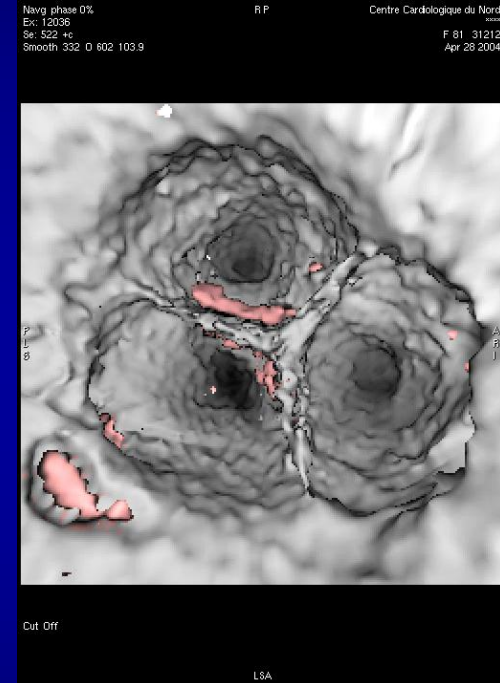
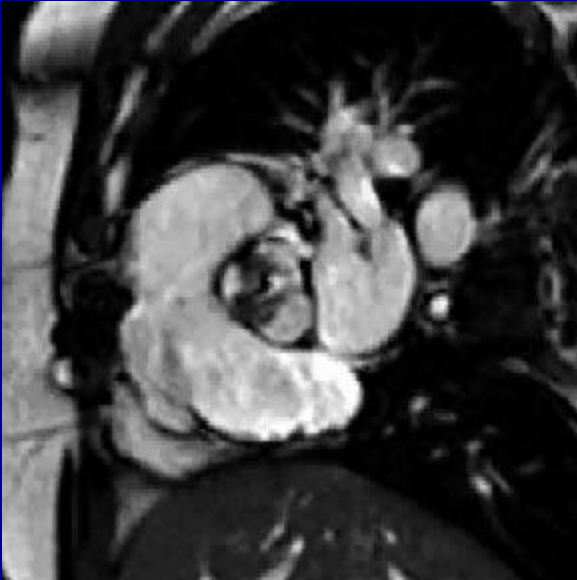




STUDIO DELLE MALATTIE VALVOLARI

“Tecniche di imaging non invasivo avanzato”



DOTT. DESTRO GIANNI

DIVISIONE CLINICIZZATA DI CARDIOLOGIA DI VERONA

COMMISSIONE SIEC IMAGING INTEGRATO

2006 Appropriateness criteria for cardiac computed
tomography and cardiac magnetic resonance imaging.

JACC 48; 7: 1476-97. 2006.

Evaluation of Ventricular and Valvular Function		
Procedures may include LV/RV mass and volumes, MR angiography, quantification of valvular disease, and delayed contrast enhancement		
23.	<ul style="list-style-type: none">• Characterization of native and prosthetic cardiac valves—including planimetry of stenotic disease and quantification of regurgitant disease• Patients with technically limited images from echocardiogram or TEE	A (8)

Legenda: A= indicazione appropriata

Score: 7- 9: test appropriato per l'indicazione specifica

4- 6: test incerto

1- 4: test NON appropriato

VALVULOPATIE: DATI ESSENZIALI

Morfologia valvolare:

- n. di lembi, integrità' (rottura, fusione, prolasso)
- Integrità' delle corde tendinee
- Calcificazioni, vegetazioni
- Morfologia perivalvolare: ascessi, pseudoaneurismi

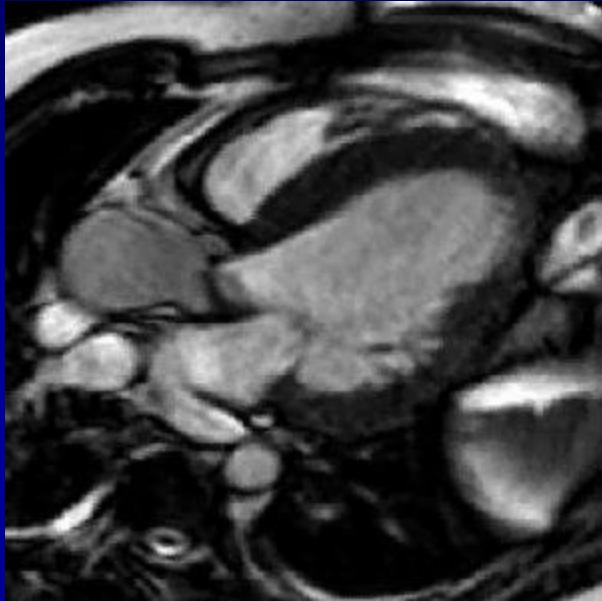
Funzione valvolare

- Pattern di apertura (bicuspidale, tricuspide)
- Pattern di coaptazione
- Orifizio valvolare – circonferenza
- Flussi medi e di picco- gradienti
- Flusso/frazione rigurgitante

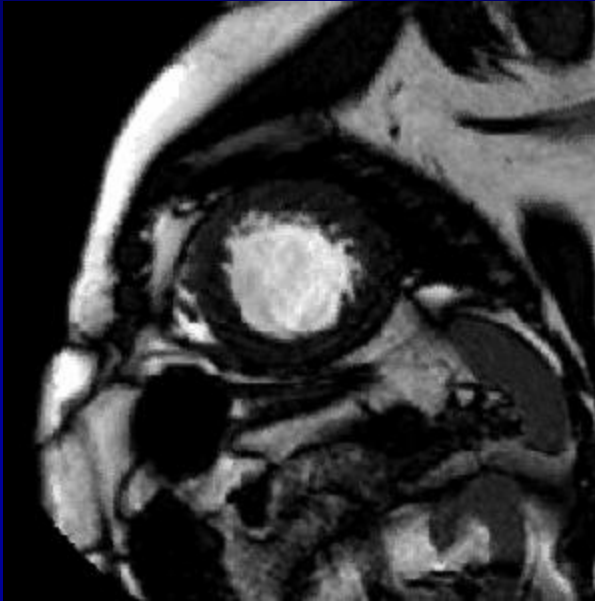
Funzione ventricolare: (volumi, FE, massa)

