

Myocardial blood flow SPECT a PET

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2024 ESC Guidelines for the management of chronic coronary syndromes

European Heart Journal (2024) **00**, 1–123
<https://doi.org/10.1093/eurheartj/ehae177>

2.4. What is new

The 2024 Guidelines contain a number of new and revised recommendations, which are summarized in [Tables 3](#) and [4](#), respectively.

Table 3 New major recommendations in 2024

Non-invasive functional myocardial imaging tests in the initial diagnostic management of individuals with suspected chronic coronary syndrome—resting and stress single-photon emission computed tomography/positron emission tomography—cardiac magnetic resonance imaging, if available and supported by local expertise—Section 3

In individuals with suspected CCS and moderate or high (>15%–85%) pre-test likelihood of obstructive CAD, SPECT or, preferably, PET myocardial perfusion imaging is recommended to:

- diagnose and quantify myocardial ischaemia and/or scar;
- estimate the risk of MACE;
- quantify myocardial blood flow (PET).

In patients selected for PET or SPECT myocardial perfusion imaging, it is recommended to measure CACS from unenhanced chest CT imaging (used for attenuation correction) to improve detection of both non-obstructive and obstructive CAD.

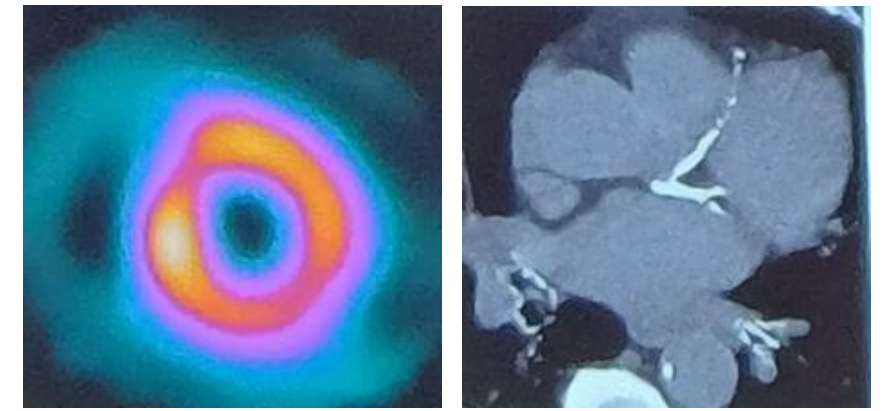
I

B

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HYBRID IMAGING GUIDELINE



2022 ASNC/AAPM/SCCT/SNMMI guideline
for the use of CT in hybrid nuclear/CT cardiac
imaging

- MPI identified ischemia & defines need for revascularization
- CACS reflects anatomic burden of atherosclerosis
- MPI & CACS are independent & complementary predictors of cardiac events
- Every pt without known CAD undergoing MPI, should have CACS (increases diagnostic acumen, enhances long term stratification, improves pt outcomes by targeting aggressive risk factor modification in those with subclinical AS)

