

# LEVOSTRANNÁ KONTRASTNÍ ECHOKARDIOGRAFIE .....U ZÁTĚŽOVÉ ECHOKARDIOGRAFIE

Karel Mědílek

I. Interní kardiologická klinika FN

Lékařská fakulta UK

Hradec Králové

Oblastní nemocnice Jičín, a.s.

16.5.2016



Nemocnice  
Jičín

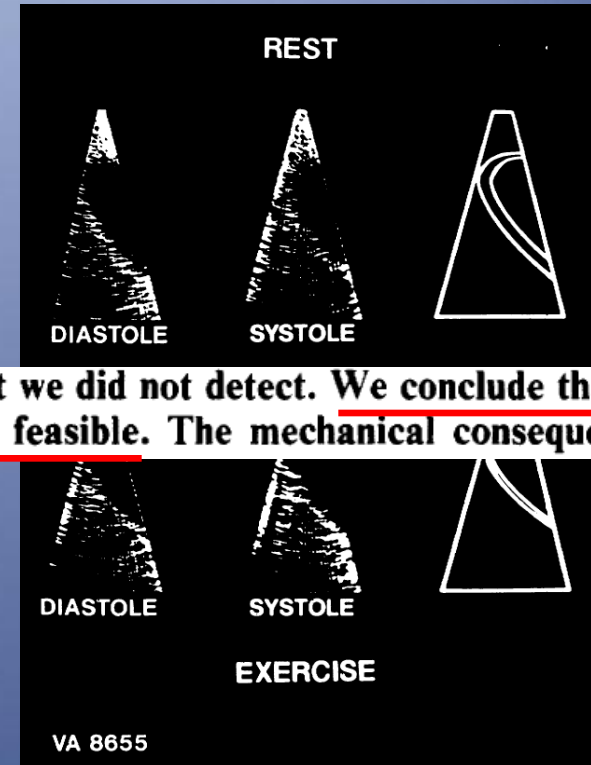
„Kvalita a lidskost“



# dyn. stress echo historie 2D



echocardiography probably experienced myocardial ischemia that we did not detect. We conclude that exercise cross-sectional echocardiography is technically difficult but feasible. The mechanical consequences of

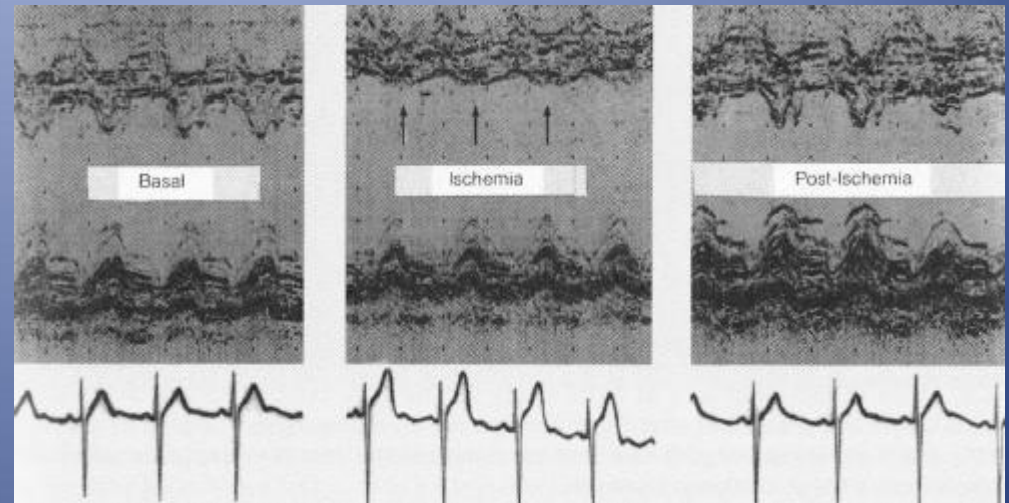


28 pac., vyšetřitelných 20 pacientů v.s. koro/SPECT  
senz. 100%  
spec. 50%

# dyn. stress echo historie

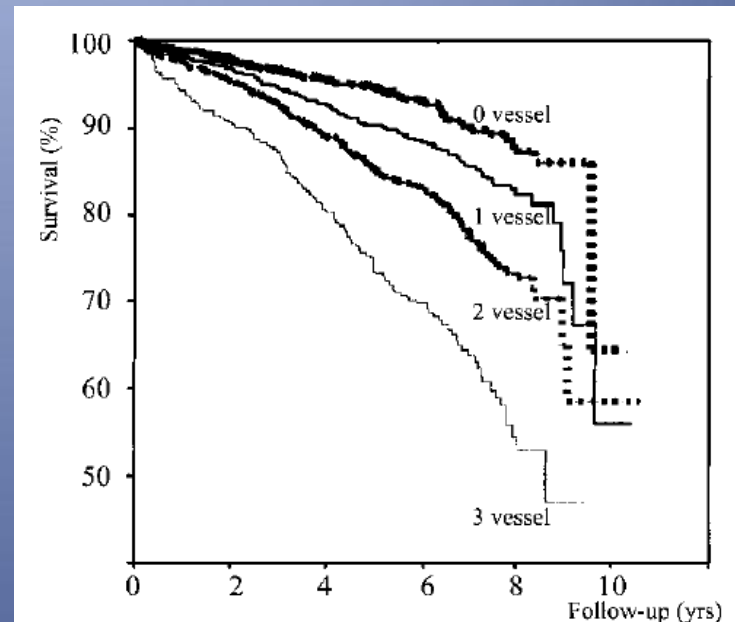
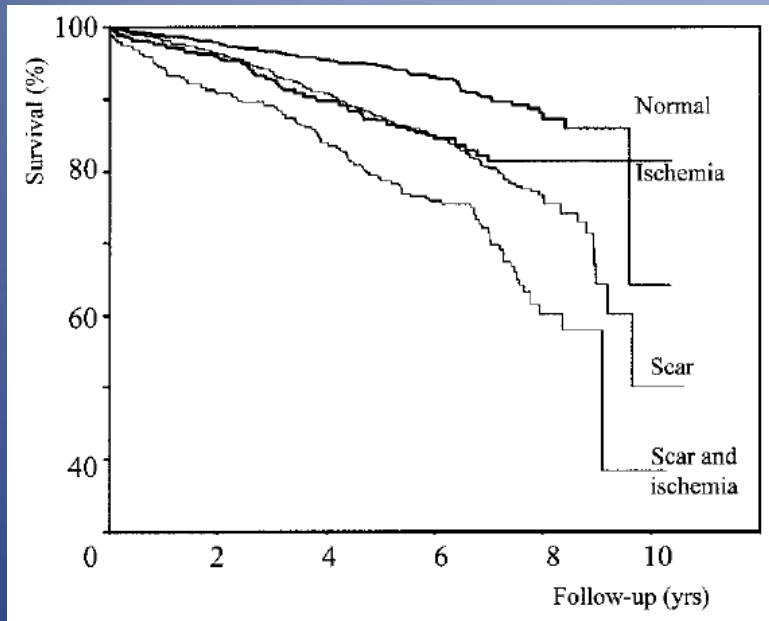
## M - mode

16 pacientů  
dynamické stress echo  
(ergometr)  
známá koronární nemoc  
M - mode, PLAX



- ↓ exkurze septa/zadní stěny ve 13 případech (senz. 81%)
- o 60s dříve než EKG změny
  - stress echo senzitivnější než zátěžové EKG

