"Αξονική στεφανιογραφία: Νεότερες δυνατότητες στην ανατομική και λειτουργική απεικόνιση"

Μιχαηλίδης Ευστάθιος MD, MSc Καρδιολόγος Ξάνθη

Νεότερες εφαρμογές CT στεφανιογραφίας

ΕΥΡΕΣΗ HIGH RISK ΠΛΑΚΩΝ

FFRCT

Stress CT PERFUSION

ΠΕΡΙΑΓΓΕΙΑΚΟ ΛΙΠΟΣ ΚΑΙ ΦΛΕΓΜΟΝΗ

CTP

Το **stress CT perfusion** είναι μια στατική ή και δυναμική απεικόνιση αιμάτωσης του μυοκαρδίου
Εκτίμηση της ισχαιμίας με τη χρήση παραγόντων που προκαλούν υπεραιμία
Η δυναμική απεικόνιση σε συνδυασμό με την CT στεφανιογραφία καθοδηγεί τα επόμενα πιθανά επεμβατικά βήματα

HOW DOES IT WORK THE STRESS MYOCARDIAL CT PERFUSION IMAGING

MYOCARDIAL CTP PROTOCOL IS COMPOSED OF:

A STRESS PHASE ACQUISITION,

PERFORMED UNDER PHARMACOLOGICAL ADMINISTRATION OF STRESS AGENTS, SUCH AS ADENOSINE, TO INDUCE A VASODILATATION;

A REST PHASE ACQUISITION,

SIMILAR TO A NUCLEAR MYOCARDIAL PERFUSION IMAGING (MPI) EXAM;

