

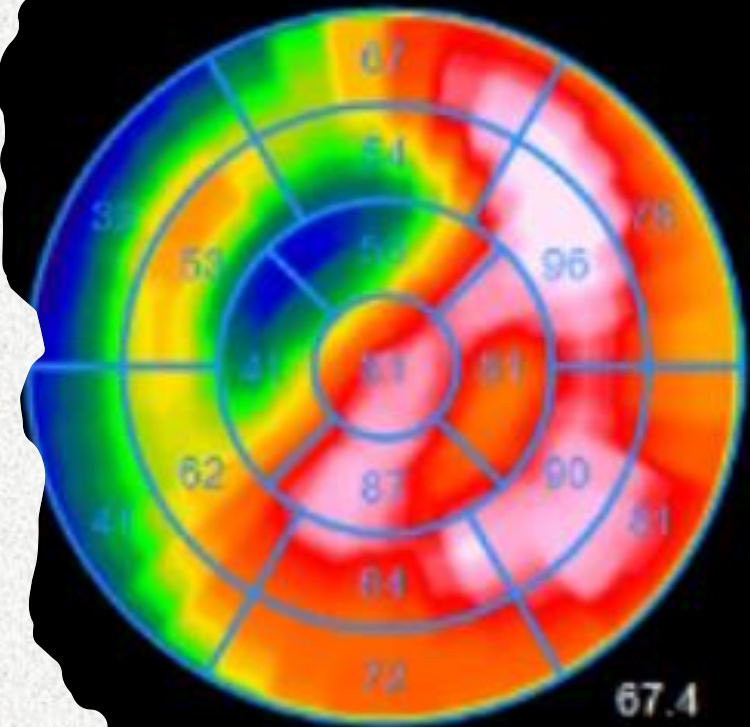
Myokarditida

*přínos
nukleární
medicíny*

Martin Havel



NoAC Recon Tomo Rest

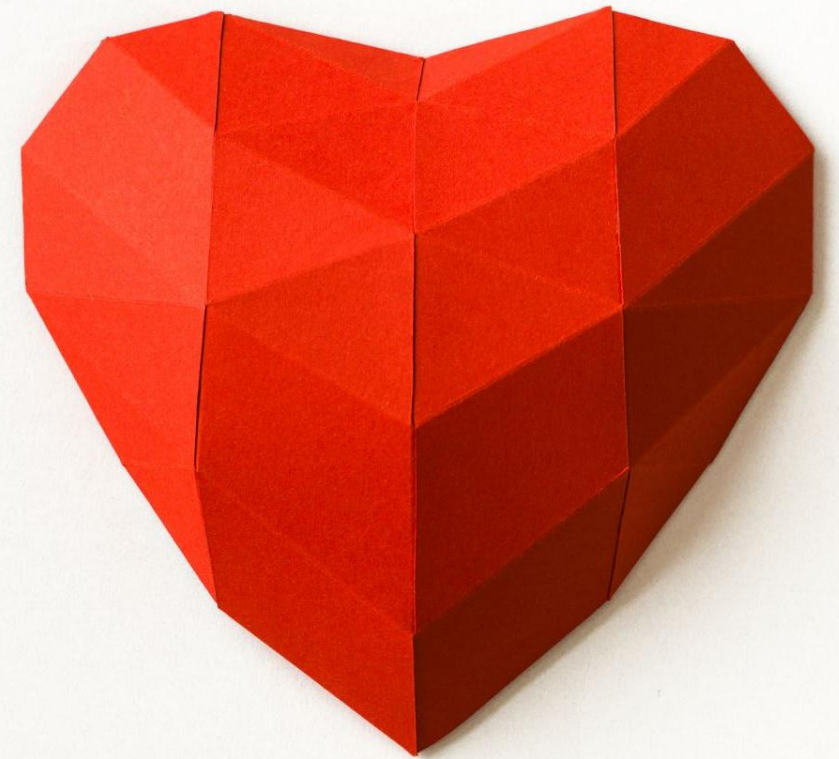


SRS



„4Is“ a PET/CT zánět – infekce – infiltrace – inerva

- Srdeční amyloidóza
- **Srdeční sarkoidóza**
- Vaskulitida velkých cév
- Infekční endokarditida
- Infekce implantovaného srdečního přístroje
- Infekce cévních náhrad
- dysfunkce srdeční inervace

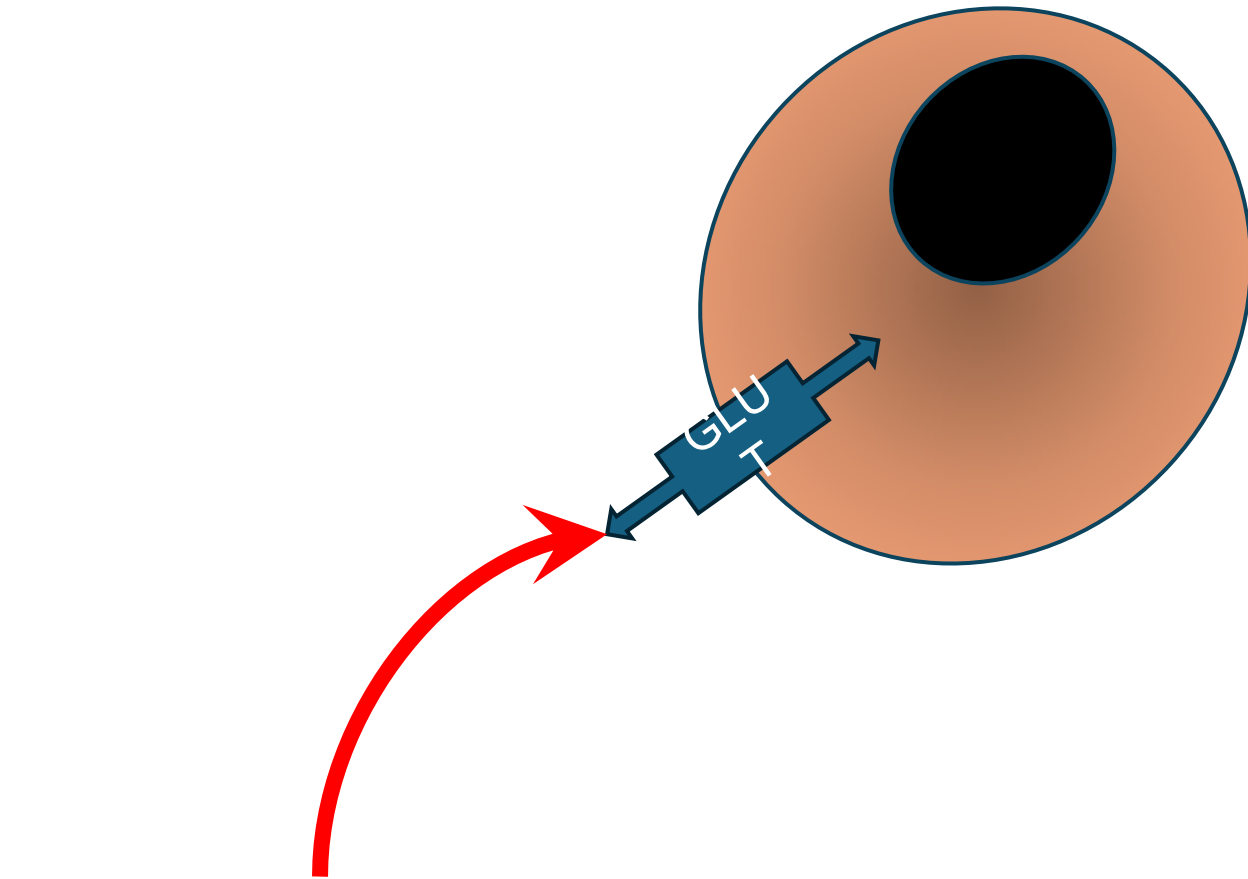



Myokarditida

^{18}F -FDG PET/CT

- Srdeční sarkoidóza
- Myokarditida při imunoterapii checkpoint inhibitory (ICI)
- Eosinofilní myokarditida
- Giant-cell myokarditida
- Virová myokarditida
- Bakteriální myokarditida

