Ungated Left Ventricular Volume is a Reliable Predictor of Left Ventricular Ejection Fraction. A Prospectively Validated Study in 731 Consecutive Patients

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Background 1

- Left ventricular ejection fraction (LVEF) as strong predictor survival
- VOL = also predictor of survival
- Myocadial PErfusion / Extent of CAD also predictor of outcome
- LVEF < 40% important cut-off for arrhythmic events (e.g. indication for ICD)

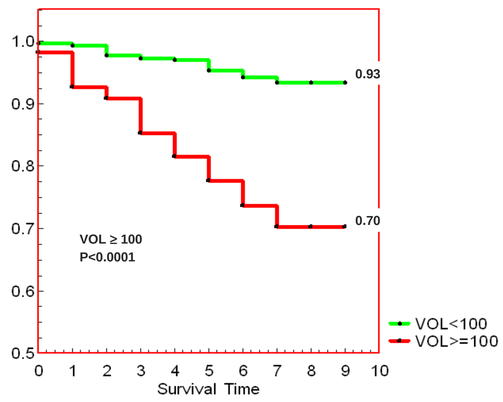
MPS may provide perfusion, does VOL allow to identify high risk patients with LVEF<40%?

Background 2: MACE free survival VOL<100 vs VOL>100 determined by MPS

Olten MPS MACE study

N=519
FU=6.1±1.5 years

MACE = fatal or nonfatal myocardial infarction



ESC oral, presentation, 3768, 2005

Aim

To determine

- Relation between VOL by MPS and LVEF
- VOL cut off to predict LVEF < 40%

To validate this relation and cut-off in a validation population

Methods

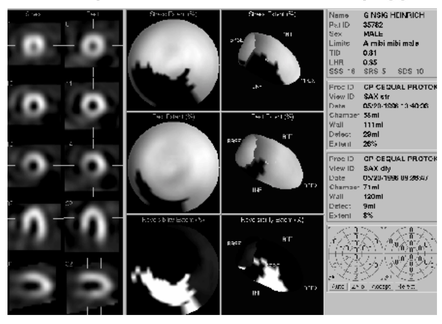
- 466 patients – study group
- 265 patients – validation group
- Determination of relation VOL-LVEF based on study population
- Validation of correlation in validation population

Study Protocol for MPS

Morning: rest SPECT (untriggered), 8 mCi

Afternoon: Exercise test
Peak exercise tracer injection, 22 mCi
> 4 min post exercise: LHR (anterior planar image)
> 15 min post exercise: stressSPECT (triggered)

injection to injection time: minimum 4 hours apart

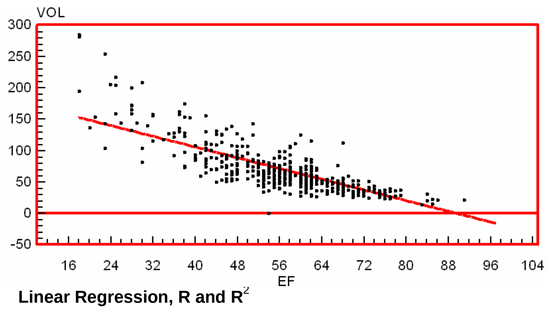


Results 1

	Study Group	Validation Group	p =
N=	466	265	
AGE (mean ± SD)	63 ± 10	63 ± 10	NS
MALE (%)	64	62	NS
CAD (%)	52	54	NS
LVEF (mean ± SD)	61.4 ± 12.6	60.7 ± 12	NS
VOL (mean ± SD)	61 ± 10	61 ± 7	NS
VOL > 100 (%)	10.3	9.8	NS
LVEF < 40% (%)	5.8	6.4	NS
SENSITIVITY (%)	82	88	NS
SPECIFICITY (%)	94	89	NS
VOL (ROC)	0.97	0.96	NS

CAD=coronary artery disease, VOL=untriggered left ventricular volume after exercise, LVEF=left ventricular ejection, fraction (gated SPECT) after exercise, sensitivity and specificity of VOL>100 ml to detect LVEF<40%, ROC=receiver operating curve for VOL to detect LVEF<40% determined by gated SPECT as the golden standard for this study

Results 2: Relation between VOL and LVEF (linear regression in study group, N=466)



Linear Regression, R and R^2

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.769(a)	.591	.590	8.059

a Predictors: (Constant), VOL

Results 3: Determination / Validation of VOL-LVEF relation

LVEF poststress = -0.296 x VOL+ 79.34

Study Group (N=466)

	N	Minimum	Maximum	Mean	Std. Deviation
EF Stress	466	18	97	61.25	12.588
LVEFscalc	466	-4.78	76.86	61.2278	9.68760
DeltaLVEFcalc	466	-36.17	25.51	-.0211	8.05070
Valid N (listwise)	466				

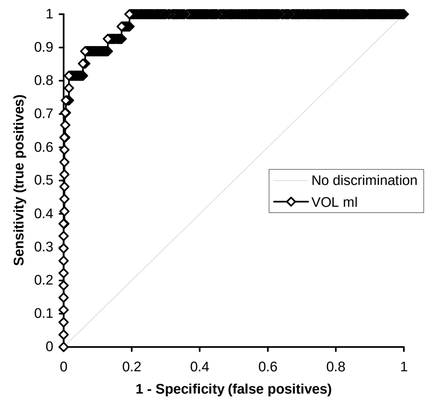
Validation Group (N=265)

	N	Minimum	Maximum	Mean	Std. Deviation
EF	265	18	91	60.43	13.001
calcLVEF	265	-3.84	75.49	61.5599	10.81697
DeltaLVEF	265	-25.85	21.84	-1.1033	6.94199
Valid N (listwise)	265				

Results 4: Ability of VOL to detect LVEF<40% by ROC analysis (c statistics)

Study Group analysis

Area 0.97, p<0.0001
95%CI: 0.96-0.98



Conclusions

This study demonstrated

- A relatively strong relation between VOL by MPS and LVEF
- This relation prooved valid in an independent 2nd population
- VOL by MPS prooved to have a high accuracy to detect LVEF < 40%, i.e. patients at high risk for an adverse outcome

Implications

MPS, in addition to diagnose myocardial perfusion abnormalities, is able to identify high risk patients based on VOL determination