# dyn. stress echo fund. zobrazení prognóza

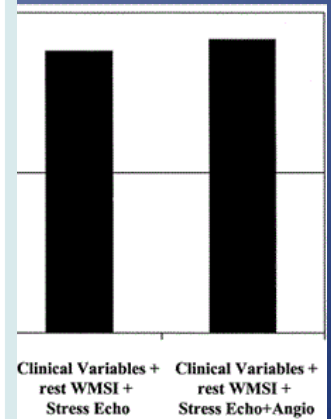
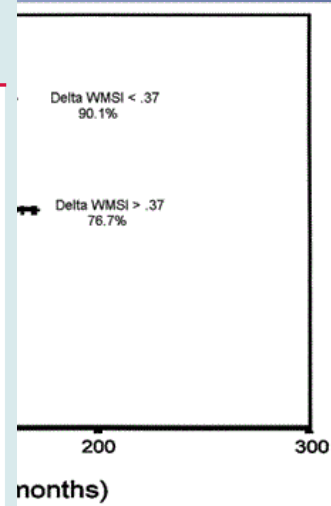
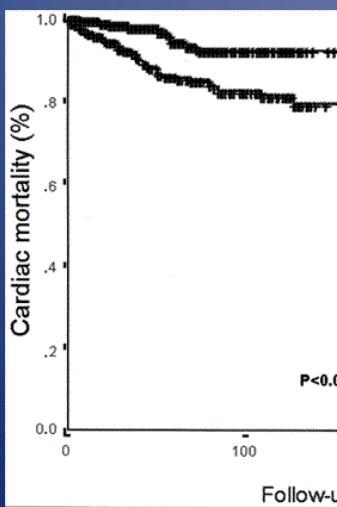
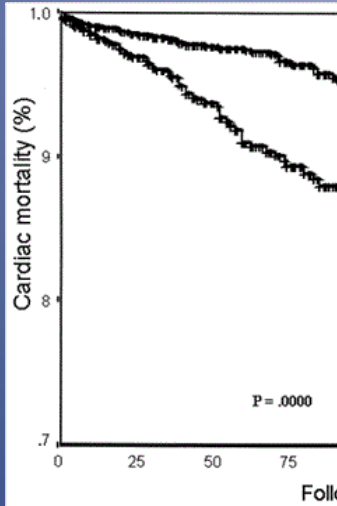


5 375 pacientů  
normální nález: mortalita 1%/rok

# farmakol. stress echo fund. zobrazení prognóza

**Table 8** Indications for revascularization in stable angina or silent ischaemia

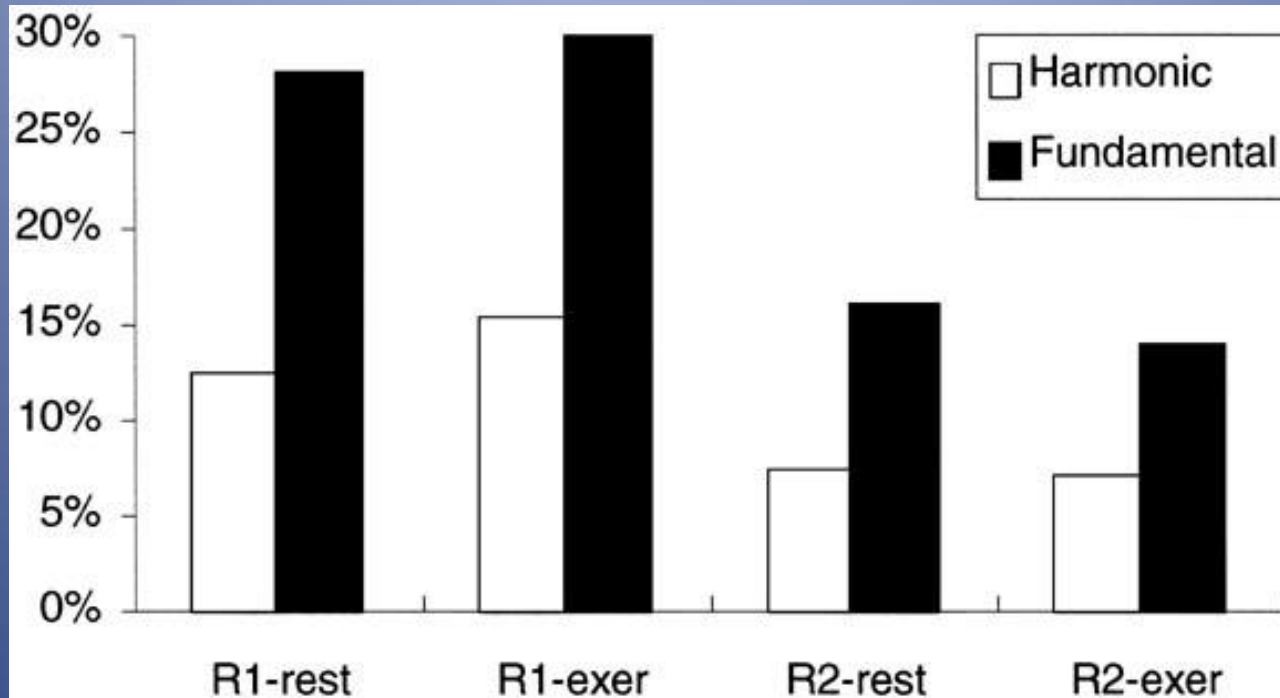
	Subset of CAD by anatomy	Class <sup>a</sup>	Level <sup>b</sup>	Ref. <sup>c</sup>
For prognosis	Left main >50% <sup>d</sup>	I	A	30, 31, 54
	Any proximal LAD >50% <sup>d</sup>	I	A	30-37
	2VD or 3VD with impaired LV function <sup>d</sup>	I	B	30-37
	Proven large area of ischaemia (>10% LV)	I	B	13, 14, 38
	Single remaining patent vessel >50% stenosis <sup>d</sup>	I	C	—
For symptoms	IVD without proximal LAD and without >10% ischaemia	III	A	39, 40, 53
	Any stenosis >50% with limiting angina or angina equivalent, unresponsive to OMT	I	A	30, 31, 39-43
	Dyspnoea/CHF and >10% LV ischaemia/viability supplied by >50% stenotic artery	IIa	B	14, 38
	No limiting symptoms with OMT	III	C	—