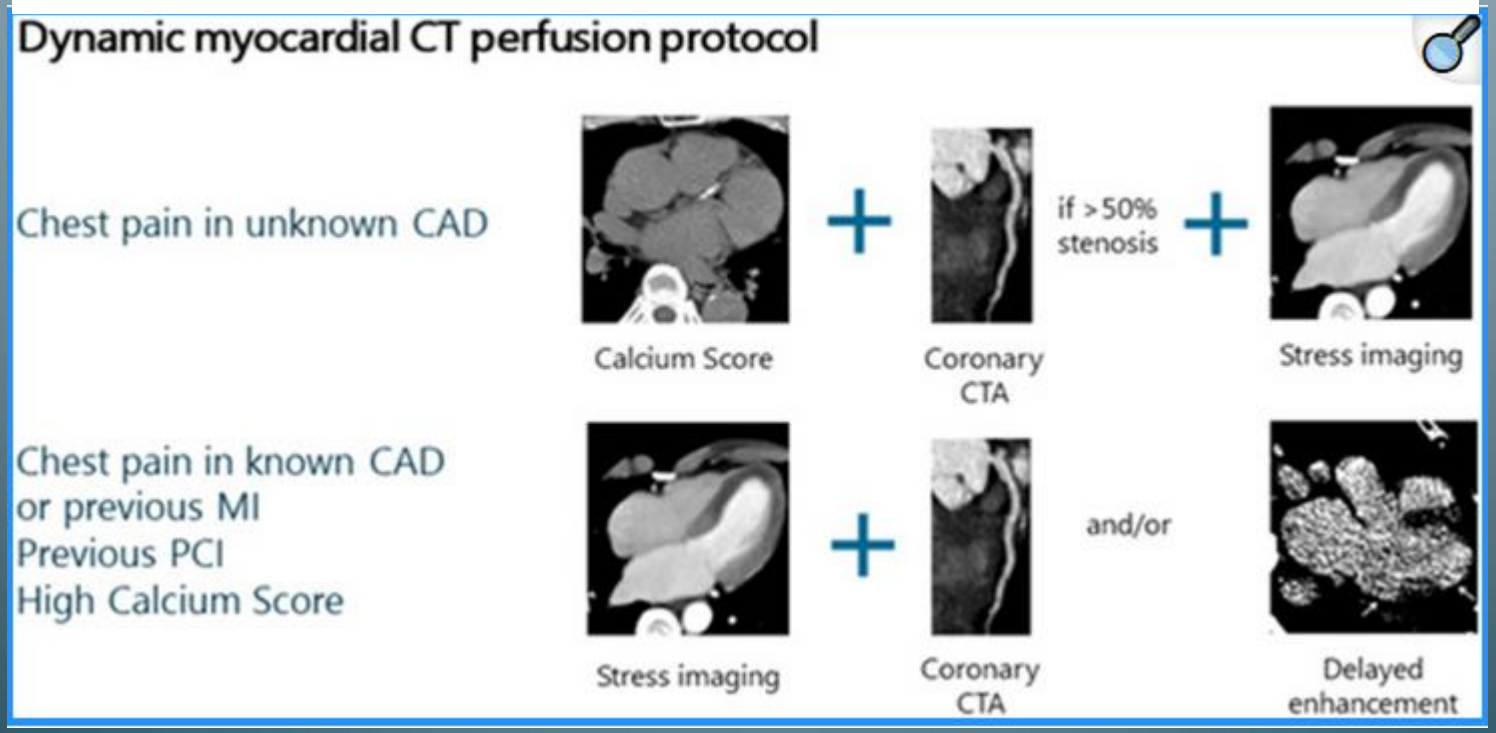
A THIRD DELAYED-PHASE

OPTIONAL, THAT CAN BE PERFORMED IN CASES WHERE LATE CONTRAST ENHANCEMENT EVALUATION FOR MYOCARDIAL SCAR IS DESIRED

▸ Eur Radiol. 2023 Mar 30;33(8):5509–5525. doi: 10.1007/s00330-023-09550-y

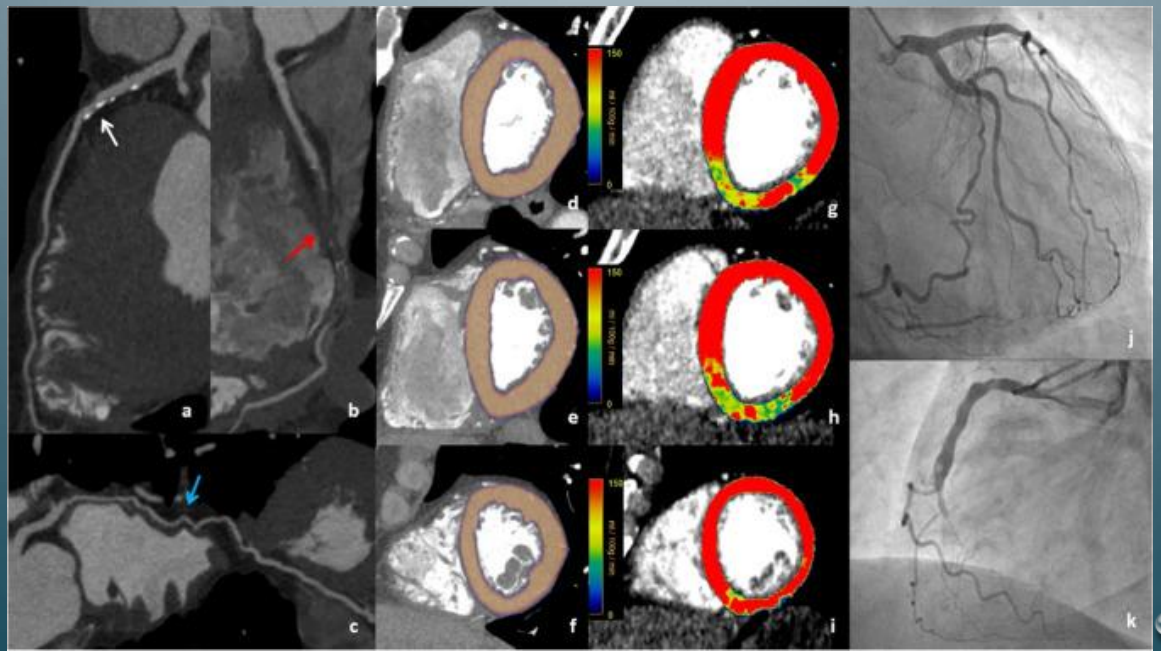
Dynamic myocardial CT perfusion imaging—state of the art

Olga Sliwicka [1,2,✉], Ioannis Sechopoulos [1,2], Andrea Baggiano [3,4], Gianluca Pontone [3,5], Robin Nijveldt [6], Jesse Habets [1,7]