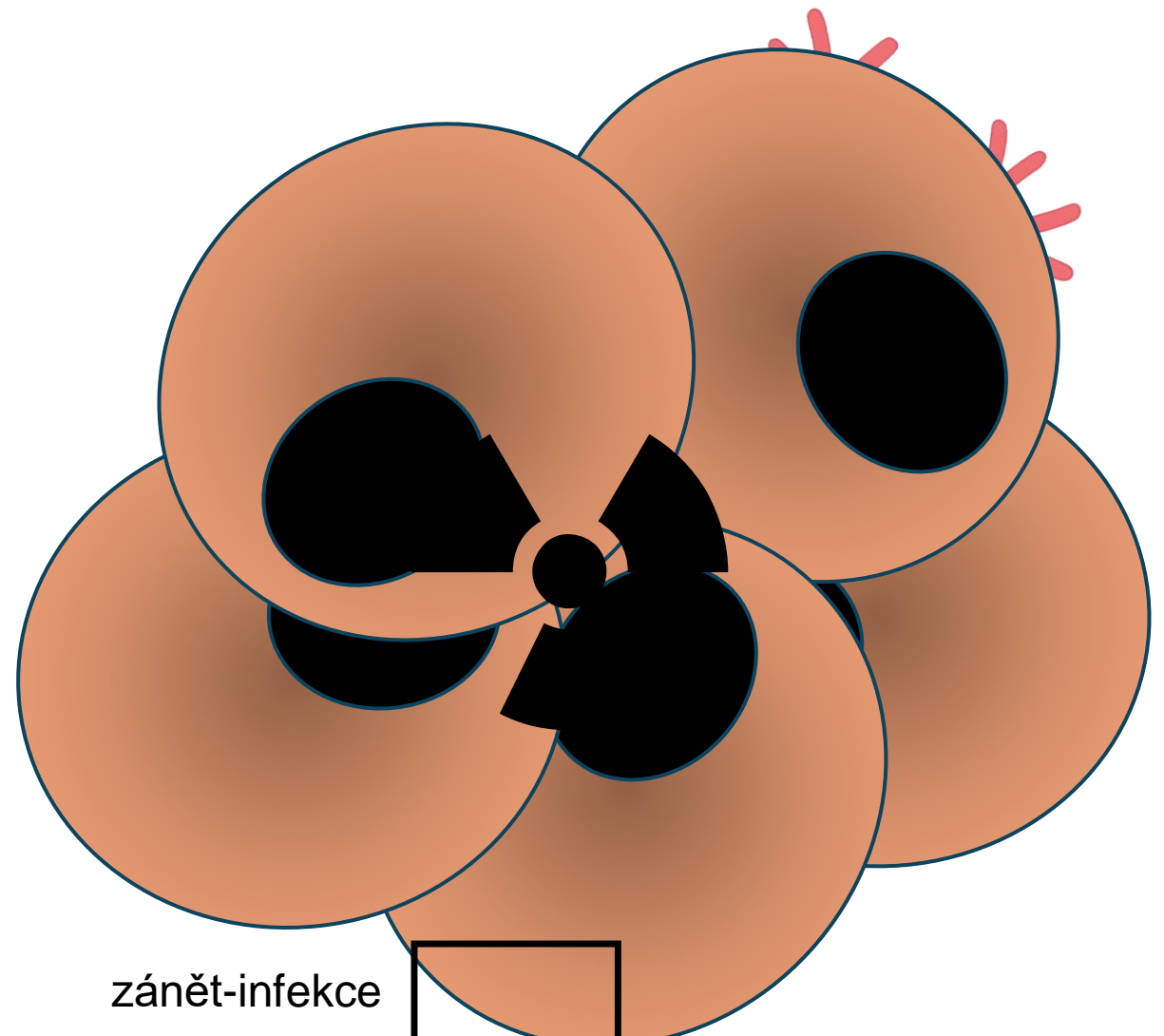
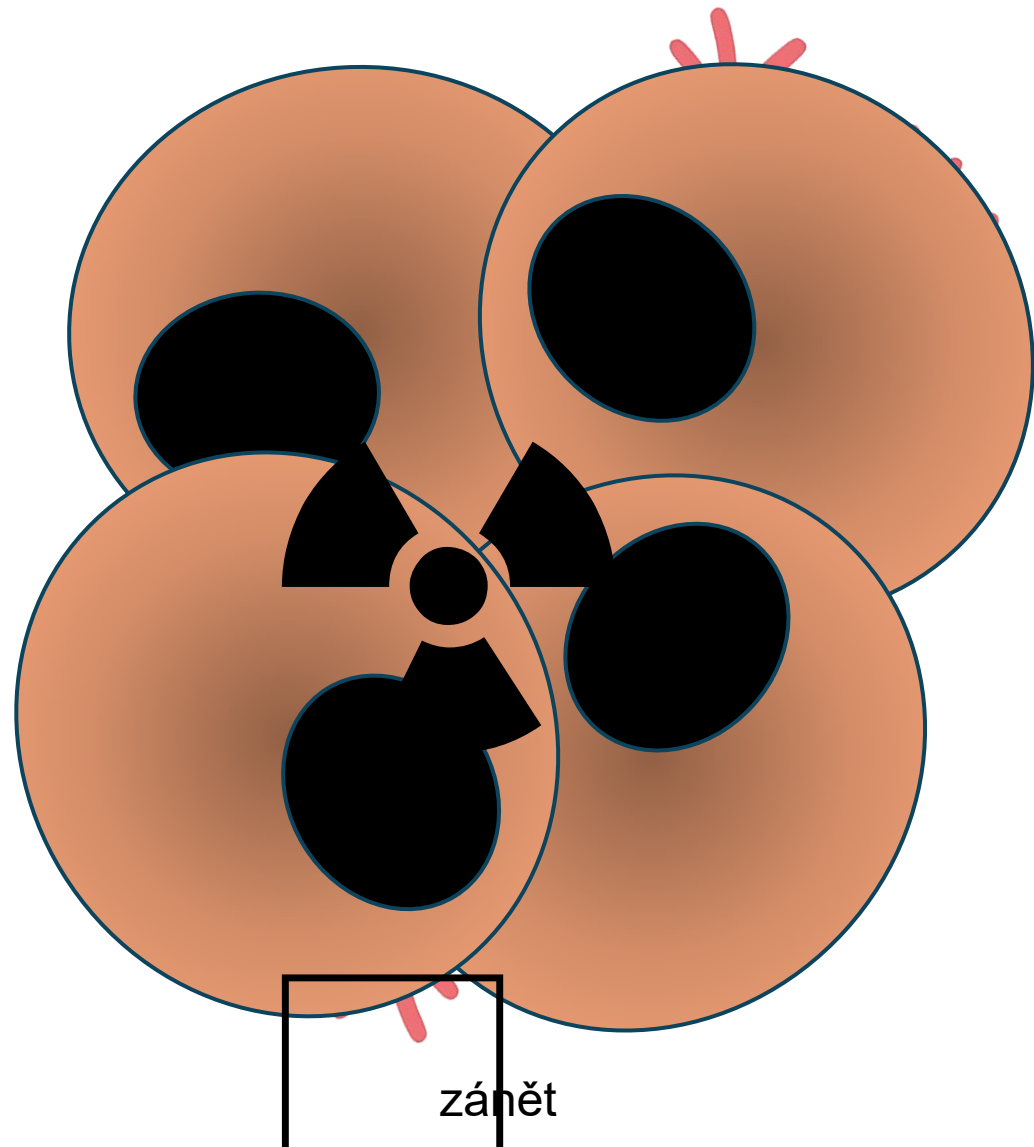