Sicari et al. J Am Coll Cardiol. 2003;41(4):589-595

normální stress echo - riziko IM 0,4-0,9%/rok

# dyn. stress echo harmonické zobrazení

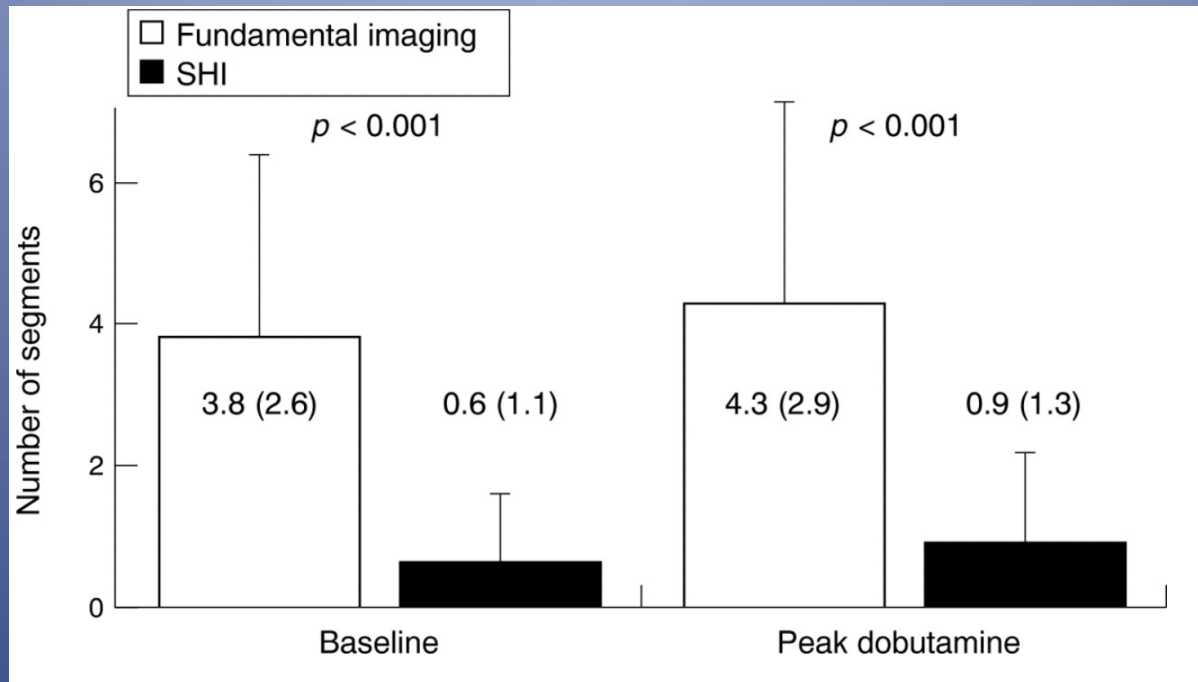


dynamické stress echo (běhátko)

40 standardní a harmonické 2D zobrazení

↓ počtu nedignostických segmentů o 50%

# DSE harmonické zobrazení



	Fundamental imaging	Second harmonic imaging	Significance
Sensitivity	64%	92%	$p < 0.001$
Specificity	75%	75%	NS
Accuracy	65%	89%	$p < 0.001$

# speciální aplikace a....

pulzní TDI

MYDISE study. Eur Heart J 2003;24:1584-1594

strain

Hanekom L et al. Circulation 2005;112:3892-3900

3D

Matsumura Y et al. Eur Heart J 2005;26:1625-1632

speckle tracking

Ishii K et al. J Am Coll Cardiol 2009;53:698-705

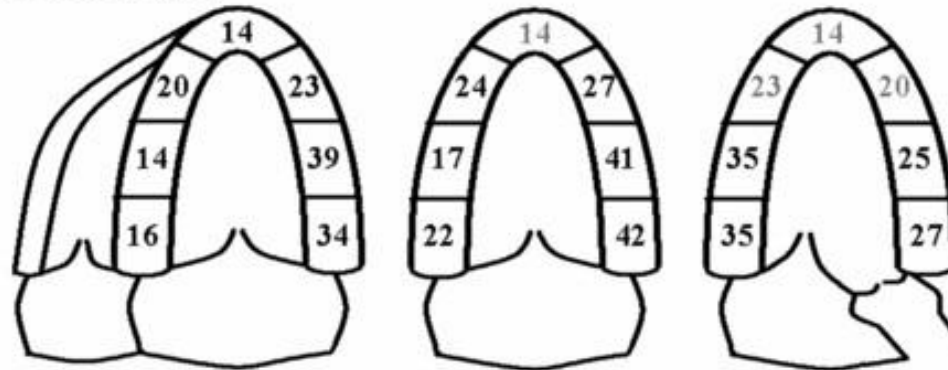
levostraná kontrastní echokardiografie (Optison, Luminiti, Sonovue)



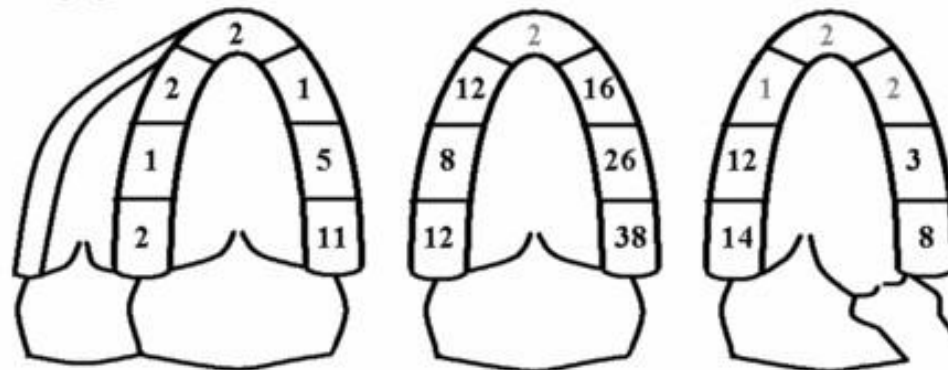


# LVO zlepšení vyšetřitelnosti

Second Harmonic Imaging



Contrast Imaging



100 pacientů, Sonos 5000/7500, harmonické zobrazení v.s. LVO  
Sonovue bolus 0,5 ml i.v. (event. + 0,25 ml)

# LVO zlepšení vyšetřitelnosti

		Observer 1			
		normal	hypokinesia	akinesia	dyskinesia
Observer 2	normal	644	143	0	0
	hypokinesia	176	549	23	0
	akinesia	1	57	99	1
	dyskinesia	0	0	0	7

Segmental Agreement = 0.76 Kappa value = 0.59

		Observer 1			
		normal	hypokinesia	akinesia	dyskinesia
Observer 2	normal	831	66	0	0
	hypokinesia	82	557	21	0
	akinesia	2	34	98	3
	dyskinesia	0	1	0	5

Segmental Agreement = 0.88 Kappa value = 0.78

zlepšení shody u hůře, středně i dobře zobrazitelných segmentů  
zlepšení variability u kalkulace EF: inter - observer 17% v.s. 7%  
intra - observer 12% v.s. 7%

# LVO zlepšení vyšetřitelnosti

209 pacientů, Ø BMI 39,3  
Sonovue bolus 0,2-0,4 ml  
Philips iE 33 MI < 0,3

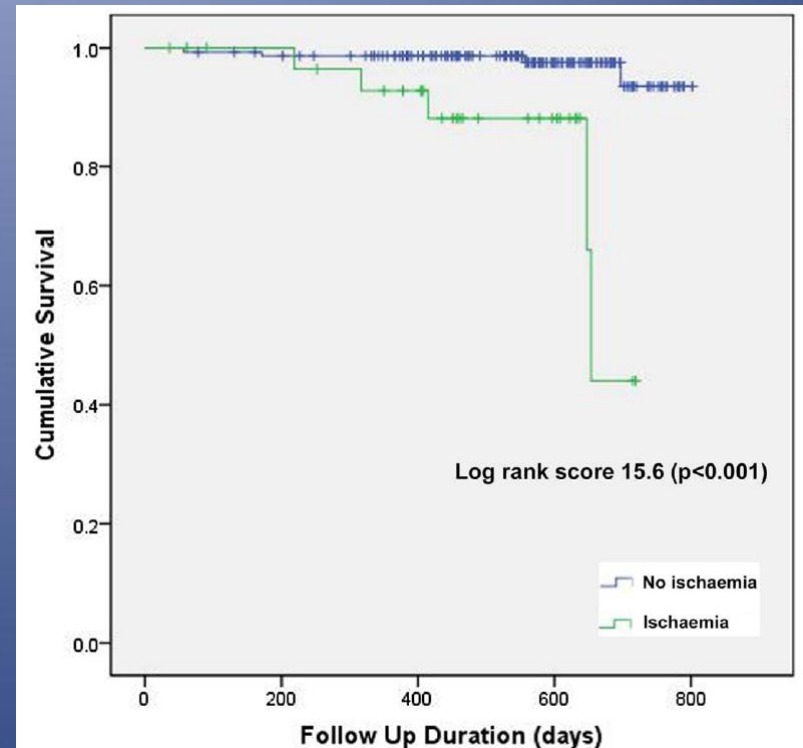
běhátko v 38%  
kontrast u 200 pacientů  
test diagnostický v 96%