No ischemia
No atherosclerosis

No ischemia
+ atherosclerosis

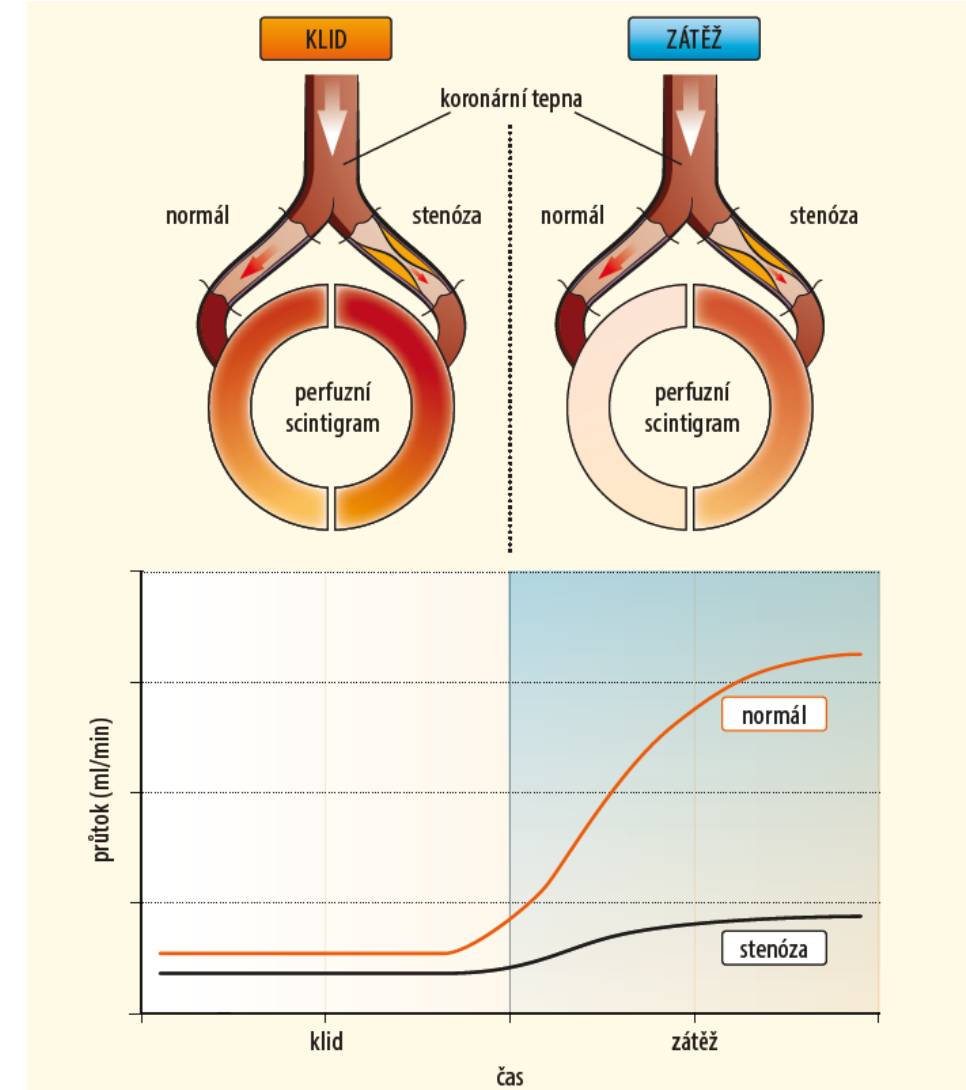
Ischemia
+/- atherosclerosis

Myocardial blood flow (MBF) SPECT a PET

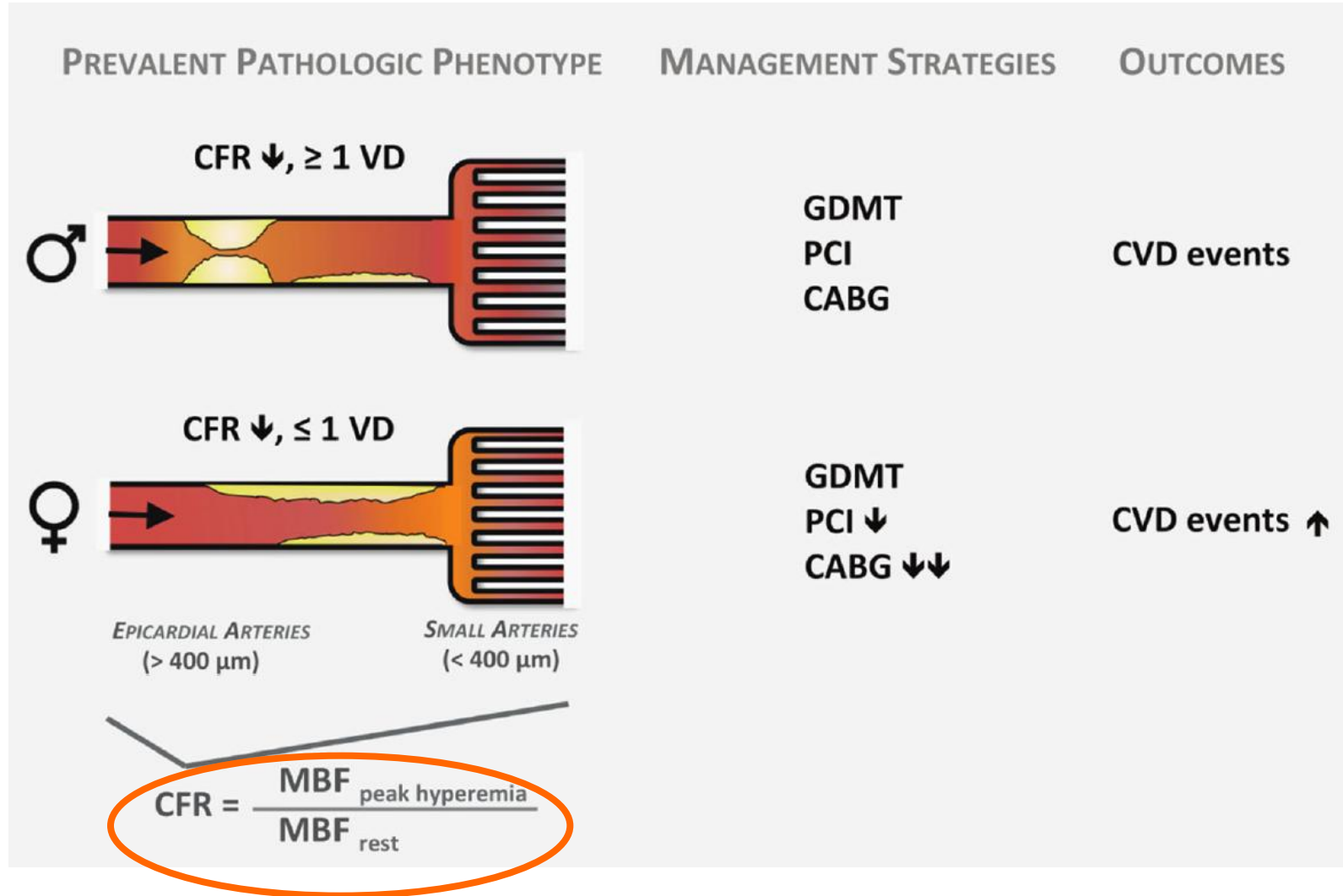
Konvenční SPECT resp. PET = relativní
perfúze

Dynamický SPECT resp. PET = absolutní
kvantifikace

*Pozátěžové navození
heterogenity perfúze*



ASNC Consensus Statement : Women



CFR - Coronary flow reserve
MBF - Myocardial blood flow

GDMT- guideline directed
medical therapy

Dynamický PET

Coronary flow reserve (CRF): prognostický význam

^{13}N -ammonia

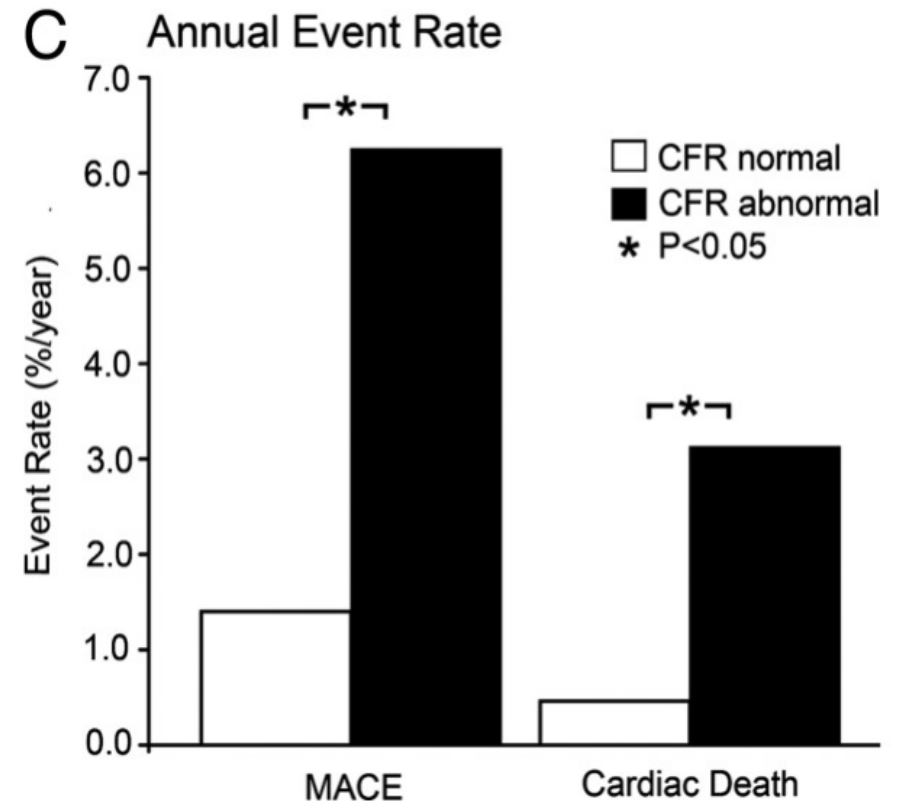
PET radiofarmaka

^{13}N - NH_3

^{15}O - H_2O

^{82}Rb ($^{82}\text{Sr}/^{82}\text{Rb}$ generátor)