Dati ulteriori: grossi vasi, trombi, coronaropatia, IMA/scarring

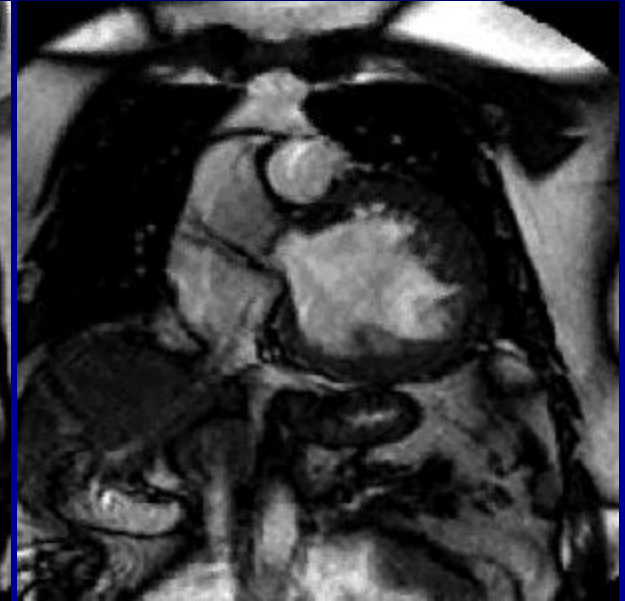
STENO-INSUFFICIENZA AORTICA



2 camere



Asse corto

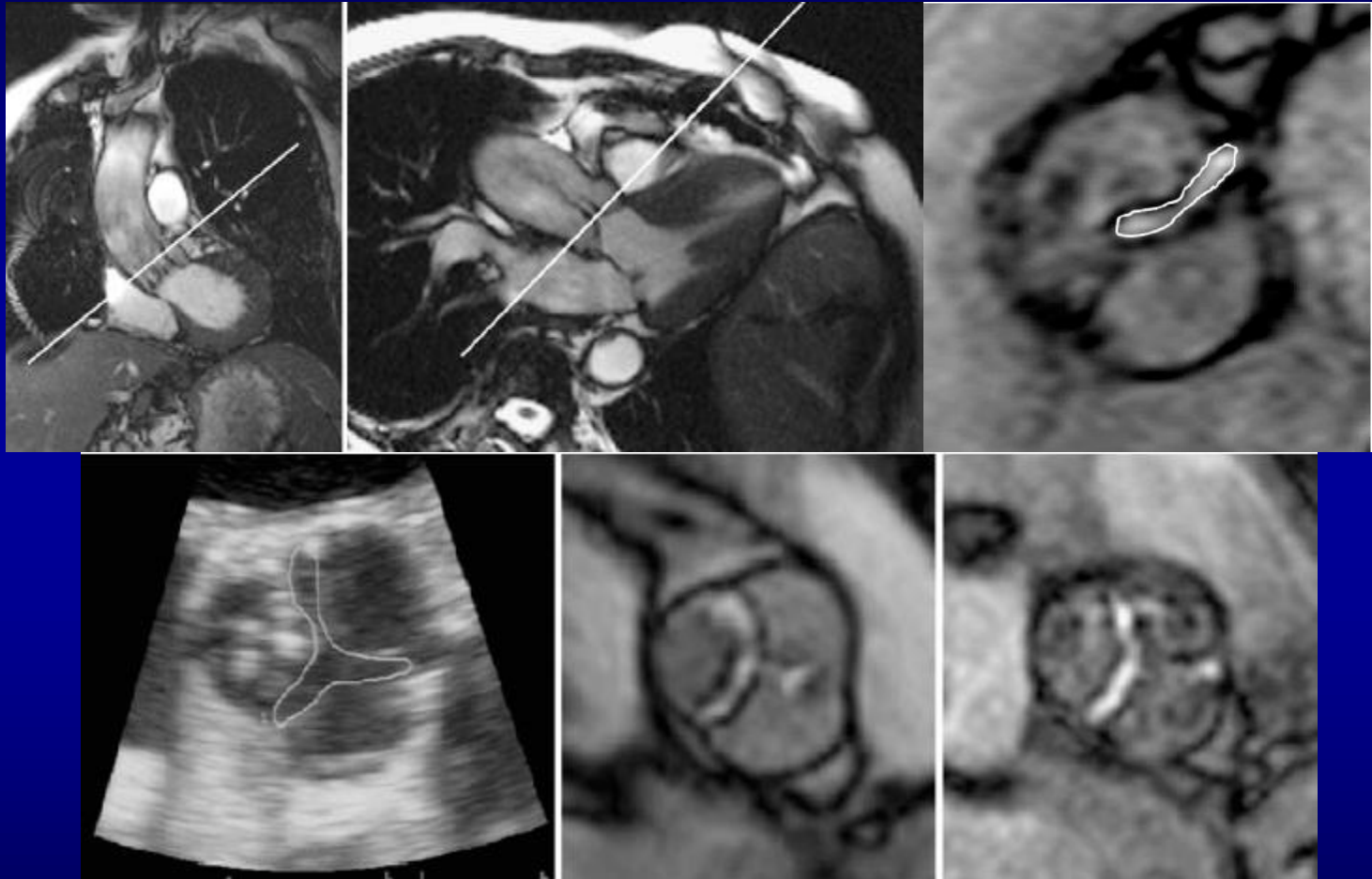


Coronale

EDV: 400 ml; FE 28%; MASSA: 530 gr

GRADIENTE: 64 MMHG; FRAZIONE RIGURGITANTE: 56%

STENOSI VALVOLARE AORTICA: PLANIMETRIA

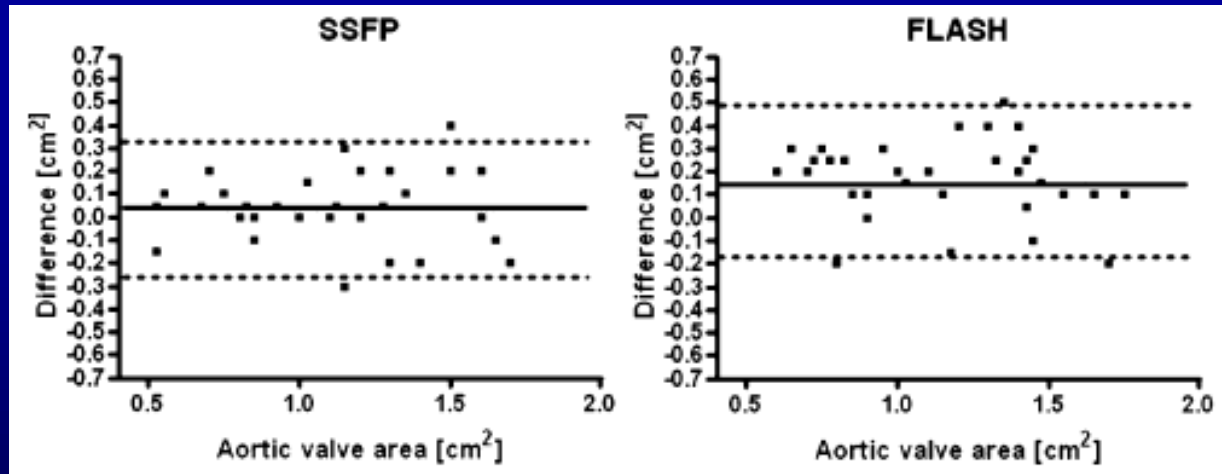


TEE

SSFP

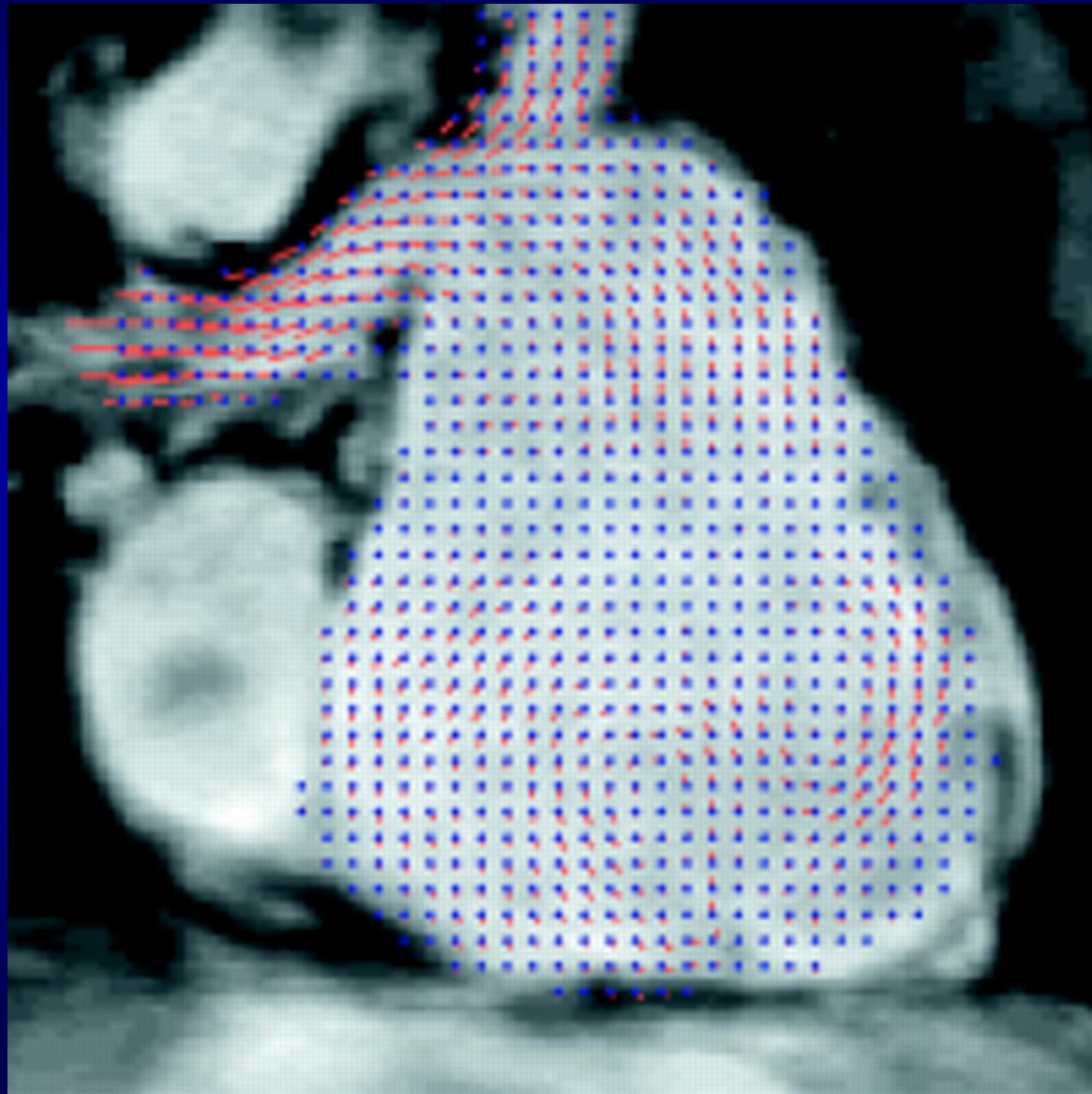
FLASH

ANALISI DI BLAND-ALTMAN



Sclosser T. Eur Radiol 17: 1284. 2007

PHASE VELOCITY MAPPING



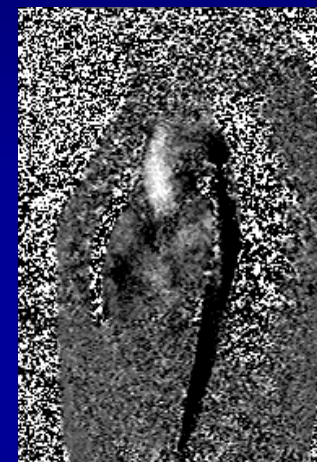
PHASE CONTRAST/VELOCITY ENCODED

Allineamento del piano di immagine al flusso senza le limitazioni imposte dalla finestra acustica

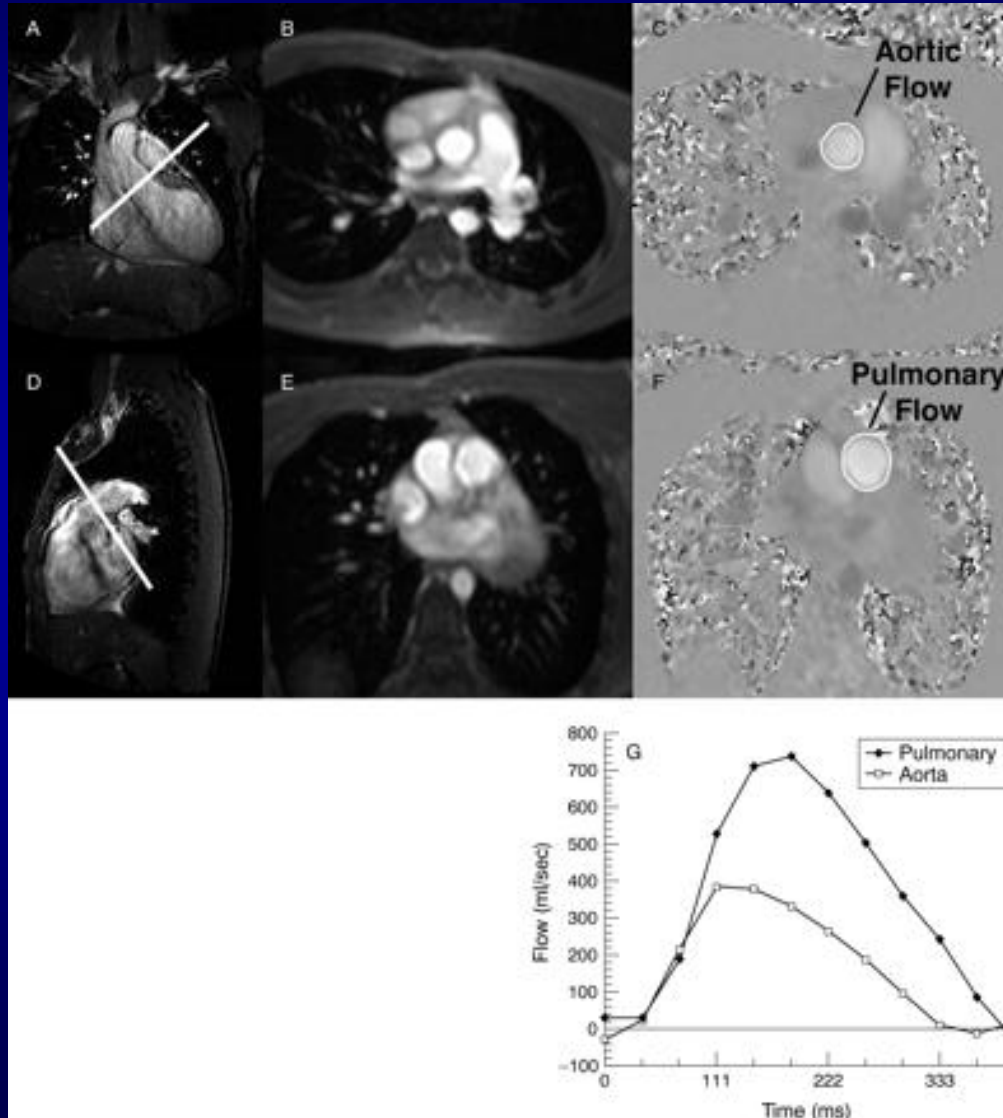
Calcolo del volume di flusso istantaneo nel ciclo cardiaco

Visualizza e quantifica i flussi, calcolando le velocità e i volumi: stroke volume, portata cardiaca, frazione di rigurgito e gradienti

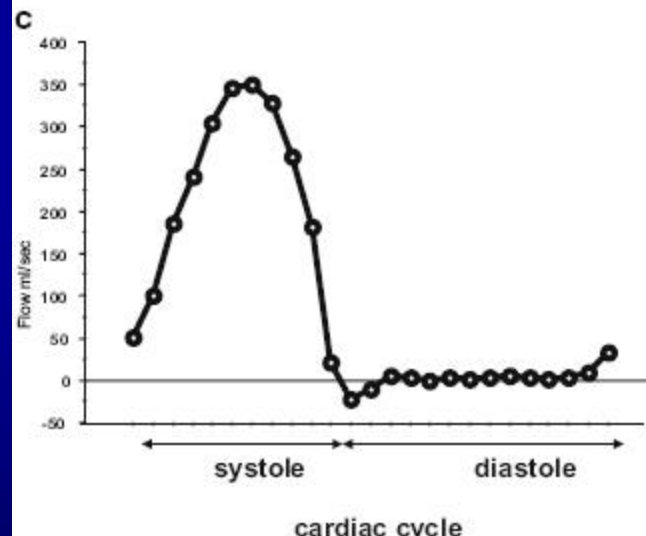
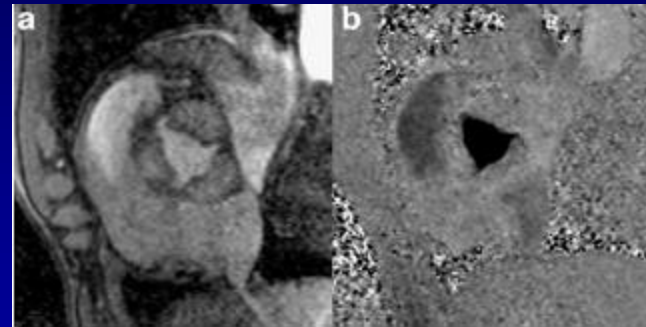
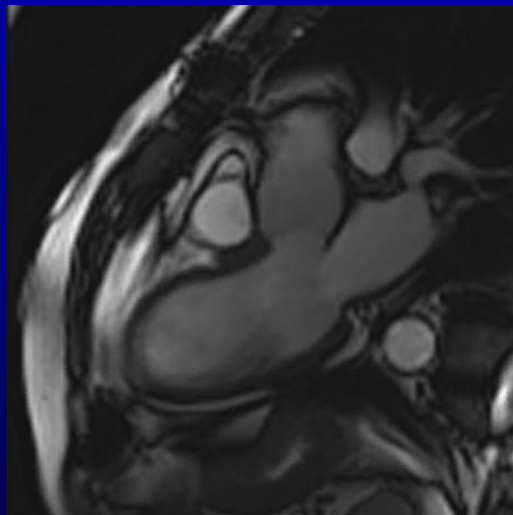
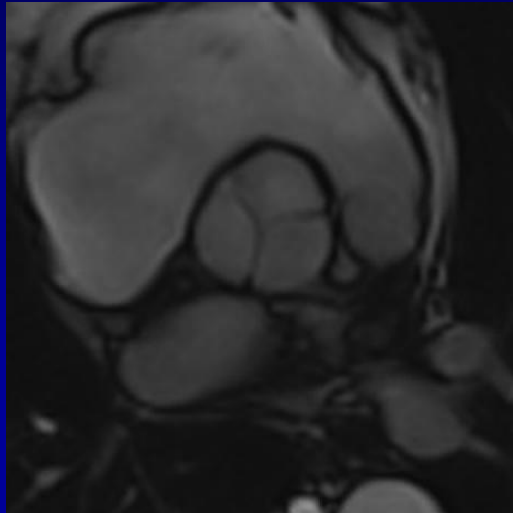
La direzione del flusso è codificata dai toni di grigio