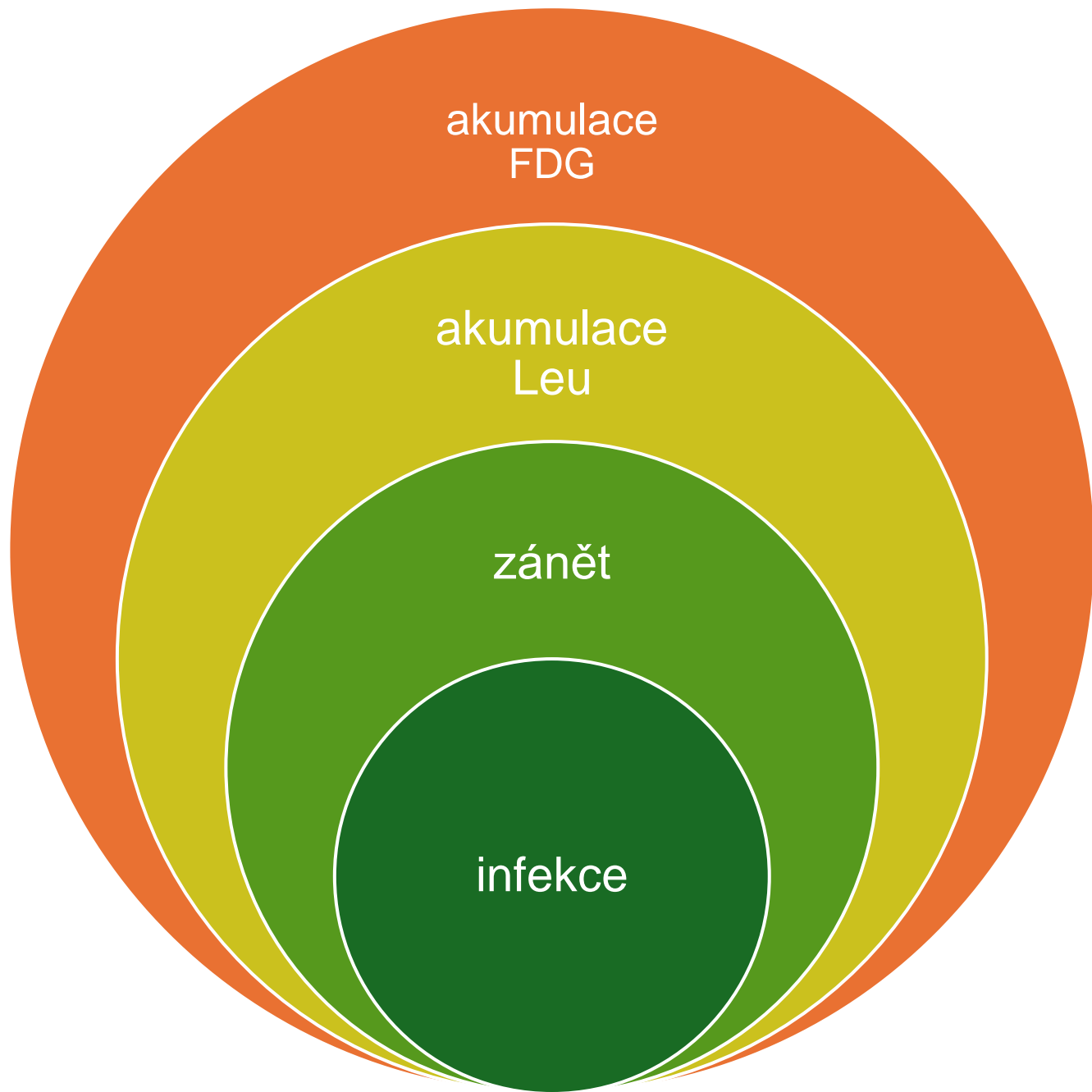


 $^{18}\text{F}-$

FDG

Myokarditida



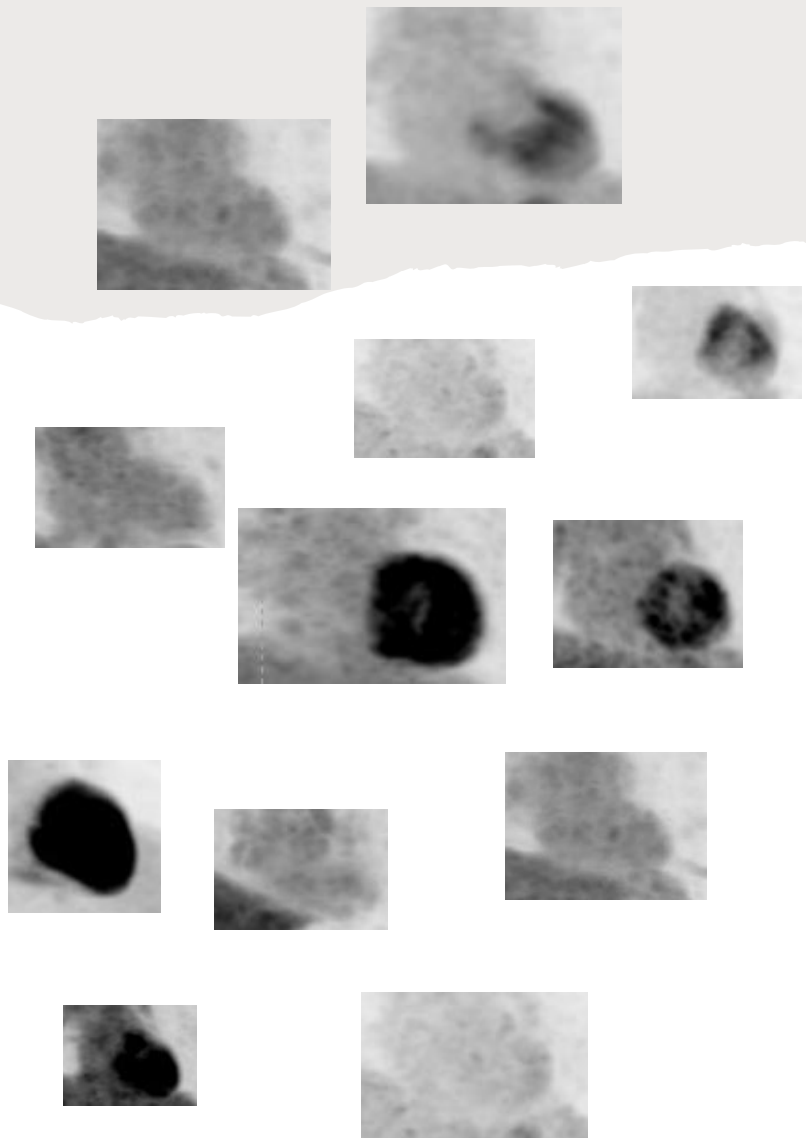


akumulace
FDG

akumulace
Leu

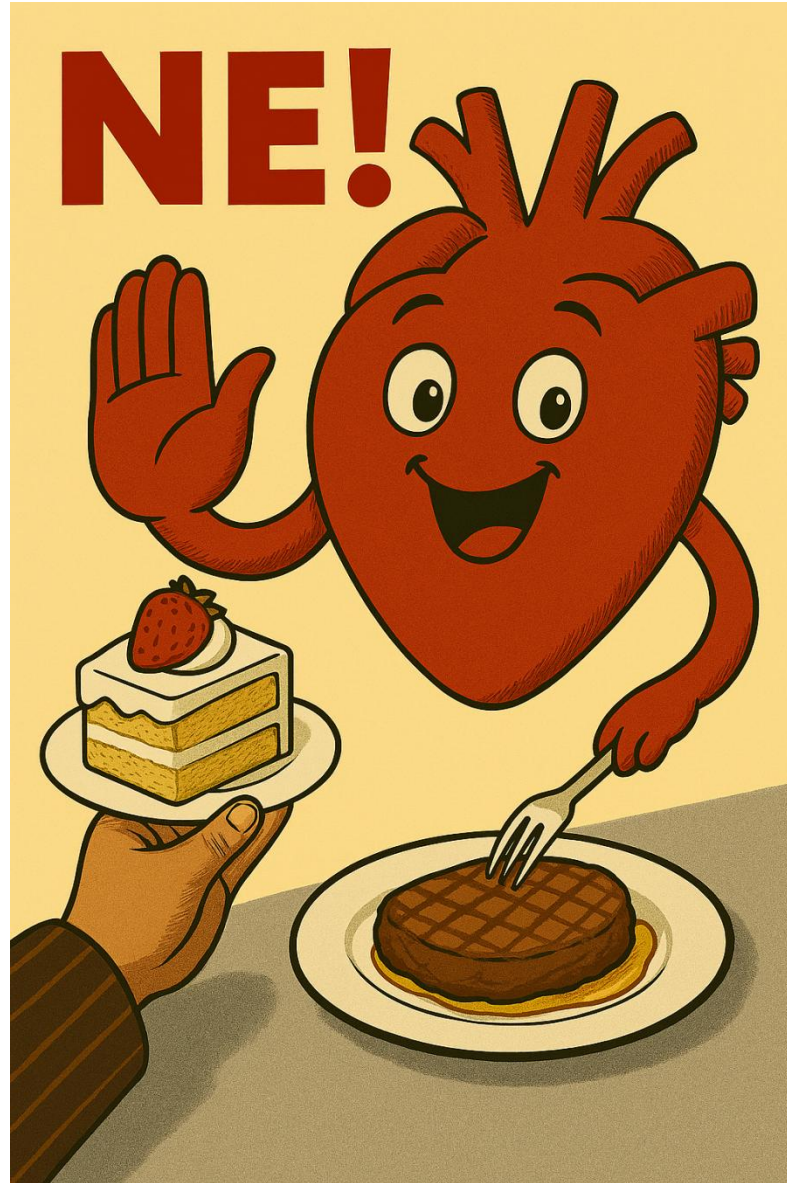
zánět

infekce



Aktivita
procesu

Aktivita
pozadí



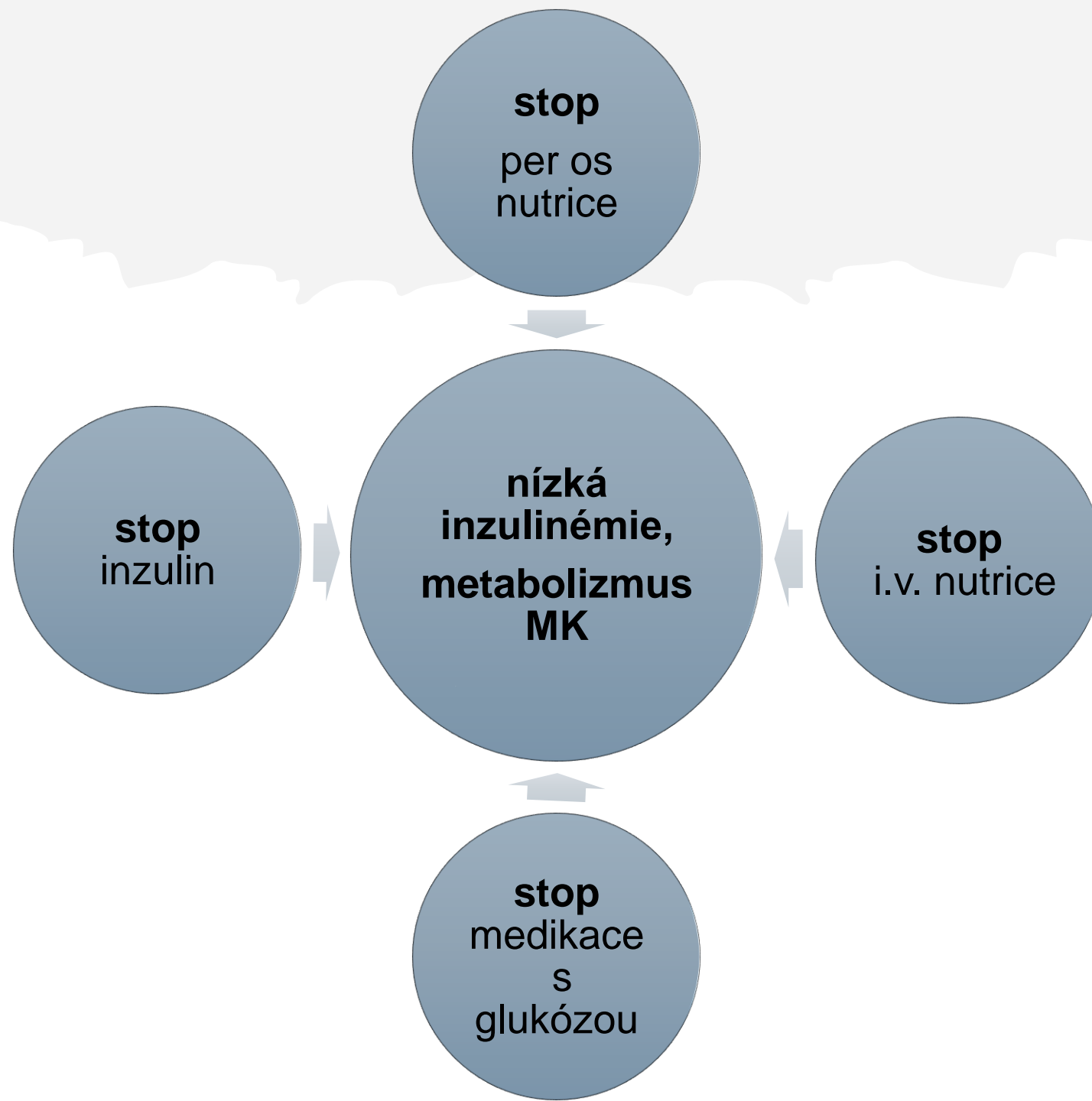
Dieta HFLC / VLCHF

48 – 24 hodin



Kategorie	Povolené potraviny (Vysoký tuk, protein)	Zakázané potraviny (Sacharidy, cukry)
Maso a ryby	Slanina, hovězí steak, kuřecí maso s kůží, losos, vejce připravená na másle/oleji	Obalované maso, uzeniny s přidaným cukrem, maso s marinádou
Tuky a oleje	Olivový olej, máslo, živočišný tuk (sádlo), avokádo	Majonézy a dresinky s cukrem, rostlinné pomazánky
Zelenina	Brokolice, květák, špenát, chřest, cuketa, okurka (omezené množství)	Brambory, luštěniny, hrášek, mrkev, kukuřice
Mléčné výrobky	Plnotučné sýry (omezeně, do 60 g denně)	Mléko, jogurty, pudinky, zmrzlina
Nápoje	Čistá voda, neslazená perlivá voda	Ovocné džusy, káva, čaj, alkohol, slazené limonády
Ostatní	Ořechy (vlašské, pekanové – v malém množství)	Ovoce, pečivo, těstoviny, rýže, sladkosti