^{18}F flurpiridaz: FDA registrace 9/2024



Herzog BA, et al. *Am J Cardiol* 2009

2024 ESC Guidelines for the management of chronic coronary syndromes

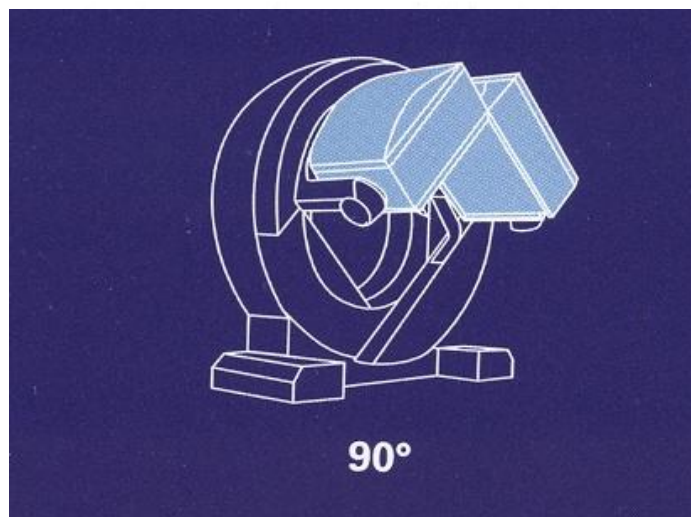
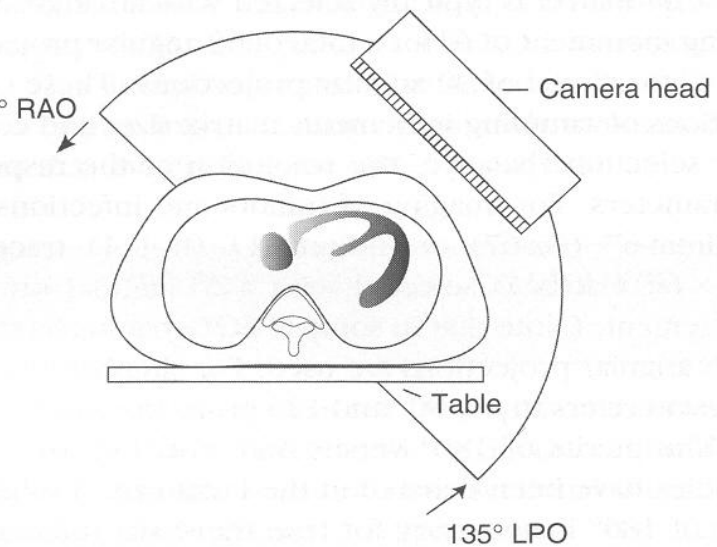
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3.3.2.2. Myocardial perfusion scintigraphy—single-photon emission computed tomography

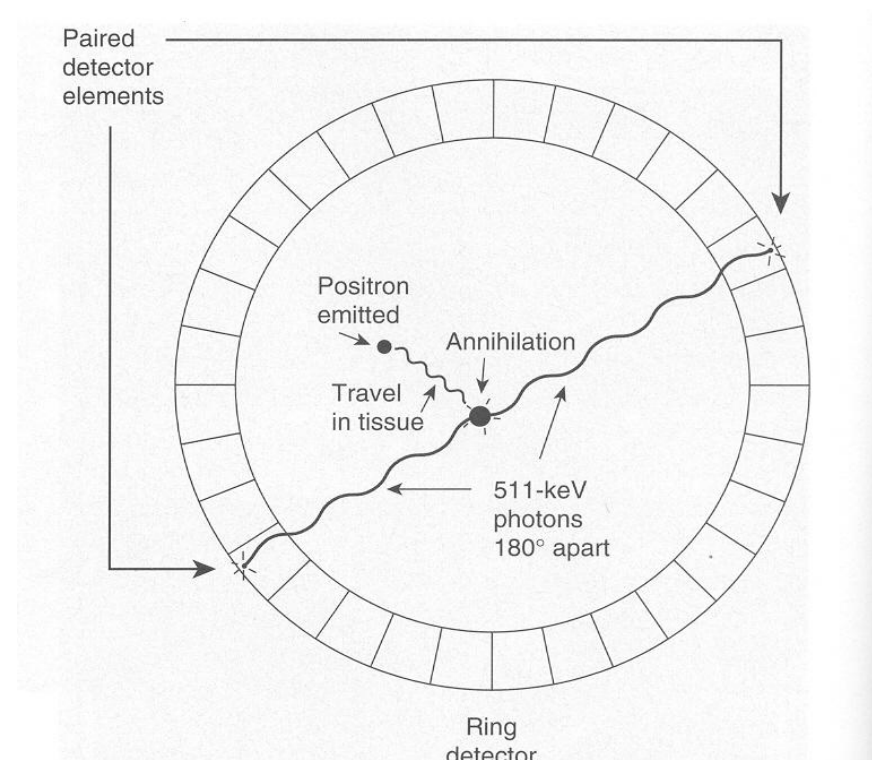
Newer-generation SPECT cameras based on cadmium–zinc–telluride (CZT) semiconductor detector technology enable a substantial reduction in radiation dose exposure and acquisition time, as well as an increased diagnostic accuracy²⁶⁰ and absolute quantification of MBF. Hence, its diagnostic performance for multivessel CAD has improved substantially.²⁶¹

261. Panjer M, Dobrolinska M, Wagenaar NRL, Slart R. Diagnostic accuracy of dynamic CZT-SPECT in coronary artery disease. A systematic review and meta-analysis. *J Nucl Cardiol* 2022;**29**:1686–97. <https://doi.org/10.1007/s12350-021-02721-8>