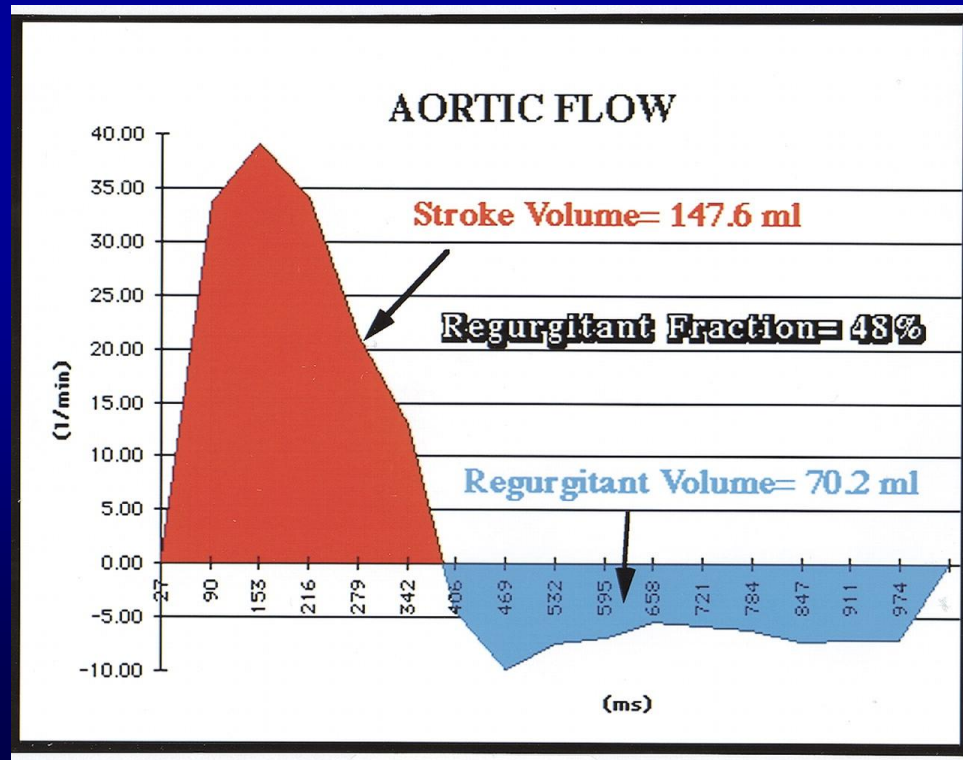
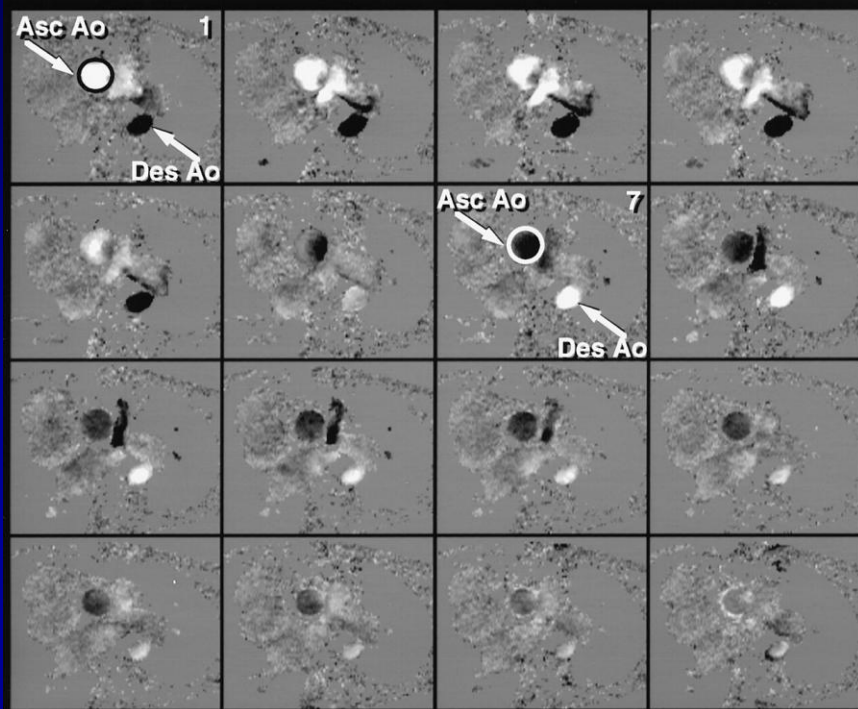
FUNCTIONAL ANALYSIS – FLOW (SHUNT)



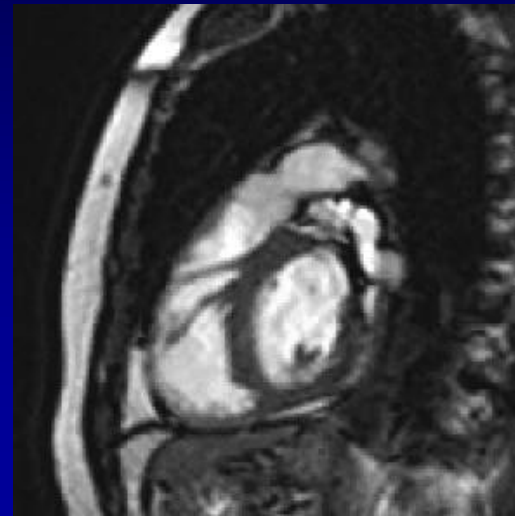
VALVOLA AORTICA NORMALE



FUNCTIONAL ANALYSIS – FLOW (AR)

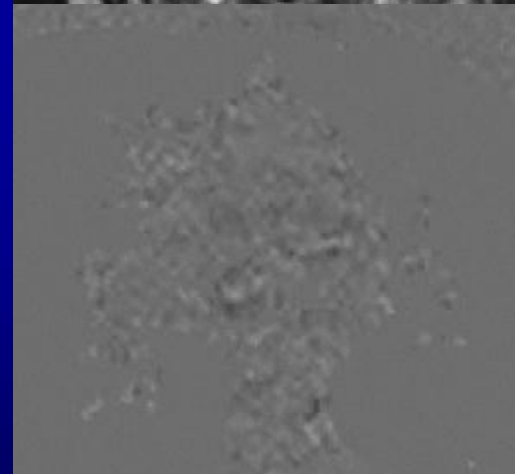


STENOSI SOPRAVALVOLARE AORTICA



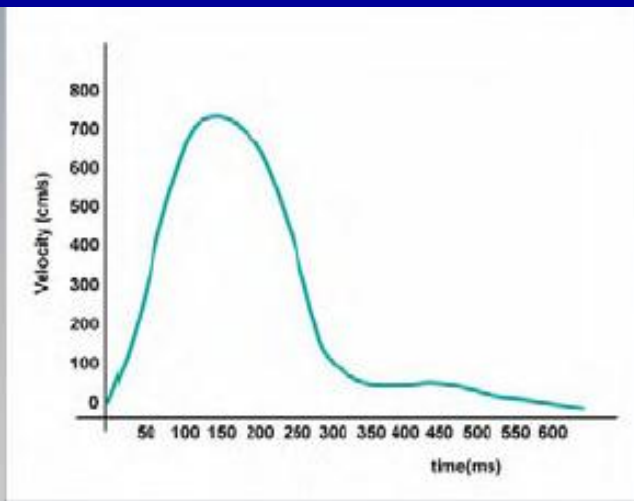
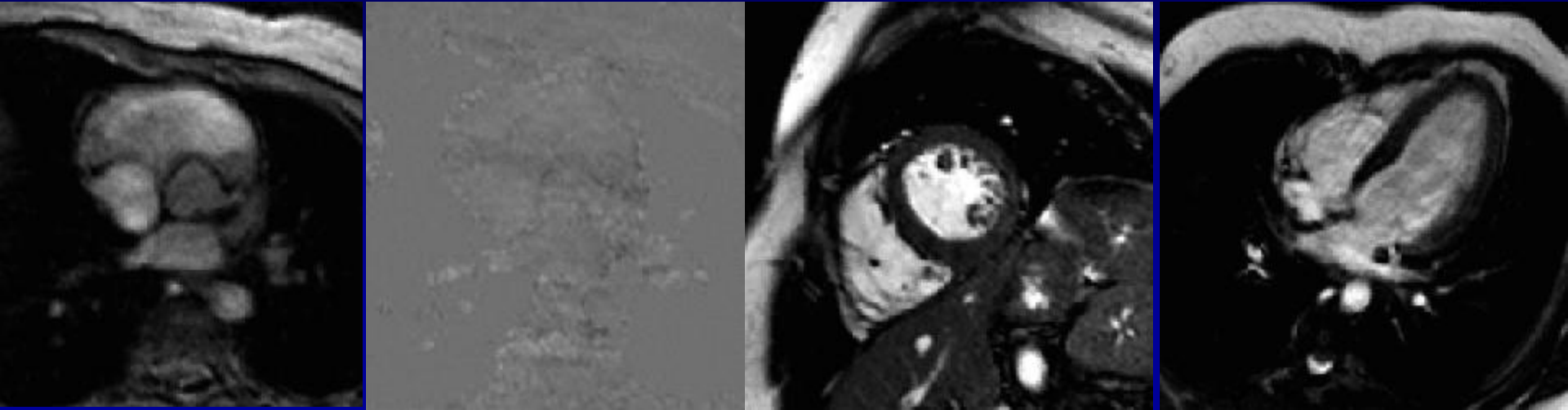
PICCO DI VELOCITA':
340 m/sec