Lačnění 12 (18h)

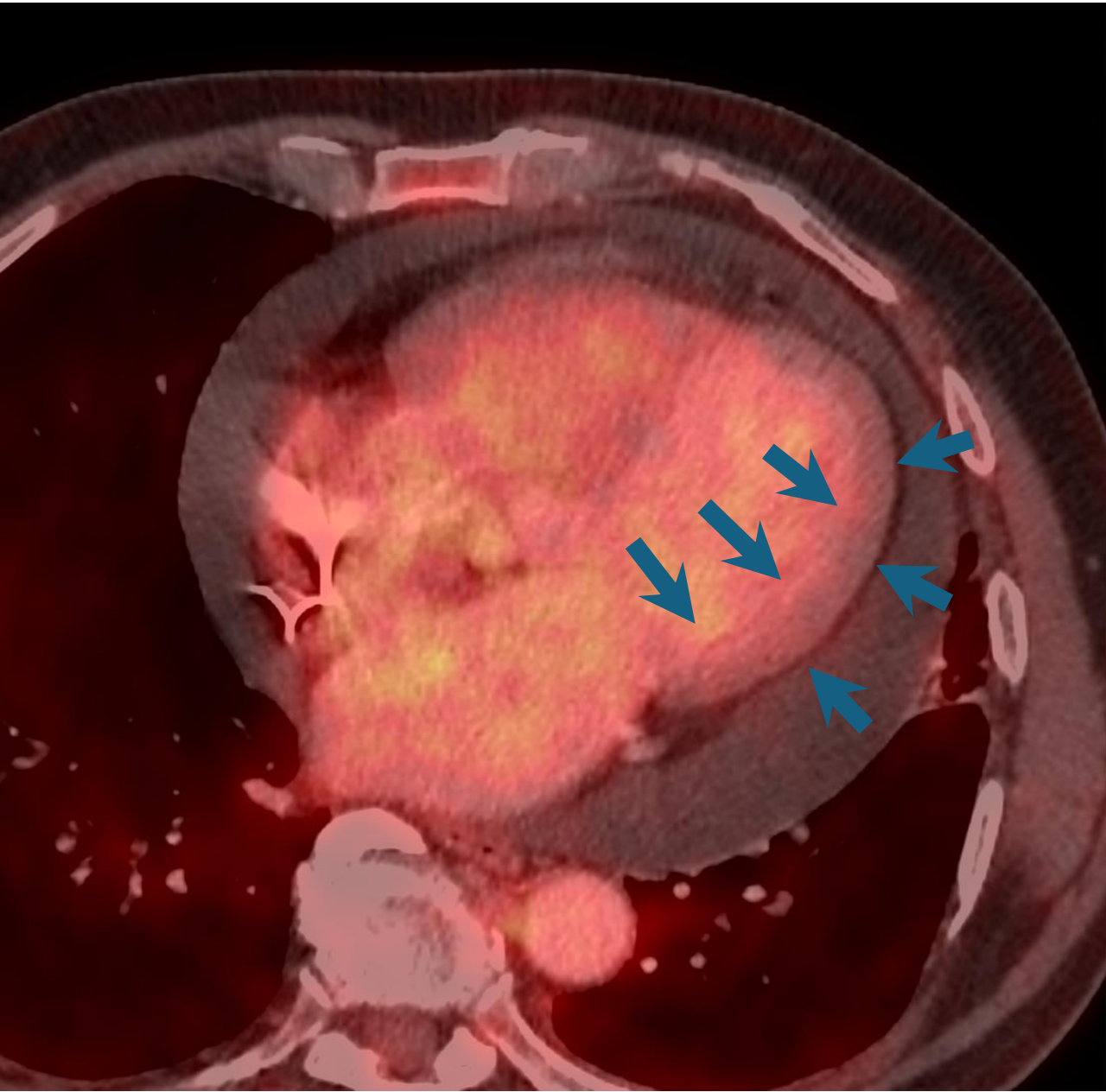


Nefrakcionovaný heparin

- aktivace lipoproteinové lipázy
- 50 IU/kg i.v.
- 15 minut před aplikací FDG
- potlačení vychytávání FDG v myokardu

- není součástí guidelines





Recommendation Table 5 — Recommendations for nuclear medicine (see Evidence Table 5)

Recommendations	Class ^a	Level ^b
Carb-free ¹⁸ F-FDG-PET or <u>¹⁸F-FDG-PET/CT should be considered</u> for the diagnostic work-up in patients with suspected myocarditis and/or pericarditis in whom echocardiography and CMR are inconclusive for the clinical diagnosis. ^{201,206}	IIa	C

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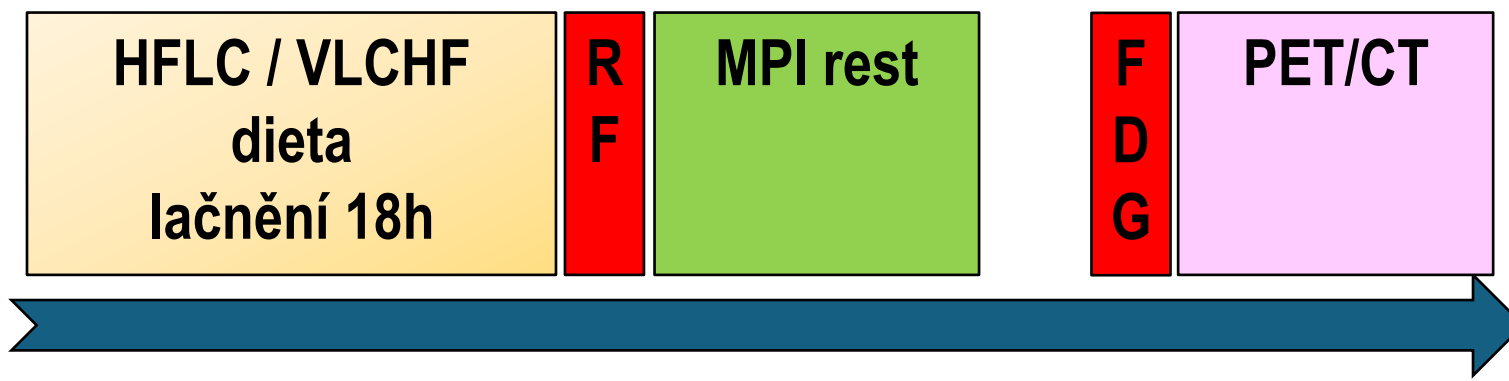
Recommendation Table 17 — Recommendations for myocarditis in sarcoidosis (see Evidence Table 17)

Recommendations	Class ^a	Level ^b
Diagnosis		
CMR, using tissue characterization techniques, is recommended in patients with suspected CS to assess cardiac inflammation and myocardial involvement. ^{408,421–425}	I	B
<u>¹⁸F-FDG-PET is recommended</u> for the diagnostic work-up, including detection of inflammation, as well as for follow-up and assessment of therapeutic response in patients with CS. ^{426–428}	I	B

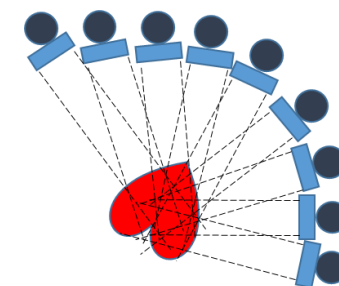
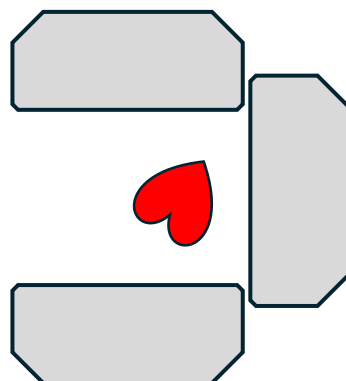
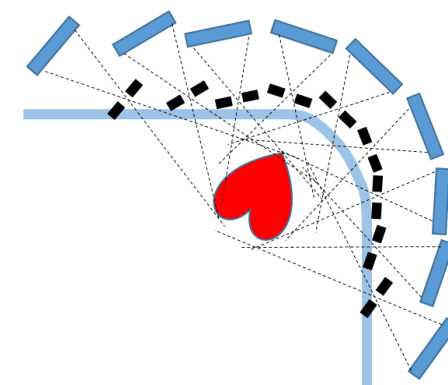
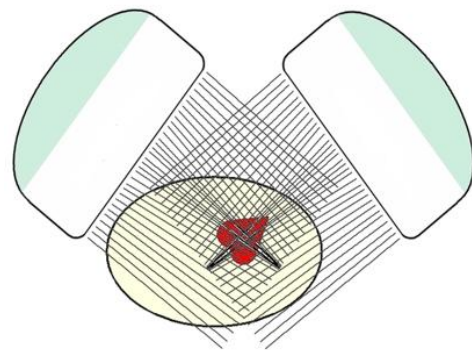
Eur Heart J. 2025;46(40):3952-4041.