**Table 3** Stress echocardiography feasibility and segment visualisation categorised by grade of obesity

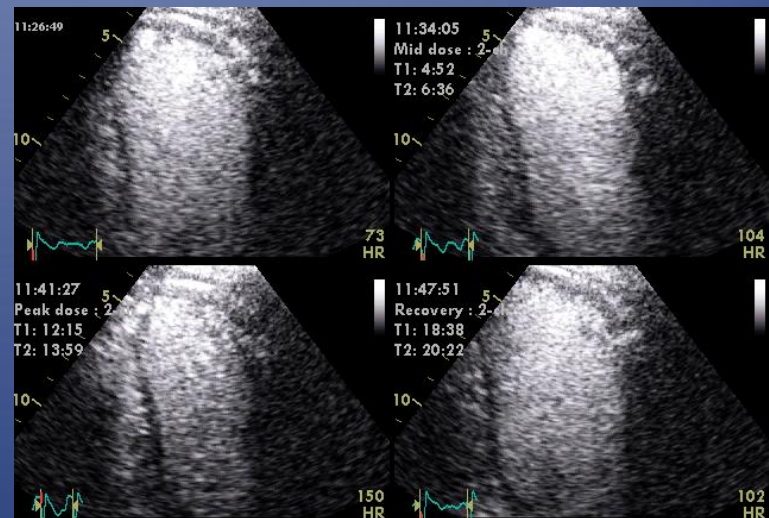
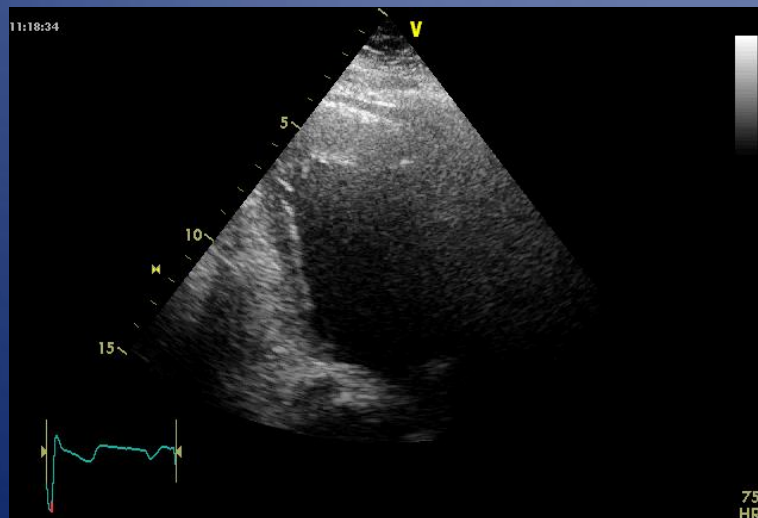
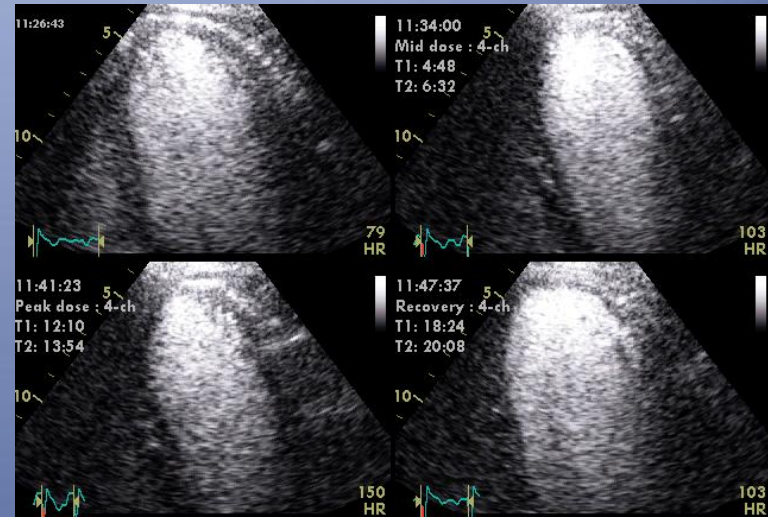
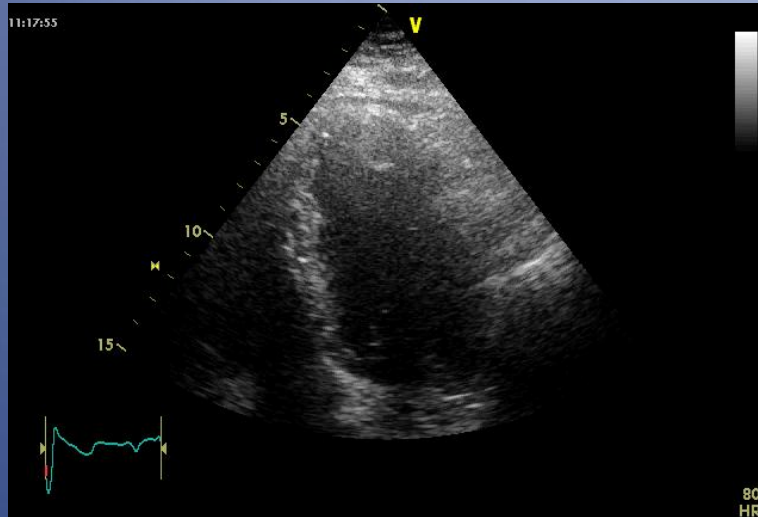
Obesity WHO grade	BMI range (kg/m <sup>2</sup> )	N	Median no. segments visualised		p Value
			PRE	POST	
2	35–39.9	134	8 (4–11)	17 (17–17)	<0.001
3	40.0–49.9	66	8 (4–12)	17 (17–17)	<0.001
4–5	>50.0	9	0 (0–5.5)	17 (16–17)	<0.001

BMI, body mass index; *PRE* and *POST*, before and after contrast administration respectively.