GRADIENTE: 46 MMHG



GIUNZIONE SINO
TUBULARE

STENOSI AORTICA CONGENITA

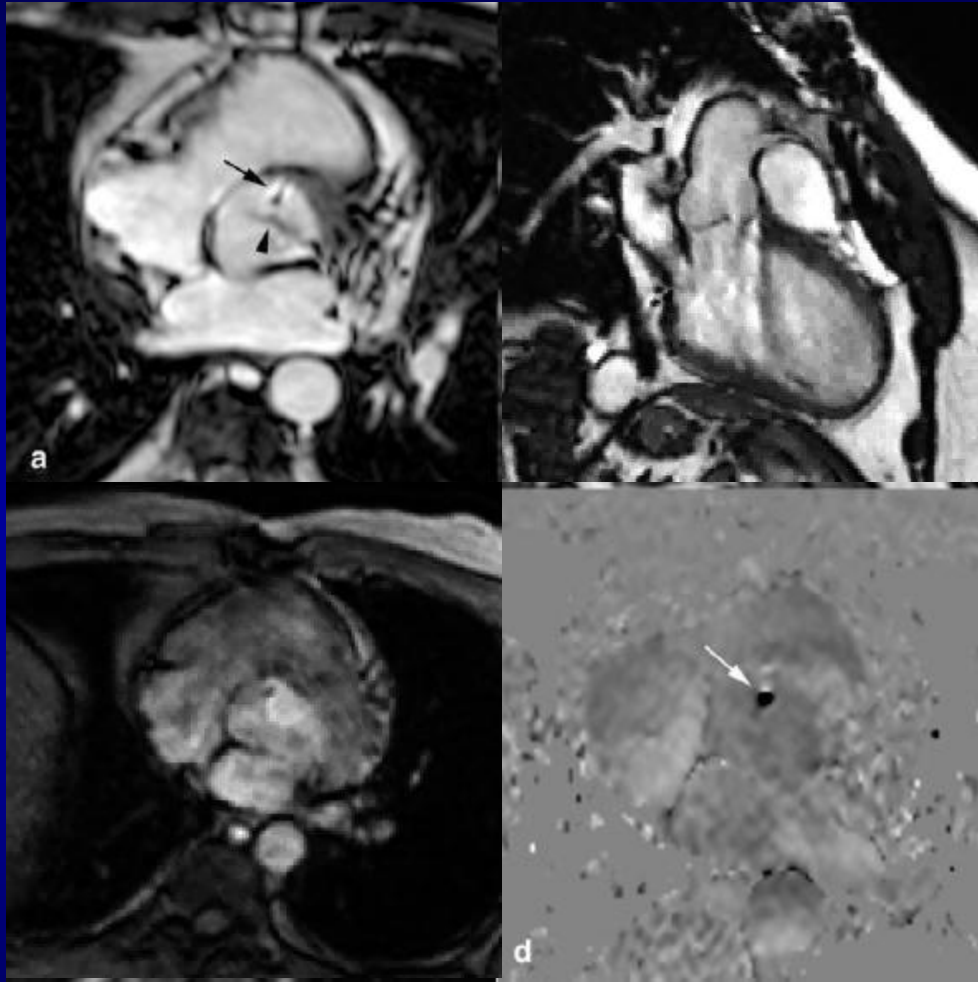


AORTA FUNZIONALMENTE BICUSPIDE

GRADIENTE RMN 180 MMHG

AREA. 0,5 CMQ

VALVOLA AORTICA BICUSPIDE



Vol. Rigurg.: 77 ml

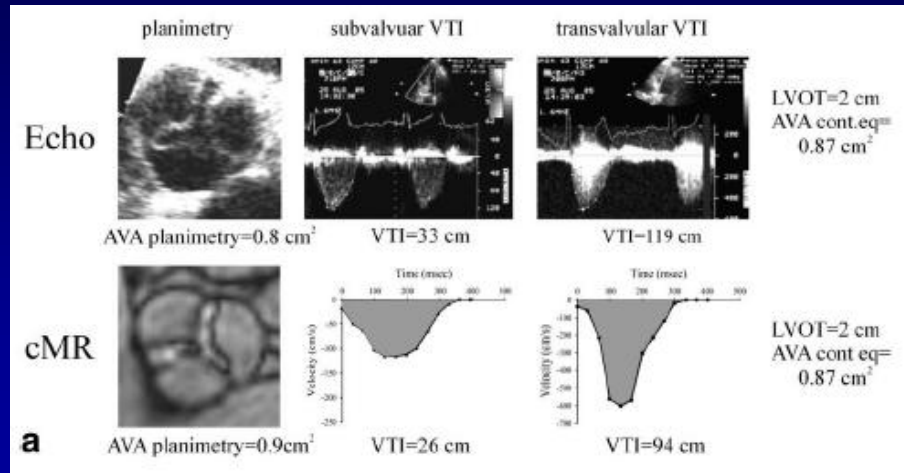
Fraz. Rigurg.: 34%

EDV: 328 ml

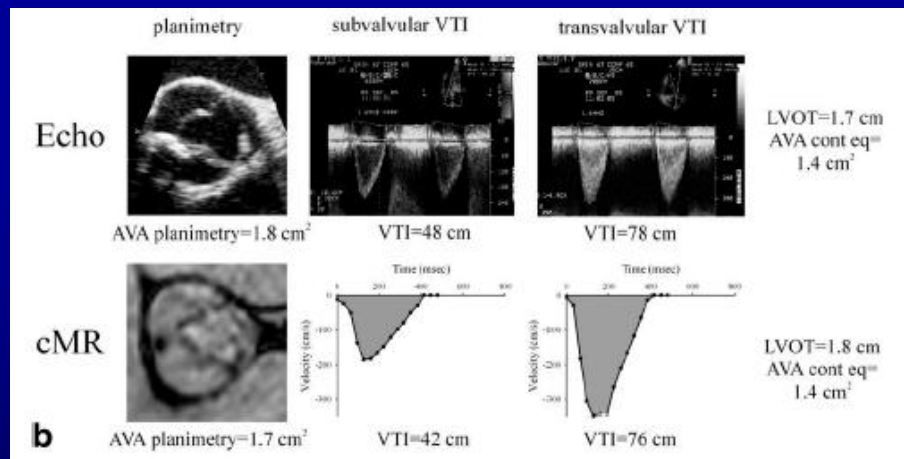
FE: 58%

MASSA: 195 gr

TESTA A TESTA ECO - RMN



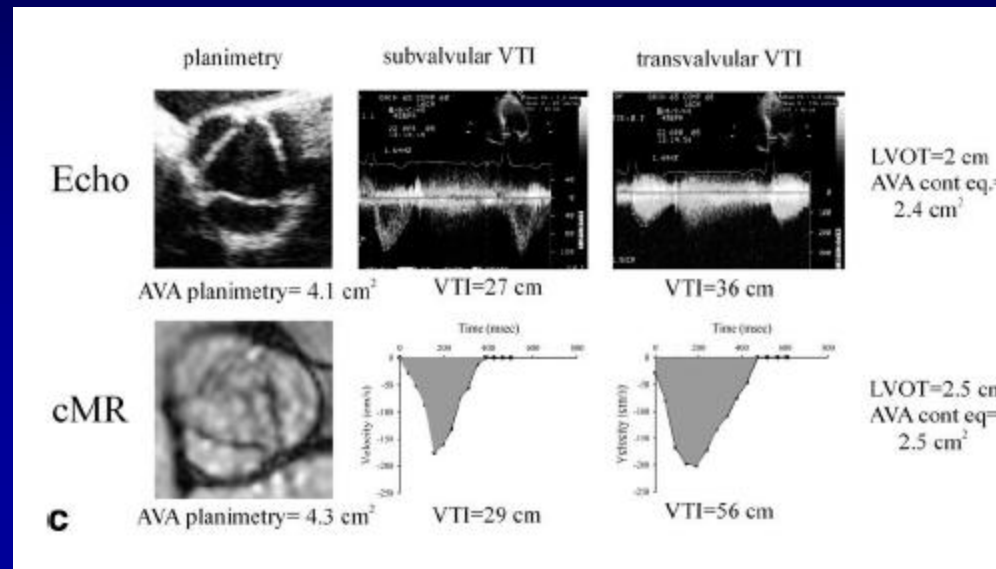
STEN A_o
SEVERA



STEN A_o
MEDIA

Pouleur AC. Jour Magn Res Imag 26: 1436. 2007.

TESTA A TESTA ECO - RMN



Ao
NORMALE

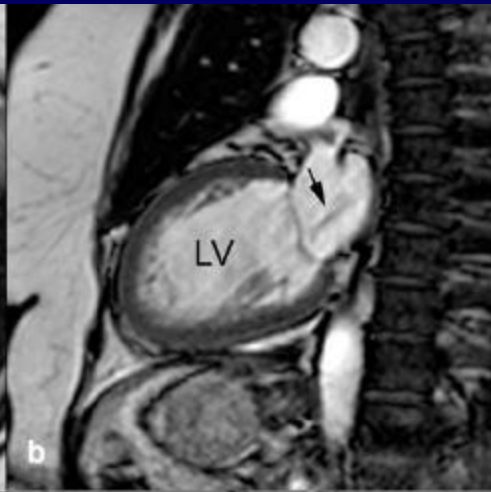
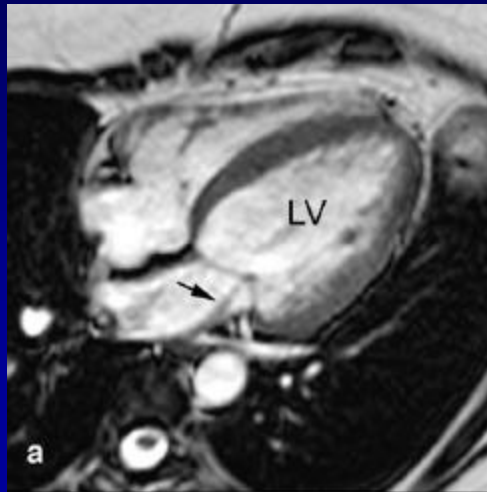
AVA by Continuity Equation and Planimetry cMR, TEE, and TTE*

Modality	AVA mean ± SD (range)	Comparison vs. TTE			Comparison vs. TEE		
		r	Bias mean ± SD	P value	r	Bias mean ± SD	P value
Continuity equation cMR	1.8 ± 1.3 (0.4-5.9)	0.98	0.1 ± 0.3	0.62 (NS)	0.96	-0.3 ± 0.5	<0.001
Continuity equation TTE	1.8 ± 1.4 (0.4-6.0)	-	-	-	0.97	0.3 ± 0.4	<0.001
Planimetry cMR	2.1 ± 1.7 (0.4-6.1)	0.96	0.3 ± 0.5	<0.001	0.98	0.1 ± 0.3	0.34 (NS)
Planimetry TEE	2.1 ± 1.6 (0.5-6.4)	0.97	0.3 ± 0.4	<0.001	-	-	-

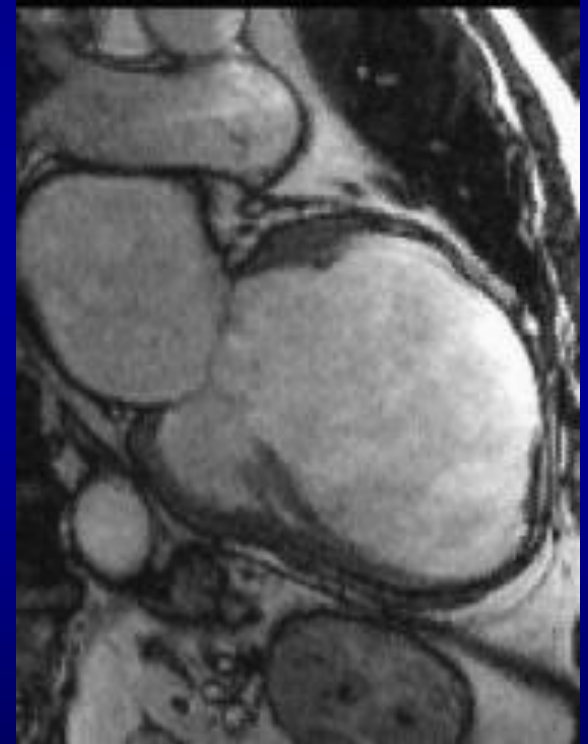
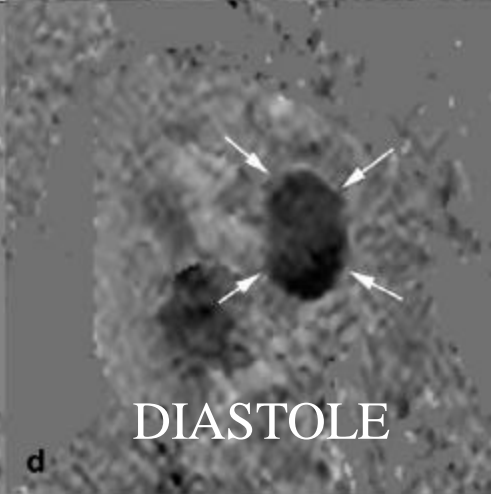
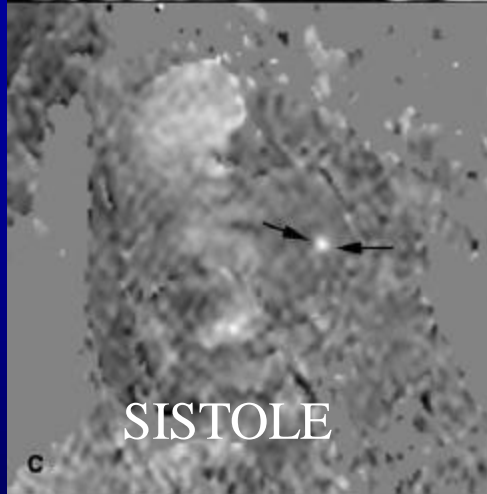
*Comparisons by repeated measurement ANOVA and post hoc Bonferroni test.

Pouleur AC. Jour Magn Res Imag 26: 1436. 2007.

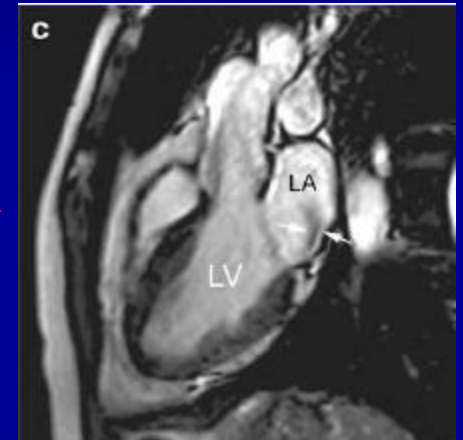
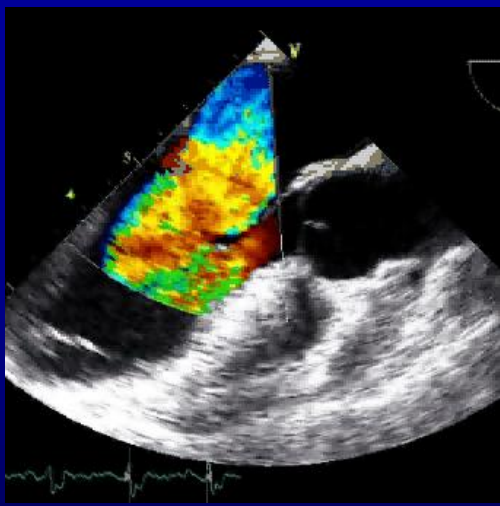
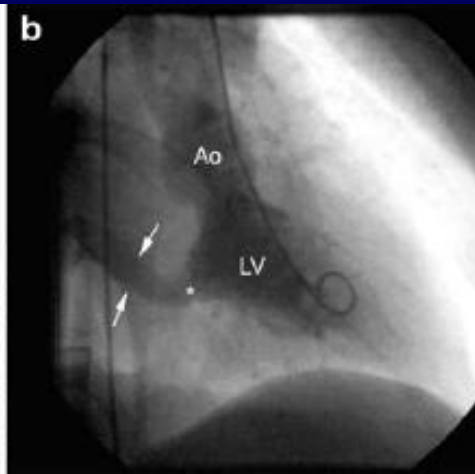
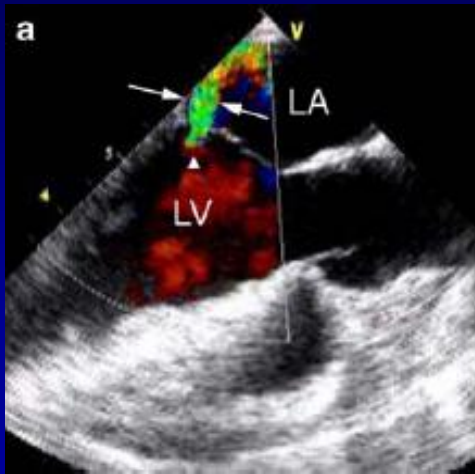
INSUFFICIENZA MITRALICA IN CMPD