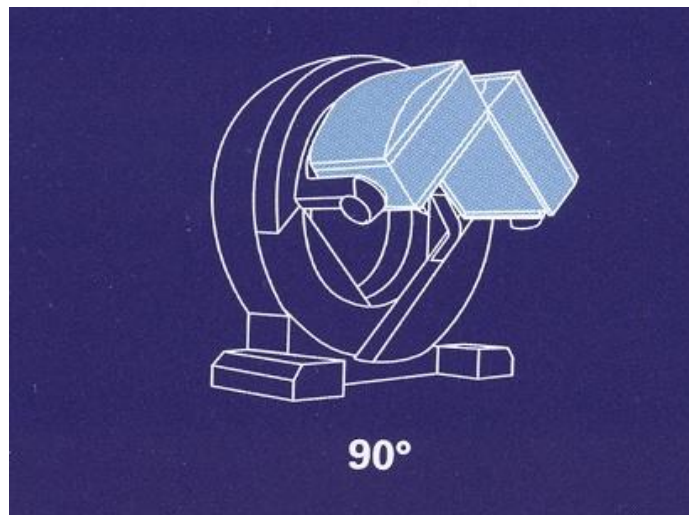
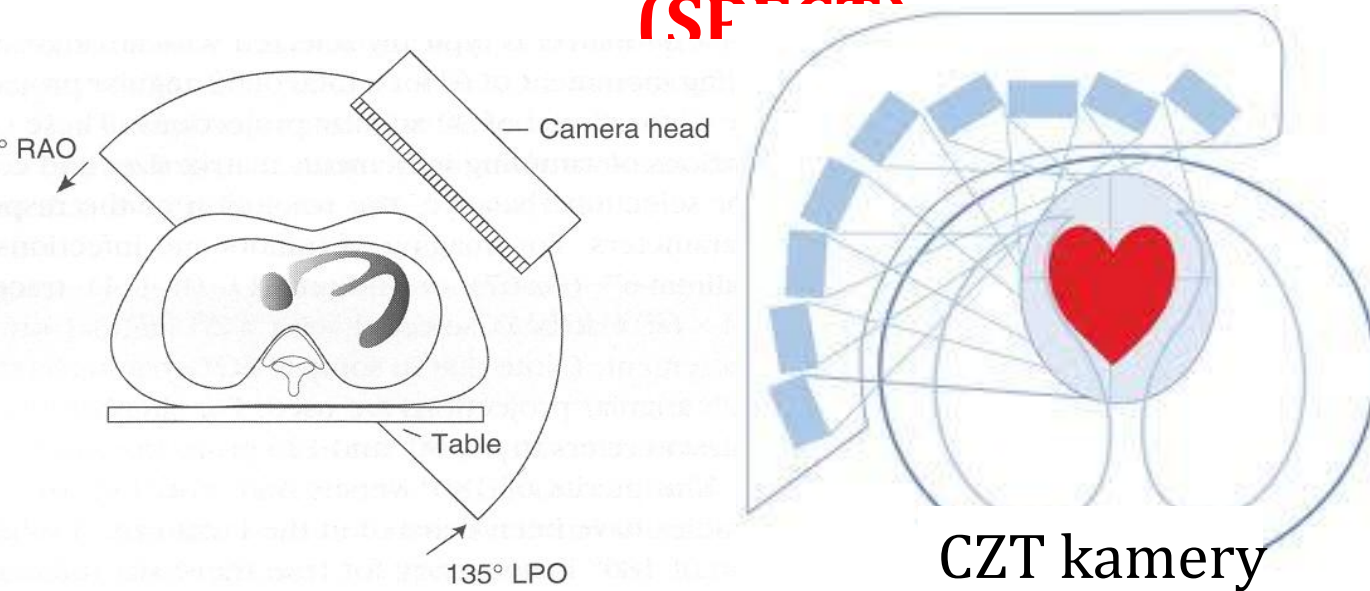
Single Photon Emission Computed Tomography (SPECT)



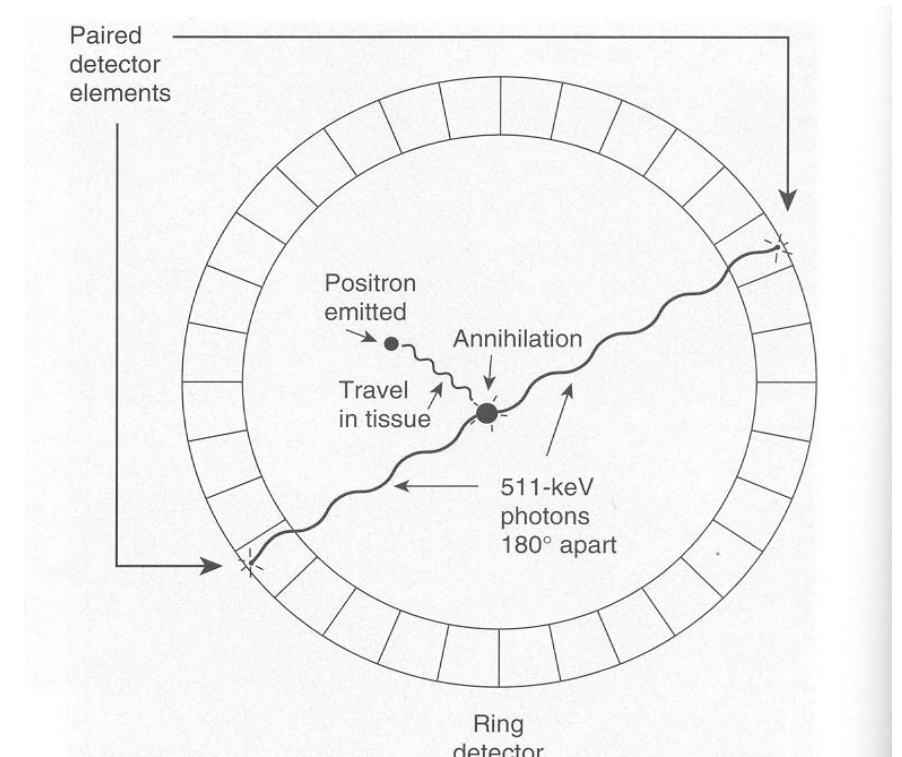
Positron Emission Tomography (PET)



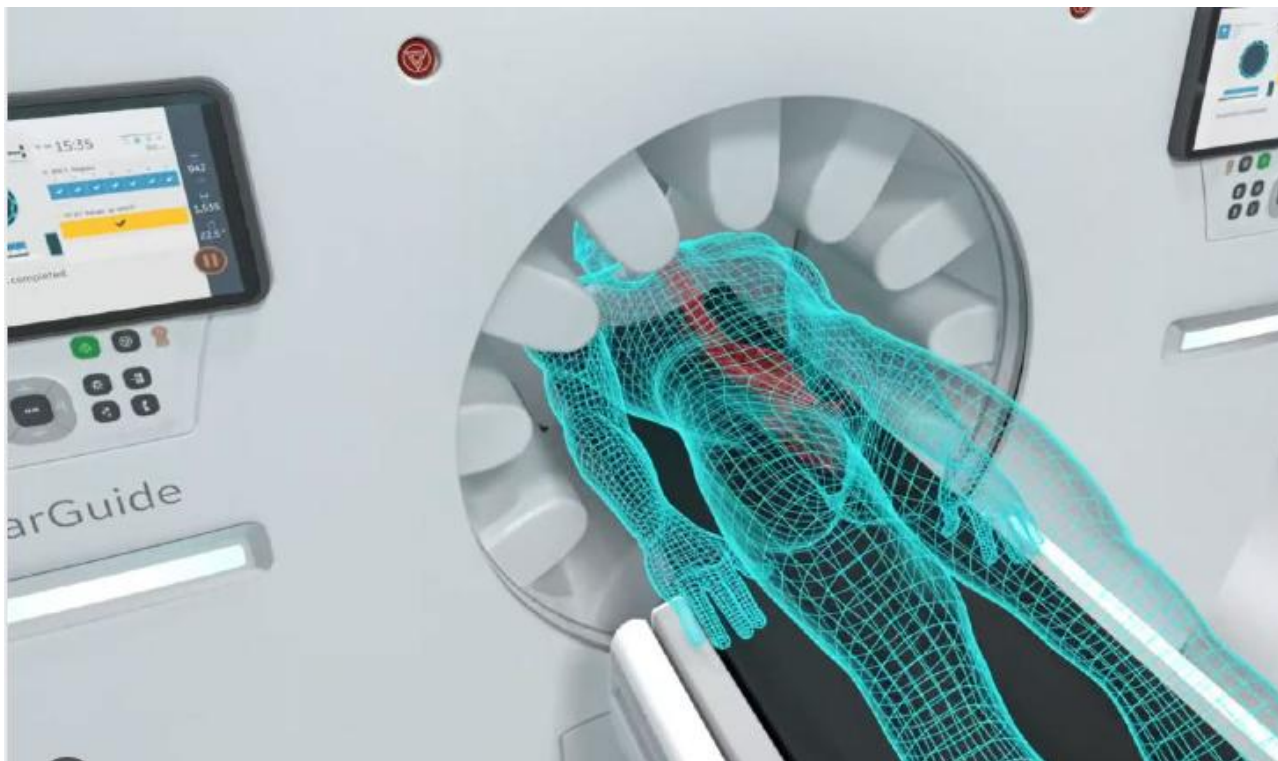
Single Photon Emission Computed Tomography (SPECT)