HOW DOES IT WORK THE STRESS MYOCARDIAL CT PERFUSION IMAGING

THE STRESS MYOCARDIAL COMPUTED TOMOGRAPHY PERFUSION (CTP) IMAGING IS A CT-BASED EXAM THAT COMBINES THE INFORMATION PROVIDED BY ANATOMY AND PERFUSION. CT ASSESSMENT OF MYOCARDIAL PERFUSION IS BASED ON THE DISTRIBUTION OF IODINATED CONTRAST MATERIAL DURING ITS FIRST PASS THROUGH THE MYOCARDIUM. BECAUSE THE CONTRAST MATERIAL'S DISTRIBUTION IS DETERMINED BY THE ARTERIAL BLOOD SUPPLY, MYOCARDIAL PERFUSION DEFECTS CAN BE IDENTIFIED AS HYPO-ATTENUATING AREAS CONTAINING REDUCED AMOUNTS OF CONTRAST MATERIAL.



CTP

Evaluation of myocardial CT perfusion in patients presenting with acute chest pain to the emergency department: comparison with SPECT-myocardial perfusion imaging

Gudrun Maria Feuchtner [1, 2], Fabian Plank [2], Constantino Pena [1], Juan Battle [1], James Min [3], Jonathon Leipsic [4], Troy Labounty [3], Warren Janowitz [1], Barry Katzen [1], Jack Ziffer [1], Ricardo C Cury [1]

Conclusions In patients presenting to the ED with CP, the evaluation of rest myocardial CTP demonstrates high diagnostic performance as compared with SPECT-MPI. Addition of CTP to CTA improves the accuracy of CTA, primarily by reducing rates of false-positive CTA.

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Original Research

Dynamic Myocardial Perfusion CT for the Detection of Hemodynamically Significant Coronary Artery Disease

Fay M.A. Nous MD [a b], Tobias Geisler MD [c], Mariusz B.P. Kruk MD, PhD [d], Hatem Alkadhi MD [e], Kakuya Kitagawa MD [f], Rozemarijn Vliegenthart MD, PhD [g], Michaela M. Hell MD [h], Jörg Hausleiter MD [i], Patricia K. Nguyen MD [j k l], Ricardo P.J. Budde MD, PhD [a b], Konstantin Nikolaou MD, MBA [m], Cezary Kepka MD, PhD [d], Robert Manka MD [n], Hajime Sakuma MD [o], Sachin B. Malik MD [p q], Adriaan Coenen MD [a b], Felix Zijlstra MD, PhD [b], Ernst Klotz DiplPhys [r], Pim van der Harst MD, PhD [s], Christoph Artzner MD [c]...
Koen Nieman MD, PhD [a b w *]

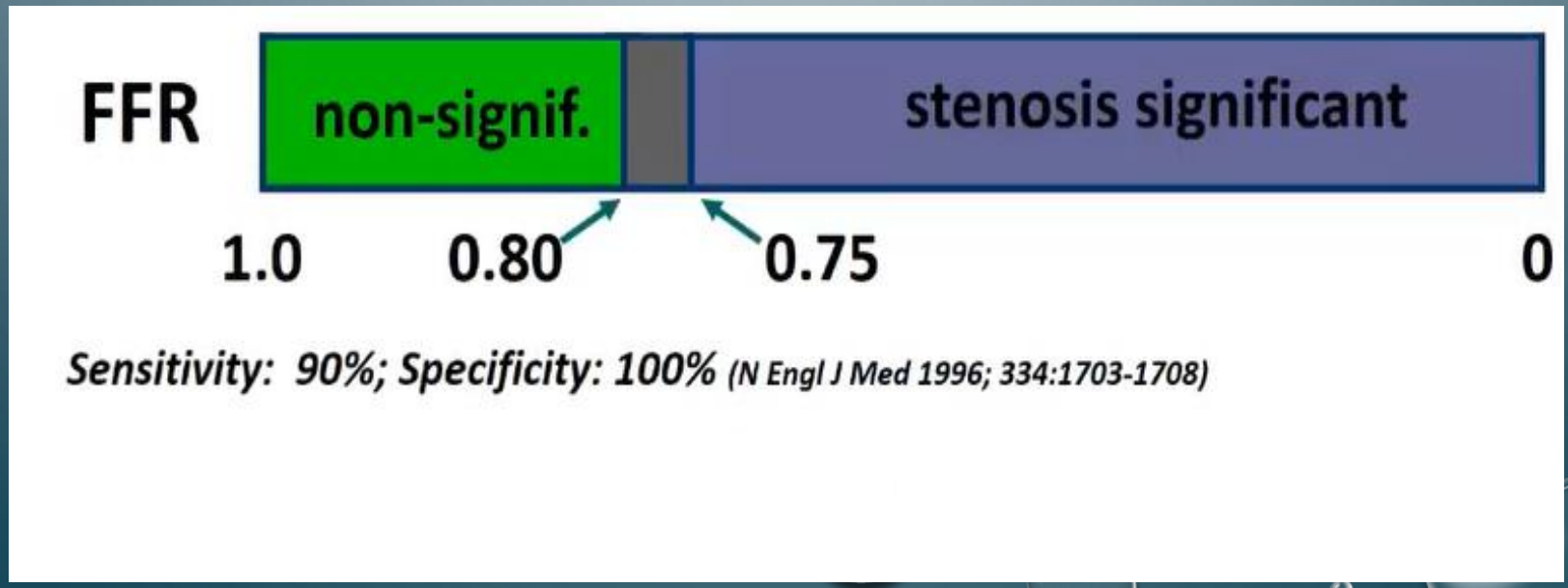
In this international, multicenter study, using third-generation dual-source computed tomography (CT), we investigated the diagnostic performance of dynamic stress CT myocardial perfusion imaging (CT-MPI) in addition to coronary CT angiography (CTA) compared to invasive coronary angiography (ICA) and invasive fractional flow reserve (FFR).