Fraz. Rigurg.: 12%



INSUFFICIENZA MITRALICA CON JET ECCENTRICO

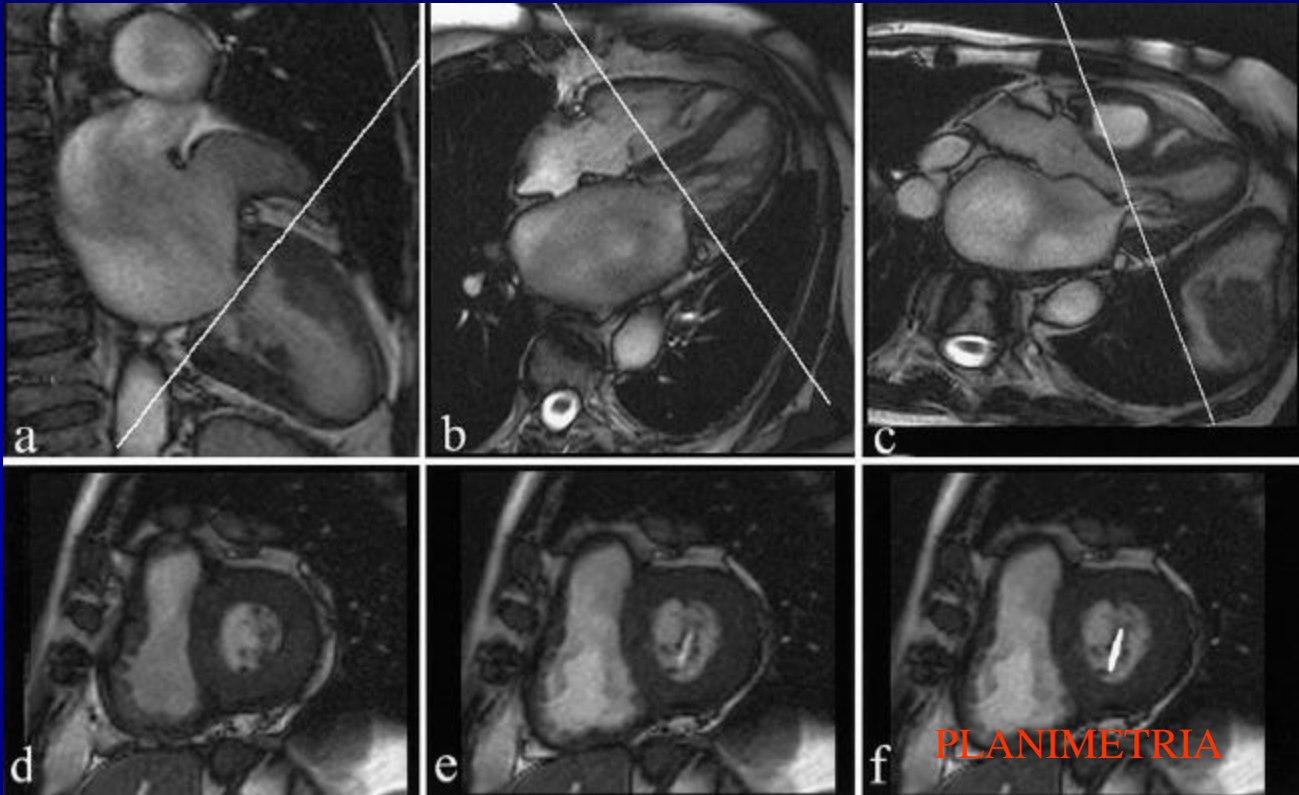


STENOSI MITALICA: PLANIMETRIA

2 CAMERE

4 CAMERE

3 CAMERE

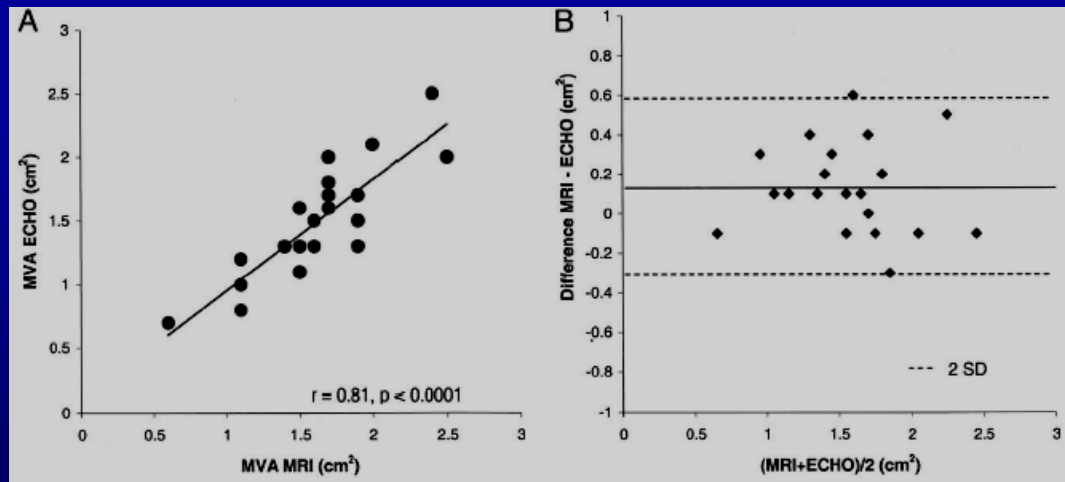
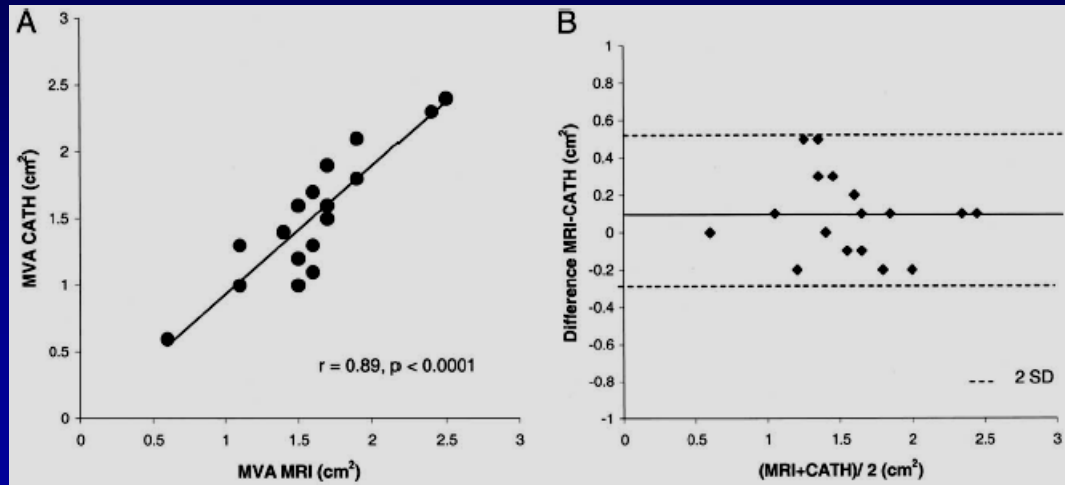


SISTOLE

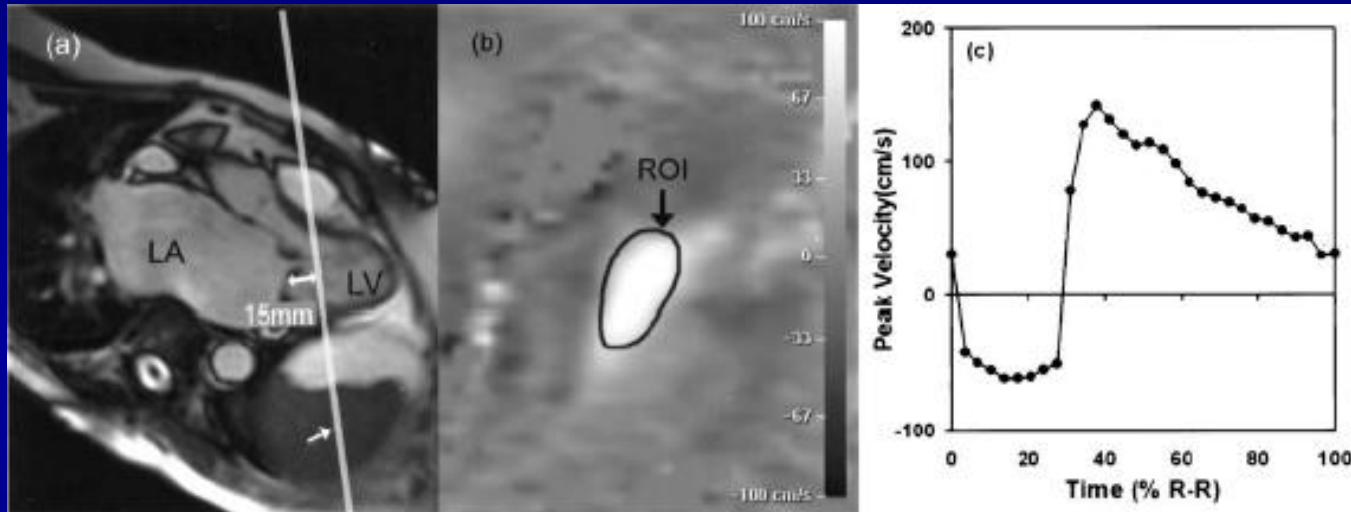
DIASTOLE

AREA:
0,6 CMQ

CONFRONTO CON CATETERISMO ED ECO

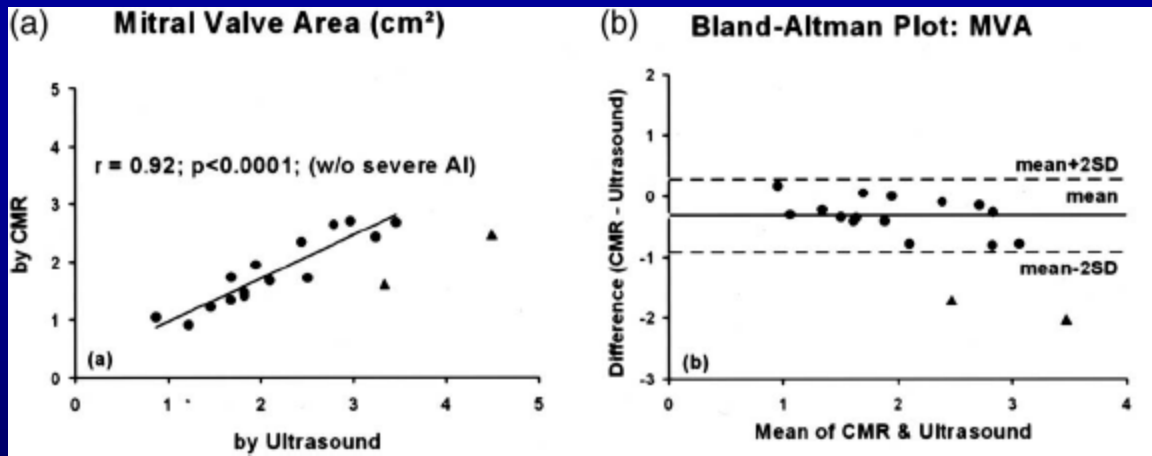
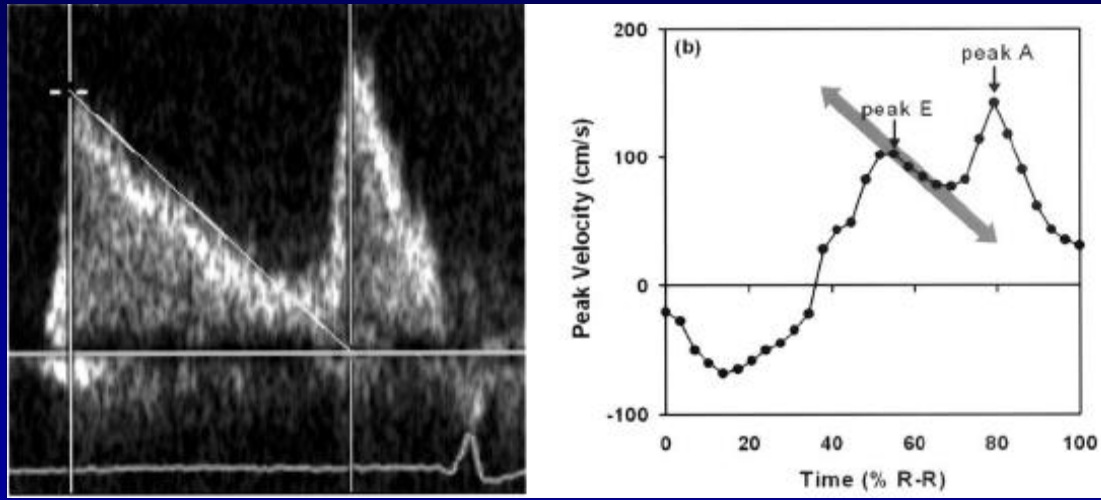


