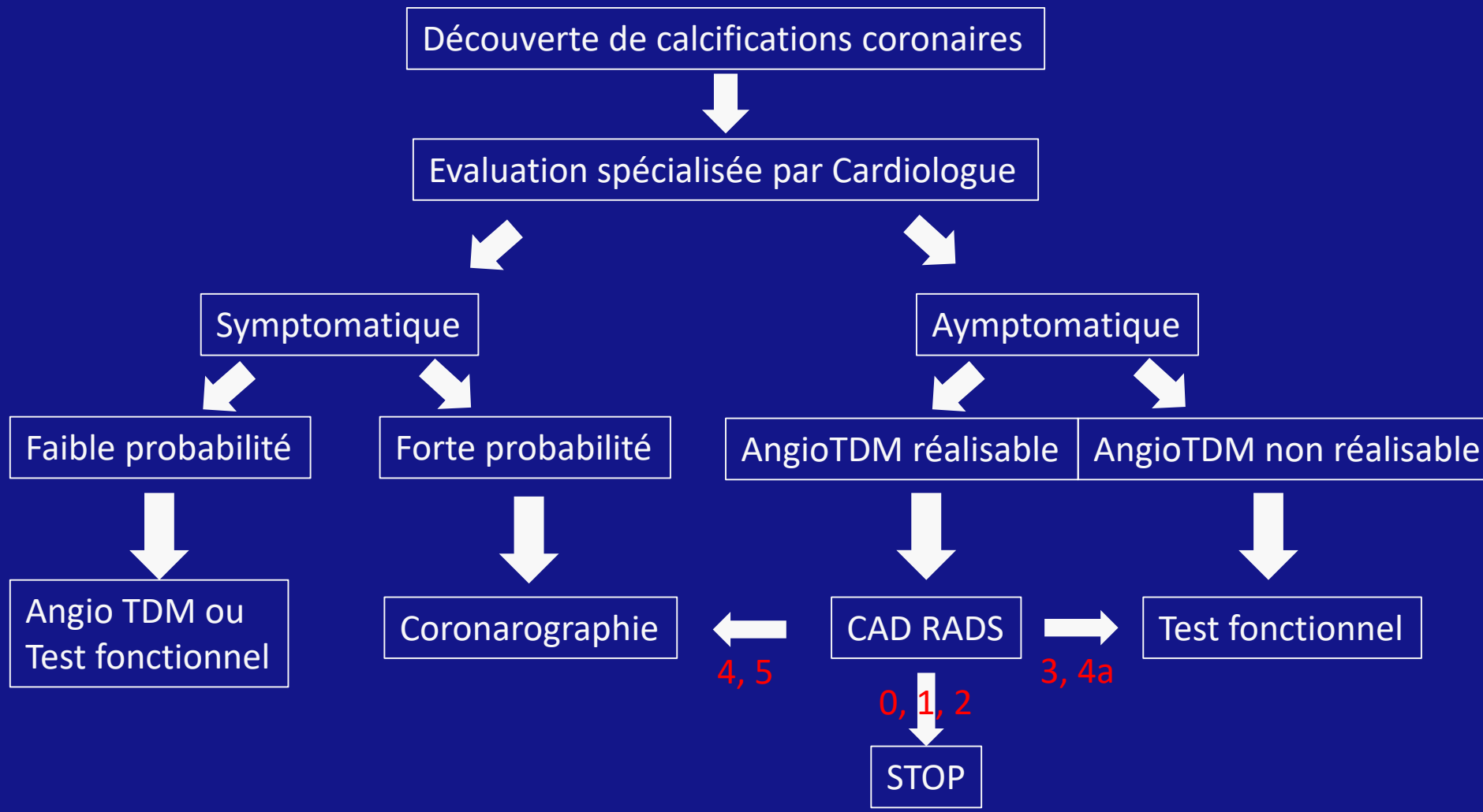
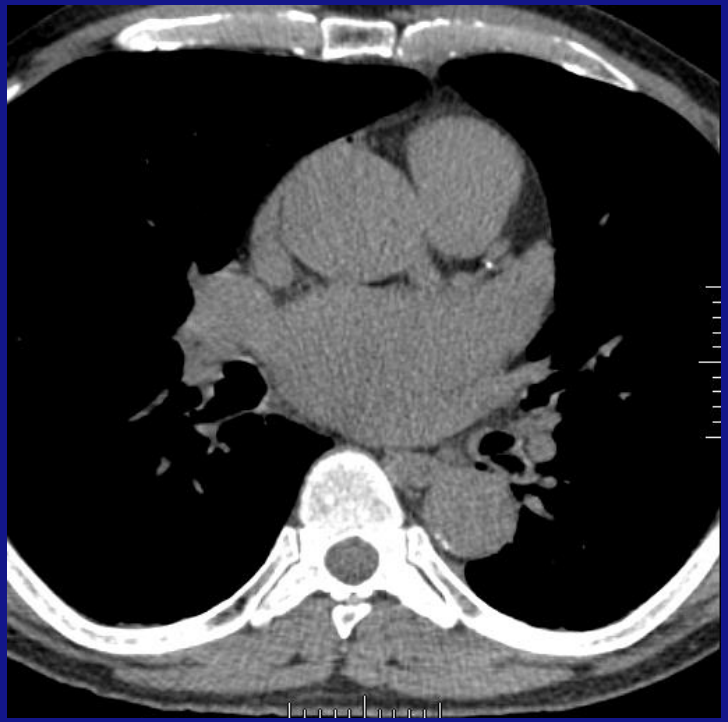
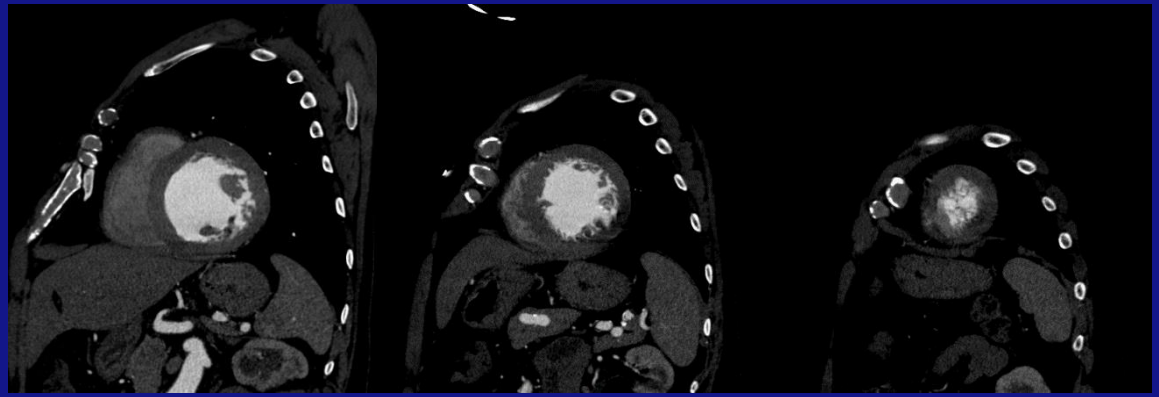
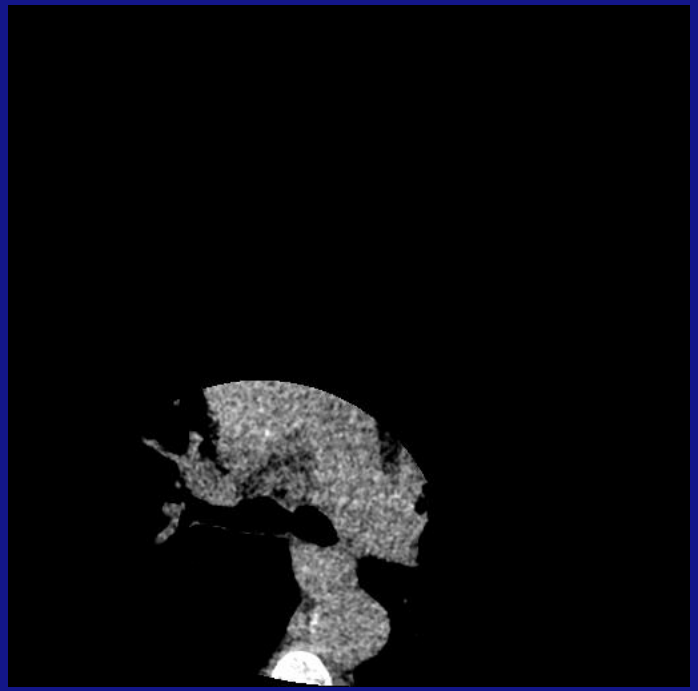
STOP


Découverte de calcifications coronaires
Evaluation spécialisée par Cardiologue
Symptomatique
Aymptomatique
Faible probabilité
Forte probabilité
AngioTDM réalisable
AngioTDM non réalisable
Angio TDM ou
Test fonctionnel
Coronarographie
CAD RADS
Test fonctionnel
4, 5
3, 4a
0, 1, 2
STOP





Score calcique

- Methode d'Agatston +++
- La meme depuis les années 1990
- Methode d'acquisition stricte:
  - FOV
  - Epaisseur de coupe
  - Synchronisation à l'ECG
  - Seuil: Aire>1mm² avec une densité > 130 HU
- Implique une acquisition:
  - SANS injection
  - Synchronisée
  - Volontairement "dégradée"