CONCLUSIONS

DYNAMIC CT-MPI OFFERS INCREMENTAL DIAGNOSTIC VALUE OVER CORONARY CTA ALONE FOR THE IDENTIFICATION OF HEMODYNAMICALLY SIGNIFICANT CORONARY ARTERY DISEASE. GENERALIZED RESULTS FROM THIS MULTICENTER STUDY ENCOURAGE BROADER CONSIDERATION OF DYNAMIC CT-MPI IN CLINICAL PRACTICE. (DYNAMIC STRESS PERFUSION CT FOR DETECTION OF INDUCIBLE MYOCARDIAL ISCHEMIA)

FFRCT

- Μέτρηση της στεφανιαίας εφεδρείας από την αξονική στεφανιογραφία
- Ανίχνευση λειτουργικής ισχαιμίας
- Χρησιμότητα στις μέτριες στενώσεις



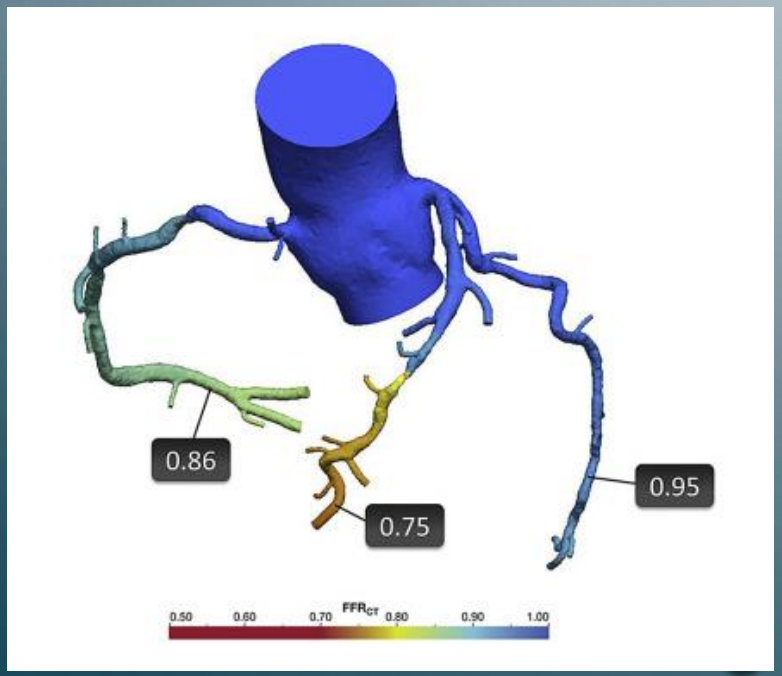
Sensitivity: 90%; Specificity: 100% (N Engl J Med 1996; 334:1703-1708)