Srdeční sarkoidóza

- kombinace MPI SPECT a FDG PET
 - perfuzní defekt – komprese mikrocirkulace / jizva
 - akumulace FDG - v zánětlivých infiltrátech (aktivní zánět)
 - hodnocení aktivity procesu i v dalších lokalizacích
- jednodenní protokol



Dedikované zobrazovací systémy pro MPI SPECT



FDG PET/CT



časové
rozlišení



prostorové
rozlišení

FDG PET/CT

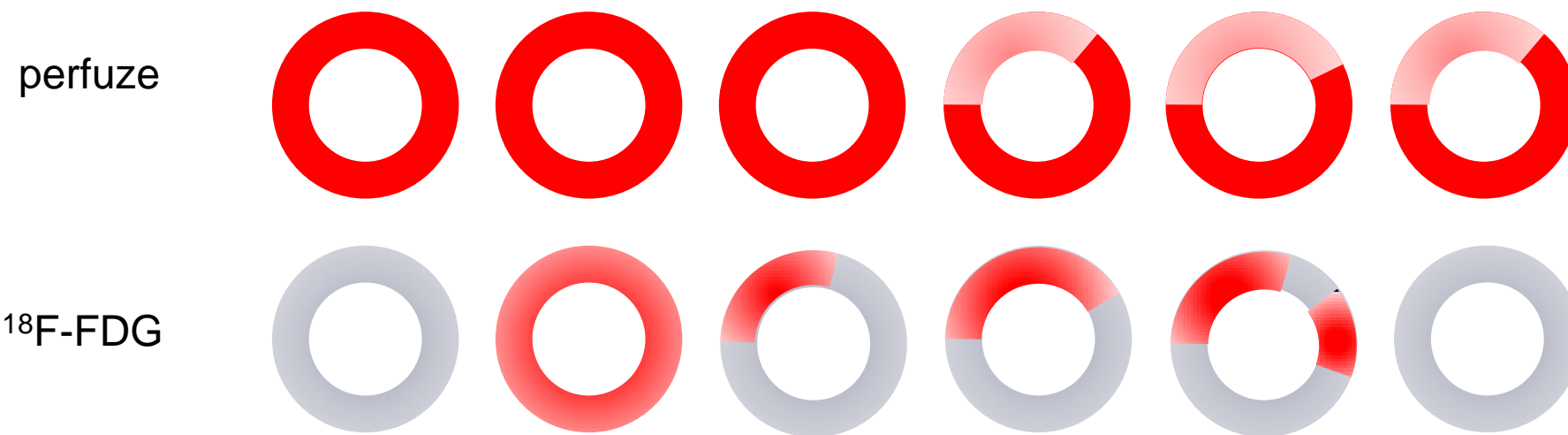


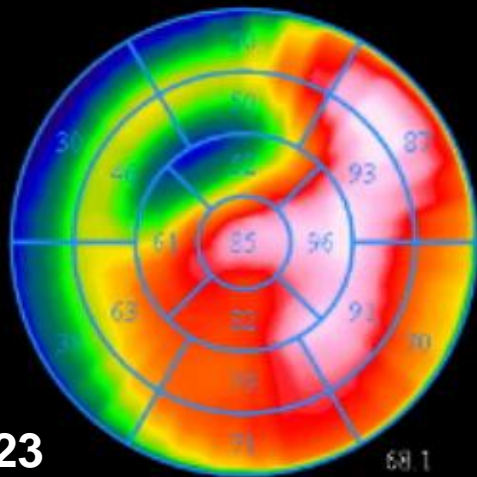
granulomy

fibróza



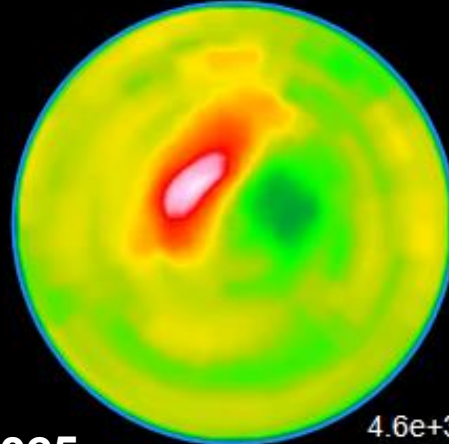
Srdeční sarkoidóza





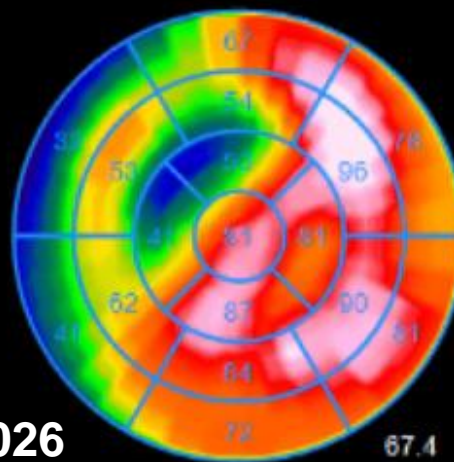
9/2023

68.1



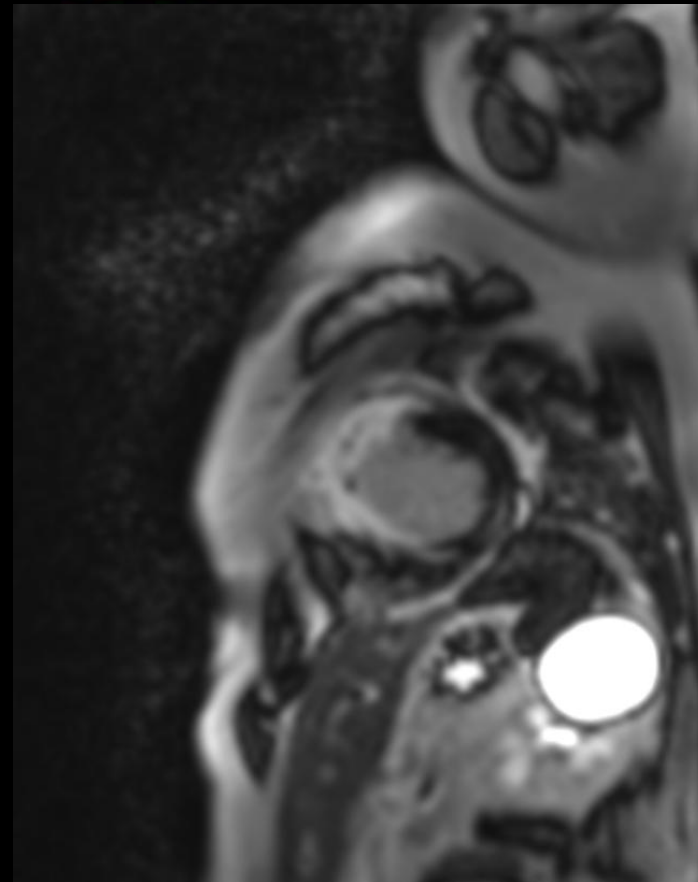
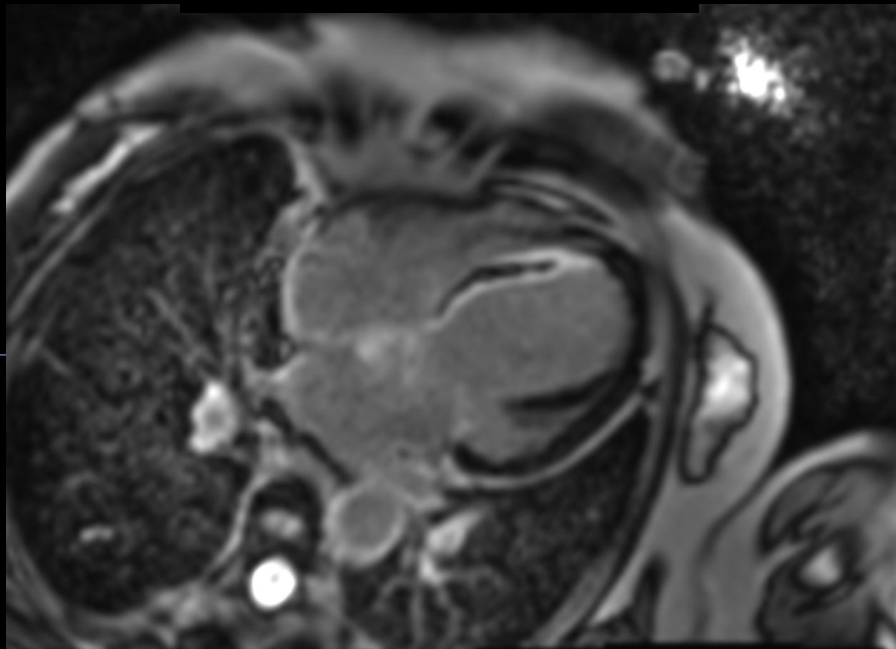
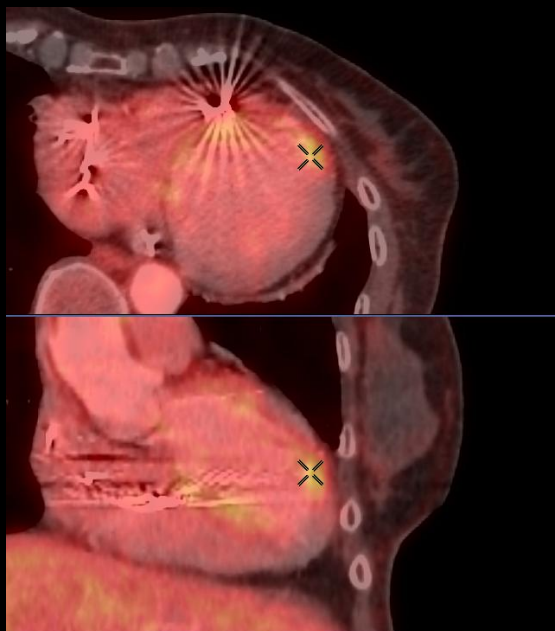
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4.6e+3