test hodnocen jako proveditelný:  
96% BMI 35-40  
95% BMI 40-45  
89% BMI > 50

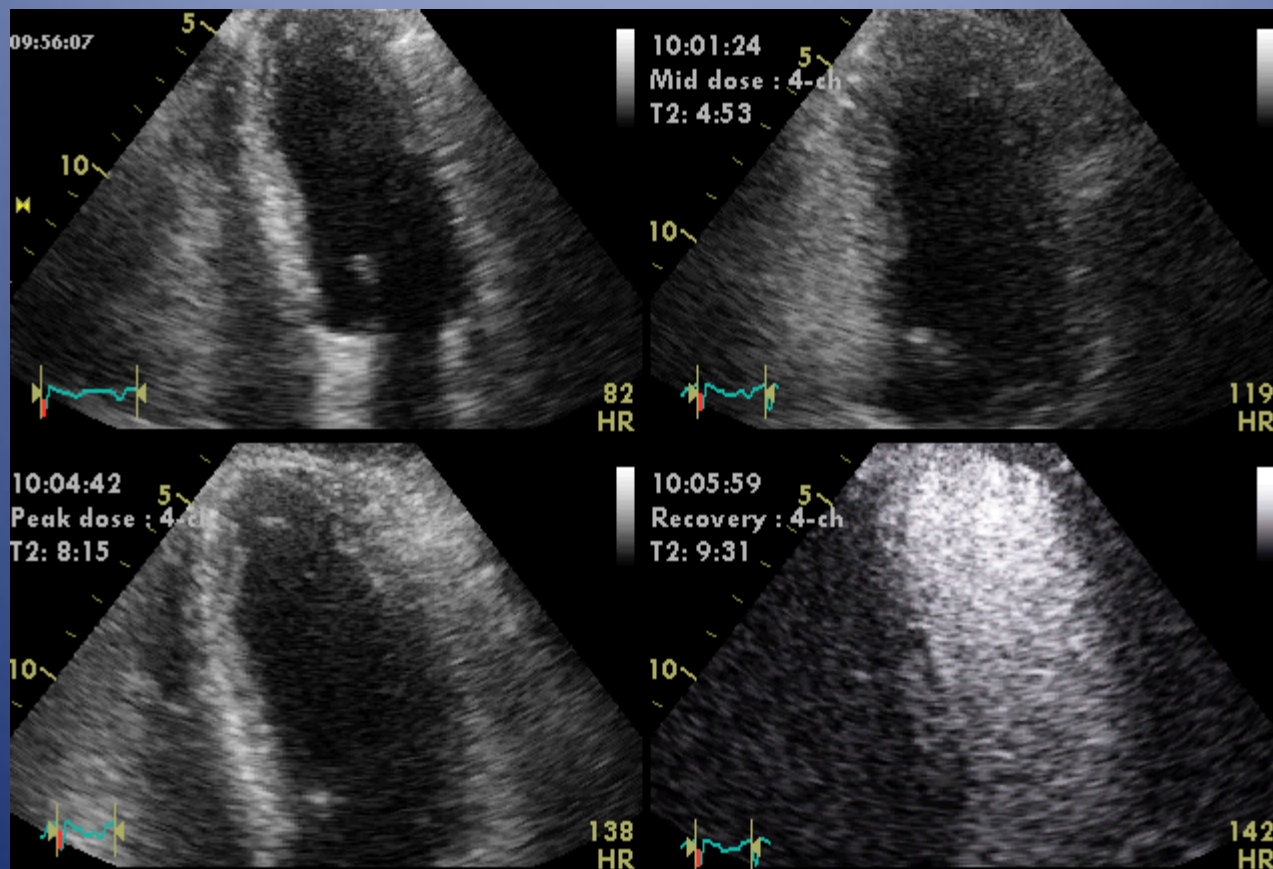


# LVO zlepšení vyšetřitelnosti 120kg, Sonovue 0,3 ml

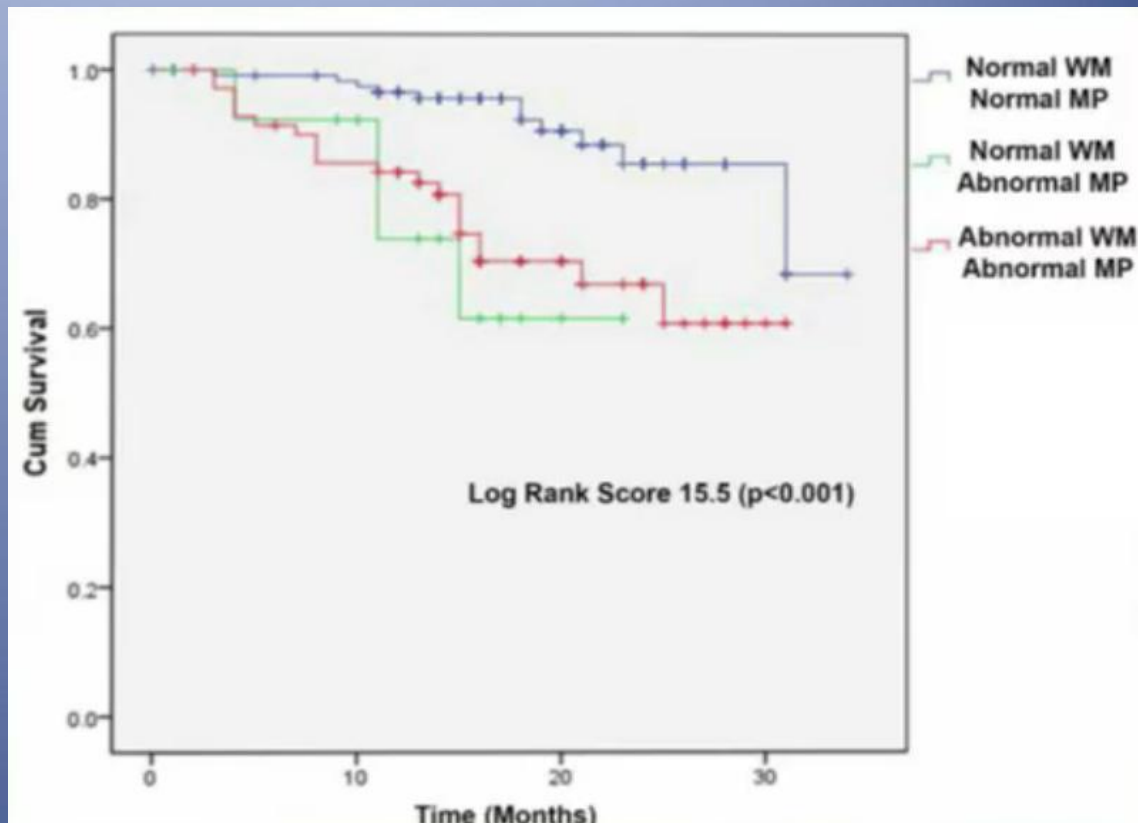
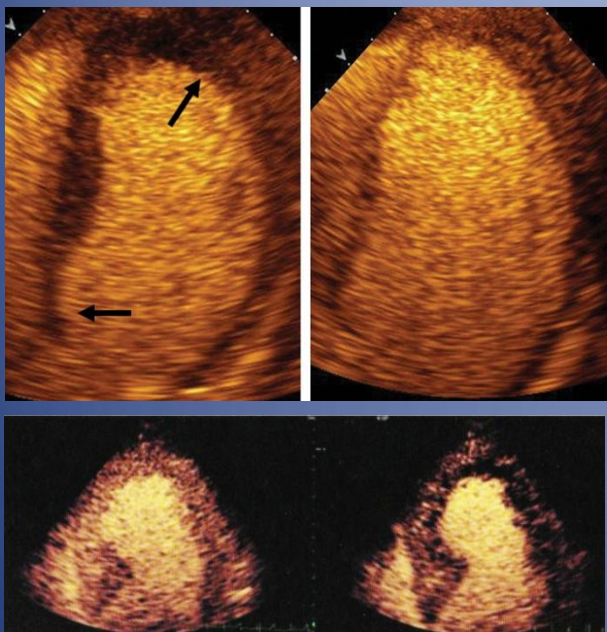