STENOSI MITRALICA: PHASE CONTRAST



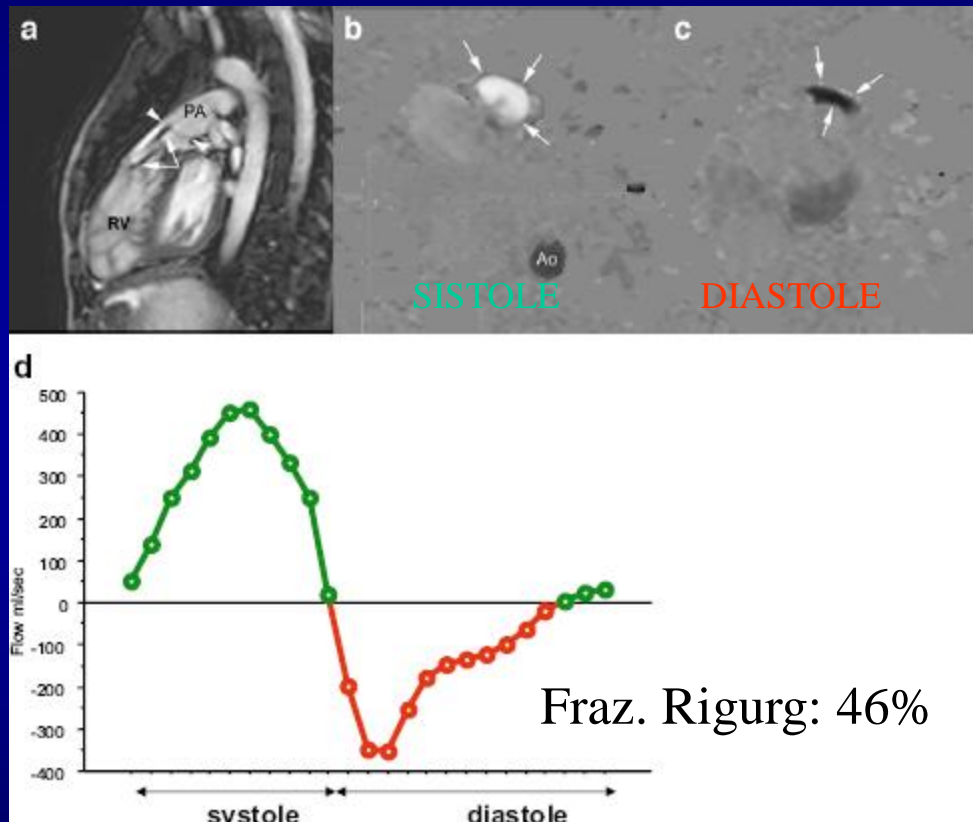
Shiow JL. JACC 2005. Quantification of stenotic mitral valve area with MRI and comparison with doppler ultrasound.

PHT

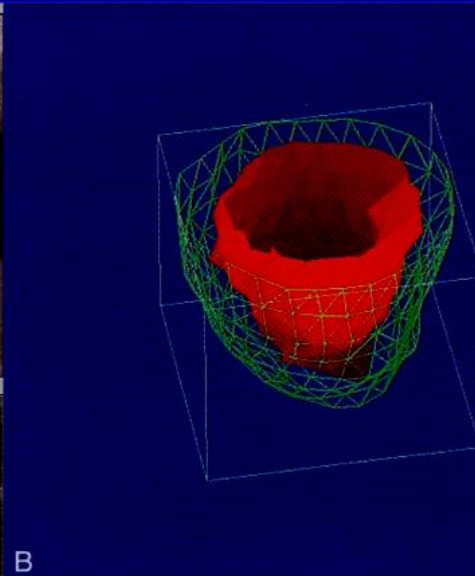
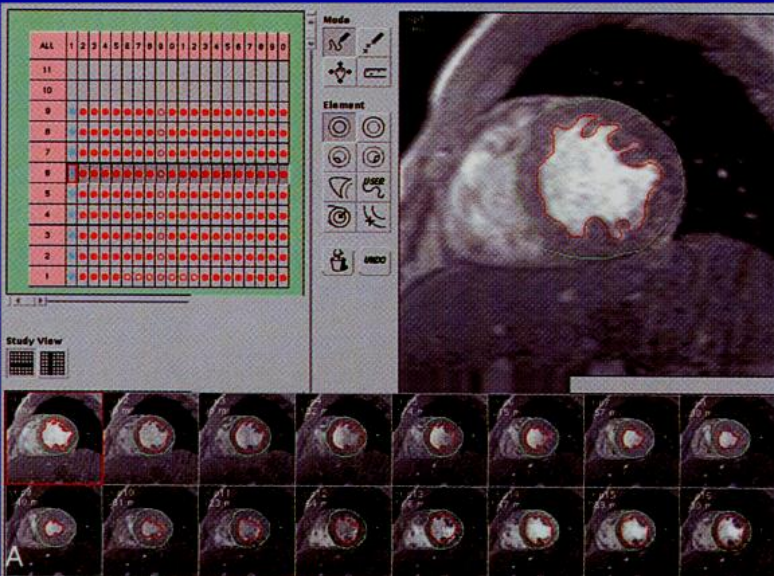
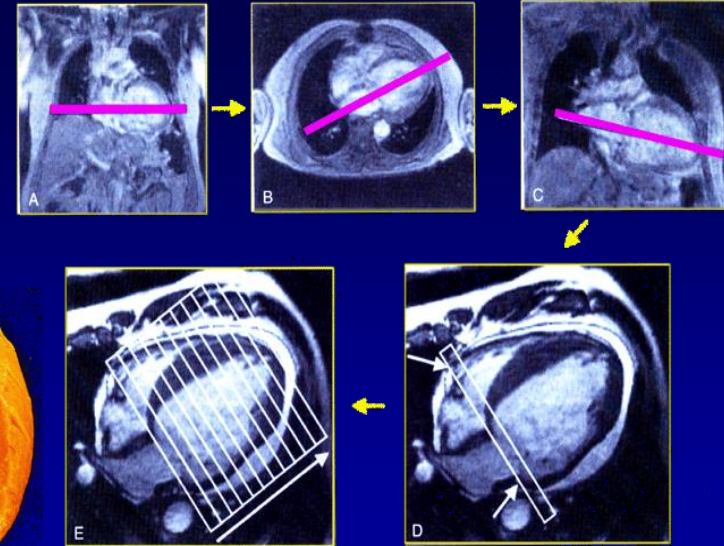
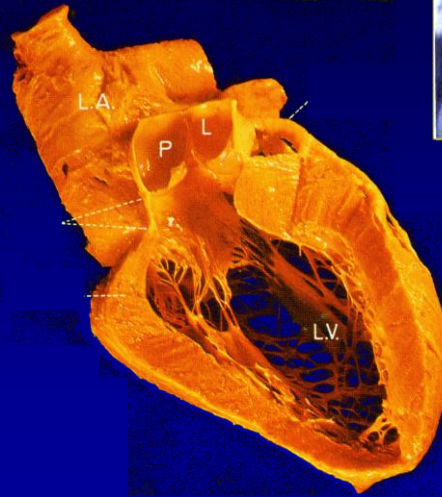
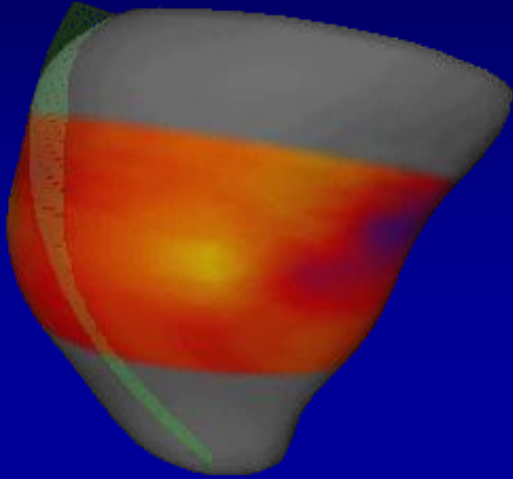


Shiow JL. JACC 2005. Quantification of stenotic mitral valve area with MRI and comparison with doppler ultrasound.

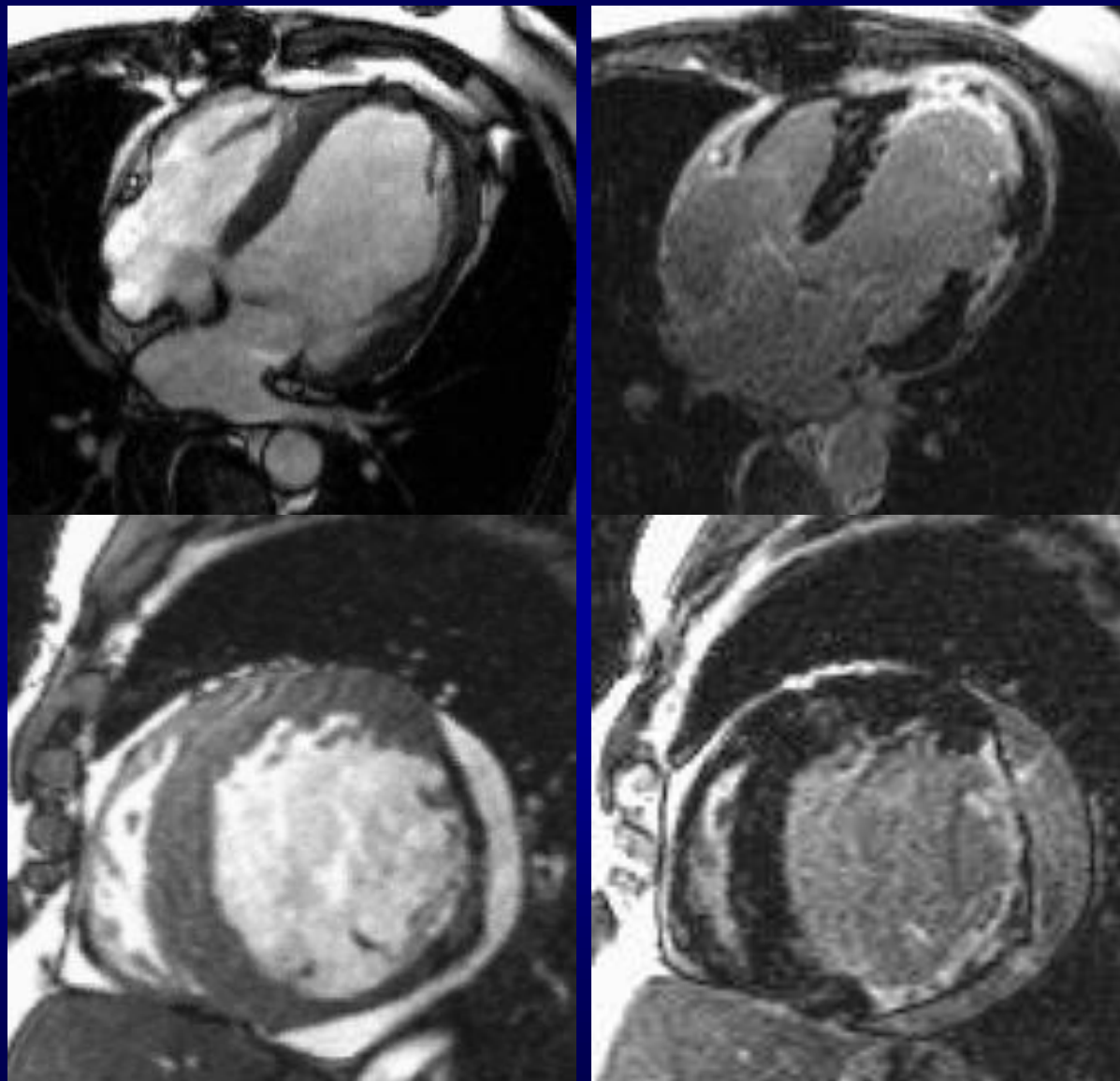
INSUFFICIENZA POLMONARE IN TETRALOGIA DI FALLOT



FUNZIONE VENTRICOLARE




STUDIO DI VITALITA'/CINETICA



2006 Appropriateness criteria for cardiac computed tomography and cardiac magnetic resonance imaging.

JACC 48; 7: 1476-97. 2006.