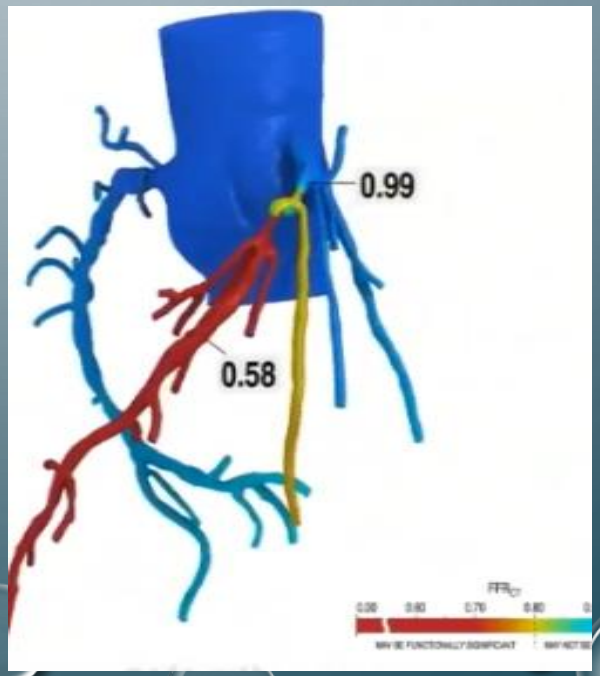
Τεχνικές προσομείωσης της στεφανιαίας αιματικής ροής με δεδομένα από την CTCA.

Μέτρηση της στεφανιαίας εφεδρείας ανατομικών στενώσεων σε μία συνεδρία.

Χρήση ειδικών λογισμικών/AI

FFR CT





FFRCT The NXT trial

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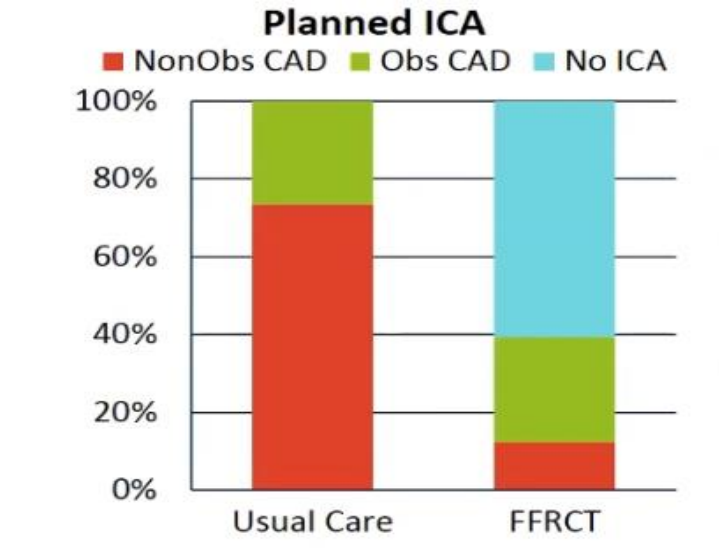
Clinical Research
Clinical Trials

Diagnostic Performance of Noninvasive Fractional Flow Reserve Derived From Coronary Computed Tomography Angiography in Suspected Coronary Artery Disease: The NXT Trial (Analysis of Coronary Blood Flow Using CT Angiography: Next Steps)

Bjarne L. Nørgaard MD, PhD *, Jonathon Leipsic MD, PhD †, Sara Gaur MD *, Sujith Seneviratne MBBS ‡, Brian S. Ko MBBS, PhD ‡, Hiroshi Ito MD, PhD §, Jesper M. Jensen MD, PhD *, Laura Mauri MD, PhD ‖, Bernard De Bruyne MD, PhD ¶, Hiram Bezerra MD, PhD #, Kazuhiro Osawa MD §, Mohamed Marwan MD, PhD **, Christoph Naber MD, PhD ††, Andrejs Erglis MD, PhD ‡‡, Seung-Jung Park MD, PhD §§, Evald H. Christiansen MD, PhD *, Anne Kaltoft MD, PhD *, Jens F. Lassen MD, PhD *, Hans Erik Bøtker MD, DMSci *, Stephan Achenbach MD, PhD **



Conclusions

THIS STUDY FOUND THAT FFR_{CT} HAS HIGH DIAGNOSTIC PERFORMANCE COMPARED WITH INVASIVELY MEASURED FFR, IDENTIFYING PATIENTS WITH HEMODYNAMICALLY RELEVANT OBSTRUCTIONS WITH HIGH SENSITIVITY AND SPECIFICITY.