# 104 kg CHOPN

## Sonovue 0,5 ml bolus na vrcholu zátěže



# MCE



197 pacientů  
no benefit 12%

zlepšení hodnocení WM 63%

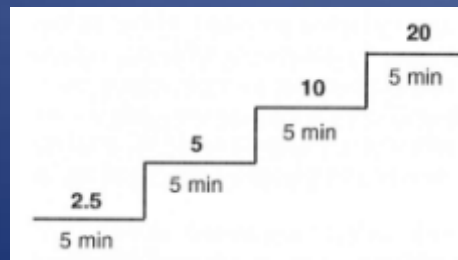
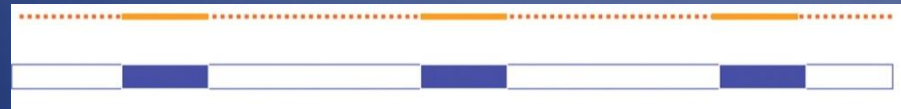
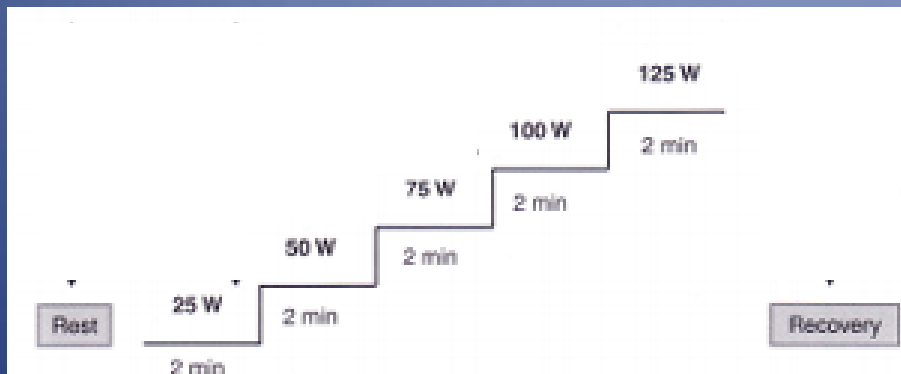
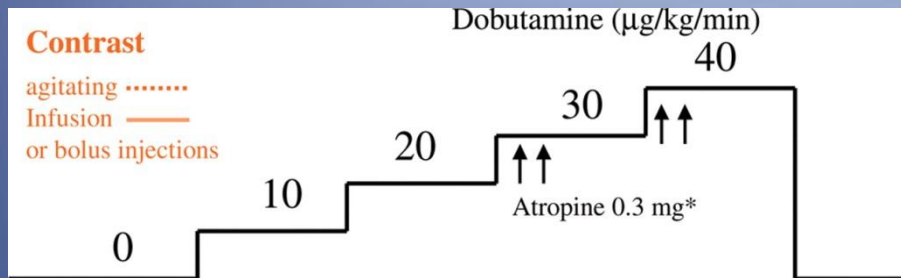
ischemie při norm. WM 25%

perfusion mode vždy

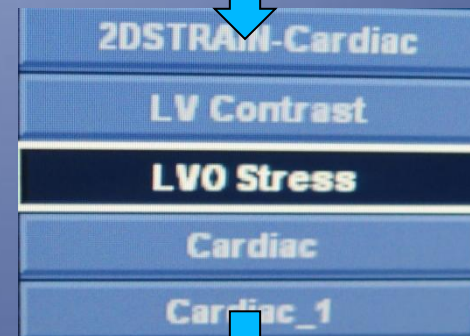
Shah BN, et al. J Am Soc Echocardiogr 2014;27 (5):520-530

Shah BN, et al. J Am Soc Echocardiogr 2015;28 (11):1358-1366

# kontrastní stress echo protokol

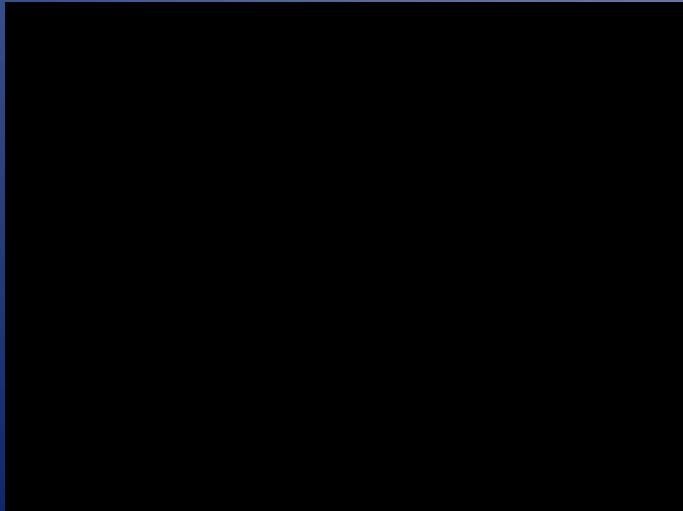


**M4S V**      **MI 0.9**  
**TIs 1.0**



**M4S**      **MI 0.12**  
**LVO Stress! TIs 0.0**

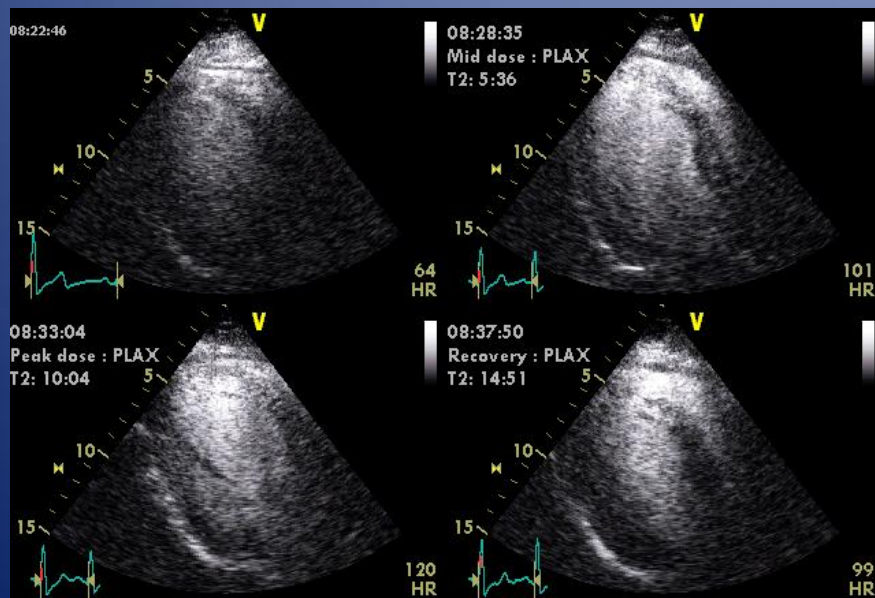
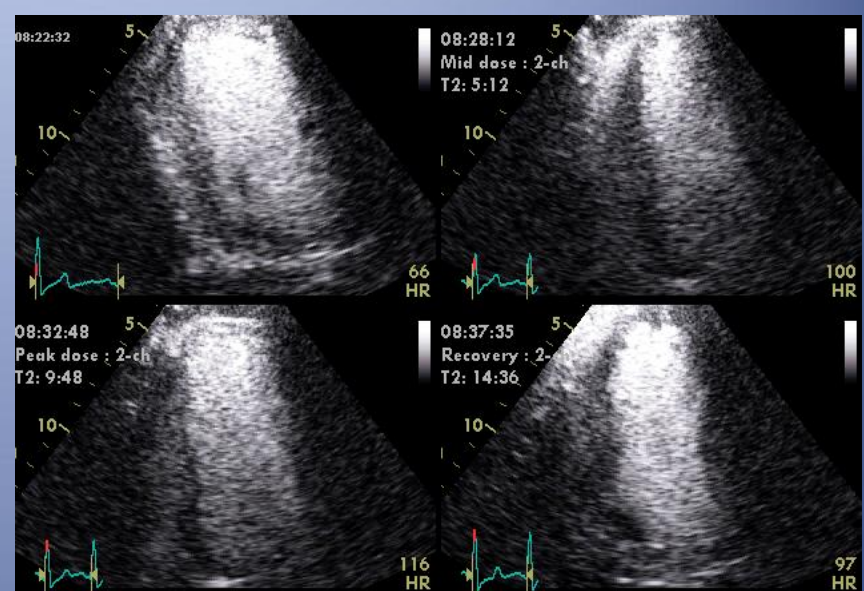
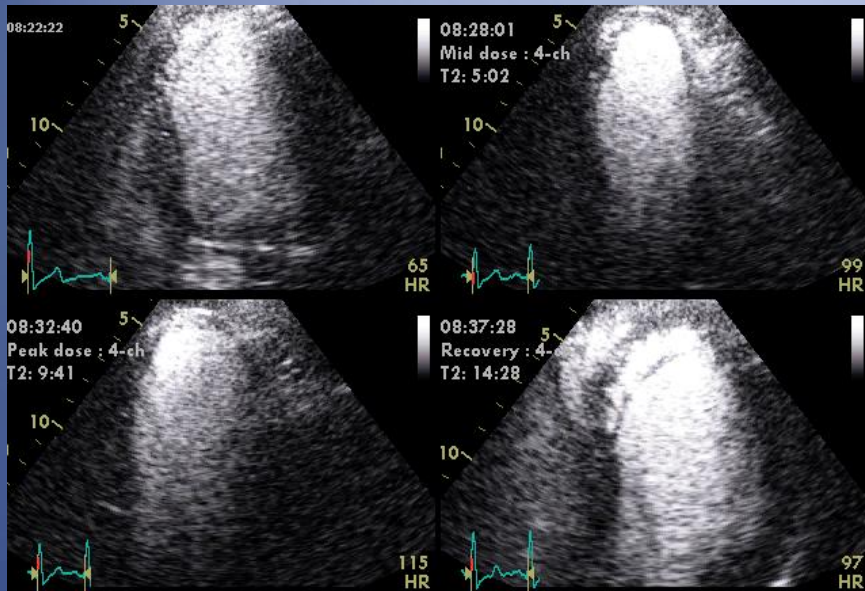
# kontrastní stress echo tips and tricks