Pozitron Emission Tomography (PET)



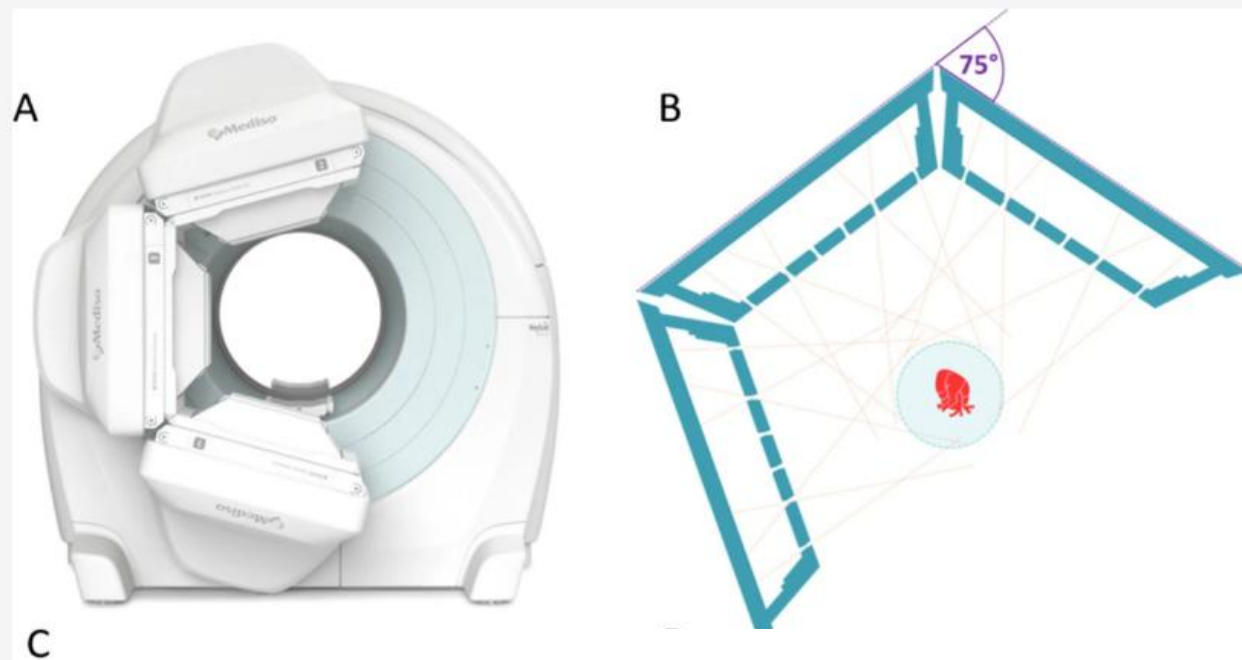
Dynamický SPECT na kamerách s všeobecným použitím