THE ADDITION OF FFR_{CT} TO CORONARY CTA MAY ALLOW FOR A COMPREHENSIVE ANATOMIC AND FUNCTIONAL ASSESSMENT OF CAD IN A MANNER POTENTIALLY PROMOTING BENEFICIAL CLINICAL AND COST OUTCOMES,.

Identification of High-Risk Plaques Destined to Cause Acute Coronary Syndrome Using Coronary Computed Tomographic Angiography and Computational Fluid Dynamics

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ABSTRACT

OBJECTIVES The authors investigated the utility of noninvasive hemodynamic assessment in the identification of high-risk plaques that caused subsequent acute coronary syndrome (ACS).

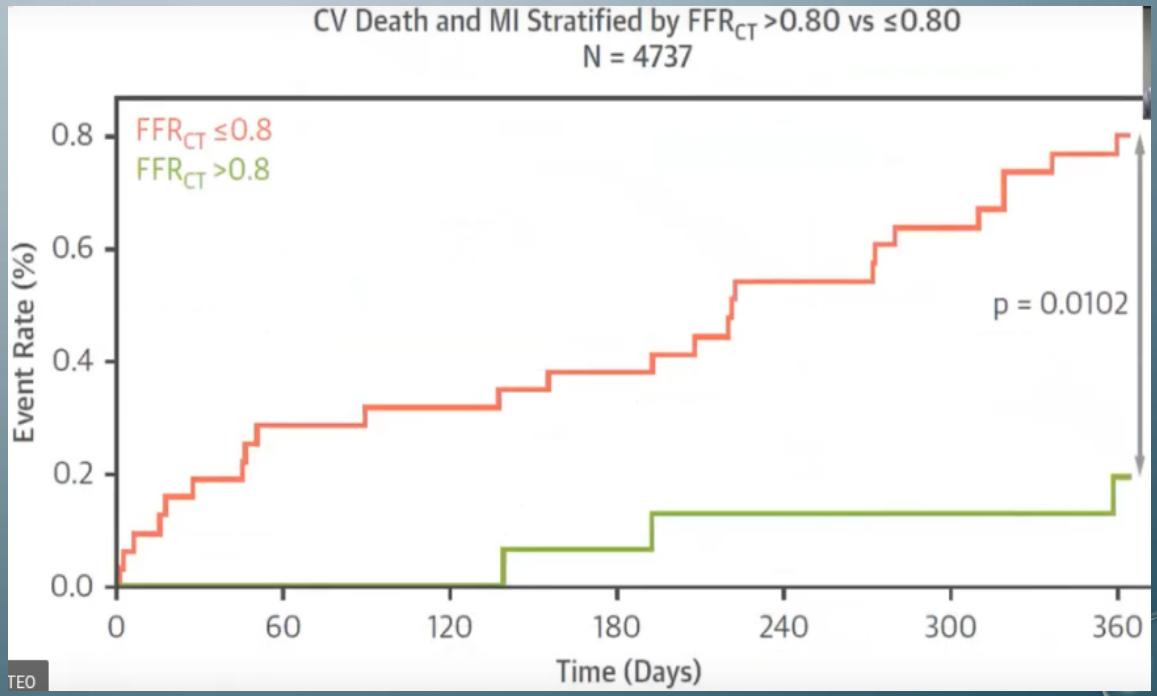
The presence of adverse plaque characteristics (APC) was assessed and hemodynamic parameters (fractional flow reserve derived by coronary computed tomographic angiography)FFRCT

Conclusions

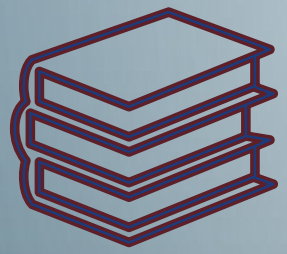
Noninvasive hemodynamic assessment enhanced the identification of high-risk plaques that subsequently caused ACS. The integration of noninvasive hemodynamic assessments may improve the identification of culprit lesions for future ACS.