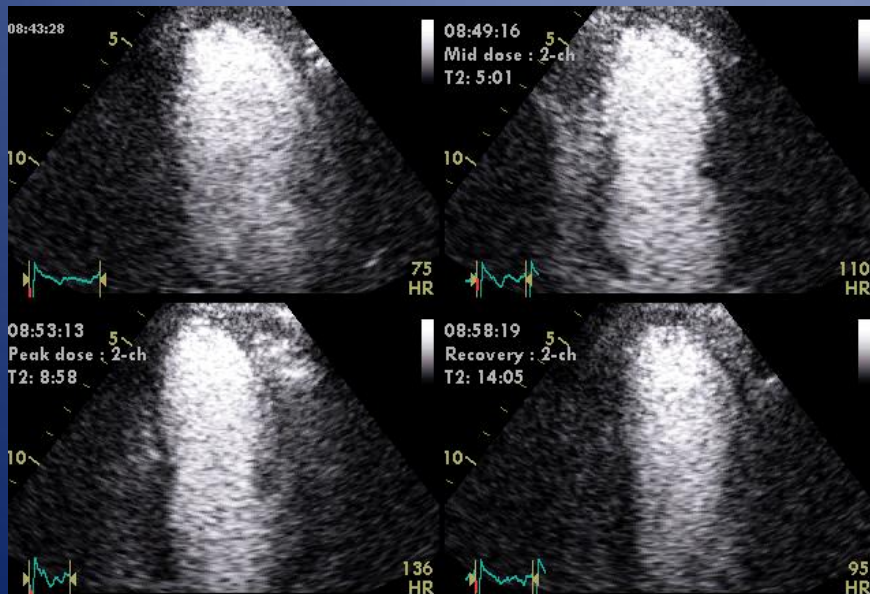
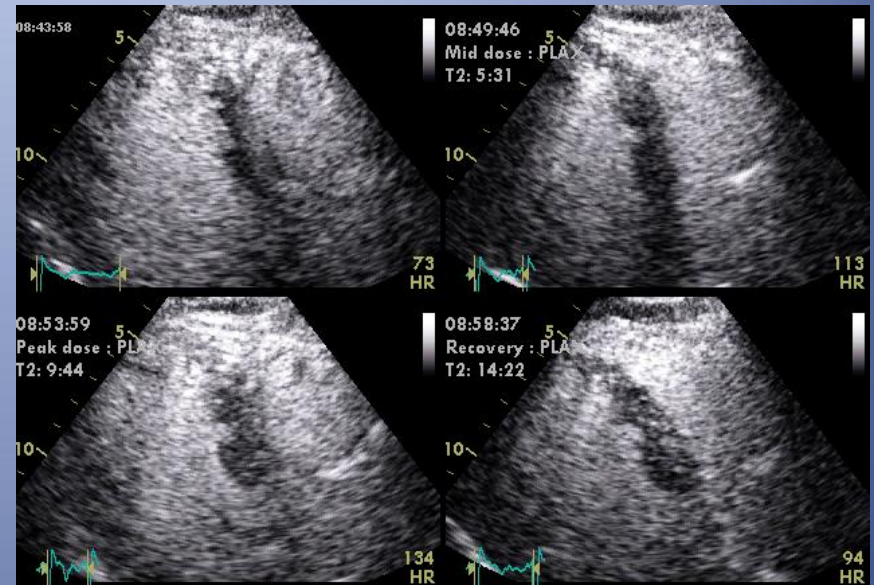
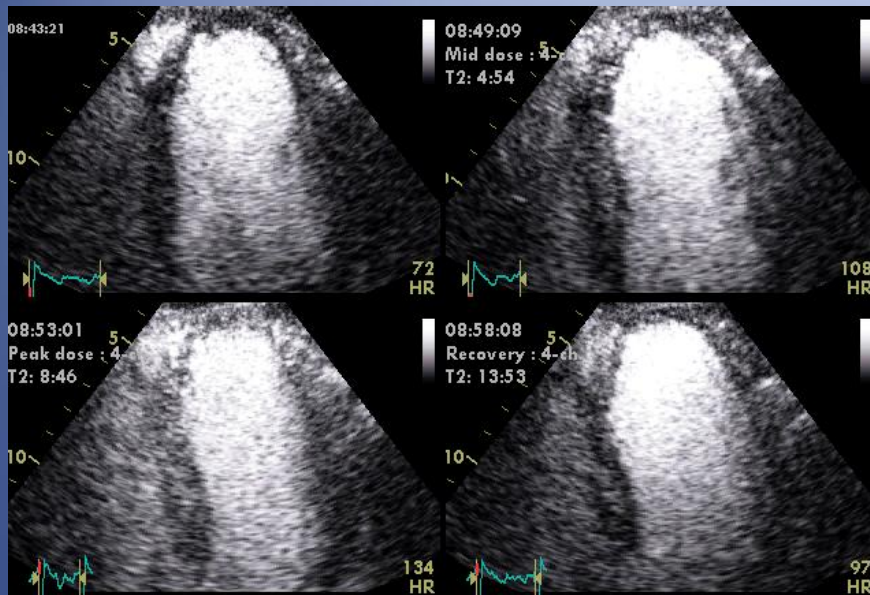


# kontrastní stress echo tips and tricks





MD 1952  
 CHRI  
 prav. dialýzy  
 non DM  
 atypické obtíže  
 WL Tx??