Full Ring 12 CZT detektors

- GE StarGuide
- Spectrum Dynamics Veriton

Triple-NaI-detector SPECT system with multi-pinhole collimator



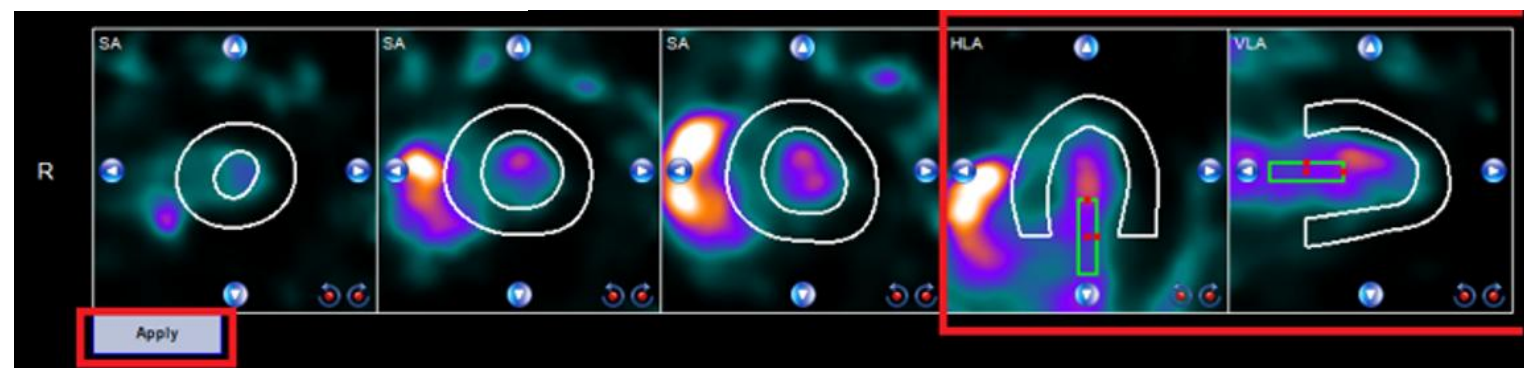
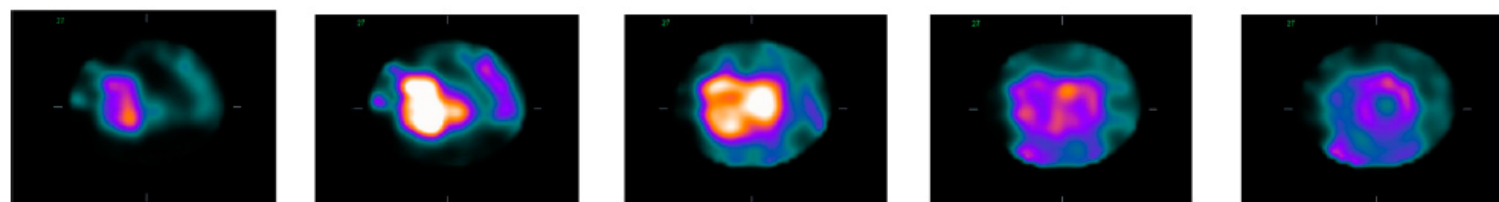
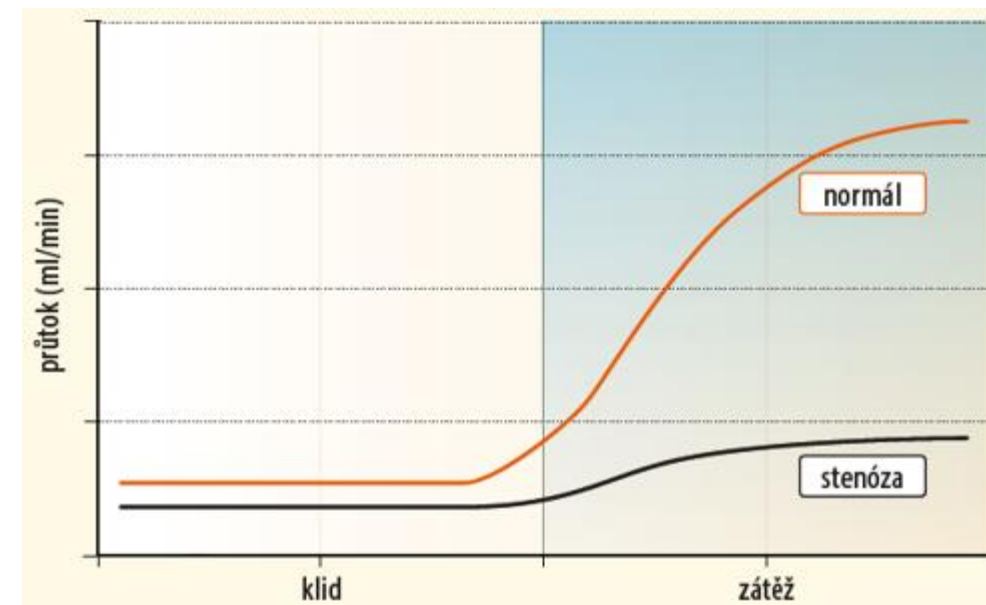
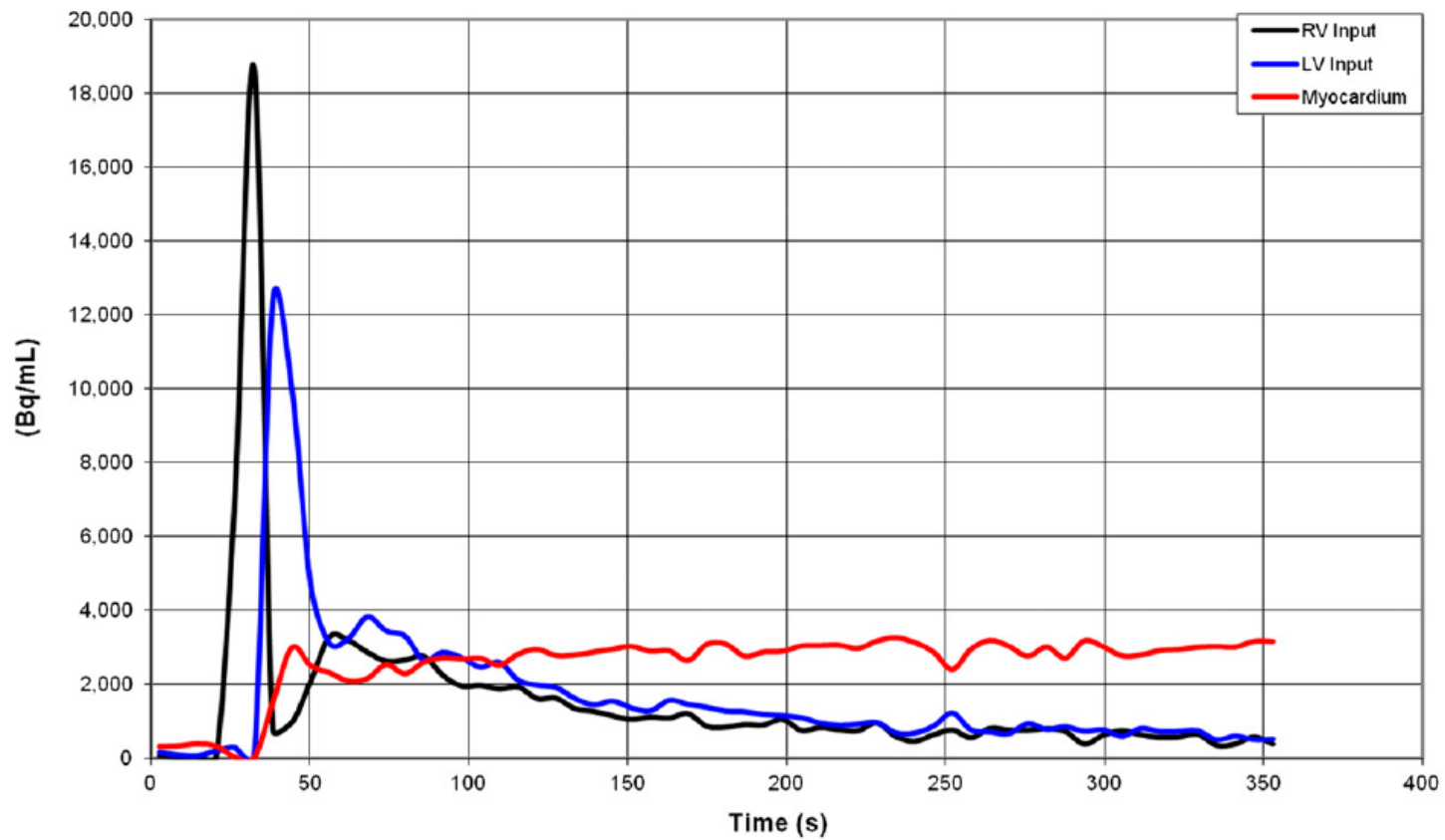
Mediso Anyscan Trio
C-shape detectors configuration
Multi-pinhole cardiac collimators