Evaluation of Ventricular and Valvular Function (Use of CT Angiogram)



32.	<ul style="list-style-type: none">• Characterization of native and prosthetic cardiac valves• Patients with technically limited images from echocardiogram, MRI, or TEE	U (5)
-----	--	-------

Legenda: U= indicazione incerta

Score: 7-9: test appropriato per l'indicazione specifica

4-6: test incerto

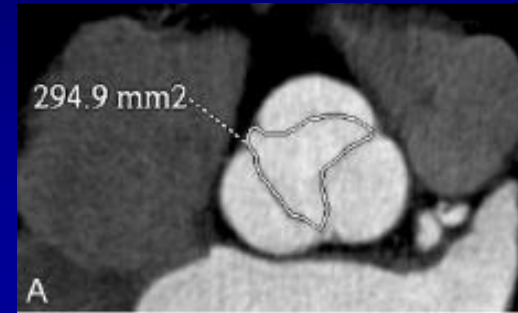
1-4: test NON appropriato

**ATTENZIONE: ESPOSIZIONE RADIAZIONI IONIZZANTI
MDC CON ALLERGIA/NEFROTOSSICITA'**

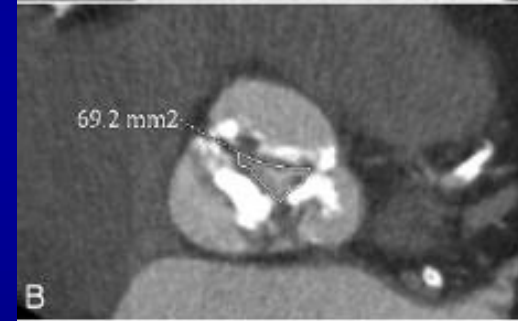
TAC CORONARICA PRECHIRURGICA?

CT (64 strati): VALVOLA AORTICA

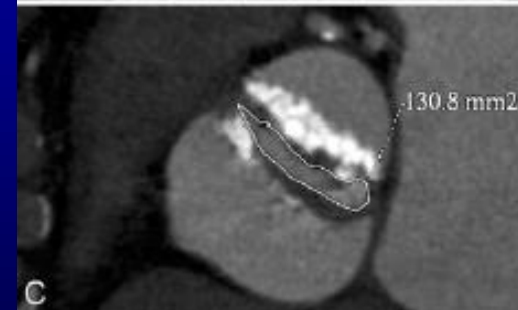
Norm.



Norm.



Tricusp.

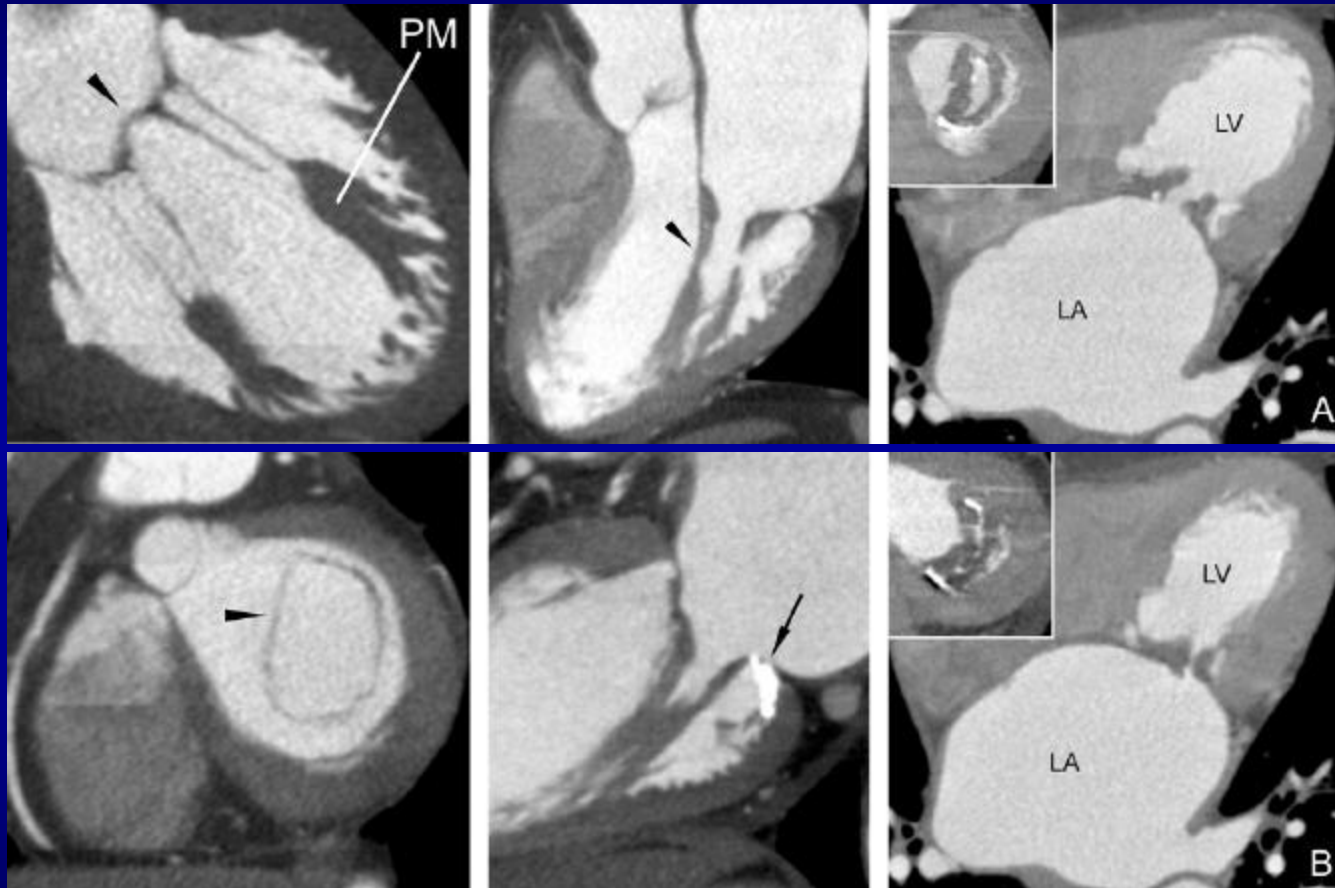


Bicusp.

Coart. AO
+ Ao
Bicuspide



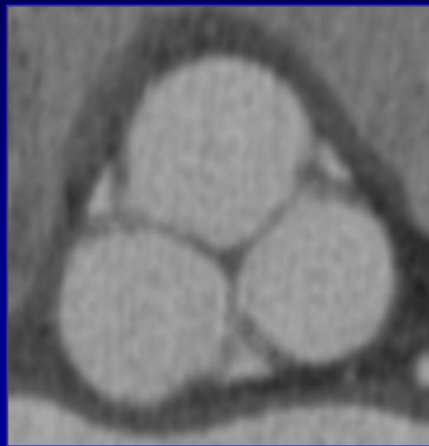
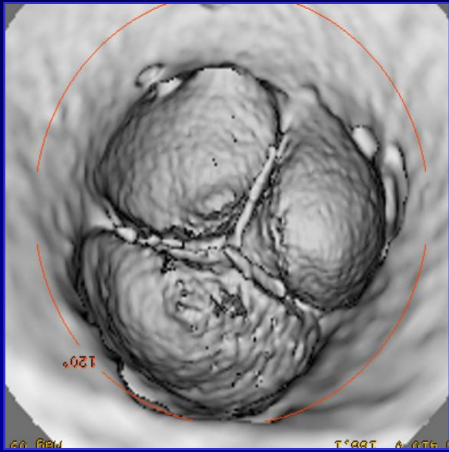
CT (64 strati): VALVOLA MITRALE



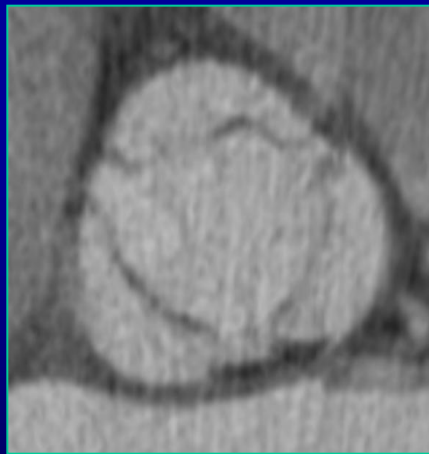
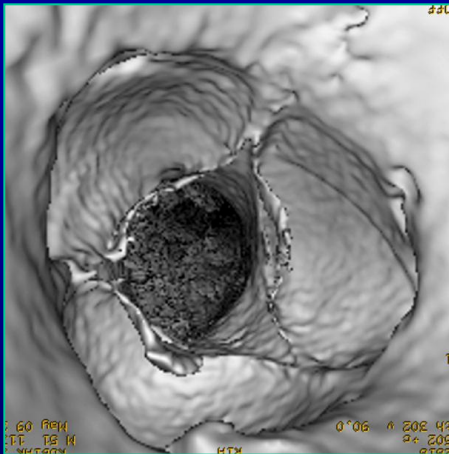
Normale

Reumatica

Studio valvole mitrale e aortica

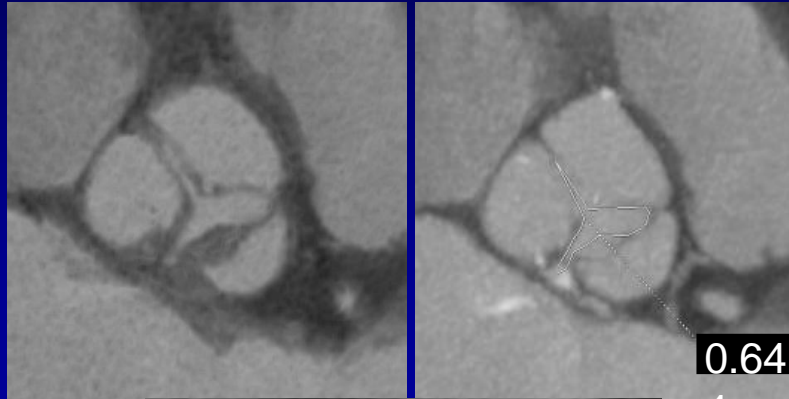


Diastole
80% R-R



Sistole
20% R-R

Valutazione funzionale lambi valvolari



4



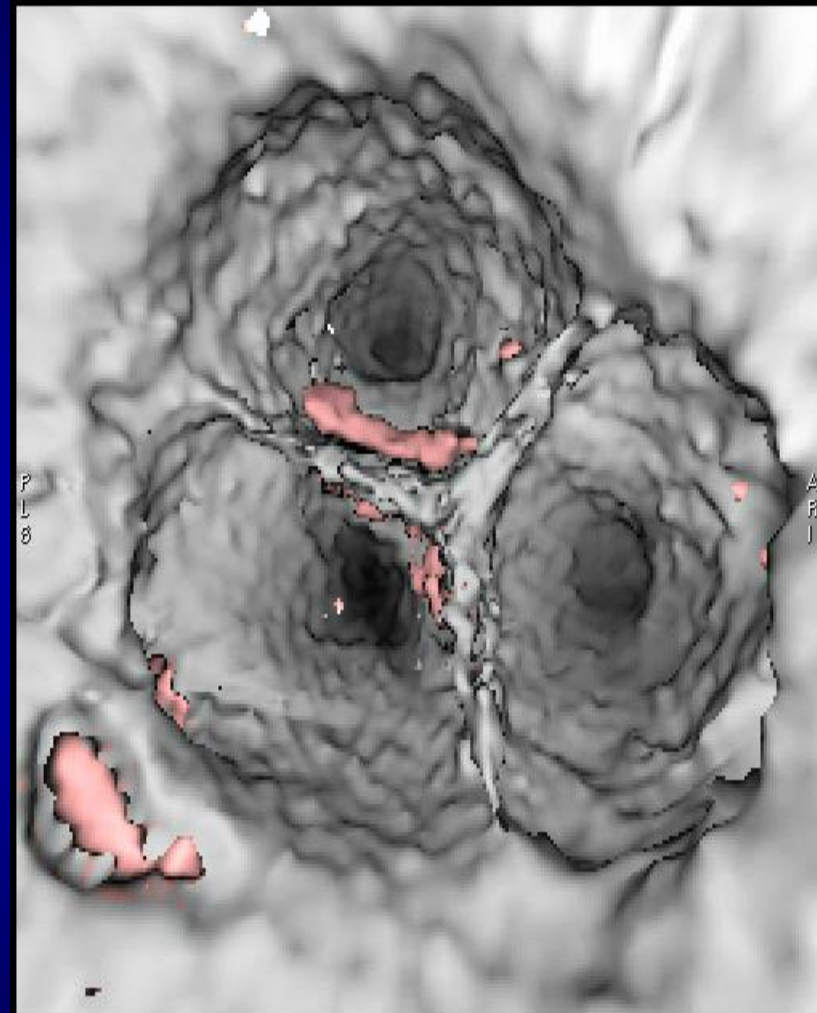
Misurazioni apertura lembi valvolari

Navg phase 0%
Ex: 12036
Se: 522 +c
Smooth 332 0 602 103.9

RP

Centre Cardiologique du Nord

F 81 31212
Apr 28 2004



Cut Off

LSA

Mechanism of Aortic Regurgitation

Functional Anatomy of Aortic Regurgitation Accuracy, Prediction of Surgical Repairability, and Outcome Implications of Transesophageal Echocardiography.