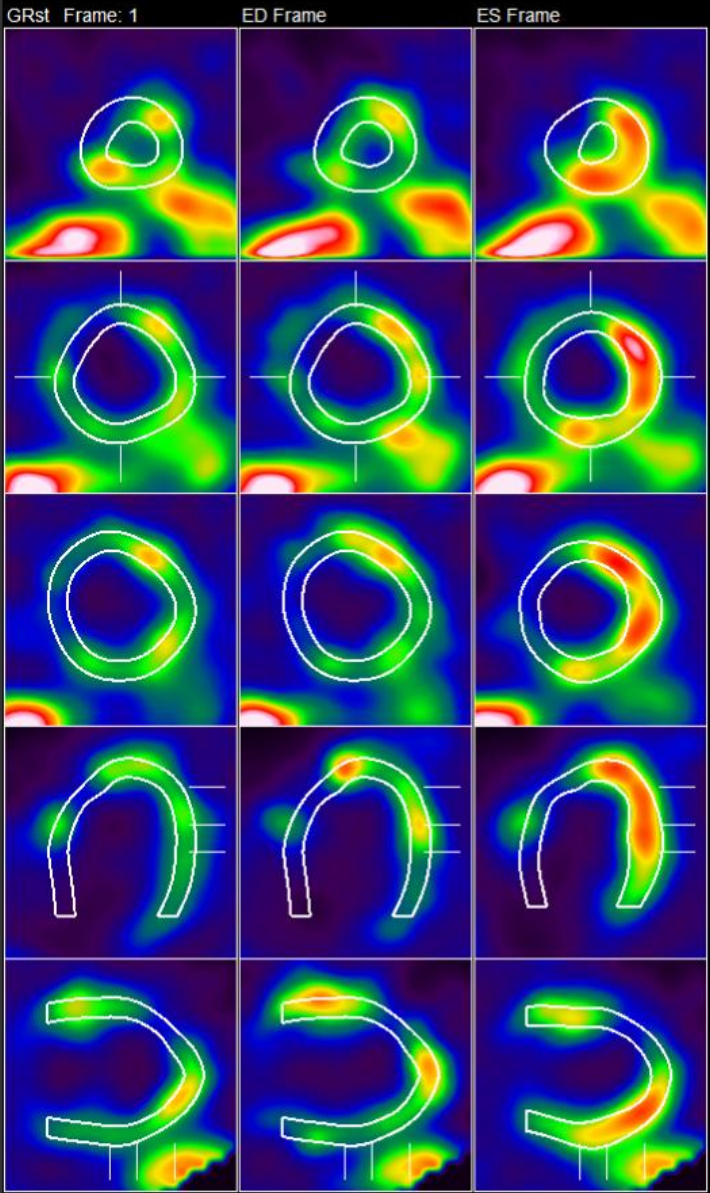
2/2026

67.4

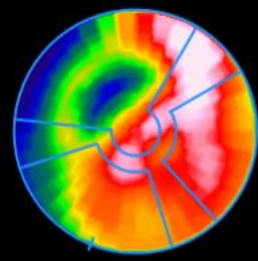


KNM FNO a VN Agel

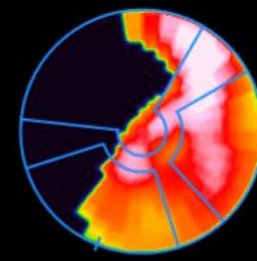
NoAC Recon Gated Tomo...
 19-Jun-2025 09:22:19
 8 Fr, Supine, IR:3D
 9.1 mCi Tc-99m Tetrofosmin
 EDV: 128 ml (80 ml/m²)
 ESV: 92 ml (57 ml/m²)
 EF: 28%
 Mass: 145 g, CO: 2.4 l/min
 UgVol: 101 ml, TID: --
 SRS: 21
 V-Flash3D/TCNC/F



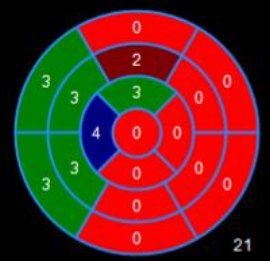
NoAC Recon Gated Tomo Rest



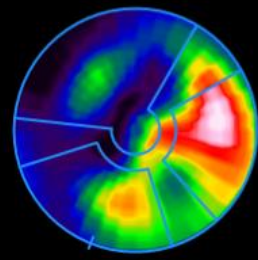
Blackout Perfusion



SRS



Wall Thickening



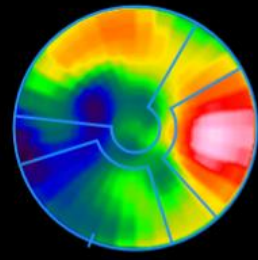
Blackout WT



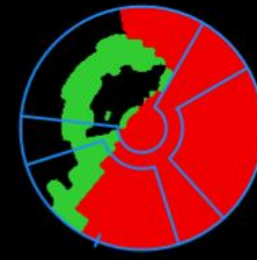
STS



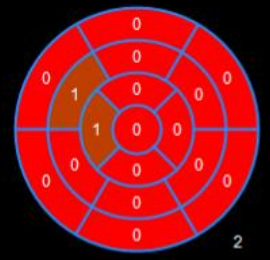
Wall Motion



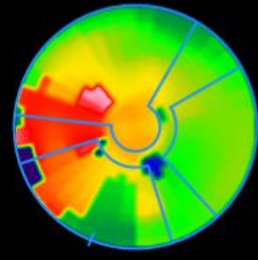
Derived



VS

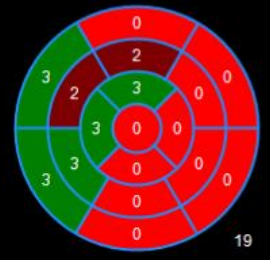


Contractility



Region	Normal	Viable	Scar
LAD	31%	29%	40%
LCX	100%	0%	0%
RCA	67%	24%	9%
TOT	61%	19%	20%

SS

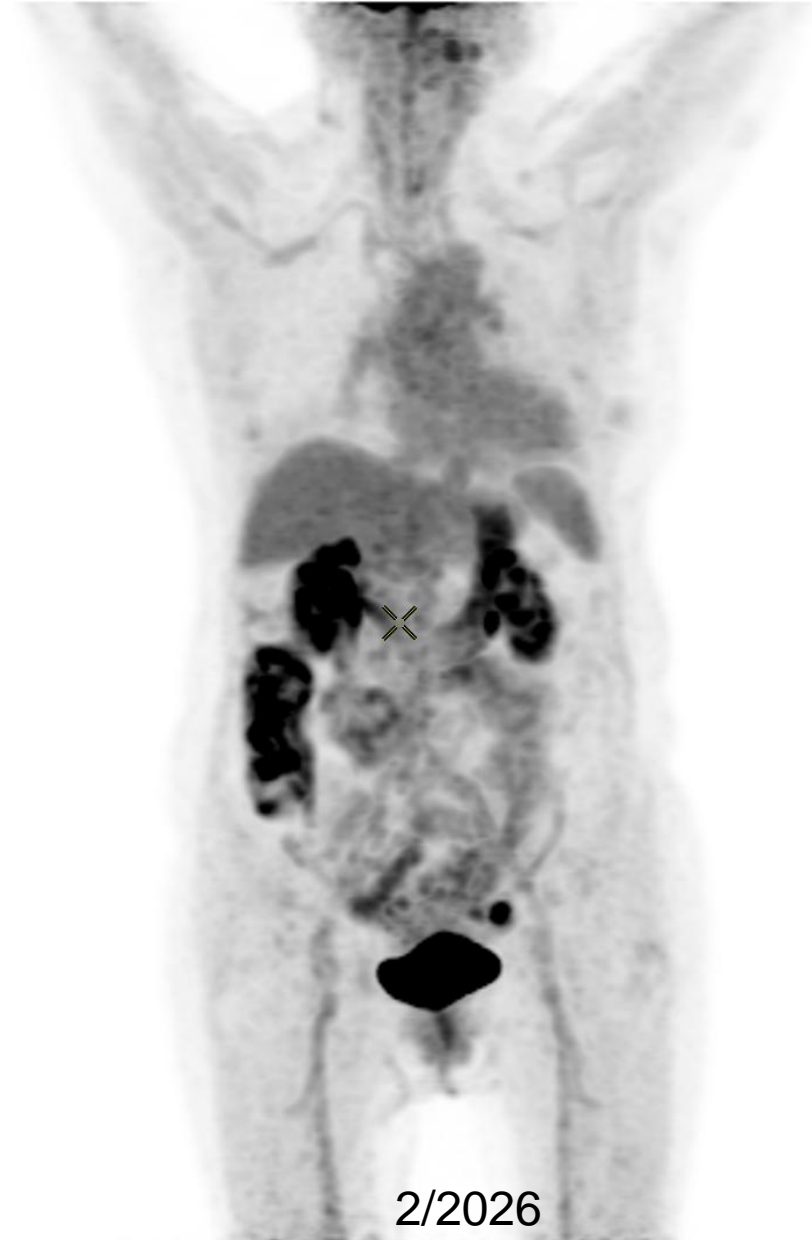
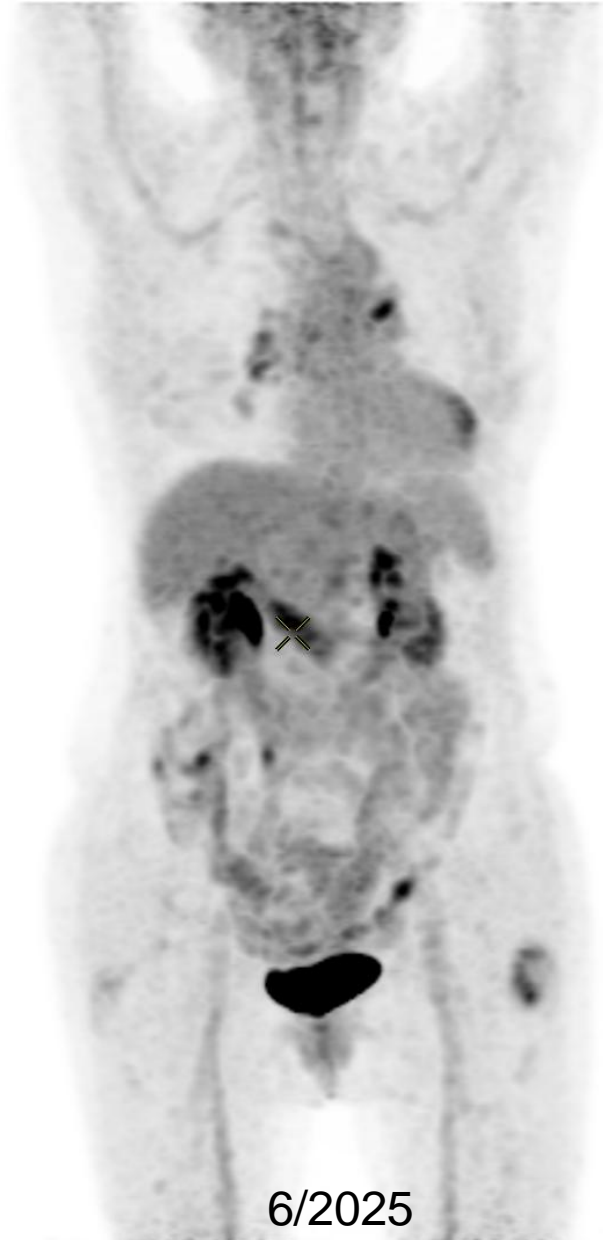
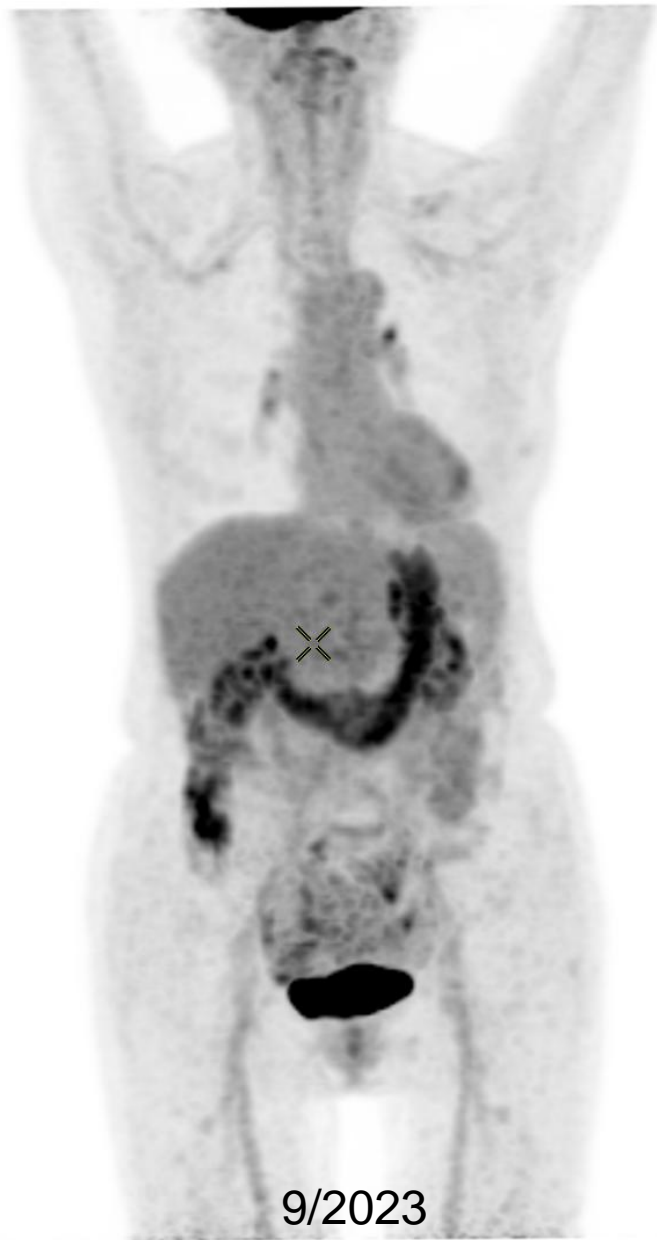