12svodové EKG



2 hod



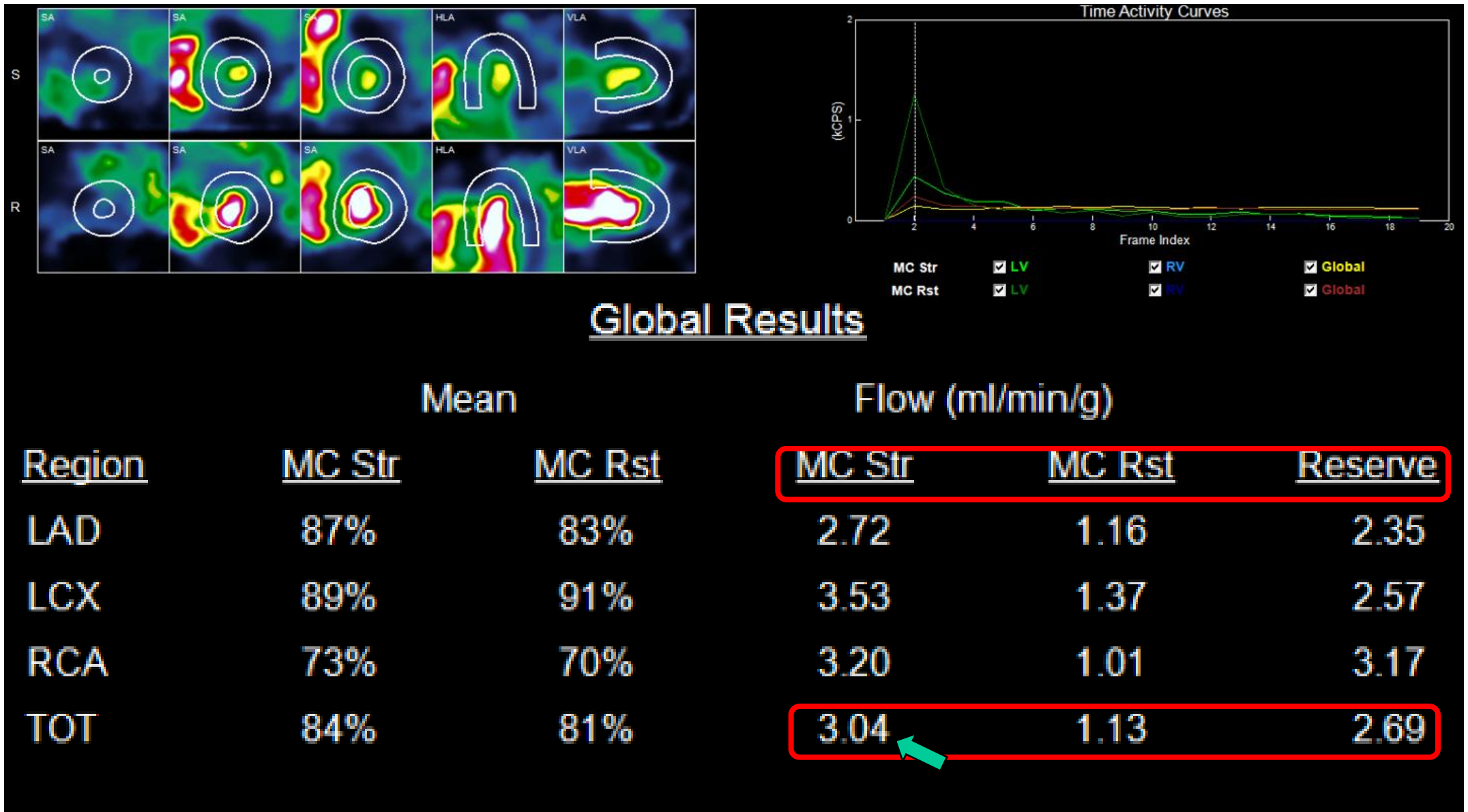
Ben-Haim S, et al. JNM 2013

Table 2. Stress and rest mbf and MFR values comparison between PET, AC-CZT and NAC-CZT

			Comparison	Significance
MBF-Rest (mL/min/gr)	PET	0.76 ± 0.19		
	AC-CZT	0.77 ± 0.24	PET vs AC-CZT	$P = 0.78$
	NAC-CZT	1.14 ± 0.40	PET vs NAC-CZT	$P < 0.01$
			NAC-CZT vs AC-CZT	$P < 0.01$
MBF-Stress (mL/min/gr)	PET	1.87 ± 0.45		
	AC-CZT	1.62 ± 0.68	PET vs AC-CZT	$P < 0.01$
	NAC-CZT	2.36 ± 1.09	PET vs NAC-CZT	$P < 0.01$
MFR	PET	2.52 ± 0.56		
	AC-CZT	2.22 ± 0.97	PET vs AC-CZT	$P < 0.01$
	NAC-CZT	2.18 ± 0.96	PET vs NAC-CZT	$P < 0.01$
			NAC-CZT vs AC-CZT	$P = 0.58$

50yo male. DM, dyspnea

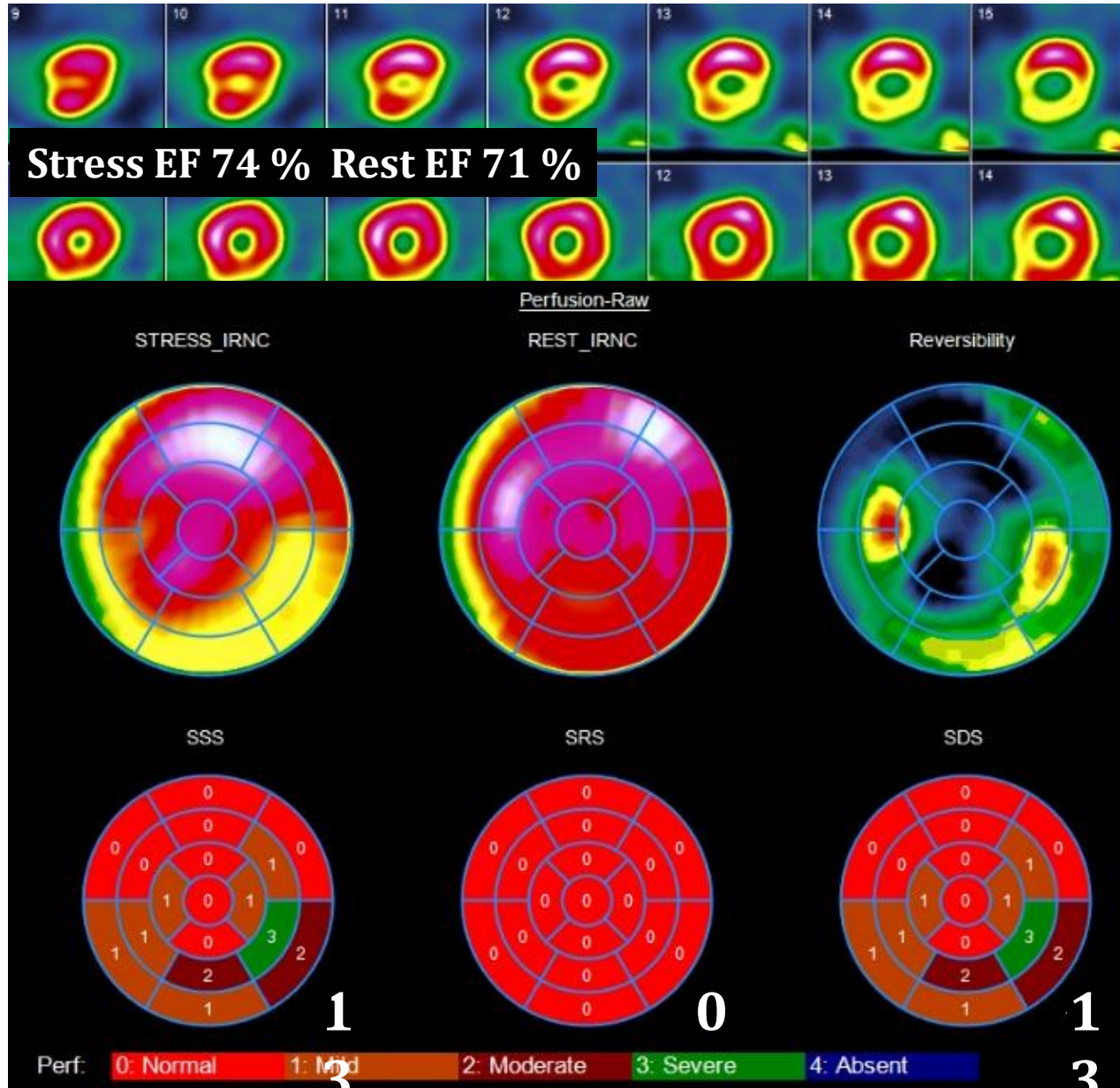
Normal Coronary Flow Reserve a Myocardial Blood Flow