1-YEAR IMPACT ON MEDICAL PRACTICE AND CLINICAL OUTCOMES OF FFRCT: THE ADVANCE REGISTRY

Στους ασθενείς με FFRCT >0,80 δεν σημειώθηκε κανένα μείζον καρδιακό σύμβαμα,
ενώ στους ασθενείς με FFRCT <0,80 είχαμε 14 συμβάματα κατά την περίοδο της παρακολούθησης



Guidelines



ESC European Society of Cardiology

European Heart Journal (2024) 45, 3415–3537
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ESC GUIDELINES

2024 ESC Guidelines for the management of chronic coronary syndromes

Developed by the task force for the management of chronic coronary syndromes of the European Society of Cardiology (ESC)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS)

Authors/Task Force Members: Christiaan Vrints *†, (Chairperson) (Belgium), Felicita Andreotti *†, (Chairperson) (Italy), Konstantinos C. Koskinas‡, (Task Force Co-ordinator) (Switzerland), Xavier Rossello ‡, (Task Force Co-ordinator) (Spain), Marianna Adamo (Italy), James Ainslie (United Kingdom), Adrian Paul Banning (United Kingdom), Andrzej Budaj (Poland), Ronny R. Buechel (Switzerland), Giovanni Alfonso Chiariello (Italy), Alaide Chieffo (Italy), Ruxandra Maria Christodorescu (Romania), Christi Deaton (United Kingdom), Torsten Doenst [1] (Germany), Hywel W. Jones (United Kingdom), Vijay Kunadian (United Kingdom), Julinda Mehilli (Germany), Milan Milojevic [1] (Serbia), Jan J. Piek (Netherlands), Francesca Pugliese (United Kingdom), Andrea Rubboli (Italy), Anne Grete Semb (Norway), Roxy Senior (United Kingdom), Jurrien M. ten Berg (Netherlands), Eric Van Belle (France), Emeline M. Van Craenenbroeck (Belgium), Rafael Vidal-Perez (Spain), Simon Winther (Denmark), and ESC Scientific Document Group

Selection of individual diagnostic tests in individuals with suspected chronic coronary syndrome—*Section 3*		
To rule out obstructive CAD in individuals with low or moderate (>5%–50%) pre-test likelihood, CCTA is recommended as the preferred diagnostic modality.	I	B
CCTA is recommended in individuals with low or moderate (>5%–50%) pre-test likelihood of obstructive CAD if functional imaging for myocardial ischaemia is not diagnostic.	I	B
Invasive coronary angiography with the availability of invasive functional assessments is recommended to confirm or exclude the diagnosis of obstructive CAD or ANOCA/INOCA in individuals with an uncertain diagnosis on non-invasive testing.	I	B
In patients with a known intermediate coronary artery stenosis in a proximal or mid coronary segment on CCTA, CT-based FFR may be considered.	IIb	B

THE ADDITION OF BOTH FFR_{CT} AND STRESS-CTP TO CCTA IS A VALID AND FEASIBLE STRATEGY TO EVALUATE THE FUNCTIONAL RELEVANCE OF CAD. BASED ON THESE RESULTS, IN MOST PATIENTS WITH SUSPECTED CAD, CCTA ALONE AND INTEGRATED WITH FFR_{CT} OR CTP IS A ROBUST TOOL TO DIAGNOSE FUNCTIONALLY RELEVANT STENOSES.

Stress Computed Tomography Perfusion Versus Fractional Flow Reserve CT Derived in Suspected Coronary Artery Disease: The PERFECTION Study