21

26

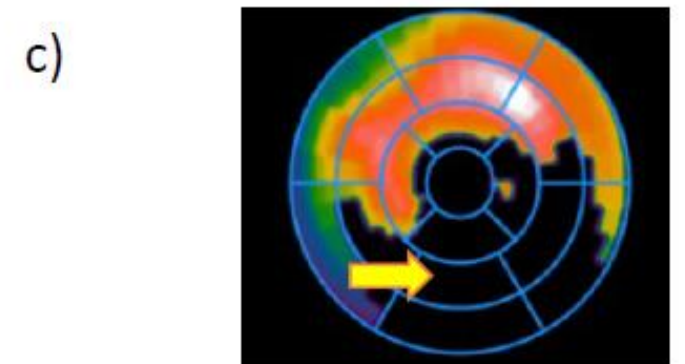
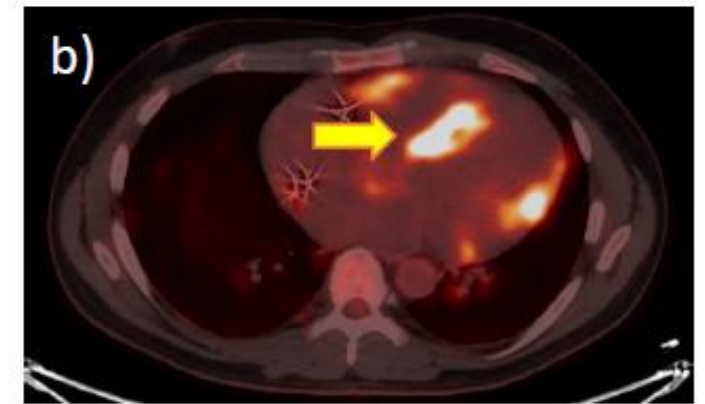
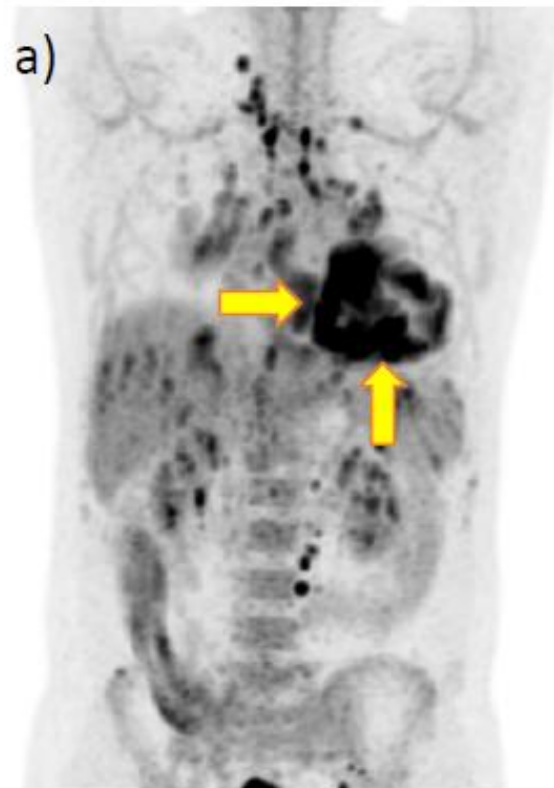
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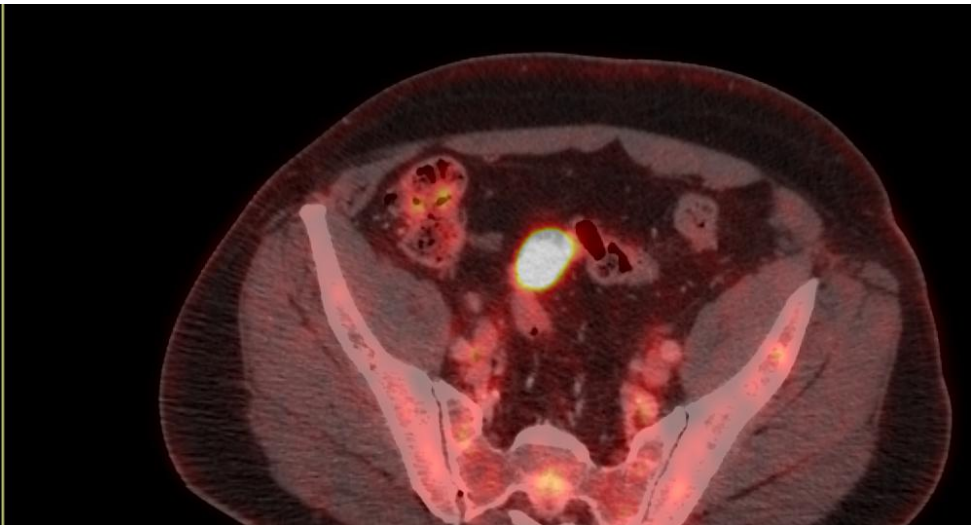
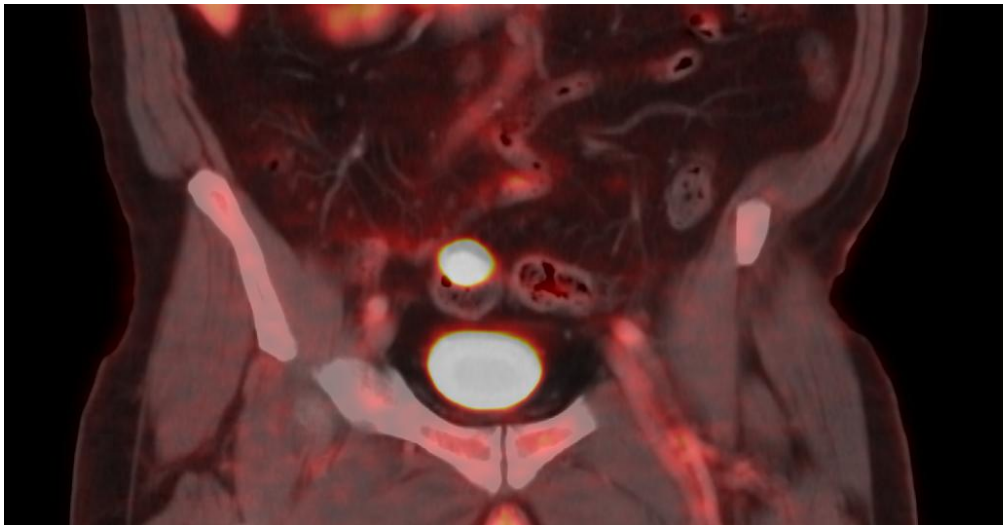
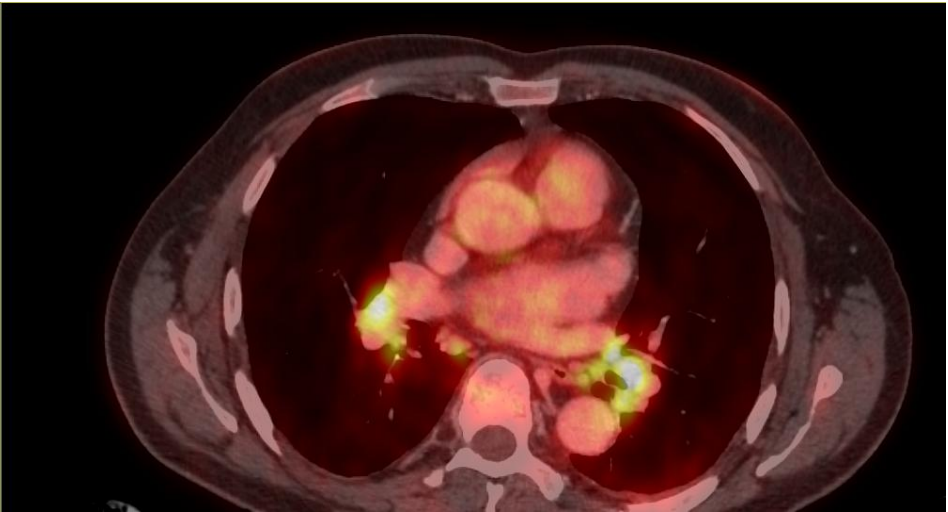
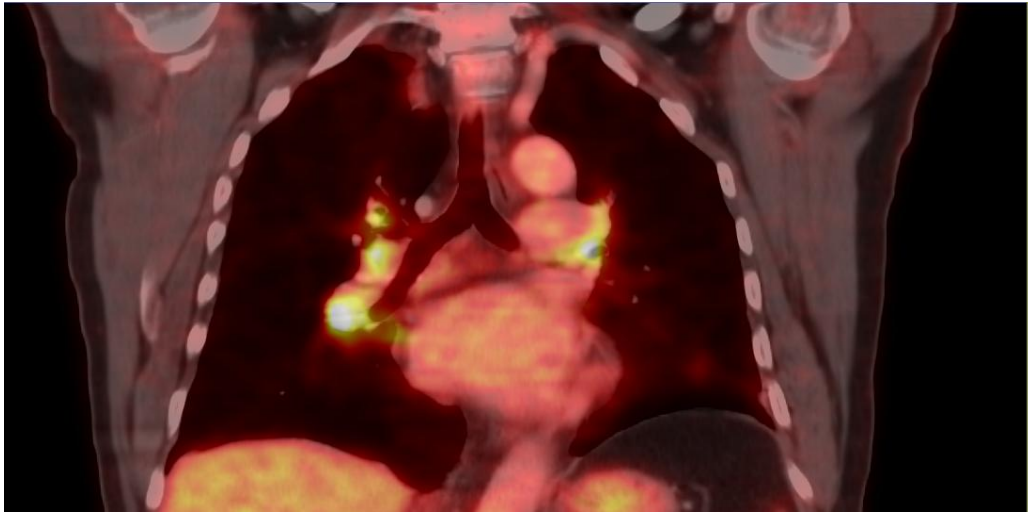
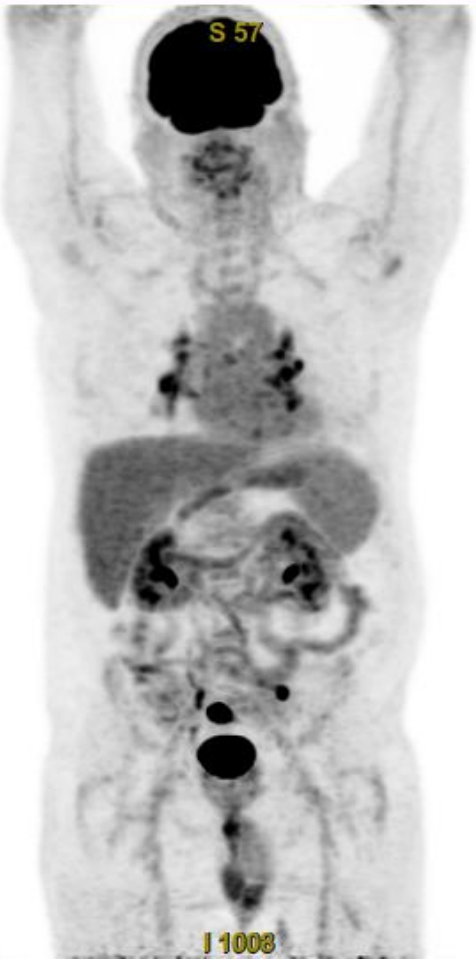
19