80letá žena, DM, implantace PM

Ischemie inferiorně a laterálně.

Kalcifikace ve
všech 3 povodích.



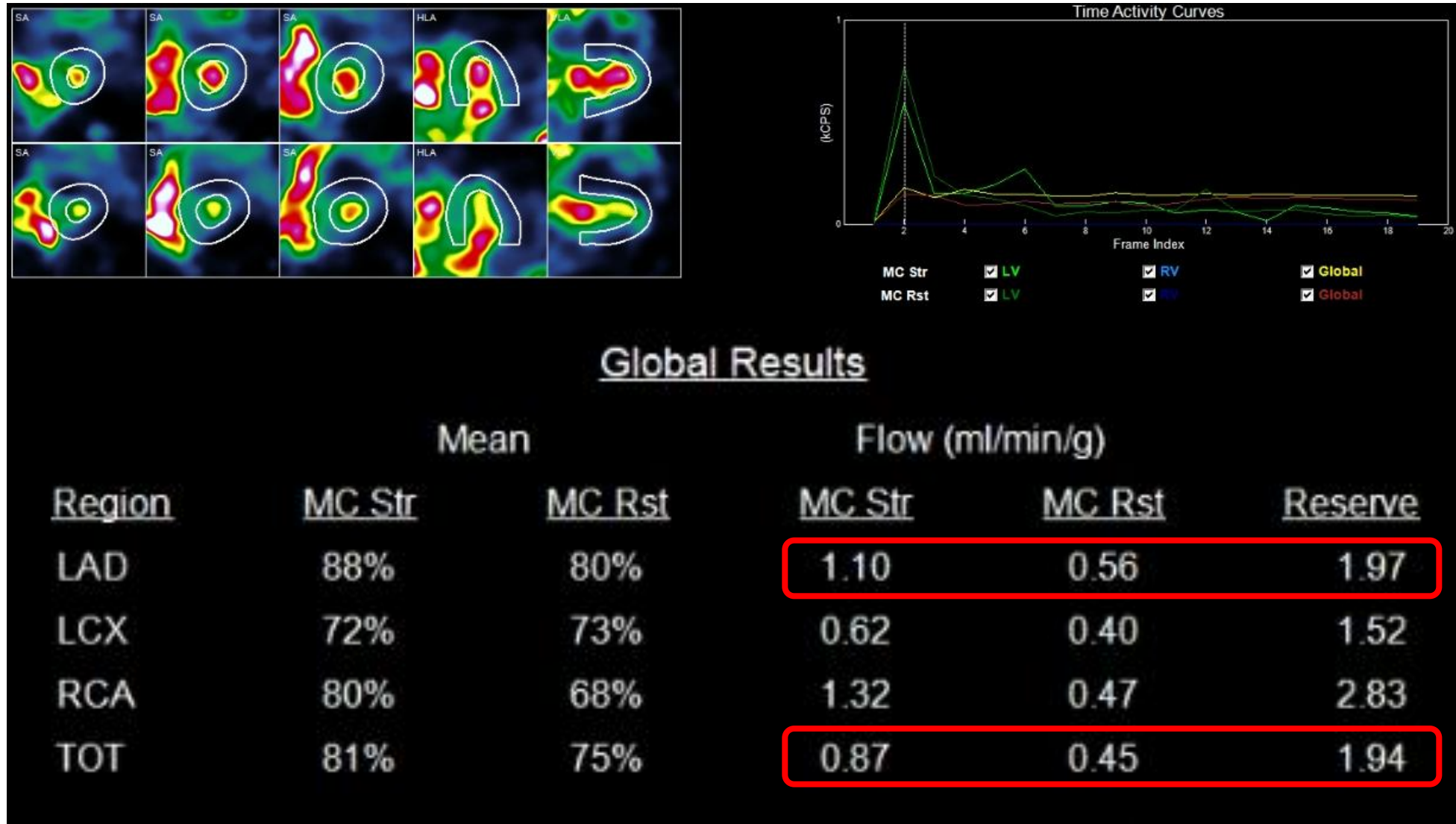
CAC score 530

Fluidothorax

= 19 % (13/68)

80letá žena, DM, implantace PM

Ischemie inferiorně a laterálně.



SKG: PCI RMS a ACD. RIA 30 % stenóza

80letá žena, DM, implantace PM

Ischemie inferiorně a laterálně. PCI RMS a ACD. RIA 30 % stenóza

- Po 36 měs sledování:

- **akutní IM, kardiogenní šok**

- reSKG výrazná progrese nálezu - 80% stenóza kmene, CTO RCx a 90% stenóza distální ACD

- **ad hoc PCI kmene + RIA + rekanalizace RCx**

- ECHO akineza spodní a laterální stěny, EF 30-35%

- **progrese kardiogenního šoku, zástava, KPR, úmrtí**



Stress only při normální:

- relativní perfuzi
- pozátěžové funkci
- **stress MBF $\geq 2,29$ ml/min/g**

Efektivní dávka 0,0 mSv

Závěr: Myocardial blood flow SPECT a PET

- Kvantifikace průtoků v ml/min/g je další možností, jak zlepšit diagnostiku nemoci koronárních tepen
- Pacienti se susp. postižením více tepen – DM, dilatace levé komory (podobně pomáhá i CT kalciové skóre a poischemické omráčení levé komory)
- Mikrovaskulární postižení, INOCA/ANOCA