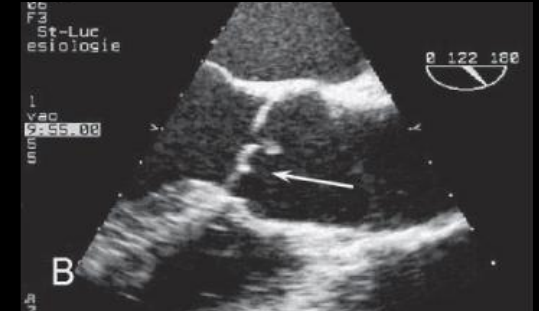
Circulation. 2007, le Polain de Waroux JB

TABLE 1. Surgical and TEE Classification of Aortic Regurgitant Lesions

Type 1	Enlargement of the aortic root with normal cusps.
Type 2	Cusp prolapse or fenestration.
Type 3	Poor cusp tissue quality or quantity.

TABLE 2. Grading of Aortic Valve Calcification

Grade 1	No calcification
Grade 2	Isolated small calcification spots
Grade 3	Bigger calcification spots interfering with cusp motion
Grade 4	Extensive calcifications of all cusps with restricted cusp motion



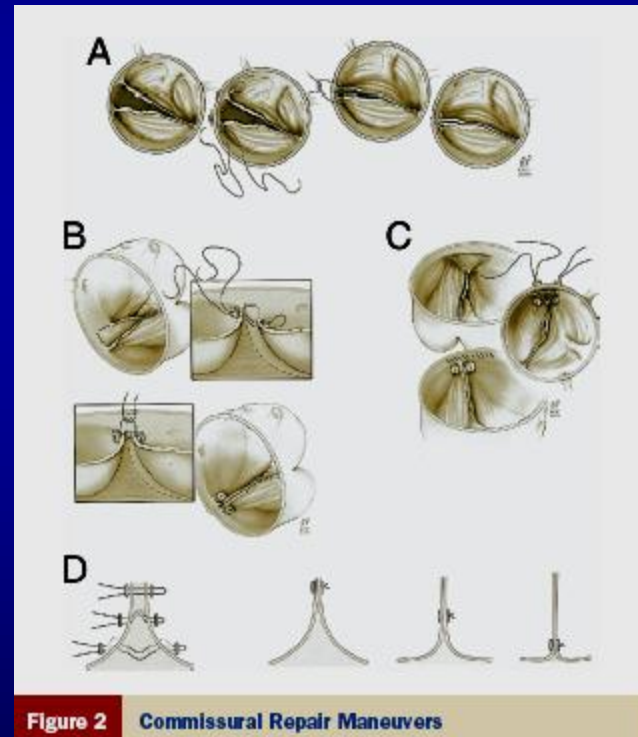
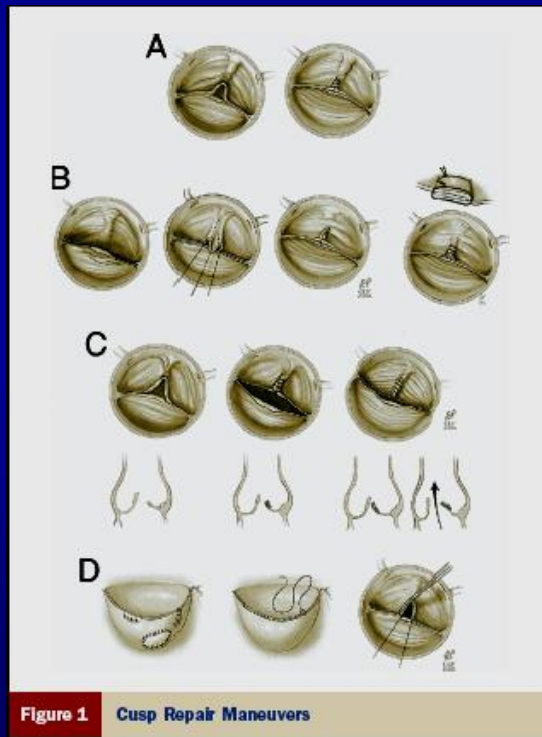
Toward Predictable Repair of Regurgitant Aortic Valves

A Systematic Morphology-Directed Approach to Bicommisural Repair

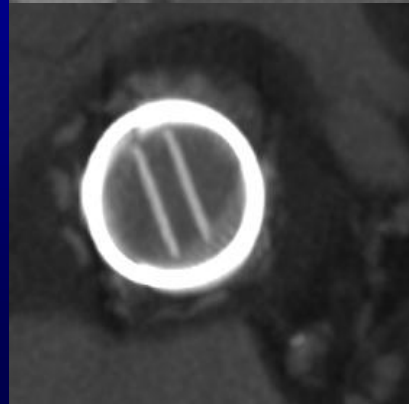
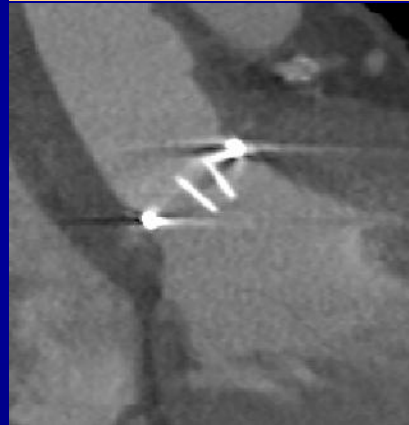
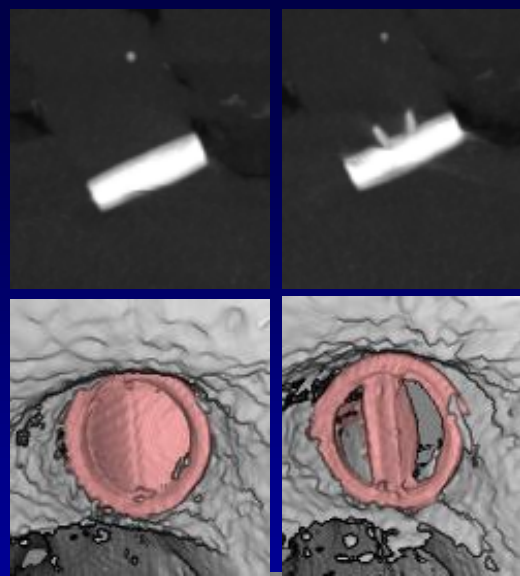
Gösta B. Pettersson, MD, PhD,* Adrian C. Crucean, MD,* Robert Savage, MD, FACC,†
Carmel M. Halley, MD,‡ Richard A. Grimm, DO, FACC,‡ Lars G. Svensson, MD, PhD, FACC,*
Sepehre Naficy, MD,* A. Marc Gillinov, MD, FACC,* Jingyuan Feng, MS,§
Eugene H. Blackstone, MD, FACC*§

Cleveland, Ohio

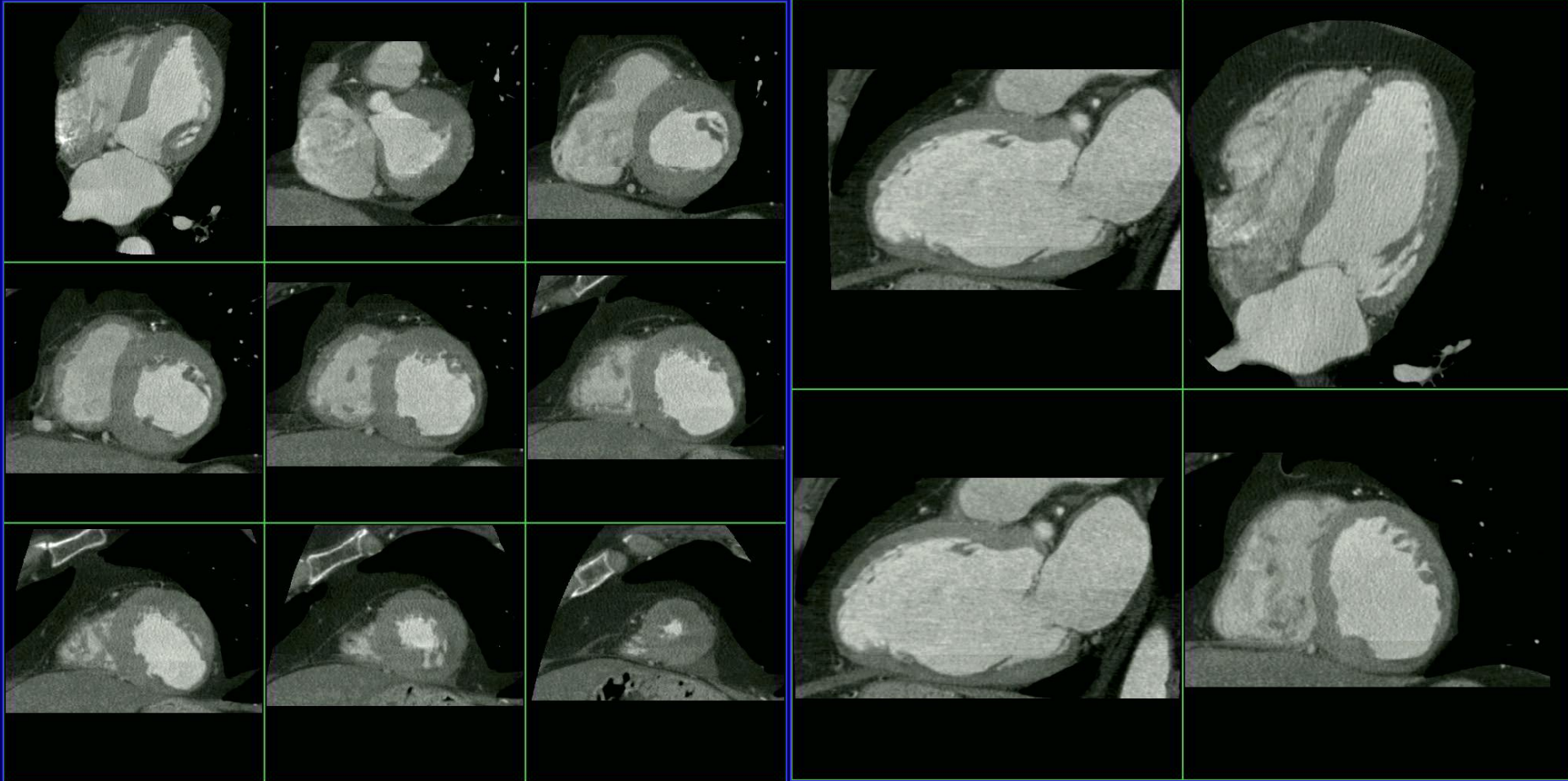
JACC Vol 52: 40; 2008



Controllo protesi valvolare post-chirurgica



Studi funzionali



Acinesia laterale

CONCLUSIONI

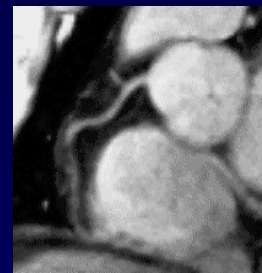
- LA RMN OGGI E' CONFRONTABILE CON L'ECO NELLE CARDIOPATIE VALVOLARI, E PUO' ESSERE UTILE IN CASO DI DUBBI DIAGNOSTICI E/O PER FORNIRE INFORMAZIONI INCREMENTALI COME LA VITALITA' O LA PRECISA DEFINIZIONE DELLA FUNZIONE VENTRICOLARE SX.
- LA TC (MULTISLICE) PUO' CONFERMARE/CHIARIRE L'AREA E L'ANATOMIA VALVOLARE IN CASO DI DUBBI DIAGNOSTICI, CHIRURGIA CONSERVATIVA E/O IN CASO DI ANGIOGRAFIA CORONARICA PREINTERVENTO.

GRAZIE PER L'ATTENZIONE

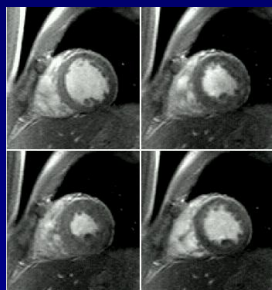
RMN CUORE



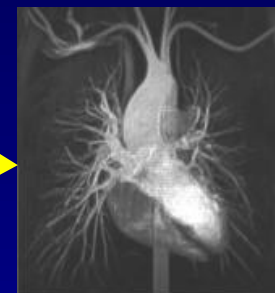
anatomia



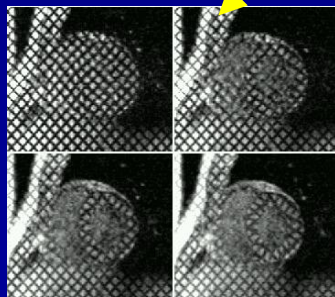
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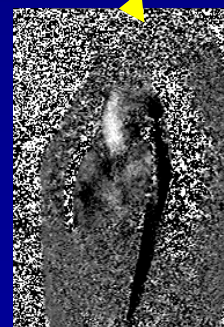
funzione



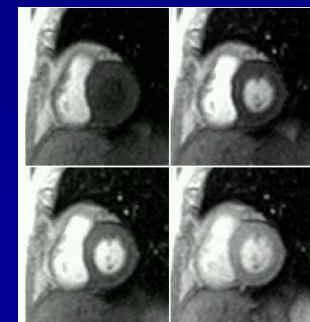
Angio-RMN



Cinetica regionale



flusso



perfusione

EBSTEIN