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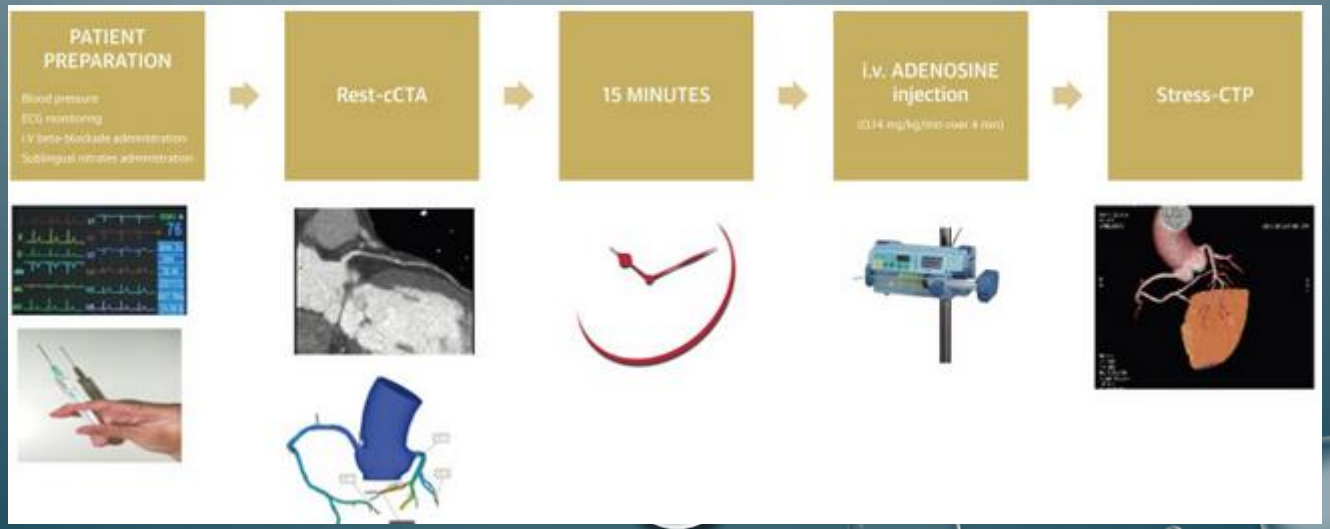
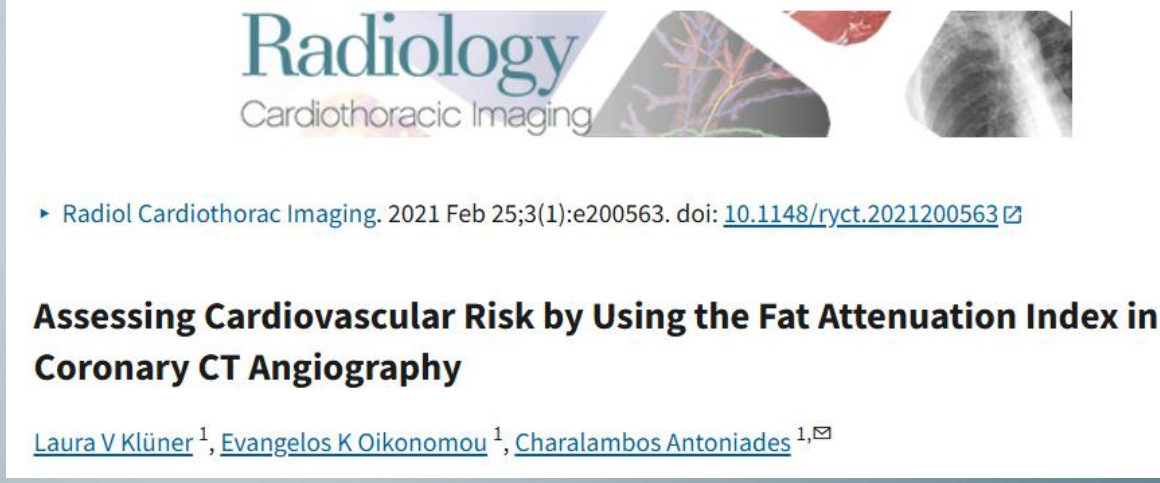


Δείκτης απομείωσης λίπους-



- There is an unmet need for biomarkers that noninvasively visualize coronary inflammation and track responses to anti-inflammatory interventions in atherosclerosis

- Perivascular adipose tissue (PVAT) acts as an in vivo biosensor of coronary inflammation by modifying its composition in response to inflammatory signals.

- The fat attenuation index detects coronary inflammation by quantifying dynamic spatial changes in PVAT attenuation.

- Further radiotranscriptomic analyses reveal additional imaging biomarkers linked to adverse PVAT remodeling with important diagnostic and prognostic implications in coronary artery disease.

Προκλήσεις για το μέλλον

- **Ανατομικός εντοπισμός και αναγνώριση των υψηλού κινδύνου πλακών με παράλληλη αξιολόγηση της φλεγμονώδους διαδικασίας**
- **Ανάλυση του επικαρδιακού και περιαγγειακού λίπους και συσχέτιση του με την εξέλιξη της αθηρωματικής νόσου (δείκτης απομείωσης λίπους- fat attenuation index)**
- **Συγχώνευση απεικόνισης,εισαγωγή τεχνητής νοημοσύνης και αλγορίθμων μηχανικής εκμάθησης**

Ευχαριστώ πολύ για την προσοχή σας!

Οικία Μάνου Χατζηδάκη, Ξάνθη