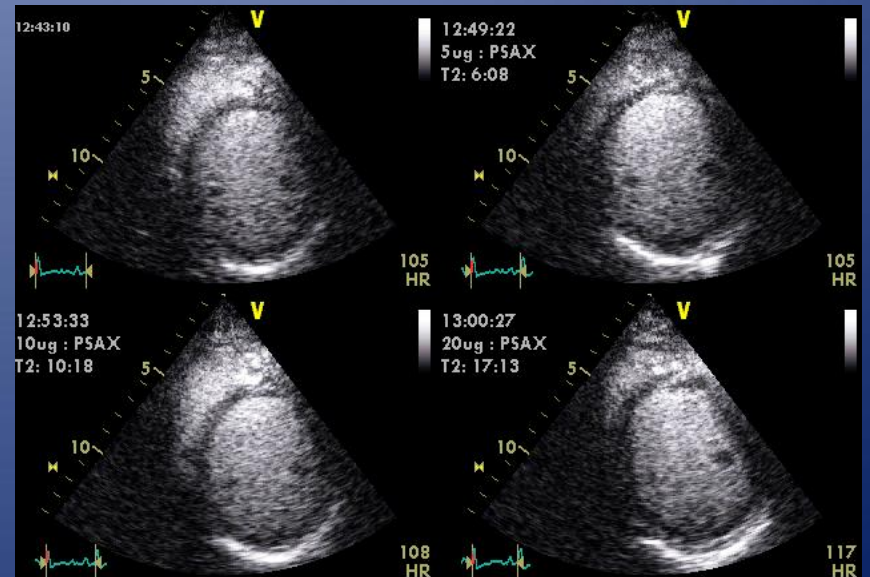
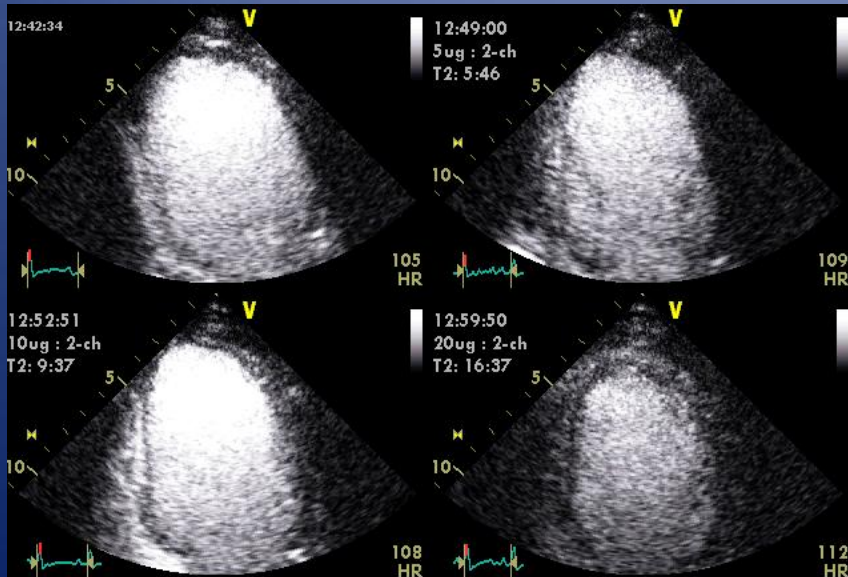
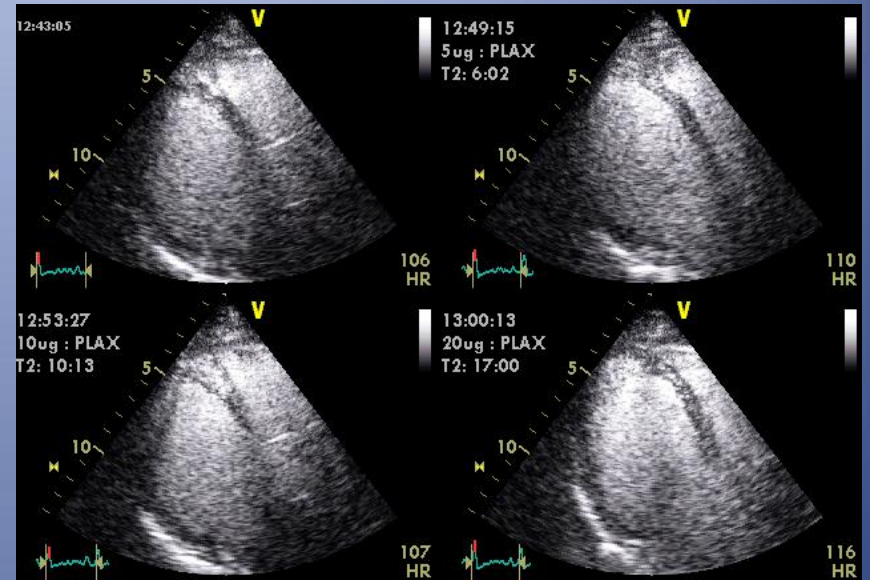
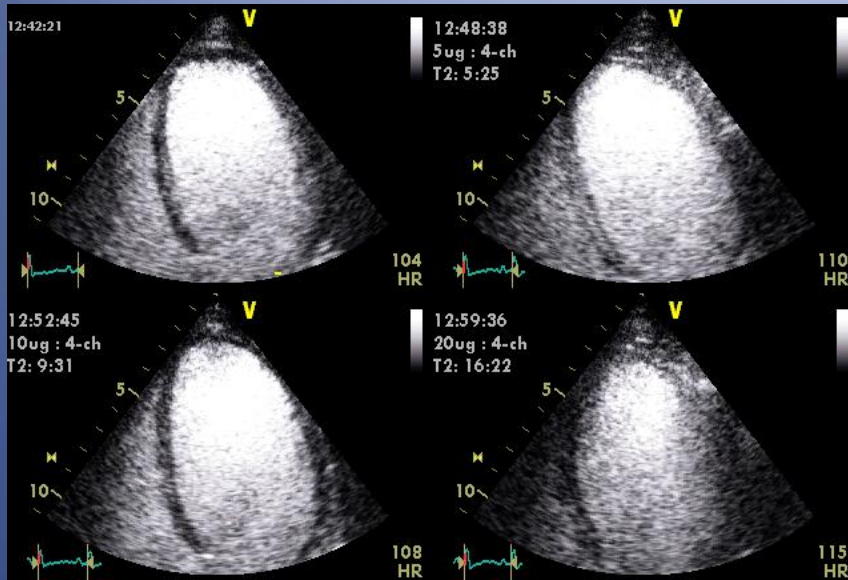


koronarografie  
3VD

LIMA-RIVA  
RIMA-RMS  
AKB RIVP/RPLS

3M poté asympt., bez ischemie  
zařazen na WL

# viab. RIA?-Sonovue bolus 0,3ml



# cost effectiveness

## Stress echocardiography available

Stress echo cost for 200 patients £26 600

44 subsequent coronary angiograms £31 768

Total cost attributable to stress echo £58 368

## Stress echocardiography unavailable

Coronary angiography £56 316

Myocardial perfusion scintigraphy £42 090

Total £98 406

Total cost saving per 200 patients £40 038

test	cena £	cena CZK
CT angiografie	122	2.900
stress echo	271	2.500/3.600
stress CMR	515	13.000
SPECT	368	14.000-16.000
koronarografie	1.684	15.000
ergometrie M/Ž	32	450

# Sonovue v ČR

ZULP

Ize vykázat pouze u amb. výkonů

léková sk. č. 1

kód 0027634

vykazovat pouze použité množství látky

v popisu možno uvést

„kontrast z důvodu

horší vyšetřitelnosti“



		(poj)=(medikar)		AMBULANTNÍ LÉČIVA			
IČZ	: 61004015	odb.:	107	Var :	1184	Účet	
Rod.čís.	:					Poj	
Zákl. Dg	: I259	Chronická ischemická choroba	srdeční	N	Stav		
Otevřen	: 11.05.2016	Ost.dg	:				
Uzavřen	: 11.05.2016	Náhrady	:				
Datum	- - -S	Kód	Množ.	Cjd	Cena	Var	
>	11.05.2016	1	0027634	0.250	2034.70	508.68	
			SONOVUE IVN INJ PLQ DIS 1X25MG+1X5ML M				

výkony:

17271 vysoce specializované echokardiografické vyšetření

17263 specializovaná kontrastní echokardiografie

17276 vysoce specializovaná zátěž farmakologická

17265 specializovaná zátěž dynamická

# děkuji za pozornost