Srdeční sarkoidóza

- postižení srdce
- extrakardiální postižení





KNM FNO

Myokarditida

^{18}F -FDG

^{18}F -FAPI

- zobrazení aktivní fibrotizace

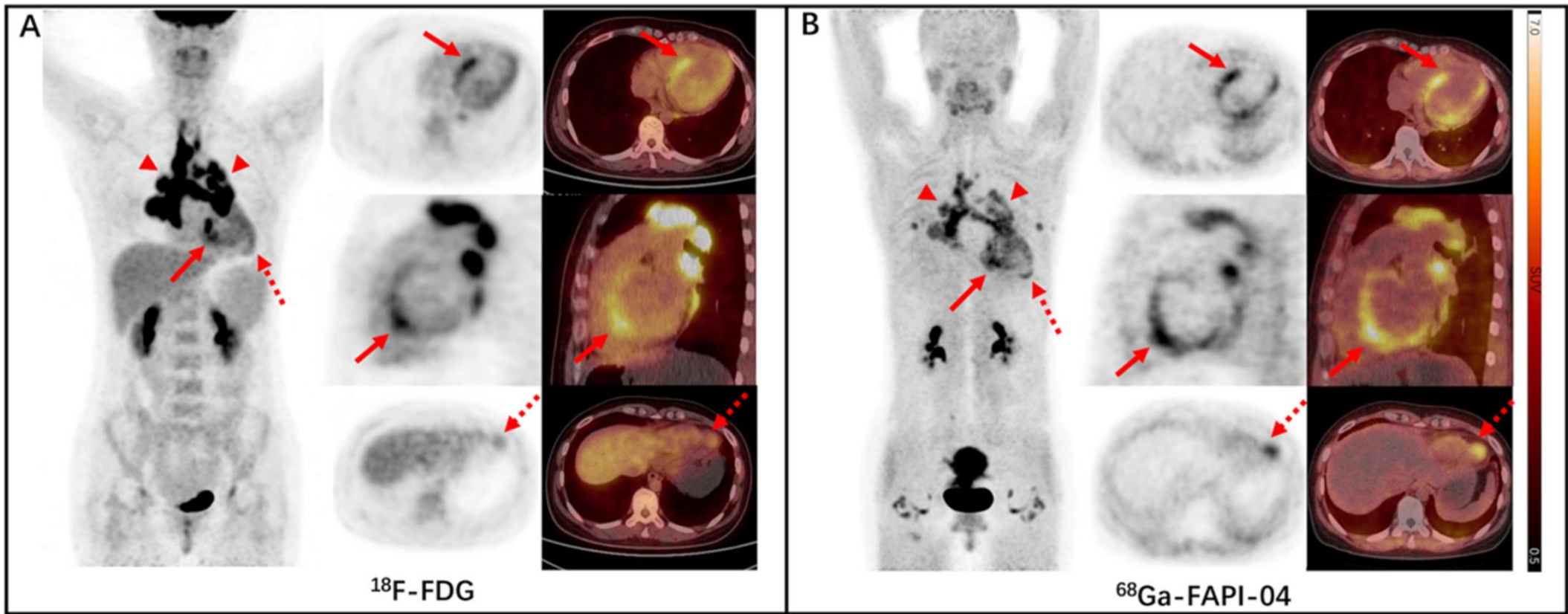
^{68}Ga -DOTA-TOC

- SSTR na aktivovaných makrofázích, zobrazení granulomů

^{68}Ga -Pentixafor

- CXCR4 chemokinový receptor, migrace buněk zánětu

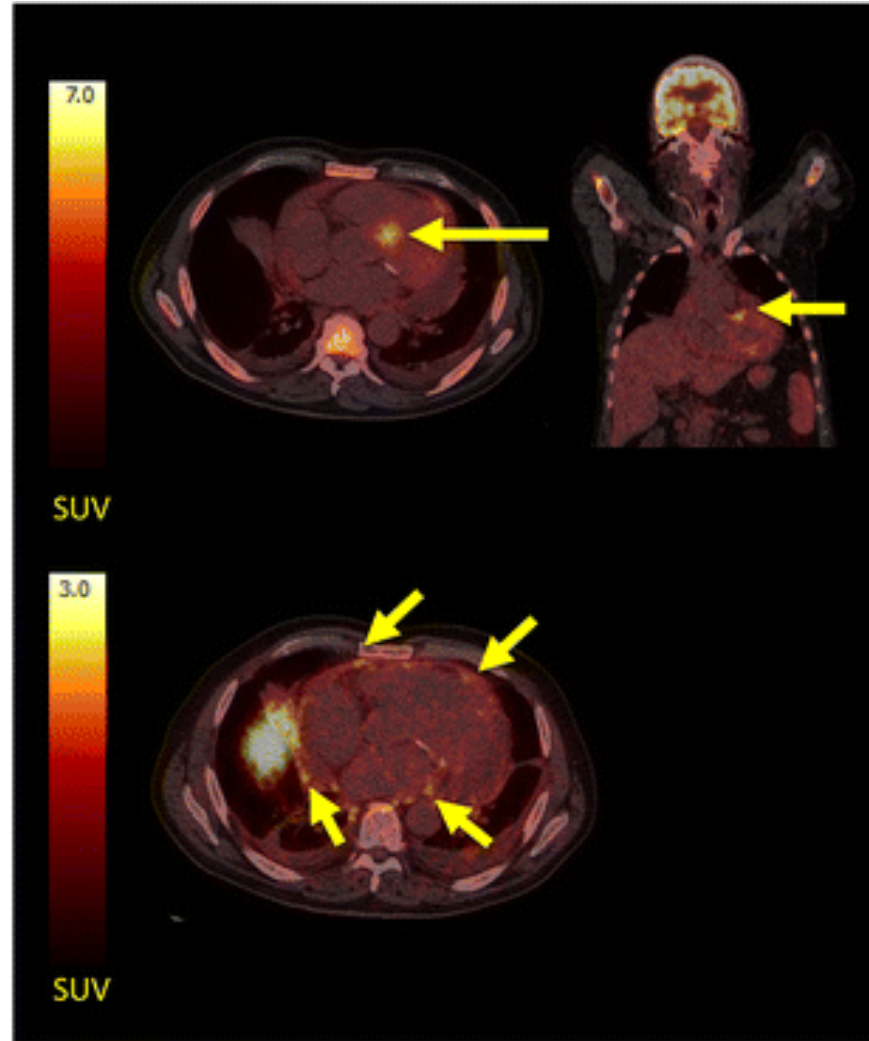




^{18}F -FDG



^{68}Ga -DOTANOC





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